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Renewing Knightian Uncertainty: A Pragmatic Prospectus and Demonstration

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Abstract: Frank Knight distinguished between 'uncertainty' and 'risk' to specify the true nature of 'profit', but his specification never caught on and I do not see realistic possibilities for renewing research in this direction. Using uncertainty to analyze the organization and conduct of contemporary entrepreneurial activity offers more promising prospects.

Dedication: This paper commemorates John H. McArthur, Harvard Business School's dean and "intellectual venture capitalist" from 1980-1995 (as the title of a book on his deanship called him). John introduced me to *Risk, Uncertainty and Profit*: None of my MBA or doctoral courses at Harvard had mentioned the book or its author. John summoned me to a three-hour lunch (to "figure out what I was about") after I joined the HBS faculty in 1988. A copy of Knight's book arrived in inter-office mail with John's scribbled note suggesting it would resonate. It has guided nearly all my subsequent work. John remained a staunch supporter and thoughtful reader of everything I wrote until his death in 2019.

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Part I: Prospectus

Introduction

A hundred years after its 1921 publication, Frank Knight's *Risk, Uncertainty and Profit* has become an object of empty obeisance: Scholars salute its novel construct, now called 'Knightian uncertainty,' but ignore it in their research. Others reject the utility of the category altogether. Ironically, the book's most enduring legacy seems to be its analysis of competition in the absence of Knightian uncertainty -- and a landmark in the development of price theory.

I offer a pragmatic antidote to the empty veneration and outright rejection. As reflected in the title of his book, Knight distinguished between uncertainty and risk to specify the true nature of profit, but this specification never caught on and I see no prospects for renewed research in this direction. As it happens, Knight also used uncertainty to specify the distinctive role of the entrepreneur (not just entrepreneurial profit). Using uncertainty along similar lines, I suggest, offers more promising prospects.

This paper, the first of a three-part series, contains a prospectus that examines the nature of Knightian uncertainty and its possible future uses. The next paper demonstrates a specific application, namely using Knightian uncertainty to help explain how different kinds of organizations tend to specialize in different kinds of entrepreneurship. The final and third part continues the demonstration by connecting my conjectures about specialization to recent research on stories and narratives.

I do not attempt to summarize Knight's intricate arguments in my prospectus. Instead, I use more familiar (and more easily understood) claims and constructs as coordinates to place Knightian uncertainty in readers' existing mental maps. Specifically, I analyze two rationalist critiques – Friedman's (1976) rejection and Leroy and Singell's (1987) deconstruction. I then explore the relationship of Knightian uncertainty to Keynes's radical uncertainty and to behavioral decision-making models. I also assess prospects for future applications of Knightian uncertainty suggested by these analyses and explorations.

1. Rationalist Critiques

Rejection. Milton Friedman (1976) unambiguously rejects a role for Knightian uncertainty in his text on price theory:

> "In his seminal work, Frank Knight drew a sharp distinction between risk, as referring to events subject to a known or knowable probability distribution and uncertainty, as referring to events for which it was not possible to specify numerical probabilities. I have not referred to this distinction because I do not believe it is valid. I follow L. J. Savage in his view of personal probability, which denies any valid distinction along these lines. We may treat people as if they assigned numerical probabilities to every conceivable event."[1]

LeRoy and Singell (1987), hereafter L-S, question Friedman's claim that Knight associated uncertainty with the absence of numerical probabilities. They cite Knight's explicit assertions that "we do estimate the value or validity or dependability of our opinions and estimates and such an estimate has the same form

as a probability judgment; it is a ratio, expressed by a proper fraction"; and likewise that: "The individual ... throws his estimate of the value of an opinion into the probability form of 'a successes in b trials' (a/b being a proper fraction) and 'feels' toward it as toward any other probability situation."

Under William James's pragmatic dictum that "every difference must make a difference"[2] however, the rejection of a special status for subjective opinions in a modern treatment of price theory seems innocuous. In the first part of his book Knight himself analyzed a "competitive system" where "practical omniscience on the part of every member" made subjective uncertainty superfluous. Friedman's mistaken claim that Knightian uncertainty excluded numerical estimates is also understandable. As Knight repeatedly observes, subjective opinions are ubiquitous and common experience of business, the law, and day-to-day life, suggests that numerical estimation is exceptional, not routine. Friedman's impression that Knight's uncertainty excluded numerical estimates is therefore understandably widespread. (Knight contributes to this impression by repeated references to "unmeasurable" uncertainty, rather than the clearer "objectively unmeasurable." He compounds the confusion by referring to opinions that are *not* reduced to numbers without explaining why that matters.[a])

Deconstruction. L-S's claims about what Knight really meant deserve more extended scrutiny than Friedman's rejection. I therefore now summarize, rebut, and then assess the prospective significance of their deconstruction.

Summary While L-S use Knight's words to refute Friedman, they also cite and reject Knight's equally explicit association of uncertainty with subjective probabilities. Their core claim, encapsulated in their paper's abstract is that the "received interpretation of Knight's classic risk- uncertainty distinction-as concerning whether or not agents have subjective probabilities-constitutes a misreading of Knight." By uncertainty, the abstract continues, "Knight instead meant situations in which insurance markets collapse because of moral hazard or adverse selection."

L-S acknowledge that Knight "repeatedly identif[ies] the risk-uncertainty distinction with that between objective and subjective probabilities: "We can also employ the terms 'objective' and subjective' probability to designate risk and uncertainty respectively, as these expressions are already in general use with a signification akin to that proposed" (p. 233). From this it is immediate that if all hazards can be classified as either risk or uncertainty, then they can be characterized using either objective or subjective probabilities." L-S also cite Knight's observations that business decisions typically deal with "situations which are far too unique, generally speaking, for any sort of statistical tabulation to have any value for guidance (p. 231)," and where it is therefore "meaningless" to "empirically" determine an objective probability "by studying a large number of instances."

To justify their rejection of Knight's unequivocal distinction between subjective uncertainty and objective risk, L-S invoke Knight's acknowledgment that: "Nothing in the universe of experience is absolutely unique any more than any two things are absolutely alike. Consequently it is always possible to form classes if the bars are let down and a loose enough interpretation of similarity is accepted." L-S likewise cite Knight's acknowledgement of the wide range of ways in which insurers calculate policy premiums, "from something like the statistical certainty of life insurance at one extreme to almost pure guesswork at the other, as when Lloyd's insures the business interests concerned that a royal coronation will take place as scheduled, or guarantees the weather in some place having no records to base calculations upon. Even in these extreme cases, however, there is a certain vague grouping of cases on the basis of intuition or judgment; only in this way can we imagine any estimate of a probability being arrived at."

[a] Knight also distinguishes between estimates of outcomes and estimates of the correctness of such estimates and allows for the numerical as well as non-numerical expression of both kinds. Knight does not however seem to use these distinctions in his arguments which I find pointless and confusing.

L-S criticize Knight's imprecise writing and "extended Austrian-style disquisitions on the foundations of human knowledge and conduct." "Almost all readers," L-S write, "will at times despair of extracting any core of original insight from the overripe fruit of Knight's prose." And they express "much sympathy for those who take away from *Risk, Uncertainty and Profit* the opinion that Knight simply had no very clear idea of what he was talking about."

Knight's blurred distinctions between subjective uncertainties and objective risks and his imprecise writing give L-S a springboard to radically reinterpret Knight's thesis. Instead of relying on what Knight wrote, they look to his "purpose" namely to "explain profit as the reward for bearing uncertainty" and then attempt to "infer how Knight used the risk-uncertainty distinction from how he defined profit" in the following way.

Knight, L-S observe, defined profit as the residual between revenues and all contractual --- and *potentially* contractable costs. Imputed costs (even if not actually incurred) of insurable risks should therefore be excluded from profit; accordingly, if the purpose of distinguishing uncertainty from risk is to pin down profit, the distinguishing feature of uncertainty must be its uninsurability. But, because insurers do cover highly idiosyncratic risks which defy statistical assessments of outcomes, uniqueness cannot be the source of unisurablity. Rather, moral hazards and adverse selection can make some risks uninsurable.

In particular, moral hazards make business decisions uninsurable. L-S make much of Knight's own words: "We have assumed . . . that each man in society knows his own powers as entrepreneur, but that men know nothing about each other in this capacity[b].... The presence of true profit, therefore, depends ... on the absence of the requisite organization for combining a sufficient number of instances to secure certainty through consolidation. With men in complete ignorance of the powers of judgment of other men it is hard to see how such organization could be effected."

In L-S's rephrasing this amounts to asserting that "any attempt to insure the outcome of entrepreneurship would fail because of the impossibility of excluding entrepreneurial lemons." From this they infer that the meaning of uncertainty consistent with Knight's purpose must be moral hazard and adverse selection rather than subjective assessments and opinions.[3]

Its true meaning revealed, L-S see in Knight's discussion of uncertainty a "striking anticipation of the modern treatment of market failure" in which moral hazard and lemons problems prevent valuable transactions. L-S note however that Knight's discussion of market failure was "always informal and in places inaccurate" and Knight did not anticipate the use of "incentive compatible contracts," particularly in the delegation of business decisions to professional managers. Knightian uncertainty is thus presented as a historical curiosity -- yet not even a steppingstone to the later development of information economics and agency theory.

Rebuttal. L-S reject Knight's explicit characterization of uncertainty as subjective because Knight cannot clearly distinguish it from objective risk. But while taxonomical purists might prefer unambiguous categories, even fuzzy idealizations have, in the pragmatist William James's words, "cash value." Deviations from "normal" temperatures and blood pressures guide medical diagnoses. Juries assess "negligence" against standards of "reasonable" care. Editors assess the "originality" of submissions, teachers the "proficiency" of students, and central bankers "tightness" in monetary conditions. Similarly, Knight's acknowledgement that pure cases of risk or uncertainty cannot exist because no two things are

[b] Crucially L-S Knight's crucial qualifier "in this first approximation" with ellipses. As we will see, Knight immediately and sharply modifies this first approximation.

perfectly alike, yet nothing is truly unique, does not justify L-S's repudiation of the constructs.[c] Rather I see the 'scalability' or degrees of uncertainty as a 'feature, not a bug,' in the current argot. I had used the degrees in my book on entrepreneurship (Bhidé 2000) and several subsequent publications to explain the differences in ventures undertaken by self-financed entrepreneurs and large professionally managed organizations. (I reprise these arguments in the next paper in this series.)

I find L-S's claims about what Knight really meant by uncertainty especially problematic. As mentioned, L-S rely on Knight's purpose (explaining profits as the reward for bearing uncertainty) to infer his 'intended' meaning of uncertainty as "situations in which insurance markets collapse because of moral hazard or adverse selection." Stigler's (1971) introduction to Knight's book provides the basis of an easy challenge. Stigler sees uninsurability as an "extreme caricature" of Knight's thesis. Modern analysis rejects "a distinction between risks (capable of actuarial treatment) and uncertainty (stochastic events not capable of such treatment)," Stigler writes. "Yet, Knight's famous result is not affected: pure profit is the difference between payments to all hired factors (including those belonging to the entrepreneur) and the realized product; and this profit, which of course may be negative or positive, arises only when there is uncertainty in the outcome of the productive process. When and to the extent that events are predictable individually or en masse, they give rise only to wages or rents (including risk premia)."

Applying Stigler's 1971 interpretation of Knight's main result against L-S's claim, we can simply say that even if some contracting mechanism to neutralize moral hazard could prevent the "collapse" of insurance markets, profits would still require individual or en masse unpredictability of outcomes. And to the extent that insurance claims were, en masse, unpredictable, the residual proceeds, would under Knight's definition comprise profits or losses (accruing to insurers rather than stockholders). Moral hazard then merely affects how the 'insurance principle' is used to distribute responsibility for subjective uncertainty rather than the source or a synonym for such uncertainty.[d]

In his later correspondence with L-S, Stigler also called Knight's recognition of moral hazard "brief" and cautioned against charitable "overinterpretation of a text that was simply not completely thought through" (L-S 1987 402). In my harsher view below, L-S's selective inclusions and exclusions misrepresent rather than overinterpret Knight's treatment of uncertainty.

An earlier footnote points to a pivotal instance: by excluding the crucial "in this first approximation" L-S exaggerate the role of asymmetric information in Knight's thesis. In Knight's first approximation, "lemons problems" induce an atomistic organization of entrepreneurship because no one trusts the quality of anyone else's judgment. But L-S do not tell us that Knight proceeds to examine what happens when people can assess other's capacities for entrepreneurial judgements. When people have knowledge or opinions of each other's capacities, Knight writes "entrepreneurship is no longer a simple and sharply isolated function. This is, of course, the state of affairs in real life … which merits most careful consideration."

Judgments of each other's capacities, Knight also asserts are "one of the most important factors in our efforts to live together intelligently in organized society." They sustain for example hierarchies in which

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[c] The paradoxical, practically inconsequential duality of likeness and uniqueness will be familiar to philosophers who debate David Hume's apparently contradictory views about whether believing that the sun will always rise from the east is "reasonable" or reflects animal instinct and convention.

[d] Knight himself wrote that trust among business associates "eliminate[s] or reduce[s] the moral hazard and make[s] possible the application of the insurance principle of consolidation to groups of ventures too broad in scope to be 'swung' by a single enterpriser." L-S assert this application "substitute[s] confidants for insurance," implying an insurance market collapse. But mutual insurance dates back millennia; and in my view reflects the widespread "embeddedness' of all kinds of transactions in social relationships (Granovetter 1985) and the highly circumscribed scope of anonymous markets (Bhidé 2021), whereas for L&S, markets are perforce anonymous and arm's length.

subordinates exercise judgments in matters which their bosses have judged their subordinates to have good judgment (but where the superiors' own capacities may be limited).

A brief discussion of mutual insurance against entrepreneurial misjudgments aside, Knight pays relatively little attention to moral hazard or information asymmetries in any of this. For example, Knight says people often form judgments of other people's abilities by watching their "performance over a period of time" (or sometimes from "mere personal appearance") without mentioning anything like "incentives to reveal their type" that are now a staple of principal-agent theories.

Knight's discussion of ways of reducing uncertainty similarly focuses on epistemic problems, not on moral hazards. "Securing better knowledge of and control over the future" Knight writes, provide "the most thoroughgoing methods of dealing with uncertainty." These include "the provision of information on business conditions" by government and specialized private agencies; "experts and consultants in nearly every department of industrial life;" advertising that both informs and persuades consumers; and "scientific research" to "increase our knowledge of the future." Again, no mention of solutions to incentive or information asymmetry problems.

Prospective Implications. L-S's 1987 deconstruction did not produce the prolonged prior neglect of Knightian uncertainty – and likely did not prevent its subsequent use. My rebuttal which then might then might also appear practically pointless does have prospective implications, however. It highlights the wide gulf between the preoccupations of many modern economists with incentive problems and Knight's epistemic concerns.[e] The incentive preoccupations (that L-S apparently reflect and play to) may have suppressed developments on the epistemic side; but that neglect also provides much scope for new research – if the barrier of framing everything possible as an incentive problem can be overcome.

2. Keynes's Radical Uncertainty

Convention often brackets John Maynard Keynes's and Knight's specifications of uncertainty. However, Keynes's examples and applications in *The General Theory of Employment, Interest and Money*, evoke a more radical construct.[4] And, like the incentive frame, the preeminence of Keynes's presentation potentially hinders the development of down-to-earth uses of Knightian uncertainty.

Adjacent but different. Bernstein's *Against the Gods* provides a useful starting point for seeing the similarities and differences. The book's introduction says it will tell a story "marked all the way through by a persistent tension between those who assert that the best decisions are based on quantification and numbers, determined by the patterns of the past, and those who base their decisions on more subjective degrees of belief." Yet, only after twelve chapters on "quantification and numbers" does Bernstein's history introduce Knight and Keynes as the first to seriously question whether "patterns of the past always reveal the path to the future."

Both Knight and Keynes, Bernstein observes, "distrusted classical theories based on the laws of mathematical probability or assumptions of certainty as guides to decision-making." Just as Knight's 1921 book portrayed decision makers contemplating the reliability of their opinions, Keynes's *Treatise on Probability*, coincidentally also published in 1921, construed probabilities as degrees of belief in opinions about what might happen. However, Keynes a "superb essayist" – and fanatic for clear expression -- then "carried the distinction between risk and uncertainty much further" than Knight.[f]

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[e] In Edmund Phelps's interpretation (personal conversations) two 'Austrian' icons, von Mises and Hayek had similarly divergent mindsets: von Mises focusing on incentive problems and Hayek on information and ignorance.

[f] L-S describe the progression as a "qualification" of Keynes's earlier views about subjective probabilities.

Keynes's 1936 *General Theory* and its explications emphasize extreme manifestations of uncertainty as the following paragraph, cited by Kay and King (2020) exemplifies:

> "By 'uncertain' knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not subject, in this sense, to uncertainty; nor is the prospect of a Victory bond being drawn. Or, again, the expectation of life is only slightly uncertain. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence, or the obsolescence of a new invention, or the position of private wealth-owners in the social system in 1970. About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know.[5]"

Knight in contrast, includes uncertainty in the "fundamental facts of life," "as ineradicable from business decisions as from those in any other field." His more mundane examples include the "typical business decision" of "a manufacturer… considering the advisability of making a large commitment in increasing the capacity of his works." Ignorance is not as extreme (or consequences as grand) as the prospects of the expropriation of private wealth after thirty years, as in Keynes's example. As mentioned, prior outcomes can provide a starting point for the subjective judgments although consideration of the specific circumstance often have greater sway. Conversely, factory expansions and other routine, yet idiosyncratic choices demand estimates and choices. A "do not know" shrug of the shoulders impelled by total ignorance lies outside the boundaries of Knightian uncertainty.[g]

Keynes also used his more radical uncertainty to stalk bigger game. Published amid the Great Depression and in the aftermath of a stock market crash, the *General Theory* attacked prevailing theories of self-equilibrating economies and markets and provided a rationale for large-scale macroeconomic interventions.[6] Knight laid out more modest and conservative aims in his book's preface. On the 'technical' side, Knight offered a "a fuller and more careful examination of the rôle of the *entrepreneur*" and "of the forces which fix the remuneration of his special function." On the "practical" side Knight would answer the question of "what is reasonably to be expected of a method of [economic] organization" and to emphasize both the defects of free enterprise as well as "the fatuousness of over-sanguine expectations from mere changes in social machinery."

Prospective Implications. Its common conflation with Keynes's radical uncertainty poses a problem for practical uses of Knightian uncertainty: the mystical, intractable, and "macro" connotations of Keynes's construct discourage research that applies Knight's more routine kind of uncertainty. Emphasizing the distinctions would lower these barriers.

3. Behavioral Propositions

Knight predicted that despite "rash statements by over-ardent devotees of the new science of "behavior," it was preposterous to suppose that it [would] ever supersede psychology.[7] Nonetheless, we can find what we would now call "behavioral" ideas in Knight's century-old analysis, albeit reflecting different ends and means than now.

Inclusion of behavioral ideas. Knight takes Laplace's classic 1814 view that all unpredictability results from ignorance. Even with a fair coin, an omniscient being would accurately predict how every single toss would land. The very idea of probability requires epistemic limits or what Simon calls our "bounded rationality" – even with perfect deductive capacities we cannot know everything about everything. Knight goes beyond

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[g] Radical uncertainty makes a brief cameo in Knight's book as "occurrences so revolutionary and unexpected by any one as hardly to be brought under the category of … judgment at all."

simple ignorance however, asserting that much of our economic behavior is actually "impulsive and capricious." Only a "small fraction of the activities of civilized man" according to Knight, seek to gratify "needs or desires having any foundation beyond the mere fact that an impulse exists at the moment in the mind of the subject." We even choose longer term objectives, such as getting an education, acquiring a skill or making money, continues Knight, "more or less at random" with "the social situation furnish[ing] much of the driving power."

Uncertainty, according to Knight, amplifies quirks (such as loss-aversion, overconfidence, and availability biases) that have now become a staple of behavioral research. Uncertainty produces, he writes "well-recognized deviations from the conduct which sound logic would dictate. Thus it is a familiar fact, well discussed by Adam Smith, that men will readily risk a small amount in the hope of winning a large when the adverse probability (known or estimated) against winning is much in excess of the ratio of the two amounts, while they commonly will refuse to incur a small chance of losing a larger amount for a virtual certainty of winning a smaller... To this bias must be added an inveterate belief on the part of the typical individual in his own "luck" … [and] the almost universal prevalence of superstitions. Any coincidence that strikes attention is likely to be elevated into a law of nature." Moreover, such reactions to uncertainty are "apt to be erratic and extremely various from one individual to another."[h]

Differences in ends and means. Why and how Knight invokes the complexities of actual human behavior is however very different from the approach adopted by modern behavioral researchers. The leading researchers apparently attack the axioms of traditional decision theory to advance a more realistic yet also equally axiomatic theory. Most notably, Daniel Kahneman and Amos Tversky's prospect theory predicts general tendencies arising from a few assumptions. In the terminology of Enlightenment and pragmatic philosophers, prospect theory is also thus 'rationalist' not 'empiricist.'

Knight in contrast does not "placard the unrealities of the postulates of theoretical economics… for the purpose of discrediting the doctrine." Rather, he also catalogs traits that contradict the assumptions of economic theories for (*inter alia*) the 'practical" reasons laid out in his preface. On the one side, Knight defends "pure theory" as an important first step "toward a practical understanding of the social system" and criticizes the "strong aversion" of a "large proportion of "scholars" to all thinking in general terms." Just as perpetual motion schemes do not "discredit theoretical mechanics, which is built upon the assumption of perpetual [frictionless] motion," Knight suggests, we should not blame the abstractions of theories for their disregard in practical designs.

On the other side, Knight chastises theorists who don't clarify the limitations of theoretical results and make "the corrections necessary to make them fit concrete facts. Policies must fail, and fail disastrously, which are based on perpetual motion reasoning *without the recognition that it is such*." (Italics in the original). Moreover, Knight sees more need to clarify the limitations of economic theory than in the natural sciences: "in spite of the greater contrast between theory and practice in the study of the mechanics of competition, as compared with the mechanics of matter and motion, the contrast is less familiar and more easily overlooked."

Thus, while Knight favors the aspiration of theoretical economics to become an exact science like physics, he acknowledges that it is a "human science" focusing on "conduct" consciously adapted to ends.

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[h] This variability presumably also increases the problem of trusting the quality other people's judgements, that as mentioned earlier Knight sees as a crucial important problem (and which I focus on in the next paper). The behavioral quirks are not strictly necessary to trust problem or to the hypotheses I will advance. Both can rest on the incompleteness of information (Simon's bounded rationality) about others' capacity for judgment. Knight himself assumed a "a tendency toward rationality even in men's whims and impulses. And if for no other reason than the impossibility of intelligently dealing with conduct on any other hypothesis, we seem justified in limiting our discussion to rational grounds of action."

But, because economic activities are often not "rational or planned," this imposes "notable restrictions" on theoretical economics that should be recognized in the practical domain.

But how? To secure the best of both worlds – a general, yet practically dependable theory – Knight recommends the "method of successive approximations:" Start with axiomatic theory but constantly check the conclusions deduced against observations and revise accordingly. Knight applies this "middle way" of following simplified abstraction with extensive qualification for his own theorizing. The "complicated" argument in the chapter, 'Enterprise and Profit' starts with the simple case, as mentioned, of people knowing nothing about each other's capacities before analyzing numerous more realistic possibilities.

Vincenti (1990) and other historians of technology have recorded extensive use of similar approaches in engineering: designers often start with general physical laws or concepts which they then adapt (typically with the help of more ad-hoc knowhow) to specific product requirements. A similar spirit animates William James's recommended combination of abstract 'rationalism' and concrete 'empiricism' and to his fellow pragmatist's, Charles Sanders Pierce's abductive "inference to the best explanation." [8] (Lipshaw's (2010) legal analysis suggests abduction includes contextual judgment and educated guesswork.)

Tradeoffs. Successive approximations and other such methods however sacrifice generality (the hallmark of a good theory) for fit with circumstance of time and place. Making designs and explanations more "specific" makes them less "scientific," as Hayek might have put it. Less rationalism and generality also produce more complexity and expositional difficulties. The laws of thermodynamics are far simpler than the blueprints for a steam engine. Similarly, an inductively or deductively produced model is easier to communicate than an abductive explanation.

Knight himself criticizes his fellow-economist Marshall's "cautious, almost anti-theoretical attitude" and insistence on "sticking as closely as possible to concrete reality." Marshall's "gain in concreteness and realism" opines Knight is "much more than offset by the obscurity, vagueness, and unsystematic character of the discussion, the inevitable consequence of burying fundamentals in an overwhelming mass of qualification and detail." Apparently, Marshall goes too far in the direction Knight recommends. Yet Knight's own "successive approximations" towards reality also do not seem offer much greater clarity, and may be responsible for the "extended Austrian-style disquisitions on the foundations of human knowledge and conduct" critiqued by L-S.

Prospective Implications. Present day economists of a variety of stripes I have argued (Bhidé 2020, 2021b) have a 'scientific' preference for parsimonious general propositions over complex 'technological' prescriptions optimized for particular times and places. The methodology now favored by most disciplinary economists follows Friedman's (1953) argument that an "important" hypothesis "'explains' much" by abstracting "crucial elements from the mass of detailed and complex circumstances." 'Empiricism' has also acquired a new complementary meaning, of testing the predictions of parsimonious theories (as Friedman had also advocated). Modifying theories to fit the facts --- instead of rejecting a hypothesis tested --- is often considered illegitimate "data mining."

These norms are enforced both by behavioral and by more traditional economic communities. Like the power of incentive-focused frames, they also offer opportunities. Scientific methods alone cannot offer solutions to many important social problems, especially in domains with high Knightian uncertainty. Kay and King (2020) suggest, hitherto unused abductive methods may open paths to progress on these fronts. Yet norms favoring scientific rather than technological methods pose formidable barriers. Abductive explanations for example carry the taint of 'just-so storytelling' and are apt to produce summary rejections from journal editors as I have personally found.

Concluding Comments

Knight's uncertainty-profit nexus – what Stigler (1971) called his "famous result" -- has become a musty relic. Knight himself did not seem to have actively promoted it after publishing it in his book. Instead, theories of monopolistic and oligopolistic competition became the dominant modes for analyzing profit. These alternatives date back, according to Ghemawat's (2002) historical account, to Antoine Cournot's "definitive analysis" published in 1838. Theories attributing the profitability of oligopolistic industries to "structural" factors blossomed after the 1930s through the work of Edward Mason and then Joe Bain[9] and Michael Porter repurposed these ideas into the strategy curricula of business schools.

The sidelining of Knight's profitability thesis cannot be blamed on economists' norms of focusing on incentive problems and favoring general, parsimonious propositions. Structural alternatives took off well before the theories (notably of Akerlof, Spence, and Stiglitz) that made incentives preeminent had been published and become mainstream. And Knight's proposition was highly general and parsimonious. However, two problems likely made it unacceptable for further scientific economic research compared to the alternatives.

First, Knight's thesis was definitional (or purely "analytical" in Kantian terms) and therefore failed the test of falsifiability. In fact, defined as net of unobservable imputable costs, true profit (as opposed to that reported in accounting statements or tax filings) is not even objectively measurable. Mason's and Bain's structural alternatives offered considerable scope for statistical testing and later strategic models have at least been conceptually contested. Second, Knight's proposition also could not provide a basis for a Kuhnian paradigm that could be extended and "elaborated" through "normal science." Structural profit theory in contrast provided the nucleus for a new Industrial Organization sub-field that produced several hundred statistical studies by the mid-1970s.[10] The subfield provided more research opportunities starting in the late 1970s through the application of game theory.[11] These two problems remain insuperable obstacles to any attempts to use the uncertainty profit link in systematic economic research, although the nexus suggests an important "necessary condition" to guide researchers using other theories (orthogonal to Knight's definitional proposition).

The construct of uncertainty itself and its role in shaping economic conduct and structures however has great promise. Knight had started down this path in his 1921 book but without much clarity or any closure. We can see this either as an indication of the hopelessness of the enterprise – or as an opportunity providing an abundance of research puzzles.

Concluding his introduction to Knight's book Stigler (1971) wrote that he found it:

> …intensely interesting for a reason somewhat removed from the theory of profit: It explains as no other work does the crucial importance of uncertainty, and its inevitable consequence, ignorance, in transforming an economic system from a beehive into a conscious social process with error, conflict, innovation, and endless spans and varieties of change. The full yield of this vision has hardly begun to be reaped by modern economics.

Fifty years later the full yield remains remote. But, as I will suggest through specific examples in the next two parts, it could be brought closer.

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Endnotes

[1] Friedman (1976) p. 282, cited in Leroy and Singell (1987) p. 395

[2] James, W. (1929). *The varieties of religious experience: A study in human nature.* Modern Library. Lecture XVIII

[3] In fact, L&S invert Knight's claim about the profit producing role of subjective and objective factors: the existence of moral hazard and lemon problems that make entrepreneurial activity uninsurable are also (in L&S's reading of Knight's argument) publicly and cheaply verifiable and therefore objective conditions.

[4] As with Knightian uncertainty, 'what Keynes' really meant' has been disputed. See for example Brady, Michael Emmett, Keynes Presented No Concept of 'Radical Uncertainty' in the General Theory or in Any Other Published Work in His Lifetime : '…Even Though It Be on Precarious Evidence…' Does not Translate as No Evidence (Radical Uncertainty) (June 3, 2018). Available at SSRN: https://ssrn.com/abstract=3189623 or http://dx.doi.org/10.2139/ssrn.3189623

[5] From an article written by Keynes (1937) pp. 213–14 summarizing the argument of his *General Theory.*

[6] Later "neo-Keynesians" have questioned the need to invoke radical uncertainty to justify the macro-economic interventions, although according to Keynes's biographer Robert Skidelsky (2009), it is crucial to Keynes's overall thesis.

[7] Knight had also predicted that "mathematical economics…seems likely to remain little more than a cult (Knight 1921 p. 14)."

[8] See Brewer's (1996) detailed historical discussion of abductive reasoning cited by Lipshaw 2010

[9] Ghemawat (2002) p. 52-53

[10] Ghemawat (2002) p. 53

[11] By the end of the 1980s according to Ghemawat (2002 p. 66) "competition to invest in tangible and intangible assets, strategic control of information, horizontal mergers, network competition and product standardization, contracting, and numerous other settings in which interactive effects were apt to be important had all been modeled using game theory."