Peoples' FinTech Expectancy Calculator

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What is expectancy?

The old Wall Street saying of "buy low sell high" is rather romantic, but in reality, trading is much more complex. Which of the many potential evaluation methods is the most effective in determining the success of a given strategy? In his book Trade Your Way to Financial Freedom, Dr. Van Tharp states, a trading system is not considered a complete system if it does not consider any of these six essential aspects:

1. Reliability or the percent of winning trades
2. Reward-to-risk ratio measured in multiples of the initial risk taken on a given position also known as R. If this value is unknown, it can be estimated as the average loss of the system.
3. Cost of trading
4. Frequency of trading
5. Position sizing algorithm which optimizes returns on trades, while allowing the system and trader room to tolerate a string of losses.
6. Size of equity

Expectancy, much like expected value in statistics, is the expected return for every dollar risked over a large number of trades. Expectancy encapsulates three of the six aspects: reliability, risk-to-reward ratio, and the cost of trading.

Expectancy = (average profit/trade)/(average loss/trade)

A trading system will typically have a set maximum loss per trade known as a stop loss. In fact, this is part of any complete trading system, but in reality, it is not uncommon to experience losses greater than planned, such as in cases when the market gapped, as a result of slippage, or not sticking to the plan. Whatever the cause may be, in situations where evaluation is being done after the fact, one would calculate the average loss as an approximation of R as previously mentioned. One R and average loss are interchangeable in the above formula.

Why it matters?

Traders often fall for common traps that understanding expectancy can help avoid. Specifically, there are a number of natural psychological biases that can affect a trader if emotions are allowed to set in. Namely, there is often a strong desire to be "right", which in turn heavily favors systems with high reliability. However, consider the following example: A system makes a profit of 1R 80% of the time and loses 10R the other 20% of the time. The system is correct 80% of the time, yet the expectancy of the system in the long run is -1.2R. This means that on average, after many trades, one would expect to lose $1.20 for every $1 risked.

Another trap traders can fall into when ignoring expectancy is a misinterpretation of the law of large numbers: thinking that the chance for the next trade to be a winner is greater because it follows a long string of loses. The correct interpretation of the law of large numbers is that over a large number of trades the net effect of each individual trade will approach the system average, yet, each trade is an independent event. It can be tempting for a trader to bet against one's own system, especially in systems with low reliability, the logic being that a trade taken in the opposite direction of the system signal would have resulted in a win. This can be tempting when a system has low reliability. However, as previously shown, high reliability and profitability are not necessarily equivalent.

The Tool

People's Fintech has developed an expectancy calculator to serve as an evaluation metric for trading strategies and as a trader education tool. In its current form, the user provides a list of profits and losses for a given trading system by either manually inputting data into the web interface or by uploading a csv file. The calculator will then output the R value for the system based on the average loss and graph the expectancy of the system over a moving window. The default size for the moving window is 30 trades, but can be customized. Assuming a windows size of 30 points, with each new trade, the expectancy is calculated for the last 30 trades and plotted.

It is necessary to point out that trade data should be transformed as necessary so that profits and losses are in points of whatever market was traded in in order to understand the behavior of the system independent of position size.

Expectancy in Action

      As a case study for using the Expectancy Calculator tool, trade data was analyzed for a couple of trading systems. One system is the "Simo Expert Long Term" strategy, published on myfxbook.com. The other strategy is an in-house proof of concept strategy based on a YouTube presentation by Joseph Nemeth. Both automated strategies traded the Euro-Dollar spot forex pair.

      Why were these two strategies chosen? The in house strategy was previously developed and traded live. It then became a natural candidate for testing the expectancy calculator. Subsequently, "Simo Expert Long Term" was chosen because it traded the same market and had published its trade data. Again, the purpose here is to show the Expectancy Calculator tool, not a showdown between the sample strategies.

Estimated R: 76.34
O'all Expectancy: 0.07 R
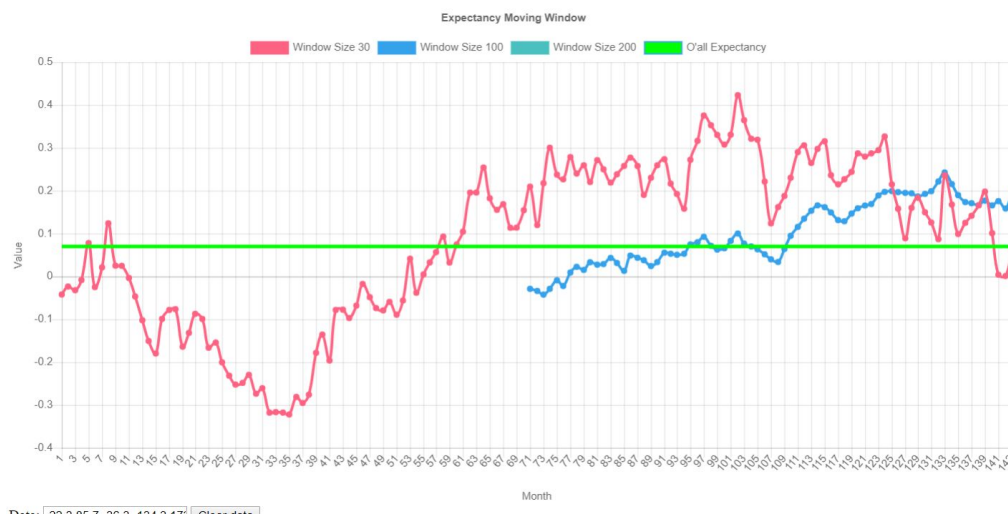
Expectancy Calculator Results for "Simo Expert Long Term"

File Name: Dummy Data
Estimated R: 8.27
O'all Expectancy: 0.11 R

Expectancy Calculator Results for in-house strategy

The most immediate and important takeaway is that the Expectancy Calculator provides a way to quickly measure if a strategy can be profitable in the long term. A strategy must have a positive expectancy to be profitable in the long term. A strategy with a negative expectancy may be profitable on individual trades and may even turn a profit over a short period, but will always lose money over a long enough period. As indicated by the green line in both graphs, we see that the overall expectancies of both strategies is positive and looking at the actual trade data we see that both strategies were profitable.

Looking at the graphs of smaller sized moving windows, we see the expectancies vary significantly. It is expected that a single new trade will more significantly affect the expectancy of a smaller sample than a larger one. The graphs can give insight as to the stability of one strategy as compared to another in cases when one strategy's graph is flatter than the other. Also, the graph can track expectancy through different market regimes given enough data.

Further analysis of trade data and the graphs provided by the calculator can allow traders to classify their strategies and potentially learn from other strategies which exhibit similar characteristics. For example, the in-house sample strategy exhibits classic characteristics of a scalper strategy, where most trades offset each other with small profits and losses, and the occasional larger winners make the overall strategy profitable. The expectancy graph for the in-house strategy for the 30 trade moving window is centered around 0.05R, with only seven of 165 data points having an amplitude outside of the range 0R to 0.1R.

Conclusion

While this tool is still under development, it can help traders analyze and optimize their strategies. Furthermore, the Expectancy Calculator helps visualize the significance of expectancy as presented by Dr. Van Tharp. Position sizing and available equity can only perhaps postpone the inevitable ruin of trading a strategy with a negative expectancy; it can never make it profitable. Moreover, be wary of the bias towards reliability amongst other potential traps. The most important results the expectancy calculator can provide are determining the profitability of a system, helping traders steer clear of potential traps, and helping traders learn more about the systems which they have implemented. I would like to thank Peoples' FinTech for giving me the chance to learn more about trading strategies and the forex market during my time as an intern.

Links
Expectancy Calculator: **https://roni762583.github.io/peoplesfintech.github.io/ec.html**