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Quantitative Value

A PRACTITIONER'S GUIDE TO AUTOMATING
INTELLIGENT INVESTMENT AND ELIMINATING
BEHAVIORAL ERRORS

+ website

WESLEY R. GRAY, PhD • TOBIAS E. CARLISLE

Quantitative Value

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*A Practitioner's Guide to
Automating Intelligent Investment
and Eliminating Behavioral Errors
+Website*

WESLEY R. GRAY, PhD, AND
TOBIAS E. CARLISLE, LLB



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*For Nickole, without whom none of this is possible, and
with whom anything is possible.*

—Toby

To all my girls: Katie, Alice, and Glenda. Semper Fidelis.

—Wes

Contents

Preface	xi
Acknowledgments	xiii
PART ONE	
The Foundation of Quantitative Value	1
CHAPTER 1	
The Paradox of Dumb Money	3
Value Strategies Beat the Market	9
How Quantitative Investing Protects against Behavioral Errors	23
The Power of Quantitative Value Investing	30
Notes	32
CHAPTER 2	
A Blueprint to a Better Quantitative Value Strategy	35
Greenblatt's Magic Formula	36
It's All Academic: Improving Quality and Price	45
Strategy Implementation: Investors Behaving Badly	54
Notes	59
PART TWO	
Margin of Safety—How to Avoid a Permanent Loss of Capital	61
CHAPTER 3	
Hornswoggled! Eliminating Earnings Manipulators and Outright Frauds	63
Accruals and the Art of Earnings Manipulation	64
Predicting PROBMs	72
Notes	79

CHAPTER 4

Measuring the Risk of Financial Distress: How to Avoid the Sick Men of the Stock Market	81
A Brief History of Bankruptcy Prediction	83
Improving Bankruptcy Prediction	85
How We Calculate the Risk of Financial Distress	86
Scrubbing the Universe	89
Notes	91

PART THREE

Quality—How to Find a Wonderful Business	93
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CHAPTER 5

Franchises—The Archetype of High Quality	95
The Chairman's Secret Recipe	96
How to Find a Franchise	99
Notes	112

CHAPTER 6

Financial Strength: Foundations Built on Rock	113
The Piotroski Fundamentals Score (F_SCORE)	114
Our Financial Strength Score (FS_SCORE)	119
Comparing the Performance of Piotroski's F_SCORE and Our FS_SCORE	122
Case Study: Lubrizol Corporation	123
Notes	126

PART FOUR

The Secret to Finding Bargain Prices	127
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CHAPTER 7

Price Ratios: A Horse Race	129
The Horses in the Race	130
Rules of the Race	133
The Race Call	134
A Price Ratio for All Seasons	141
The Official Winner	142
Notes	143

CHAPTER 8	
Alternative Price Measures—Normalized Earning Power and Composite Ratios	145
Normalized Earning Power	147
Compound Price Ratios: Is the Whole Greater than the Sum of Its Parts?	150
Notes	163
PART FIVE	
<hr/>	
Corroborative Signals	165
CHAPTER 9	
Blue Horseshoe Loves Anacott Steel: Follow the Signals from the Smart Money	167
Stock Buybacks, Issuance, and Announcements	169
Insider Traders Beat the Market	173
Activism and Cloning	176
Short Money Is Smart Money	179
Notes	182
PART SIX	
<hr/>	
Building and Testing the Model	185
CHAPTER 10	
Bangladeshi Butter Production Predicts the S&P 500 Close	187
Sustainable Alpha: A Framework for Assessing Past Results	189
What's the Big Idea?	191
Rigorously Test the Big Idea	196
The Parameters of the Universe	206
Notes	208
CHAPTER 11	
Problems with the Magic Formula	211
Glamour Is Always a Bad Bet	216
Improving the Structure of a Quantitative Value Strategy	218
Our Final Quantitative Value Checklist	222
Notes	228

CHAPTER 12	
Quantitative Value Beats the Market	229
Risk and Return	231
Robustness	239
A Peek Inside the Black Box	249
Man versus Machine	257
Beating the Market with Quantitative Value	262
Notes	264
Appendix: Analysis Legend	265
About the Authors	267
About the Companion Website	269
Index	271

Preface

This book is first and foremost about value investment—treating stock as part ownership of a business valued through analysis of fundamental financial statement data. Benjamin Graham established the principles of value investing more than 75 years ago. Today, they are widely employed in the investment industry and generally accepted in academia. Its success as an investment philosophy is largely due to the investment performance of Graham’s most famous student, Warren Buffett, whose shareholder letters have inspired multitudes to follow in his footsteps. Despite the widespread adoption of the philosophy, the exponential growth in computing power, and the ubiquity of financial data, the value phenomenon persists. It seems to defy logic. Why does the efficient market leave a free lunch on the table? The best answer is that the value phenomenon persists for the same reason it existed when Graham first conceived it: human beings behave irrationally. While investment tools have advanced, humans remain all too human, subject to the same cognitive biases that have plagued us since time immemorial. We may not be able to conquer these intrinsic behavioral weaknesses, but we can adapt our investment process to minimize them. The means to do so is the second aspect of this book: quantitative investment.

While the term *quantitative* likely conjures images of complex equations churned by powerful computers, it’s best understood as the antidote to behavioral error. Our apparatus for reasoning under conditions of uncertainty is faulty, so much so that we are often entirely unaware of how imperfect it is because it blinds us to our failure. We are confidently incompetent. We need some means to protect us from our cognitive biases, and the quantitative method is that means. It serves both to protect us from our own behavioral errors and to exploit the behavioral errors of others. The model does need not be complex to achieve this end. In fact, the weight of evidence indicates that even simple statistical models outperform the best experts. It speaks to the diabolical nature of our faulty cognitive apparatus that those simple statistical models continue to outperform the best experts *even when those same experts are given access to the models’ output*. This is as true for a value investor as it is for any other expert in any other field of endeavor.

This book is aimed at value investors. It’s a humbling and maddening experience to compare active investment results with an analogous passive

strategy. How can it be that so much effort appears to be wasted? (We use the word *wasted* euphemistically. A more honest expression might be “value destroying.”) The likely reason is that active managers unconsciously—but systematically—introduce cognitive biases into the portfolio, and these biases lead to underperformance. It’s not, however, our destiny to do so. There are several quantitative measures that lead to better performance, and these metrics will be familiar to any value investor: enhancing the margin of safety, identifying the highest-quality franchises, and finding the cheapest stocks. We canvass the research in each, test it in our own system, and then combine the best ideas in each category into a comprehensive quantitative value strategy. It’s not passive indexing. It’s active value investing performed systematically.

Acknowledgments

We are a lot like a turtle on top of a fencepost—it’s obvious we didn’t get here alone. We have had enormous support from many colleagues, friends, and family in making this book a reality. First and foremost, Dr. Gray would like to thank Jack Vogel for his outstanding research and amazing dedication to accomplishing the mission. David Foulke played an integral role in the development of the book and made the book more accessible to “nonquants.” Carl Kanner and the rest of the crew at Empiritrage, LLC—Cliff Gray, Yang Xu, Tao Wang, and Shenglan Zhang—read and reread the manuscript, ensuring it was democratizing quant at every step along the way. Katie Gray also played a key role in drafting the initial manuscript, ensuring it was easy to read and free of errors. Dr. Gray would also like to thank Drexel University’s LeBow College of Business, and particularly his colleagues in the Department of Finance, for supporting his research agenda. Jared Wilson served as a dedicated research assistant and offered excellent advice and insights throughout the book-writing process. A number of colleagues at other institutions, notably Hui Chen at MIT, Steve Crawford at Rice University, Gil Sadka at Columbia, and Richard Price at Rice University, also provided valuable insights along the way. Robert Kanner and Edward Stern have been unfailing mentors in many of Dr. Gray’s endeavors and particularly supportive in the development of the book, for which he is eternally grateful. When Dr. Gray’s Popsicle stand finally takes flight, Bob and Eddie will be the reason for its success.

Legendary Australian ad man John “Singo” Singleton once said, “Anyone who reckons luck doesn’t have anything to do with success has never been successful, and never will be, unless they’re bloody lucky.” It’s a worldview to which Mr. Carlisle subscribes, and so, first and foremost, he’d like to thank his own personal Goddess Fortuna, Nickole Carlisle. Nickole helped to make the manuscript as compelling to the lay reader as we hope it is to the quant. Mr. Carlisle would also like to thank Michael and Heather Craft, Steve Baxter, Pete Latham, Chris Hughes, and Roger and Wendy Carlisle for the support; Troy Harry for the opportunity; Dougs, for teaching him that you don’t play Ping-Pong if you can’t take a punch; Em, who taught him that if you can keep your head when all about you are losing theirs, you have not

fully grasped the gravity of situation; and Pete Love and Ross Johnson for the thoughtful discussion. Finally, he would like to thank the loyal readers of greenbackd.com, who inspired him to push beyond the boundaries of the online world.

Finally, we are deeply appreciative of the entire team at Wiley Finance, most especially Bill Falloon and Meg Freeborn, who provided guidance and advice all along the way.

The Foundation of Quantitative Value

This book is organized into six main parts. Part One sets out the rationale for quantitative value investment and introduces our checklist. In it we examine several simple quantitative value strategies to illustrate some key elements of the investment process. In Part Two we discuss how to avoid stocks at high risk of sustaining a permanent loss of capital—those suffering from financial statement manipulation, fraud, and financial distress. Part Three contains an examination of the indicia of high-quality stocks—an economic franchise and superior financial strength. We go bargain hunting in Part Four, looking for the price ratios that best identify undervalued stocks and lead to the best risk-adjusted investment performance. We look at several unusual implementations of price ratios, including long-term average price ratios and price ratios in combination. Part Five sets out a variety of signals sent by other market participants. There we look at the impact of buybacks, insider purchases, short selling, and buying and selling from institutional investment managers like activists and other fund managers. Finally, in Part Six we build and test our quantitative value model. We study the best way to combine the research we've considered into a cohesive strategy, and then back-test the resulting quantitative value model.

The Paradox of Dumb Money

“As they say in poker, ‘If you’ve been in the game 30 minutes and you don’t know who the patsy is, you’re the patsy.’”

—Warren Buffett (1987)

In the summer of 1968, Ed Thorp, a young math professor at the University of California, Irvine (UCI), and author of *Beat the Market: A Scientific Stock Market System* (1967), accepted an invitation to spend the afternoon playing bridge with Warren Buffett, the not-yet-famous “value” investor. Ralph Waldo Gerard hosted the game. Gerard was an early investor in Buffett’s first venture, Buffett Partners, and the dean of the Graduate School at UCI, where Thorp taught. Buffett was liquidating the partnership, and Gerard needed a new manager for his share of the proceeds. Gerard wanted Buffett’s opinion on the young professor and the unusual “quantitative” investment strategy for which he was quietly earning a reputation among the members of the UCI community.

Gerard had invested with Buffett at the recommendation of a relative of Gerard’s who had taught Buffett at Columbia University: the great value investment philosopher, Benjamin Graham. Graham had first published the value investor’s bible, *Security Analysis*, along with David Dodd, in 1934.¹ He was considered the “Dean of Wall Street,” and regarded Buffett as his star pupil. Graham’s assessment would prove to be prescient.

By the time Thorp met Buffett in 1968, Buffett had established an exceptional investment record. He had started Buffett Partners 12 years earlier, in 1956, at the tender age of 26, with initial capital of just \$100,100. (Buffett joked that the \$100 was his contribution.) By 1968, Buffett Partners controlled \$100 million in capital, and Buffett’s share of that was \$25 million.²

For the 12 years between 1956 and 1968, Buffett had compounded the partnership's capital at 30 percent per year before his fees, which were 25 percent of the gain over 6 percent per year. Investors like Gerard had compounded at an average of 24 percent a year. Before taxes, each original dollar invested in Buffett's partnership had grown to more than \$13. Each of Buffett's own dollars, growing at the greater prefee annual rate of 30 percent became before taxes over \$23. By 1968, however, Buffett was having difficulty finding sufficiently undervalued securities for the partnership, and so had decided to wind it up. This had led Gerard to find a new manager, and Gerard hoped Thorp was the man. He wanted to know if Thorp's unusual quantitative strategy worked, and so, at Gerard's behest, Thorp found himself sitting down for a game of bridge with Buffett.

Buffett is a near world-class bridge player. Sharon Osberg, international bridge player and regular professional partner to Buffett, says, "He can play with anyone. It's because of his logic, his ability to solve problems and his concentration."³ Says Buffett, "I spend 12 hours a week—a little over 10 percent of my waking hours—playing the game. Now I am trying to figure out how to get by on less sleep in order to fit in a few more hands."⁴ Buffett presented a daunting opponent. Thorp observed of Buffett's bridge playing⁵:

Bridge players know that bridge is what mathematicians call a game of imperfect information. The bidding, which precedes the play of the cards, conveys information about the four concealed hands held by the two pairs of players that are opposing each other. Once play begins, players use information from the bidding and from the cards as they are played to deduce who holds the remaining as yet unseen cards. The stock market also is a game of imperfect information and even resembles bridge in that they both have their deceptions and swindles. Like bridge, you do better in the market if you get more information, sooner, and put it to better use. It's no surprise then that Buffett, arguably the greatest investor in history, is a bridge addict.

Thorp was no stranger to the card table either. Before he figured out how to beat the market, Thorp wrote *Beat the Dealer*, the definitive book on blackjack card counting. William Poundstone recounts the story of Thorp's foray into card counting in his book, *Fortune's Formula*.⁶ In 1958, Thorp had read an article by mathematician Roger Baldwin, who had used U.S. Army "computers"—which actually meant "adding machines" or the people who operated them—to calculate the odds of various blackjack strategies in an effort to find an optimal strategy. Over three years, he and three associates found that by using an unusual strategy they could reduce the

house edge in blackjack to 0.62 percent. Amazingly, prior to their paper, nobody, including the casinos, knew the real advantage held by the house. There were simply too many permutations in a card deck of 52 to calculate the casino's edge. "Good" players of blackjack, other writers had claimed, could get the house's edge down to 2 or 3 percent. Baldwin's strategy, by reducing the house edge to 0.62 percent, was a huge leap forward. The only problem, as far as Thorp could see, was that Baldwin's strategy still lost money. He was convinced he could do better.

Thorp's key insight was that at the time blackjack was played using only one deck and it was not shuffled between hands. In the parlance of the statistician, this meant that blackjack hands were not "independent" of each other. Information gleaned in earlier hands could be applied in subsequent hands. For example, in blackjack, aces are good for the player. If the dealer deals a hand with three aces, the player knows that only one ace remains in the deck. This information would lead the player to view the deck as being less favorable, and the player could adjust his or her betting accordingly. Thorp used MIT's mainframe computer to examine the implications of his observation and found something completely counterintuitive—the "five" cards had the most impact on the outcome of the hands remaining in the deck. Fives are bad for the player and good for the house. Thorp realized that by simply keeping track of the five cards, the player could determine the favorability or otherwise of the cards remaining in the deck. Thorp found that his improved strategy gave the player an edge of 0.13 percent. That small edge, Thorp reasoned, given enough hands, could add up to a lot of money. He published his new strategy first in a paper and then subsequently as *Beat the Dealer* in 1962, which went on to become a classic in gambling literature. The book detailed how Thorp had used his card-counting strategy for a period of several years, making \$25,000 in the process. The casinos didn't like players counting cards to gain an edge. They immediately started taking "counter-measures," including adding more decks, randomly shuffling the cards, using "mechanics" (dealers who cheated by manipulating the cards in the deck), threatening Thorp with physical harm, and then simply barring him from the casinos. By 1964, Thorp no longer found blackjack fun or profitable. He had found a new obsession, the stock market, and he was already hunting for an edge.

Thorp started working on the key element of what would become his quantitative investment strategy when he moved to UCI in 1964.⁷ There he met Sheen Kassouf, another professor at UCI, who had been working on the same problem: how to value a warrant, an unusual security that converted into stock on a certain event. They started meeting together once a week in an effort to solve the warrant valuation conundrum. Thorp found the answer in an unlikely place. In a collection of essays called *The Random*

Character of Stock Market Prices (1964), Thorp read the English translation of a French dissertation written in 1900 by a student at the University of Paris, Louis Bachelier. Bachelier's dissertation unlocked the secret to valuing warrants: the so-called "random walk" theory. As the name suggests, the "random walk" holds that the movements made by security prices are random. While it might seem paradoxical, the random nature of the moves makes it possible to *probabilistically* determine the future price of the security.

The implications of the random walk theory are profound, and they weren't lost on Thorp. He saw that he could apply the theory to handicap the value of the warrant. Where the warrant's price differed from Thorp's probabilistic valuation, Thorp recognized that an opportunity existed for him to trade the warrant and the underlying stock and to profit from the differential. While any given warrant might expire worthless, given a large enough portfolio of warrants Thorp was likely to make money. These two insights—a probabilistic approach to valuation and the construction of portfolios large enough to capture the probabilities—formed the bulwark of Thorp's "scientific stock market system," one of the most consistently profitable trading strategies ever developed. In 1965, Thorp wrote in a letter to a friend about his strategy⁸:

I have finally hit pay dirt with the stock market. I have constructed a complete mathematical model for a small section (epsilon times "infinity" isn't so small, though) of the stock market. I can prove from the model that the expected return is 33 percent per annum, and that the empirical assumptions of the model can be varied within wide limits (well beyond those dictated by skepticism) without affecting this figure much. Past records corroborate the 33 percent figure. It assumes I revise my portfolio once a year. With continuous attention to the portfolio the rate of return appears to exceed 50 percent gross per year. But I haven't finished with the details of that, so I can only be sure of the lower rate at present. A major portion of my modest resources has been invested for several months. We once "set" as a tentative first goal the doubling of capital every two years. It isn't far away now.

As he had with his blackjack betting system, Thorp was again seeking to steadily exploit a small edge—epsilon times "infinity"—to beat the market.

Thorp put the strategy to work in his hedge fund, Princeton-Newport Partners, which went on to become one of the most successful ever formed. For the 20 years from its inception in 1969, the fund compounded at

15.1 percent annually after fees. By the time it was wound up, Princeton-Newport was managing over \$270 million. Each dollar invested in the fund in 1969 had grown to \$14.78. By way of comparison, the Standard & Poor's (S&P) 500 averaged 8.8 percent annually over the same period, which means that Princeton-Newport outperformed the market by more than 6 percent per year. But that's only half the story. The fund was much less volatile than the market itself. In fact, Princeton-Newport never had a down year or down *quarter*. Thorp closed Princeton-Newport in 1988 following an investigation by Rudy Giuliani into stock parking on behalf of Drexel Burnham Lambert in which Thorp was not accused of any wrongdoing.

Unable to stay away, Thorp relaunched in August 1994 as Ridgeline Partners. From the get-go Ridgeline outperformed Princeton-Newport, averaging 18 percent per year after fees. In 1998, Thorp reported that since the inception of Princeton-Newport in 1969 he had returned 20 percent per year for nearly 30 years, with a standard deviation of just 6 percent⁹:

To help persuade you that this may not be luck, I estimate that ... I have made \$80 billion worth of purchases and sales ("action," in casino language) for my investors. This breaks down to something like one and a quarter million individual "bets" averaging \$65,000 each, with on average hundreds of "positions" in place at any one time. Over all, it would seem to be a moderately "long run" with a high probability that the excess performance is more than chance.

As Buffett and Thorp sat down for the 1968 game of bridge, it appeared that a deep philosophical chasm existed between each man's investment strategies. Buffett, the value investor, used fundamental analysis on individual securities to carefully calculate their "intrinsic value," and find those trading at a market price well below that intrinsic value. Thorp, the quantitative investor, valued securities on a probabilistic basis and relied on the statistical phenomenon known as "the law of large numbers"—the law states that the more observations we make, the closer our sample will be to the population, and hence greater the certainty of our prediction—to construct portfolios of securities that would, in aggregate, outperform the market. There were other apparently irreconcilable differences. In his 1992 Berkshire Hathaway, Inc. Chairman's Letter,¹⁰ Buffett said of value investing:

The investment shown by the discounted-flows-of-cash calculation to be the cheapest is the one that the investor should purchase—irrespective of whether the business grows or doesn't, displays volatility or smoothness in its earnings, or carries a high price or low in relation to its current earnings and book value.

Thorp had a different view of value investing, spelled out in *Beat the Market*¹¹:

My attraction to fundamental analysis weakened further as practical difficulties appeared. It is almost impossible to estimate earnings for more than a year or two in the future. And this was not the least difficulty. After purchasing an undervalued stock it is essential that others make similar calculations so that they will either purchase or wish to purchase it, driving its price higher. Many “undervalued” stocks remain bargains for years, frustrating an owner who may have made a correct and ingenious calculation of the future prospects.

Buffett spoke in his 1987 Shareholder Letter¹² about the use of computer programs in the investment process:

In my opinion, investment success will not be produced by arcane formulae, computer programs or signals flashed by the price behavior of stocks and markets. Rather an investor will succeed by coupling good business judgment with an ability to insulate his thoughts and behavior from the super-contagious emotions that swirl about the marketplace.

Thorp countered in the introduction to *Beat the Market*¹³:

We have used mathematics, economics, and electronic computers to prove and perfect our theory. After reading dozens of books, investigating advisory services and mutual funds, and trying and rejecting scores of systems, we believe that ours is the first scientifically proven method for consistent stock market profits.

While the philosophical differences between Thorp and Buffett were vast, over a game of bridge they were able to find common ground chatting about their shared interests in statistics and finance. For his part, Thorp was thoroughly charmed by Buffett, writing later that Buffett was a “high speed talker with a Nebraska twang and a steady flow of jokes, anecdotes and clever sayings.”¹⁴ He also observed that Buffett had a “remarkable facility for remembering and using numerical information, plus an adeptness in mental calculation.” At the end of the evening, Thorp told his wife that he thought Buffett would one day be the richest man in America. Buffett’s subsequent trajectory through life is well chronicled, and Thorp’s prediction

has been true, or within spitting distance, since the 1990s. Buffett's opinion on Thorp is unfortunately lost in the sands of time. We can, however, guess that it was favorable. Gerard, who had made a fortune with Buffett, went on to invest with Thorp. As we have seen, it turned out to be another great investment for him.

At first blush, each man's strategy seems diametrically opposed to the other, and irretrievably so. They agreed, however, on one very important point: both believed it was possible to outperform the stock market, a belief that flew in the face of the efficient market hypothesis. While it is true that Thorp's strategy was grounded in the random walk, a key component of the efficient market hypothesis, he disagreed with the efficient market believers that it necessarily implied that markets were efficient. Indeed, Thorp went so far as to call his book *Beat the Market*. Buffett also thought the efficient market hypothesis was nonsense, writing in his 1988 Shareholder Letter¹⁵:

This doctrine [the efficient market hypothesis] became highly fashionable—indeed, almost holy scripture in academic circles during the 1970s. Essentially, it said that analyzing stocks was useless because all public information about them was appropriately reflected in their prices. In other words, the market always knew everything. As a corollary, the professors who taught EMT said that someone throwing darts at the stock tables could select a stock portfolio having prospects just as good as one selected by the brightest, most hard-working security analyst. Amazingly, EMT was embraced not only by academics, but also by many investment professionals and corporate managers as well. Observing correctly that the market was frequently efficient, they went on to conclude incorrectly that it was always efficient. The difference between these propositions is night and day.

On this most important point, Buffett and Thorp agreed: the market was beatable, if you held an edge.

VALUE STRATEGIES BEAT THE MARKET

[It] is extraordinary to me that the idea of buying dollar bills for 40 cents takes immediately to people or it doesn't take at all. It's like an inoculation. If it doesn't grab a person right away, I find that you can talk to him for years and show him records, and it

doesn't make any difference. They just don't seem able to grasp the concept, simple as it is.

—Warren Buffett, “The Superinvestors of Graham-and-Doddsville”¹⁶

Corporate gold dollars are now available in quantity at 50 cents and less—but they do have strings attached.

—Benjamin Graham, “Should Rich but Losing Corporations Be Liquidated?”¹⁷

It is difficult to overstate Benjamin Graham's impact on Wall Street. He arrived there in 1914 fresh from Columbia College, where he just had turned down offers to undertake doctorates in the philosophy, mathematics, and English departments. He was employed on Wall Street as a “statistician” (as analysts were then known) and observed in this role that the “mass of information” available from the data services like Moody's and Standard Statistics was “largely going to waste in the area of common-stock analysis.” Graham found Wall Street “virgin territory for examination by a genuine, penetrating analysis of security values.”¹⁸

Graham wasn't exaggerating about the lack of genuine analysis on Wall Street. At the time, stock market statisticians had a deservedly poor reputation. A 1932 paper by Alfred Cowles III had asked, “Can stock market forecasters forecast?” and concluded that they could not. With the aid of an IBM punch card machine, Cowles examined the investment performance of 16 statistical services, 25 insurance companies, 24 forecasting letters, and the Dow Theory editorials of William Peter Hamilton over the period from December 1903 to December 1929. Only a handful beat the market. Worse, Cowles concluded of the performances of those few who had beaten the market that their results were “little, if any, better than what might be expected to result from pure chance.”¹⁹

Graham took it upon himself to form a rigorous analytical framework for the scrutiny of securities. In 1927, he started teaching his philosophy at Columbia in a night class called “Security Analysis.” By 1934, Graham, with the assistance of David Dodd, a student who had taken his first night class in 1927 and was by 1934 a Columbia Business School professor, converted his lectures into *Security Analysis*, his magnum opus.

Graham and Dodd's 1934 publication of *Security Analysis* laid out the first well-reasoned and comprehensive approach to analyzing securities. As each new edition was published, and with the subsequent publication of *The Intelligent Investor* in 1949,²⁰ Graham refined his approach, but the philosophy remained the same: equity securities should be regarded as a part share in a business. An investor should thoroughly analyze a security's

financial statements to determine a conservative valuation for the security. If the price of the security is available in the market at a sufficient discount to the rough valuation to provide a margin of safety, the security could be purchased. This was “value” investing. More than any other book, *Security Analysis* ushered in the era of the professional financial analyst. But does it work? And how can we know?

The arguments for value investing fall into two categories: logical and empirical. The logical argument is that value investing seeks to exchange one sum of value (money) for a greater sum of value (the “intrinsic value” of the security), which Buffett more pithily states as “price is what you pay; value is what you get.”²¹ Value investors seek to pay less than the security’s value. They realize the profit when the price reverts to the value, but the gain is made at the time of purchase because the purchaser has exchanged a smaller store of value for a greater one. Implicit in this assertion is the concept that price and value are distinct. There are many examples of stocks trading at a discount to intrinsic value, but the most transparent case is in a liquidation scenario. In the 1934 edition of *Security Analysis*, Graham argued that the phenomenon of a stock selling persistently below its liquidation value was “fundamentally illogical.” In Graham’s opinion, it meant that the stock is too cheap. In a liquidation, an investor can identify a transparent difference between market value and intrinsic value. After all other liabilities have been met, common stockholders are the residual claimants to the company’s assets. As Seth Klarman, legendary chairman of the Baupost Group, elegantly demonstrated in his hugely popular out-of-print 1991 book *Margin of Safety*²²:

A liquidation is, in a sense, one of the few interfaces where the essence of the stock market is revealed. Are stocks pieces of paper to be endlessly traded back and forth, or are they proportional interests in underlying businesses? A liquidation settles this debate, distributing to owners of pieces of paper the actual cash proceeds resulting from the sale of corporate assets to the highest bidder. A liquidation thereby acts as a tether to reality for the stock market, forcing either undervalued or overvalued share prices to move into line with actual underlying value.

To say that price and value are distinct in theory is not to say that we can profit from this distinction in practice. The problem is that in the real world we cannot observe intrinsic value. Rather we must estimate it through some proxy, a model populated with imperfect, backward-looking information, and must make certain assumptions about the future. Change the assumptions, and we change our estimate of “intrinsic value.” Klarman

discusses the use of the “net current asset value” or “net-net working capital” model to calculate liquidation value²³:

In approximating the liquidation value of a company, some value investors, emulating Benjamin Graham, calculate “net-net working capital” as a shortcut. Net working capital consists of current assets (cash, marketable securities, receivables, and inventories) less current liabilities (accounts, notes, and taxes payable within one year). Net-net working capital is defined as net working capital minus all long-term liabilities. Even when a company has little ongoing business value, investors who buy at a price below net-net working capital are protected by the approximate liquidation value of current assets alone.

All well and good, but let’s not forget that this assessment must be made with imperfect information. There are a number of assumptions embedded in the model, which amply demonstrates why the calculation is often difficult²⁴:

As long as working capital is not overstated and operations are not rapidly consuming cash, a company could liquidate its assets, extinguish all liabilities, and still distribute proceeds in excess of the market price to investors. Ongoing business losses can, however, quickly erode net-net working capital. Investors must therefore always consider the state of a company’s current operations before buying. Investors should also consider any off-balance sheet or contingent liabilities that might be incurred in the course of an actual liquidation, such as plant closing and environmental laws.

Critics of this approach—typically adherents to the *efficient market theory*—focus on the deficiency of the information available to investors. They argue that price and value cannot be distinct in practice because all information about a security’s value is immediately incorporated into the price. Any new information that might affect the value of a security is immediately reflected in its price by arbitrageurs trading away the differential. It is therefore not possible to profit from the difference. This argument reminds us of the old joke about the two professors of finance who while walking one day spot a 10-dollar note lying on the ground. One professor turns to the other and says, “Is that a 10-dollar note lying on the ground?” The other says, “Impossible. If that were a 10-dollar note, someone would have picked it up already.”

The other argument in favor of value investing is empirical. Numerous studies demonstrate that a variety of price ratios find stocks that outperform the broader market. In Chapters 7 and 8, we examine in detail the performance of various value metrics. Figure 1.1 sets out a brief graphical overview of the performance of the cheapest stocks according to common fundamental price ratios, such as the price-to-earnings (P/E) ratio, the price-to-book (P/B) ratio, and the EBITDA enterprise multiple (total enterprise value divided by earnings before interest, taxes, depreciation, and amortization, or TEV/EBITDA).

As Figure 1.1 illustrates, value investing according to simple fundamental price ratios has cumulatively beaten the S&P 500 over almost 50 years.

Table 1.1 shows some additional performance metrics for the price ratios. The numbers illustrate that value strategies have been very successful (Chapter 7 has a detailed discussion of our method of our investment simulation procedures).

The counterargument to the empirical outperformance of value stocks is that these stocks are inherently more risky. In this instance, risk is defined as the additional volatility of the value stocks. Prolific finance researchers and founders of modern quantitative asset management analysis Eugene Fama and Ken French made this argument most forcefully in their 1992 paper, “The Cross-Section of Expected Stock Returns.” Behavioral finance researchers Joseph Lakonishok, Andrei Shleifer, and Robert Vishny argue

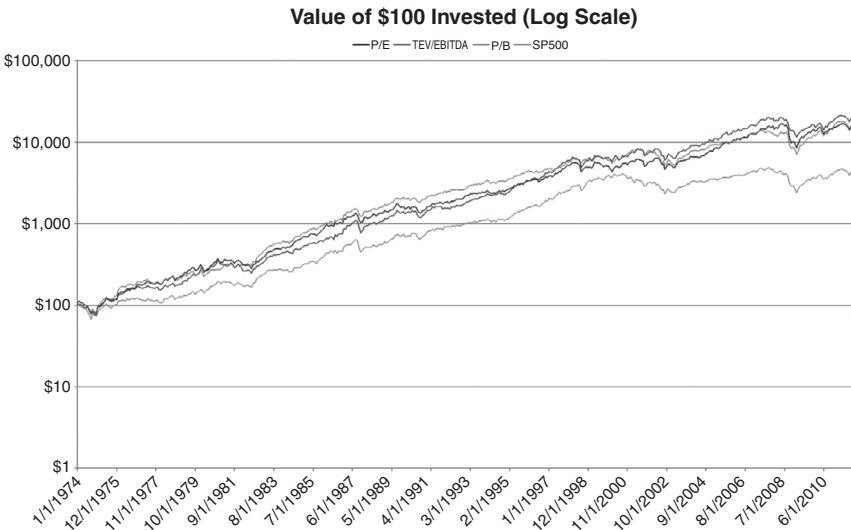


FIGURE 1.1 Cumulative Returns to Common Price Ratios