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The Onchain Gambler: Price Sensitivity and Jackpot Seeking in Blockchain Lotteries

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Funding Statement

No funding was received for this research.

Declaration of competing interest

The authors declare the following financial interests: In the three-year period from 2022 to 2025, KS received research funding from the Cambridge Health Alliance, Division on Addiction; travel support from the German Foundation on Gambling Research, consulting payments from APCO, Eilers & Krejcik Gaming, Scientific Affairs, Victor-Strategies, MGM Resorts, and the General Commercial Gaming Regulatory Authority; and he received expert witness payments from Benjamin Leigh Carter.

Biography

Dr. Kahlil Simeon-Rose is an Associate Professor in the School of Hospitality Business Management. His research focuses on public policy and consumer behavior in gambling industries, including casinos, sports, online, and crypto.

27 Abstract

28 Blockchain technology facilitates novel forms of online interaction and commerce,
29 including unregulated gambling markets. Understanding user behavior within these
30 environments is crucial, yet empirical research is limited. This study investigates consumer
31 behavior in a large-scale, blockchain-based lottery, examining whether established psychological
32 drivers of lottery participation persist in this technologically distinct context. Leveraging
33 granular, publicly available wallet-level transaction data over 18 months, we analyze the
34 influence of jackpot size, participation cost, and recent jackpot winners on ticket purchasing. A
35 novel instrumental variable approach is used to address potential endogeneity, and is
36 complemented by qualitative analysis of user discussions. Results across models indicate that
37 behavior mirrors traditional lottery findings and hypothesized relationships: participation
38 increases significantly with prize pools and decreases with higher costs of entry (including
39 nominal ticket price and blockchain transaction fees). These findings suggest that core
40 psychological mechanisms driving gambling behavior, such as attraction to large payoffs and
41 multiple motivations, may be transferable to blockchain environments. The study highlights the
42 utility of blockchain data for granular behavioral analysis and underscores the need to consider
43 human behavior and potential risks when designing and regulating computer-mediated gambling
44 applications in decentralized platforms.

45 *Keywords:* blockchain; lottery; cryptocurrency; gambling; metaverse

46 The Onchain Gambler: Price Sensitivity and Jackpot Seeking in Blockchain Lotteries
47 Blockchain technology facilitates novel forms of online interaction and commerce,
48 leveraging unique attributes like security, transparency, decentralization, and trustless
49 transactions to potentially transform various sectors (Al-Megren et al., 2018; Ante, 2025; Casino
50 et al., 2019; Kimani et al., 2020). Its impact on financial services and consumer products,
51 including unregulated markets like online gambling, creates unique challenges and opportunities
52 for studying human behavior in digital environments.

53 Despite blockchain's growing prominence, empirical research into its impact on
54 individual consumer behavior remains scarce. Much of the existing literature focuses on
55 institutional applications or the technology's macro-level potential, leaving a significant gap in
56 understanding how users interact with and make decisions within blockchain-enabled ecosystems
57 at a microeconomic level. This lack of empirical investigation, particularly concerning consumer
58 behavioral aspects, limits insights into the adoption, use, and potential consequences of these
59 emerging digital platforms. For researchers, exploring blockchain's role in product design is
60 important, as the technology disrupts traditional consumer relationships and redefines
61 transactional processes, presenting potentially meaningful differences to existing paradigms.

62 A challenge to this research has been the lack of consumer adoption of onchain services,
63 driven in-part by regulatory constraints. However, one industry that accrued meaningful
64 consumer interest is online gambling. For example, a single gambling site that used
65 cryptocurrencies for payment processing is reported to have produced revenue of \$2.6 billion in
66 2022, higher than many regulated alternatives (Barnes & Chipolina, 2023). At one point in 2022,
67 that lone operator reported that it was responsible for “5.9% of all Bitcoin transactions; 12.3% of

68 all Dogecoin transactions; [and] 15.1% of all Litecoin transactions” (Eddie, 2022). Aside from
69 decentralized finance, gambling may be the industry most benefiting from onchain technology.

70 Blockchains present several characteristics that make them desirable to gambling service
71 businesses (Casino et al., 2019). First, transparency and fairness are highly valued in gambling
72 (Gainsbury et al., 2013), and smart contracts offer a provable, immutable record of each
73 transaction, which can help eliminate disputes and provide a clear audit trail in the absence of
74 regulatory oversight (Breidenbach et al., 2021). Second, the decentralized nature of blockchain
75 eliminates the need for intermediary financial service providers and makes the services difficult
76 to restrict by law enforcement. This makes the marketplace borderless and less impacted by
77 jurisdictional constraints, sales taxes, and other market actors found in regulated markets. Third,
78 the use of cryptocurrencies that are enabled by blockchains creates a global market, as they are
79 not bound by the same restrictions and regulations as traditional fiat currencies. Last, there
80 appears to be meaningful overlap between blockchain users and traditional gambling consumers
81 (Mills & Nower, 2019; Philander, 2023; Steinmetz, 2023), creating a potentially large audience
82 for gambling products onchain.

83 Understanding whether onchain gambling products exhibit similar traits to regulated
84 markets is important to identifying potential risks or protections needed for consumers in these
85 largely unregulated spaces. It is also advantageous to researchers, as transactional data is publicly
86 available from blockchain ledgers (Scholten et al., 2020). In this research, we studied the largest
87 crypto-lottery game on a public blockchain, PancakeSwap Lottery V2, to understand whether it
88 shared the market wide characteristics commonly observed in regulated lottery literature. We
89 estimated the effects of jackpot prize pools on demand, and consumer responses to large jackpot
90 wins. In addition, we exploited variation in cryptocurrency prices and transaction costs to test

91 consumer responses to changes in the nominal price of lottery tickets, which has not been
92 possible in traditional lotteries. To do so, we used transactional data collected through onchain
93 activity.

94 Our contribution is both empirical and methodological. By leveraging the inherent
95 transparency of blockchain, we analyze lottery participation at an unprecedented level of
96 granularity, the individual wallet, providing evidence beyond traditional studies that necessarily
97 were reliant on data aggregated at the store or jurisdictional level. To our knowledge, this
98 represents the first empirical investigation of a conventional game of chance operating entirely
99 within a blockchain. Our approach of linking draw-level characteristics to wallet-level
100 transaction data provides a novel methodology applicable to broader behavioral research in
101 onchain markets and environments. Ultimately, enhancing the understanding of user dynamics
102 within blockchain-based gambling can guide the development of fairer and potentially less
103 harmful digital entertainment models and inform policymakers navigating the regulatory
104 challenges posed by these decentralized platforms.

105 **Related Literature**

106 Evidence of lottery play appears in literature as early as the Old Testament, Greek
107 Mythology, and the Han Dynasty (Kynnersley, 1885; Willmann, 1999) with more modern lottery
108 designs occurring during the Roman empire (Willmann, 1999) and in Europe during the 16th
109 century (Ashton, 1893; Willmann, 1999). After an extensive period of lotto draw game expansion
110 in the second half of the 20th century (Coughlin et al., 2006; Perez & Humphreys, 2013;
111 Willmann, 1999), lotteries are now ubiquitous. Altogether, the World Lottery Association reports
112 that it has 156 lottery members and \$284 billion in annual revenue among members globally
113 (World Lottery Association, 2022).

114 Academic models of lottery consumer behavior generally attribute consumer interest to
115 one of three explanations: 1) An entertainment based model, where participating in the lottery is
116 viewed as a form of leisure activity that brings excitement and fun (Burger et al., 2016; Kearney,
117 2005; Kocher et al., 2014; Perez & Humphreys, 2013); 2) A cognitive bias model, where
118 participation is rooted in distorted cognitions and misconceptions about probabilities of winning
119 prizes (Griffiths & Wood, 2001; Hansen et al., 2000; Kahneman, 2003; Langer, 1975; Miyazaki
120 et al., 2001); and 3) A Friedman-Savage utility model (Friedman & Savage, 1952), which
121 proposes that utility derived from an increase in wealth that is both convex and concave at
122 different levels, which explains why individuals are willing to pay small amounts of money for
123 the opportunity to win large prizes that are ‘life changing’ (Ariyabuddhiphongs, 2011; Forrest et
124 al., 2002; Kearney, 2005; Perez & Humphreys, 2013). Each of these models has empirical
125 support, but it seems likely that they must be considered collectively to fully explain consumer
126 behavior (Perez & Humphreys, 2013).

127 Many studies of lotteries attempt to measure demand elasticity, generally finding that
128 demand is inelastic unless high take out rates near 50% are reached (Forrest et al., 2000; Gallet,
129 2015; Grote & Matheson, 2013). In this context, elasticity refers to the expected value of a ticket,
130 defined as the difference between the nominal ticket price and the expected return of the ticket in
131 the draw (Combs et al., 2014; Grote & Matheson, 2013; Kearney, 2005; Perez & Forrest, 2011;
132 Rodgers, 2020). This is referred to as the effective price model and is largely possible to estimate
133 due to variation in expected value that is produced by rollover prizes that accrue to future draws
134 when no jackpot winner occurs (Farrell et al., 2000; Perez & Humphreys, 2013). Baker et al.
135 (2020) viewed this estimation approach as insufficient and argued that since expected value is
136 typically less than the ticket price, the decision to buy must also driven by other properties that

137 standard estimation strategies cannot estimate due to endogeneity problems from a lack of
138 additional instruments. Endogeneity arises because lottery sales are influenced by the
139 characteristics of the prize distribution, which are simultaneously affected by the level of sales.
140 This seems plausible, as consumers must approximate expected value and will do so with a
141 margin of error that may be skewed. For instance, regarding a lottery with a takeout rate of 52%,
142 Kearney (2005) found that only 22 percent of National Opinion Research Council survey
143 respondents estimated the takeout rate to be 'about half', while 70 percent guessed it to be a
144 'quarter or less' and 8 percent guessed 'three-quarters or more'. Baker et al. (2020) correct for
145 endogeneity in their Spanish lottery data by using a 'self-consistent regression' solution, which
146 exploits the unique lottery property that the impact of the sales on the prize distribution is
147 deterministic and known.

148 Skewness is more generally described as one of the most consistent results in the
149 empirical literature, a preference of lottery players for large jackpots (Grote & Matheson, 2013;
150 Perez & Humphreys, 2013). Forrest et al. (2002) most clearly articulate the case for jackpot size
151 importance, noting in a study of the UK National Lottery that the largest possible prize effect
152 tends to dominate expected value in terms of importance to demand. This model helps to explain
153 earlier results from Cook and Clotfelter (1993), Forrest, Gulley, and Simmons (2000), and others
154 (Perez & Humphreys, 2013) who provided evidence that consumers were more likely to
155 participate in lotteries with larger jackpots, even when the odds of winning were lower.
156 Lockwood et al. (2021) extend these findings and show that demand responds more to a change
157 in the maximum jackpot expected value than it does to a similar change in second prize expected
158 value, implying a preference for skewness and big wins. This motivates our first hypothesis.

159 H1: Lottery ticket sales are positively related to the jackpot size.

160 While much research focuses on the effective price of a lottery ticket, defined by its
161 expected value, the nominal ticket price itself is notably absent as a direct variable of study in the
162 provided text. This is interesting because the nominal price is the most salient cost to the
163 consumer at the point of purchase, representing a fixed outlay regardless of the complex
164 probabilities and potential returns. However, the challenge in measuring the price elasticity of
165 lottery games is that there is typically little variation in the ticket price to exploit, and when
166 variation does occur, there are often confounding changes in other product characteristics
167 (Combs et al., 2014; Perez & Humphreys, 2013). We exploit novel variation in our data and test
168 the nominal price of lottery tickets in our second hypothesis.

169 H2: Lottery ticket sales are negatively related to the ticket cost.

170 One phenomenon that tends to replicate across games of chance is the representativeness
171 heuristic, where gamblers interpret short-term outcomes as representative of the long-run odds of
172 winning (Goodie et al., 2019; Kahneman & Tversky, 1972; Philander et al., 2019). In lotteries,
173 several studies identify the existence of a ‘halo effect’ that occurs after a jackpot is awarded as
174 evidence of representativeness. The ‘halo effect’ describes a short-term persistence in increased
175 sales despite prize pools returning to normal (Farrell et al., 2000; Forrest & Pérez, 2015).
176 Matheson & Grote (2005) attribute this phenomenon to the publicity following the award of a
177 prize, though Guryan & Kearney (2008) expand on these results and show that part of the higher
178 demand may be attributed to a false belief that the winning store is lucky. They find that same
179 game sales at the winning store increase 37.7 percent in the week following the winner. In
180 framing our final hypothesis, we examine crypto lotteries for evidence of a halo effect.

181 H3: Lottery ticket sales are positively related to a jackpot winner in the prior draw.

182 **Methods**

183 **Study Setting**

184 PancakeSwap Lottery V2 is examined in this study. The crypto-lottery was created by a
185 pseudonymous group of one or more developers (*PancakeSwap Intro*, 2020/2022). The wider
186 PancakeSwap platform contains several other Web3 products, including the most visited
187 decentralized exchange on any smart contract blockchain (CoinGecko, 2023). The site appears to
188 have begun as a fork of the Uniswap decentralized exchange and has since evolved into different
189 product categories (Zinsmeister et al., 2019/2019). The PancakeSwap platform issues a
190 ‘governance’ cryptocurrency token named CAKE that is described as a multi-purpose token that
191 can be used to vote on changes to the PancakeSwap ecosystem protocols, participate in new
192 token launches and NFT minting, earn other tokens, or play in the lottery (PancakeSwap, 2022b).
193 To make changes to the smart contract code, a majority of CAKE holders must vote onchain in
194 support of the change. CAKE is a fungible token that follows a BEP-20 standard that is based on
195 the ERC-20 standard (Liu et al., 2019/2022; Vogelsteller & Buterin, 2015) and actively trades on
196 both centralized and decentralized exchanges. Accordingly, it is a straightforward process to
197 convert CAKE into other cryptocurrencies or US dollar stablecoins.

198 Compared to typical lotto games, the PancakeSwap lottery has a fairly simple design.
199 Prior to a draw, users can manually or randomly select a six-digit ticket numbers. To determine
200 winners, six integers from the set $\{0:9\}$ are randomly drawn in sequence with replacement and
201 prizes are allocated based on the number of consecutive matching numbers. For example, to win
202 the two-matching numbers prize, a ticket must match both the first number and the second
203 number in order. Accordingly, the probability of winning the Match ‘x’ prize is given by the
204 formula, $\rho_x = 0.1^x$. The lottery uses the Chainlink Verifiable Random Function system to draw

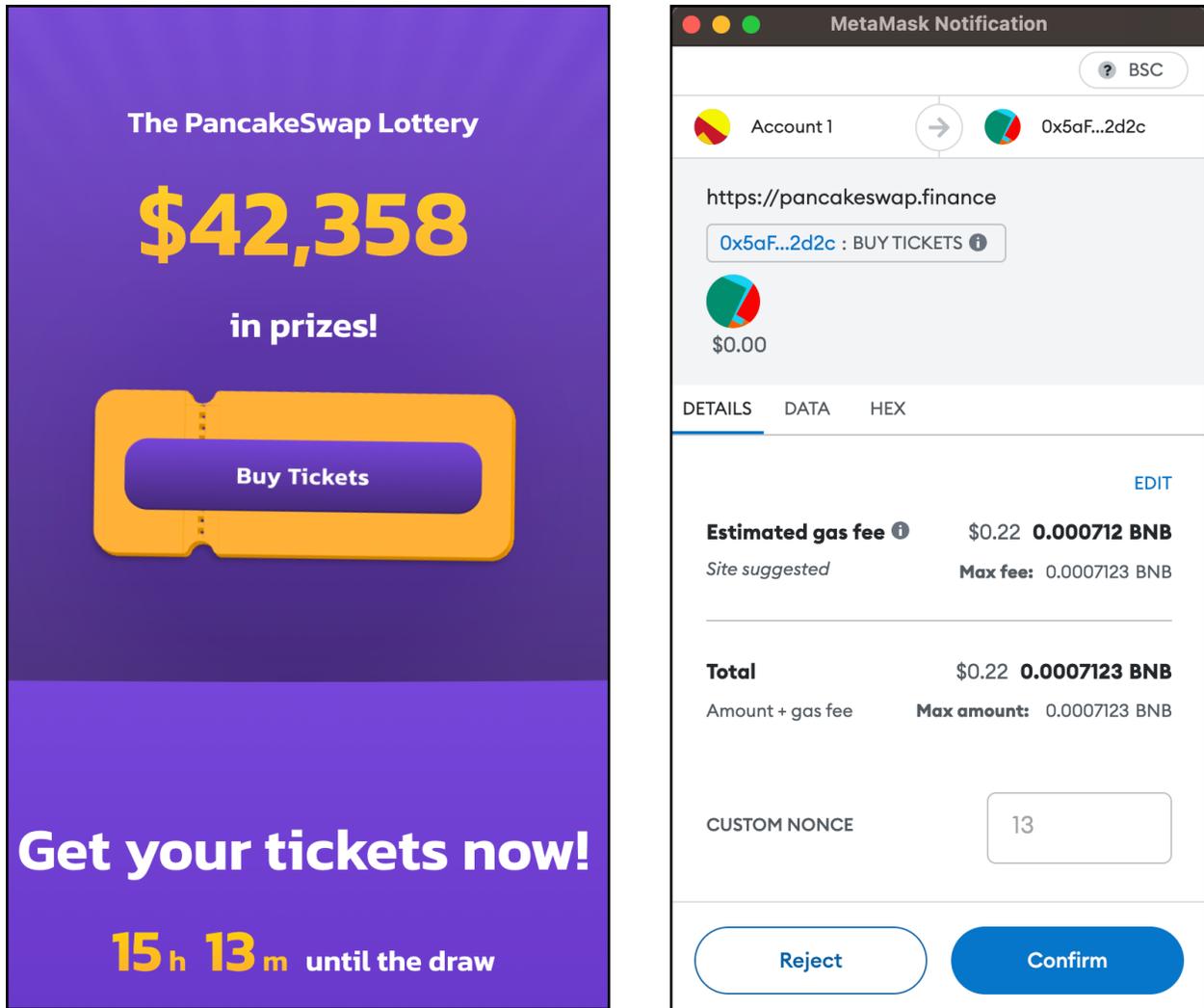
205 the numbers. This mechanism provides random number generation that can be verified by
206 interested parties onchain (Breidenbach et al., 2021). The lottery code is open source and is
207 described as audited for errors by two Web3 security firms (PancakeSwap, 2022c).

208 Unlike many draw lotto games, there is no cap to the jackpot prize and it increases
209 linearly with sales. The lottery prize pool follows the following allocation schedule: 1-match, 2%
210 of pool; 2-match, 3% of pool; 3-match, 6% of pool; 4-match, 10% of pool; 5-match, 20% of
211 pool; 6-match, 40% of pool. The remaining 20% of funds is sent to a ‘burn’ pool that
212 permanently removes the CAKE from circulation. The burn feature is portrayed as a mechanism
213 for value capture by the overall ecosystem (PancakeSwap, 2022a). The burn feature acts like a
214 take-out rate in typical lottery game.

215 Tickets for the lottery cost roughly five US dollars each but are priced in CAKE. Since
216 the price of CAKE is volatile, the price is set at the beginning of the ticket sale period and will
217 vary with the USD-CAKE exchange rate until the draw. This provides variation in the nominal
218 price. Players can also receive a discount on the ticket price if they purchase more than one ticket
219 per draw. The discount escalates by a linear path from zero to 4.95% if 100 tickets are purchased:

$$220 \quad \text{Discount} = \frac{n_{\text{Tickets}} \cdot 0.0495}{100}$$

221 Where n_{Tickets} equals the number of tickets purchased by a given Binance Smart Chain wallet
222 for a given draw. Although transactions occur in CAKE, the lottery prizes on the main landing
223 page are shown in US dollars (see Figure 1, left). Participants must also pay a variable
224 blockchain use fee known as ‘gas’ that is used by the Binance Smart Chain to prioritize
225 transactions when space on the blockchain is scarce. When confirming the transaction, wallets
226 will typically display the estimated gas fee in US dollars, but the fee is paid in Binance Coin
227 (BNB, see Figure 1, right).



228

229 *Figure 1 - Landing page for PancakeSwap Lottery (left); Metamask wallet notification for ticket*
 230 *purchase (right).*

231 If multiple winning tickets are sold in any of the match categories, the CAKE for that
 232 matching sequence is shared equally among the tickets. If no winning tickets are sold, the CAKE
 233 will rollover into the next draw. The mean rollover is 64.97% ($SD = 7.21\%$) of the prize pool. In
 234 addition, 5,000 or 10,000 CAKE is typically added as a bonus to every second drawing, but this
 235 amount is not consistent.¹ The lottery typically has a positive expected value, although the lottery

¹ Governance tokens are often used as an incentive to bootstrap participation in decentralized applications (Fan et al., 2023).

236 cannot be exploited in practice as the required 20% burn of ticket sales would lead to a negative
237 expected value if a player purchased every ticket combination.

238 Due to the structure of the lottery, the expected value of a ticket in US dollars can be
239 described as a function of the prize pool, the number of tickets sold, and the cost of the ticket.

$$240 \quad ev = \sum_{x=1}^6 \frac{\rho_x \cdot Z^x}{1 + N \cdot \rho_x} - Ticket\ Cost$$

241 Where x is the number of matched numbers, ρ_x is the probability of matching x numbers, Z^x is
242 the prize allocation for matching x numbers, N is the number of other tickets sold, and Ticket
243 Cost is the price of a ticket in CAKE adjusted USD and the gas transaction costs in BNB
244 adjusted USD.

245 A V1 version of the PancakeSwap Lottery pre-dated V2 but used a different mechanism
246 to facilitate the lottery system that relied on non-fungible tokens (NFTs) as the primary
247 mechanism to represent lottery tickets and determine the winners. The NFT-based lottery system
248 added an interesting collectible aspect to the game, but had higher transaction fees and
249 complexity in managing NFTs for participants (PancakeSwap, 2021). PancakeSwap decided to
250 transition to the V2 product reduce transaction costs and improve the user experience. On April
251 28, 2021, the final CAKE incentive into V1 of the lottery occurred and the lottery was paused
252 until V2 launched on July 6, 2021. During those 69 days, 350,000 CAKE in bonus rewards
253 accrued from missed lottery injections, which were allocated to the first week of V2 lottery
254 draws.

255 At the beginning of the V2 series, lottery draws occurred roughly every 12-hours but later
256 the frequency was changed to alternate between 12-hour and 36-hour gaps, i.e. twice daily, every
257 other day (PancakeSwap, 2023). Some draws during the period did not occur at exactly the

258 scheduled time due to execution errors by the ‘deployer’ smart contract that engages the lottery
259 smart contract or due to downtime in the Binance Smart Chain.

260 **Content Analysis Study**

261 **Methods**

262 The objective of this study was to qualitatively explore consumer interests in various
263 aspects of the PancakeSwap Lottery, using the platform’s primary Telegram channel, in support
264 of the quantitative analysis. The focus was to examine lottery-related messages and explore
265 themes related to instances of consumer interest in jackpot size, expected value, price, and recent
266 jackpot winners, to understand their potential relevance to the quantitative empirical study. Given
267 the exploratory nature of this research, we targeted an active subset of users on Telegram,
268 recognizing that their perspectives may not fully represent all lottery participants.

269 **Data**

270 The data source for this research was the English language PancakeSwap channel on
271 Telegram. Telegram is a popular communication platform for blockchain users and PancakeSwap
272 uses it as its platform for interacting with consumers. PancakeSwap asserts that there is no
273 customer support for users but also direct individuals with issues to their Telegram channel
274 where there are over 69,000 members and support is often provided by pseudonymous
275 administrative accounts to pseudonymous users (PancakeSwap, 2022c). Chat logs from the main
276 channel were exported directly from the Telegram application. Data collection was confined to
277 the first three months of operation from July 5, 2021 to October 4, 2021. The chat logs were
278 imported into R for data cleaning and preliminary analysis using jsonlite (Ooms, 2014; R Core
279 Team, 2023). Since the Telegram channel is used for the entire PancakeSwap ecosystem that
280 includes non-lottery products, we filtered the results to include only messages containing a word

281 beginning with 'lott'. To ensure relevance, the filter was tested on a sample of unfiltered
282 messages, confirming minimal loss of lottery-related content. In total, 174,927 messages were
283 retrieved from Telegram, 1,397 remained after selecting lottery-related messages, and 1,250
284 remained after removing moderator comments or channel announcements.

285 **Coding and Analysis**

286 Following the initial processing, manual coding was performed for detailed content
287 analysis. Messages were categorized according to a pre-established coding scheme. Coding was
288 conducted by a single researcher with multiple passes to ensure consistency. The coding
289 categories were as follows:

290 **Interest in jackpot size;** messages explicitly mentioning or discussing the size of the
291 jackpot or total prize pool.

292 **Interest in expected value;** messages discussing the expected return or value from
293 participating in the lottery.

294 **Interest in price;** messages focusing on the nominal price of a lottery ticket.

295 **Interest in recent jackpot winners;** messages discussing or referring to recent jackpot
296 winners.

297 Each message could be coded into multiple categories. The coding process was iterative and
298 reflexive, allowing for the coding scheme's revision if relevant new themes emerged. Following
299 the completion of coding, coded data were analyzed to identify patterns and trends. Data were
300 evaluated qualitatively and quantitatively, with frequency counts of coded categories to
301 determine the most common areas of consumer interest.

302 Results

303 Our analysis of messages from the PancakeSwap Telegram channel revealed notable
304 patterns of consumer interest related to common lottery themes. Overall, the most common
305 theme was interest in the jackpot size, followed by recent jackpot winners and nominal price.
306 There was little interest in the expected value of the draws although many users were interested
307 in the odds of winning a prize.

308 Interest in Jackpot Size

309 Discussion regarding the size of the jackpot was the most common theme in the analyzed
310 messages, comprising a total of 27 of the coded comments. Users often expressed enthusiasm
311 about large prize pools: “New Lotto is looking good! Prize pot is currently over 23K Cake!”.
312 They also expressed disappointment in response to perceived smaller pools: "It seems, intrest
313 (sic) in lottery going down. It used to be 1m-2m before” and “I don't get the point of lottery, it's
314 too small pot”.

315 Interest in Recent Jackpot Winners

316 Discussion of recent jackpot winners constituted a total of 26 of the messages. Users
317 expressed curiosity, excitement, or skepticism about recent winners. Messages showed an
318 interest in knowing if anyone had won a large prize, “Has anyone won big on [PancakeSwap]
319 lottery?” and if anyone on the channel had won a prize, “Has anyone here actually won the cake
320 lottery and if so when and how many tickets did you buy?”. There was also a general interest in
321 being able to access and track results from past draws. A typical message was, “Is there any way
322 to filter down the addresses who have won the lottery under match 4, match 5?”

323 Interest in Price

324 Price-related discussions were found in 23 of the messages. These were mostly queries
325 about the change in price from V1 of the lottery. A typical message was, "How much cake is
326 required to participate in lottery?" and "Make a \$1 lottery draw! That's what you originally
327 promised!". However, there was some awareness of US dollar price in relation to CAKE price,
328 "I love how it's getting cheaper to enter to lottery as cake rises," and the costs associated with
329 paying gas fees, "How much BNB do I have to have to buy a lottery ticket to pay the fee?"

330 Interest in Expected Value

331 Only two messages were categorized as related to expected value and neither directly
332 discussed the concept as described in the lottery literature: "Where can I find the lottery
333 economics? How much is injected from emissions, what happens when there is no winner in a
334 category etc" and "Is there a good site which analyses the odds and the best strategy for the
335 pancake lottery?" However, after an initial review of the messages, an additional category of
336 interest in the odds of winning was added to the coding scheme due to its prominence in the
337 discussions. A total of 26 of the coded messages reflected an interest in the odds of winning the
338 lottery. Several users inquired about or debated the odds of winning the jackpot, suggesting that
339 many participants are not merely attracted to the potential payout but are also considering the
340 probability of winning when deciding whether to participate. Messages like "Has anyone
341 calculated the odds of getting all 6 numbers in order in the lotto, I was thinking it's just 1 in 10^6
342 but I feel like the order has a part to play" and "Anyone [know] the probabilities of winning in
343 cake lottery?" were common.

344 **Discussion**

345 Interest in jackpot size emerged as the most common theme, followed closely by
346 discussions around recent jackpot winners, and the price of participating. Contrary to what might
347 be predicted by the effective price model, there was minimal actively discussed interest in the
348 expected value of the draws. However, a significant number of users showed curiosity towards
349 the odds of winning a prize.

350 Users expressed their enthusiasm or disappointment regarding the jackpot size. They
351 were excited about large prize pools and showed disappointment in response to smaller pools.
352 This suggests that the size of the jackpot is a significant motivator for lottery participation.
353 Discussions around recent jackpot winners revolved around curiosity, excitement, and
354 skepticism. Users were interested in knowing about the experiences of big winners and whether
355 anyone in their community had won. The ability to track and access past draw results also
356 appeared to be an area of interest. The success of others may have an impact on users' decision to
357 participate in the lottery.

358 Price-related discussions were common, with many users showing awareness of the
359 changes in price from V1 of the lottery. Messages showed that users were not only mindful of the
360 nominal price of a lottery ticket but also of the cost associated with paying gas fees. This
361 awareness suggests that some users are considering the full cost of participation, not just the
362 ticket price.

363 **Empirical Study**

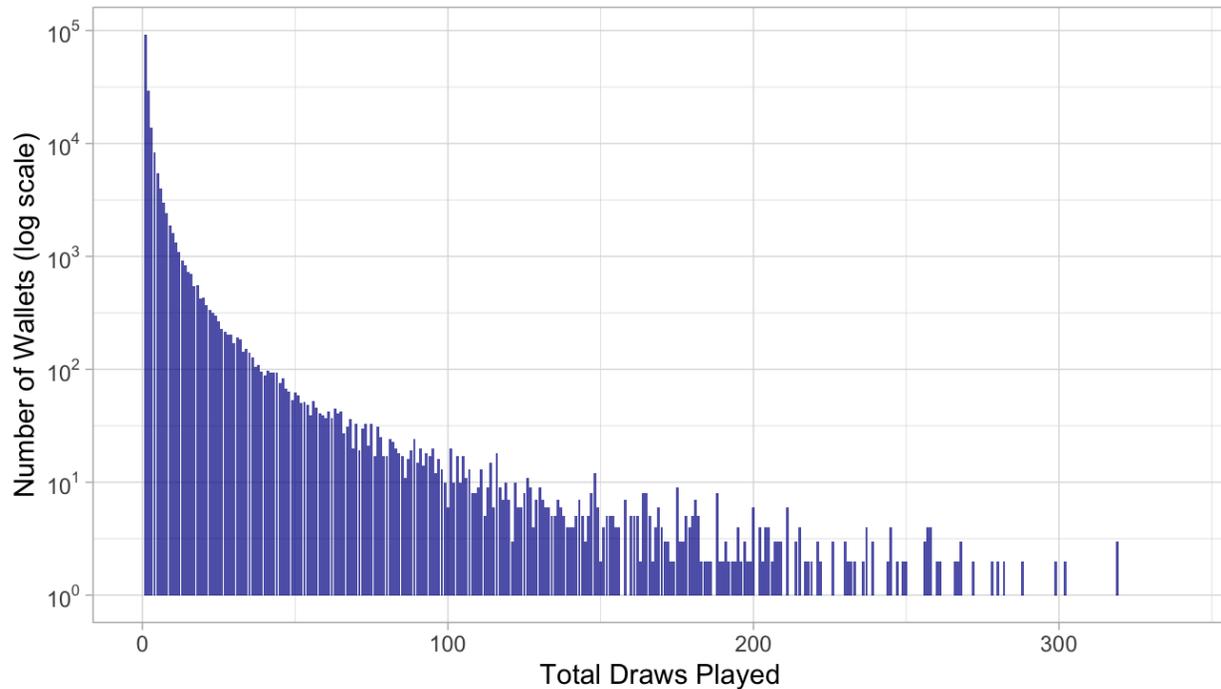
364 **Overview**

365 This empirical study leverages a unique feature of blockchain lottery data: the ability to
366 track transactions at the individual wallet level. A Binance Smart Chain wallet allows users to

367 manage their cryptocurrencies, interact with smart contracts, and connect with applications on
368 the Binance Smart Chain. Each wallet is associated with a unique public address, which serves as
369 an identifier on the blockchain. These addresses do not necessarily reflect unique individuals, as
370 a single user can create and manage more than one wallet. For example, some users may create
371 multiple wallets to enhance their privacy or security. However, barring a loss of private keys, a
372 person that controlled a given wallet at time t can be reliably viewed as the same subject at time t
373 $+ 1$, which makes the data amenable to panel methods. We therefore linked every ticket purchase
374 to its private wallet address.

375 **Data Period**

376 Data for the lottery draws was extracted using a public remote procedure call node
377 maintained by binance.org (Haarstad, 2021/2022) in Python 3.11. Since the first seven draws of
378 the lottery were non-public (PancakeSwap, 2021), we excluded those observations from
379 consideration and retrieved data on each lottery draw from July 6, 2021 to December 7, 2022.
380 The draw data includes the time of the draw, the draw round, the number of tickets sold, the total
381 prizes, the number of winning tickets, and the ticket price. In total, the initial data set includes
382 734 lottery draws. We collected wallet-level data using Dune Analytics (*Dune Docs*, 2021/2023),
383 which produced the number of tickets purchased by each wallet address for each draw. Out of
384 734 draws that occurred during the time period, there were 198,027 unique wallets. The median
385 wallet played only one draw, but as shown in Figure 2, there were many participants in multiple
386 draws.



387
388 *Figure 2 – Frequency of Lottery Participation by Wallet Address*

389 **Measures**

390 The measures used in our empirical modeling include the following variables:

391 **Tickets Sold.** The total number of tickets purchased. Quantities reported may refer to the total
392 number of tickets sold in a draw across all players or the number purchased by an individual
393 wallet address for a given draw. The wallet level quantity is the dependent variable in all models.

394 **Prize Pool.** The primary variable to measure jackpot size, prizes includes all entry fees, CAKE
395 that rolled over from prior draws, and all bonus CAKE added to the pool for that given draw in
396 US dollars. The ‘Match-6’ jackpot size is equal to 40% of the prize pool.

397 **CAKE Price.** The price of the CAKE token for a given draw (Ryan & Ulrich, 2022). Since
398 draws are scheduled at times that alternate between 00:00 UTC and 12:00 UTC, the CAKE price
399 used was the daily opening price for the 0:00 draw, and the average of the daily opening and
400 closing price for the 12:00 UTC draw.

401 **Ticket Price.** The price per ticket in US dollars for a given draw at the time of the drawing,
402 converted from the CAKE price (Ryan & Ulrich, 2022).

403 **Gas Costs.** The estimated fee in US dollars required to execute a lottery ticket purchase on the
404 Binance Smart Chain at the time of the draw. The fee is computed as the product of the average
405 daily gas price on the day of the draw (BscScan.com, 2023a) and the gas limit programmed to
406 execute the *buyTickets* function of the lottery contract (*PancakeSwapLottery*, 2020/2023).

407 **Total Cost.** The sum of the Ticket Price and Gas Costs, which reflects the entire amount paid to
408 participate in the lottery.

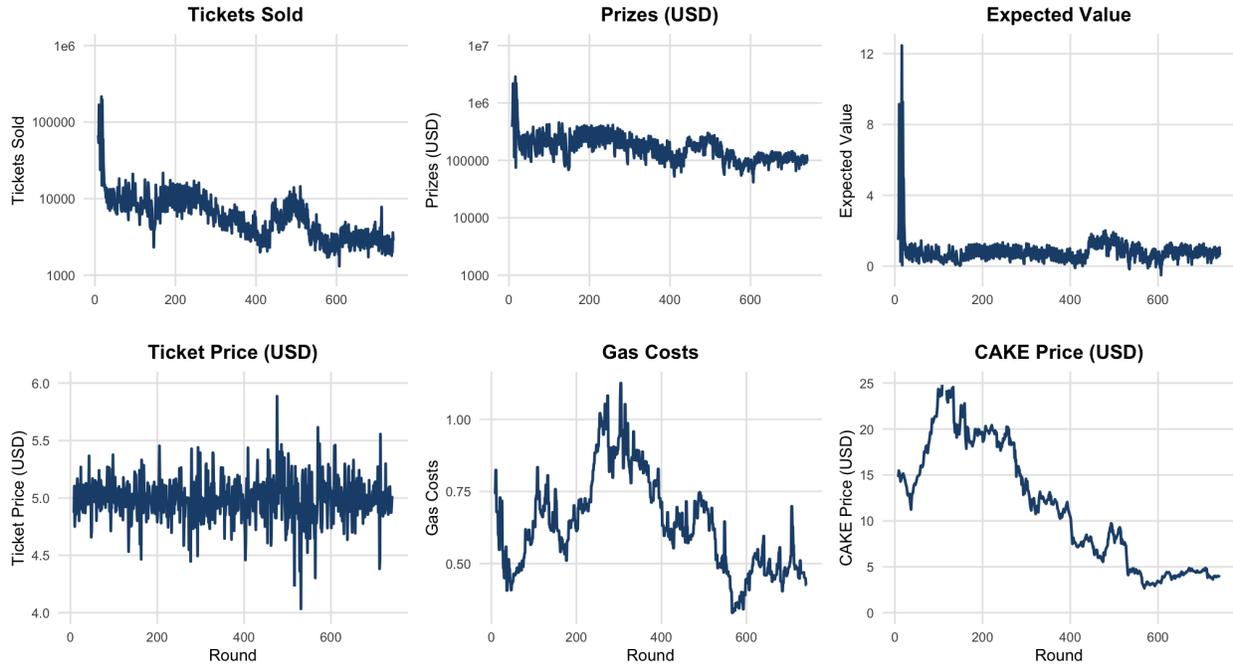
409 **Blockchain Transactions.** The average daily number of transactions on the Binance Smart
410 Chain (BscScan.com, 2023b) on the day of the draw. This variable is a proxy for general
411 blockchain activity.

412 **Hours since Prior Draw.** Since draws do not occur at even intervals, ‘Time from Prior Draw’ is
413 computed as the difference in hours between draw number n and draw number $n + 1$. The
414 variable is intended to model variation the size of the time window to buy tickets.

415 **Match-6 Winner.** The occurrence of a jackpot winner of the prize pool with all six correct
416 numbers.

417 **Second Lottery.** A binary variable denoting the launch of a second lottery product in the
418 PancakeSwap ecosystem on August 8, 2022. The second lottery operates similar to a prize-linked
419 savings account, offering random prizes without risking the principal deposited.

420 Figure 2 illustrates the values of the key variables during the period of study. There were
421 signs of much different levels during the first week of the lottery when large bonus incentives
422 were added to the prize pool as a marketing incentive to attract attention and participation. We
423 removed this week of outliers from the data to avoid biasing our estimates.



424
 425 *Figure 3 – Line plots for time-series data. The first fourteen periods are affected by one-time*
 426 *incentives and advertising to launch the product (PancakeSwap, 2021).*

427 Table 1 reports the summary statistics of the model variables, excluding the initial outlier
 428 period and a correlation table is provided in Appendix A.

429 *Table 1 – Summary Statistics of Draws*

Variable	Mean	SD	Min	Max	N
Tickets Sold (per Draw)	6,257	3,562	1,311	21,665	720
Ticket Price	4.989	0.18	4.034	5.886	720
Prize Pool	170,835	77,866	41,676	455,174	720
Gas Costs	0.634	0.166	0.329	1.126	720
Match-6 Winners	0.003	0.053	0	1	720
Hours since Prior Draw	17.09	9.792	6	37	720
CAKE Price	11.496	6.67	2.669	26.134	720
Blockchain Transactions (Millions)	6.397	2.994	2.595	16.263	720

430

431 **Empirical Specification**

432 We estimate the variable relationships using two complementary modeling strategies on
 433 wallet-level Tickets Sold. In the first strategy, we estimate a linear two-stage instrumental
 434 variable (IV) estimator for panel data model (2SLS) using the xtvreg2 command in Stata
 435 (Schaffer, 2020). The first-difference transformation removes time-invariant unobserved effects,

436 while the IV approach addresses potential endogeneity of the ticket Total Cost and the Prize
437 Pool, which may be influenced by reverse causality or unobserved factors correlated with Tickets
438 Sold. We use robust standard errors to account for heteroskedasticity. First-stage regression
439 results are examined to assess the strength of the instruments.

440 To complement the first-difference IV models, we also estimate analogous control
441 function Poisson models, following the methodology proposed by Lin and Wooldridge (2019).
442 These models account for the count nature of ticket sales data, which may exhibit overdispersion
443 or non-linear relationships not fully captured by the linear first-difference models. The control
444 function approach similarly addresses endogeneity by incorporating the residuals from the first-
445 stage regressions into the Poisson framework, providing a robustness check on our primary IV
446 results. This dual estimation strategy allows us to evaluate the consistency of our findings across
447 different modeling assumptions, enhancing the reliability of our inferences about the
448 determinants of lottery ticket sales.

449 The endogenous variables are instrumented using three variables: (1) the difference of the
450 CAKE token price from draw number n and draw number $n + 1$ (δ_{CAKE}); (2) the number of
451 Binance Smart Chain transactions (Blockchain Transactions) in millions on the day of the draw,
452 and (3) the injected amount of CAKE to the draw (Bonus CAKE) in millions of USD.

453 The fluctuation of the CAKE token price between draws has a direct, externally-driven
454 effect on the lottery system. Although the ticket price is fixed at a value equivalent to \$5 USD
455 right after one draw ends, the amount of USD required to meet this CAKE-denominated ticket
456 price changes during the intervening period to the next draw. Fluctuations in the CAKE price can
457 reasonably be viewed as exogenous over this short period, as it is impacted by macro impacts in
458 the cryptocurrency markets and short-term trading or transactions that are largely unrelated to

459 short-term lottery activity. For context, the largest amount of draw sales during our study period
 460 was \$107,446, while the largest volume day for CAKE tokens during the period was roughly
 461 \$1.74 billion (CoinGecko, 2025).

462 Blockchain Transactions also serves as an instrument for Total Cost, as higher network
 463 activity on the Binance Smart Chain increases gas prices, which directly increases the gas cost
 464 component of Price (BNB Chain Blog, 2024). This network activity is driven by broader usage
 465 of the Binance Smart Chain ecosystem and is exogenous to specific lottery-related activities.
 466 Given the scale of CAKE token trading volumes and BSC network activity relative to lottery
 467 sales, these instruments are unlikely to be influenced by the lottery dynamics, supporting their
 468 validity in addressing endogeneity in our models.

469 Bonus CAKE has an exogenous impact on Prize Pool, as it is set by the lottery operators
 470 and is unrelated to the individual ticket sales or participant behavior within a given draw,
 471 ensuring its independence from the endogenous variation in prize amounts. Its impact should
 472 therefore entirely be transmitted through the Prize Pool variable.

473 **2SLS Model**

474 In the first stage, the first-differenced endogenous variables are regressed on the first-
 475 differenced values of all exogenous variables. Let i index the individual or wallet and t index
 476 time (draw). The prefix Δ denotes the first difference operator.

$$477 \quad \Delta \text{Total Cost}_{it}$$

$$478 \quad = \gamma_0 + \gamma_1 \Delta \delta_{\text{CAKE},it} + \gamma_2 \Delta \text{BSC transactions}_{it} + \gamma_3 \Delta \text{Bonus CAKE}_{it} + \gamma_4' \Delta X_{it} + \Delta u_{1it} \quad (1)$$

$$479 \quad \Delta \text{Prize Pool}_{it}$$

$$480 \quad = \beta_0 + \beta_1 \Delta \delta_{\text{CAKE},it} + \beta_2 \Delta \text{BSC transactions}_{it} + \beta_3 \Delta \text{Bonus CAKE}_{it} + \beta_4' \Delta X_{it} + \Delta u_{2it} \quad (2)$$

481 In the second stage, the first-differenced dependent variable (Tickets Sold) is regressed
 482 on the predicted first-differenced endogenous variables from the first stage, and the first-
 483 differenced values of the other exogenous variables.

$$484 \quad \Delta \text{Tickets Sold}_{it}$$

$$485 \quad = \delta_1 \Delta \text{Ticket} \widehat{\text{Total Cost}}_{it} + \delta_2 \Delta \text{Prize} \widehat{\text{Pool}}_{it} + \delta_3' \Delta X_{it} + \zeta_{it} \Delta \text{TS}_{it} = \delta_1 \Delta \widehat{\text{TTC}}_{it} + \delta_2 \Delta \widehat{\text{PP}}_{it} \quad (3)$$

486 **Control Function Model**

487 First, we model the endogenous variables as linear functions of all strictly exogenous
 488 variables and wallet-specific fixed effects. The exogenous variables include the vector of
 489 controls X_{it} and the instruments. These reduced form equations are estimated using linear fixed-
 490 effects regression in StataMP 15 (StataCorp, 2017):

$$491 \quad \text{Total Cost}_{it}$$

$$= \alpha_{Ci} + \gamma_1 \delta_{\text{CAKE},t} + \gamma_2 \text{BSC transactions}_t + \gamma_3 \text{Bonus CAKE}_t + \mathbf{X}_{it} \boldsymbol{\gamma}'_4 + u_{it,Cost} \quad (4)$$

$$492 \quad \text{Prize Pool}_{it}$$

$$= \alpha_{Pi} + \beta_1 \delta_{\text{CAKE},t} + \beta_2 \text{BSC transactions}_t + \beta_3 \text{Bonus CAKE}_t + \mathbf{X}_{it} \boldsymbol{\beta}'_4 + u_{it,Pool} \quad (5)$$

493 The dependent variable, Tickets Sold is modeled in the second stage using a Poisson distribution.
 494 The expected value of Tickets Sold, conditional on the explanatory variables and the first-stage
 495 residuals, is modeled using a log link function. Where c_i is the multiplicative wallet-specific
 496 fixed effect handled by the estimator, (θ) are the structural coefficients of interest, and (ρ) are the
 497 coefficients on the control functions used to test for endogeneity. Bootstrapped standard errors
 498 are estimated using 300 replications.

$$499 \quad E(\text{Tickets Sold}_{it} | \dots, c_i)$$

$$= c_i \exp(\theta_{\text{Cost}} \text{Total Cost}_{it} + \theta_{\text{Pool}} \text{Prize Pool}_{it} + X_{it} \theta_X + \rho_{\text{Cost}} \widehat{u}_{it,Cost} + \rho_{\text{Pool}} \widehat{u}_{it,Pool}) \quad (6)$$

500 **Results**

501 The first-stage results for the estimated 2SLS models are described in Table 2. The results
 502 are empirically consistent with our hypothesized relationships. The first-stage regressions
 503 establish the relationship between the endogenous variables (Total Cost and Prize Pool) and the
 504 instrumental variables, including CAKE Price Change, Blockchain Transactions, and Bonus
 505 CAKE. For Total Cost, both hypothesized instruments predict the endogenous variable,
 506 including CAKE Price Change ($\beta = 0.263$, $p < 0.001$) and Blockchain Transactions ($\beta = 0.014$, p
 507 < 0.001). Bonus CAKE shows a significant effect on Prize Pool ($\beta = 0.859$, $p < 0.001$).

508 Instrument validity is further supported by weak identification and overidentification
 509 tests. The Cragg-Donald Wald F-statistic (68018.29) far exceeds the Stock-Yogo critical values
 510 (e.g., 13.43 for 10% maximal IV size), rejecting the null hypothesis of weak identification and
 511 confirming that the instruments are sufficiently strong to identify the endogenous variables. The
 512 Hansen J statistic for overidentification (Hansen J = 0.671, $\chi^2(1)$, $p = 0.4128$) fails to reject the
 513 null hypothesis, supporting the exogeneity of the instruments and suggesting that CAKE Price
 514 Change, Bonus CAKE, and Blockchain Transactions are uncorrelated with the second-stage error
 515 term.

516 *Table 2: First-Stage Results - First Difference Regressions*

	(1)	(2)	(3)	(4)
	2SLS	2SLS	Control Function	Control Function
	Total Cost	Prize Pool	Total Cost	Prize Pool
CAKE Price Change	0.263*** (0.001)	0.004*** (0.000)	0.264*** (0.0005)	0.003*** (0.0001)
Bonus CAKE	0.133*** (0.003)	0.742*** (0.001)	0.281*** (0.004)	0.859*** (0.001)
Blockchain Transactions	0.014*** (0.001)	-0.000* (0.000)	0.022*** (0.0001)	-0.003*** (0.00003)
Hours since Prior Draw	0.00002*** (0.000003)	-0.0004*** (0.00003)	0.0008*** (0.00003)	-0.0006*** (0.000008)
Lag Match-6 Winner	-0.418*** (0.004)	-0.038*** (0.001)	-0.332*** (0.004)	-0.050*** (0.001)

Second Lottery	0.034*** (0.001)	0.009*** (0.000)	-0.059*** (0.001)	0.038*** (0.0003)
Constant	-0.002*** (0.000)	-0.001*** (0.000)	5.504*** (0.001)	0.162*** (0.0003)
Weekday Indicator	Yes***	Yes***	Yes***	Yes***
Observations	346,928	346,928	847,087	847,087

517 First-stage regression for Price, Prize (USD, m) and Expected Value. Robust standard errors in parentheses. *
518 p<0.05, ** p<0.01, *** p<0.001

519
520 In the second-stage regressions (Table 3), we estimate the number of tickets purchased
521 using both first-difference instrumental variable and conditional fixed-effects Poisson models
522 with a control function approach to address endogeneity. In the 2SLS model, a \$1 increase in the
523 ticket costs is related to roughly one-half tickets purchased on average ($\beta = -0.540$, $p < 0.001$),
524 and a \$1 million increase in Prizes is associated with 8.16 more tickets purchased on average (β
525 = 8.161, $p < 0.001$), indicating sensitivity to nominal price and strong responsiveness to jackpot
526 size. The presence of a Lag Match-6 Winner increases ticket purchases by roughly three quarters
527 of a ticket ($\beta = 0.742$, $p = 0.005$) but only two instances were recorded of jackpot winners, so
528 these estimates are unreliable. Hours since Prior Draw has a small positive effect ($\beta = 0.011$, $p <$
529 0.001), while the Second Lottery is not significant ($\beta = 0.605$, $p > 0.05$).

530 *Table 2: Main Results - Panel data models with possibly endogenous regressors*

	(1) 2SLS	(2) Control Function
Total Cost	-0.540*** (0.132)	-0.086*** (0.021)
Prize Pool (Millions)	8.161*** (0.295)	1.339*** (0.048)
Hours since Prior Draw	0.011*** (0.001)	.00002 (.0003)
Lag Match-6 Winner	0.742** (0.263)	0.159*** (.040)
Second Lottery	0.605 (0.632)	-0.077*** (0.011)
Control Function Prices		0.082** (0.024)
Control Function Prizes		-0.205** (0.069)

Constant	-0.513*** (0.018)	
Weekday Indicator	Yes	Yes
Observations	346,928	755,756
Unique Wallets	53,367	83,711

531 Robust standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

532

533 In the Poisson model, a \$1 million increase in Prize Pool is associated with a 133.94%
534 increase in ticket purchases ($\beta = 1.339$, 95% CI [1.246, 1.433], $p < 0.001$), which given the
535 average number of tickets purchased in the estimation sample ($m = 4.686$), equates to roughly
536 6.27 more tickets sold per wallet. A \$1 increase in Total Costs reduces ticket purchases by 8.63%
537 ($\beta = -0.086$, 95% CI [-0.127, -0.046], $p < 0.001$), which equates to 0.40 fewer tickets purchased
538 based on wallet averages. Both these effect sizes are similar in magnitude to the linear 2SLS
539 model estimates. Lag Match-6 Winner increases ticket purchases by 15.92% ($\beta = 0.159$, 95% CI
540 [0.080, 0.238], $p < 0.001$), while Second Lottery reduces ticket purchases by 7.65% ($\beta = -0.077$,
541 95% CI [-0.099, -0.054], $p < 0.001$). Hours since Prior Draw is not significant ($\beta = 0.00002$, $p >$
542 0.05). The control function residuals for Total Costs ($\beta = 0.082$, $p < 0.01$) and Prizes ($\beta = -0.205$,
543 $p < 0.01$) are significant, further confirming endogeneity.

544

General Discussion

545 Recent advancements in blockchain scalability (Thibault et al., 2022) created
546 opportunities for more complex product designs, transcending the basic mechanics of first-
547 generation gambling products (Scholten et al., 2020). Today's consumers can engage with
548 numerous on-chain games, such as lotteries, table games, slot machines, and sports betting. As
549 blockchain-facilitated gambling grows, the need to understand consumer behavior on these
550 platforms increases. Blockchains could potentially improve the user experience but could also

551 disrupt a significant revenue source for public services while contributing to public health risks
552 associated with gambling harm (Ariyabuddhipongs, 2011; Egliston & Carter, 2023).

553 This study investigated consumer behavior in a novel context: a large-scale lottery
554 operating entirely on a public blockchain. By leveraging granular wallet-level transaction data
555 and employing a dual estimation strategy to address endogeneity, we examined the impact of
556 jackpot size, ticket cost, and prior winner effects on lottery participation. Our findings largely
557 indicate that, despite the technological novelty and unregulated nature of the environment,
558 consumer behavior in this crypto-lottery mirrors patterns well-documented in traditional,
559 regulated lottery markets.

560 Consistent with our first hypothesis (H1) and a vast body of traditional lottery literature,
561 we found a strong positive relationship between the Prize Pool size and Tickets Sold per wallet.
562 This suggests the allure of large, potentially life-changing jackpots, potentially driven by
563 preferences for skewness or specific utility curve considerations, remains a strong motivator for
564 participation, even within a digital cryptocurrency-based environment. This quantitative result
565 was corroborated by our qualitative content analysis of user discussions on Telegram, where
566 interest in jackpot size was the most prominent theme.

567 Our second hypothesis (H2), predicting a negative relationship between cost and
568 participation, was also supported. Both the linear and Poisson models indicated that higher Total
569 Cost (incorporating both the nominal ticket price and variable gas fees in USD equivalent)
570 significantly reduced the number of tickets purchased. This finding is particularly noteworthy
571 because estimating nominal price elasticity in traditional lotteries is often hampered by a lack of
572 price variation. The unique dynamics of this crypto-lottery, where a ticket price fixed
573 momentarily in CAKE tokens translates to a variable amount of volatile USD, combined with

574 fluctuating network gas fees, provided the necessary variation to identify this effect. The content
575 analysis further supported this finding, revealing user awareness and discussion around both
576 ticket price and gas costs, indicating that participants are sensitive to the overall cost outlay, not
577 just the potential prize.

578 Finally, we found some evidence consistent with the 'halo effect' observed in traditional
579 lotteries (H3) but we had insufficient occurrences of jackpots to view these effects as reliable.
580 The presence of a Lag Match-6 Winner was associated with increased ticket sales in the
581 subsequent draw in both models. This occurred despite the absence of traditional media coverage
582 or specific 'lucky store' effects, potentially driven instead by community discussion (as seen in
583 the content analysis) and the inherent transparency of winner information on the blockchain.
584 Phenomena linked to cognitive biases like the representativeness heuristic may persist in this on-
585 chain environment, but more data will be needed to confirm the estimate's reliability.

586 Methodologically, the consistency between the linear first-difference 2SLS model and the
587 fixed-effect Poisson control function model strengthens confidence in our findings. The
588 significance of the control function residuals in the Poisson model confirmed the presence of
589 endogeneity related to Total Cost and Prize Pool, validating the necessity of our IV strategy.
590 Furthermore, the use of wallet-level panel data, a level of granularity rarely available in lottery
591 research, represents a significant methodological advancement enabled by blockchain's
592 transparency.

593 **Theoretical and Practical Implications**

594 From a theoretical perspective, our results suggest that established models of lottery
595 consumer behavior that are rooted in entertainment value, cognitive biases, and specific utility
596 functions appear largely transferable to this new technological domain. The prominence of

597 jackpot seeking over explicit expected value calculations, both in our models and user
598 discussions, aligns with prior work suggesting heuristics and framing effects are likely drivers of
599 lottery demand. This study serves as an important empirical bridge between traditional gambling
600 research and the emerging field of decentralized finance and blockchain consumer behavior.

601 For policymakers and regulators, the study underscores that despite operating in an
602 unregulated, pseudonymous, and technologically distinct environment, crypto-lotteries elicit
603 consumer behaviors similar to those seen in regulated markets. This implies that concerns
604 regarding consumer protection, gambling disorders, and the potential social costs associated with
605 traditional lotteries may extend to their blockchain counterparts. While blockchain offers
606 potential tools for transparency and auditing, the borderless and often pseudonymous nature
607 presents unique regulatory challenges.

608 **Limitations and Future Research**

609 This study, while offering novel insights, has several limitations. First, our analysis is
610 confined to a single platform and product, PancakeSwap Lottery V2. Findings may not
611 generalize to other crypto-lotteries or different blockchain ecosystems. Second, while wallet-
612 level data is granular, a wallet address does not necessarily equate to a unique individual, as
613 users can manage multiple wallets. Third, the content analysis, while insightful, was limited to
614 the platform's main English Telegram channel over a specific three-month period and may not
615 represent the full spectrum of user opinions or behaviors. Fourth, the limited number of jackpot
616 winners during the study period impacts the robustness of the halo effect finding.

617 More broadly, while many lottery studies focus on demand elasticity relative to expected
618 value, directly modeling the impact of expected value presented significant empirical challenges
619 in this product design. Since the prizes were a scalar multiple of the Prize Pool, expected value

620 was largely determined by changes in the Prize Pool and Ticket Cost. The inherent endogeneity
621 in prize sharing (based on total tickets sold influencing individual payout per winner)
622 complicates the identification strategy for EV itself. Given these challenges, and qualitative
623 findings suggesting users focus more on primary components like jackpot size and cost, our
624 study deliberately focused its endogeneity correction on Prize Pool and Total Cost. This
625 represents a limitation in terms of directly measuring EV elasticity as commonly formulated in
626 the literature, though it allowed for robust estimation of the effects of its key underlying drivers.

627 Future research could expand on these findings in several directions. Replicating the
628 analysis on other onchain gambling platforms would test the generalizability of these behavioral
629 patterns. Investigating player heterogeneity, such as distinguishing between casual participants
630 and heavy users, could reveal different sensitivities to price and jackpots. Methodological
631 advancements in linking wallets or modeling multi-wallet usage would enhance the precision of
632 individual-level analyses. Likewise, longitudinal studies tracking wallets over longer periods
633 could provide valuable data on the potential development of problematic risk-taking behaviors in
634 this environment. Some scholars argue that blockchain-enabled gambling is evident in digital
635 asset speculation (Delfabbro et al., 2021; Philander, 2023; Steinmetz, 2023), which may have
636 entrenched a specific culture of risk-taking in this onchain economy. Finally, comparative studies
637 analyzing user behavior across regulated fiat lotteries and unregulated crypto-lotteries could
638 further illuminate the specific impact of the blockchain context and regulatory environment.

639 **Conclusion**

640 This study demonstrates that core drivers of traditional lottery demand persist strongly
641 within a major blockchain-based lottery. By utilizing the unique data transparency of blockchain
642 and advanced econometric techniques to address endogeneity, we provide robust evidence

643 supporting these relationships at the individual wallet level. These findings contribute to both the
644 gambling studies literature and the understanding of consumer behavior in nascent blockchain
645 ecosystems, highlighting implications for platform design, theoretical models, and regulatory
646 considerations in this rapidly evolving space.

647

648 **Data availability**

649 Study data is available at: https://osf.io/4gn87/?view_only=9d5ef53efe5a457cb1f590143dccd14f

650

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843 Appendix A: Lottery Draw Variable Correlations

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Variable	Tickets Sold	Expected Value	Ticket Price	Prizes	Gas Costs	Match-6 Winners	Hours since Prior Draw	CAKE Price	Blockchain Transactions (Millions)
Tickets Sold	1.000	0.394	0.016	0.905	0.309	0.014	-0.158	0.683	0.408
Expected Value	0.394	1.000	-0.004	0.548	0.032	0.012	0.517	-0.179	-0.084
Ticket Price	0.016	-0.004	1.000	0.048	0.005	-0.050	0.028	0.027	-0.034
Prizes	0.905	0.548	0.048	1.000	0.407	0.018	-0.143	0.622	0.419
Gas Costs	0.309	0.032	0.005	0.407	1.000	0.046	-0.335	0.500	0.687
Match-6 Winners	0.014	0.012	-0.050	0.018	0.046	1.000	-0.027	0.000	0.027
Hours since Prior Draw	-0.158	0.517	0.028	-0.143	-0.335	-0.027	1.000	-0.493	-0.384
CAKE Price	0.683	-0.179	0.027	0.622	0.500	0.000	-0.493	1.000	0.565
Blockchain Transactions (Millions)	0.408	-0.084	-0.034	0.419	0.687	0.027	-0.384	0.565	1.000

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