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> ***"The solid wealth of insurance companies and the success of those who organize gambling are some indication of the profits to be derived from the efficient use of chance."***
> ***— Edward De Bono***

Years ago, the motivational guru Tony Robbins came to visit my office, searching for the attributes of successful options trading. I was nervous about making a good impression. After all, he was the expert on success who wrote the book on getting the edge. What advice could I possibly offer? During the interview, it occurred to us both that the "secret sauce" of trading is similar to the required attributes of any profitable business. It must have a definable and consistent "edge", it must be hard for others to harvest (even if the basic business concept is easy) and it requires relentless discipline.

Investors everywhere are clamoring for the formula, the secret sauce, to trading options profitably. There is a ton of solid research and information about all aspects of investing, including options trading. This ranges from complex and obscure mathematical formulas to simple call overwriting strategies. The trading methods and secret sauce are widely available. But that is not how profits are generated. *How* is not the primary issue.

The trading edge (the "how") is certainly important. But to be profitable we have found that one needs much more than just a trading edge.

If "how" were the answer, everyone would be successful. Yet many investors struggle because it is hard to follow through. Just as there are numerous funds, strategies and trades, there are numerous coaches promoting fitness, exercise and self-improvement. The "how" is relatively straightforward, the difficulty is sticking to it. In trading, as in many other pursuits, it is the combination of edge with execution, implementation and discipline that is crucial to success. Small edges can seem insignificant for prolonged periods and yet can have extraordinary payoffs over time.

Discipline and Time

The key is discipline and time. Without a good estimate for expected time to success, discipline is much harder. Without knowledge of waiting times, a loss creates doubt, emotions take over and failure manifests itself.

Casinos play the odds, manage risk and succeed over time. If they fight the odds or are lax in managing risk, they eventually fail. A casino must not shut down its roulette table when a patron spins red three, four or five times in a row. It must stay disciplined and allow profits to materialize over time. The house edge (the "how") can only materialize when combined with discipline and time.

But there is a problem with discipline and time: *we don't have endless time*. It is hard to be patient. Often we do not know how long we need to wait before profits appear. Without a clear understanding of the expected waiting time, it is difficult to remain disciplined.

Many real life trading and investment strategies are similar to repeatable casino bets. The trading edge, no matter how good, is invariably accompanied by volatility and randomness. A single spin of the roulette wheel will lead to an unpredictable result, but, when spun multiple times, the results become predictable. A single positive edge trade may show unpredictable results, but positive edge trades repeated over time are profitable.

Be it in nature, a casino or trading, many times unpredictable single events can lead to predictable patterns when repeated. In other words, order and predictability can arise from random unpredictable single events over time.

Erwin Schrödinger referred to this as the principle of order from disorder.

When does this order materialize? How many trades or spins of the roulette wheel must we observe before the edge dominates the short-term noise? In short, how long should we reasonably expect to wait before a great trading strategy proves itself? Knowing helps calibrate the expectation and discipline.

An example from the gaming industry is instructive. It also illustrates that the waiting time, even for high edge trades, is longer than most would guess.

Imagine an opportunity to invest in a casino that operates a roulette wheel and suppose every day someone bets exactly $1,000 on red or black. If the roulette wheel has 18 black, 18 red and one green, the house edge is 1/37 or 2.7%. The P/L on any given day can be up or down $1,000. Over many days, the P/L will show volatility in either direction, including strings of losses and gains. Viewed over short periods, the investor may not have the discipline to stick to it.

Over time, the house should make an average of $27 per day. However, there is no guarantee the house will win on any single day, week, month or longer, even though it has a clear, mathematical edge.

Let C_n be the cumulative payoff to the house after n days. The expected value and standard deviation of this cumulative payoff are given by the following:[1]

$$\mathbf{E}[C_n] = nb(2p - 1)$$

$$\boldsymbol{\sigma}[C_n] = 2b\sqrt{np(1-p)}$$

where b is the bet size and p is the probability the house wins ($1,000 and 19/37 in this case).

On a single day, the house payoff is highly variable. While the house expects to make $27 per day, the first day variability is a much larger $1,000. A single day is not enough time to distinguish the edge from the noise. An analysis of the "information ratio" can help answer how much time is necessary until the casino is confident the edge will dominate the short-term noise.

The information ratio is simply the expected value of the payoff over its standard deviation (this is analogous to a non-annualized Sharpe ratio with a 0% risk-free rate). In this example, the ratio increases with the number of days. The ratio after the first day is 0.027 but is 0.191 after 50 days.

Number of Days	Expected Cumul. P/L ($)	Standard Dev. Cumul. P/L ($)	Information Ratio
1	27	1,000	0.027
10	270	3,161	0.085
25	676	4,998	0.135
50	1,351	7,068	0.191
100	2,703	9,996	0.270
365	9,865	19,098	0.517

After many days, this ratio becomes large enough that the profits greatly dominate the volatility.

Most consider an information ratio of 1.0 as indicative of good performance and confirmation of strategy viability. How many days must we wait before seeing a ratio of 1.0? It takes 1,368 days, or **almost four years**, for the ratio to be equal to 1.0! Of course, the waiting time is less if you have more than one spin per day.

[1] The cumulative payoff C_n follows a variation of the binomial distribution.

Many investors seek a ratio of 1.0 as it provides confirmation that the business edge dominates the noise. This example shows that investors must wait a long time even in businesses where the edge is clear and unchanging!

The practical ramification is that the waiting time required for the house edge to show up in the data can take a long time. The "story", no matter how compelling, will generally not match the results until much later. In this example, "the order from disorder" takes four years to materialize.

Many of us would invest in the casino game because the story "the house always wins" is compelling. Without knowing that it takes many years for the results to match the story makes it hard to stay disciplined. Investment strategies are much more complex and volatile than this simple casino game. All investments, ranging from passive index funds, fundamental stock picking to the most esoteric hedge fund, have expected waiting times that can be estimated in advance. Even a business that has a clear sustainable edge can take multiple years to be confirmed by the data.

Today, banks are retrenching from traditional risk trading functions across multiple asset classes. This presents one of the most dramatic and compelling business opportunities in decades. Those who are able to "be the house" today will reap enormous benefits in the years to come. As the motivational gurus would say, the key is discipline and time.

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