

VARIANCE AND THE IMPACT OF STRIKE RATE

Our previous article on Winning and Losing Cycles introduced the concept of standard deviation, which allows us to measure the range of winners you can experience in a given number of bets and therefore the variance in profit results that can be expected.

It's a very important concept for betting, so I'll cover it again here:

Let's assume we are flipping a coin and you are calling heads or tails with a \$1 bet on each. Your chance of success on each flip is 50% (strike rate) and if I paid you \$2.20 for each win then your long-term profit edge is +10%

If we flipped twenty times, then on average you would expect to win ten and make a 10% POT. However the exact number of wins will very rarely be exactly ten. You are more likely to get an uneven run of heads or tails (to varying degrees), which means you end up with a result different to a perfect ten-ten split.

The standard deviation of correct number of flips you could experience in a sample of twenty is calculated as the **square root of: $(20 \text{ (number of races)} \times 0.5 \text{ (win probability)} \times 0.5 \text{ (losing probability)}) = 2.2 \text{ wins}$** .

In a statistical sense your actual number of wins will fall within one standard deviation 68% of the time. One standard deviation is 2.2, so your range of winners in twenty flips will be between 7.8 (i.e. $10 - 2.2$) and 12.2 (i.e. $10 + 2.2$). In practice you can only experience whole numbers, so we can say that 68% of the time your result will fall between 8 and 12 correct flips. It doesn't matter how you call them, 68% of the time this will be your range of success.

Your expected result will fall within two standard deviations 95% of the time, so if we ignore the possibility of the other 5%, then your realistic range of correct calls in twenty flips is actually 5.5 to 14.5 (let's say 6 to 14 in whole numbers)

In terms of betting profit, if you are getting paid \$2.20 for every correct call, then 6 wins means you only return \$13.2 for your \$20 outlay, which is a \$6.80 loss or -34% profit on turnover (POT%). If you were at the upper end of the range and had 14 correct flips, you would return \$30.8 for a profit of +54% on turnover.

This simple example highlights the nature of variance in betting. If you only achieved six wins in twenty and a -34% POT then it doesn't mean you are a mug at guessing coin flips. Equally if you achieved fourteen wins and a +54% POT, it doesn't mean you are a coin flip genius. There is no skill at all in correctly guessing the outcome of each flip yet in two samples of twenty you can get totally contrasting results. That's natural variance at work.

The same concept applies to horse race betting. You could use a high degree of insight to back twenty good value bets at \$2.20 that are actually a 50% chance of winning (+10% POT edge, same as the coin flip) and end up with somewhere between a -34% POT and +54% POT for no other reason than natural variance.

As your sample size grows larger, your expected range of results will become narrower and much closer to the average. For example, in a sample of 1,000 coin flips you number of correct guesses will be between 485 and 515 most of the time (68%), which is a POT of +7% to +13%, much closer to the +10% long-term average than our twenty flip sample.

The Impact of Strike Rate

The degree of variance you can experience in a cycle of bets is not a constant number, it is heavily influenced by the winning chance of the group of bets you make i.e. your expected overall strike rate.

Using the methods outlined above, the table below shows the range of POT% results you could experience in a 200 bet cycle depending on your long-term average strike rate and assuming a long-term +10% POT edge.

200 Bet Cycle		POT 68% of time		POT 95% of time	
SR%	Avg Div	From	To	From	To
20%	\$ 5.50	-5.6%	25.6%	-21.1%	41.1%
25%	\$ 4.40	-3.5%	23.5%	-16.9%	36.9%
30%	\$ 3.67	-1.9%	21.9%	-13.8%	33.8%
35%	\$ 3.14	-0.6%	20.6%	-11.2%	31.2%
40%	\$ 2.75	0.5%	19.5%	-9.1%	29.1%
45%	\$ 2.44	1.4%	18.6%	-7.2%	27.2%
50%	\$ 2.20	2.2%	17.8%	-5.6%	25.6%

You can see the significant impact that strike rate has on the variance in expected results. With a 20% strike rate your results could fall anywhere between -21% and +41%, while with a 45% strike rate the range is much narrower, between -7% and +27%.

With a long-term profit of 10% on turnover, a 20% strike rate can produce a downside of -31% from the average, but also an upside of +31% on the average. A 45% strike rate on the other hand produces a much narrower range, with just a + or - 17% swing from the average.

This highlights an important principle about the nature of betting:

"The lower your average strike rate, the more volatile your results will be and vice-versa."

If in the past you believed that strike rate wasn't important, then this should definitely change your mind. With a 20% strike rate you must be prepared to deal with the fact that after 200 bets you could be losing 20% on turnover and still be following a strategy that will deliver a +10% long-term profit. The -20% POT doesn't necessarily mean you've been making poor betting decisions; it could simply be natural variance at work.

Whether your results are negative variance from a profitable strategy or the sign of a losing strategy is one of the great uncertainties of betting. It's only through the experience of managing variance that you gain some proof and confidence that what you are doing works.

If you are measuring on a smaller cycle of 50 bets for example, the result range can be even more extreme, ranging from a -52% loss on turnover and +72% profit on turnover for a 20% SR. Neither would be indicative of your long-term performance, it would simply be a matter of very bad luck, or very good luck in that cycle.

On the other hand, with a 40% strike rate the worst you might experience in a 200 bet cycle is -9% POT and most of the time you will be showing some level of profit. In a 50 bet cycle you might could be as low as -28% POT or as high as +48%POT... still a big range, but much narrower than the lower strike rate.

Strike Rate Implications

What does all of this mean? The key point to understand is that the lower the strike rate of your betting strategy, the more your variance increases and therefore **the greater the financial and psychological pressure you will eventually face.**

Operating a strategy that can see you lose 50% on turnover over 50 bets and still be within the “normal range” is a tough game to play. Of course you can also get the thrill of a +70% POT in the same number of bets, but it’s those losing runs that make punting such a tough game and end up breaking the spirit of many punters.

With a higher strike rate (e.g. 35%-40%) you will still endure losing runs that shake your confidence and create uncertainty, but they are far less significant than when playing the game with a lower strike rate.

With that in mind we can draw a very important conclusion about the impact of strike rate and nature of betting which says:

"The lower your strike rate, the more challenging it is to be a long-term winner."

This is the key reason why I avoid playing multi-bets, exotics and other bet types that typically provide a very low strike rate. The negative variance can be horrendous, while still well within the “normal range.” That makes the challenge of winning far more difficult than it actually needs to be.

I prefer to play near the top of the market (which historical data shows is easier to profit from anyway) with the odd longer priced bet when the scenario is right. We were fortunate to land a number of those longer priced bets as winners during the Spring Carnival. This strategy helps me to maintain a high strike rate and keep variance within limits that can still be very frustrating, but are ultimately manageable.

Whatever strategy you follow for your own betting decisions, it’s worth thinking about what your expected average strike rate will be and what that means for the variance you will encounter. If you find it difficult to deal with losing runs then you should aim for a strategy that helps you achieve a higher strike rate, while still being profitable.

Smart punting!

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