CHAPTER 1

Foundations

Every autobiography is the fragment of a theory.
—Leigh Gilmore, *The Limits of Autobiography*[1]

The young meteorologist started his computer run and walked down the hall for a cup of coffee. When he returned, the direction of both his life and his science had radically shifted. Ed Lorenz was experimenting with models of the weather on an early desk-sized computer. His research project called for him to input variables for atmospheric conditions and then let the computer grind out future weather patterns according to well-established algorithms based on meteorological laws. On this occasion, he decided to repeat an earlier computation in order to examine longer-term output in more detail. Normally, the computer ran these calculations from beginning to end in one take, but to save time Lorenz decided to start nearer to the point of his interest rather than to redo the entire run. As initial conditions he typed in a line of numbers printed midway during an earlier computation, started the program, and left the room. His coffee break lasted about an hour.

On his return, he expected to find an identical copy of his previous weather simulation, but the numbers now churning from the computer did not match the earlier version. At first he suspected a weak vacuum tube, but on closer inspection of the output he noticed that while values repeated previous results early on, the new numbers being printed out gradually diverged from the old. The difference between the two series

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doubled periodically until finally, near the end of the run, results differed wildly.

> This was enough to tell me what had happened: the numbers that I had typed in were not the exact original numbers, but were the rounded-off values that had appeared in the original printout. The initial round-off errors were the culprits; they were steadily amplifying until they dominated the solution. In today's terminology, there was chaos.[2]

The computer employed six decimal places during computation but printed results to only three. The data Lorenz entered from the earlier printout was off by three decimal places, a very small amount but enough to generate a very large difference in results. Lorenz dubbed this phenomenon the "butterfly effect"[3] to make his point that small changes in initial conditions, even the flapping of a butterfly's wings, could theoretically produce large-scale changes in the weather. "It soon struck me," Lorenz wrote, "that if the real atmosphere behaved like the simple model, long-range forecasting would be impossible."[4] This insight, born of Lorenz's error, ultimately forced analysts to rethink the dynamics of deterministic systems and, in the process, led to a novel line of inquiry now referred to as chaos theory.

This was Lorenz's first inkling that small differences early on could radically alter outcomes. His own career would become a prime example. Had Lorenz followed protocol and begun the program at the beginning rather than in the middle, his role in a new branch of mathematics might have been delayed or perhaps not materialized. But that's life. We all know how small events can lead to important changes. Miss your bus by five minutes and miss the commuter train by an hour. Miss the train, and meet your future wife. Or make the bus and meet your future wife. Sleep in, arrive too late for the interview, and your career path changes. In science, as in life, it often comes down to the smallest details of biography.

Serendipity

My father sat in his recliner, reading the evening paper, dropping pages to the floor as he read them. Sprawled on the carpet—I might have been watching

Flash Gordon or Gene Autry on our black and white Hoffman TV—I began carelessly to read the financial section. Scanning up and down the columns of data, I spotted a stock selling for around $3, a price I could relate to. The company mined silver, and I imagined miners with picks and shovels filling car after car with valuable rocks, like the miners I had seen in movies.

I followed the stock for a few days before I noticed the volume increase sharply, though the price rose only modestly. The same thing happened the next day. For some reason, I became convinced that the stock would triple, and I announced that prediction to my dad. Why a triple? I'm not sure what reasoning, if any, led to that conclusion. In the absence of any method, perhaps I found the symmetry of three times $3 appealing.

Amazingly, the stock moved to $9 within a few days. Of course, it was just a fluke, an odd coincidence with no wider meaning. On the other hand, had I guessed wrong that day, would I be telling this story? A lucky guess on one long-ago summer evening sparked a lifelong interest in the market and, more specifically, in the analysis of price-volume.

What leads us to the methods we eventually adopt for ourselves? What makes us see things the way we do? The answers, it seems to me, are mostly anecdotal. But if an analytical approach is rooted in some accident of biography, how can we legitimize our choice of method? Shouldn't method be supported by rigorous appeal to objective reality?

> I do not know how it is with you, but for myself I generally give up at the outset. The simplest problems which come up from day to day seem to me quite unanswerable as soon as I try to get below the surface.
>
> —*Justice Learned Hand*[5]

Most of us, if asked, would express confidence in an objective reality that lies just below the surface, beyond appearances. Albert Einstein shared that belief, but late in his career he confronted two irreconcilable versions of physical reality. His own theory of relativity assumes continuous space and time, whereas quantum theory introduces the idea that space and time are not continuous at all scales but are finally reducible to indivisible lumps, or quanta. Einstein believed that because each theory offered only a partial account, each was inadequate, and that a deeper mining of reality would ultimately provide a comprehensive narrative superseding both.

However, Einstein was also keenly aware of the limits to our knowledge. He began one of his essays with this sentence:

> Belief in an external world independent of the percipient subject is the foundation of all science.[6]

Einstein could have advanced a stronger, unqualified statement:

> An external world independent of the percipient subject is the foundation of all science.

But he did not. Perhaps he was just being careful, and chose to avoid a murky issue better left to metaphysics. In any case, clearly he, along with Learned Hand, found the notion of objective reality problematic. Nevertheless, each likely accepted as an article of faith, as most of us do, the existence of an "external world independent of the percipient subject" that warrants experience and, at bottom, makes sense.

In the work of Isaac Newton, faith in deterministic rationality reached its zenith. Since laws of motion regulate the position and velocity of a body, if the initial states of both are known, then the trajectory of the body is uniquely determined. The French mathematician Pierre-Simon Laplace penned this classic statement of the determinist creed one century after the success of Newton's *Principia*:

> An intellect which at a certain moment would know all forces that set nature in motion, and all positions of all items of which nature is composed, if this intellect were also vast enough to submit these data to analysis, it would embrace in a single formula the movements of the greatest bodies of the universe and those of the tiniest atom; for such an intellect nothing would be uncertain and the future just like the past would be present before its eyes.[7]

If, like Laplace's demon,[8] we knew "all forces that set nature in motion, and all positions of all items of which nature is composed," we could confidently predict tomorrow's weather, the next winner of the Kentucky Derby, or the path of the market. The problem, of course, is that we are not all-knowing. Our vision is narrow, as if we were peering through a tube. Rather than seeing the world as a coherent whole, what we know, or think we know, consists of a patchwork of ideas, stories, traditions, theories, lists, manuals, folklore, habits, standards, rules of thumb, and procedures.

Because we build explanatory systems out of materials within the range of our own experience, our attempt to make sense of things is mostly serendipitous and necessarily autobiographical. In the end, a particular way of seeing the world, informed by culture and personal history, emerges. What is revealed may not ascend to truth, but—if we are lucky—to a more or less useful way forward.

The Data Set

> The success of any investigation depends on the judicious selection of what is to be observed.
>
> —*James C. Maxwell*[9]

Traders are drawn to all sorts of data, including price-volume, fundamentals, market cycles, and astrology. The amount and varieties of available data challenge our limited ability to process information, so choices must be made. Perhaps out of mere accident, for me the choice of price-volume as the object of research came easily. But now that my choice has been made, or made for me, I will venture a soft defense of my preference.

Skeptics hold that operations based only on observed price changes cannot succeed. Markets are moved by news, they argue, and since, by definition, news cannot be predicted (or it would not be news), price movement cannot be anticipated. It is a short step to conclude that price data are not linked and that price series follow a random walk.

Skeptics fail to take into account that price activity is also news. Traders respond to news of price change just as they respond to other sorts of news. By their collective response, traders forge links between past price data and current price movement. Price data are linked because traders link them.

Of all alternatives, the set of business and economic data is the most broadly accepted, in part because fundamentals sport a data set larger and more open than price-volume. For some, the richness of fundamental data is an advantage, but for me the openness, the inexhaustibility, of fundamental news is a liability. Broadening analysis to include economic data does not make things easier, since economic data is harder to come by and unlimited. How much information is enough? An old joke makes the point: A little girl

came home from school and exclaimed, "Today we learned to spell banana, but we didn't learn when to stop!"

Any system is defined by the boundary between itself and its environment, and price data comprise a system that is both finite and well defined. Publication is more or less immediate. Data is cheap and available to all simultaneously. The problem is not the availability of data, or that there is too much or too little data. The problem, or rather the potential solution, lies in properly decoding the data. That is what I found interesting from the start and what has driven my investigations in the years since.

Reasons and Causes

> There is always a reason for a stock acting the way it does. But also remember that chances are you will not become acquainted with that reason until some time in the future, when it is too late to act on it profitably.
>
> —*Jesse Livermore*[10]

The link between fundamentals and price is elastic. At times strong earnings buoy the price of a security, while at other times positive earnings prompt traders to sell. Will a crisis increase the value of the dollar or send it lower? The linkage between change in the world-at-large and change in the market is often ambiguous and sometimes just mysterious. In most cases, human beings are clever enough to devise plausible stories to account for the market's response to events, but too often only with the aid of hindsight.

There is a constant shift in the fundamental rationale used to support decisions to buy and sell. During the 1960s, synergy became a popular concept. The stocks of companies successful at acquiring other companies were bid up aggressively on the theory that, in the stock market at least, $2 + 2 = 5$. However, during the 1970s, after a series of bear markets had chastened investors, conservative analysis of book value and dividend history, not the synergy of the go-go years, provided a very different rationale for traders' decisions.

A dramatic change in the culture of investing took place in Japan during the 1960s. Japanese traders traditionally viewed equities as a form of high-risk bonds. Stocks were purchased based on the strength of dividends, and the growth of earnings was largely ignored. When American traders discovered

the Japanese stock market, they found that price-to-earnings ratios for Japanese stocks were far lower than for comparable U.S. issues. To the Japanese, local equities were fairly priced, but for Americans, Japanese stocks were bargains. Americans began to buy Japanese issues massively, based on an investment rationale imported from America. Almost overnight, the culture of Japanese investing changed, and one of the great bull markets in history was launched.

There is no disputing the importance of traders' reasons for buying and selling. People routinely use reasons to support decisions of all sorts, and trading decisions are important enough to merit important reasons. However, as the above illustrations demonstrate, fundamental conventions supporting trading decisions can vary from period to period and from place to place.

We may draw a useful distinction between reasons and causes. Earnings do not cause prices to move, neither do research reports, news bulletins, dividends, stock splits, the economy, peace, nor war. These factors may be reasons motivating traders to buy and sell, but the direct cause of securities' price movement is the buying and selling activity of traders.[11] This book focuses on causes, not reasons—on what traders do, not why. Of course, we will tell stories, too, but our stories do not shed much, if any, light on traders' reasons. Instead, they offer a context for making sense of traders' actions.

Befuddled

> I found everything perfectly clear, and I really understood absolutely nothing. To understand is to change, to go beyond oneself.
>
> —*Jean-Paul Sartre*[12]

I arrived a few minutes late. The session was already underway, so I took the last available chair in the back row. On a screen behind the broker were patterns traced by stock prices. He gave them names and explained what each portends. Near the end of the session, an older gentleman in the chair next to mine leaned over and whispered, "If you want to understand how the market really works, call this number." He handed me a scrap of paper.

How odd it seems to me now, more than 40 years later, that had I arrived a few minutes earlier I might have missed a chance encounter and small

gesture that again altered the course of my life. On the scrap he had written the number for Wyckoff Associates in Park Ridge, Illinois.

At $22 per month, the Wyckoff correspondence course was expensive for a graduate student, but with the gracious consent of my wife, who at the time supported us both, I enrolled. Over the next two years I drew by hand, and puzzled over, hundreds of charts, and I listened to dozens of taped lessons. It was not long before my interest in studying the market overtook my interest in reading dead philosophers.

Richard Wyckoff founded the *Magazine of Wall Street* in 1907, and over the decades, as trader, teacher, and financial writer, he developed a deep understanding of the moment-to-moment struggle waged between buyers and sellers. Perhaps the most important thing I learned from him was that the proper object of study is not something we call "the market" but rather the collective intent of investors and traders, who reinvent the market daily. If that is so, then patterns in the data cannot be enough since they do not account for what is distinctively human behind the tape.

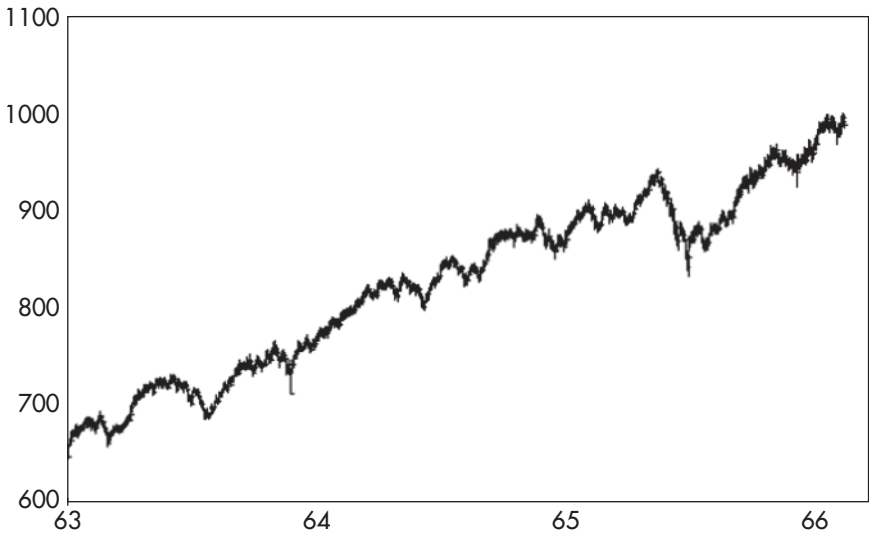
Wyckoff wrote his course in the 1930s, and its content was no doubt shaped by his experience of the 1929 crash and the post-crash period. The market of the early 1930s was lively in both directions, and anyone who survived and succeeded during those turbulent times necessarily developed a keen appreciation for market risk. For that reason, perhaps, he stressed methods that were both risk averse and contrarian.

Contrarian traders focus not on trends, but on changes in the trends of stocks and of the overall market. Contrarians tend to buy sold-out issues, usually before upward trends are broadly recognized. On the other hand, contrarian traders are ever alert for signs that a rising market should be sold.

My introduction to live trading began during the go-go years of the 1960s. The market at the time was trending powerfully, and the leading issues were, nearly without exception, trading well above their lows and showed no signs of tiring as day after day, week after week, they climbed to new highs.

The dominant feature of the market during those years was its continuing trend. However, whatever edge I had then depended on my ability to spot changes in the trend. I was soon completely befuddled. Stocks that lagged continued to languish, while strongly trending stocks rolled right through levels of intense selling. A contrarian in a trending market, I was like a plumber who had been called out to repair the electrical wiring. The skills I had worked so hard to develop seemed irrelevant. I still had much to learn, and the market itself became my teacher.

FIGURE 1.1 Dow Jones Industrial Average—January 1963 through mid-February 1966



Which Way Is Up?

> Never trade in a market which does not show a definite trend. You are just guessing.
>
> —*Orline D. Foster*[13]

Eddie Toppel speaks with a wry, pixie glint in his eyes. Much more is meant, one suspects, than is said. Addressing a conference of technical traders some years ago, Eddie, then a 22-year veteran of Chicago's futures and options pits, pointed his finger toward the ceiling without preamble. "What direction is this?" he asked. A wary silence fell over the gathered technicians, as if he had asked a trick question. "Up!" someone ventured. "Right!" Eddie responded. "This is easy!" He pointed his finger down. "And which way is this?" Together the audience cried, "Down!"

"You learn quickly!" It was clear that Eddie was having fun. "It's simple. When they are going up, buy 'em, and when they are going down, sell 'em. The secret of success is knowing which way is up."

There are some who, having perceived clearly the failure of price predictions, conclude that markets are random and unknowable. Against those claims, I maintain that there is something we can know: the presence or absence of a trend. Without the occasional emergence of trends, market price series would be truly random and radical cynicism justified. Fortunately, trends happen. As Tom Basso points out:

> If there were no trends, you could expect a fairly random distribution of price changes. Yet if you look at the distribution of price changes over time in almost any market, you'll see a very long tail in the direction of large price changes. This is because there are abnormally large price changes that you'd never expect to see by chance over a given period of time.[14]

It is the trend, and only the trend, that offers profit. Overbought/oversold indicators, trading setups, the patterns we read into charts might help clarify, or not, might embolden the trader to take a position, or not. But there is no device or trading trick that makes the trader money. Only the trend can do that.

Traders face a practical problem, however. Price moves incessantly, at times arcing in sustained trends while at other times twisting back upon itself. At what point, and how, is the trader to determine that a nascent price trend is likely to continue? When Jack D. Schwager, the author of *Market Wizards*, interviewed trend trader Richard Dennis, he asked, "Is there something special that you look for to define a trend?" Dennis's answer was to the point: "No."[15] In the absence of independent evidence of a trend, Dennis's response makes sense. The notion of a self-warranting trend is tautological and empty. If there is some mark or feature that verifies trends, it cannot be merely that trends persist, since that is the question at issue.

Trend followers cited in Schwager's book look for independent evidence to help verify trends, and the nature of that evidence can shift based on general conditions. As Bruce Kovner observes in *Market Wizards*, "the rules of the trading and investment game keep changing."[16]

So the question remains. Is there a property of trends, or evidence of some dynamic, that might help traders identify reliable trends early on, even before a trade is taken? The search for this missing observable led to insights that form the foundation for methods presented in this book.

Notes

1. Leigh Gilmore, *The Limits of Autobiography* (Ithaca, NY: Cornell University, 2001).
2. Edward N. Lorenz, *The Essence of Chaos* (Seattle: University of Washington Press, 1993).
3. Edward N. Lorenz, "Predictability: Does the Flap of a Butterfly's Wings in Brazil Set Off a Tornado in Texas?" (address at the American Association for the Advancement of Science, Boston, MA, December 29, 1972).
4. Ibid.
5. Learned Hand, "Democracy: Its Presumptions and Realities," in *The Spirit of Liberty: Papers and Addresses of Learned Hand*, collected by Irving Dillard, 3rd ed. (New York: Alfred A. Knopf, 1960), 92–93.
6. Albert Einstein, "Clerk Maxwell's Influence on the Evolution of the Idea of Physical Reality" (1931), in *The World As I See It* (London: John Lane the Bodely Head, 1935).
7. Pierre-Simon, Marquis de Laplace, *Essai philosophique sur les probabilités* (Paris: Courcier, 1814).
8. In commentaries on Laplace's work, *intellect* is often referred to as Laplace's *demon*.
9. James C. Maxwell, quoted in Gerard M. Weinberg, *An Introduction to General Systems Thinking* (New York: John Wiley & Sons, 1975).
10. Jesse Livermore, *How to Trade in Stocks* (New York: Duell, Sloan and Pearce, 1940).
11. Whether a short-term trader or long-term investor, any person or institution dealing in either long or short equities is speculating. In this book I use the term *trader* to mean anyone who buys or sells shares.
12. Jean-Paul Sartre, *Search for a Method* (New York: Vintage Books, 1960).
13. Orline D. Foster, *Ticker Technique* (New York: Investors' Press, 1965).
14. Tom Basso, in Van K. Tharp, *Trade Your Way to Financial Freedom* (New York: McGraw-Hill, 1999).
15. Jack D. Schwager, *Market Wizards: Interviews with Top Traders* (New York: New York Institute of Finance, 1989).
16. Ibid.