Strengths and Limitations of Technical Analysis

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Market Price Movements

Some people think that market price movements are "normally" distributed and independent. Converting prices into a series of percent changes and plotting a histogram of them clearly shows (as Mandelbrot asserted [1]) that market price movements resemble a power-law (Laplace) or a Cauchy distribution. This distribution appears consistently on all time scales. The Laplace and Cauchy distributions are nothing like a Gaussian distribution, but the myth of normal distribution persists.

As far as market price movements being independent (random) events, calculation of the Hurst exponent shows that they are not independent [2], and that past prices do have an effect on current prices [3]. In other words, market price movements are noisy but they trend. It turns out that market price movements are neither random nor predictable (in any absolute way). This may seem contradictory but is explained by recently discovered mathematical concepts. These concepts, which have been developed in the last 50 years, will be discussed in the next section.

Price movements in the past affect the present because markets have memory. Markets have memory for the simple reason that markets are people. Even when computers are making the trades, the computer programs are based on the beliefs of the people who wrote them.

Markets are people; people have memory; therefore markets have memory.

Since markets have memory, market price movements are not independent events (Bernoulli trials). What happened yesterday <u>does</u> have an influence on what will happen today. This is what causes market price movements to trend and it is why they are not random.

Looking a little deeper, markets are complex systems (i.e., examples of complexity theory), so they are continually changing and cannot be predicted in any sort of absolute way. Nonetheless, because market price movements have memory and they trend, one can meaningfully describe market behavior in terms of probabilities. This means it is possible to determine what is <u>likely</u> to happen next [4, 5].

Complexity Theory

Complexity theory is closely related to chaos theory (so closely related that it is very easy to conflate the two). Here is the critical difference. A chaotic system is driven by a deterministic process that produces apparently random results. Complexity is driven by the confluence of a large number of independent forces which also produce apparently random results. (Complexity theory is sometimes referred to as the "edge of chaos" because mathematically it falls between chaotic and deterministic systems.)

Complexity theory has a number of branches. The one we are most interested in is referred to as CAS (Complex Adaptive Systems). The essential elements of Complex Adaptive Systems [6] are:

1. There is an interconnected network of autonomous agents (also called *actors*).
2. The agents are all pursuing their own objectives.
3. The agents are aware of each other.
4. The agents adapt to each other's actions.

A key characteristic of Complex Adaptive Systems is that they produce emergent behavior which cannot be inferred from the behavior of their components. In other words, Complex Adaptive Systems are perpetually novel and therefore unpredictable in any absolute sense; however, with accurate data and the right tools it is possible to make reasonably accurate probabilistic predictions.

Complex Adaptive Systems are also referred to as "self-organizing systems". A self-organizing system is one that achieves a state of order or recurring equilibrium without being guided or managed by any centralized authority or source of control. In many kinds of self-organizing systems, the orderly state is transient—in other words, the system alternates between order and disorder. (This falls in line with what economist Hyman Minsky said about periods of stability leading to periods of instability [7] in economics.)

The agents in a self-organizing system interact under general rules and/or environmental constraints. They may operate independently of each other. They may cooperate or they may compete. Some may form temporary or even durable alliances.

The agents of self-organizing systems adapt to each other's actions. The result of their actions and adaptations creates a complex network of interactions, which alters the environment. The change in the environment requires further adaptation on the part of the agents, which again changes the environment. This circular pathway of cause and effect is called a *feedback loop*. Continual adaptation and feedback results in a perpetually novel environment[8].

A simple example of a self-organizing system is the predator/prey relationship within a given geographic area, for example, wolves and their prey in an isolated valley. If the number of elk, moose, deer, or other prey animals increases, then after a time there will be a commensurate increase in the wolf population. When the wolf population becomes too large or there is a drought or other negative occurrence, the number of prey animals decreases. In time the wolf population must decrease, also.

The changes in the populations are never quite in sync, and never at equilibrium except on the way from one state of imbalance to the other. A surplus of prey animals leads to an increase in the number of wolves a year or two later. After a time, the excess of wolves leads to a reduction in the number of prey animals. Then there is not enough food to support the larger wolf population. Soon the wolf population dwindles and the prey animal population starts to build up again. This is an example of the *feedback loop* I mentioned earlier.

If an observer monitors what is going on in the valley for a long enough time, it becomes relatively easy to know what phase each of the populations is in. As in the capital markets, we see it is possible to make probabilistic predictions about where things are going, but absolute predictions seldom work out.

Technical Analysis

Technical analysis focuses on understanding market forces. Lots of people like to make fun of technical analysis. They compare it to reading tea leaves and say, "See? It doesn't predict the future."

But the true goal of technical analysis (TA) is not to peer into the future; it is to scrutinize the present. The primary role of technical analysis is descriptive, not predictive.

A byproduct of TA is insight into what is likely to happen next. Knowing what is happening now cannot tell us what will happen next — for that is unknowable — but it helps determine the odds of various outcomes. If one rigorously sticks to the business of figuring out what is happening now, then **afterwards** one can develop a reasonably good picture of what is likely to happen next. As one veteran technical analyst put it:

> …indicators and technical analysis cannot forecast future price moves, they can only gauge all known information that is built into the price series. However, using technical analysis can be very useful in mitigating risk and increasing higher-probability outcomes. — Brett Golden

There are always charlatans and swindlers who learn the jargon of TA but not the correct methods. They pretend to do technical analysis and promise to foretell the future. They fill their pockets with money from desperate and gullible people, and provide ammunition to the critics who say that technical analysis is a sham. But the critics of technical analysis sometimes employ distortions and sophistry, so neither the pretenders nor the critics can be trusted.

How Technical Analysis Really Works

The first task of technical analysis is to identify trends in market price movements. The second task is to identify turning points. TA focuses on trend detection because whatever has been happening in the past tends to continue happening. As Tony Sagami puts it, "…trends in motion tend to keep moving until they’ve run their course." In the markets, trends continue until there is a shift in the expectations of the market participants. That is when identifying turning points becomes important.

Identifying trends is not simple. Since markets are Complex Adaptive Systems, they never go anywhere in a straight line. The constant changes in direction make it hard to tell the difference between run-of-the-mill gyrations and significant turning points. Technical analysis has tools for telling the difference between meaningful movements and inconsequential noise. Learning how to use those tools requires both study and practice.

Technical analysis works as long as we avoid the pitfall of letting our personal opinions interfere with our interpretation of what the market is telling us. The big danger in technical analysis is becoming distracted from what is happening now and starting to make guesses about what you think will happen next. As soon as you think you have figured out what will happen next, it clouds your vision of what is happening today—this minute—and it biases your interpretation.

Technical analysis will not tell you what will happen next year or next month, or even next week. It only tells you what is going on NOW. Once you really understand what is happening now, you can begin to make inferences about what is likely to happen next.

Technical Trading

99% of the criticisms I have heard regarding technical trading are based on naïve interpretations of what it is and what it is for. The worst of these is from people who want to use technical analysis for entries and then use conventional investing rules for managing the position once they're in it. You can't sail two boats at the same time.

One function of technical analysis is to provide an edge, a small but distinct advantage in identifying high probability entry opportunities. Another function is to provide an edge in identifying when an advance or decline is showing signs of having run its course. But it is seldom the only tool in the toolbox of the "technical trader".

Technical trading has far more to do with patience, position sizing, and rigorous exit discipline than any attempt to divine the future.

Footnotes

1. *The (Mis)Behavior of Markets*, Dr. Benoit Mandelbrot, Basic Books, 2004
2. *Complexification: Explaining a Paradoxical World through the Science of Surprise*, Dr. John L. Casti, HarperCollins, 1994, pages 102-107
3. "Estimating the Hurst Exponent", Ian Kaplan, 2013, http://www.bearcave.com/misl/misl_tech/wavelets/hurst/index.html
4. Forecasting Expected Returns in the Financial Markets, Stephen Satchell, Elsevier, 2007, pages 219-226
5. A Non-Random Walk Down Wall Street, Lo and MacKinlay, Princeton University Press January 15, 2002
6. "Complex Adaptive Systems", Serena Chan, ESD.83 Research Seminar in Engineering Systems, November 6, 2001
7. "Minsky Crisis", L. Randall Wray, Levy Economics Institute of Bard College, March 2011
8. " Creating an Epidemic of Health with the Internet", Tom Munnecke, September 2000, http://munnecke.com/papers/EOH.doc, Page 91

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Richard Ahrens is a senior market analyst and investing coach with 30 years of experience in financial markets. During that time he has gained an extensive background in trading psychology, decision making under uncertainty, time series analysis, non-Gaussian Levy distributions, and complexity theory. He has worked as an adviser to institutional and private investors and he is an internationally published author of articles on quantitative analysis and technical trading. For many years he was an active member of the invitation-only investors group known as "the Gurus" and his work has been covered in Fortune Magazine and Fast Company. He is currently Director of Research at TrendlineDynamics.com and he can be reached at risk.analyzer@gmail.com.