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Technical Research Note: Uncertainty vs. Unpredictability

The distinction between uncertainty and unpredictability represents one of the most fundamental yet often confusing concepts in investing. While both phenomena challenge traditional financial modeling and forecasting, they operate through different mechanisms and require distinct analytical approaches. Understanding these differences is crucial for portfolio managers navigating complex market environments, particularly when allocating capital across emerging markets and sectors undergoing structural transitions (for example, energy and materials markets). Uncertainty primarily concerns the inability to assign probabilities to known potential outcomes. In contrast, unpredictability relates to the fundamental impossibility of forecasting specific events or timing.

Theoretical Foundations: The Knight-Keynes Framework

The conceptual foundation for distinguishing between uncertainty and risk dates back to the seminal works of Frank Knight and John Maynard Keynes in 1921. Knight's framework establishes that uncertainty is radically distinct from most day-to-day notions of risk. This distinction proves particularly relevant for investment analysis because it fundamentally alters how portfolio managers should approach decision-making under different conditions.

Risk, according to Knight's definition, represents situations where measurement opportunities exist, allowing investors to assign probabilities to various outcomes thoughtfully. For example, when analyzing the probability of default for corporate bonds, historical data and credit metrics enable reasonably precise assessments of the probability. Insurance company underwriting exemplifies this approach by using actuarial data to estimate the likelihood of specific events. These quantifiable risks can be managed through diversification, hedging strategies, and position sizing based on expected value calculations.

Knightian uncertainty, by contrast, exists when people cannot assign probabilities to outcomes. Investors might recognize that various scenarios could unfold, but lack sufficient information to estimate their respective likelihoods. This represents "unknown unknowns" rather than "known unknowns".

Uncertainty in Investment Contexts

Investment uncertainty manifests across multiple dimensions that directly impact portfolio decision-making. Economic uncertainty, defined as situations where the economic environment is challenging to predict and involves a high degree of unknowns, creates specific challenges for asset allocation and risk management. This uncertainty can stem from various sources, including political instability, policy changes, natural disasters, and market fluctuations.

Political uncertainty represents a particularly relevant example for investors at the moment. When governments announce potential changes to tax policies, trade policies, regulatory frameworks, or monetary policy directions, they create environments in which traditional financial models may provide limited guidance. The challenge lies not merely in the range of possible outcomes but in the fundamental inability to assign meaningful probabilities to different policy scenarios, especially when dealing with political systems that lack extensive historical precedent or stable institutional frameworks.

Market volatility provides another lens for understanding uncertainty in investment contexts. The VIX index, which measures implied volatility in S&P 500 options, serves as a practical measure of market uncertainty. During periods of heightened uncertainty, such as the early stages of the COVID-19 pandemic, VIX levels spike as investors demand higher premiums for taking on exposure to unknown outcomes. This relationship between uncertainty and volatility demonstrates how market participants translate their inability to assign probabilities into higher required returns for risky assets.

Unpredictability in Financial Markets

Unpredictability in financial markets operates through different mechanisms than uncertainty, though the two concepts often overlap in practice. Academic research identifies three distinct types of unpredictability: intrinsic stochastic variation, instance unpredictability, and extrinsic unpredictability.¹ Each type presents different challenges for investment analysis and portfolio management.

For example, the inherent randomness in market prices, even when underlying probability distributions remain stable, is a type of unpredictability that implies even perfect information about market fundamentals cannot eliminate all variability in asset returns. For practical investment purposes, this suggests that some degree of return volatility cannot be reduced through better analysis or more sophisticated models.

Instance unpredictability relates to what Nassim Taleb characterizes as "Black Swan" events—highly impactful but rare occurrences that, while theoretically possible, remain impossible to predict precisely. Financial markets exhibit numerous examples of such events, from market crashes to unexpected policy announcements that trigger significant price movements.

The Sandpile Model of Market Dynamics

Complex systems theory provides additional insight into market unpredictability through models like the sandpile game. In this model, markets naturally organize themselves into critical states where a single grain in the wrong place could trigger a cascade of any size at any time. While each additional piece of information or market participant increases the probability of significant price movements, it remains impossible to predict the trigger for a cascade.

This framework suggests that market unpredictability arises partly from the inherent nature of complex adaptive systems, rather than simply from incomplete information. Even with perfect knowledge of current market conditions, the interconnected nature of financial markets creates situations where small perturbations can trigger large, unpredictable price movements. For portfolio managers, this implies that traditional academic risk management approaches based on historical volatility and correlation patterns may provide false confidence during periods of market stress.

The distinction between predictable patterns and unpredictable timing becomes particularly relevant for tactical asset allocation decisions. While long-term relationships between valuation metrics and future returns often prove robust, the timing of when these relationships reassert themselves remains largely unpredictable. For example, research demonstrates that book-to-market ratios contain significant information about future expected returns; however, this predictability operates over extended time horizons rather than providing reliable timing signals for short-term trading strategies.

¹ <https://www.nuff.ox.ac.uk/economics/papers/2013/UnPredDFHGEM12.pdf>

Practical Differences for Investment Decision-Making

The distinction between uncertainty and unpredictability has direct implications for portfolio construction and risk management practices. Under conditions of uncertainty, where potential outcomes can be identified but not assigned reliable probabilities, investors face what decision theorists call "ambiguity aversion", a preference for situations that appear less ambiguous. This psychological bias typically leads to under-diversification and excessive concentration in familiar assets, even when broader diversification might offer superior risk-adjusted returns.

Options markets provide a practical tool for distinguishing between uncertainty and unpredictability in investment strategies. When facing heightened uncertainty, "there are often two very different and highly distinct scenarios or potential outcomes competing with each other in the minds of market participants".² Markets will price securities based on "the capital-weighted average of the probabilities of each potential outcome". However, when uncertainty resolves in favor of one scenario, prices may move abruptly to reflect the new reality, creating event risk.

This dynamic suggests that options strategies may be more appropriate than directional positions when dealing with uncertainty, as options provide asymmetric payoff profiles that can benefit from sharp price movements regardless of direction. By contrast, unpredictability - particularly the instance unpredictability associated with fat-tailed return distributions - may be better addressed through position sizing and diversification strategies that account for the possibility of extreme outcomes.

Estimation Risk and Model Uncertainty

Academic research on "estimation risk" offers an additional framework for understanding how uncertainty influences investment decisions. Even when underlying economic relationships remain stable, investors face uncertainty about the parameters of these relationships due to the limited availability of historical data. For portfolio managers, this research suggests that apparent mispricings may sometimes reflect justified skepticism about model parameters rather than genuine arbitrage opportunities.

This is particularly relevant when investing in emerging markets or in situations where historical data is limited. The appropriate response involves building portfolios that remain robust across a range of possible parameter values, rather than optimizing for point estimates that may prove to be precisely incorrect.

The challenge becomes more complex when dealing with structural breaks or regime changes, which represent a form of extrinsic unpredictability. When fundamental economic relationships change unexpectedly, both uncertainty about new parameter values and unpredictability about transition timing can simultaneously affect investment decisions. Climate change provides an example where investors face uncertainty about the pace and magnitude of physical and transition risks, combined with unpredictability about when specific tipping points or policy changes might occur. The current state of global trade provides another example: investors face uncertainty about the pace and magnitude of the impact of policy decisions on economies. They must also deal with the unpredictability of Donald Trump.

Portfolio Management Implications

The practical implications of distinguishing uncertainty from unpredictability extend beyond academic theory to concrete portfolio management decisions. Different approaches to diversification, position sizing, and risk

² <https://www.cmegroup.com/openmarkets/openmarkets-the-economists/2022/The-Difference-Between-Risk-Uncertainty-in-Finance.html>

management become appropriate depending on whether the primary challenge involves uncertainty or unpredictability.

When dealing with uncertainty, portfolio construction should emphasize strategies that remain robust across multiple scenarios rather than optimizing for specific expected outcomes. This might involve greater geographic diversification to reduce exposure to region-specific political uncertainties or sector allocation strategies that balance exposure to different transition scenarios in energy markets. The goal is to avoid excessive dependence on specific probabilistic forecasts when the underlying probability distributions remain fundamentally unknowable.

Unpredictability, particularly the instance unpredictability associated with fat-tailed distributions, calls for different approaches. Position sizing becomes crucial, as does maintaining sufficient liquidity to capitalize on opportunities that arise during market dislocations. A barbell strategy that combines extremely safe positions with small allocations to high-risk, high-reward opportunities is an example of this type of strategy. This approach acknowledges that while extreme events remain unpredictable in timing and magnitude, their eventual occurrence is virtually inevitable over extended investment horizons.

Dynamic Adjustment and Learning

The temporal dimension of uncertainty and unpredictability also affects portfolio management practices. Uncertainty often resolves gradually as new information becomes available, allowing for dynamic adjustment of portfolio positions as probability assessments become more refined. Our recent valuation of tin miner Alphamin is a perfect example. At the time of writing, political uncertainty in the DRC necessitated the inclusion of downside scenarios that have since been overtaken by events, and thus dropped from our probability-weighted valuation. Path dependency has narrowed the spread of possible futures, and therefore, the valuation range has narrowed. As the valuation range has narrowed, the risk-adjusted return potential has increased, allowing for increased exposure with higher conviction.

Unpredictability, by contrast, may not resolve in ways that provide clear learning opportunities. The occurrence of a "Black Swan" event rarely provides guidance on when the next such event might occur, as these phenomena are often characterized by their uniqueness rather than their membership in predictable patterns. This suggests that portfolio management approaches should emphasize maintaining consistent exposure to unpredictable risks rather than attempting to time their occurrence. This is something that investors expecting to time commodity cycles should consider.

Recent advances in behavioral finance research indicate that investor responses to uncertainty versus unpredictability may differ systematically. While uncertainty often leads to increased information gathering and delayed decision-making, unpredictability may trigger more extreme behavioral responses, including panic selling or excessive risk-taking. Understanding these behavioral patterns is crucial for portfolio managers, as it enables them to anticipate market dynamics and manage their decision-making processes effectively under stress.

Conclusion

The distinction between uncertainty and unpredictability in investment analysis proves both theoretically important and practically relevant for portfolio management decisions. Uncertainty, characterized by the inability to assign reliable probabilities to known potential outcomes, necessitates robust portfolio construction that minimizes excessive dependence on specific scenario forecasts. Unpredictability, characterized by the fundamental impossibility of timing or forecasting certain events, necessitates approaches that strike a balance between maintaining appropriate exposure to tail risks and preserving capital for opportunities that arise during market dislocations.

For portfolio managers operating across diverse markets and sectors, particularly those focused on emerging markets and real assets, understanding these distinctions becomes crucial for developing effective risk management frameworks. While traditional financial theory often treats these concepts as equivalent, the evidence suggests they require different analytical approaches and investment strategies. The ongoing evolution of global markets, driven by technological change, climate transition, and geopolitical shifts, is likely to increase the relative importance of both uncertainty and unpredictability in investment decision-making, making this conceptual framework increasingly relevant for practical portfolio management.

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