



BETTING MATHEMATICS – ESSENTIAL CONCEPTS

An understanding of basic mathematics is essential for every punter. In this article we present some of the key concepts that relate to betting on the races (or anything for that matter) and the role that play in the overall punting game.

THE BETTING MARKET

Market Price – Winning Chance

All punters are familiar with the concept that the price of a horse determines how much money you get back per \$1 bet. For example, if you have \$20 to win at a fixed price of \$5 and the horse wins, you are returned \$100 (\$20 x \$5)... for a profit of \$80.

However the price of a horse also has another very important meaning. It reflects the market's opinion on the **winning chance of that horse** in the race.

The easy way to approximate the winning chance of a horse is to take 100 and divide it by the market price. For example:

- A horse that is \$1.80 in the market has a $100 / 1.8 = 55.55\%$ chance of winning
- A horse that is \$2.20 in the market has a $100 / 2.2 = 45.45\%$ chance of winning
- A horse that is \$5.00 in the market has a $100 / 5 = 20\%$ chance of winning
- A horse that is \$11 in the market has a $100 / 11 = 9.1\%$ chance of winning
- A horse that is \$26 in the market has a $100 / 26 = 3.85\%$ chance of winning

I say it's an approximation of the winning chance of each horse because a betting market expresses winning chances that add up to greater than 100% (see below for an explanation of market percentage.) What that means is that this method will slightly overestimate the winning chance of each horse by varying degrees (more for longer priced horses and less for shorter priced horses) but it's certainly close enough for a practical understanding.

What is Market Percentage?

Market percentage is simply the sum of the winning chance calculated for each horse (using the above method.) The table below shows a theoretical ten horse market sorted from highest winning chance to the lowest winning chance. Against each market price you can see the % winning chance and how much you would need to bet on that horse to collect \$100

Price	Win %	Bet	Return
\$2.80	35.7%	\$35.7	\$100
\$4.40	22.7%	\$22.7	\$100
\$8.00	12.5%	\$12.5	\$100
\$8.00	12.5%	\$12.5	\$100
\$8.50	11.8%	\$11.8	\$100
\$10.00	10.0%	\$10.0	\$100
\$31.00	3.2%	\$3.2	\$100
\$31.00	3.2%	\$3.2	\$100
\$51.00	2.0%	\$2.0	\$100
\$101.00	1.0%	\$1.0	\$100
	<u>114.6%</u>	<u>\$114.6</u>	

There are a few things to note about market percentage and this example:

- The total of all winning chances as expressed by this market is 114.6%. Another way to look at it is to see that if you backed every horse to collect \$100, you would need to outlay \$114.60... obviously a losing bet. If market percentages were less than 100% it would mean punters could back every horse in the market and make a profit, regardless of who the winner was.
- As mentioned above, at any point in time you take a snapshot of a betting market, the sum of chances will be greater than 100%. This means that on average, the real winning chance of each horse is slightly less than the percentage indicated by the market price. The total percentage in excess of 100 is the margin in favour of the wagering provider (sometimes called the 'overround'.)
- The higher the market percentage the greater the average gap between each horses expressed chance of winning and their actual chance of winning. Sometimes you will hear or read about punters complaining about high market percentages and that's because they create a greater advantage for bookmakers.
- Conversely, the lower the market percentage the closer each horse is on average to its true winning chance and the better it is for punters.
- On average horses that are shorter in the market tend to be much closer to their real chance of winning than horses longer in the market. This is called the **favourite-longshot bias**. It's a common characteristic of most betting markets across the world (Google for further information.)
- For example, backing every horse at \$2.80 in the market would result in a loss on turnover of around 4%. The market price is on average quite close to the real winning chance. To make a profit you theoretically only need to find cases where the market has made a mistake in its price of 5% or more.
- Compare that to horses \$15 in the market. If you backed every one of them you would lose 20% on your turnover. To profit on these horses you theoretically need to find cases where the market is making a mistake of more than 20%. It's easy to see that making a profit on shorter priced horses is on average easier than longer priced horses.

BETTING CONCEPTS

How do you make a profit from betting?

This may sound like a silly question, but it's easy to overlook the fundamental concept of profitable betting. You make a profit from betting when on average:

The horses you back win more often than the probability expressed by their market price.

It doesn't matter how much you like a horse as a betting prospect. The essence of successful betting is being able to back horses where the real winning chance is greater than the winning chance expressed by the market price. This should be at the forefront of your mind in every betting decision you make.

What is Value?

Value is the term used to describe the relationship between a horse's winning chance as expressed by the betting market (and described above) and its real winning chance.

- ✓ **Good value** means the horse's market price is greater than the horse's real chance of winning (often referred to as "over the odds.") For example, a horse at \$2.80 in the market (implied 35.7% chance of winning) that is actually a 40% chance of winning (implied \$2.50 market price), is considered good value. \$2.80 is considered "over the odds" as the correct price should be \$2.50.
- ✓ **Poor value** means the horse's market price is less than its real chance of winning (often referred to as "under the odds.") For example, a horse at \$3.00 in the market (implied 33.3% chance of winning) that is actually a 28.6% chance of winning (implied \$3.50 price), is considered poor value. \$3.00 is considered to be "under the odds" as the correct price should be \$3.50.

Of course the "actual winning chance" of a horse is very much a subjective concept. What one punter views as good value will be viewed as poor value by another punter. It's only through a very large sample of bets or assessments that you can start to ascertain whether your overall judgement about value is correct or at least sufficient enough to show a profit.

What is the value edge of a bet?

A natural extension of the concept of value is to understand the value edge offered on a particular horse. It is calculated by the following formula:

(Real % chance of winning x Market Price) minus 100

For example a horse that has a 40% chance of winning (implied correct price of $100 / 40 = \$2.50$) that is available in the market at \$2.80 is providing a value edge of $(40 \times 2.80) = 112 - 100 = 12\%$ edge. In the long-term you would make 12% profit on turnover betting in this scenario (assuming your judgement is correct.)

A horse with a 33.3% chance of winning (implied correct price of $100 / 33.3 = \$3.00$) that is available at \$2.70 in the market has a value edge of $(33 \times 2.70) = 89.9 - 100 = -10.1\%$ value edge. In the long-term you would lose 10.9% on turnover betting in this scenario.

MEASURES OF BETTING RESULTS

What is Strike Rate?

There are two basic types of strike rate measures:

- **Individual Strike Rate** = *(The number of collects / the number of runners backed.)* For example if you back 25 winners from 88 bets then your individual strike rate is $25 / 88 = 28.4\%$
- **Race Strike Rate** = *(The number of collects / the number of races bet in.)* This is the most relevant measure if you back more than one horse in each race. For example, you may have 88 bets in 65 races and back 25 winners (as above). Your individual strike rate is still 28.4%, but your race strike rate is $25 / 65 = 38.5\%$.

Strike rate not only applies to your personal betting, but any factor in racing has an associated strike rate. For example we may look at a history of a jockey's rides as see that he or she has 21 winners from 132 rides, which is a 15.9% strike rate.

Similarly we could research all last start winners and determine that individually they have a 17.1% winning strike rate. However because there can be more than one last start winner in each race, they have a 30.5% race strike rate. In other words, 30.5% of races with at least one last start winner are won by a horse with that trait.

What is Profit on Turnover?

Profit on turnover (POT) is calculated by the following formula:

$$((\text{Total Return} - \text{Total Outlay}) / \text{Total Outlay}) \times 100$$

For example, if you had a return of \$15,500 from your bets against a total outlay of \$12,500, then your profit on turnover would be $(\$15,500 - \$12,500) = (\$3,000 / \$12,500) \times 100 = +24\%$ profit on turnover.

If you have made a loss on your outlay, then the profit on turnover result will be negative, which is referred to as a loss on turnover.

As is the case with strike rate, individual racing factors can also have an associated profit or loss on turnover, when we analyse them with theoretical betting amounts.

For example, if we simulate backing every one of Hugh Bowman's metropolitan rides from 1/8/2015 to 22/10/2016, using a bet size to collect \$100 based on the starting price of each horse, the result would be a +1.9% profit on turnover. When you consider the result of backing all horses in the market using the best of SP and three totes is a dividend is -9%, a jockey that has returned +1.9% is a very good result. It means he / she has won more often than the market price of their horses suggested.

Analysing the strike rate and profit on turnover of different factors including jockeys, trainer, barriers and other form angles is a big advantage in building knowledge that can help you to make more profitable betting decisions. You've seen some examples of this in our articles on betting insights at tracks such as Caulfield and Moonee Valley. In the future we will do a more specific article that discusses the concept of studying racing factors and using that knowledge to help increase your betting success.

WRAPPING UP

This article touched on some of the most basic mathematical concepts related to betting, but they shouldn't be overlooked or taken for granted. Each of them has a role to play in helping you to make good betting decisions, understanding your results and maintaining a healthy state of mind as a punter. It's this knowledge that develops the foundation on which your long-term success will be built.

Smart punting!

Daniel