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Differential Peer Influence in Japanese Lotteries: Evidence from Consumer-Level Analysis

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Abstract

All lotteries sold in Japan are national lotteries and the proceeds from these are utilized for socially beneficial projects. However, lotteries constitute a form of gambling and research has demonstrated that the purchase of lottery tickets by acquaintances and family members influences them. This study investigated the influence of others on lottery purchases in Japan. Data were obtained through a questionnaire survey, and statistical analysis revealed that the consumption of lotteries with short intervals between draws, such as scratch-off lottery tickets and internet lotteries, Numbers 3 and Numbers 4, was correlated with social networks. Conversely, there was a limited correlation between social networking and the consumption of lotteries with high first-prize money, such as Jumbo, Lotto 6, and Lotto 7, but long intervals between draws. This research provides implications not only for lottery consumption decision-making, but also for lottery policy implementation.

Keywords: Japan, lottery consumers, statistical analysis, peer influence

1 Introduction

In Japan, gambling operations are allowed solely through organizations supervised by national and local governments. Legislation requires that the proceeds from gambling be used exclusively for projects that benefit society. Public organizations conduct various forms of gambling, including horse racing, boat racing, and keirin, with lotteries being one category. In the fiscal year 2023, lottery sales reached approximately JPY 800 billion, with approximately JPY 300 billion in profits designated for socially beneficial projects.

Although lotteries contribute to the public good, they are also a form of gambling. As noted in [1], lotteries are the most commonly played game of chance in Japan, with 69.4% of individuals who gambled in the past year having purchased at least one ticket. Furthermore, 42.9% of respondents with a Problem Gambling Severity Index (PGSI) score of 8 or higher—indicative of problem gambling—reported buying lottery tickets.

International studies have identified peer effects through acquaintances and family members in relation to lottery consumption [2]. Moreover, previous research has highlighted that the ease of purchasing—available almost anywhere, anytime [15]—and the allure of substantial first prize money [11] influence consumption. Although lottery purchasing behavior is believed to impact others in Japan, given that lotteries are a form of gambling, there is a scarcity of studies on this topic. Additionally, earlier research on the influence of lottery ticket purchasing behavior on others has not accounted for variations in the nature of lotteries.

To bridge this gap, we examine short-interval lotteries (scratch-off, internet, Numbers

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(Numbers 3 and 4)) alongside high first prize lotteries (Jumbo and Lotto (Lotto 6 and 7)) as two representative types of lotteries. We aim to determine whether the lottery participation of acquaintances influences an individual's own purchasing decisions among Japanese lottery consumers. If there is a correlation between others' lottery consumption and one's own lottery purchasing decisions, it would imply that the risks associated with lottery-related gambling are underestimated in Japan. Moreover, if the effects vary based on the type of lottery, these new findings will provide fresh insights and contribute to research on decision-making in lottery consumption. According to [1], there is a link between the risk associated with gambling and the immediacy of lottery result announcements. The study may uncover the role of social networks in shaping lottery ticket purchasing decisions. These findings could be crucial in developing innovative strategies to mitigate gambling-related risks.

The remainder of the paper is organized as follows: Section 2 reviews the literature, while Section 3 develops testable hypotheses. Section 4 outlines the methodology and materials, and Section 5 presents the empirical results and hypothesis tests. Finally, Sections 6 and 7 conclude the study and discuss its limitations.

2 Literature Review

2.1 Factors of Lottery Demand

Several studies have indicated that lottery demand is deprived of a high win prize [9]–[11] and addictive [12]–[15]. Meanwhile, people have been influenced by the consumption behaviors of others who buy lottery tickets [2]–[5].

2.2 The Consumption Behavior That Lottery Players Purchase tickets with Others

Numerous studies have demonstrated that lottery consumers frequently purchase tickets collectively. [2] identifies a correlation between the propensity for lottery participation and the expenditure on lottery tickets within families where at least one member engages in lottery purchases. Research on syndicated lottery plays has also been documented [3]–[5]. The primary cause of this phenomenon is attributed to peer influence on lottery purchases. [6] illustrates that social networks exert a significant influence on lottery participation. This indicates that social networks, which are based on reliance and reinforcement within interpersonal relationships, can be sustained through synchronous consumption [4]. This finding is consistent with research indicating that consumption is influenced by friends [7] and family emotions [8].

2.3 Two Type of Lottery Characteristics

Japanese lotteries can be classified into two categories:

- High first prize lotteries can potentially make an individual millionaire.
- Short interval lotteries allow consumers to know the results in a relatively short period of time.

In the case of the former type of lottery, the size of the first prize significantly affects sales and demand [9]–[11]. According to [11], when the jackpot is substantial, sales correlate with income; however, when the jackpot increases due to rollovers, sales rise in areas with a high concentra-

tion of economically disadvantaged individuals, disrupting or even reversing this proportional relationship. As for the latter type, lotteries with short draw intervals, such as internet lotteries, scratch-off lotteries, and Numbers, heighten gambling risks for consumers [12]–[15]. [14] notes that individuals who frequently buy scratch-off lottery tickets are high-risk gamblers. [15] highlights the dangers of chasing losses through internet lotteries.

3 Hypothesis

Based on the literature reviewed above, we propose two hypotheses concerning the influence of peers on lottery purchasing behavior:

- Hypothesis 1 (peer influence and short-interval lotteries): The likelihood of an individual purchasing lottery tickets with outcomes disclosed in a short time frame increases with the number of friends or family members who engage in buying lottery tickets.
- Hypothesis 2 (peer influence and high first prize lotteries): The likelihood of an individual purchasing lottery tickets with a substantial first-prize jackpot increases with the number of friends or family members who engage in buying lottery tickets.

In relation to Hypothesis 1, we posited that the impact of social influences on lottery purchases involving risk would be amplified with an increased number of friends and family members who engage in lottery buying. This hypothesis is informed by [6] and [14]– [15], which suggest that social networks significantly affect lottery consumption, and that instant lotteries such as scratch-off and internet lottery have gambling risk and make people try to recover their financial losses.

In relation to Hypothesis 2, we posited that the impact of social influences on purchasing high prize lottery would be more pronounced with a greater number of friends and family members who participate in lottery buying. This hypothesis is informed by [6] and [11], as [6] has been previously elucidated, and [11] demonstrates that sales demand intensifies with an increasing number of jackpots.

4 Materials and Methods

We opted to gather data through the Internet and perform statistical analyses to evaluate our hypothesis. The specific methodologies employed are as follows:

4.1 Materials

4.1.1 Sampling Target

Due to the absence of available data for analysis, it was imperative to undertake data collection. We engaged a survey research company to facilitate this process, targeting individuals which the company can ask for responding to the questionnaire. An equivalent quantity of data was gathered across each gender and age category such as under 29, 30s, 40s, 50s, 60s, and over 70s. This uniform distribution was informed by findings in [16] and [17], which indicate that age and gender significantly influence lottery purchasing behavior. In total, 1,500 data points were collected.

4.1.2 Variable Definition

We designated the dependent variable as binary. In Hypothesis 1, the dependent variable was defined such that individuals who had purchased internet lottery, scratch-off lottery, and Numbers tickets within the past year were coded as 1, while those who had not were coded as 0. Similarly, in Hypothesis 2, the dependent variable was defined such that individuals who had purchased Lotto or Jumbo Lottery tickets in the past year were coded as 1, and others as 0. The explanatory variables include gender, age groups segmented into 10-year intervals, and the number of friends or family members who purchased lottery tickets. The binary nature of the dependent variable was established to facilitate streamlined data collection. Given the potential scarcity of analyzable data, it was possible that sufficient consumer data could not be gathered for each specific type of lottery ticket. By consolidating the two primary characteristics of lottery tickets, we can analyze consumer behavior based on these attributes. The dependent variables of gender and age group were derived from previous studies indicating that age and gender are related to lottery purchasing behavior [16]–[17]. The explanatory variable representing the number of lottery purchasers among respondents' acquaintances and family members was considered as an ordinal variable. This variable was essential to ascertain whether the prevalence of lottery consumers in the respondent's social environment affects their purchasing behavior.

4.2 Methods

4.2.1 Data Collection

To collect data for hypothesis testing, a questionnaire was administered to analyze the gender, age, and frequency of lottery purchases among lottery consumers. The company conducted the survey among individuals from a group that has had over 10 million respondents in the past year. The items in the questionnaire are detailed in Table 1. During the survey, the contents of Table 1 were presented to respondents in Japanese.

Table 1: Contents of Questionnaire

No.	Contents
1	**Question**: Gender **Options**: 1. male, 2. female
2	**Question**: Age **Answer**: [Input Number]
3	**Question**: Please answer about the quantity of your acquaintance or family who buy lottery tickets. **Options**: 1. Very many, 2. Many, 3. Normal, 4. A few, 5. Very few, 6. None
4	**Question**: Please answer about the lottery tickets you have bought in the past year. (You can choose as many as you like.) **Options**: 1. Jumbo lottery tickets, 2. Normal lottery tickets other than Jumbo, 3. Numbers 3 and Numbers 4, 4. Lotto 6 and Lotto 7, 5. Scratch-off lottery tickets, 6. Internet lottery tickets (Quick One, Kisekae-Kuchan), 7. Sports lottery tickets (toto, BIG, WINNER), 8. Bingo 5, 9. I haven't bought any in the past year

Unnatural data, such as those with excessively brief response times or internal inconsistencies, were excluded from the data. The 1,500 data points did not include eliminated entries.

4.2.2 Data Processing

The data were processed for analysis according to the procedures outlined in Table 2.

Table 2: Variables for Data Analysis

No.	Contents
Male	1 if gender is male, otherwise 0.
18–29 year old	1 if range of age is 18–29, otherwise 0.
30s	1 if range of age is 30–39, otherwise 0.
40s	1 if range of age is 40–49, otherwise 0.
50s	1 if range of age is 50–59, otherwise 0.
60s	1 if range of age is 60–69, otherwise 0.
70s or above	1 if range of age is 70 year old or above, otherwise 0.
Very Many	1 If very many number of one's acquaintances or family members purchase lottery tickets, otherwise 0.
Many	1 If many significant number of one's acquaintances or family members purchase lottery tickets, otherwise 0.
Normal	1 If normal number of one's acquaintances or family members purchase lottery tickets, otherwise 0.
A Few	1 If a few number of one's acquaintances or family members purchase lottery tickets, otherwise 0.
Very Few	1 If very few number of one's acquaintances or family members purchase lottery tickets, otherwise 0.
None	1 If none of one's acquaintances or family members purchase lottery tickets, otherwise 0.
Frequent Lottery Consumer	1 if the person buys scratch-off lotteries, internet lotteries, Numbers 3 or Numbers 4, otherwise 0.
High Win Prize Lottery Consumer	1 if the person buys Jumbo lottery, Lotto 6 or Lotto 7, otherwise 0.

Internet lotteries, including Kisekae-Kuchan and QuickOne, exhibit distinct operational frequencies. Kisekae-Kuchan holds its drawings daily from Monday through Friday, whereas QuickOne allows participants to verify their winning status immediately after each draw. The lotteries known as Numbers 3 and 4 also conduct their drawings on weekdays. Scratch-off lottery tickets offer consumers the opportunity to instantly determine their winning status upon scratching. These lotteries are classified as short-interval lotteries due to their frequent drawing schedules. Conversely, lotteries with a maximum drawing frequency of twice per week do not fall under the category of short-interval lotteries.

The Jumbo lottery and Lotto are classified as high-prize lotteries. Additionally, Lotto incorporates a rollover feature. This classification is predicated on the maximum prize amount, which exceeds JPY 100 million. Other lotteries were excluded from this classification due to their maximum prize being less than JPY 100 million.

4.2.3 Data Analysis Model

We applied a probit model for our statistical analysis, given that the independent variables were binary. This approach allowed us to effectively compare the magnitudes of the coefficients in our analysis results and during hypothesis testing. Such a comparison is instrumental in highlighting variations in peer influence.

5 Result

5.1 Model Equation Setting

5.1.1 Hypothesis 1

The probit model was employed to examine the personal characteristics of lottery ticket buyers and the status of their acquaintances as consumers of short-interval lotteries. The model specifications are described by Equation 1

Equation 1:

$$ShortIntervalLotteryConsumer_i^* = \beta_0 + \beta_1 Male_i + \sum_{j=2}^{6} \beta_j\, Surrounding_{ji} + \sum_{k=7}^{11} \beta_k\, ageRange_{ki} + \epsilon_i. \quad (1)$$

Where:

$$ShortIntervalLotteryConsumer_i = \begin{cases} 1\ (FrequencyLotteryConsumer_i^* > 0) \\ 0, otherwise. \end{cases},$$

$$\epsilon_i \sim N(0,1),$$
$$Surrounding_{ji} = [VeryMany_i, Many_i, Normal_i, AFew_i, VeryFew_i\ ],$$
$$ageRange_i = [18-29YearOld_i, 30s_i, 40s_i, 50s_i, 60s_i, 70sOrAvobe\ ].$$

Assuming that the error term ϵ_i follows a standard normal distribution, the probability of $FrequencyLotteryConsumer_i = 1$ can be expressed by $\Phi\left(\beta_0 + \sum_{j=1}^{11} \beta_j x_{ji}\right)$ using the cumulative distribution function Φ of the standard normal distribution. β_0 is the constraint term and $\beta_1, \beta_2, \cdots, \beta_{11}$ represent the coefficient terms.

5.1.2 Hypothesis 2

Equation 2 was established to verify Hypothesis 2: This is identical to Equation 1, except that $FrequencyLotteryConsumer_i\ as$ the dependent variable is changed to $HighWinPrizeLotteryConsumer_i$, β is changed to α, and ϵ is changed to u.

Equation 2:

$$HighWinPrizeLotteryConsumer_i^* = \alpha_0 + \alpha_1 Male_i + \sum_{j=2}^{6} \alpha_j \, Surrounding_{ji} + \sum_{k=7}^{11} \alpha_k \, ageRange_{ki} + u_i. \quad (2)$$

Where:

$$HighWinPrizeLotteryConsumer_i = \begin{cases} 1 \, (HighWinPrizeLotteryConsumer_i^* > 0) \\ 0, otherwise. \end{cases}$$

5.2 Descriptive Statistics

The descriptive statistics for the data are presented in Table 3. All variables were binary indicators.

Table 3: Descriptive Statistics of Input Data

Variable	Obs.	Mean	Std. dev.	Min	Max
Male	1,500	0.500	0.500	0.000	1.000
18–29 year old	1,500	0.167	0.373	0.000	1.000
30s	1,500	0.167	0.373	0.000	1.000
40s	1,500	0.167	0.373	0.000	1.000
50s	1,500	0.167	0.373	0.000	1.000
60s	1,500	0.167	0.373	0.000	1.000
70s or above	1,500	0.167	0.373	0.000	1.000
Very Many	1,500	0.046	0.210	0.000	1.000
Many	1,500	0.077	0.267	0.000	1.000
Normal	1,500	0.323	0.468	0.000	1.000
A Few	1,500	0.301	0.459	0.000	1.000
Very Few	1,500	0.183	0.387	0.000	1.000
None	1,500	0.070	0.255	0.000	1.000
Short Interval Lottery Consumer	1,500	0.333	0.472	0.000	1.000
High Win Prize Lottery Consumer	1,500	0.865	0.341	0.000	1.000

The descriptive statistics indicated that virtually no respondents reported the absence of family members or acquaintances who purchased lottery tickets. This suggests that the majority

of lottery ticket purchasers have at least one family member or acquaintance who engage in lottery ticket buying. Furthermore, the data reveal that 33.3% of lottery ticket purchasers frequently acquire lottery tickets and 86.5% buy high-priced first-prize lottery tickets. This observation implies that a significant proportion of participants prefer high-priced first-prize lottery tickets.

5.3 Analysis Results

5.3.1 Hypothesis 1

Table 4 presents the results of the statistical analysis of Hypothesis 1.

Table 4: The result of Analysis for Hypothesis 1

Variable	Coefficients	Robust std. err.	z	P>z	95% Interval Lower	Higher
Male	-0.176	0.070	-2.530	0.012**	-0.312	-0.039
18–29 year old	0.464	0.122	3.800	0.000***	0.225	0.702
30s	0.575	0.119	4.850	0.000***	0.343	0.808
40s	0.144	0.120	1.190	0.232	-0.092	0.380
50s	0.047	0.122	0.390	0.700	-0.192	0.286
60s	-0.372	0.130	-2.860	0.004***	-0.627	-0.117
Very Many	1.056	0.214	4.940	0.000***	0.637	1.475
Many	0.861	0.187	4.590	0.000***	0.494	1.228
Normal	0.619	0.157	3.950	0.000***	0.311	0.926
A Few	0.422	0.159	2.660	0.008***	0.111	0.733
Very Few	0.272	0.169	1.610	0.106	-0.058	0.602
Constraint Term	-1.016	0.167	-6.100	0.000***	-1.343	-0.690
Prob > chi2	0.0000					
Pseudo R2	0.0808					

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The value of Prob > chi2 is 0.000, indicating that the null hypothesis that all the coefficients are zero is rejected. The Pseudo R2 value of 0.0808 suggested that the model required further refinement. However, to elucidate the observed phenomenon, it was retained in the current analysis.

The coefficient of "Men" exhibits a negative value, indicating that male gender has a negative impact on buying lotteries with short-interval lotteries. This suggests a higher probability that female consumers purchase short-interval lotteries than males.

The age-related coefficients "18–29 year old", "30s" and "60s" demonstrate statistical sig-

nificance. The coefficients of "18–29 year old" and "30s" are positive, while "60s" is negative. This indicates that younger age groups, specifically "18–29 year old" and "30s," have a higher probability of purchasing the short-interval lotteries, whereas older age groups, such as "60s," have a lower probability.

The coefficients "Very Many", "Many", "Normal", and "A Few" representing the quantity of lottery purchasers among family and acquaintances, are statistically significant. These coefficients exhibit positive values and demonstrate a positive correlation with purchasing short-interval lotteries. The magnitude of the coefficient increased with the quantity of individuals in one's social circle, indicating a relationship between the number of people in one's immediate environment and lottery participation.

5.3.2 Hypothesis 2

Table 5 presents the results of the statistical analysis of Hypothesis 2.

Table 5: The Result of Analysis for Hypothesis 2

Variable	Coefficients	Robust std. err.	z	P>z	95% Interval Lower	Higher
Male	0.357	0.089	4.030	0.000***	0.184	0.531
18–29 year old	-0.842	0.144	-5.840	0.000***	-1.124	-0.559
30s	-0.473	0.149	-3.180	0.001***	-0.765	-0.181
40s	-0.152	0.154	-0.980	0.326	-0.454	0.151
50s	0.246	0.178	1.380	0.168	-0.103	0.595
60s	0.347	0.182	1.900	0.057*	-0.010	0.704
Very Many	0.271	0.223	1.220	0.224	-0.166	0.708
Many	0.325	0.185	1.750	0.080	-0.038	0.688
Normal	0.802	0.160	5.000	0.000***	0.488	1.116
A Few	0.633	0.160	3.960	0.000***	0.320	0.946
Very Few	0.592	0.172	3.440	0.001***	0.255	0.930
Constraint Term	0.625	0.177	3.540	0.000***	0.279	0.972
Prob > chi2	0.0000					
Pseudo R2	0.1335					

Robust z-statistics in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The value of Prob > chi2 is 0.000, indicating that the null hypothesis that all the coefficients are zero is rejected. The Pseudo R2 value of 0.1335 suggests that the model exhibits a moderate level of robustness.

The coefficient associated with the "Men" variable exhibits a positive value, indicating that male gender demonstrates a positive correlation with the purchase of high-win-prize lottery

tickets. This finding suggests an increased probability that male consumers acquire lottery tickets with high potential winnings compared with female consumers.

The age-related coefficients for the "18–29 year old" and "30s" categories demonstrate statistical significance. The coefficients for these age groups exhibit negative values, indicating that younger cohorts, specifically those aged 18–29 years and in their 30s, have a lower probability of purchasing high-win-prize lotteries.

The coefficients "Normal", "A Few", and "Very Few" are statistically significant. These coefficients exhibit positive values and demonstrate a positive correlation with the purchase of high-prize lotteries. This finding suggests that the number of lottery ticket purchasers among an individual's acquaintances and family members is not substantial for consumers of high-prize lotteries.

5.4 Hypothesis Testing

5.4.1 Hypothesis 1

The results of the analysis support this hypothesis based on the observed outcomes. This is because the more people who responded to the questionnaire that they had many acquaintances or family members who bought lottery tickets, the more likely they were to buy lotteries with frequent drawings. This result suggests that purchasing lotteries of frequent drawings is influenced by the influence of others on one's lottery purchases and is correlated. This conclusion aligns with [2], [4], [6] demonstrating that social networks influence lottery participation, as well as studies indicating that consumer behavior leads to the purchase of lotteries with high draw frequencies [15].

5.4.2 Hypothesis 2

The results of the analysis did not support this hypothesis. This reason is based on the observation that the responses of surveyed individuals who reported having numerous acquaintances or family members who purchased lottery tickets were not statistically significant. While the presence of lottery consumers among acquaintances of individuals who purchase lottery tickets with high prizes cannot be refuted, no correlation has been established. This finding contradicts [2], [4], [6] that demonstrated the influence of others on one's lottery purchases, and suggests that [9]–[11] of increased sales of lottery tickets with high first prize money, as observed in prior studies, cannot be attributed to influence of others on one's lottery purchases. This observation may be attributed to the extended drawing period of lotteries with substantial first-prize amounts, which typically spans several days. Therefore, a discrete drawing of the lottery may influence lottery consumers. This observation aligns with the findings of [18], which demonstrated a decrease in purchasing patterns due to interference with gambling behaviors.

6 Discussion and Conclusion

This study investigated the influence of lottery consumption by acquaintances and family members. The findings indicated a correlation between this influence and lotteries with continuous draws, whereas the impact was limited for lotteries with discrete draws, such as those offering high first prize amounts. [12]–[15] has demonstrated that scratch-off lottery tickets and internet lottery tickets present a high gambling risk; however, this study suggests the potential for mitigating gambling risk through the implementation of a discrete mechanism. Specifically, by

introducing a system that allows appropriate intervals between gambling sessions, it may be possible to regulate decisions regarding gambling participation and provide a safer gambling service. [1] showed a correlation between short lottery intervals and gambling risk, but it is possible that gambling risk can be reduced by having few acquaintances who purchase lottery tickets.

In this study, we investigated the correlation between lottery purchases by acquaintances and family members for each type of lottery and elucidate the differences in influence. This indicates that Japan is also possible to the peer influence of international research spending on lottery consumption. The results also revealed that the influence of lottery purchases by acquaintances and family members, as indicated in previous studies [2], varies depending on the nature of the lottery. This new finding suggests that the influence of others on lottery consumption varies depending on lottery type. These findings suggest that in Japan, not only must the influence of others on lottery consumption decisions be taken into account, but also indicate measures to control gambling risk.

7 Limitation

The data for this study were obtained from a company that focuses on academic research. Only people who could be hired by the company participated, so they might not be like the general public. If we had large-scale data from public sources like the government, we could better study how different lotteries affect people. The survey did not check the quality of the questionnaire, so we need to set quality standards for it. People's sense of abundance is different, so fair analysis needs accurate measures. Also, the Pseudo R-squared value for Hypothesis 1 was below 0.1, showing it needs improvement. Adding more variables to the analysis might create a stronger model.

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