

lence, strife, or disorder on behalf of a particular portion of the populace. By the early eighteenth century, violence and strife was on the rise in England, which resulted in Parliament passing the Riot Act of 1715. The Riot Act stated that if twelve or more persons unlawfully or riotously assembled and refused to disperse within an hour after being read a specified portion of the act by proper authority, those persons would be considered felons and authorities would have the right to use lethal force against them. The Act provided broad powers to institutional authority during riots and despite some notable riots over the next two centuries, resulted in a general decline in the number and severity of riots in England. Although repealed in 1973, the Riot Act was influential in providing a legal framework for similar legislation in many other nations, including Australia, Belize, Canada, and the United States. From 1965 to 1973 the United States experienced a significant increase in the number of domestic riots, particularly in large urban areas with high concentrations of poverty and racially based residential segregation. Some community members from these areas objected to the term *riot*, as they believed it called to mind the image of an unruly ghetto. Consequently, many scholars and politicians began to refer to riots as *civil disorders*. Although *riot* no longer appears to have this same negative connotation and again appears in popular and social science terminology, the term *civil disorder* is still often used interchangeably.

Recent research by social scientists has again sparked interest in the study of riots. In a comprehensive review and reanalysis of riots in the United States during the 1960s and 1970s, Clark McPhail (1994) found that a lack of resources, grievance, and aggression did not play as large a role in riots as originally claimed. In addition, McPhail found that actors in a riot are far more purposive in their actions than previously supposed. However, McPhail's findings regarding the causes of riots may be limited in generalizability, as research by Ashutosh Varshney (2002) found urban, caste, and community factors to be predictors of riots in India. This renewed interest in riots highlights the need for a better understanding of where and why they are likely to occur.

SEE ALSO *Communalism; Ethnocentrism; Kerner Commission Report; Protest; Quotas; Race Riots, United States; Resistance; Tulsa Riot; Urban Riots; Violence; Wilmington Riot of 1898*

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RIOTS, URBAN

SEE *Urban Riots*.

RISK

The concept of risk is fundamental in the social sciences. Risk appears in numerous guises, from theoretical modeling of financial decisions to determining the social consequences of expanded nuclear power usage. Despite this importance, the precise definition of risk depends on the context and application. Common usage is derived from insurance applications where risk represents the possibility of loss, injury, or peril. This definition is reflected in various risk assessment and management applications, ranging from social and psychological risk to environmental and biohazard risk, where units of measurement for risk vary with context. In contrast, financial economics associates risk with the possibility that the actual return for a security will differ from the expected return. This financial risk is typically measured using the variance or standard deviation of historical return from the mean return, a definition of risk that includes both positive and negative outcomes. Key theoretical notions such as risk aversion and the risk-return tradeoff employ this definition. Where only the possibility of financial loss is of concern, as in value-at-risk applications, measurements are evaluated using the left tail of the relevant probability distribution.

RISK, UNCERTAINTY, AND PERCEPTION

The evolution of methods for the identification, assessment, and management of risk have played a central role in the progress of civilization. In ancient times, religious beliefs were important in reconciling the risks confronting a society. Appeals to the gods by the priesthood, prophecies from the oracle, and chanting by the shaman were all methods of passively dealing with risks encountered. The development of scientific, mathematical, and probabilistic methods during the Enlightenment permitted risk to be more actively identified and assessed. This advancement encountered a philosophical quandary concerning subjective and objective interpretations of probability. More precisely, the objective interpretation views probability as inherent in nature. Logic, scientific investigation, and statistical analysis can be used to discover objective probabilities. In contrast, subjective probabilities quantify an individual's belief in the truth of a proposition or the occurrence of an event and are revealed in an individual's choice behavior. Such probabilities can vary among individuals due, for instance, to differing degrees of ignorance about the event of interest.

Debate over subjective versus objective probability reached a peak around the time that Frank Knight (1885–1972) introduced a distinction between risk—where the objective probability of an event is at least measurable—and uncertainty, where the probability is not knowable and has to be determined subjectively. This terminological distinction between risk and uncertainty has now faded from common usage as the subjectivist approach has gained prominence, supported by seminal contributions from Frank Ramsey (1903–1930), Bruno di Finetti (1906–1985), and Leonard Savage (1917–1971). Attention has shifted to whether subjective beliefs derive from intuition or are realized only in choice behavior. The intuitive approach leads to a focus on the perception of risk, a concept often employed in psychometric and sociological research. Development of the choice-theoretic approach to subjective probability was facilitated by the expected utility function introduced by John von Neumann (1903–1957) and Oskar Morgenstern (1902–1976) in a classic work of social science, *The Theory of Games and Economic Behavior* (1944). The choice-theoretic approach has sustained the modeling of decision-making under uncertainty that is a central component of modern economic theory.

RISK IN ECONOMICS

Prior to von Neumann and Morgenstern, mathematically formal neoclassical economic theory was based on certainty or perfect foresight. Consideration of risk in decision-making could be found in the less formal approaches

of Frank Knight, John Maynard Keynes (1883–1946), and Irving Fisher (1867–1947) that have contributed to a range of future contributions and perspectives on the impacts of risk in economics. Knight's recognition that uncertainty could be handled by the insurance principle led to contributions on the importance of moral hazard and adverse selection in decision-making under uncertainty. By explicitly recognizing what he termed the “caution coefficient,” which measures the difference between the mathematical expectation and the price that will be paid for a gamble, Fisher laid the foundation for later contributions in mean-variance portfolio theory. The numerous contributions by Keynes on risk and uncertainty range from the *Treatise on Probability* (1921) to the *General Theory of Employment, Interest and Money* (1936). Disciples of Keynes, such as George L. S. Shackle (1903–1992) argue against the use of probability theory to model decision-making under uncertainty. Similarly, the failings of the ergodicity assumption are an important post-Keynesian critique of mathematically formal economic theory.

In addition to the diverse approaches to risk generated by Knight, Keynes, and Fisher, the application of mathematical formalism in economic theory has also produced impressive progress. Using preference orderings over state contingent commodities, Kenneth Arrow (born 1921) and Gerard Debreu (1921–2004) were able to extend the neoclassical economics of Stanley Jevons (1835–1882), Léon Walras (1843–1910) and Alfred Marshall (1842–1924) to include decision-making under uncertainty. This development follows naturally from using the choice-theoretic approach to subjective probability developed by von Neumann and Morgenstern. The utility of a certain outcome is replaced by the expected utility, calculated using known probabilities and the utilities for a set of random outcomes. The known probabilities are notionally determined by direct observation of previous choice behavior. Using this approach, while there is no formal distinction between risk and uncertainty, risk is usually associated with the variability of random outcomes and uncertainty with randomness. Sensitivity to risk is measured by comparing a certain outcome to a random outcome with the same expected value. Risky outcomes are measured in income, dollars, or returns, and can take both positive and negative values.

In financial economics, the expected utility framework has been applied to the problem of determining how to optimally combine individual securities into a portfolio of securities. Using an expected utility function specified over the expected portfolio return and variance of portfolio return, Harry Markowitz (born 1927) and William Sharpe (born 1934) were able to demonstrate that the variability or risk of a portfolio can be further divided into two components: firm specific risk, which is diversifiable

and non-systematic; and market related risk, which is systematic and not diversifiable. Applying this to the tradeoff between risk and return, it is demonstrated that only increases in the systematic risk of an individual security will be rewarded with higher expected return. Hence, it is only that portion of the total variability of a security's return that cannot be diversified away that warrants higher expected return. A measure of systematic risk—the beta of a security—is provided. Beta can be calculated as the slope coefficient in a least squares regression of individual security return on market return; the ratio of the covariance between the individual security return and the market return divided by the variance of the market return. More recently, a variety of risk measures have been developed to deal with limitations of variance of return and beta. These new measures include expected regret, conditional value at risk, and expected shortfall.

RISK IN OTHER SOCIAL SCIENCES

In social sciences other than economics, risk is usually identified with only negative outcomes. Units of measurement vary and can include the annual death toll, deaths or injuries per hour of exposure, loss of life expectancy, loss of working hours, accidents per mile driven, and crop loss per storm. A wide range of risk definitions and risk models are employed, including the classical approach based on objective probabilities, adapted from engineering and medicine; the choice-theoretic expected utility approach employed in economics; and the risk perception approach popular in sociology and psychometrics, where it is explicitly recognized that risk depends on cultural and individual perceptions that can differ from expert or objectively specified risk estimates. Because a variety of different negative outcomes can be of interest, measures of risk vary with the consequences involved. For example, in the classical approach, risk is defined as the loss or hazard if the event occurs times the probability the event will occur. In other words, risk is a combination of exposure and uncertainty. However, when risk involves an event such as death, then risk relates only to the probability of the event occurring.

In many situations in the social sciences, the application of objective probabilities to determine risk is problematic. Though it is possible to specify the relative frequency of a negative outcome from past data, the data is often limited and the estimated risk can be less than objective. In addition, because risk depends on the context, there is room for disagreement over the selection and measurement of relevant consequences. This poses problems in studies of perceived risk where individual perceptions are compared with calculated risk obtained from expert or objective estimates. Early studies on risk perception were concerned with determining whether there were

significant deviations between individual risk perceptions and expert estimates. If such deviations were present, this provided support for the presence of heuristics and other sources of probability judgment bias. Further research has revealed that risk perception is a more complicated phenomenon. For example, risk perception depends on the target selected. This is manifested in risk denial, where individuals perceive risk to the general public from, say, alcohol or nuclear waste, to be greater than perceived risk to the individual or the individual's family.

SEE ALSO *Economics, Post Keynesian; Expected Utility Theory; Insurance; Keynes, John Maynard; Markowitz, Harry M.; Risk Neutrality; Risk Takers; Risk-Return Tradeoff; Utility, Von Neumann-Morgenstern; Von Neumann, John*

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RISK AVERSION

SEE *Maximin Principle; Risk; Risk Neutrality*.

RISK NEUTRALITY

Risk neutrality is an economic term that describes individuals' indifference between various levels of risk. When confronted with a choice among different investment opportunities, risk-neutral decision makers only take into account the expected value of the alternative and not the associated level of risk. For example, a risk-neutral investor will be indifferent between receiving \$100 for sure, or playing a lottery that gives her a 50 percent chance