

AGAINST THE GODS

THE REMARKABLE STORY OF RISK

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now on are, like Arrow, still alive. They are testimony to how young the ideas of risk management are.

The concepts we shall encounter in the chapter ahead never occurred to the mathematicians and philosophers of the past, who were too busy establishing the laws of probability to tackle the mysteries of uncertainty.

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The Radically Distinct Notion

Francis Galton died in 1911 and Henri Poincaré died the following year. Their passing marked the end of the grand age of measurement, an era that reached back five centuries to Paccioli's game of *balla*. For it was his problem of the points (page 43) that had launched the long march to defining the future in terms of the laws of probability. None of the great mathematicians and philosophers of the past whom we have met so far doubted that they had the tools they needed to determine what the future held. It was only the facts that demanded attention.

I do not mean to imply that Galton and Poincaré finished the task: the principles of risk management are still evolving. But their deaths occurred—and their understanding of risk climaxed—on the eve of one of the great watersheds of history, the First World War.

The optimism of the Victorians was snuffed out by the senseless destruction of human life on the battlefields, the uneasy peace that followed, and the goblins let loose by the Russian revolution. Never again would people accept Robert Browning's assurance that "God's in his heaven:/All's right with the world." Never again would economists insist that fluctuations in the economy were a theoretical impossibility. Never again would science appear so unreservedly benign, nor would religion and family institutions be so unthinkingly accepted in the western world.

World War I put an end to all that. Radical transformations in art, literature, and music produced abstract and often shocking forms that stood in disturbing contrast to the comfortable modes of the nineteenth century. When Albert Einstein demonstrated that an imperfection lurked below the surface of Euclidean geometry, and when Sigmund Freud declared that irrationality is the natural condition of humanity, both men became celebrities overnight.

Up to this point, the classical economists had defined economics as a riskless system that always produced optimal results. Stability, they promised, was guaranteed. If people decided to save more and spend less, the interest rate would fall, thereby encouraging investment or discouraging saving enough to bring matters back into balance. If business managers decided to expand their firms rapidly but households failed to save enough for them to borrow what they needed for expansion, the interest rate would rise to set matters right. Such an economy would never suffer involuntary unemployment or disappointing profits, except perhaps during brief periods of adjustment. Although individual firms and investors took risks, the economy as a whole was risk-free.

Such convictions died hard, even in the face of the economic problems that emerged in the wake of the war. But a few voices were raised proclaiming that the world was no longer what once it had seemed. Writing in 1921, the University of Chicago economist Frank Knight uttered strange words for a man of his profession: "There is much question as to how far the world is intelligible at all. . . . It is only in the very special and crucial cases that anything like a mathematical study can be made."¹ During the depths of the Great Depression, John Maynard Keynes echoed Knight's pessimism:

We are faced at every turn with the problems of Organic Unity, of Discreteness, of Discontinuity—the whole is not equal to the sum of the parts, comparisons of quantity fail us, small changes produce large effects, and the assumptions of a uniform and homogeneous continuum are not satisfied.²

In 1936, in his masterwork, *The General Theory of Employment, Interest and Money*, Keynes flatly rejected Jevon's faith in the universal applicability of measurement: "[Most of our decisions] to do something posi-

tive . . . can only be taken as a result of animal spirits . . . and not as the outcome of a weighted average of quantitative benefits multiplied by quantitative probabilities."³

Faced with the tensions of the postwar years, only the most naive theorist could pretend that all problems could be solved through the rational application of differential calculus and the laws of probability with well-ordered preferences. Mathematicians and philosophers had to admit that reality encompassed entire sets of circumstances that people had never contemplated before. The distribution of odds no longer followed the distribution Pascal had defined. It violated the symmetry of the bell curve and was regressing to means that were far more unstable than what Galton had specified.

Researchers sought for ways of conducting a systematic analysis of the unexpected. Before the war they had concentrated on the inputs that went into decision-making. Now they recognized that the decision is only the beginning. The devil is in the consequences of our decisions, not in the decisions themselves. As Robert Dixon, an Australian economist, has remarked, "Uncertainty is present in the decision-making process, not so much because there is a future as that there is, and will be, a past. . . . We are prisoners of the future because we will be ensnared by our past."⁴ That ultimate realist, Omar Khayyam, had had the same thought nearly a thousand years before:

The Moving Finger writes; and having writ,
Moves on: nor all your Piety nor Wit
Shall lure it back to cancel half a Line,
Nor all your Tears wash out a Word of it.

What do you do when a decision leads to a result that was not even contemplated in your set of probabilities? Or when low-probability outcomes seem to occur more frequently than they should? Don't the patterns of the past always reveal the path to the future?

Knight and Keynes, the first two to confront such questions in a serious fashion, were both noisy nonconformists, but, together, they defined risk as it has come to be understood today.



Frank Knight was born on a farm in White Oak Township, Illinois, in 1885, the oldest of eleven children.⁵ Though he lacked a high-school diploma, he attended two tiny colleges, perhaps the best he could afford in view of his family's poverty. The first was American University (which had no connection to the university with the same name in Washington, D.C.); this college emphasized *temperance* above all else and even taught "the principles of political economy in regard to the use of intoxicating liquors." In its national advertising it urged "parents to send their hard-to-handle boys to American University for disciplining." The second college was Milligan. On Knight's graduation, the president of the college described him as "the best student I have had . . . best read student . . . [with] practical business capacity as well as technical knowledge."

Knight claimed that the reason he became an economist was that plowing was too hard on his feet. Before turning to economics he did graduate work in philosophy at Cornell; he switched to economics after a professor declared, "Stop talking so much, or leave the philosophy department!" But it was not just the overuse of his high, squeaky voice that got him into trouble; one of his philosophy professors predicted, "He will destroy the true philosophic spirit wherever he touches it." Knight was an incurable cynic about human nature. A more sympathetic professor once told him, "You came out of a malodorous environment where every man with a mind doubts everything."

Knight began teaching economics at the University of Iowa in 1919 and moved to the University of Chicago in 1928. He was still teaching there when he died in 1972 at the age of 87; "It beats working for a living," he once remarked. His lectures were often ill prepared, delivered in a rambling, country-boy manner, and larded with heavy-handed humor.

Despite his early exposure to religion and his continuing study of religion throughout his life, Knight was an implacable enemy of everything to do with organized forms of religion. In his presidential address to the American Economic Association in 1950, he likened the pope to Hitler and Stalin. He once said that religion was responsible for his bad sleeping habits: "It's that damned religion. I just can't get it out of my mind."

An irascible, dedicated, honest man, he took a dim view of people who took themselves too seriously. He claimed that economic theory

was not at all obscure or complicated, but that most people had a vested interest in refusing to recognize what was "insultingly obvious." Noting a quotation by Lord Kelvin chiseled in stone on the social science building at Chicago—"[W]hen you cannot measure it . . . your knowledge is of a meager and unsatisfactory kind"—Knight sarcastically interpreted it to mean, "Oh, well, if you cannot measure, measure anyhow."⁶



Knight's cynicism and concern for moral values made it hard for him to come to terms with the selfishness, and frequently the violence, of capitalism. He despised the self-interest that motivates both buyers and sellers in the marketplace, even though he believed that only self-interest explains how the system works. Yet he stuck with capitalism, because he considered the alternatives unacceptable.

Knight had no interest in working up empirical proofs of his theories. He harbored too many doubts about the rationality and consistency of human beings to believe that measuring their behavior would produce anything of value. His bitterest sarcasm was reserved for what he saw as "the near pre-emption of [economics] by people who take a point of view which seems to me untenable, and in fact shallow, namely the transfer into the human sciences of the concepts and products of the sciences of nature."

The attitude reflected in this remark is evident in Knight's doctoral dissertation, which was completed at Cornell in 1916 and published as a book in 1921. *Risk, Uncertainty and Profit* is the first work of any importance, and in any field of study, that deals explicitly with decision-making under conditions of uncertainty.

Knight builds his analysis on the distinction between risk and uncertainty:

Uncertainty must be taken in a sense radically distinct from the familiar notion of Risk, from which it has never been properly separated. . . . It will appear that a *measurable* uncertainty, or "risk" proper . . . is so far different from an *unmeasurable* one that it is not in effect an uncertainty at all.⁷

Knight's emphasis on uncertainty decoupled him from the predominant economic theory of the time, which emphasized decision-

making under conditions of perfect certainty or under the established laws of probability—an emphasis that lingers on in certain areas of economic theory today. Knight spoke of the failure of the probability calculus to, in Arrow’s words, “reflect the tentative, creative nature of the human mind in the face of the unknown.”⁸ Clearly Knight was a creature of the twentieth century.



The element of surprise, Knight argued, is common in a system where so many decisions depend on forecasts of the future. His main complaint against classical economics with its emphasis on so-called perfect competition arose from its simplifying assumption of “practical omniscience on the part of every member of the competitive system.”⁹ In classical economics, buyers and sellers, and workers and capitalists, always have all the information they need. In instances where the future is unknown, the laws of probability will determine the outcome. Even Karl Marx, in his dynamic version of classical economics, never makes reference to forecasting. In that version, workers and capitalists are locked in a drama whose plot is clear to everyone and whose dénouement they are powerless to change.

Knight argued that the difficulty of the forecasting process extends far beyond the impossibility of applying mathematical propositions to forecasting the future. Although he makes no explicit reference to Bayes, he was dubious that we can learn much from an empirical evaluation of the frequency of past occurrences. *A priori* reasoning, he insisted, cannot eliminate indeterminateness from the future. In the end, he considered reliance on the frequency of past occurrences extremely hazardous.

Why? Extrapolation of past frequencies is the favored method for arriving at judgments about what lies ahead. The ability to extrapolate from experience is what differentiates adults from children. Experienced people come to recognize that inflation is somehow associated with high interest rates, that moral character is desirable in the choice of whom we play poker with and whom we marry, that cloudy skies frequently presage bad weather, and that driving at high speed along city streets is dangerous.

Business managers regularly extrapolate from the past to the future but often fail to recognize when conditions are beginning to change from poor to better or from better to worse. They tend to identify turning points only after the fact. If they were better at sensing imminent changes, the abrupt shifts in profitability that happen so often would never occur. The prevalence of surprise in the world of business is evidence that uncertainty is more likely to prevail than mathematical probability.

The reason, Knight explains, is this:

[Any given] “instance” . . . is so entirely unique that there are no others or not a sufficient number to make it possible to tabulate enough like it to form a basis for any inference of value about any real probability in the case we are interested in. *The same obviously applies to the most of conduct and not to business decisions alone.*¹⁰ (Italics are mine.)

Mathematical probabilities relate to large numbers of independent observations of homogeneous events, such as rolls of the dice—in what Knight describes as the “apodeictic certainty” of games of chance.¹¹ But no event is ever identical to an earlier event—or to an event yet to happen. In any case, life is too short for us to assemble the large samples that such analysis requires. We may make statements like “We are 60% certain that profits will be up next year,” or “Sixty percent of our products will do better next year.” But Knight insisted that the errors in such forecasts “must be radically distinguished from probability or chance. . . . [I]t is meaningless and fatally misleading to speak of the probability, in an objective sense, that a judgment is correct.”¹² Knight, like Arrow, had no liking for clouds of vagueness.

Knight’s ideas are particularly relevant to financial markets, where all decisions reflect a forecast of the future and where surprise occurs regularly. Louis Bachelier long ago remarked, “Clearly the price considered most likely by the market is the true current price: if the market judged otherwise, it would quote not this price, but another price higher or lower.” The consensus forecasts embedded in security prices mean that those prices will not change if the expected happens. The

¹⁰Knight rarely uses such arcane words. “Apodeictic” means incontestable, necessarily true because logically certain.

Saves having to look it up, but you do have to read this to add this ridiculous word to your vocabulary.

volatility of stock and bond prices is evidence of the frequency with which the expected fails to happen and investors turn out to be wrong. Volatility is a proxy for uncertainty and must be accommodated in measuring investment risk.

Galton, a Victorian, would have expected prices to be volatile around a stable mean. Knight and Bachelier, neither of them a Victorian, are silent on precisely what central tendency would prevail, if any. We will have more to say about volatility later on.



Knight disliked John Maynard Keynes intensely, as he revealed when, in 1940, the University of Chicago decided to award Keynes an honorary degree. The occasion prompted Knight to write a rambling letter of protest to Jacob Viner, a distinguished member of the Department of Economics at Chicago. Viner, Knight declared, was the person reported to be responsible “more than anyone else” for the decision to honor Keynes and therefore was “the appropriate party to whom to express something of the shock I received from this news.”¹³

Knight grumbled that Keynes’s work, and the enthusiasm with which it had been greeted by academics and policymakers, had created “one of my most important . . . sources of difficulty in recent years.” After crediting Keynes with “a very unusual intelligence, in the sense of ingenuity and dialectical skill,” he went on to complain:

I have come to consider such capacities, directed to false and subversive ends, as one of the most serious dangers in the whole project of education. . . . I regard Mr. Keynes’s [views] with respect to money and monetary theory in particular . . . as, figuratively speaking, passing the keys of the citadel out of the window to the Philistines hammering at the gates.

Although most of the free-market economists at Chicago disagreed with Keynes’s conviction that the capitalist system needed a frequent dose of government intervention if it was to survive, they did not share Knight’s disdain. They deemed it fit to honor Keynes as a brilliant innovator of economic theory.

Knight may simply have been jealous, for he and Keynes shared the same philosophical approach. For example, they both distrusted classi-

cal theories based on the laws of mathematical probability or assumptions of certainty as guides to decision-making. And they both despised the “the mean statistical view of life.”¹⁴ In an essay written in 1938, titled “My Early Beliefs,” Keynes condemns as “flimsily based [and] disastrously mistaken” the assumption of classical economists that human nature is reasonable.¹⁵ He alludes to “deeper and blinder passions” and to the “insane and irrational springs of wickedness in most men.” These were hardly the views of a man who was passing the keys of the citadel to the Philistines hammering at the gates.

Knight may have been annoyed that Keynes had carried the distinction between risk and uncertainty much further than he himself had carried it. And he must surely have been angered when he discovered that the sole reference Keynes made to him in *The General Theory of Employment, Interest and Money* was in a footnote that disparages one of his papers on the interest rate as “precisely in the traditional, classical mould,” though Keynes also conceded that the paper “contains many interesting and profound observations on the nature of capital.”¹⁶ Only this, after Knight’s pioneering explorations into risk and uncertainty fifteen years before.



Keynes was from the opposite end of the intellectual and social spectrum from Knight. He was born in 1883 to an affluent, well-known British family, one of whose ancestors had landed with William the Conqueror. As Robert Skidelsky, his most recent biographer, describes him, Keynes was “not just a man of establishments, but part of the élite of each establishment of which he was a member. There was scarcely a time when he did not look down at England, and much of the world, from a great height.”¹⁷ Among Keynes’s close friends were prime ministers, financiers, philosophers Bertrand Russell and Ludwig Wittgenstein, and artists and writers such as Lytton Strachey, Roger Fry, Duncan Grant, and Virginia Woolf.

Keynes was educated at Eton and Cambridge, where he studied economics, mathematics, and philosophy under leading scholars. He was a superb essayist, as he demonstrated in presenting his controversial ideas and proposals.

Keynes's professional career began with an extended stint at the Treasury, including service in India and intense involvement in Treasury activities during the First World War. He then participated as chief Treasury representative at the Versailles peace negotiations after the war. Finding the treaty so vindictive that he was convinced it would lead to economic turmoil and political instability, he resigned his post to write a book titled *The Economic Consequences of the Peace*. The book soon became a best seller and established Keynes's international reputation.

Keynes subsequently returned to his beloved King's College at Cambridge to teach, write, and serve as the college's bursar and investment officer, all this while serving as chairman—and investment manager—of a major insurance company. He was an active player in the stock market, where his own fortunes fluctuated wildly. (Like many of his most famous contemporaries, he failed to predict the Great Crash of 1929). He also enriched King College's wealth by risk-taking on the Exchange. By 1936, Keynes had built a personal fortune from a modest inheritance into the equivalent of £10,000,000 in today's money.¹⁸ He designed Britain's war financing during the Second World War, negotiated a large loan by the United States to Britain immediately after the war, and wrote much of the Bretton Woods agreements that established the postwar international monetary system.

Ideas came to Keynes in such a rush and in such volume that he often found himself at odds with something he had said or written earlier. That did not disturb him. "When somebody persuades me that I am wrong," he wrote, "I change my mind. What do *you* do?"¹⁹



**Not sure he said this.
See last page**

In 1921, Keynes completed a book titled *A Treatise on Probability*. He had begun work on it shortly after graduating from Cambridge and had worked on it fitfully for about fifteen years; he even took it with him on his travels abroad, including a trip on horseback through Greece with the painter Duncan Grant. He struggled to convey novel ideas with the clarity he prized. He never quite broke away from his training in philosophy at Cambridge, where, he later reminisced, "What *exactly* do you mean?" was the phrase most frequently on our lips. If it appeared under cross-examination that you did not mean

exactly anything, you lay under a strong suspicion of meaning nothing whatever."²⁰

A Treatise on Probability is a brilliant exploration of the meaning and applications of probability, much of it a critique of the work of earlier writers, many of whom have made their appearance in the earlier pages of this book. Unlike Knight, Keynes does not distinguish categorically between risk and uncertainty; in less precise fashion, he contrasts what is definable from what is undefinable when we contemplate the future. Like Knight, however, Keynes has little patience with decisions based on the frequency of past occurrences: He felt that Galton's peapod analogy was applicable to nature but irrelevant to human beings. He rejects analyses based on events but welcomes predictions based on propositions. His preferred expression is "degrees of belief—or the *a priori* probabilities, as they used to be called."²¹

Keynes begins the book with an attack on traditional views of probability; many of our old friends are victims, including Gauss, Pascal, Quetelet, and Laplace. He declares that probability theory has little relevance to real-life situations, especially when applied with the "incautious methods and exaggerated claims of the school of Laplace."²²

An objective probability of some future event does exist—"it is not, that is to say, subject to human caprice"—but our ignorance denies us the certainty of knowing what that probability is; we can only fall back on estimates. "There is little likelihood," Keynes suggests, "of our discovering a method of recognizing particular probabilities, without any assistance whatever from intuition or direct judgment. . . . A proposition is not probable because we think it so."²³

Keynes suggests that "we pass from the opinions of theorists to the experience of practical men." He pokes fun at the seat-of-the-pants method that most insurance companies use in calculating their premiums. He doubts that two equally intelligent brokers would consistently arrive at the same result: "It is sufficient if the premium he names *exceeds* the probable risk."²⁴ He cites the odds quoted by Lloyd's on August 23, 1912, on the three-way race for the presidency of the United States; the odds added up to 110%! The reinsurance rates in the insurance market on the *Waratagh*, a ship that disappeared off South Africa, varied from hour to hour as bits of wreckage were discovered and as a rumor spread that under similar circumstances a vessel had stayed afloat, not seriously damaged, for two months before being dis-

covered. Yet the probability that the *Waratagh* had sunk remained constant even while the market's evaluation of that probability fluctuated wildly.

Keynes was scornful of what he refers to as "The Law of Great Numbers." Simply because similar events have been observed repeatedly in the past is a poor excuse for believing that they will probably occur in the future. Rather, our confidence in an outcome should be strengthened only when we can discover "a situation where each new series differs in some significant fashion from the others."²⁵

He heaps scorn on the arithmetic mean, "a very inadequate axiom." Instead of adding up a series of observations and then dividing the sum by the total number of observations, "Equal suppositions would have equal consideration, if the . . . estimates had been multiplied together instead of added."²⁶ Granted, the arithmetic mean is simple to use, but Keynes quotes a French mathematician who had pointed out that nature is not troubled by difficulties of analysis, nor should humanity be so troubled.



Keynes rejects the term "events" as used by his predecessors in probability theory, because it implies that forecasts must depend on the mathematical frequencies of past occurrences. He preferred the term "proposition," which reflects degrees of belief about the probability of *future* events. Bradley Bateman, an economist who teaches at Grinnell College, has observed that probability to Keynes is the basis on which we analyze and evaluate propositions.²⁷

If Keynes believed that probability reflects degrees of belief about the future, and that past events are only a modest part of the input, we might conclude that he regarded probability as a subjective concept. Not so. Modern though he is in so many ways, he occasionally revealed his Victorian background. At the time he wrote *A Treatise on Probability*, he believed that all rational people would in time come to recognize the correct probability of a certain outcome and would hold identical degrees of belief. "When once the facts are given which determine our knowledge, what is probable or improbable in these circumstances has been fixed objectively and is independent of our opinion."²⁸

Yielding to criticism of this unrealistic view, Keynes later began to focus increasingly on how uncertainty influences decisions and, in turn, the world economy. At one point in the *Treatise* he declares, "Perception of probability, weight, and risk are all highly dependent on judgment," and "the basis of our degrees of belief is part of our human outfit."²⁹ Charles Lange, a statistician and an old friend, once remarked that he was pleased that "Maynard does not prefer algebra to earth."



Keynes's view of economics ultimately revolves around uncertainty—uncertainty as to how much a family will save or spend, uncertainty as to what portion of its accumulated savings a family will spend in the future (and when it will spend that portion), and, most important, uncertainty as to how much profit any given outlay on capital goods will produce. The decisions business firms make on how much to spend (and when to spend it) on new buildings, new machinery, new technology, and new forms of production constitute a dynamic force in the economy. The fact that those decisions are essentially irreversible, however, makes them extremely risky given the absence of any objective guide to the probability that they will turn out as planned.

As Frank Knight observed fifteen years before Keynes published *The General Theory*, "At the bottom of the uncertainty problem in economics is the forward-looking character of the economic process itself."³⁰ Because the economic environment is constantly changing, all economic data are specific to their own time period. Consequently they provide only a frail basis for generalizations. Real time matters more than time in the abstract, and samples drawn from the past have little relevance. What was 75% probable yesterday has an unknown probability tomorrow. A system that cannot rely on the frequency distribution of past events is peculiarly vulnerable to surprise and is inherently volatile.

Keynes had no use for a hypothetical economy in which past, present, and future are merged by an impersonal time machine into a single moment. Involuntary unemployment and disappointing profits occur too frequently for an economy to work as the classical economists had assumed it would. If people decide to save more and spend less, consumer spending will fall and investment will decline. The inter-

est rate in any case might fail to fall in response to the higher propensity to save. Keynes argued that interest is a reward for parting with liquidity, not for refraining from consumption. Even if the interest rate does decline, it may not decline enough to encourage business managers to risk investing further capital in an economic environment in which animal spirits are lacking and in which shifting to a new set of decisions is costly. Decisions, once made, create a new environment with no opportunity to replay the old.

Another reason for a decline in investment spending may be that business firms have exhausted all opportunities for earning a profit. Keynes once remarked, "The Middle Ages built cathedrals and sang dirges. . . . [T]wo masses for the dead are twice as good as one; but not so two railways from London to York."³¹ That same idea had appeared in a song popular during the Great Depression, "Brother, Can You Spare a Dime?" "Once I built a building, now it's done./Once I built a railroad, made it run."

Keynes and his followers focused on money and contracts to demonstrate that uncertainty rather than mathematical probability is the ruling paradigm in the real world. The desire for liquidity and the urge to cement future arrangements by legally enforceable agreements testify to the dominance of uncertainty in our decision-making. We are no longer willing to accept the guidance that the mathematical frequency of past events might provide.

Keynes rejected theories that ignored uncertainty. The "signal failure of [the classical doctrine] for the purposes of scientific prediction," he observed, "has greatly impaired, in the course of time, the prestige of its practitioners."³² The classical economists, he charged, had reached a state where they were looked upon as "Candides, who . . . having left this world for the cultivation of their gardens, teach that all is for the best in the best of all possible worlds, provided we will let well alone."³³

Impatient with *Candide*-based theories, Keynes proposed a course of action that was diametrically opposed to *laissez-faire*: a more active role for the government, not just in order to substitute government demand for waning private demand, but to reduce the uncertainties abroad in the economy. We have discovered over time that Keynes's cure has on occasion been worse than the disease and that his analysis has other, less visible, faults. Yet none of that can detract from his primary contribution to economic theory and the understanding of risk.

At the end of the single-paragraph first chapter of *The General Theory*, Keynes wrote: "[T]he characteristics . . . assumed by the classical theory happen not to be those of the economic society in which we actually live, with the result that its teaching is misleading and disastrous if we attempt to apply it to the facts of experience."³⁴ Given the state of the world in 1936, Keynes could hardly have concluded otherwise. Uncertainty must provide the core of the new economic theory.



In 1937, in response to criticisms of *The General Theory*, Keynes summed up his views:

By "uncertain" knowledge . . . I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty. . . . The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention. . . . About these matters, there is no scientific basis on which to form any calculable probability whatever. We simply do not know!³⁵

A tremendous idea lies buried in the notion that we simply do not know. Rather than frightening us, Keynes's words bring great news: we are not prisoners of an inevitable future. Uncertainty makes us free.

Consider the alternative. All the thinkers from Pascal to Galton told us that the laws of probability work because we have no control over the next throw of the dice, or where our next error in measurement will occur, or the influence of a static normality to which matters ultimately revert. In this context, everything in life is like Jacob Bernoulli's jar: we are free to pull out any pebble, but we cannot choose its color. As Laplace reminded us, "All events, even those which on account of their insignificance do not seem to follow the great laws of nature, are a result of it just as necessarily as the revolutions of the sun."³⁶

This is, in short, a story of the inevitable. Where everything works according to the laws of probability, we are like primitive people—or gamblers—who have no recourse but to recite incantations to their gods. Nothing that we do, no judgment that we make, no response to our animal spirits, is going to have the slightest influence on the final

result. It may appear to be a well-ordered world in which the probabilities yield to careful mathematical analysis, but each of us might just as well retire to a windowless prison cell—a fate that the flutter of a butterfly's wings billions of years ago may have ordained in any case.

What a bore! But thank goodness, the world of pure probability does not exist except on paper or perhaps as a partial description of nature. It has nothing to do with breathing, sweating, anxious, and creative human beings struggling to find their way out of the darkness.

That is good news, not bad news. Once we understand that we are not obliged to accept the spin of the roulette wheel or the cards we are dealt, we are free souls. Our decisions matter. We can change the world. Keynes's economic prescriptions reveal that as we make decisions we *do* change the world.

Whether that change turns out to be for better or for worse is up to us. The spin of the roulette wheel has nothing to do with it.

CHAPTER 13

1. Knight, 1921, p. 209.
2. Keynes, 1933, in Moggridge, 1972, Vol. X, p. 262.
3. Keynes, 1936, p. 161.
4. Dixon, 1986, p. 587.
5. Most of the background material on Knight was generously supplied to me by Donald Dewey and is drawn from Dewey, 1987; Dewey, 1990; and personal correspondence.
6. Quoted by Herbert Stein in *Wall Street Journal*, November 1, 1995, p. A14.
7. Knight, 1921, p. 205.
8. Arrow, 1951.
9. Knight, 1921, p. 197.
10. *Ibid.*, p. 226.
11. *Ibid.*, p. 223.
12. *Ibid.*, p. 227.
13. Donald Dewey provided me with the text of this letter.

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Notes

14. Quoted in Newman, 1988c, p. 1336, which cites the *Times Literary Supplement*, February 23, 1951, p. 111.
15. Keynes, 1971, p. 98.
16. Keynes, 1936, p. 176n.
17. Skidelsky, 1986, p. 1.
18. See Blaug, 1994, p. 1209, for citations on Keynes's personal financial affairs.
19. This quotation appears in Moggridge, Vol. X, p. 440. See also Keynes, 1921, p. 408.
20. Keynes, 1971, p. 88.
21. Keynes, 1933, in Keynes, 1972, pp. 338-339.
22. Keynes, 1921, p. 51.
23. *Ibid.*, pp. 3-4.
24. *Ibid.*, pp. 22-26.
25. *Ibid.*, pp. 407.
26. *Ibid.*, pp. 206-209.
27. Bateman, 1987, p. 101.
28. Keynes, 1921, pp. 3-4.
29. *Ibid.*, p. 5.
30. Knight, 1921, p. 237.
31. Keynes, 1936, p. 171.
32. *Ibid.*, p. 33.
33. *Ibid.*, p. 33.
34. *Ibid.*, p. 3.
35. Keynes, 1937.
36. Laplace, 1814, p. 1301.

I couldn't find this.
See next page

Not at all clear Keynes ever said this:

Next the presentation skips to 2011 and an inquisitively skeptical journalist who writes for the Wall Street Journal. Jason Zweig wondered about two quotations attributed to Keynes: "When the facts change, I change my mind. What do you do, sir" and "The market can remain irrational longer than you can remain solvent." He doubted that Keynes said either of them, and he contacted an expert [MKJZ]:

In an e-mail in 2003, Keynes' most authoritative biographer, Lord Robert Skidelsky, told investment advisor William Bernstein that he believed they were "both apocryphal." This week I asked another renowned expert on Keynes, Donald Moggridge of the University of Toronto, if he could identify the source of either of the oft-quoted remarks. "The simple answer," Prof. Moggridge replied by e-mail, "is there is no evidence."

In conclusion, there is some evidence that Keynes made a remark similar to the one under investigation, but this evidence is weak and problematic. Keynes died in 1946 and the first known attribution to him is dated 1978. There are so many variants of the quotation that it is not possible to select a single one. Samuelson, for example, gave more than one version over the years.

Source: <https://quoteinvestigator.com/2011/07/22/keynes-change-mind/>

But it is a pretty good quip.