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# Analyzing volatility risk and risk premium in option contracts: A new theory☆

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ABSTRACT

We develop a new option pricing framework that tightly integrates with how institutional investors manage options positions. The framework starts with the near-term dynamics of the implied volatility surface and derives no-arbitrage constraints on its current shape. Within this framework, we show that just like option implied volatilities, realized and expected volatilities can also be constructed specific to, and different across, option contracts. Applying the new theory to the S&P 500 index time series and options data, we extract volatility risk and risk premium from the volatility surfaces, and find that the extracted risk premium significantly predicts future stock returns.



## 1. Introduction

The option pricing literature has made great advances during the past decade; yet large gaps remain between theory and practice. First, traditional option pricing models specify the underlying price and variance rate dynamics and derive their implications on option prices; however, institutional investors manage their volatility views and exchange their quotes not through option prices, but through the option implied volatility computed from the Black-Merton-Scholes (BMS) model. This common practice does not mean that investors agree with the assumptions made by Black and Scholes (1973) and Merton (1973); rather, they use the BMS model as a transformation to enhance quote stability and to highlight the information in the option contract. Second, traditional option pricing theory requires the full specification of the instantaneous

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