

NORTH CAROLINA STATE UNIVERSITY

**OPERATIONS RESEARCH PROGRAM
SEMINAR SERIES**

**October 30, 2023
4:30PM-5:45PM**

In-Person: 4290 Fitts-Woolard Hall

[Zoom](#) details – bottom of page

Andrew Papanicolaou

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Title

The Expected Impermanent Loss in Decentralized Liquidity Provision: Cross-Sectional Evidence from Cryptocurrency Options

Abstract

We propose a continuous-time stochastic model to analyze the dynamics of impermanent loss in liquidity pools in decentralized finance (DeFi) protocols. We replicate the impermanent loss using option portfolios for the individual tokens. We estimate the risk-neutral joint distribution of the tokens by minimizing the Hansen–Jagannathan bound, which we then use for valuation of options on relative prices and for calculation of implied correlations. In our analyses, we investigate the relationship between the impermanent loss, the implied quantities, and their risk premia in the cross-section of liquidity pools. We test our theory using options data from a major centralized derivative exchange.

Biography



Andrew Papanicolaou

Andrew Papanicolaou received the B.S. degree in mathematical sciences from the University of California, Santa Barbara, the M.S. degree in financial mathematics from the University of Southern California, and the Ph.D. degree in applied mathematics from Brown University. He is currently an Associate Professor with the Department of Mathematics, North Carolina State University. Before joining North Carolina State University, he was an Assistant Professor with the Department of Finance and Risk Engineering, New York University. His research interests include computational finance and stochastic systems for control and optimization, such as non-Markovian and high-dimensional optimizations. He works on problems in financial data analysis and the challenges associated with these highly complex data sets.

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