



THE UNIVERSITY OF  
**CHICAGO**

DEPARTMENT OF STATISTICS

## Master's Thesis Presentation

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“On two-step estimation of extreme VaR: would incorporating realized measures and bias-adjusted extreme value index estimation boost accuracy?”

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### Abstract

The Value-at-Risk (VaR), introduced by JPMorgan in 1993, is a widely employed instrument to capital allocation and risk management. To account for the conditional heteroskedasticity observed in series of stock prices, GARCH-type filtering is commonly used to predict the mean and implicit volatility of these series; since the return is usually heavy-tailed, extreme value theory is popular in modeling the innovations. In this study, four different two-step forecast procedures of the one-step-ahead extreme VaR were compared, with either standard-GARCH or realized-GARCH combined with either normal innovations or extreme value index under the unbiased Gomes-de Hann (UGH) approach. In particular, the realized-GARCH-UGH is a novel model proposed and tested in this study. The results indicate that for stock indices, the UGH method is better than assuming normal innovations; the realized-GARCH-UGH has similar performance to standard-GARCH-UGH. However, the forecast using the realized-GARCH-UGH on Bitstamp, a cryptocurrency, has a severe over coverage. Risk managers can choose the filtering method based on backtesting results.