Abstract:

A State preference approach to Jump risk

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This thesis develops a theoretical framework to valuation of downside jump risk using a state preference approach initiated by Arrow (1964) and Debreu (1959). We first introduce a concept of a catastrophe bond and theoretically show the relationship between this bond’s price and the probability of downside jumps. We then construct downside jump risk predictors and investigate their economic implications. By incorporating the CBOE volatility index (VIX) and individual expected volatilities into the state preference approach, we develop out-of-sample predictors of downside jump risk of not only the market index but also individual securities. The thesis consists of three essays.

The first essay examines the predictive power of the S&P 500 downside jump risk’s predictors developed under the risk-neutral Black-Scholes’ (1973) framework.

Relaxing the assumption of a lognormal distribution of stock prices under the Black-Scholes’ framework, the second essay constructs the S&P 500 downside jump risk’s predictors using the risk-neutral Merton’s (1976) jump-diffusion framework.

Moving one step forward, the third essay applies the state preference approach to the estimation of the catastrophe bond’s price and value at risk at the individual security level. The framework for the state price estimation in this essay is chosen based on a comparative analysis between the first and second essays.

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