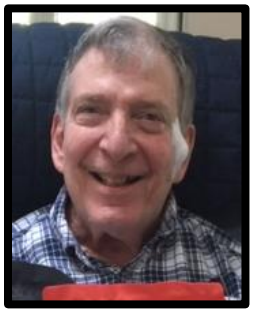
Gambler's Ruin? Probability & The Detroit Tigers



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The other day, I was perusing some sports betting sites, curious to see if the odds have changed for my beloved Tigers, as the team appears to have greatly improved.

I then found the following anomaly:

Site One:

Date	Team	Bet	Win
7/20/2021	T -1.5	$15.00	$25.95

Site Two:

Date	Team	Bet	Win
7/20/2021	Tex -1.5	$15.00	$24.75

One site gave me strong odds against Tigers winning by 2 or more runs (bet $15, win $25.95) and another similar odds against Texas. This seemed rather strange. How can I play this?

Answer: I'm playing both sides! This is not easy for a $2 bettor, but to make it worthwhile (and still fun) I did choose the $15 amount, and…yeah…it's legal here in Tigers' land.

I bet $15 on each side. If we end up with one team winning by one run, I'll feel foolish and lose $30. Anything else I win. If the Tigers win by at least 2, I win $25.95 but lose $15. If Texas is victorious, I win $24.75 and lose $15. However, I did place a $2 bet to win $15 if the game goes to extra innings. So, if I lose the original bet via an extra innings one-run loss, the hedge will cut my $30 loss in half.

So, what happened? Spoiler alert: **Tigers won 4-1.**

So, was this a clever bet? Or was this a new-fangled Martingale-type of wager. With Martingale, you double up when you lose. (Gambling Paradox Video & Why The Martingale Betting System Doesn't Work) For the most part, it looks great, until it doesn't. One "nice" losing streak and your bankroll along with all your gains are wiped out. Could this be such a case? Let's see.

I looked at all the Tigers games this year. There were 23 one-run games and 70 others. So, the probability of a 1-run result is 23/93 = 0.25 (rounding slightly).

It follows that the probability is 0.75 of a non 1-run result. Let's assume half of these outcomes result in a win for the Tigers (0.375) = Tigers win and half of these games the opponent wins (0.375).

We can compute the expected value:
.25 * (-30) + .375 * (10.95) + .375 * (9.75) = 0.26.

This means on average (long run) I win 26 cents per time with the $15 bet and those exact odds shown. If I bet $150 for each scenario then the expected value is $2.60.

Had this been negative, it would be a form of “Gambler’s Ruin”:
a gambler playing a game with negative expected value will eventually go broke, regardless of their betting system.

If I wanted to do this for a living:

I would bet a much larger amount each way (a few thousand?). I would look at both teams' one-run game percentage and probably average those and would scan all the games – not just Tigers games -- looking for these anomalies.

But, most importantly, I would “paper trade” for a year, as I’m probably missing many factors. For example, are the two teams very evenly matched? Are the opposing pitchers both top-notch? In both cases, it is more likely that we do see a one-run result, and hence, not a good bet!

It’s fun to think about. ONLY to think about!

Melvin Billik is a long-time contributor to MCTM’s former journal Mathematics in Michigan. He worked as a mathematician at the NASA Flight Research Center in Edwards, CA. Mel spent 31 years teaching mathematics at H.H. Dow High School in Midland, Michigan with 28 of those years at Mathematics Department Head. He then spent 11 years teaching mathematics at Northwood University as a full-time Associate Professor of Mathematics.