Risk Management in the Australian Stockmarket using Artificial Neural Networks

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A dissertation submitted in total fulfilment of the requirements of the degree of Doctor of Philosophy for the School of Information Technology, Bond University.

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Statement of Original Authorship

This thesis is submitted to Bond University in fulfilment of the requirements of the degree of Doctor of Philosophy. This thesis represents my own original work towards this research degree and contains no material which has been previously submitted for a degree or diploma at this University or any other institution, except where due acknowledgement is made.

Bjoern Krollner

Date
Abstract

This thesis proposes an Artificial Neural Network (ANN) enhanced decision support system for financial risk management. The decision support system allows hedgers to maximise their expected return while practising the hedge against financial risks.

The importance of the research stems from the fact that it can be used to reduce the risk associated with adverse price movements in the stock market.

The literature review reveals that there are a large number of studies trying to forecast movements in the stock market, but there is a lack of literature trying to improve stock market risk management strategies with machine learning techniques.

This thesis addresses this gap by applying the existing body of literature in stock index forecasting with machine learning techniques to the domain of portfolio risk management. In particular, it analyses whether strategies used to predict movements in the stock index can also be used to derive hedging strategies and improve the overall risk-return trade off an investor faces.

A new market timing model based on ANNs is developed which forms the heart of the proposed decision support system. The system analyses stockmarket and futures data and makes a prediction about expected stock market conditions one month ahead. The proposed ANN based hedging strategy uses stock index futures to protect the portfolio against downturns in the share market.

Overall, this thesis concludes that the proposed model achieves a significant improvement in the risk-return tradeoff compared to the benchmark hedging strategies in the Australian stockmarket.
Additional Publications

The following is a list of publications by the candidate on matters relating to this thesis.

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This thesis is dedicated to my family for always being there for me.

To my mother Karin and my father Heinz-Dieter.

To my brother Dirk and his family.

Last but not least, to my wife Ximena.

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