

Statistics and Probability in Lottery of “WINFall”

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Abstract: The “WINFall Lottery” has been closed since May 14, 2005. By the analysis of the lottery game WINFall’s design of, there was significant chance to win. This article describes how it works. [The Journal of American Science. 2006;2(1):51-53].

Keywords: lottery; probability; statistics; win; WINFall

Introduction

The “WINFall Lottery” has been closed since May 14, 2005. I am sorry that you have lost your chance to win money! There was significant rate to win by the design of lottery game WINFall. This article describes how it runs. All data are from www.michigan.gov/lottery (Michigan Lottery Website, 2005).

Analysis and Discussions

When you open the advertisement for the “WINFall Lottery”, you will read the following:

“Simply choose six numbers from a field of 49 and enter them on your play slip.”

“Players win the jackpot by matching all six of the numbers drawn. There are also prizes for matching five, four and three numbers...”

“If the jackpot reaches \$5 million and no one hits it, get ready for a “WINFALL.” Then ALL of the prize money, including the cash accumulated in the jackpot, is paid out to match five, four and three lower-level prizes increase by approximately 10 times!” (Lottery Results Website, 2005; Michigan Lottery WINFall Results Website, 2004).

The above statements are the advertisements for the WINFall lottery. All of the information has been summed up in Table 1. The total prizes in the last two

years (from May 14, 2003 to May 14, 2005), have been listed in Table 1 as well.

The jackpot has reached \$5 million 10 times in the last two years. This has been summed up in Table 2. At the same time, when the jackpot reaches \$5 million, the probability (P_{jh}), of hitting the jackpot each time is estimated and listed in the Table 2.

By knowing the total tickets N_{tt} each time, P_{jh} can be estimated easily:

$$P_{jh}=1-(1-P_6)^{N_{tt}}$$

Lottery P_6 is the probability of matching 6 numbers. In the case of the WINFall lottery, $P_6=1/13,983,816$.

The total tickets N_{tt} each time can be estimated by its samples and their probabilities. The WINFall lottery has 4 samples, matching 6 numbers N_6 , matching 5 N_5 , matching 4 N_4 and matching 3 N_3 respectively. N_3 is the largest sample of the WINFall lottery. As far as we have four samples in hand: N_6 , N_5 , N_4 and N_3 , we use N_3 to calculate the total tickets. Because the more sample are there, the small differences we have (Statistics Accuracy). The N_{tt} is:

$$N_{tt}=N_3/P_3$$

P_3 is the probability of matching 3 numbers. In the case of lottery WINFall, $P_3=1/57$.

According to the rule of the WINFall lottery, when

the jackpot reaches \$5 million, if someone hits the jackpot-matches 6 numbers, there is no WINFALL.

Table 1. WINFall lottery information

Match Number	6	5	4	3
Theory Probability	1/13,983,816	1/54,201	1/1,032	1/57
All prizes (in 2 years)	15	2,158	117,685	2,150,651
Prize (normal)	Jackpot	\$2,500	\$100	\$5
Prize in Fall (estimated)	The jackpot not be hit	\$25,000	\$1,000	\$50

Table 2. WINFall lottery result history

Match Number	6	5	4	3	Probability of the jackpot be hit (P_{jh})
#Sat. Jun 14, 2003	1(\$5.4m)	38(\$2500)	1,793(\$100)	30,825(\$5)	1/8.4694
#Sat. Aug 30, 2003	0	30(\$21170)	1,327(\$1005)	23,943(\$50)	1/10.7547
#Sat. Oct 18, 2003	0	32(\$20,758)	1517(\$919)	27,715(\$45)	1/9.3615
#Wed. Dec 03, 2003	0	26(\$24,142)	1331(\$990)	25,397(\$46)	1/101686
#Sat. Jan 17, 2004	0	27(\$24,012)	1,499(\$908)	28,536(\$43)	1/9.1071
#Wed. Mar 03, 2004	1(\$5.4m)	48(\$2500)	2321(\$100)	38,934(\$5)	1/6.8145
#Wed. Jun 02, 2004	0	70(\$9,508)	2,585(\$540)	33,504(\$37)	1/7.8339
#Sat. Oct 23, 2004	0	24(\$25,641)	1211(\$1067)	23,868(\$48)	1/10.787
#Sat. Mar 26, 2005	0	33(\$20,930)	1,585(\$915)	28,303(\$46)	1/9.1778
#Sat. May 14, 2005	0	28(\$22,816)	1,527(\$878)	28,715(\$42)	1/9.0535

Table 3. WINFall lottery result analysis

	Probability of hitting jackpot	5	4	3	Total prize	Net incoming
Match number	1/259	1	53	951		
#Sat. Jun 14, 2003	1(\$5.4m)	\$2,500	\$100	\$5	\$12,555	-\$41,646
#Sat. Aug 30, 2003	0	\$21,170	\$1005	\$50	\$121,985	+\$67,784
#Sat. Oct 18, 2003	0	\$20,758	\$919	\$45	\$112,260	+\$58,059
#Wed. Dec 03, 2003	0	\$24,142	\$990	\$46	\$120,358	+\$66,157
#Sat. Jan 17, 2004	0	\$24,012	\$908	\$43	\$113,029	+\$58,828
#Wed. Mar 03, 2004	1(\$5.4m)	\$2,500	\$100	\$5	\$12,555	-\$41,646
#Wed. Jun 02, 2004	0	\$9,508	\$540	\$37	\$73,315	+\$19,114
#Sat. Oct 23, 2004	0	\$25,641	\$1067	\$48	\$127,840	+\$73,639
#Sat. Mar 26, 2005	0	\$20,930	\$915	\$46	\$113,171	+\$58,970
#Sat. May 14, 2005	0	\$22,816	\$878	\$42	\$109,292	+\$55,091

We can spend \$54,201 on WINFall lottery tickets when the jackpot reaches \$5 million, and choose the numbers of all tickets carefully.

Our law of choosing is:

Group A: It's being composed of 57 tickets and there are no 3 same numbers on any two tickets. From the probability of matching 3 numbers, at least one ticket will hit the prize of matching 3 numbers;

Group B: It comes from Group A and being composed of 1032 tickets. Among them, there are no 4 same numbers on any two tickets. From the probability of matching 4 numbers, at least one ticket will hit the prize of matching 4 numbers;

Group C: It comes from Group B and being composed of 54,201 tickets. There are no 5 same numbers on any two tickets. From the probability of matching 5 numbers, at least one ticket will hit the prize of matching 5 numbers;

At same time, the probability P of the jackpot being hit by our 54,201 tickets is

$$P=1-(1-P_0)^{54201}=1/259$$

According to the information from Table 1, we can estimate our situation when the jackpot reaches \$5 million (Table 3).

From Table 3, we can conclude that if unfortunately the jackpot is hit by someone other than us, we lose \$4.3 and only gain only \$1.

However, “if the jackpot reaches \$5 million and no one hits it”, we use \$1 to get relatively \$2.3 prize. We win money!!

We also know that the probability of the jackpot being hit by someone (including us) is between 1/7 &

1/11, which means the probability that we win money is large!

Now suppose from the time of Sat. Jun 14, 2003 to Sat. May 14, 2005, every time the jackpot of the WINFall lottery reaches \$5 million, we buy 54,201 tickets by following the rules above; we lost money two times, but we won money 8 times. See Table 4.

The total money that we get from the WINFall lottery is:

$$-\$41,646+\$67,784+\$58,059+\$66,157+\$58,828-\$41,646 \\ +\$19,114+\$73,639+\$58,970+\$55,091=\$374,350$$

We can win money indeed! Au, don't forget pay taxes!

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