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Theorizing Risk & Uncertainty in Social Enquiry: Exploring the Contributions of Frank Knight

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Abstract

The problem of risk and uncertainty continues to plague social scientific enquiry, ostensibly imposing epistemological limits to knowledge. This paper explores this issue in relation to the writings and theoretical contributions of Frank Knight, one of the most illustrious economic thinkers of the twentieth century. Knight's contributions essentially constructed a means for assessing and measuring risk in various facets of social activity, seeding insights which remain pertinent to this day. As the paper notes, however, despite Knight's insights and the tri-partite methodological schema he constructed for probability analysis, remarkably few social sciences have mined his work. Ironically, much that we need to know to more effectively theorize and accommodate the conundrums of risk and uncertainty into social scientific methods Knight long ago bequeathed us.

Introduction

When Donald Rumsfeld ruminated over the difficulties of prosecuting the War on Terror, he confessed to reporters gathered at a briefing in the Department of Defense, that;

> . . . the truth is, there are things we know, and we know we know them ─ the known knowns. There are things we know that we don't know ─ the known unknowns. And there are unknown unknowns; the things we do not yet know that we do not know.[1]

Rumsfeld's statement spoke to an enduring problem endemic to the conduct of foreign affairs; decision making under conditions of uncertainty. In theaters of war it constitutes the greatest of all enemies, the "fog of war," where the unknown and or uncertain attributes of enemies makes force deployment and the commitment of precious finite military resources a high risk calculus. Military strategists throughout the millennia have faced this dilemma; second guessing the motives, calculations, reasoning, capabilities and likely actions of opponents, and through agile mental arithmetic, imagining futures and scenarios where possible actions, events or interventions might outmaneuver rivals. Such games are played out in the minds eye and involve a complex assessment of known facts, discounting those facts thought less reliable, calculating how the contours of distant realities might be imagined and assessed by opponents, while anticipating the response of rivals to these imagined futures as a means of gauging what one's own course of action should be. To the victor goes the spoils of war, to the vanquished the weight if history.

That history should be decided by such calculations and their asymmetric nature, explains both its capricious ebbs and flows and our inability to predict accurately its future. While many might interpret this an outcome of luck, fortune, or the perils of reckless behavior, it more obviously represents a habit ubiquitous to humankind: the process of peering into the future, anticipating events yet to transpire and, on the basis of these imagined futures,

[1] Donald Rumsfeld, Secretary of Defense, Department of Defense news briefing, The Pentagon, October 17, 2001 < http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=3793>

making decisions and deciding on courses of action to intercept realities before they emerge. Such calculations are the gist of all social actors; they make history and explain its dissonant and myriad forms.

For Frank Knight, one of the most illustrious economic thinkers of the twentieth century, such a predilection spoke not only to the fallibility of human beings but, more importantly, to the limits of knowledge. For Knight, humankind was capture to a self-evident peculiarity; the inclination to think, act and position ourselves in relation to events and processes referenced in the future while tending to discount or ignore those of the past and present. Strangely, Knight observed, despite the great advances in rationalist epistemologies and the mass reservoirs of scientific knowledge produced, human thought and action is defined as much by a consciousness of the future as by a prescience of the past. Much of our thinking, Knight insisted; was a function of anticipatory futures; a complex chess game of possibilities yet to emerge informing courses of action and decisions before they have happened. As conscious beings we strive perennially for knowledge of the future.[2]

Knight's insights spoke to a recurrent problem in scientific enquiry of how social agents think and act and on what information and under what conditions they premise their calculations. How rational can "rational man" be if, in fact, he bases his deliberations on facts that cannot be known or on realities which do not currently exist? Indeed, absent a rational calculus of action to what extent can scientific precepts be applied to social actors at all? Random subjectivity, incessant serendipity or the thought traits of countless actors forever engaged in futurist navel gazing, might well be the constitutive elements of the collective body-economic-politic. Much like a mirrored Panoptigon, human thought and action could well prove to be as cursory, imprecise and emotive as the most visceral belief systems used to validate truth.

[2] Frank H. Knight (2002), Risk, Uncertainty and Profit. Washington D.C.: Beard Books, pp.199, 201.

It is, of course, easier to assume away such confusing flotsam and jetsam and embrace, instead, neat and rationally precise epistemologies able to impose order, clarity and explanatory consistency. As Knight well recognized, however, doing so would be to render unlikely meaningful explorations into the social world and make improbable progress in social enquiry.[3] Fairly obviously, the messy prognostications of actors are what drives history; they populate the market place, the corporate boardroom, the mind of the political strategist and infuse our daily individual thinking. In the corporate boardroom, for example, decisions to invest large sums of money are necessarily always made in anticipation of future demand for products or services still on the drawing board. Corporate strategy, by definition, is formulated in anticipation of the actions of competitor companies which may or may not materialize. Individually, we decide to enroll in a course of study on the basis of future perceived career opportunities, or decide against courting a prospective partner having anticipated that the relationship will fail in the future. Markets themselves are driven by such calculations. The equity market, for example, is the raw expression of this carnal disposition to base current decisions on perceived futures. When we invest into the stock market we draw little on the abundance of factual information about the historical performance of equities; time-series valuations, dividend yields, beta volatility measures, and price to earnings ratios data, so much as base our decisions to buy, hold or sell almost exclusively on an imagined future and the anticipation of unrealized events impacting the value of the equities concerned.[4]

Peering beyond the here and now and understanding the complex interstitial relations of events yet to transpire and how human agents plan to interface with these and thus change the circumstances that obtain, was, for Knight, the primary task of the social

[3] The utility of rationalist epistemologies for understanding the social world Knight forcefully problematizes by both embracing them and questioning the limits of their ability to deliver greater insight and knowledge: "It has become somewhat the fashion, especially since Bergson came into vogue, to be irrationalistic, and question the validity of logical processes. It seems to the writer that there is much ground for this position. There is to my mind no question of understanding the world by any other method. There is, however, much question as to how far the world is intelligible at all." ibid., p.209

[4] The "Beta value" refers to a quantitative measure of the volatility of a given stock relative to the performance of the stock market as a whole.

scientist. Within this triangulated time-space dimension, he argued, knowledge ultimately resided.

Knowing the Future: Risk, Uncertainty and Profit

Knight was not the first to recognize the conundrums of this perennial search for a knowledge of the future. Social and political theorists like Weber, Durkheim, Marx and Hegel had each postulated the vast expanse of social agency which made problematic definitive conceptions of pure knowledge or a teleology of history's trajectory. But while many had pondered these dilemmas as abstract philosophical problems, Knight was the first to make this ontological assumption his starting point, nesting in economic theory a seed which spoke to its absolute limitations as a science of rational calculation. For Knight, the disposition of human consciousness to "perceive the world before we act to it, and react not to what we perceive, but always to what we infer," defined the limits of the rational universe.[5] We are and remain, Knight insisted, creatures of anticipation.

For Knight, the problem of course rested in constructing this knowledge of the future and understanding both the attributes that shape its constitution but also the limits of its accuracy. Knight famously captured the essence of this dilemma in his opus dictum, Risk, Uncertainty and Profit (RUP), widely celebrated for its explorations into the elemental problem of a future knowledge constrained by the vicissitudes of inference, perception and anticipation. It was these, Knight argued, that defined the space in which human kind is forced to think and act: thinking and action under conditions of uncertainty. For Knight, this was the great conundrum. Indeed, it posed for the social scientist specific problems associated with the acquisition of theory-knowledge and, more importantly, spoke to the absolute limits of this knowledge as a means of predicting and understanding human behavior.

Uncertainty and the Limits of Knowing

[5] Frank H. Knight (2002), op.cit, p.201.

Knight's work is the seminal statement of the analytical distinction between risk and uncertainty. "If we are to understand the workings of the economic system," he wrote, we must first "examine the meaning and significance of uncertainty."[6] But why? Why the need to differentiate the concept of uncertainty from that of risk? Knight's reasoning is intricate and sophisticated, and ultimately predicated upon his philosophical questioning of the limits of rationalist epistemologies. As an economist and student of philosophy in the early part of the twentieth century, Knight was confronted by a near universal embrace of rationalist thinking; increasingly intricate and abstract forms of empirical-theory knowledge that presumed scientific discovery of every facet of economy and society was possible. Explanation and the discovery of insight was increasingly viewed merely as a matter of the application of rigorous, scientific precepts, of the collection of greater numbers of facts, the discovery of greater numbers of causal associations, and thus the revelation of historical patterns which could explain human action in the economy and in social matters generally. In the early part of the twentieth century, the zest for science and the great leaps forward it had enabled in virtually all facets of human endeavor, naturally disposed its celebrants to assume that these same precepts could be applied in the social affairs of a society; to the workings of the economy and the organization of its politics. Science and rationalist epistemologies disposed its adherents to see a world only of increasing certainty. The secrets contained within the functioning and operations of the economy, its tendencies to boom and bust, or the machinations of full employment and financial stability, had simply to be unearthed through discovery. The secrets of homo economucis would soon reveal themselves.[7]

[6] Frank H. Knight (2002), op.cit, p.199.

[7] The optimism embodied in the belief structure around the capabilities of science, quantification techniques and the role of measurement and objective assessment, emboldened adherents in the Nineteenth and early Twentieth century to assume no facet of society could not be both understood and any ills rectified. Adherents like Francis Edgeworth, an economist, and Frank Ramsey, a Cambridge mathematician writing in the 1920s, proposed respectively the development of a "hedonimeter" and a "psychogalanometer," presumably to measure those mechanisms best able to produce optimal outcomes for both society and the individual. As quoted in Peter L. Bernstein (1998), Against the Gods: The Remarkable Story of Risk. John Wiley & Sons, pp.191-192.

Knight's departure from this rationalist optimism is seeded in his rejecting neoclassical positivism and by insisting on the need for economics to reframe itself as an interpretative social science, in essence for economics to understand the differences between the natural and social universes. This required, Knight insisted, "some inquiry into the nature and function of knowledge itself."[8]

Natural Science Versus Social Science: The Limits of Rationality and the Poverty of Economic Method

For Knight, "the fundamental difference in the case of animal or conscious life is that it can react to a situation before that situation materializes; it can 'see things coming'."[9] This gives rise to a series of elemental postulates the social scientist must be cognizant of. First, that "the universal form of conscious behavior is . . . action designed to change a future situation." Second, that this form of consciousness involves perception and a twofold form of inference: "we must infer what the future situation would have been without our interference, and what change will be wrought in it by our action."[10] And third, that perception and inference are not infallible processes. The precise dimensions of perception versus inference Knight insists is immaterial. The point, rather, is that the "function of consciousness is to infer, and all consciousness is largely inferential, rational."[11] As Knight observes, the fact that we as social actors "do not perceive the present as it is and in its totality, nor do we infer the future from the present with any degree of dependability, nor yet do we accurately know the consequences of our own action," renders the categorical realm of uncertainty the primary condition under which action and knowledge always obtain.[12] The limits to knowledge, or at least the paths to knowing, were, for Knight, thus circumscribed by these elemental philosophical considerations.

[8] Frank H. Knight (2002), op.cit, p.199.
[9] ibid., p.200.
[10] ibid., p.202
[11] ibid., p.203.
[12] ibid., pp.202-203

The base knowledge we have as social scientists thus rests on the observation that "things not present to sense are operative in directing behavior, that reason, and all consciousness, is forward-looking; and an essential element in the phenomena is a lack of . . . accuracy . . . [and the tendency toward] . . . error."[13] This intricate schema defines for Knight the problem of social based knowledge. Social based phenomena display unique characteristics. "What is observation and what is inference are questions on par with what is truth," Knight suggested. They essentially remain perennial such that "we cannot separate the discussion of reality from the discussion of the knowledge of reality, the nature and structure of thinking and the conditions of its validity."[14]

Under these conditions, neoclassical positivism proves entirely unsuitable for revealing anything about the social-economic world:

> Concrete and positive answers to questions in the field of economics science or policy depend in the first place on judgments of value and procedure, based on a broad, general education in the cultural sense, and on 'insight' into human nature and social values, rather than on the findings of any possible positive science. From this point of view, the need is for an interpretive study (verstehende Wissenschaft) which, however, would need to go far beyond any possible boundaries of economics and should include the humanities as well as the entire field of social disciplines.[15]

For Knight, "Economics and other social sciences deal with knowledge and truth of a different category from that of the natural sciences, truth which is related to sense

[13] ibid., p,203.
[14] Frank H Knight (1956), On the History and Method of Economics: Selected Essays. Chicago: University of Chicago Press, p.159. See also the discussion in R.A Gonce (1992), Frank H. Knight on Social Control and the Scope and Method of Economics," in Mark Blaug (ed.), Pioneers in Economics 37: Frank Knight (1885-1972), Henry Simons (1899-1946), Joseph Schumpter (1883-1950). Aldershot: Edward Elgar, pp.22-33.
[15] ibid., p.177. See also the discussion in Tony Fu-Lai Yu (2004), "Frank H Knight's Thought Revisited: Subjectivism, Interpretation and Social Economics," International Journal of Social Economics, 31(7), p.659. See also further discussion of the role of science in economic theory in Frank H. Knight (1935) "The Limitations of Scientific Methods in Economics," in Frank H. Knight (1935), The Ethics of Competition. London: George Allen & Unwin, pp.105-147.

observation ─ and ultimately even to logic . . . "[16] The precision required of the natural sciences in the observation and correlation of facts and behaviors to events is beyond the scope of economic theory, since human action and conduct are related to factors which are not observable or testable.[17]

Rank positivism is thus rejected by Knight but not in favor of a fundamentally less rigorous analytical framework, but a more interpretative one.[18] Specifically, Knight suggests the need to contextualize the types of knowledge produced by humans on the basis of their ability to interface with events, foresee them, and thus change the outcomes that obtain.[19] Economics, Knight insists, might thus be better situated:

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[16] Frank H Knight (1956), op.cit, pp. 154-155.

[17] Knight's philosophical questioning of positivist economic method is addressed extensively in his volume Freedom and Reform: Essays In Economics and Social Philosophy (1947). Tellingly, he writes; "All discussion is really critical and philosophical, even in the realm of facts. The decisive problems and discussions of science deal with method; for discussion of what is true runs largely in terms of the methods of inquiry and proof. In the field of law they deal with moral philosophy. Science is instrumental knowledge ─ knowledge of facts about properties and behavior of things (including persons) with reference to using them as instruments for given ends. But 'valid' science is social knowledge. As the deeper problems of science itself have to do with method, they are critical and philosophical; the noninstrumental interest in truth is a philosophical and an ethical interest." Frank H. Knight (1947), Freedom and Reform: Essays In Economics and Social Philosophy. New York: Harper & Brothers, p.218. See in particular chapter VIII, "Science, Philosophy, and Social Procedure."

[18] Knight's interpretative stance should not be confused with a relativist one. Knight remained committed to the precepts of scientific enquiry and to rationality as an otology suited to investigating the social world. Rather, he favored a normative cum contextualist approach which he argued should be fiercely critical, interrogating categories like "rational actor" as core assumptions on which knowledge systems could be built and universally applied. The model of positivist, value neutral science so favored by most of his contemporaries as the appropriate method for economists, Knight thought both ill-suited and flawed in its ability to provide insight, purposeful action and guidance in understanding economic behavior and helping moderate it toward good social outcomes. As James Buchanan notes of Knight, "[a]lthough he remains far from accepting a purely relativistic position, Knight refrains from either asking or answering the question concerning the existence of some ultimate and unchanging reality. 'Truth' is measured only by agreement or consensus among informed persons, despite the acknowledged questions that this definition begs." See the discussion in James M. Buchanan (1967), "Politics and Science: Reflections on Knight's Critique of Polany," Ethics, 77(4), July, p.304. In contrast, William Kern prefers to characterize Knight as a skeptical scientist, not anti science but intensely inquisitive, a trait which probably accounts for the seeming paradox of Knight both embracing and rejecting the methods of science and rationality, or at least wanting to keep them in more constrained boxes and ascribe less explanatory and analytical weight to them than was popularly accepted. As Kern notes, Knight's inquisitive reflection on the method of economics earned him the reputation as "the external asker of questions." William S. Kern (1990), "Frank Knights Skeptical View of Economic Education," The Journal of Economic Education, 21(2), Spring, p.196. Knight's thinking on issues of science, economic method and philosophy is further revealed through his extensive private correspondence. See Warren J. Samuels (1977), "The Knight – Ayres Correspondence: The Grounds of Knowledge and Social Action," Journal of Economic Issues, XI(3), September, pp.485-525.

[19] Frank H. Knight (1956), op cit. pp.158-165.

> . . . in the field of art, and not of science, of suggestion and interpretation, and not accurate, definite, objective statement, a sphere in which common sense works and logic falls down, and where, in consequence, the way to improve our techniques is not to attempt to analyze things into their elements, reduce them to measure and determine functional relations, but to educate and train our intuitive powers.[20]

For Knight the result is an imperfect or critical knowledge but one wholly superior to the methodological flaws of positivism and scientific rationalism that assume certainty and predictability; that the building blocks of social activity could be dissembled into their constituent parts, causal associations established and thus predictive models constructed.[21] In contradistinction, the social and economic world Knight saw as much messier and much harder to understand and analyze. Much of what we do as social actors is far from "rational" in the narrow economic sense. In fact, he noted, "it probably occasions surprise to most persons the first time they consider seriously what a small portion of our conduct makes any pretense to a foundation in accurate and exhaustive knowledge of the things we are dealing with."[22] How we calculate decisions and decide on courses of action arises as much from ill informed supposition and serendipitous encounters with partial information, irrational conduct and idiosyncratic impulses, as it does serious rational calculation of events and phenomena; "[t]he ordinary decisions of

[20] Frank H. Knight (1924), "The Limitation of Scientific Method in Economics," in R. Tugwell (ed.), The Trend in Economics. New York: Alfred A. Knopf, p.247.

[21] Knight's dismissal of positivism and empiricism as an epistemological basis for understanding economics and economic behavior is most forcefully expressed when he writes; "It is not conceivably possible to 'verify' any proposition about 'economic' behavior by any 'empirical' procedure, if the key words of this statement are defined as they must be defined to be used with relevance and precision." This debate, of course, reified the distinction between what Knight identified as "theoretical economics" and mathematical or "empirical economics," and set off fierce condemnation from many of his peers. See Frank H. Knight (2002), op.cit., pp.3-21; T.W. Hutchison (1941), "The Significance and Basic Postulates of Economic Theory: A Reply to Professor Knight," The Journal of Political Economy, 49(5), October, pp.732-750. See also Morris A. Copeland (1925), "Professor Knight on Psychology," The Quarterly Journal of Economics, 40(1), November, pp.134-151; James M. Buchanan, (1967), "Politics and Science: Reflections on Knight's Critique of Polany," Ethics, 77(4), July, pp.303-310.

[22] Frank H. Knight (2002), op.cit., p.210.

life are made on the basis of estimates of a crude and superficial character."[23] Life is more than economics and rational conduct, it is "rivalrous and contentious . . . and less than perfectly rational" and fraught with an eye to the future that bases decisions and calculations on non-known phenomena and events whose reality is only imagined to exist at some future juncture.[24] It is as if, he wrote, "Men 'exist' in several different universes of reality, between which philosophy has built no adequate bridges, and does not seem to be in the way of doing so." Each of these universes contain their own truth, and each may contradict the truth of other universes.[25] Understanding the contingent interrelationships between these universes and how they connect was, in a sense, Knight's life work.

Risk, Probability and Uncertainty: Three Knightian Typologies

Knight's ingenuity and gift to economic theory was his ability to understand the agility of concepts readily employed but little theorized. Three key concepts seem to suffer such a fate in economics and, more importantly, seem to capture assumptions about the causal relationship between subjective social processes and objective phenomena; *risk*, *uncertainty* and *probability* ─ or chance. Each portend to a different knowledge-set but, in economics, had been treated ubiquitously as if all three categories could be captured through measurement and subject to rational processes of calculation in respect of the frequency of their recurrence, the underlying causality responsible for their generation, and the magnitude of their impact on the phenomena being observed. Knight rejected this outright and forever changed discourse on risk in economics and the assumptions on which it was based. Risk, probability and uncertainty, he insisted, were entirely different creatures:

[23] ibid., p.210. See also J. Patrick Raines & Clarence R. Jung, Jr (1992), "Schumpeter and Knight on Economic and political Rationality: A Comparative Restatement," Journal of Socio-Economics, 21(2), pp.109-124.
[24] J. Patrick Raines & Clarence R. Jung (1992), op.cit., p.121.
[25] John McKinney (1977), Frank H. Knight on Uncertainty and Rational Action," Southern Economic Journal, 43(4), April, p.1439.

> 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.[26]

Knight's principal contribution thus rested in his disentangling the concepts of risk and probability from that of uncertainty. A great deal of RUP is therefore devoted to the analytical articulation of these concepts. While uncertainty, for Knight, represents the Achilles heel of social enquiry, both the problem to investigate *and* the obstacle to greater knowledge and understanding, risk, chance or probability, in contrast, lend themselves to statistical based analyses and thus application in all facets of actuarial and probability based research; the modern bedrock of the insurance and finance industries. As Knight well demonstrated, however, the precision of these knowledge instruments had also to be problematized.

1. Knightian Risk

Risk, for Knight, arises from the objective observation of events and phenomena, from observable causalities whose frequency, severity, and magnitude of impact or consequences can be reasonably assessed. Risk, in other words, is a *measurable* entity whose magnitude can be inferred through formal inductive logic. For Knight, risk is therefore tangible and quantified through the calibration of observable facts with the frequency of their recurrence. Knight invokes the famous example given by the French classical economist, Von Mangoldt, and the bursting of Champagne bottles, to arguer his point.

In the Eighteenth century the production of Champagne was not for the faint of heart. Wide variance in the manufactured quality of glass champagne bottles made for explosive situations. As still wine is mixed with sugar and yeast or *liqueur de triage*, the

[26] Frank Knight as quoted in Peter L. Bernstein (1998), op.cit., p.219.

fermentation process releases large amounts of carbon dioxide into the wine and pressure in the bottle slowly builds to 80-90 pounds per square inch; about three or four times the pressure in a car tyre. Not surprisingly, in the early years of Champagne production imperfect bottles tended to explode with great frequency, in some instances producing now legion stories of large chain reactions through the inappropriate storage of bottles which led to huge financial losses for the champagne producers concerned.

As Mangoldt and Knight observed, however, the fact that bottles of champagne exploded frequently did not itself introduce an uncertainty or hazard into the production of Champagne "since in the operations of any producer a practically constant and known proportion of the bottles burst." The rate of failure of champagne bottles is thus known and "the loss becomes a fixed cost in the industry and is passed on to the consumer, like the outlays for labor materials or any other."[27]

The point for both Mangoldt and Knight was that bottles of champagne exploding was a contingent risk, the magnitude of which could be calculated through recurrent observation, the costs associated with a certain percentage of the bottles failing factored into the price of the bottles that survived, and thus the costs of production underwritten. The risk, as such, could be managed and the consequences to the business mitigated. Contingent risk, in this instance, is a risk that is not certain or even necessarily probable, but as Knight famously observed "if the numerical probability of its occurrence is known, conduct in relation to the situation in question may be ordered intelligently." In other words, contingent risks could be compensated for and or mitigated in terms of their impact on the actors concerned.

These definitional principles of risk we now recognize as the bedrock of the insurance industry. No one, for example, can know if a particular building will catch fire and burn to the ground and few businesses operate on a scale that would allow them to calculate the fixed cost that fire represents to their business. The insurance industry, however, does

[27] Frank H. Knight (2002), op.cit., p.213.

operate on such a scale. By aggregating industry wide contingencies of building fires it is able to calculate the fixed cost fire represents to a particular industry. On the basis of these calculations, insurance products can be offered to business operators, converting the contingency cost of fire into the fixed cost of the insurance product that is then passed on to the consumer. As Knight notes, it makes no difference "whether the grouping of cases is effected through a mutual organization [a business association, for example] of the persons directly affected or through an outside commercial agency."[28] The principle remains the same.

While, however, the principle remains the same it has been the advent of a commercial insurance industry that has enabled the conversion of contingent risks into fixed costs and catapulted the ability of industry, commerce and individuals to mange so many of the contingent risks they face in everyday life. Insurance aggregates the contingent risks of large numbers of people or organizations and, in doing so, enables individuals and organizations to enjoy the advantages provided by the Law of Large Numbers. The Law of Large Numbers essentially expresses the idea that in a random process as the number of trials increases the percentage difference between the actual and expected outcomes approaches zero. The idea is normally highlighted with reference to Jacob Bernoulli's theory for calculating probabilities.[29] Tossing a coin, for example, will result in either the coin being heads or tails. Probability theory tells us that the chances of the coin being heads or tails is 50/50 for each toss. Several tosses of the coin in a row, however, may result in an unequal number of heads or tails in succession. The Law of Large Numbers does not tell us that with repeated throws the ratio of heads to tails will approach a 50/50 mean, but rather that the variance between the observed and true average will diminish. As Peter Bernstein expresses it, what the Law of Large Numbers "tells us is that the average of a large number of throws [of a coin] will be more likely than the average of a

[28] ibid., pp.213, 247.
[29] The Law of Large Numbers is sometimes referred to as Bernoulli law of large numbers. See Peter L. Bernstein (1998), op.cit, pp.121-123.

small number of throws to differ from the true average by less than some stated amount."[30]

While a seemingly innocuous observation, for the insurance industry and, indeed, for those of us who use commercial insurance products, the Law of Large Numbers represents one of the great revolutions in the management and mitigation of contingent risk. It not only provides a greater variety of monetized instruments to compensate and manage for risk exposure but at a cost to the end user that diminishes relative to the size of the contingent risks each of us face. In essence, the Law of Large Numbers enables the insurance industry to manage the risk exposures it faces with greater certainty. It allows insurers to increase the accuracy of the expected deviation from probabilities concerning their risk exposures within a given business segment or population and, in a competitive insurance environment, allows for more accurate risk pricing of insurance products. The Law of Large Numbers thus represents a kind of economies of scale for the insurance industry that, because of the spread of the cost of contingent risks among numerous actors, reduces the relative cost to the end user of mitigating contingent risks. In the modern era, the management of contingent risks has thus never been cheaper for the individual actor or as profitable for the insurer.

While, however, the Law of Large Numbers makes the insurance industry possible, it also defines the outer limits beyond which insurance cannot operate. It requires, for example, that "the risks insured must be both large in number and independent of one another," but, more importantly, that the phenomena to be insured must be amendable to rational calculation. [31] By definition, as Knight recognized, only contingent risks are amenable to rational calculation:

> If in a certain class of cases a given outcome is not certain, nor even extremely probably, but only contingent, but if the numerical probability of its occurrence is

[30] ibid., pp.121-123;204-205. See also Kenneth J. Arrow (1971), Essays in the Theory of Risk Bearing. Chicago: Markham Publishing Company.
[31] ibid., p.204.

known, conduct in relation to the situation in question may be ordered intelligently.[32]

In practical terms this limits the provision of insurance to areas where the prospects for loss can be calculated or at least the contingent costs of insurance exposures can be reasonably estimated. It also limits the provision of insurance to phenomena that are non-relational. Insurance, for example, can be offered against theft but never where theft is related to the activities of the policy holder. Likewise, insurance can be offered against the risk of fire, flood, accident, loss of life, disability, or instances of malfeasance or misfeasance, but not against the risk that a book will fail to become a bestseller, that the colour red will be the winter season's new fashion trend, or that a particular variety of cookie will acquire a dominant market share.[33]

As Knight and others recognized, however, just because risks are contingent does not always render their calculation transparent or easy. Contingent risks are more often opaque than transparent and measuring their occurrence and frequency fraught with numerous technical problems. Disentangling instances of arson from acts of negligence, oversight, mechanical malfunction, lightening, or mishap and accident in the case of fire, for example, involves all manner of calculations, assumptions, interpretation and inference. Similarly, calculating the contingent risks to shipping presents numerous challenges in terms of the contingencies of weather at various points along a ship's route, the time of year passage occurs, the unpredictability of sudden weather related events (fog and collision risk, for example), the possibility of rogue waves and damage to the vessel and cargo, and the relationship of these factors to the build of the vessel, the

[32] Frank H. Knight (2002), op.cit., pp. 212-213.

[33] *Malfeasanc*e or *misfeasance* operates in relation to the privity of contract. A contract creates a future obligation. Where a signatory to the contract fails to deliver on that obligation, this is referred to as *nonfeasance* (non-delivery on contractual obligations). Where a signatory to the contract performs the obligation negligently, only partially or in a sub-standard manner, this is said to be *misfeasance*. And where a signatory sabotages his/her contractual obligations and attempts to inflict intentional damage, this is said to be a case of *Malfeasanc*e. See Robert Merkin (2000), Privity of Contract: The Impact of Contract (Rights of Third Parties) Act 1999. London: LLP; Geoffrey Cheshire (2001), Cheshire, Fifoot and Furmston's Law of Contract. London: Butterworths (14th Edition).

manner of its operation, the possibility of navigational error and the expertise and experience of its crew.[34]

As Knight observes, even in instances of contingent risks, much of what we do relies conspicuously on the measurement of "uncertainty through the classification of instances."[35] In the case of the shipping industry, for example, the Lloyds Register of Shipping is essentially little more than a medium for classifying the build attributes of a ship; its hull capabilities and its onboard equipment with reference to its design specifications and confirmed through periodic independent inspections. As a maritime insurer, Lloyds of London uses this information as a means of assessing and classifying the seaworthiness of a vessel and its likely ability to handle all manner of weather and ocean related events. The contingent risks a ship may encounter, in other words, Lloyds of London or any other insurer would find too difficult if not impossible to assess and or calculate the fixed cost to the vessel operators. Instead, they rely on "the classification of instances" rule as a means of correlating the build attributes of a ship, the equipment it has on-board, and the training standards of the crew as a means of calculating the *probability* of the vessel to navigate safe passage through the world's oceans. The classification of instances thus allows Lloyds of London to correlate the frequency of loss of a certain class of vessel and to price insurance based on a ship's attributes rather than having to identify specific contingent risks the vessel might encounter over its ocean going life. Insurance companies, Knight observed, had stumbled across a practical and parsimonious method for converting the uncertainty of various risk events (weather rogue waves, navigational error, etc) and the uncertainty of their distribution through time, into a simple yet highly effective tool for calculating the probability of their occurrence and thus allowing all manner of risks to be managed. Indeed, it was the subjugation of risk events to probability analysis that, for Knight, offered the most effective way forward and defined implicitly an avenue down which all risk analysis must travel.

[34] Frank H. Knight (2002), op.cit., pp.249-250.
[35] ibid., pp.246-247.

2. Knightian Probability and the Classification of Instances

Like the insurance industry, Knight too understood the problem of ascribing specific values to contingent risks and that for many such risks direct sense observation was impractical as a means of determining their frequency and severity. Mangoldt's bursting champagne bottles, for example, easily allowed the identification of what Knight termed "an association between predicates" where risk in Champaign production reflected simply a relationship between the quality of the glass bottles produced, the fermentation process and the breakage rate. As Knight observes, however, "it will be evident that the practical difficulties of ordering conduct intelligently are enormously increased where . . . [risk causality] . . . is contingent rather than being positive."[36] What happens when the causal factors responsible for generating risk are only occasional, or where the "demonstration of a dependable connection is vastly more difficult," or where, for example, there is the additional problem of "ascertaining the precise proportion of cases in which the connection occurs?"[37] Lung cancer, for example, can be correlated to smoking but smoking does not ensure the development of lung cancer and the presence of lung cancer can occur in the absence of a history of smoking. The "association between predicates" in the case of lung cancer is thus vastly complicated by a plethora of factors; the number of years an individual has been smoking — if at all, the number of cigarettes smoked per day, possible exposure to passive smoking, the relative health and age of the individual, their genetic composition as well as a variety of other lifestyle habits. It is, obviously difficult if not impossible to observe all these correlates or the chain of causality represented by them.

Knight's solution to the apportionment of values in ascertaining risk is to turn to probability as a means for calculating the possibility of outcomes. "We have to estimate the given factors in a situation and also estimate the probability that any particular consequence will follow from any of them *if* [original emphasis] present in the degree

[36] ibid., pp.213-214.
[37] ibid., p. 214

assumed."[38] To do so, Knight develops a classification "scheme for separating three different types of probability situation":[39]

i. *a priori* probability
ii. Statistical probability
iii. Estimated probability

a priori probability

a priori probabilities are derived deductively. The roll of a dice, for example, has a one in six chance of a particular number being rolled. Games of chance where defined parameters exist for certain outcomes to ensue are what Knight meant when he referred to *a prior* probabilities. The outcomes, in other words, have a defined universe, but the order in which the will occur, i.e., whether the roll of a dice will result in a 1, or 3 or 6, for example, can only be estimated in relation to its (one in six) probability of occurrence for each throw of the dice.

What is unique about *a priory* probability for Knight, then, is the fact it speaks to a defined classification of instances. The risk outcomes are known and there is no possibility of deviation from these save for nefarious activity in terms of rigging the dice. *A priori* probability thus represents an "absolutely homogeneous classification of instances" and, for Knight, "is on the same logical plane as the proposition of mathematics" in as much as "the chances can be computed" through the application of general principles.[40]

While, however, a useful heuristic tool *a priori* probability has limited application as a means for understanding the general universe of risks we face and the probability of their distribution. As Knight notes, "a mathematician can easily calculate the probability that

[38] ibid.
[39] ibid., pp. 224-225.
[40] ibid., pp. 224-225.

any proposed distribution of results will come out of any given number of throws" of a dice, but no finite number of throws of a dice can give certainty to the actual distribution of results that will arise. Uncertainty in terms of the distribution of risks thus still obtains in the case of *a prior* probability. It would, Knight argues, "be ridiculous to suggest calculating from *a priori* principles the proportion of buildings to be accidentally destroyed by fire in a given region and time" let alone to know which buildings and at which times they will burn.[41] In this instance, the risk outcomes are known, fire, but the ability to calculate with certainty the distribution of these risks and when they will occur is beyond the ability of the mathematician and the principles of *a prior* probability.

Statistical Probability

As mathematically precise as *a priori* probability might be its penultimate limiting factor is that this type of probability is practically never met with in business or another facet of social, political and economic activity. It is, Knight observed, difficult to think of a business hazard in which it is "possible to calculate in advance the proportion of distribution among the different possible outcomes." In the absence of a defined universe of outcomes the types of risk business face must be dealt with by "tabulating the results of experience." [42] Knight refers to this form of "tabulation" as *statistical probability* which he defines as the "empirical evaluation of the frequency of association between predicates" but which are "not analyzable into varying combinations of equally probable alternatives."[43]

"The main distinguishing characteristic of this type [of probability] is that it rests on an empirical classification of instances."[44] Where the universe of outcomes is not defined as with the throw of a dice, Knight's suggestion for dealing with the exigencies of social and economic risk was parsimonious: define categories of risk through classifying

[41] ibid., p.215.
[42] ibid.
[43] ibid., p.225.
[44] ibid. See also Stephen F. LeRoy and Larry D. Singell (1987), "Knight on Risk and Uncertainty," The Journal of Political Economy. 95(2), April, pp. 397.

experiential instances and then tabulate the frequency of like instances as a means of calculating their probability for recurrence. In doing so, much if not most of the risks business face Knight insisted could be reduced to a fair degree of certainty. The process of statistical grouping, in other words, while it would not necessarily reveal patterns would generate frequencies and thus a means of calculating their nominal probability.

For Knight, statistical probability provided the one concrete tool for dealing effectively with common forms of risk endemic in social and economic activity; indeed for helping business and economic actors to provision and plan for risk contingencies. But, as Knight acknowledged, statistical probability is limited by its inability to gain the same "degree of homogeneity in the instances classed together" as in, for example, *a priori* probability. The throws of a dice represent a situation of absolute homogeneity where each throw is perfectly comparably and identical to any other throw of the dice. By contrast, in the case of statistical probability the classification of instances relies on a statistical grouping of phenomena that are not strictly homogenous. Classifying buildings in order to understand the probability of fire, for example, relies on a statistical grouping of buildings and building types that by definition are dissimilar. The materials used in construction, the build quality of the structure, its age, location, the fire retarding attributes of the internal walls and countless other factors make classification problematic. The problem of defining groups as accurately as possible thus reduces the nominal accuracy of statistical probability. The problem is succinctly expressed by Knight:

> The practical differences between *a priori* and statistical probability seems to depend upon the accuracy of classification of the instances group together. In the case of the die, the successive throws are held to be alike in a degree and a sense which cannot be predicated of the different buildings exposed to fire hazard. There is, of course, a constant effort on the part of the actuary to make his classifications more exact, dividing groups into subgroups to secure the greatest

> possible homogeneity. Yet we can hardly conceive this process being carried so far as to make applicable the idea of real probability in a particular instance.[45]

Classifying instances is thus fraught with an obvious tension: the need to form statistical groupings in order to generate meaningful probabilities about the frequency of recurrence while logically confronted by the reality that no two things are exactly alike.[46] As Knight suggested, however, this is a relative and graduated problem that represents a kind of sliding scale from highly homogeneous to highly heterogeneous. Some phenomenon are inherently more homogeneous, some less so. The flooding of domestic households, for example, makes for a relatively homogeneous classification of instances in terms of the predicates that cause flooding (geographic location, water hydrology and weather related events) and the resultant outcomes. Domestic household burglaries, by contrast, make for a less homogeneous classification of instances since the security measures vary widely between households and the contents peculiar to them in terms of artwork, jewelry, personal effects and the value attached to each are dissimilar. Both are amendable to statistical probability analysis, but the degree of homogeneity is a graduated.[47]

Actuaries, of course, strive constantly to compensate for statistical errors by modifying for instances of heterogeneity by imputing coefficients to allow for differences that are frequently or always present in classes of instances. But again this issue for statistical probability is such as to limit its absolute accuracy.

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[45] Frank H. Knight (2002), op.cit., p.217. See also James L. Athearn (1971), "What is Risk," The Journal of Risk and Insurance, 38(4), December, pp.639-645.

[46] ibid., p.227.

[47] Jochen Runde (1998), "Clarifying Frank Knight's Discussion of the Meaning of Risk and Uncertainty," Cambridge Journal of Economics, 22, p.541. The problem of statistical grouping and thus of statistical probability is a relative one, however, as Knight recognized. There is, he noted, a "graduation of probability situations" by which he meant some things could be more accurately grouped and classified together compared to others. Grouping orange producers together for the purpose of understating crop failure due to weather related risks, for example, is inherently less graduated and relatively homogenous despite variation in terms of different varieties of oranges, the role of geographic location, or variation in crop maintenance habits by farmers or the systems they practice to avert frost, heat, or sunburn damage to the crop. The existence of graduated probability situations thus allows for an inverse relationship between the accuracy of statistical probability in situations of low graduation compared to higher error ratios in highly graduated statistical probability situations (i.e., as heterogeneity in statistical grouping becomes greater). See the discussion in Jochen Runde (1998), op.cit., p.542.

Estimated Probability

Both *a priori* and *statistical probability* make possible the management of risk in terms of defining the possible universe of outcomes and nominally calculating their probability to recur. But what if the universe of outcomes *cannot* be defined? What if the circumstances that obtain are so unique or the outcomes so infrequent that it is meaningless to tabulate experience as a measure of their probability? Or, what if there is no way to classify instances because they are strictly non-comparable or represent such a complex degree of interrelated contingencies that attempts to isolate the variables responsible for causality are meaningless? Knight refers to this type of probability situation as *estimates*. For Knight, the distinction is that "there is *no valid basis of any kind* for classifying instances."[48] Instead, all that we have at our disposal to understand this universe of uncertainty is to generate *estimates*. Knight's third probability situation thus returns to the problem of *uncertainty* as distinct from risk, where in the absence of a universe of probable (statistical probability) or known outcomes (*a priori* probability), we are forced to make a "judgment of probability" (estimated probability) and infer a universe of possible or likely outcomes.

For Knight, of course, situations of estimated probability comprise the vast bulk of our social and economic universe. Much of what we confront and do in life falls to this form of calculation. Knight uses a common business example to highlight his point. Consider, he says, a manufacturer contemplating expanding their business. To do so they will have to expend more resources, perhaps acquire additional debt, increase the size of the production facilities and hire more people. These costs can be readily calculated. But what of the calculations about the viability of this course of action? Will added capacity depress returns or initiate a price war with competitors? Will the income stream generated by the additional capacity be enough to service the increased costs of the additional hires, the factory expansion and the higher debt service? What if interest rates

[48] Frank H. Knight (2002), op.cit., p.225

go up, or new market entrants with lower operating costs enter the market? Will the economy and demand for the product remain strong? Will competitors move production offshore and undercut retail pricing?[49]

As Knight asks, "what is the 'probability' of error . . . in the judgment?" of the manufacturer deciding to expand production?[50] Obviously, notes Knight:

> . . . it is manifestly meaningless to speak of either calculating such a probability *a priori* or of determining it empirically by studying a large number of instances. The essentially and outstanding act is that the 'instance' in question 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 . . . most conduct and not business alone.[51]

The point, for Knight, is that the manufacturer does in fact perform a type of probability analysis about the viability of their chosen course of action but also forms an estimate of the likely probability that their estimate is correct.[52] Knight was not discounting the value of estimates but attempting to highlight that even in circumstances where the universe of outcomes cannot be known, attempts to delineate a universe of *potential* outcomes through rational calculation is possible albeit subject to higher error probabilities.

For many, however, estimates undoubtedly appear an inferior or at least a problematic means for calculating potential outcomes because of their subjective nature and indeterminate means of measurement. Knight both accepts and rejects this interpretation.

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[49] See also C. Robert Taylor (2003), "The role of risk versus the role of uncertainty in economic systems," Agricultural Systems, 75, pp. 251-264; Jochen Runde (1998), Clarifying Frank Knight's Discussion of the Meaning of Risk and Uncertainty," Cambridge Journal of Economics, 22, pp.539-546; David Dequech (2003), "Uncertainty and Economic Sociology: A Preliminary Discussion," American Journal of Economics and Sociology, 62(3), July, pp.509-532.
[50] Frank H. Knight (2002), op.cit., p.226.
[51] ibid.
[52] ibid. See also the discussion in Tony Lawson (1988), "Probability and Uncertainty in Economic Analysis," Journal of Post Keynesian Economics, 11(1), Fall, pp.38-65.

Individuals by their very circumstances, he insists, must deal with an uncertain universe. Attempting to eliminate uncertainty, or at best reduce it to risk by developing estimates, Knight sees as a perfectly valid and rational human response. [53] Individuals do so by invoking as objective an assessment as possible of the known facts, imagining future ones, weighting these and then applying rational precepts to anticipate possible outcomes.[54] There is nothing irrational about this, Knight insists, but simply the subjective application of objective rationality to situations of uncertainty. Hardcore scientists might object to such calculations on the basis of non-verifiability, but this does not refute the notion that such estimates are made using objective criteria and calculation. Knight thus sees estimates an integral means of managing uncertainty and a highly effective cognitive strategy for mapping the future.

For Knight, the only anomalous situation is the extent to which individuals thrive on uncertainty and use it as a means of creative engagement in economic and social activity. For Knight, it is the variegated responses to uncertainty that "accounts for a large part of the phenomena of current economic life;" it is the *gestalt* that inspires the creation of business systems, management processes and production ingenuities ─ all designed to counter uncertainty.[55] Uncertainty, in other words, drives serendipity and multifarious outcomes through agential reactions to it. The profundity of this standpoint is not lost on Knight; he recognizes it as marking the outer limits beyond which science and positivist epistemologies lose their explanatory veracity. In the face of uncertainty, agential authority made Knight profoundly skeptical of the idea of developing objective tools for predicting human action or of developing methods of appraisal that would substantially reduce the probability of error in calculating uncertainties.[56] Agential interpretations of, and reactions to uncertainty, combined with the myriad ways individuals seek to interface

[53] R. A. Gonce (1992), "F.H. Knight on capitalism and Freedom," Journal of Economic Issues, 26(3), September, p.829.
[54] Stephen F. LeRoy and Larry D. Singell (1987), op.cit., p. 397.
[55] Frank Knight as quoted in R. A. Gonce (1992), op.cit, 829. See also the discussion in C. Robert Taylor (2003), "The Role of Risk versus the Roe of Uncertainty in Economic Systems," Agricultural Systems, 75, pp.251-264.
[56] A contrary interpretation to the one I have offered here concerning Knight's distinction between risk and uncertainty is provided by Richard M. Langlois and Metin M. Cosgel (1993), "Frank Knight on Risk, Uncertainty, and the Firm: A New Interpretation," Economic Inquiry, 31, July, pp.456-465.

with future situations before they materialize in order to alter the circumstances that obtain, were altogether too complex a set of phenomena and too contingent on interpretive discretion to be reduced to accurate calculation. Prediction, in other words, was beyond the realm of the economist. The implications of this are profound. For Knight, it delimited the ability of economics to become a science. Predicative accuracy or the development of tools for the precise management of economic and social affairs would forever remain beyond the reach of the economist. Economics, in Knight's understanding, was doomed to a theory-knowledge that could never adequately capture the complexity of agential authority. As Ross Emmett observes;

> The uncertainty created by the dilemmas and contradictions of subjective knowledge and voluntary action in an open-ended universe means that neither scientific nor probability analysis will provide the knowledge of individual action or social consequences that the Economist craves.[57]

Knights tripartite classification of probability situations is summarized in Figure 2.1.

[57] Ross B. Emmett, (1999), The Economist and the Entrepreneur: Modernist Impulses in Risk, Uncertainty and Profit," History of Political Economy, 31(1), p.41. See also John McKinney (1977), "Frank H. Knight on Uncertainty and rational Action," Southern Economic Journal, 43(4), April, pp.1442-1443; Stephen John Nash (2003), "On Pragmatic Philosophy and Knightian Uncertainty," Review of Social Economy, 86(2), June, pp.251-271.

Figure 1: Knight's Tripartite Probability Classification

Probability type	Characteristics	Examples of application and outcomes in managing risk
***A priori* Probability**	• Derived deductively • Homogenous classification of instances • Defined universe of known outcomes • Can be objectively calculated • Probability of risk recurrence can be calculated using general principles.	Games of chance with limited or defined universe of possible outcomes (rolling of a dice; tossing of a coin,). High level of certainty in terms of *known* universe of outcomes but no certainty in terms of the order and distribution of risks

Statistical Probability	• Derived inductively • Rests on an empirical classification of instances (statistical grouping) • Generated through empirical evaluation of relative frequencies of a class of instances • Universe of outcomes is less defined but broadly enumerated through recurrent observation / tabulation of experience • Homogeneity of instances classified is subject to error and the limitations of statistically grouping dissimilar things • Probabilities can be objectively calculated	General forms of insurance such as life, property, fire, and flood insurance The universe of *probable* outcomes can be reduced to broad classifications, but the *possible* universe of outcomes can not be fully known or the order and distribution of risk outcomes known with certainty

Estimated Probability	• No valid basis of any kind for classifying instances • No ability to tabulate frequency of instances because the instance is unique or the frequency of recurrence is extremely low • Estimates are subjectively generated • Characterized by situations of complexity and ambiguity • The universe of outcomes can only be anticipated on the basis of instinct, inference and various forms of deliberation and subjective calculation	Many business, economic and life instances where agents are required to assess the likelihood of certain outcomes materializing and or the possibility of risks arising through various activities of decisions taken by the agent (business ventures, investment decisions, political calculations, personal decisions, etc) The universe of outcomes is uncertain and cannot be known.

Assessing Knight's Contributions to Theorizing Risk and Uncertainty

When John Maynard Keynes wrote that "it would be foolish, in forming our expectations, to attach great weight to matters which are very uncertain," Knight had reason to be bemused. For Knight, Keynes misses the point when he states that "it is reasonable . . . to be guided to a considerable degree by the facts about which we feel somewhat confident, even though they may be less decisively relevant to the issue than other facts about which our knowledge is vague and scanty."[58] But for Knight, herein lies the problem; that which we know with some degree of certainty is mostly unimportant, not in the sense of its objective value as knowledge, but in the sense that its ability to be imputed into calculation and subject to scientific manipulation renders it intelligible. This quota of knowledge is of course necessary, but the *marginal* quota. Of itself it reveals little. The larger and thus more significant quota of knowledge rests in the realm of *uncertainty*. It is in this environment that we formulate strategy, engage in exercises and actions calculated through perceptions and inferences of an uncertain future. Understanding human action, the composition, reflexive social landscapes and thus activities that propel change and construct social and economic orders, or the decisions of firms and economic actors, rests ultimately on understanding the role of *uncertainty* in rational action.[59] It was here that Knight made his greatest contributions to risk discourse. These contributions fall into three categories.

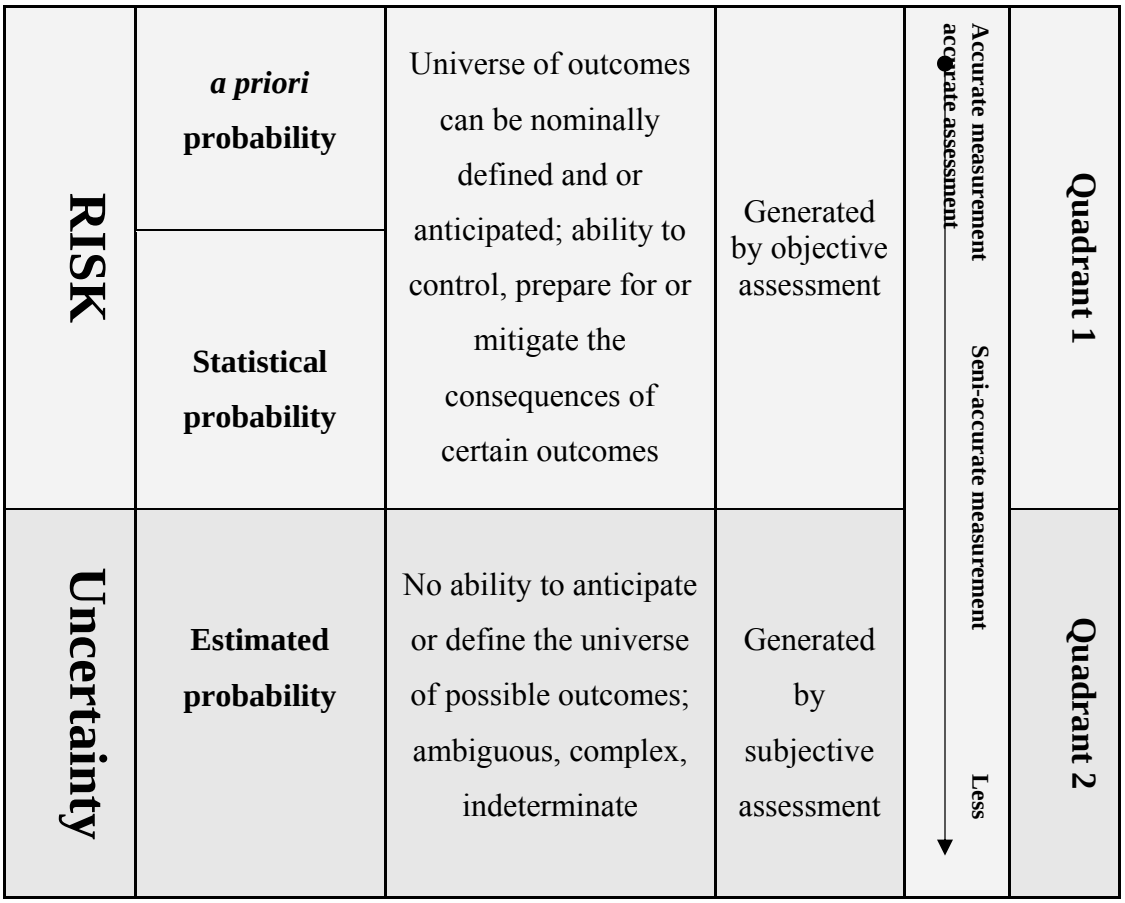
[58] John Maynard Keynes (1973), The General theory of Employment, Interest and Money. Macmillan & Cambridge University Press for the Royal Economic Society, p.148. See also Mark Perlman and Charles R. McCann, Jr. (1996), "Varieties of Uncertainty," in Christian Schmidt (ed.), Uncertainty in Economic Thought. Aldershot: Edward Elgar, pp.9-20. See also Oliver G. Wood, Jr., (1964), "Evolution of the Concept of Risk," *The Journal of Risk and Insurance*, 31(1), March, pp.83-91.

[59] These Knightian propositions were not unproblematic. See, for example, T.W Hutchinson (1941), "The Significance and Basic Postulates of Economic Theory: A Reply to Professor Knight," The Journal of Political Economy, 49(5), October, pp.732-750.

A Graduated Risk ─ Uncertainty Schema

The first is Knight's development of an analytical framework that makes precise the definitional parameters that separate risk from uncertainty. As Figure 2.2 highlights, Knight essentially associates risk with *a priori* and *statistical probability* type situations and uncertainty with *estimated* probability type situations. Apart from providing a sophisticated heuristic device, Knight bestowed a powerful typology by which to understand the role of risk and, more importantly, the mediums by which to *assess* the likelihood of its recurrence. Knight's conception of statistical probability and the classification of instances rule, for example, laid the path for social scientists to develop risk forecasting tools and for generating meaningful probabilities about the frequency of risk generation. In no small measure, Knight gave social scientists a method for quantifying risk.

Figure 2: Knightian Risk versus Uncertainty



Source: Adapted from Tony Lawson (1988), "Probability and Uncertainty in Economic Analysis," Journal of Post Keynesian Economics, 11(1), Fall, p.48.

Despite the heuristic utility of this graduated risk ─ uncertainty schema, however, Knight paid little attention to enunciating what he identified as its most dominant element — uncertainty. As a category supposedly endemic to all forms of human conduct, Knight had little to say about possible modes of evaluation, mechanisms for its management and or mitigation, or indeed the constitutive elements that comprise uncertainty. Instead, Knight reifies the role of subjective evaluation and suggests implicitly that uncertainty remains beyond rational deliberation; too complex and altogether too dyadic to be subject to cognitive strategies that might meaningfully render this category more transparent or at least able to be productively managed.

To what extent, however, is Knight's conceptualization of uncertainty problematic? After all, it constructs a kind of monolith that, by definition, renders it beyond science and rationality and thus beyond a politics of control or a science of management and mitigation. But how true is this? Should we simply accept Knight's definitional construct and defer to its implications? To put it another way, we perhaps need to inquire how uncertain uncertainty actually is? Knight has a graduated scale from highly probabilistic risks calculated through *a prior* probability analysis to a category that he defines as beyond all forms of anticipation; events so unique, instances so exceptional that they essentially fall outside of our ability to comprehend them. Surely, however, this category speaks not to a broad and encompassing category true of much of the phenomena that we experience in everyday life, but a rare category that many if not most of us never encounter in everyday life? We live, for example, mostly in highly institutionalized environments mediated by rules, laws, and norms, all of which create path dependencies and a larger degree of certainty than uncertainty. And while, to be sure, the degree of social embeddedness of formal and informal institutional practices varies greatly between and within national communities, the cultural and social norms that arise from these contexts act to produce customs, practices and regularities all of which reduce uncertainties. In broader social contexts, then, to what extent is it valid to talk about the role of uncertainty dominating social life? Life patterns in industrialized countries and increasingly in large parts of Asia and Latin America, for example, display greater

regularities than has historically been the case. Institutionalized statist approaches to the management of welfare, living conditions, health care provision and educational attainment, while they do not eradicate uncertainty increasingly produce greater regularities and stability in our life patterns and the likely trajectories we will each experience.

Equally, if we consider the economic and business worlds to which Knight devotes much of his enterprise, these same predicates would seem to apply. The extension and normalization of property rights, contract law, and the increasing degree to which investor rights are now subject to internationally uniform standards, surely introduce less and not more uncertainty? The emergence of the regulatory state and the codification of business law, market operation, securities law and the compliance requirements for reporting standards and corporate transparency, obviously do not eradiate uncertainty in terms of business failure, corruption, or poor management, but they increasingly regularize business operations and business practices which help reduce the prospectus for happenstance.[60] Knight, of course, could not have anticipated the depth of the regulatory state or the great extension of institutionalized practices into the business and social world. The point, however, is that such practices perhaps change the categorical realm of uncertainty and reduce its visceral impact on the collective body politic. In other words, uncertainty might be increasingly less uncertain and the modes of analysis, institutional and regulatory practices that we bring to bear upon it, progressively subjugating uncertainty to processes that circumscribe its consequences. This is not a process of regulating uncertainty away, but an increasing ability to manage its consequences.

Second, to what extent is uncertainty categorically unique such that it is impossible to map, anticipate, or mitigate? Knight implicitly suggests that the application of science, measurement, or reliable calculation are not possible in situations of uncertainty. But how

[60] See, for example, David Levi-Faur and Jacint Jordana (2005), "The Rise of Regulatory Capitalism: The Global Diffusion of a New Order," The ANNALS of the American Academy of Political and Social Sciences, 598(1), pp. 200-217.

true is this? There is, after all, a vast array of cognitive mapping strategies that exist in various disciplinary and professional settings aimed at helping manage uncertainty. Scenario analysis, for example, is hardly new and an integral part of agential reasoning and cognition. History is littered with such thought examples, from military strategists recounting the Peloponnesian wars and the scenarios played out by the Athenians against the Peloponnesian League, to the assault of Napoleon on Russia and Czar Alexander I and the intricate scenarios of Marshal Kutuzov as he campaigned against the invading French. These same cognitive strategies were famously employed by business and the great industrial barons of the nineteenth and twentieth century with great effect. Andrew Carnegie, John Pierpont Morgan, Henry Ford and John D. Rockefeller, among others, were all masters at anticipating competitor behavior and mapping their business moves in much the same way that a chess player would map-out the alternative options of an opponent in order to presage their own moves and options. Whether formally mapped or cogitatively implicit, the point is that scenario analysis has proven a powerful tool in the management of uncertainty.

Similarly, the development and application of trend analysis techniques to social, political and economic phenomena, the use of path dependency analysis to map the trajectory of institutional forms, norms and practices of discrete segments of populations, or the use of Delphi techniques in the generation of political and commercial forecasts, have all emerged as key tools for managing situations of uncertainty. Indeed, converting uncertainty into manageable risks has been the hallmark of disaster and emergency planning. "Over the horizon" mapping strategies have been applied to all manner of crises and disaster planning; improving our capacity to manage and mitigate the effects of earthquakes, hurricanes, floods, various weather related events, criminal activities and terrorist attacks ─ to name but a few. Hardening critical infrastructure, securing continuity of supply in the case of critical resources, redundancy-back-up planning in the case of water supply, or emergency management protocols in the case of critical infrastructure failures, are all common preparedness protocols now widely adopted

among professional agencies with proven ability to manage uncertainty and mitigate the impact of relatively infrequent events.

Uncertainty might thus not be the black hole that Knight paints it, but a category where effective management protocols can be developed to reduce its effect and anticipate its consequences.

All of this does not repudiate Knight's risk ─ uncertainty schema, but it does make problematic his conceptualization of uncertainty as a category which both dominates our lives and one which must forever remain enigmatic. It also raises questions about the ontological efficacy of conceiving of uncertainty as a realm of danger and or harm; a great unfathomable realm. Knight was not alone in his thinking. Despite their strong disagreements, John Maynard Keynes shared his critic's pessimism, suggesting that in matters such as whether there will be war or whether stock prices would rise or fall, "there is no scientific basis on which to form any calculable probability whatsoever. We simply do not know."[61] In the absence of a rational, scientific calculus, uncertainty remained a dark and negative force. But is it? As Bernstein notes, "uncertainty makes us free."[62] Uncertainty liberates us from a teleology of historical determinism, of the grand designs of history as an ultimate trajectory manipulated by gods, men and megalomaniacs. Uncertainty democratizes our collective destinies. The negative or dark view of uncertainty as "danger" or "harm" perhaps, then, reflects a cultural anguish peculiar to techno-managerialists and the modernist project of constructing architectures of social and economic control rather than an objective assessment of the condition itself. The foot soldiers of science celebrate order, patterns, causalities, and parsimonious models able to relate cause to effect, inputs with outcomes, triggers that instigate processes, and the phenomena that result. Uncertainty, by contrast, invokes notions of disorder, an absence of control, an inability to correlate causalities, to predict and manage. It is pre-science, pre-modern and primordial. As a man of science and a

[61] John Maynard Keynes as quoted in Pat O'Malley (2004), Risk, Uncertainty and Government. Bodmin, UK.: Lasshouse Press, p.4.
[62] Peter Bernstein as quoted in ibid., p.4.

celebrant of rationalist approaches, Knight thus held contradictory views about the composition of uncertainty, seeing it as omnipresent and thus a black hole beyond rationality, but also the quotient responsible for creativity, innovation and progress.

A Risk Discourse for Social Science

Knight's second great contribution laid in the risk research agenda he bequeathed to social science. Knight essentially pointed the way forward in terms of detailed, contextualized historical studies of commercial processes and institutions and then tabulating the risk events associated with these to produce risk maps in terms of statistical probabilities. Knight essentially championed a method of analysis that, if followed, would allow relatively high degrees of accuracy in anticipating risk events within discrete classes of instances. Experiential tabulation combined with the classification of instances rule, in other words, provided the one concrete social scientific tool that could garner insights not just into the frequency of risk events, but the contours of their severity, the nature of their impact and the resultant implications for the organization / populations concerned.

Strangely, however, the up-take of Knight's approach has been sparse outside of actuarial studies and certain facets of sociology, social work, medicine and public health. Social work and public health studies, for example, have used the classification of instances approach as a means of developing diagnostic tools and intervention strategies for identifying individuals / populations at risk. Indeed, public health campaigns rest on this approach, developing increasingly intricate classifications of traits and exigent factors that are correlated closely to major health events (smoking and heart disease; sedentary lifestyles and cardiovascular disease; blood pressures and chronic cardiovascular events such as stroke and heart attack, etc.). Similarly, in social work the classification of instances method is variously used to identify youth at risk of suicide, the frequency and distribution of family breakdown, and as a basis for the development of prescriptive policy to enhance the delivery of social services to communities with high propensities

for risk events (family violence and spousal abuse, child truancy, etc). In each of these areas, the intensive development of rigid classifications and the investment of considerable resources into tabulating the frequency of risk events through constructing longitudinal time-series data has revolutionized public health and social work methodologies, diagnostic tools and policy mechanisms to manage and help mitigate public health and social risk. With such demonstrably superior outcomes the question arises, however, why more of the social sciences have not emulated this approach?

Part of the explanation for the poor uptake of similar approaches in political science and International Relations (IR) undoubtedly lies in the propensity for rational choice methods and game theoretic approaches, which, ironically, have precluded the type of onerous data gathering necessary to fruitfully develop classifications and statistical probabilities. So too, part of the problem also lies in the historical bias against "grubby empiricism;" grand theoretical approaches and meta-narratives are much the more fashionable and bring professional notoriety. Correcting professional incentive structures is obviously no easy task. Yet, if political science and international relations are to make significant inroads into developing more robust risk assessment tools and, concomitantly, developing the types of interventionist risk mitigation strategies indicative of various health sciences and social work, some form of emulation might be necessary and desirable. As political scientists, for example, we tend not to map the phenomena we profess to study. Political risk analysis, for instance, tends to be defined by ad-hoc approaches relying on due diligence check lists, situation analyses or case study approaches. There is no data to mine; no longitudinal time-series data that might allow various classifications of risk (regulatory risk, contract repudiation, policy change, expropriation, etc) to be correlated to institutional type or to specific institutional features such as accountability mechanisms, transparency, probity, institutional capacity, statutory independence, budget procurement practices, etc. In political science we simply don't have the empirical data sets to map the associations that obtain between certain types or features of institutions and various forms of political risk and thus calculate the

probability of such risks recurring.[63] Doing so would yield significant insights into political risk, providing not only a means of calculating the propensity for risks in specific institutional settings but, more importantly, helping to define policy prescriptions that redress the institutional design flaws that allow risk generation in the first place. Knight's legacy might thus lay in emulating his method and allowing it to provide a catalyst to help develop and systemize a more rigorous theoretical basis for risk assessment.

The Limits of Knowledge

Knight's third and obvious contribution was perhaps his greatest: demarcating the possible from the improbable. In differentiating between risk and uncertainty, Knight explicitly suggested the limits of knowledge and the practical limitations of what can be controlled and or reasonably calculated (quadrant 2, Figure 2.2). Knight was a rationalist and believed strongly in the role of rationality as a medium of scientific inquiry. But he was not a scientist nor did he believe economics or any other social science could become a "science" as might be true of physics or chemistry. Causality and the generative drivers of human action were simply too interdependent, too complex and far too emotive in terms of subjective calculation to make them amendable to general laws or principles.[64] As a consequence, the role of the social scientist, in Knight's view, could not be to "discover truth" since much of this was socially fabricated, but to champion social justice

[63] See Paul Dragos Aligica (2006), "Institutional & Stakeholder Mapping: Frameworks for Policy Analysis and Institutional Change," Public Organization Review, 6, pp.79-90. J. Roger Hollingsworth (2000), "Doing Institutional Analysis: Implications for the Study of Innovations," Review of International Political Economy, 7(4), Winter, pp.595-644. Notable and fascinating contributions to empirical – institutional mapping exercises can be found in Thorsten Beck *et al* (2000), "New Tools and New Tests in Comparative Political Economy: The Databases of Political Institutions," Development Research Group, World Bank**,** Washington, D.C. Working Paper & Yi Feng (2001), "Political Freedom, Political Instability And Policy Uncertainty: A Study of Political Institutions and Private Investment in Developing Countries," International Studies Quarterly, 45, pp.271-294.

[64] John Nash (1998), Cost, Uncertainty, and Welfare: Frank Knights Theory of Imperfect Competition. Aldershot: Ashgate, p.59. See also Frank H. Knight (1960), Intelligence and Democratic Action. Cambridge, Massachusetts: Harvard University Press; Frank H. Knight (1947), Freedom and Reform: Essays in Economics and Social Philosophy. New York: Harper & Brothers;

and advocate ways for improving social outcomes.[65] Economics, in other words, was to be purposive. [66] As John McKinney notes, Knight's concern was to "keep science within an appropriately restricted domain" while simultaneously using science "to develop a rigorously mechanical interpretation of human conduct, and then as a social philosopher and moralist, impress upon his readers the 'sweeping limitations' which must be placed on such an interpretation."![67] Those limitations, of course, disposed Knight to place considerable analytical weight on the role that uncertainty plays in every facet of economic and social life, and to admit that this categorical realm spoke to the limits of knowledge but, at the same time, should define its concerns, focus and energies. As Ross Emmett notes of Knight's RUP, its implications are profound. "For the modern economist, bent on pursuing the science of economics to its limits, RUP presents a cognitive tragedy: in an open-ended universe, 'the essential evil of uncertainty' is the impossibility of complete knowledge."[68]

The ramifications of Knight's work thus remain as pertinent today as when first published in 1921. It is, perhaps, in this light that we should mine Knight's contributions; exploiting his keen insights into the analytical distinction between risk and uncertainty, mining his methods as a means developing more sophisticated tools for assessing risk through the calculation of statistical probabilities, but informed ultimately by the limitations of what we can reasonably expect to achieve under the weight of uncertainty.

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[65] Arther Schweitzer (1992), "Frank Knight's Social Economics," in Mark Blaug (ed.) Pioneers in Economics: Frank Knight (1885-1972, Henry Simons (1899-1976), Joseph Schumpter (1883-1950). Aldershot: Edward Elgar, p.35.

[66] Indeed, Mary S. Morgan suggests that Knight's thinking was so antithetical to notions of economic science and specifically to economistic abstractions like "economic man" that "Knight insisted that this ideal figure of economic science does not help describe actual economic behavior, and so cannot be used for socially useful economic analysis or policy interventions. See Mary S. Morgan (2006), "Economic Man as a Model man: Ideal Types, Idealization and Caricatures," Journal of the History of Economic Thought, 28(1), March, p.15.

[67] John McKinney (1977), Frank H. Knight on Uncertainty and Rational Action," Southern Economic Journal, 43(4), April, pp. 1439-1440.

[68] Ross B. Emmett (1999), The Economist and the Entrepreneur: Modernist Impulses in Risk, Uncertainty and profit," History of Political Economy, 31(1), pp.31.

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