Optimizing Portfolio Liquidation Under Risk-Based Margin Requirements

Geng Deng, PhD, FRM* Tim Dulaney, PhD†
Craig McCann, PhD, CFA‡

Securities Litigation and Consulting Group, Inc.
3998 Fair Ridge Drive, Suite 250, Fairfax, VA 22033

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Abstract

This paper addresses a situation wherein a retail investor must liquidate positions in her portfolio – consisting of assets and European options on those assets – to meet a margin call and wishes to do so with the least disruption to her portfolio. We address the problem by first generalizing the usual risk-based haircuts methodology of determining the portfolio margin requirement given the current positions of a portfolio. We derive first and second-order analytic estimates for the margin requirements given the positions. Given this generalization, we determine the liquidation strategy that minimizes the total positions liquidated and meets the margin requirement. We implement the strategy on example portfolios and show advantages over traditional piece-wise liquidation approaches. The analytic approach outlined here is more general than the margin context discussed. Our approach is applicable whenever an investor is attempting to maximize the impact of their capital subject to leverage limits and so has obviously applications to the hedge fund industry.

*Director of Research, Office: (703) 539-6764, Email: mailto:GengDeng@slcg.com.
†Senior Financial Economist, Office: (703) 539-6777, Email: mailto:TimDulaney@slcg.com.
‡President, Office: (703) 539-6760, Email: mailto:CraigMcCann@slcg.com.