

Statistics and Probability in Lottery of “WINFall”

Hao Li

509 Burcham Drive, East Lansing, MI 48823, USA

Telephone: (517) 355-2758; Email: liqi2@msu.edu

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 change to win. This article is describing how it runs. . [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 lost your chance to win money! There was significant change to win by the design of lottery game WINFall. This article is describing 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 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, the probability P_{jh} of the jackpot being hit each time, when the jackpot reaches \$5 million, is estimated and listed in the Table 2.

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 (Statistics Accuracy) we have. 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 |

If we 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: being composed of 57 tickets. Among them, 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: Coming 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: coming from Group B and being composed of 54,201 tickets. Among them, 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

$$P=1-(1-P_6)^{54201}=1/259$$

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

From Table 3, we know that: if we are unfortunate and the jackpot is hit by someone other than us, we lose \$4.3 and only get prize of only \$1, losing money!

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

We know that also: the probability of the jackpot being hit by someone (including us) is between 1/7 & 1/11. That means: the probability that we win money is large!

Now suppose that: from 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 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!

Correspondence to:

Hao Li
509 Burcham Drive
East Lansing, MI 48823, USA
Email: liqi2@msu.edu
Telephone: (517) 355-2758

References

1. Michigan Lottery Website. <http://www.michigan.gov/lottery>. 2005.
2. Lottery Results Website. <http://www.michigan.gov/lottery/0,1607,7-110-28916---,00.html>. 2005.
3. Michigan Lottery WINFall Results Website. <http://www.michigan.gov/lottery/0,1607,7-110-28916---LP,00.html>. 2004.