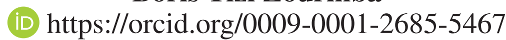
Chapter 12
Selection and Analysis of Optimized Portfolio Sectors of Johannesburg Stock Markets

Boris Tizi Zourmba

https://orcid.org/0009-0001-2685-5467
University of Ngaoundere, Cameroon

Jimbo Henri Claver
Samarkand International University of Technology, Uzbekistan

Nzotem Tchoumi Cyrille Audrey

https://orcid.org/0009-0007-1027-5728
University of Ngaoundere, Cameroon

Paul Tchoua
University of Ngaoundere, Cameroon

Georges Nguefack-Tsague

https://orcid.org/0000-0002-3847-3490
University of Yaounde 1, Cameroon

ABSTRACT

The study of financial markets can be performed by an aggregation of the study of principal sectors that make up the latter. In this paper a sectorial approach is proposed by building sectorial portfolios to give a global insight to investors on JSE (Johannesburg Stock Exchange). Four portfolios are built: maximum Sharpe ratio portfolio, maximum Sortino ratio, maximum Calmar ratio portfolio and maximum

DOI: 10.4018/979-8-3693-6215-0.ch012

Copyright © 2025, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.

CVaR ratio, for the eight chosen sectors on South Africa Stock Market. Portfolios are built on four different optimization frameworks. The data are taken on Yahoo Financial website from 1st March 2020 to 1st March 2024. The evaluation of portfolio performance is done based on their cumulative returns and their Ulcer index ratio over the training and test period for each sector. Based on the results obtained, the best portfolio is identified for each sector. The results provide useful insights for investors with the selection and allocation strategies based on the current profitability and risk associated with investment in the stocks of the chosen sectors of the JSE.

INTRODUCTION

A financial market can be defined as a large portfolio that contains all the assets available on the market in question. Then it can be interesting to study how portfolios behave to understand the market better and potentially identify the best investment opportunities. To capitalize on these opportunities, it is crucial to achieve the optimal balance between risk and return strategically. Markowitz associated risk with the variance in the value of a portfolio (Markowitz, 1952). To avoid risk, he derived optimized portfolios (Markowitz, 1959). His approach is appealing and intuitive but taking variance as a risk measure penalizes both upside and downside risk. However, investors are more interested in downside risk (Mao, 1970). Then, it is more appropriate to assess portfolio risk using downside risk measures. The downside risk is an estimation of a security's potential loss in value due to a decline in market conditions (Kumaran, 2013). For example, concerning downside risk measures, we have semi-variance, maximum drawdown, VaR, CVaR, etc (Jaaman et al., 2011, Markowitz et al., 2019). Several optimization frameworks can be derived from these downside risk measures (Sivnarain, 2017).

This study operates within four optimization frameworks: mean-variance, mean-semi variance, mean-maximum drawdown, and mean-CVaR. The portfolios are constructed by maximizing the Sortino, Sharpe, Calmar, and CVaR ratios. The historical stock data was scrapped from the Yahoo Finance website from ‘01-04-2020’ to ‘01-04-2024’. The data was divided into two periods; the first one from ‘01-04-2020’ to ’01-04-2023’ denotes the training period, and the second one from ’01-04-2023’ to ’01-04-2024’ denotes the test period. This choice is motivated by the stump articles used in our work (Sen & Dutta, 2022; Sen et *al.*, 2023). Furthermore, we believe that a 3-year training period is sufficient to capture trends and cycles in the evolution of market asset prices. The choice of 1-year test period could be motivated by the desire to observe the power of the model trained over a reasonable period of the same scale. The portfolio weights are computed and exhibited in graphical and tabular forms. The non-compounded cumulative returns and

42 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/selection-and-analysis-of-optimized-portfolio-sectors-of-johannesburg-stock-markets/362732

Related Content

The Future of Research Design: AI-Driven Tools and AR Solutions
Mustafa Kayyali (2026). *Revolutionizing Academic Research With AI and Augmented Reality (pp. 411-432).*
www.irma-international.org/chapter/the-future-of-research-design/386564

Convolutional Neural Networks for Detection of COVID-19 From Chest X-Rays
Karishma Damania, Pranav M. Pawarand Rahul Pramanik (2022). *International Journal of Ambient Computing and Intelligence (pp. 1-21).*
www.irma-international.org/article/convolutional-neural-networks-for-detection-of-covid-19-from-chest-x-rays/300793

Decoding Customer Opinion for Products or Brands Using Social Media Analytics: A Case Study on Indian Brand Patanjali
Madan Lal Yadav, Anurag Dugarand Kuldeep Baishya (2022). *International Journal of Intelligent Information Technologies (pp. 1-20).*
www.irma-international.org/article/decoding-customer-opinion-for-products-or-brands-using-social-media-analytics/296271

Socio-Technical SIEM (ST-SIEM): Towards Bridging the Gap in Security Incident Response
Bilal AlSabbaghand Stewart Kowalski (2021). *Research Anthology on Artificial Intelligence Applications in Security (pp. 189-203).*
www.irma-international.org/chapter/socio-technical-siem-st-siem/270598

The Virtual Twin: A Socialization Agent for Peer-to-Peer Networks
Alexandre Gachetand Pius Haettenschwiler (2005). *International Journal of Intelligent Information Technologies (pp. 56-67).*
www.irma-international.org/article/virtual-twin-socialization-agent-peer/2384