

How Position Sizing Based on Probability of Returns Can Save Your Portfolio

7 min read • [original](#)

As I was writing this, I got Vitaliy Katsenelson's latest article on [J.C. Penney](#).

If Katsenelson is a new name to you, he is a prominent investor and fund manager in the value investing community. He is also the author of [Active Value Investing](#) where he introduces the [Absolute PE model](#) which I've modified and incorporated into the [OSV Stock Analyzer](#).

The article Katsenelson wrote was based on the errors of investing in J.C. Penney, but the main point he was conveying was the use of probabilities and position sizing.

Something that isn't discussed enough.

What I can say is that by including it into your analysis, your decisions become more systematic, emotionless and low risk.

Investing is a Probabilistic Adventure

I don't think buying the department store chain's shares was a mistake. Investing is a probabilistic adventure: You assess upside and downside probabilities of a potential investment, and if at the end the balance is significantly favorable, you pull the trigger. – [Source](#)

One of the many reasons why Warren Buffett is so successful at what he does is because he is a probability machine. He is able to internally calculate the probabilities of every investment opportunity and act accordingly.

His love for Bridge isn't surprising because it's a game where the most successful players are able to judge mathematical probabilities to beat their opponents.

Same concept with poker.

Not only are you forced to bet based on the probabilities, a strong mental state is required to win at it.

David Einhorn is an avid poker player, even going to Las Vegas to participate in poker tournaments. One thing that he wrote was that every investor should play poker, just to learn about themselves.

Poker tends to bring out your inner enemies to the surface.

- If you believe that you are good at analyzing, poker will show you that you suck
- If you believe that you are able to keep calm in the face of losses, poker shows you that you suck
- and the list goes on

My tip is for you to download a poker game on your phone or play it from facebook and play like it's real money. Then you'll see what you need to work on when it comes to investing too.

Back to probabilities.

The Forgotten Analysis of Looking at Probabilities

Let's say you found a hidden gem, read the reports, identified the risks, listened to management, and calculated the intrinsic value.

Everything points to a buy.

So what happens next?

An order is placed based on how confident you feel about the company.

But there is an additional step that gets forgotten just before the buying phase.

What Buffett says is that you should weigh the probability that certain events will or will not occur.

Simple Probability Questions You Should Ask Yourself Before Buying Anything

Let's look at Apple (AAPL).

As a shareholder, I argued that **Apple is not worth \$460**. The way I did it was by using reverse stock valuation with the **stock analyzer** to see what the expectations of the stock were.

By running **reverse valuations**, you are forced to think and answer simple probability type questions.

- What is the chance that the stock price is due to a deterioration of the business?
- What is the probability that Apple will not be able to meet the market expectations?
- How likely is it that growth will be negative?
- What is the likelihood that FCF will grow xx% over a 5 year period?

Simple questions that a professional analysts wouldn't bother asking.

But these are fundamental questions to make rational decisions.

Thinking in terms of probabilities has its advantages. You end up focusing on the longer term instead of quarterly or annual numbers.

I could have easily answered the question of "*will Apple exceed market growth expectations this year?*" with a no, ultimately not buying the shares.

But when you articulate the question, it ends up coming out to be something like "*will Apple exceed current market growth expectations in the next 3 years?*", my answer turns into a yes, and I'm more than happy to hold and ignore the short term noise.

A More Concrete Probability Calculation with InfuSystem

A practical example of applying probabilities comes from analyzing **risk arbitrage special situations**.

Let's pick apart my failed **arbitrage in Infusystem (INFU)** to see what I mean.

Current Price	\$1.70	% Upside
Bid Range	\$1.85	8.1%
	\$2.00	15.0%
Realistic Ranges	\$2.25	24.4%
	\$2.50	32.0%
	\$2.75	38.2%
Current Price	\$1.70	% Downside
Failed Bid	\$1.50	-13.3%

INFU Outcome Table

This table shows how I viewed the end result. I placed a bet that there was a 70% chance of the deal going through and doubled down.

Boy was I wrong about that.

For what it's worth, once the buyout was canceled, the stock price did fall back to \$1.50 on the first day, but with disappointed investors, the stock price fell to as low as \$1.30.



INFU after the Buyout is Canceled

If something like this happens to you, your gut tells you to take the loss and walk away.

It's what most people think as you can see from the comment I was getting.

A screenshot of a social media comment thread. The first comment is from a user named 'Old School Value' who has a 'Mod' (Moderator) badge. The comment says 'happy to have a 10% position. Cheap, catalyst. Still hold plenty of cash.' Below the comment are icons for upvote, downvote, and options for 'Edit', 'Reply', and 'Share'. The second comment is from a user named 'fata' and says 'funny you use the word "still", your subconscious mind already knows what's going to happen, your conscious mind is still in denial and needs a bit more pain before it learns.....' This comment also has upvote/downvote icons and 'Reply'/'Share' options.

Use people's reaction as a contrarian signal

My bet that the deal would go through was incorrect, but my bet that InfuSystem was worth more was not.

The investor trying to buy out InfuSystem offered a lowball offer of \$1.85 to \$2.00. Management came back and said the business was worth more.

So in this case, which probability is higher?

- Probability A: Stock is worth less than \$1.50
- Probability B: Stock is worth at least \$1.85

I placed more odds that option B is correct and bought a little more during the fall.

As mentioned before, thinking in terms of probabilities helps you stay focused and see beyond short term cycles and criticism.

But Your Probabilities are Wrong

In case I'm drawing up a dreamy picture of limiting downside by slapping on probabilities to everything, I want to bring up some realistic view points.

Probabilities are going to be incorrect most of the time.

In Katsenelson's article, he mentions that he thought J.C. Penney had a 70% of tripling versus a 30% chance of dropping 40%.

We believe position sizing should be driven not by reward but by risk. J.C. Penney had a terrific upside, but it still had a 40 percent downside, with a meaningful 30 percent probability. However, when we sold the stock at a loss, the impact on the total portfolio was less than 1 percent.

The trouble is that quantifying 70% or 30% is impossible.

Random events cannot be quantified.

Then what's the point?

The alternative method that I apply is by determining what the max upside and downside is.

I did it in the InfuSystem case.

Here it is again.

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INFU Upside vs Downside

If ever I need to quantify a probability, I make sure that I know what the upside is versus the downside.

In this case, it was a 30% upside compared to a 13% downside.

Breaking it down like this then makes the decision of how much to buy easier.

Probability of Returns and Position Sizing

This all ties in together with *position sizing*.

Positions are bought in two ways.

1. Systematically following a rule or
2. Gut feelings and confidence

The most common way of building a position is option 2.

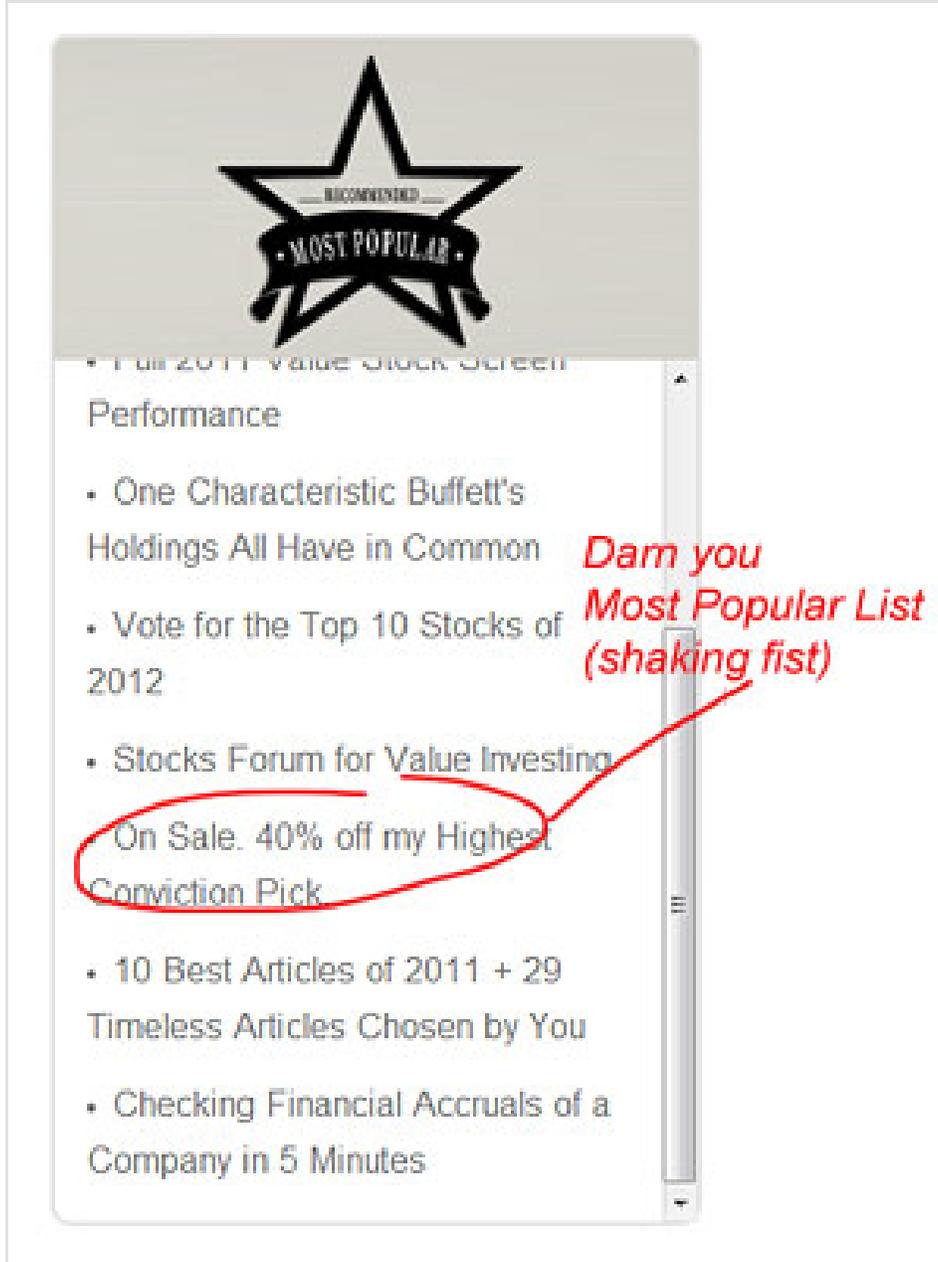
When I came across [Dacha](#), I dreamed of the profits I could be making with this stock.

Long story short, it was one of my worst picks and also one of my worst position sizing.

Instead of performing the probability check and then applying a position size accordingly, my eyes flipped over in greed, and I bit off way more than I could chew.

I sold at a mega loss.

In fact, that post is still listed as #8 on the most popular posts on the blog page. I'm ashamed that it's still there, but it's a sober reminder to screw my head on the right way.



my wall of shame

Thankfully, my position sizing has improved drastically since.

Going back to Katsenelson's thesis on J.C. Penney, he saw that the upside was 300% vs downside of 40%.

A possible drawdown of 40% for any stock is a high risk stock, but with a tempting upside of 300%, it would have been tempting to load up and build a massive position. So I applaud Katsenelson's ability to not be led astray by the upside and to limit the impact to his portfolio to less than 1%.

Here's some more insight into how he sizes positions now.

Each company in our portfolio gets a rating for the quality of its business: the size of its moat, the strength of its balance sheet, how it fits in its industry. We assess its management in two dimensions: how good it is at running the business (building moats around it) and at allocating capital. Last, there is an X factor, where we judge business cyclicality, complexity and transparency (banks, for instance, would never get a high score there). Then we balance the totality of these factors against the cheapness of the stock: Should we take a starter position or a full position?

The Kelly Criterion for Portfolio Allocation

If you want a more mathematical approach, check out the Kelly Criterion.

It was first widely used by the gambling society but has since spread to the investing community as well.

It's a formula that will tell you how much you should put into a single bet or position based on your stock winning probability and win/loss record.

Here's a [Kelly Criterion calculator](#) you can use for position sizing.

For extra reading, here is one from Investopedia that dives into the [details of the Kelly Formula](#).

For Wall Street also discusses a practical way of applying the Kelly Formula based on Mohnish Pabrai's *The Dhandho Investor* which I also list as a **top 15 book to read**.

Ultimately the Price You Pay is the Most Important

Quantifying events is something that you need to think about, but close to impossible to get right.

Where does that leave you?

The only thing that you do have control over with a realistic chance of applying probabilities is the intrinsic value.

Too many investors purchase stocks without knowing what they are buying and what it's worth. Whatever the next person says is the intrinsic value.

That's where the [OSV stock analyzer](#) comes in as well as the other [free spreadsheets](#) and [calculators](#) I have up for you to use. By calculating the stock value and knowing what it's worth before buying, it makes it easier to size your position.

I don't bother reading what others are saying Apple is worth. All I know is that it wasn't worth \$460 when I bought it.

It's worth more.

InfuSystem wasn't worth \$1.30 when it hit bottom this year.

It's worth more.

On the flip side, I'm afraid to say the same thing for LinkedIn (LNKD) or Netflix (NFLX). The downside is just as real as the upside with equal probabilities on the downside.

Tesla could do no wrong for investors. The consensus was that hitting \$200 was a 100% probability. Downside was 0%.

Learn from my mistakes and start applying probabilistic thinking into your analysis.

It ties directly into position sizing, and you will definitely see less drawdowns and save your portfolio from the possibility of a blowup due to one mistake.

Tell me Your Position Sizing Method

Leave a comment because I'm interested to hear your thoughts. Do you analyze in terms of probabilities?

How have you been sizing positions?

Original URL:

<http://www.oldschoolvalue.com/blog/investing-strategy/position-sizing-probability/>