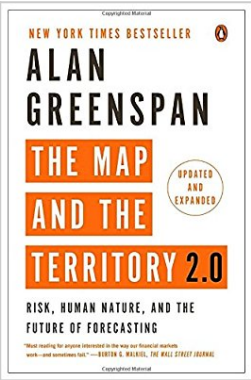

The Map and the Territory 2.0: Risk, Human Nature, and the Future of Forecasting

By Alan Greenspan

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Like all of us, though few so visibly, Alan Greenspan was forced by the financial crisis of 2008 to question some fundamental assumptions about risk management and economic forecasting. No one with any meaningful role in economic decision making in the world saw beforehand the storm for what it was. How had our models so utterly failed us?

To answer this question, Alan Greenspan embarked on a rigorous and far-reaching multiyear examination of how Homo economicus predicts the economic future, and how it can predict it better. Economic risk is a fact of life in every realm, from home to business to government at all levels. Whether we're conscious of it or not, we make wagers on the future virtually every day, one way or another. Very often, however, we're steering by out-of-date maps, when we're not driven by factors entirely beyond our conscious control.

The Map and the Territory is nothing less than an effort to update our forecasting conceptual grid. It integrates the history of economic prediction, the new work of behavioral economists, and the fruits of the author's own remarkable career to offer a thrillingly lucid and empirically based grounding in what we can know about economic forecasting and what we can't.The book explores how culture is and isn't destiny and probes what we can predict about the world's biggest looming challenges, from debt and the reform of the welfare state to natural disasters in an age of global warming.

No map is the territory, but Greenspan's approach, grounded in his trademark rigor, wisdom, and unprecedented context, ensures that this particular map will assist in safe journeys down many different roads, traveled by individuals, businesses, and the state.

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Editorial Review

About the Author
Alan Greenspan was born in 1926 and reared in the Washington Heights neighborhood of New York City. After studying the clarinet at Juilliard and working as a professional musician, he earned his B.A., M.A., and Ph.D. in economics from New York University. In 1954, he cofounded the economic consulting firm Townsend-Greenspan & Co. From 1974 to 1977, he served as chair of the Council of Economic Advisors under President Gerald Ford. In 1987, President Ronald Reagan appointed him chairman of the Federal Reserve Board, a position he held until his retirement in 2006. He is the author of the number one *New York Times* bestseller *The Age of Turbulence*.

INTRODUCTION

It was a call I never expected to receive. I had just returned home from indoor tennis on the chilly, windy Sunday afternoon of March 16, 2008. A senior official of the Federal Reserve Board was on the phone to alert me of the board's just-announced invocation, for the first time in decades, of the obscure but explosive section 13 (3) of the Federal Reserve Act. Broadly interpreted, section 13 (3) empowered the Federal Reserve to lend nearly unlimited cash to virtually anybody.1 On March 16, it empowered the Federal Reserve Bank of New York to lend $29 billion to facilitate the acquisition of Bear Stearns by JPMorgan.

Bear Stearns, the smallest of the major investment banks, founded in 1923, was on the edge of bankruptcy, having run through nearly $20 billion of cash just the previous week. Its demise was the beginning of a six-month erosion in global financial stability that would culminate with the Lehman Brothers failure on September 15, 2008, triggering possibly the greatest financial crisis ever. To be sure, the Great Depression of the 1930s involved a far greater collapse in economic activity. But never before had short-term financial markets, the facilitators of everyday commerce, shut down on so global a scale. The drying up of deeply liquid markets, literally overnight, as investors swung from euphoria to fear, dismantled vast financial complexes and led to a worldwide contraction in economic activity. The role of human nature in economic affairs was never more apparent than on that fateful day in September and in the weeks that followed.

On the face of it, the financial crisis also represented an existential crisis for economic forecasting. I began my postcrisis investigations, culminating in this book, in an effort to understand how we all got it so wrong, and what we can learn from the fact that we did. At its root, then, this is a book about forecasting human nature, what we think we know about the future and what we decide we should do about it. It's about the short term and the long term and, perhaps most important, about the foggy place where the one turns into the other. We are at this moment faced with a number of serious long-term economic problems, all in a sense having to do with underinvesting in our economic future. My most worrisome concern is our broken political system. It is that system on which we rely to manage our rule of law, defined in our Constitution (see Chapter 15). My fondest hope for this book is that some of the insights my investigations have yielded will be of some use in bolstering the case for taking action now, in the short term, which is in our long-term collective self-interest despite the unavoidable short-term pain it will bring. The only alternative is incalculably worse pain and human suffering later. There is little time to waste.

THE FORECASTING IMPERATIVE

As always, though we wish it were otherwise, economic forecasting is a discipline of probabilities. The degree of certainty with which the so-called hard sciences are able to identify the metrics of the physical world appears to be out of the reach of the economic disciplines. But forecasting, irrespective of its failures, will never be abandoned. It is an inbred necessity of human nature. The more we can anticipate the course of events in the world in which we live, the better prepared we are to react to those events in a manner that can improve our lives.

Introspectively, we know that we have a limited capability to see much beyond our immediate horizon. That realization has prompted us, no doubt from before recorded history, to look for ways to compensate for this vexing human "shortcoming." In ancient Greece, kings and generals sought out the advice of the oracle of Delphi before embarking on political or military ventures. Two millennia later, Europe was enthralled by the cryptic prognostications of Nostradamus. Today, both fortune-tellers and stock pickers continue to make a passable living. Even repeated forecasting failure will not deter the unachievable pursuit of prescience, because our nature demands it.

ECONOMETRICS

A key plot point in the history of our efforts to see the future has been the development over the past eight decades of the discipline of model-based economic forecasting. That discipline has embraced many of the same mathematical tools employed in the physical sciences, tools used by almost all economic forecasters, both in government and in the private sector, largely to build models that "explain" the past, and perhaps, as a consequence, make the future more comprehensible.

I was drawn to the sophistication of the then-new mathematical economics as a graduate student at Columbia University in the early 1950s. My professors Jacob Wolfowitz and Abraham Wald were pioneers in mathematical statistics.2 But my early fascination was increasingly tempered over the years by a growing skepticism about its relevance to a world in which the state of seemingly unmodelable animal spirits is so critical a factor in economic outcomes.

John Maynard Keynes, in his groundbreaking 1936 opus, *The General Theory of Employment, Interest and Money*, set the framework for much of modern-day macromodeling. The Keynesian model, as it came to be known, to this day governs much government macroeconomic policy. Keynes's model was a complete though simplified version of how the major pieces of a market economy fit together. The class of models that today we still call Keynesian is widely employed in the public and private sectors, especially to judge the impact of various governmental policies on the levels of GDP and employment.

Keynes's approach was a direct challenge to classical economists' belief that market economies were always self-correcting and would, when disturbed, return to full employment in relatively short order. By contrast, Keynes argued that there were circumstances in which those self-equilibrating mechanisms became dysfunctional, creating an "underemployment equilibrium." In those circumstances, he advocated government deficit spending to offset shortfalls in aggregate demand. Remarkably, more than seventy-five years later, economists continue to debate the pros and cons of that policy.

Economic forecasting of all varieties, Keynesian and otherwise, has always been fraught with never-ending challenges. Models, by their nature, are vast simplifications of a complex economic reality. There are literally millions of relationships that interact every day to create aggregate GDP, even for a relatively simple market economy. Because only a very small fraction of these interactions can be represented in any model, economists are continually seeking sets of equations that, while few in number, nonetheless are presumed to capture the fundamental forces that drive modern economies.

In practice, model builders (myself included) keep altering the set of chosen variables and equation specifications until we get a result that appears to replicate the historical record in an economically credible manner. Every forecaster must decide which relative handful of “equations” he or she believes most effectively captures the essence of an economy’s overall dynamics.

For the most part, the modeling of the nonfinancial sectors of market economies has worked tolerably well. Vast amounts of research have increasingly enhanced our understanding of how those markets function.3 Finance, however, as we repeatedly learn, operates in a different leveraged environment where risk is of a significantly larger magnitude than in the rest of the economy. Risk taking and avoiding is at the root of almost all financial decisions. Nonfinancial business is more oriented to engineering, technology, and management organization.

Nonfinancial businesses do factor risk into all their capital investment and other decisions, but their principal concern concentrates on, for example, how many transistors can be squeezed onto a microchip and how to ensure bridges can safely carry the traffic load they are built to carry. But that is the application of quantum mechanics and engineering, where risk has been largely, though not wholly, removed from decision making. Synthetic derivative trading and other new activities in our financial sector have levels of risk many multiples greater than exist in the physical sciences, the critical body of knowledge that supports nonfinancial business. Human nature has no role to play in how subatomic particles interact with one another.4 Our propensities related to fear, euphoria, herding, and culture, however, virtually define finance. Because finance importantly guides a nation’s savings toward investment in cutting-edge technologies, its impact on overall economic outcomes, for good or ill, is far greater than its less than 10 percent share of GDP would suggest. Moreover, financial imbalances are doubtless the major cause, directly or indirectly, of modern business cycles. Finance has always been the most difficult component of an economy to model.

Spurred in the 1960s by the apparent success of the forecasting models of the Council of Economic Advisers (CEA) under Presidents Kennedy and Johnson, econometrics, as it came to be known, moved from the classroom to the forefront of economic policy making. By the late 1960s, econometric models had become an integral part of government and private policy making, and remain so to this day.

But the road forward for forecasters has been rocky. Simple models do well in the classroom as tutorials but regrettably have had less success in the world beyond. No sooner had Keynes’s paradigm gained wide acceptance within the economics profession than the American economy began to behave in a manner that contradicted some of the core tenets of the so-called Keynesian models, including the thesis that a rise in unemployment reflected increased slack in the economy that would in turn lower the rate of inflation. For much of the 1970s, the unemployment rate rose, but the inflation rate remained stubbornly elevated—a malady dubbed stagflation at the time.

The forecasting tools that had made government economists seem so prescient a decade earlier now appeared flawed. Milton Friedman of the University of Chicago gained intellectual traction by arguing that our inflationary economic policies, most notably the rapid expansion of the money supply, were raising inflation expectations that overcame the disinflationary effect of slack in the labor market. Friedman and his followers developed a theory, monetarism, and a forecasting tool based on the growth in money supply that, for a while, appeared to forecast the developments of the late 1970s far more accurately than any of the variations of the Keynesian model. By the end of the 1970s, the weekly issuance by the Federal Reserve of its money supply figures soon drew as much attention as today’s unemployment numbers.

By the 1980s, with inflation under control—thanks, in part, to the Federal Reserve’s restraint of money supply growth—a rejuvenated but somewhat chastened Keynesianism, with a stagflation fix to reflect the importance of inflation expectations, reemerged. Such models worked reasonably well for the next two

decades, largely as a consequence of an absence of any serious structural breakdown in markets. The model constructed by Federal Reserve staff, combining the elements of Keynesianism, monetarism, and other more recent contributions to economic theory, seemed particularly impressive and was particularly helpful to the Fed's Board of Governors over the years of my tenure.

THE WORLD CHANGED

But leading up to the almost universally unanticipated crisis of September 2008, macromodeling unequivocally failed when it was needed most, much to the chagrin of the economics profession. The Federal Reserve Board's highly sophisticated forecasting system did not foresee a recession until the crisis hit. Nor did the model developed by the prestigious International Monetary Fund, which concluded as late as the spring of 2007 that "global economic risks [have] *declined* since . . . September 2006. . . . The overall U.S. economy is holding up well . . . [and] the signs elsewhere are very encouraging."5 JPMorgan, arguably America's premier financial institution, projected on September 12, 2008—three days before the crisis hit—that the U.S. GDP growth rate would be accelerating into the first half of 2009.

Most analysts and forecasters, both public and private, agreed with the view expressed by the *Economist* in December 2006 that "market capitalism, the engine that runs most of the world economy, seems to be doing its job well." As late as the day before the crash, September 14, 2008, the outlook was still sufficiently equivocal that I was asked on ABC's Sunday morning show *This Week* if "the chances of escaping a recession [were] greater than fifty percent."6 With the crisis less than twenty-four hours away, conventional wisdom had not yet coalesced around even the possibility of a typical recession, to say nothing of the worst economic crisis in eight decades.

Moreover, even after the crash, in January 2009, the unemployment rate, then at 7.8 percent, was forecast by the chairman designate of the President's Council of Economic Advisers to fall to 7.0 percent by the end of 2010 and to 6.5 percent by the end of 2011.7 In December 2011, the rate was 8.5 percent.

What went wrong? Why was virtually every economist and policy maker of note so off about so large an issue?

My inquiry begins with an examination of "animal spirits," the term John Maynard Keynes famously coined to refer to "a spontaneous urge to action rather than inaction, and not as the [rational] outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities."8 Keynes was talking about the spirit that impels economic activity, but we now amend his notion of animal spirits to include its obverse, fear-driven risk aversion. I had long been aware of such "spirits" and their quirkiness; in 1959, as a young economist, I had my first taste of being impressively wrong in a public prediction when I worried in the pages of *Fortune* magazine of investors' "over-exuberance" at what would prove to be very far from the top of a roaring bull market.9, 10 The point isn't that I and other economic forecasters didn't understand that markets are prone to wild and even deranging mood swings that are uncoupled from any underlying rational basis. The point is rather that such "irrational" behavior is hard to measure and stubbornly resistant to any reliable systematic analysis.

But now, after the past several years of closely studying the manifestations of animal spirits during times of severe crisis, I have come around to the view that there is something more systematic about the way people behave irrationally, especially during periods of extreme economic stress, than I had previously contemplated. In other words, this behavior can be measured and made an integral part of the economic forecasting process and the formulation of economic policy.

In a change of my perspective, I have recently come to appreciate that "spirits" do in fact display "consistencies" that can importantly enhance our ability to identify emerging asset price bubbles in equities,

commodities, and exchange rates—and even to anticipate the economic consequences of their ultimate collapse and recovery.

In Chapter 1 in particular, I seek to identify specific behavioral imperatives—spirits—such as euphoria, fear, panic, optimism, and many more—and explore how they, and the cultures they foster, interact with rational economic behavior and spur important market outcomes. This isn't to say that we should throw *Homo economicus* out with his dirty bathwater: Despite ample evidence of persistent irrational market behavior, the data indicate that over the long run, rational economic judgments still guide free economies. But, of course, the long run can, famously, take a *very* long time.

Nonetheless, it is essential to take both a long- and a short-term perspective when we examine the roots of the 2008 crisis and the tepid recovery that followed. The rise and fall from 1994 to 2008 of two asset price bubbles, the data indicate, did reflect in part real improvements in productivity, but the bubbles were also carried by a wave of irrational exuberance and bubble euphoria. Those waves, when they inevitably collapsed, produced widespread fear that disabled markets.

It is important to recognize, however, that not all bubbles, when they collapse, wreak the degree of havoc experienced in 2008. As I detail in Chapter 2, the crashes of 1987 and 2000 had comparatively minimal negative effect on the economy. The severity of the destruction caused by a bursting bubble is determined not by the type of asset that turns "toxic" but by the degree of leverage employed by the holders of those toxic assets. The latter condition dictates to what extent contagion becomes destabilizing. In short, debt leverage matters—as we see in Chapter 2.

Bubbles are spawned by prolonged periods of prosperity, low inflation, and very narrow debt-yield spreads. Such a set of measures, I believe the data confirm, are both a necessary and sufficient condition for the emergence of bubbles. All bubbles, by definition, deflate.

• • •

This book touches on many related issues of importance to our economic future. Writing it has taken me into some uncharted waters—some that might, because of the nature of some of my concerns about the course we are now on, prove to be uncomfortably warm. But I did not write this book in a spirit of criticism, or of pessimism. My interest in writing it was not to establish what I now think but what I now believe I can demonstrate with some reasonable degree of assurance.

Coming out of World War II, the United States was at the top of its game. Productivity was growing rapidly. Household and business savings rates were close to 10 percent, and capital investment and residential building were booming. Moreover, even after funding our burgeoning capital investment, we still had enough savings to spare to invest beyond our borders.

After securing our place of leadership in the economic world, we turned magnanimously to ensure that the least well-off in our society shared in the good fortune of the nation as a whole. After many years of Social Security and lesser programs, such "government social benefits to persons" totaled 4.7 percent of GDP in 1965. With the additions of Medicare and Medicaid, and shortly thereafter a major increase in Social Security through benefit inflation indexation, we embarked on a truly bipartisan unprecedented four-decade rise in outlays averaging nearly 10 percent per year.

The unfortunate consequence of our magnanimity, as I demonstrate in later chapters, is that these benefits have been crowding out private savings almost dollar for dollar. That loss of funding for capital investment led to slowed productivity growth, a phenomenon that would have been even worse if we had not turned to borrowing so heavily from abroad. Moreover, to fund our generosity we have foraged into every corner of

our federal budget to meet the inexorable rise in social benefit spending. We have been eating our seed corn and damaging the very engine of America's comparative strength in the world. We desperately need a change in direction. We have done it before—many times, in fact.

A NOTE TO READERS

Where applicable in the chapters that follow, I have included appendices in support of my conclusions, with additional explanatory text, tables, charts, and regression analyses, the most widely used statistical procedure to assist in judging economic cause and effect.11 Statistics first appear in Chapter 2, and I have accompanied that chapter with a short primer on the interpretation of the results of regression analysis. In Appendices A and B, I expand on the "metrics of animal spirits" and the "metrics of uncertainty," respectively. For those uninterested in these metrics, appendices can readily be bypassed. I trust my written commentary will carry the line of reasoning of the appendices' equations.

ONE

ANIMAL SPIRITS

In my early years, I lived a cloistered life, traveling only rarely outside the confines of New York City. When, in my mid- to late teens, I was first exposed to the rest of the world, I was amazed at how similarly all varieties of people behaved. They may have hailed from different cultures and spoken different languages, but their interactions and behavior were quite familiar to a boy brought up in the canyons of New York City. As I began to travel widely, I became fascinated when businesspeople in Norway, tribal leaders in South Africa, and Chinese musicians all had remarkably similar emotional reactions to day-to-day events. They all smiled and laughed, for example, as a sign of pleasure. They all expressed fear and euphoria in a similar manner.

As the years rolled on, I observed generation after generation of teenagers all exhibiting similar insecurities, awkwardness, and aspirations. The novels of Jane Austen, written in early nineteenth-century Britain, depicted to me a playing field of social intercourse quite familiar to everyone alive today. We humans appear to be a truly homogenous species.

But at root, what are we? We like to describe ourselves as fundamentally driven by reason to an extent not matched by other living creatures. This is doubtless true. But we are far from the prototype depicted by neoclassical economists: that of people motivated predominantly by considerations of rational long-term self-interest. Our thinking process, as behavioral economists point out, is more intuitive than syllogistic. In the end, of course, all intellectual and hence material progress requires verification by a systematic logical process, but that is rarely the way we think day by day.

The economics of animal spirits, broadly speaking, covers a wide range of human actions and overlaps with much of the relatively new discipline of behavioral economics. The point is to substitute a more realistic version of behavior than the model of the wholly rationality-driven "economic man" so prominent for so long in economics courses taught in our universities.1 This more realistic view of the way people behave in their day-by-day activities in the marketplace traces a path of economic growth that is somewhat lower than would be the case if people were truly "rational" economic actors. Most of the time this issue is of little more than academic interest because all our statistical observations and forecasts are already based on decisions that people *actually* made, not what those decisions would have been had people been acting more rationally. While it's true that if people acted at the level of rationality presumed in the standard economics textbooks I was brought up with, the world's standard of living would be measurably higher; but, in fact, they do not.

From the perspective of a forecaster, the issue is thus not whether behavior is rational but whether it is sufficiently repetitive and systematic to be numerically measured and predicted.

Can we better identify and measure those quick-reaction judgments on which we tend to base much, if not all, of our rapid-fire financial market and related decisions—"fast thinking," in the words of Daniel Kahneman, a leading behavioral economist? I think so.

THE LONGER PERSPECTIVE

Consider the insights that brought us the steam engine and the electric motor, the railroad, the telegraph, atomic energy, and the integrated circuit. It was those innovations, and more, that over the past two centuries propelled civilization to the highest material standards of living ever achieved. They were all the result of human reasoning. As the seventeenth-century French mathematician Blaise Pascal is said to have put it, "Man's greatness lies in his power of thought." It's Kahneman's "slow thinking."

To be sure, great innovators often explain their insights as epiphanies, or intuition. But those epiphanies seem to happen only to those who have laboriously accumulated the knowledge relevant to such awakenings.2 I rank the revolution of the eighteenth century, the Enlightenment, particularly in the works of John Locke, David Hume, Adam Smith, and their followers, as the critical intellectual root of the twenty-first century's elevated standard of living. The radical ideas of such men led to the political upheaval that changed societies previously ruled by the divine right of kings, often in complicity with the Church. Many countries reorganized under a rule of law that protected individual rights, especially property rights. By engaging our competitive self-interest, we fostered the innovations that changed the world after millennia of economic stagnation. Those were all acts of human intelligence from which the historical roots of modern capitalist economies have arisen. But that human intelligence has always existed side by side with a large strain of human irrationality.

As the nineteenth century progressed and populations moved from self-sufficient farming to the increasingly complex and interactive urban-dominated economies of the modern world, the industrial business cycle emerged. It demonstrably was driven by the animal spirits we currently observe at the core of speculative booms. But because agriculture, diminishing in importance but still prominent into the 1950s, was largely dependent on weather rather than animal spirits, it was out of sync with the business cycle of nonagricultural industries and thus assuaged the ebb and flow of economic activity as a whole.

On occasion in this book I try to supplement standard forecasting models to capture what we have always known about financial market disruption but have never integrated into those models. As I mentioned, I had always viewed animal spirits as the human propensities driven largely by *random* irrationalities not readily integrated into formal models of the way market economies function. September 2008 was a watershed moment for forecasters, myself included. It has forced us to find ways to incorporate into our macromodels those animal spirits that dominate finance.

All such spirits, as I observe later, are tempered by reason to a greater or lesser degree, and hence I more formally choose to describe such marketplace behavior as "propensities." The technologies that have driven productivity since the Enlightenment were, at root, reasoned insights. Random irrationality produces nothing. If reason were not ultimately prevailing, we could not explain the dramatic improvements in standards of living that the world has achieved in the past two centuries.

As I will demonstrate, these reason-tempered animal spirits significantly affect *macro*economic decision making and outcomes. Newly popular behavioral economics is forcing forecasters to evaluate economic data in the context of a more complex model than that to which most of us had become accustomed.

BEHAVIORAL ECONOMICS

Behavioral economics is not a substitute for conventional economics, nor is it claimed to be. Daniel Kahneman, in discussing his latest book, noted that “much of the discussion . . . is about biases of intuition. However, the focus on error does not denigrate human intelligence. . . . Most of our judgments and actions are appropriate most of the time.”3

As Colin Camerer and George Loewenstein aptly put it a decade ago:

At the core of behavioral economics is the conviction that increasing the realism of the psychological underpinnings of economic analysis will improve economics *on its own terms*. . . . It does not imply a wholesale rejection of the neoclassical approach to economics based on utility maximization, equilibrium, and efficiency. . . . [Behavioral] departures are not radical . . . because they relax simplifying assumptions that are not central to the economic approach. For example, there is nothing in core neoclassical theory that specifies that people should . . . weight risky outcomes in a linear fashion, or that they must discount the future exponentially at a constant rate.4

IDENTIFICATION

Because human beings demonstrate similar characteristics, most, if not all, inbred propensities can be inferred by introspection and observation by every one of us. Fear, euphoria, competitive drive, and time preference, for example, are both introspectively self-evident and readily recognizable in others. Other propensities, such as inbred herding and home bias, we infer mainly by observing the behavior of others. (All these separate propensities will be discussed shortly.)

In classifying propensities, I do not pretend to know which are truly inbred and which just have statistical regularities that are tantamount to being inbred. I classify propensities as “inbred”—herd behavior, for example—more for convenience than for insight. I use the term “inbred” to cover both truly inbred propensities and those consistencies of behavior that enable model builders to operate on that assumption. I do not contend to have covered all the economically relevant spirits or propensities, but I do hope that I have addressed the most important of them. My ultimate purpose is defining a set of economic stabilities of human actions that are statistically measurable and hence capable of being modeled. I am fully aware that in the process I am delving into disciplines with which I have little experience, and have tried to temper my conclusions accordingly.

PROPENSITIES

Fear and Euphoria

We all directly experience threats to our self and our values (fear) and the sense of well-being or elation (euphoria) triggered in the course of our pursuit of our economic interests. Fear, a major component of animal spirits, is a response to a threat to life, limb, and net worth. That emotion is decidedly inbred—no one is immune to it. But people respond to fear in different ways, and the differences are part of what defines the individuality of people. We are all alike fundamentally, but it is our individuality that makes for differences in values and our position in the hierarchy of society. Moreover, it is our individuality that creates markets, division of labor, and economic activity as we know it.

Risk Aversion

Risk aversion is a complex animal spirit crucial to forecasting. It reflects the ambivalent attitude people exhibit to the taking of risk. That we need to act to obtain food, shelter, and all the necessities of life is

evident to all, as is the fact that we can't necessarily know in advance how successful our actions will be. The process of choosing which risks to take and which to avoid determines the relative pricing structure of markets, which in turn guides the flow of savings into investment, the critical function of finance (an issue I address in Chapter 5).

If risk taking is essential to living, is more risk taking better than less? If more risk were better than less risk, demand for lower-quality bonds would exceed demand for riskless bonds, and high-quality bonds would yield more than low-quality bonds. They do not, from which we can infer the obvious: Risk taking is a necessary part of living, but it is not something the vast majority of us actively seek. Finding the proper balance of risks is critical to all of us in our day-to-day lives and perhaps manifests itself most obviously in finance in the management of portfolio risk.

The extremes of zero and full risk aversion (or its obverse, full and zero risk taking) are outside all human experience. Zero risk aversion—that is, the absence of any aversion to engaging in risky actions—implies that an individual does not care about, or cannot discriminate among, objective states of risk to life and limb. Such individuals cannot (or do not choose to) recognize life-threatening events. But to acquire the staples of life requires action, that is, the taking of risks, either by an individual or by others, such as parents taking risks on a child's behalf.

We live our lives day by day well within these outer boundaries of risk aversion and risk taking, which can be measured approximately by financial market yield spreads with respect to both credit rating and maturity. Those boundaries are critical to forecasting. The turn in stock prices in early 2009 following the crash of 2008 was a sign of the level of human angst approaching its historical limit (see Chapter 4). The limits of angst are also evident in credit spreads, which exhibit few or no long-term historical trends. Prime railroad bonds of the immediate post?Civil War years, for example, reflect spreads over U.S. Treasuries that are similar to our post?World War II experience, suggesting long-term stability in the degree and spread of human risk aversion.

I calibrate how people respond to risk in nonfinancial markets, both rationally and emotionally, with a measure I have employed for years—the share of liquid cash flow that management *chooses* to commit to illiquid, especially long-term, capital investments. That share is a measure of corporate managers' degree of uncertainty and hence their willingness to take risks. In 2009, it had fallen to its lowest peacetime level since 1938. The equivalent measure of risk aversion for households is the share of household cash flow invested in homes. This measure reached its lowest postwar level in 2011. That collapse in investment, especially in long-lived assets, explains most of the recent failure of the American economy to follow a path of recovery similar to the other ten post?World War II recoveries (see Chapter 7).

Throughout this book I delve into the role of risk aversion and uncertainty as critical determinants of economic activity. I conclude that stock prices are not only an official leading indicator of business activity but are also a major cause of that activity (see Chapter 4). Uncertainty has many of the characteristics of peering into fog. Heavy discounting of the future is tantamount to having difficulty perceiving clearly beyond a certain point, and progressively less well as distance (risk) increases. The lessening or the end of uncertainty is like the lifting of the fog.

Time Preference

Time preference is the self-evident propensity to value more highly a claim to an asset today than a claim to that same asset at some fixed time in the future. A promise delivered tomorrow is not as valuable as that promise conveyed today. That many buyers of Apple's immensely popular iPhone 5 (released in September 2012) would have paid for immediate delivery to bypass a waiting list is a clear reflection of time preference.

We experience this phenomenon mainly through its most visible counterpart: interest rates and savings rates (see Box 1.1). The stability of time preference over the generations can be demonstrated; indeed, in fifth-century BC Greece, interest rates exhibited levels similar to what we see in today's markets.5 The Bank of England's official policy rate for the years 1694 to 1972 ranged between 2 percent and 10 percent. It surged to 17 percent during the inflationary late 1970s, but it has since returned to its single-digit historical range. It is reasonable to conclude that time preference, too, has no evident long-term trend.

Such inferences of the stability of time preference are also consistent with behavioral economics. A famous experiment, conducted in 1972 and 1990 by Stanford psychologist Walter Mischel, concluded that the ability of children between the ages of four and six to forgo immediate gratification6 was reflected years later by the high SAT scores of those who deferred gratification as children compared with those who could not. A follow-up study of the same individuals in 2011 confirmed the response, indicating a *lifelong* inbred propensity to a specific level of time preference, though not the same for each individual. To forgo short-term gratification for greater rewards in the future is generally consistent with higher intelligence.

Real (inflation expectation adjusted) market interest rates, I assume, are continually converging toward a stable time preference, though we cannot be sure because time preference is rarely directly visible.

BOX 1.1: TIME PREFERENCE AND SAVINGS

The extent that we discount the future (time preference) must obviously affect our saving propensity. A high preference for immediate consumption would diminish the propensity to save, while a high preference for saving for retirement, for example, would diminish the propensity to consume. But through most of history, time preference could not have had a major determining role in the level of savings. Prior to the late nineteenth century, almost all production had to be dedicated to keeping the population alive. There was little to save even if our inbred propensities were inclined in that direction.

Western Europe's population, for example, was able to grow only 0.2 percent annually between 1000 and 1820, following stagnation in the previous millennium.* It is only when innovation and productivity growth freed generations from the grip of chronic starvation that time preference could emerge as a significant economic force. Since 1880, the gross private savings rate in the United States has been remarkably stable, ranging mostly between 10 percent and 20 percent of GDP. Gross domestic savings averaged somewhat higher, and as can be seen from Exhibit 9.5, the savings rate rose sharply after 1834.

Savings is a measure of the extent of abstaining from consumption. Investment is a measure of the particular assets to which those savings are applied. Savings and investment, as I note in Box 9.3, are alternate measures of the same transactions, *ex post*.

Culture reflects a country's degree of abstinence. People acting rationally would tend to save in their early years to create provisions for years of retirement. ("Retirement," incidentally, is only a twentieth-century phenomenon.) But our less rational propensities are too often evident in a failure to always do so.

What is remarkable is how, in the United States, we have managed to exhibit so stable a private savings rate for more than a century. Time preference, judging from the historical data on the long stability of real riskless interest rates, apparently remained stable, and doubtless sets the upper limits to the proportion of income that people are willing to save, if they are able to do so at all. It has only been when human ingenuity brought production levels beyond the needs of raw survival that time preference became a factor in the rate of savings.

Herd Behavior

There is a universally observed human trait to follow or emulate a leader of some sort. It is driven by most people's need to achieve the security (emotional and physical) of belonging to a group. It is arguably one of our most important propensities, second only to fear, and a significant driver of economic activity. Herd behavior exaggerates speculation and the business cycle as it distracts us from the facts of markets and draws us to the less relevant views of other people. It captures consumer behavior known by the idiom "keeping up with the Joneses," also known as "conspicuous consumption," the term coined by Thorstein Veblen in 1899.7, 8

I would argue that this behavior accounts for the long-term stability we see in household spending and saving patterns from one generation to the next. Personal savings as a share of disposable personal income during peacetime has held in a relatively narrow range of 5 to 12 percent almost all the time since 1897 (see Exhibit 1.1). With the very large rise in average real household incomes over the generations, why does the average savings rate not rise as a consequence? As I noted in *The Age of Turbulence* (pages 269–70), happiness depends far more on how people's incomes compare with those of their perceived peers, or even those of their role models, than how they are doing in any absolute material sense. When graduate students at Harvard were asked a while back whether they would be happier with $50,000 a year if their peers earned half that or $100,000 if their peers earned double that, the majority chose the lower salary. When I first saw the story, I chuckled and started to brush it off. But it struck a chord, and ultimately brought back a long-dormant memory of a fascinating 1947 study by Dorothy Brady and Rose Friedman.9

Brady and Friedman presented data showing that the share of income an American family spends on consumer goods and services is largely determined not by the level of family income but by its level relative to the nation's average family income. Their study suggests that a family with the nation's average income in 2000 would be expected to spend the same proportion of its income as a family with average family income in 1900, even though in inflation-adjusted terms that 1900 income was only a minor fraction of that of 2000. I reproduced and updated their calculations and confirmed their conclusion.10 Consumer behavior has not changed much over the last century and a quarter.

Herding is a different type of propensity from all the rest in that it refers not only to individuals' copycat propensity but also to the principles of group behavior and thus has implications for the economy overall. Fear and euphoria, for example, are contagious processes exaggerated by herding.11 It can be difficult to parse, however, why individuals seek to emulate one group rather than another and what it takes to wean them away from one "crowd" to join another. The emergence of modern social media has only accelerated herd behavior.

Herd behavior is a key driver and an essential characteristic of speculative booms and busts. Once the speculative herd-driven propensity arrives at a state in which the vast majority of market participants have become committed to the bull market, the market becomes highly vulnerable to what I dub the Jessel paradox (see Chapter 3), and the market breaks. While the Jessel paradox explains the upside of speculative booms, an analogy to how the downside plays out, both literally and figuratively, is the extreme form of herding, the dreaded *stampede*—a term borrowed from the cattle drives of our Old West.

Dealing with day-to-day reality requires a level of detailed decision making that most adults, to a greater or lesser extent, perceive as beyond their ken.12 For most of us, the comfort of guidance is sought in religion, and all of us are drawn to following the directions or emulating the actions of our peers or leaders.

Those who believe, rightly or wrongly, that they know the direction that their society should take compete for leadership. Cliques or political parties arise, from which the ultimate leaders emerge, sometimes by

grasping the levers of military power. In democratic societies at least, who the leaders turn out to be, for good or ill, is heavily influenced by herd behavior.

Few if any social groups have flourished without some hierarchy of leadership. Communal groups that make collective decisions by strict consensus—especially those attempting to live communally to the extent of holding income and wealth in common—almost always collapse. People have a propensity to form emotional bonds to a larger group, but when these bonds demand an equal sharing of income or status in a pecking order, they tend to break down, floundering on the inbred self-centered nature of our species. Our propensity for competition invariably produces the jockeying for leadership that has persistently undermined communal societies.

People in every society seek to improve their status in the pecking order of any organization. Even those who deem themselves unaffected by the opinions of others conform to the customs and culture of their societies. Albert Einstein, for example, however intellectually self-generating, followed many of the social norms of his day. Ayn Rand, the most independent person I have ever known, followed many of the trivial dress customs of her society.

Inertia

We all seek actions that will reduce the daily tensions and anxieties that afflict us. Inertia, a disinclination to move, is the state we generally seek until stirred into action by other more pressing imperatives. This inclination is particularly visible in the marketplace where changes from day to day in, for example, prices and production seem initially biased to inaction or, at best, to very small changes.

As I demonstrate in Appendix A, stock prices, even when adjusted for their long-term trend, do not exhibit the randomness that would be expected to exist were it not for the propensity to be inert. This is evident in a much heavier concentration of small daily changes than would be inferred if stock price changes were fully random.

Dependency

Our sense of mutual dependency leads us to search for the companionship and approval of people we perceive as our peers. Instead of living as self-sufficient hermits, people almost universally choose to live in groups and gain from companionship and a division of labor.13 And, of course, if we did not harbor an inbred biological imperative to procreate, none of us would be here. But a sense of dependency by definition places “dependents” in a constant state of uncertainty. To assuage the uncertainty, people’s inbred sense of self-worth asserts itself and we challenge authority. Our nature also requires us to seek a measure of independence. Dependency in one form or another is a necessary, but not necessarily a pleasurable, state. Children under the restrictive guidance of elders often revolt against parental apron strings. Many children, at one time or another, in extremis, leave home in an assertion of independence, only to return when the reality of their dependence becomes all too real.

The Interaction

Time preference, coupled with risk aversion and herd behavior, governs the pricing of all income-producing assets and, since the nineteenth century, sets the proportion of income that households seek to save over the long run. The real (inflation-adjusted) interest rate is anchored by time preference, and it fluctuates according to the balance of saving and investment in an economy and the degree of financial intermediation. Bond yields measure risk aversion in two dimensions: by credit rating and maturity. Herd behavior will often skew an individual’s risk aversion judgment toward the mean of a group: other investors, family, or pundits. Stock prices can be thought of as the sum of the expected future earnings per share, tempered by a rate of discount

applied to those earnings. That discount rate is the rate of return that investors require to hold such risky assets. The equity premium is the rate of return that investors expect, less the real rate of return on riskless assets, a proxy for time preference. The capitalization of rental returns on real estate properties is similarly calculated.

Home Bias

Home bias is the propensity to deal with the familiar: with people and things geographically close to home and familiar in terms of culture, language, and interests. This is especially evident in trade data, both foreign and domestic, even allowing for savings in transportation costs. Canada and Mexico, for example, accounted for more than 29 percent of our total international trade in 2013, far more than their share of global non–U.S. GDP. And my family's favorite pharmacy sells the vast majority of its wares to patrons who live within a mile of its location.

Aside from any direct or indirect barriers, people seem to prefer to invest in familiar local businesses. The United States has no barriers to interstate investment, and the states share a common currency, culture, language, and legal system. Yet studies have shown that individual investors and even professional money managers have a slight preference for investments in their own communities and states. Trust, so crucial an aspect of investing, is most likely to be fostered by the familiarity of local communities.

A propensity related to the comfort and familiarity of trading with partners close to home is the emotional comfort we all sense in personal relationships that become familiar and predictable. The uncertainty that arises with strangers imparts a certain, if minor, stress that subsides with familiarity. Personal relationships that build over months and years are a major reason why people born and brought up in a particular locale tend to stay put, often for a lifetime, even when they have accumulated the physical resources to move elsewhere and have ample reason to do so. The familiarity of home is the source of the angst we feel after leaving, namely, homesickness.

Competition

More complex, and battling with our sense of dependency, is our introspectively self-evident propensity to be competitive. Its consequences range over a much broader spectrum than most propensities. Competition as it plays out in markets is, of course, indispensable to the efficient functioning of our economies, as has been emphasized by economists for more than two centuries. The degree of competitiveness has a broad sway in defining our culture and its indirect effect on economic events.

We compete whether on a ball field or during a dinner conversation. When we view a familiar competitive sport, even though we may begin by having no preference for either competitor, we usually find ourselves rooting within a matter of minutes for one or the other. If not, we lose interest. It is our nature. And when we combine this propensity with copycat herd behavior and our home bias propensity, we develop overwhelming support for local teams against "foreign" competitors. Spectator sports are effectively morality plays: stylized views of the type of competition in which we all engage in our day-to-day activities with respect to both economic and noneconomic relationships. The specific spectator sport is irrelevant—all that is required is that there is competitive "combat" and that there are winners and losers to gain our attention.

I suspect, but cannot prove, that this propensity is driven by the fact that competition is, in a Darwinian sense, necessary for survival. Unless we successfully compete in the taking of risk, we perish. War appears to be an ugly extension of this propensity. War is competition raised to a level of mortal combat in which there are ultimate winners and losers. Since war has been a part of the human condition as far back as history allows, I assume this propensity is inbred. This is one of many ambivalences that arise with animal spirits.14

Code of Values

No human being can avoid the imperative of judging right from wrong. What we feel is right and just reflects our own deep-seated code of values. We rationally codify our introspective view of how our actions will further our values and, therefore, what set of actions we believe, rightly or wrongly, will nurture our lives. The value systems of most people are rooted in religion and culture and are heavily inculcated at an early age by our parents and, later in life, by our peers.

What is perceived by people as right or wrong is not preordained and requires that each of us fill in the blanks by drawing on our own value systems. Herd behavior, not surprisingly, is apparently a major factor in individuals' choices, and people's value hierarchy can and does change over time. Moreover, we cannot help applying our own standards to judge the actions of others.

This propensity is the source of our sense of "fairness" in economic matters. Most people act as though a particular sense of fairness is self-evident. It is not. It is rather one's most deeply imbedded hierarchy of values that most people have difficulty expressing, or even identifying in some instances. Most commentators take it as self-evident that taxing the wealthy at a higher rate than lower-income groups is "fairer." But that implies that somehow upper-income taxpayers have not "earned" their income, a view that rests on the belief that in a division of labor of society, all income is produced jointly. The alternate view is that even though output is produced collectively in a free, competitive market, each individual's income reflects that person's marginal contribution to total output. Either view can be, and has been, rationally held, but neither can claim self-evidence. "Ability to pay" is a pragmatic view that also rests on the premise that income is not "earned."

Most people in a society or country tend to hold similar standards of fairness. This, in democratic societies, ultimately determines what is legally "just," the basis of our set of laws. Such fundamental beliefs are the major glue that holds societies together. In the United States, for example, the pact with respect to public issues is our Constitution. We are governed by a rule of law anchored by the protection of those "fundamental" individual rights. That constitution has existed with relatively few amendments since 1789. But that stability in the governing law of our land has periodically come under strain over the generations and indeed broke down on the set of issues, slavery first among them, that led to the Civil War. That the break did not come sooner is surprising given the inherent contradiction between the Declaration of Independence's assertion that "all men are created equal" and the existence of slavery.

Optimism

Another propensity is people's bias toward optimism rather than realism—a propensity to assume that success in all actions is more likely than their objective probabilities. The mentality behind widespread participation in lotteries, for example, is that one can beat the odds, even as they are objectively stacked against us. Given the required "take" of the lottery organizers, the expected outcome of every lottery ticket is negative. Nonetheless, a large part of the population is drawn to such gambling—a case of optimism over reality.

But even in the more "rational" business world, the prevalence of success of newly opened restaurants, for example, is objectively far lower than the biased optimism of neophyte restaurateurs. However, the failure rate apparently does not change with experience. In the larger corporate world, there are remarkably successful entrepreneurs who hit it big, but who, if they took seriously the odds of success, would never have tried.

For any individual, of course, failure is a setback. For society as a whole, though the success rate may be only one percent or less, that one percent might include Edison's lightbulb and early electric power

transmission, Morse’s telegraph, or Bessemer’s steel furnace. Their impact on future productivity growth was enormous.

The names we never remember are those optimists who failed. Failure was certainly a discouragement to them. But the resources consumed by failed initiatives are small when compared with the creations of the one percent. For a society as a whole, it does not matter which entrepreneurs, for whatever reasons, end up in the one percent. But the fact that one percent of them are successful does matter. We do not know which of the long-odds ventures will succeed. But in a society where “optimistic” inventors have free reign, unencumbered by political repression or crony capitalism, a certain number will succeed, and they, in retrospect, govern much of the overall economic growth.

As Daniel Kahneman points out, “the people who have the greatest influence on the lives of others are likely to be optimistic and overconfident, and to take more risks than they realize. . . . Optimistic individuals play a disproportionate role in shaping our lives. Their decisions make a difference; they are the inventors, the entrepreneurs, the political and military leaders—not the average people. . . . The optimistic risk taking of entrepreneurs surely contributes to the economic dynamism of a capitalistic society, even if most risk takers end up disappointed.”15

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