

# 以限制規劃程式構建投資組合決策支援系統之研究

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## 摘要

傳統投資組合問題之研究多數採用考慮限制風險水準下，求取最大投資報酬的數學規劃方法論。但金融投資通常包含總經面、基本面、技術面、產業面、籌碼面、消息面等多個層面，數學規劃方法並不易納入相關層面趨勢變化的影響因素。本研究以限制規劃方法取代傳統數學規劃方法來建立投資組合模式，並適當地納入技術面、總經面與股市連動關係的專家知識，使之能依據環境的變化，對投資組合操作策略做出適當之調整。此外，本研究以投資組合限制規劃模式為核心，開發出一套「智慧型投資組合決策輔助系統」，提供使用者彈性處理實務投資操作邏輯規則的機制。該系統可藉由技術指標與總經指標的狀況，動態調整風險承受程度、個股資金分配、現金部位，打破傳統投資組合模式靜態的操作方式。

本研究以民國 90 年台灣股票市場之歷史資料作測試，每半個月為一期共分成 24 個測試期，並以「大盤指數」與「投資標的股票指數」為績效比較之測試標竿。經由實證測試後發現，利用投資組合限制規劃模式求解產生之投資組合在報酬表現上，若保守考慮 2% 的交易成本，其年報酬成長率為 62.4%，遠高於大盤指數的 22.8% 與投資標的股票指數的 34.8%；若以市場常用之績效指標「夏普比率」做基準，投資組合在 24 個測試期中，有 20 期皆能打敗測試標竿。若將測試期間區分為「上漲」、「下跌」、「盤整」三種時期，則以下跌時期投資組合之績效表現最為顯著，相較於測試標竿不但能維持最低的風險，同時能創造最高的報酬。整體而言，投資組合具有在低風險下尋求高報酬之特性，證實本研究提出之創新概念確實能有效提升投資組合之績效。

# Development of A Decision Support System for Portfolio Selection Based on Expert Knowledge: A Constraint Programming Approach

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## Abstract

Most of existing literature on portfolio selection is based on mathematical programming. However, MP-based optimization models are difficult to incorporate many critical macroeconomic and technical factors in quick changing investment environment. To make portfolio model more suitable and reliable for real world applications, this research took the portfolio selection as a constraint satisfaction problem (CSP), and developed a constraint programming model to take expert knowledge into considerations. In addition, a decision support system is also developed to provide users a friendly interface to do preference setting and obtain the portfolio solution after processing by ILOG OPL Studio.

Stock market data of Taiwan in 2001 were applied to test the proposed portfolio constraint programming model. Taiwan Stock Weighted Index (TX) and target stock index are adopted as benchmark for comparison. Our proposed model yielded an annual return of 62.4%, which is much higher than that of Taiwan Stock Weighted Index, 22.8%, and is also higher than that of the target stock index, 34.8%. The results showed that the portfolio constraint programming model provides an effective planning tool for portfolio analysis.