

# ABSTRACT

The conventional Value at Risk (VaR) mainly concentrates on market risk. The lesson from the Long Term Capital Management (LTCM) highlights the importance of the liquidity risk. This study extends the standard VaR into two dimensions: (1) incorporating liquidity into VaR estimation and (2) in an intraday time horizon. Our rationale is that the Liquidity Adjusted Intraday VaR (L-VaR) is particularly relevant to traders who much concern about the intraday market movement that could not be simply represented by a single VaR figure generated from interday data. Hence, intraday risk measurement, L-VaR, rather than conventional VaR, enables day traders, brokers, or other active financial institutions to have a more adequate risk control for frequently day traded securities.

We apply the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model to characterize L-VaR in the Hong Kong financial market. Our result shows a U-shape intraday L-VaR, implying the liquidity cost and volatility are the lowest toward the middle of the day. However, higher volatility at the opening and closing is also associated with higher liquidity cost. Hence, traders should be aware the particular high risk at the opening and closing of a trading day and then incorporate the intraday effect of L-VaR into risk control. In particular, day traders, brokers and active financial institutions who need the intraday risk measurement can enhance the adequacy of risk control by incorporating liquidity into the design of risk control, such as position limit of trading desk or the design of margin setting to clients, especially for the frequently day traded securities.

Furthermore, given the importance of derivative securities nowadays, we conjecture that if liquidity is an important component in VaR for stocks, it will also assert significant impact of the derivatives counterpart. We therefore extend the study to highlight this importance by comparing the structure of the bid-ask spread of the Hong Kong options and stocks market. The result shows that the intraday behavior of bid-ask spread of stock options is double U-shape, generally similar to a single U-shape pattern in stock market even though both are under different market structures. It indicates that investors encounter the higher spread not only at the opening and closure of a trading day, but also before and after the afternoon break in the option market. We also provide explanation for wider spreads in option markets given different levels of moneyness and time to expiry.