

## Ellenberg, Jordan – How Not To Be Wrong

Penguin Books, 2014, [Surrounding knowledge] Grade ★★★★★

Part of the daily life as an investor is about making choices between alternatives. Is this stock at a more attractive valuation than that? Shall I buy, shall I sell or do nothing? A famous quote is: "*investment is an art not a science*", which doesn't mean that math is not needed, but instead that it's unlikely for anyone to become a successful investor by just looking at the numbers. Finance professor and value investor Aswath Damodaran describes people as either number crunchers or storytellers but insists that you need to tackle both to become a good investor. The book *How Not To Be Wrong* is focused on math but it's also likely to help you improve your storytelling capabilities.

The author, Jordan Ellenberg, is an American mathematician and writer. He has competed in the International Mathematical Olympiad three times, winning two gold medals and one silver medal. He has been writing about math for a general audience for the past fifteen years and he has penned pieces for many of the largest newspapers in the US. Ellenberg has also published two books where *The Grasshopper King* was his first.

*How Not To Be Wrong* is structured in five chapters describing linearity, inference, expectation, regression and existence. There are further sub-chapters where different real-world situations are described to clarify the subjects.

Some of the nuggets from the book are the description of a lottery called Cash WinFall which at some points had a positive expected value for the buyers. Some mathematically minded people noticed this and took advantage of the favorable odds in the game. As the author writes: "*If gambling is exciting you are doing it wrong*" - but in this specific example the opposite was true. Another gem is the story about the mathematician Abraham Wald who during World War II got the question from the US military on where the amount of armor on the air fighters should be strengthened. He was widely expected to answer to strengthen them where the bullet holes of the surviving planes were, but

instead answered that the armor should be placed on the parts which were not hit on the surviving planes arguing that the destroyed planes were likely hit on those places, namely the engines. This is an example of survivorship bias. It is also an example of inversion where thinking like a mathematician, to prove something by showing that what can't be true, often gives us the right answer. The author brings up a profound quote from Sherlock Holmes on the topic: "*It is an old maxim of mine that when you have excluded the impossible, whatever remains, however improbable, must be the truth*".

In science, statistical significance is a method used to distinguish if a hypothesis is true or false. It may be hard for the scientist to accept that a hypothesis failed and that the result was negative, wasting years of scientific work as the scientist is not rewarded for unsuccessful studies. This is an example of bad incentives. Similarly, it's hard for the investor who has put a lot of work into analyzing a stock, to accept that the numbers don't add up and move on to the next opportunity. By tweaking some numbers in the excel spreadsheet it may look like a compelling opportunity after all - confirmation bias at work. The author also brings up a study of the rate of return of 5 000 funds where the return was 20% higher if the dead funds were excluded which is another example of where it's possible to use statistics to suit the purpose.

For the most part, it's easy to follow the reasoning in the book without knowing much math but in some parts, especially in the later parts of the book, it is a bit more difficult. The examples brought up throughout the book span across a wide spectrum of subjects and in a few examples I thought the point made by the author was a bit incomplete. However, I don't think of this as a great disturbance as the point is brought home anyway.

*How Not To Be Wrong* is another great example of a book that, while not focused on finance, nevertheless is a great source of knowledge for the investor.

Niklas Sävås, March 25, 2018