INTERDAY AND INTRADAY MARKET RISK MODELING

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Abstract

Objective

The recent financial turmoil of 2007-2009 had vividly high-lightened the need to revise the current risk-management approaches. The paper focuses on market risk-management issues and aims at finding the rationale to setting trade limits of interday and intraday positions. Previous works of [Chang et al (1993)], [Andersen et al. (2000)], [Tang, Lui (2002)] dealt with the interday and intraday volatility patterns modeling of Japanese and Hong-Kong stock indexes disregarding its application to the trade limits policy of an investment firm.

Methodology

For the purpose of the study the following methodology is proposed. Denote $P^\text{CLOSE}_t$ as close price of an asset for time period $t$, $P^\text{OPEN}_t$ open price for the same period, $R_t$ - return for the period. Common practice is to calculate the return for period $t$ by taking the close price difference (cf. [Fantazzini (2009)]). Actually it comprises both intraday and interday risks as shown below.

$$P^\text{CLOSE}_t - P^\text{CLOSE}_{t-1} = \frac{(P^\text{CLOSE}_t - P^\text{OPEN}_t)}{\text{INTRADAY RISK}} + \frac{(P^\text{OPEN}_t - P^\text{CLOSE}_{t-1})}{\text{INTERDAY RISK}}$$

Then it is argued that the trade limit policy and consequently value-at-risk (VaR) calculation is to be based on the intraday and interday risk return distributions evaluated as follows.

$$R^\text{INTRADAY}_t = \frac{P^\text{CLOSE}_t - P^\text{OPEN}_t}{P^\text{OPEN}_t}$$

$$R^\text{INTERDAY}_t = \frac{P^\text{OPEN}_t - P^\text{CLOSE}_{t-1}}{P^\text{CLOSE}_t}$$

To model interday and intraday risk primarily marginal risk distributions are analysed, secondly their copula-based joint distribution analysis output is compared to the traditional approach of close price differences modeling.

Data

The research is based on daily data for six world indexes for the period of Jan. 2004-Mar. 2011.

VaR Value: Econometric Output

The research undertaken shows intraday risk to exceed the interday risk (excluding the Hang Seng case) implying the need to restrict intraday trading limits. Research extension includes solving portfolio optimization problem given the intraday and interday risk patterns modeling based on copulas.

References