

A Unified Model: Arbitrage-free Term Structure Movements of Flow Risks*

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Abstract

This paper first dichotomizes risk drivers into “stock” or “flow” attributes. Stock risk drivers are prices of tradable securities and flow risk drivers are rates represented by the stochastic movements of a term structure of securities. This paper then shows that the Black Scholes model is the relative valuation model for the stock risk drivers while the proposed unified model is for the flow risk drivers.

The unified model can be described in the Ho-Lee model framework. We apply this model to five different flow risk drivers: interest rate, credit risk, liquidity risk, energy risk, and inflation risk. We then show that the unified model provides an analytical framework for securities that are subjected to several of these flow risk drivers, offering many applications.

For example, the 2008 financial crisis clearly shows the importance of the use of a unified model in enterprise risk management. The crisis demonstrates that risk management should not take a silo approach to manage each flow risk driver, such as interest rate risk and credit risk. We propose an integrated approach to manage risks using the unified model.

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