Implementing and testing the Maximum Drawdown at Risk

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A R T I C L E   I N F O

A B S T R A C T

Financial managers are mainly concerned about long lasting accumulated large losses which may lead to massive money withdrawals. To assess this risk feeling we compute the Maximum Drawdown, the largest price loss of an investment during some fixed time period. The Maximum Drawdown at Risk has become an important risk measure for commodity trading advisors, hedge funds managers, and regulators. In this study we propose an estimation methodology based on Monte Carlo simulations and empirically validate the procedure using international stock indices. We find that this tool provides more accurate market risk control and may be used to manage portfolio exposure, being useful to practitioners and financial analysts.

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1. Introduction

Financial managers are mainly concerned about large losses because they may destroy accumulated wealth leading to massive money withdrawals and risking the continuity of businesses. Financial crises such as the 2008 global one have shown how extensive these losses could be, with investment funds all over the world showing more than 50% losses and survivors taking several years to recover. Investors have now become more cautious, trying hard to avoid large negative portfolio changes.

Given a fixed time period, the *Maximum Drawdown* (MDD) may be defined as the largest percentage loss of an investment over this period. Following an extremely large fall (or a long sequence of small falls) in market prices, an investor (specially retirees) may decide to sell valuable positions irrespective of market conditions for fear of even larger losses. Tracking the drawdown helps controlling the risk and preserving the capital of an investment.

To manage risk several risk measures are available capturing various aspects of risk, the most popular one being the Value at Risk (VaR). The *Maximum Drawdown at Risk* (MDaR), defined as a percentile of the MDD distribution, has become an important and useful tool for hedge funds managers, commodity trading advisors, and regulators.

In the literature, one will find few but important related works. Cvitanić and Karatzas (1999) study the MDD as a risk measure. Chekhlov et al. (2000) define the Conditional Expected Drawdown (CDaR) as the mean of all drawdowns exceeding

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