

# Faculty of Business Administration

## Distinguished Seminar Series 01/1011

### *Statistical Modeling*

# "Pricing Asian Weather Derivatives"

Distinguished Speaker  
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Time: 11:00 - 12:30

Venue: HG01, Ho Yin Convention Center, UM

#### **Abstract**

Weather derivatives (WD) are different from most financial derivatives because the underlying weather cannot be traded and therefore cannot be replicated by other financial instruments. The market price of risk (MPR) is an important parameter of the associated equivalent martingale measures used to price and hedge weather futures/options in the market. The majority of papers so far have priced non-tradable assets assuming zero MPR, but this assumption underestimates WD prices. We study the MPR structure as a time dependent object with concentration on emerging markets in Asia. We find that Asian Temperatures (Tokyo, Osaka, Beijing, Teipei) are normal in the sense that the driving stochastics are close to a Wiener Process. The regression residuals of the temperature show a clear seasonal variation and the volatility term structure of CAT temperature futures presents a modified Samuelson effect. In order to achieve normality in standardized residuals, the seasonal variation is calibrated with a combination of a fourier truncated series with a GARCH model and with a local linear regression. By calibrating model prices, we implied the MPR from Cumulative total of 24-hour average temperature futures (C24AT) for Japanese Cities, or by knowing the formal dependence of MPR on seasonal variation, we price derivatives for Kaohsiung, where weather derivative market does not exist. The findings support theoretical results of reverse relation between MPR and seasonal variation of temperature process.