



THE UNIVERSITY OF  
**CHICAGO**

Department of Statistics

MASTER'S THESIS PRESENTATION

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Nonparametric Method for Value at Risk Estimation of Long-Term  
Integrated Returns and Its Application

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#### ABSTRACT

After 2008 financial crisis, more and more portfolio managers used the long-term portfolios as their important hedge tools in order to reduce their financial risk. Quantile of return distribution or commonly called Value at Risk is a significant measurement in predicting portfolio risk. Due to this popular trend, this paper mainly focuses on the non-parametric method in quantile estimate that incorporates the rate with which the true quantile diverges as the integration horizon expands. The asymptotic normality of quantile estimates also made it possible for us to establish the confidence interval for the true quantile. In this paper, the theory behind the asymptotic normality was presented firstly. Then, the evaluation of non-parametric known mean and unknown mean method were performed through simulation of univariate and multivariate time series which were assumed to follow stochastic volatility models. Finally, as the application, the confidence intervals coverage rates were examined on US stock market Russell 2000, Dow Jones Indexes and NASDAQ composite Indexes.

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