CAPITAL IDEAS EVOLVING

PETER L. BERNSTEIN

JOHN WILEY & SONS, INC.

CAPITAL IDEAS EVOLVING

Books by Peter L. Bernstein

Capital Ideas Evolving

Wedding of the Waters: The Erie Canal and the Making of a Great Nation

The Power of Gold: The History of an Obsession

Against the Gods: The Remarkable Story of Risk

Capital Ideas: The Improbable Origins of Modern Wall Street

The Debt and the Deficit: False Alarms/Real Possibilities (with Robert Heilbroner)

Economist on Wall Street: Notes on the Sanctity of Gold, the Value of Money, the Security of Investments, and Other Delusions

A Primer on Money, Banking, and Gold

A Primer on Government Spending (with Robert Heilbroner)

The Price of Prosperity

CAPITAL IDEAS EVOLVING

PETER L. BERNSTEIN

JOHN WILEY & SONS, INC.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.
Published simultaneously in Canada.

Wiley Bicentennial Logo: Richard J. Pacifico.

Library of Congress Cataloging-in-Publication Data:

Bernstein, Peter L.
Capital ideas evolving / Peter L. Bernstein.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-471-73173-3 (cloth)
1. Finance. 2. Investments. I. Title.
HG173.B473 2007
658.15—dc22
2006102237

Printed in the United States of America.

10 9 8 7 6 5 4 3 2 1

For Barbara
With love, gratitude, and cheers

Contents

Preface

> Theorists can always resist facts; for facts are hard to establish and are always changing anyway, and ceteris paribus can be made to absorb a good deal of punishment. Inevitably, at the earliest opportunity, the mind slips back into the old grooves of thought since analysis is utterly impossible without a frame of reference, a way of thinking about things, or, in short, a theory.
>
> Paul A. Samuelson, "Lord Keynes and the General Theory," *Economica* 14 (1946), pp. 187–199

> We make models to abstract reality. But there is a meta-model beyond the model that assures us that the model will eventually fail. Models fail because they fail to incorporate the inter-relationships that exist in the real world.
>
> Myron Scholes, speech at NYU/IXIS conference on hedge funds, New York, September 2005

The revolution in the theory and practice of investing that swept over Wall Street during the last three decades of the twentieth century had been carried out by scholars toiling in the ivory towers, far away from the heart of the financial world in New York City. Hence, the improbable origins of modern Wall Street, the subtitle of *Capital Ideas,* the book I published in 1992 and the prequel to the book you are now reading.

But the products of those improbable origins have been evolving for over three decades. Today, the concepts described in *Capital Ideas* are conventional wisdom, from Wall Street to financial centers all around the world. Beginning with the simple notion that risk is at the center of all investment decisions, that diversification is essential to successful investing, and that markets are hard to beat, the Capital Ideas—the products of

the ivory towers (and also known as "neoclassical finance")—are now the intellectual core of a myriad of powerful innovations in active investing and in risk management.

These innovations involve concepts and tools no one could have conceived of in the old days. When I originally wrote *Capital Ideas* from 1989 to 1991, the fascination was with the wonders of passive management and the disturbing implications of the efficient market. Today, as we shall see in the pages that follow, even the theorists of *Capital Ideas* are at work in the capital market. Some are seeking new methods of active management and searching for alpha while others are applying their theoretical ideas to the problems of financing retirement or enhancing the fairness and efficiency of the markets.* All, in one way or another, are exploring the frontiers of risk management.

As Capital Ideas have moved down these paths from the ivory tower to the computer room, both form and function continue to undergo radical changes. This process of change is what this book, *Capital Ideas Evolving,* is about.

Consider the contrast between today's world and when I was writing *Capital Ideas* from 1989 to 1991. Much of the theory was unpalatable to an investing environment where people saw no hurdle in beating the market, never calibrated risk, and valued options on the back of an envelope. The initial response of many investors to the introduction of these uncomfortable and mathematically rooted theories in the 1970s and 1980s was to reject them as "baloney." Risk was an incidental matter. In *A Random Walk Down Wall Street,* Burt Malkiel has recalled that the reception of Efficient Market Theory "was greeted in some Wall Street quarters with as much enthusiasm as Saddam Hussein addressing a meeting of B'nai Brith." Burt informs me the ninth edition of *A Random Walk Down Wall Street* shifts the metaphor to "with as much enthusiasm as Jeff Skilling addressing the Better Business Bureau."

Nevertheless, I wanted my book to include some examples of practical applications of the Capital Ideas I was describing, in order to make

* "Alpha" refers to returns in excess of the returns of a benchmark such as the S&P 500, after adjustment for risk. Subsequent chapters expand upon this compressed explanation.

these theoretical advances credible to the wider audience I hoped to reach. After a good deal of scrounging around, I could come up with only three actual, hands-on cases of putting the new theoretical structure to work. There was nobody else I could find at that moment.

The first practical example was Wells Fargo Bank, where many of the creators of Capital Ideas were helping out as consultants. But Wells Fargo was struggling to find customers for its index funds and risk-controlled asset management—and it made no money at it for a matter of years. I will always remember Jim Vertin telling me about "pushin' that rock uphill." Nevertheless, as I asserted in *Capital Ideas,* "It was they who truly brought the gown to town." Chapter 10 of this book shows how well time has justified that observation.

The second case study was Barr Rosenberg. Barr, then still an academic, was developing what was probably the first viable variation on the theme of the Capital Asset Pricing Model in the form of factor analysis, but he was also carrying out hugely popular seminars at Pebble Beach to indoctrinate practitioners in the intricacies of market efficiency, mean/variance, the Capital Asset Pricing Model, and the theory of options pricing. Without Barr's powerful effort, the whole process of making Capital Ideas both comprehensible and acceptable to professional investors would surely have been more protracted. He deserves far more credit than he has received for these accomplishments.

Portfolio insurance was the third example of applying theory to practice. Hayne Leland of the University of California at Berkeley had concocted this product when he went on a search for what he boldly described to me as "the ultimate invention"—a real-life version of Merton's replicating portfolio for a put option on the market.* For a brief period, as portfolio insurance became all the rage, it looked as though Leland had achieved his dream. Then came the jumbo crash of October 19, 1987, when stock prices fell over 20 percent in one day, and portfolio insurance crashed along with the market.

But that was then. In contrast to *Capital Ideas,* this book is almost completely about the implementation of theory and only incidentally about the development of new theory.

*Just incidentally, in relation to how transactions costs on October 19 nearly buried portfolio insurance, Bob Merton has pointed out to me the wonderful paradox that there would be no Black-Scholes-Merton option pricing model without transactions costs. Transactions costs make the replicating portfolio impractical and options irreplaceable.

It is interesting to note that this process is not unique to finance. E. Han Kim of the Ross School of Business at the University of Michigan and two colleagues recently authored a study of papers published in major economics journals over the last thirty-five years that had received more than 500 citations as of June 2006.[1] In reviewing the content of these papers, Kim and his coauthors find that "In the early 1970s, 77 percent of the most highly cited papers were theoretical, while only 11 percent [were] empirical. At the end of the century, 60 percent are empirical and only 11 percent theoretical. . . . [The balance of] the contributions are econometric methodological contributions."

What has caused this profound change from a focus on theory to a focus on implementation? Although more subtle forces must also have been at work, the arrival of the desktop computer stands out as the most important contributor, along with the increasingly complex software it can handle. The computer provides opportunities to do handsprings with the data and to test out theories from perspectives never dreamed of in the world of slide rules and electric calculators. On the other hand, the process does not work in reverse. While scholars and practitioners can use the computer to test theories and to find new ways to put theories to use, new theories do not come out of the computer. Theory is a product of the human brain.

Over the years since *Capital Ideas* first appeared, the unquenchable vitality of these ideas has been too great to resist. Powerful forces are constantly at work in the markets to bring the resemblance between theory and reality closer with the passage of time. Indeed, the ideas have created a new world in their own image. Even the greatest skeptics of this body of knowledge now key off their opposition, both theoretical and practical, from the foundations of the improbable origins of modern Wall Street.

Bill Sharpe once said that "Markowitz came along, and there was light."[2] Before Harry Markowitz's 1952 essay on portfolio selection, there was no genuine *theory* of portfolio construction—there were just rules of thumb and folklore. It was Markowitz who first made risk the centerpiece of portfolio management by focusing on what investing is all about: *investing is a bet on an unknown future*. Before Bill Sharpe's

articulation of the Capital Asset Pricing Model in 1964, there was no genuine *theory* of asset pricing in which risk plays a pivotal role—there were just rules of thumb and folklore. Before Franco Modigliani and Merton Miller's work in 1958, there was no genuine *theory* of corporate finance and no understanding of what "equilibrium" means in financial markets—there were just rules of thumb and folklore.[3] Before Eugene Fama set forth the principles of the Efficient Market Hypothesis in 1965, there was no *theory* to explain why the market is so hard to beat. There was not even a recognition that such a possibility might exist. Before Fischer Black, Myron Scholes, and Robert Merton confronted both the valuation and the essential nature of derivative securities in the early 1970s, there was no *theory* of option pricing—there were just rules of thumb and folklore.

The practice of investing that prevailed before Markowitz wrote "Portfolio Selection" in 1952 has vanished. The investors of 1952 thought the same thoughts and talked the same language as the investors of 1873, although the active topics of conversation may have changed from concerns about deflation to worries about inflation. The revolution unleashed by Capital Ideas created an entirely new way of thinking about the nature of financial markets, the theory of investing, and the role of an uncertain future in all investment decisions. Paul Samuelson has used colorful language to describe this process: "Markowitz-Sharpe-Tobin quadratic programming in terms of portfolio means and variances is a powerful approximation that has captured real-world converts the way that smallpox used to infect once-isolated aborigines."[4]

Risk was at the core of all these ideas. Markowitz's famous comment that "you have to think about risk as well as return" sounds like a homey slogan today. Yet it was a total novelty in 1952 to give risk at least equal weight with the search for reward. *Nothing more deeply divides Capital Ideas from the world before 1952.* Modigliani and Miller soon followed suit by pointing out that changing the liability structure of a corporation does not matter because the value of the corporation depends on the riskiness of its business; shuffling the liabilities only influences how the risk is parceled up among the stakeholders. The Capital Asset Pricing Model says that the expected return on assets will be a function of their risk, or beta, while the definition of the Efficient Market is a market where the predictions of CAPM are borne out. And

hedging risk was one of the prime motivations for the development of the options pricing model.

Every chapter that follows, in one way or another, is about managing risks of many varieties. The protagonists in the story are smart at finding ways to make money, but, as we shall see, all of them are aware that risk management is the key to success in the search for excess returns.

Why is this point about risk so vital, at the core of everything to do with investing? Is it just because decisions in finance are always confronted by uncertainty? That is no answer. All decisions about anything are confronted by uncertainty. The true answer to this question is more illuminating.

In the old days, when most economic activity consisted of hunting, fishing, and agriculture, the weather was the only source of economic uncertainty. You cannot do anything about the weather. Consequently, people depended on prayer and incantation, in one form or another, as the only available form of risk management. What other approach could you take when everything seemed to be God's will or the will of the Fates?

As we move toward modern times, nature has declining importance. What takes its place? I would seek the answer to that question in the words of the mathematician John von Neumann, who developed the theory of games of strategy (as opposed to games of chance) during the 1920s and 1930s. The most significant insight in game theory was to recognize that men and women are not Robinson Crusoes—each individual isolated from all other individuals. Failure to keep this distinction in mind is the primary reason the techniques and concepts of the natural sciences so often lead the social scientists astray.

Before von Neumann, decision theory visualized each individual making choices that had no effect on any other individual's range of choices. They all calculated utilities in the privacy of their own room. That is an artificial concept. No man is an island. As von Neumann and his coauthor Oskar Morgenstern point out, in emphasizing the difference between a real economy and a Robinson Crusoe economy:

> Crusoe is confronted with a formal problem quite different from the one a participant in a social economy faces. . . . [Crusoe] controls all the variables exclusively . . . to obtain maximum resulting satisfac-

> tion. . . . In order to bring [the rules of the game] into *the sphere of combat and competition* . . . it is necessary to consider n-person games with $n \geq 2$ and thereby sacrifice the simple maximum aspect of the problem [emphasis added].[5]

All economic systems, even the most primitive, depend on production and technology, but capitalism is about combat and competition—about buying and selling even more than it is about production and technology. Capitalism is a giant von Neumann game! Buying and selling means human decisions: What will the customer decide? What will the supplier decide? What will the employee decide? What will the politicians decide? What will other investors decide? The process is intensively interactive. The enemy is us.

The decisions that each of us makes as we ask ourselves these questions will in turn have an influence on how customers, suppliers, employees, politicians, and investors will make their choices in response to ours. In the end, the value of your portfolio is not what somebody tells you is likely to happen over the long run but how much other investors out there are going to be willing to pay you for your assets.

Game theory teaches us that human beings create a complex jumble of uncertainties for one another. It is not enough to say that human nature never changes and let it go at that. Human beings learn from experience and learn from technology. Evolution, in one form or another, is always at work. Yesterday's response to a given set of circumstances is only a hint of what tomorrow's response to that set of circumstances will be—and in any case Leibniz reminds us that today's circumstances will reappear tomorrow, not precisely, but only for the most part.

So we really do not know what the future holds. Risk in our world is nothing more than uncertainty about the decisions that other human beings are going to make and how we can best respond to those decisions.

The basic concepts of Capital Ideas developed between 1952 and 1973 have survived through changes in the world of finance that have been pervasive, rapid, bewildering—and fascinating. These changes have ranged from the black years of the inflationary 1970s to the great bull market that got under way in the early 1980s, and from the small bubble that led to the crash of October 1987 to the soaring high-tech bubble that led to the

crash of 2000. There have been revolutions in communication and in globalization, with new financial instruments and new players on the world scene unimaginable to investors of the 1970s or 1980s.

While all this was going on, the attacks on the body of thought in *Capital Ideas* have been fierce, brilliant, incessant, varied, significant, and immensely influential in the practice of investment management. The borders between gown and town, once so clearly drawn, have blurred to a point where the distinction between a business school professor or an engineer and a denizen of Wall Street is now often difficult to make.

When *Capital Ideas* was published in 1992, I could refer to the markets of that time as "dazzling creations," but the size, range, and impact of financial markets on all aspects of economic activity have exploded everywhere. Indeed, economic globalization would have been unthinkable without markets that led the way toward a plethora of novel and complex forms of financial instruments for the transfer of capital and the management of new exposures to risk. Market prices themselves are not shaped only by information; they convey information from informed to uninformed investors—and sometimes vice versa, just to make life more complicated.

As a consequence, the flow of information that was already rising in the early 1990s has turned into a torrent of fact and fiction assailing all of us around the clock. The computer, still a clumsy and primitive aid to most investors and business managers when I wrote the original edition of this book, is now central to the world of business and finance.* The computer has altered communication, calculations, investment portfolio decisions, and the management of risk in ways no one could have dreamed of as recently as twenty years ago.† Perhaps most important, the crazy bubble of the late 1990s and its disastrous aftermath have led many observers to raise questions about the assumptions of rationality on which the whole edifice of *Capital Ideas* was built.

* The manuscript was written on a DOS-based computer and is no longer available to me in that format.

† Talk about surpassing dreams. A *Wall Street Journal* article of July 27, 2006, reports that Marshall Wace, an investment advisory, has developed a computer model that received 500,000 trading ideas from 246 securities firms in 2005.

Despite all this turmoil, the applications of Capital Ideas have developed into orthodox operating procedures in the daily management of investment portfolios and trading activity in the financial markets all around the globe. The centrality of the trade-off between risk and expected return infuses all investment decisions. The notion that the market is hard to beat is conventional wisdom, even among those who declare they know how to outperform. The principles of corporate finance have undergone important changes; indeed, Modigliani–Miller's bold concepts may have had a greater impact on the bubble of the 1990s and its aftermath than many observers realize. Alpha and beta—once upon a time the unpalatable language of the Capital Asset Pricing Model—have become critical ingredients of the most sophisticated forms of portfolio management and investment performance measurement. New portfolio structures, most notably in the form of hedge funds and the increasing acceptance of short-selling, are increasingly important, but all of them have deep roots in Capital Ideas.

Finally, the proliferation of products, strategies, and innovation stemming from the options pricing model—what Eugene Fama has called "the biggest idea in economics of the century"—has been explosive, and may still have a long way to go.[6] As just one example, the total notional amount of derivatives outstanding at the end of 2006 was $370 trillion, a number to make one's head spin.*

The book begins by facing up front the attack on Capital Ideas by the proponents of Behavioral Finance—and especially on the idea of the Efficient Market Hypothesis. The next chapter describes the current views of Paul Samuelson, one of the great sages about market behavior and portfolio formation. Samuelson takes a dim view of efforts to outperform the returns of the market as a whole or, in a more practical sense, to outperform mutual funds indexed to some primary benchmark like the S&P 500.

Later pages offer the views of other well-known academics, all of whom, in one way or another, are involved in developing practical applications for the core ideas of finance theory in new and exciting

*Cited in International Strategy & Investment Group's publication, *ISI Reports,* December 11, 2006.

formats. We then turn to a series of chapters that relate the startling success of a few institutional investors, and we shall see how every one of those investors developed their strategies from a base composed of the principles of Capital Ideas.

That is just the beginning. It may sound ironic, but as investors increasingly draw on Capital Ideas to shape their strategies, to innovate new financial instruments, and to motivate the drive for higher returns in relation to risk, the real world itself is on a path toward an increasing resemblance to the theoretical world described in *Capital Ideas.* Subsequent pages repeat that observation on more than a few occasions. Baloney those ideas were not.

Perhaps the most remarkable feature of these ideas is the indomitable power of their influence on investment decisions, even though the theories failed to survive a battery of empirical testing. The situation is identical to what Louis Menand, the Pulitzer Prize–winning professor of English and American literature and language, had to say about Freud's *Civilization and Its Discontents:*

> The grounds have entirely eroded for whatever authority it once enjoyed as an ultimate account of the way things are, but we can no longer understand the way things are without taking it into account.[7]

The academic creators of these models were not taken by surprise by difficulties with empirical testing. The underlying assumptions are artificial in many instances, which means their straightforward application to the solution of real-time investment problems is often impossible. The academics knew as well as anyone that the real world is different from what they were defining. But they were in search of a deeper and more systematic understanding of how markets work, of how investors interact with one another, and of the dominant role of risk in the whole process of investing. They were well aware that their theories were not a finished work. They were building a jumping-off point, a beginning of exploration, and, as each step led to the next, they began the search for an integrated structure to simultaneously explain the performance of markets and to solve the investor's dilemma in trading off risk against return. That structure is still evolving.

As with all great revolutions, the passage of time has produced unanticipated variations in the basic themes, both theoretical and practical. Time has also brought periods of disillusion and efforts to mount a counterrevolution. The overarching assumption of investor rationality in every one of these Capital Ideas was admittedly an unrealistic one, but its fault lines are all too visible in markets given to high volatility, to bubbles and crashes, to concentration on short-term developments, and to shocking inconsistencies in the uses of information. We cannot examine the role of Capital Ideas in today's world without giving full consideration to the ideas of what has come to be known as Behavioral Finance—especially as here, too, Nobel Prizes have been earned by the leading thinkers.

As we shall see, the conflict has been brutal at some stages, but the impetus provided by Behavioral Finance to reexamine basic assumptions has also led to fresh perspectives of great value within the framework of the original ideas. Through it all, those Capital Ideas permeate every investment decision.

This assertion in no way minimizes the importance of the vast changes in finance since *Capital Ideas* appeared in 1992 or the incisive new ideas that have attacked the old ones from all sides. But the revolution in theory from 1952 to 1973 transformed the entire practice of investing so profoundly that the world can never go back to where it was before this revolution took place. Every new theoretical notion takes these basic ideas as its starting point.

Despite its rigid assumptions about investor rationality and the role of information, the Efficient Market Hypothesis remains the standard by which we judge market behavior and manager performance. Today, as in the past (and in some ways even more so than in the past), only a precious few investors have found strategies to beat the markets with any acceptable degree of consistency. Although Markowitz's prescription for constructing portfolios requires assumptions we cannot replicate in the real world, the risk/return trade-off is central to all investment choices. Just as essential, Markowitz's emphasis on the difference between the portfolio as a whole and its individual holdings has gained rather than lost relevance with the passage of time. The beta of the Capital Asset Pricing Model is no longer the single parameter of risk, but investors cannot afford to ignore the distinction between the risk of the expected returns of an asset class and the risk in decisions to

outperform that asset class. Modigliani–Miller's perception of the stock market as the dominant determinant of whether a corporation earns its cost of capital was in many ways the intellectual driving force of the great bubble of the 1990s and the source of the scandals of corporate accounting that emerged in its wake.

Above all, the Black-Scholes-Merton insights into the valuation and the virtually unlimited applications of derivatives and into the meaning of volatility have pervaded every market for every asset all around the world. In fact, a recent study reports that 92 percent of the world's top 500 companies are using derivatives.[8] The Edinburgh professor Donald MacKenzie has described options pricing theory as "mathematics . . . performed in flesh and blood."[9]

As you read on, keep in mind that the powerful body of knowledge motivating this whole story was conceived in the space of only twenty-one years, from 1952 to 1973. That is a remarkable fact.* The resulting theoretical structure had no prior existence and only a few scattered roots in the past. Few triumphs in the history of ideas can compare with this achievement. Think of the centuries from Euclid to Isaac Newton to Albert Einstein or the 160 years in the development of modern economic theory from Adam Smith in 1776 to David Ricardo, Alfred Marshall, and Karl Marx in the nineteenth century, and finally to John Maynard Keynes in 1936.

When I started work on this project early in 1989, all of my heroes were still alive, which was my prime motivation for telling the story at that moment. They were, indeed, very much alive. They were also available to me for personal interviews and correspondence, which they gave with boundless generosity. Three have since died: Merton Miller, Franco Modigliani, and Fischer Black. A significant cohort of the total—Harry Markowitz, Robert C. Merton, Merton Miller, Franco Modigliani, Myron Scholes, and William Sharpe—have won Nobel Prizes, and, if he had been alive when Scholes and Merton received

*In his fine book, *An Engine, Not a Camera: How Financial Models Shape Markets* (2006), MacKenzie has characterized the process as a "cascade," in which each innovator drew directly on his predecessors (p. 389).

theirs in 1997, Fischer Black would surely have been included. Jack Treynor, very much a part of the original story, should also have won a Nobel but missed out because he never published his seminal paper on the Capital Asset Pricing Model.*

Working on this project has been a great adventure and a rare privilege.

Peter L. Bernstein

New York, New York
March 2007

* On a personal note, I owe Jack Treynor an apology. On page 184 of *Capital Ideas,* I wrote that Treynor "left Harvard Business School in 1955 . . . ," giving the impression that Jack left without graduating. Graduate he did, with honors.

A Note on Usage

This book is a continuation of the story I told in *Capital Ideas: The Improbable Origins of Modern Wall Street,* which was published in 1992. *Capital Ideas* was primarily about theory; *Capital Ideas Evolving* tells how the theories set forth in *Capital Ideas* have become the fundamental structure of the daily business of investing money. Indeed, even the theoretical innovators of *Capital Ideas* have transformed themselves into innovators in implementation, right along with leading practitioners. While *Capital Ideas* focused on beta—the behavior of markets and how to compose and price portfolios in light of that behavior—*Capital Ideas Evolving* focuses on alpha, or the achievement of returns in excess of some benchmark. To put the case in less formal terms, *Capital Ideas Evolving* is about how the gown came to town.

The text makes frequent reference to *Capital Ideas.* In many places, I suggest referring to specific passages where the earlier text might illuminate what I have had to say here.

I also use the expression Capital Ideas, with upper-case first letters but no italics. In that format, Capital Ideas refers to the body of thought covered in *Capital Ideas,* such as the dominance of risk in decision making, the pricing of assets in competitive markets, the power of diversification, the huge hurdles involved in efforts to outperform the markets, and the giant step forward provided by the development of the options pricing model.

In short, Capital Ideas refers to Harry Markowitz's work on portfolio selection, Franco Modigliani's and Merton Miller's revolutionary views about corporate finance and the behavior of markets, the Sharpe-Treynor-Mossin-Lintner Capital Asset Pricing Model, Eugene Fama's explication of the Efficient Market Hypothesis, and the options pricing model of Fischer Black, Myron Scholes, and Robert C. Merton.

PART I
THE BEHAVIORAL ATTACK

1

Who Could Design a Brain . . .

Alfred Marshall, the great Victorian economist, opens his *Principles of Economics* with these words:

> Economics . . . examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of wellbeing. Thus it is on the one side a study of wealth; and, on the other, and more important side, a part of the study of man.

Marshall's *Principles* were to set the tone of economics for the next half century. In this work, despite his noble words in the quotation above, he made the study of man secondary to the study of wealth. Under all conditions, man in classical economics is an automaton capable of objective reasoning. Furthermore, disagreement about the future—a fundamental feature of the study of man—has no place in this particular study of wealth. Marshall's approach was finally dislodged, with great difficulty and after many years of dispute, by the publication in 1936 of his student John Maynard Keynes's masterwork, *The General Theory of Employment, Interest, and Money.*

The bundle of ideas, models, concepts, and systems embodied in the theoretical structure of modern finance—what I describe as Capital

Ideas—appeared between 1952 and 1973. They owe little to Keynes and almost everything to Marshall. The entire underlying structure of Capital Ideas rests on one overriding assumption: Investors have no difficulty in making optimal choices in the bewildering jumble of facts, rumors, discontinuities, vagueness, and black uncertainty that make up the real world around us.

Over time, this tension between an ideal concept of human rationality and the coarse reality of our daily lives has become an increasingly contentious issue. How much do we know about how people in the real world arrive at decisions and make choices? How great are the differences between the theoretical assumptions and the real world? And do those differences matter?

Although these questions have always been central to understanding the way investors behave and how their responses affect the performance of financial markets, no one made any systematic effort to provide the answers until the mid-1960s. The most significant and influential effort to approach these problems, a field of study that has come to be known as Behavioral Finance, began to take shape quite by accident when two junior psychology professors at Hebrew University in Jerusalem, Daniel Kahneman and Amos Tversky, happened to compare notes one day about their work and their life experiences. The hugely productive result of their friendship and subsequent collaboration has created a competing vision to the rational model of how people make choices and reach decisions under conditions of uncertainty.* The essence of this work is the study of man—of human behavior.

As Kahneman and Tversky wrote in 1992: "Theories of choice are at best approximate and incomplete. . . . Choice is a constructive and contingent process. When faced with a complex problem, people . . . use computational shortcuts and editing operations."[1] The result is a decision-making process differing in many aspects from the assumptions of Capital Ideas.

It would be a mistake to accuse Kahneman and Tversky of tarring all humanity with the black brush of irrationality. That was never the case, as Kahneman's autobiography makes clear: "The interpretation of our work as a broad attack on human rationality rather than a critique

*Tversky died at the age of 59 in 1996. Kahneman, now at Princeton University, was awarded the Nobel Prize in Economic Sciences in 2002.

of the rational-agent model attracted much opposition [to our efforts], some quite harsh and dismissive."[2] As Kahneman put the point to me, "The failure in the rational model is . . . in the human brain it requires. Who could design a brain that could perform in the way this model mandates? Every single one of us would have to know and *understand* everything, completely, and at once."* He expresses this position even more precisely in writing:

> I am now quick to reject any description of our work as demonstrating human irrationality. When the occasion arises, I carefully explain that research on heuristics and biases only refutes an unrealistic conception of rationality, which identifies it as comprehensive coherence. . . . In my current view, the study of judgment biases requires attention to the interplay between intuitive and reflective thinking, which sometimes allows biased judgments and sometimes overrides or corrects them.[3]

Kahneman's and Tversky's published papers, both individually and jointly, constitute an imposing compendium of evidence, ideas, and axioms of human behavior in the process of decision making. One of the most interesting features of Kahneman's and Tversky's work is the innovative nature of their discoveries. The patterns of human nature they discuss must have existed since the beginning of time, but no one before them had caught their vision. They unleashed a far larger flood of research from other academics and, over time, from the practitioner side as well.

In highly compressed fashion, the rest of this chapter conducts a survey of Behavioral Finance based on a small but characteristic sample of these investigations. The implications of this survey for investment are fascinating, but along the way the material also provides a mirror in which we see ourselves probably more often than we would like.

* Unless otherwise specified, all quotations come from personal interviews or personal correspondence.

The real issue is this: How much damage has this attack inflicted on the standard theories and models of finance? Do the critique of the rational-agent model and the demonstrations of its empirical failures render my book, *Capital Ideas,* useless and at best obsolete? Or, in a more practical mode, do the teachings of Behavioral Finance lead us to alpha—to an excess return on our investments after adjustment for risk?

Final judgment must await the presentation of the evidence. But final judgment will be rendered.

Before moving on, a separate point is worth making. The focus of the discussion so far has been on how the findings of Behavioral Finance relate to each of us as an investor. But a deeper issue is also involved, set forth by John Campbell of the Economics Department at Harvard in his presidential address to the American Finance Association in January 2006:

> Even if asset prices are set efficiently, investment mistakes can have large welfare costs for households. . . . They may greatly reduce the welfare gains that can be realized from the current period of financial innovation. . . . If household finance can achieve good understanding of the sources of investment mistakes, it may be possible for the field to contribute ideas to limit the costs of these mistakes.*

A story that Kahneman recounted in the course of his address accepting the Nobel Prize provides a typical example of the "computational shortcuts and editing operations" we use in our attempts to make choices in complex problems. Kahneman had conducted an experiment with two different audiences. Although he offered both audiences an identical set of choices, he presented these choices in different settings that led to strikingly different results.

He asked each audience to imagine a community preparing for the outbreak of a dreaded disease. The experts have predicted the disease will kill 600 people if nothing is done, but they offer two different programs to deal with the contingencies.

* Campbell (2006).