# Quantum Propensity Modeling of Economic Decision-Making:

## Capturing Preference Reversals and Contextual Interference

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***Abstract*—Classical economic decision-making models rely on assumptions of stable preferences, logical consistency, and additive probabilities. Yet decades of behavioral research consistently reveal systematic violations of these principles, including preference reversals, framing effects, and context-sensitive judgment patterns that challenge rational-choice theory. This study examines how quantum propensity modeling—grounded in mathematical structures derived from quantum theory—offers a compelling alternative for understanding these anomalies. Unlike classical models, quantum cognition treats decisions as evolving cognitive states represented in superposition, allowing individuals to hold simultaneous, uncertain predispositions before committing to a choice. Contextual interference, probability amplitude effects, and state-dependent transitions enable these models to accurately describe how information order, framing, and emotional cues distort decision trajectories. Through qualitative analysis of case studies from behavioral economics, cognitive psychology, and decision theory, this research highlights how quantum models capture the non-commutativity of choices, the instability of preferences under uncertainty, and the mechanisms behind cognitive interference patterns. The findings suggest that quantum propensity modeling not only explains well-documented behavioral anomalies more coherently than classical frameworks but also provides a theoretical foundation for applications in market forecasting, algorithmic pricing, consumer behavior analysis, and policy design. Ultimately, the study argues that quantum-inspired decision models represent a transformative step toward more realistic, context-aware interpretations of economic behavior.**

Economic decision-making has traditionally been modeled through the lens of classical rationality, where individuals are assumed to possess stable preferences, evaluate choices consistently, and update beliefs according to fixed probabilistic rules [6]. Expected utility theory, Bayesian inference, and the axioms of rational choice form the foundation of modern economic analysis. However, real-world behavior frequently diverges from these idealized frameworks. People reverse their preferences when options are presented differently, choose inconsistently across equivalent scenarios, and exhibit sensitivity to subtle contextual cues [8]. Such persistent deviations reveal that human judgment cannot be fully captured by models that treat preferences as static and probabilities as context-independent.

The emergence of quantum cognition and quantum decision theory offers a promising paradigm shift [3]. These approaches do not claim that the brain is a quantum computer; rather, they adopt mathematical

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