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MARGIN ADEQUACY AND EXTREME VALUE ANALYSIS IN JSE FINANCIAL FUTURES

Abstract:

This paper examines margin levels for futures contracts on the Johannesburg Stock Exchange (JSE). In Adrangi and Chatrath (1999), a margin is a good faith deposit protecting financial market participants from default. Margins are central to risk minimization and market stability. Margin setting entails balancing trading costs against the probability of default (Dewachter & Gielens, 1999). As far as we know, there has not been any paper on margin exceedances in financial futures on the JSE. Furthermore, it is believed this may be the first paper on financial futures margins on JSE applying extreme value theory approaches.

Cotter (2001) poses the question whether extreme movements on financial markets are inherently symmetrical across long and short positions? We motivate the paper based on potential asymmetry in tails of returns testing whether there is a difference in extreme positive and negative price movements. The null hypothesis states positive and negative returns have equal distributions. If normality exists, t-tests are appropriate, otherwise distribution-free tests are used. Two-sample distribution-free tests used include; Wilcoxon (W) test, Siegel-Tukey (ST), Kolmogorov-Smirnov (KS) test and Mann Whitney (MW) test. Further, we follow Peiró (2004) in choosing cut-off points in the two return tails, say -5% and +5%. We count the number of observations beyond the cut-off points in negative and positive extreme tails making comparisons ascertaining symmetry.

Extreme market movements are linked to market corrections, crashes, financial collapses and foreign currency crisis (Longin, 2000). The extreme value approach derives optimal margins using tails of returns distribution (Cotter, 2001). The generalized pareto distribution (GPD) and the generalized extreme value distribution (GEV) are key approaches used similar to Lehikoinen (2007) and Zhao, Scarrott, Oxley, and Reale (2011). Three methods are identified for dispersion, location and shape parameter estimation; non-linear least squares, maximum log likelihood, and the non-parametric Hill estimator. Margin violation probabilities are estimated given a range of margin levels. Exceedances at given margin levels are used to calculate the amount of time before margin violation occurs, for lower and upper tail distributions. Actual margin levels fixed by JSE are examined estimating corresponding violation probabilities. Implications of inadequate margins are spelt out taking into account margins are a cost limiting participation on futures markets.

Keywords:

Futures market; margin adequacy; extreme value theory; return asymmetry; margin violation probabilities

JEL Classification: C14, G00, G01