

Accepted Manuscript

Probability interference in expected utility theory

G. Charles-Cadogan

PII: S0304-4068(18)30036-3

DOI: <https://doi.org/10.1016/j.jmateco.2018.03.006>

Reference: MATECO 2229

To appear in: *Journal of Mathematical Economics*



Please cite this article as: Charles-Cadogan G., Probability interference in expected utility theory. *Journal of Mathematical Economics* (2018), <https://doi.org/10.1016/j.jmateco.2018.03.006>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Probability Interference in Expected Utility Theory*

G. Charles-Cadogan[†]

Working paper
Comments welcome

March 10, 2018

Abstract

Allais (1952) was one of the first to propose an outcome dependent probability weighting function to characterize probability distortions that explain violations of the linear probability model for expected utility theory (EUT). Quantum probability theory (QPT) extends the probability distortion paradigm with state dependent preferences, and non-Kolmogorov quantum probability measures, over a complex valued Hilbert space. Key innovations in QPT include representing vectors in Hilbert space as (mental) states, and a wave function comprised of a normalized linear combination of states. Born rule treats the real valued squared amplitude of the wave function as the associated probability often accompanied by a trigonometric probability interference factor addend. In this paper, we prove that the Born rule innovation of QPT which resolve, *inter alia*, violations of Savage's sure thing principle, conjunction and disjunction fallacies, preference reversal, etc, can also be obtained by replacing EUT's transitivity axiom with a weak harmonic transitivity (WHT) axiom in classic Kolmogorov probability space. The WHT axiom supports an abstract harmonic probability weighting function (HPWF) that mimics random fields driven by mental states, and it admits a harmonic addend akin to the trigonometric probability interference factor in QPT. By imposing suitable moment conditions on the underlying objective probability distribution, we derive a complex valued HPWF that satisfies Born rule. We calibrate the HPWF to a recent QPT probability measure derived from evaluation of state representation of binary choice, estimate it with harmonic regression, and show how heteroskedasticity correction has debiasing effects.

Keywords: transitivity axiom, harmonic analysis, abstract probability weighting function, quantum probability

JEL Classification: C02, D81

*This paper is based on Chapter 4 of the author's PhD dissertation. I thank Sure Mataramvura for his guidance and encouragement throughout that process, and Ganna Pogrebna for the idea of axiomatizing harmonic probability weighting functions. I thank the Editor, and three anonymous referees for their comments and suggestions which greatly improved the paper. I am grateful to Peter Wakker for his detailed comments on an early version of this paper circulated under "The Source Of Uncertainty In Probabilistic Preferences Over Gambles", and Glenn Harrison and Don Ross for suggesting generalization of the harmonic probability weighting function specification in that version. I thank participants at the Foundations for Utility and Risk (FUR) XVI Conference 2016, Models to Decisions (M2D) Conference 2017 at Exeter, and MathPsych/ICCM Conference 2017, Warwick for their comments on earlier versions of material in this paper. This paper also benefited from personal communication with Paul Slovic, Michael J. Stutzer and Jerome R. Busemeyer whose keen awareness of the literature helped to improve the presentation. Any errors that may remain are my own.

[†]Division of Finance, School of Business, University of Leicester, Leicester, LE1 7RH, United Kingdom; and Institute for Innovation and Technology Management (IITM), Ted Rogers School of Management, Ryerson University, 575 Bay, Toronto, ON M5G 2C5; Tel: +44 (0116) 229 7385; e-mail: : gcc13@le.ac.uk.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات