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**Fundamental law of active portfolio management
and implementing an investment strategy**

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ABSTRACT

Fundamental Law's strategic perspectives and terminology are common frameworks in aggressive portfolio management practices. To make it easier to deal with, the basic rule theory depends on the assumption of simplifying the diagonal covariance matrix of security offsets, but the matrix provided to the numerical optimizer is completely filled. We allow a complete covariance matrix and extend the fundamental law in active management and show that the final forward (anticipated) and post (real) return equations are the exact opposite of the approximate equality of previous derivations. The accuracy of post-equations permits the performance contribution of realized returns to fully decompose profits. The various basic rule parameters that we define incorporate all information into the covariance matrix, providing better prior insight into the sources and limitations of risk-adjusted active returns. In addition to generalizing the basic laws, we also describe the complete covariance matrix alpha generation process and add some clarification to the concept of implicit widths.

Active portfolio management is an important method used in current finance literature. In the academic studies on this topic, the method of analysis is determined through Markowitz's modern portfolio method. Active portfolio investigation strategies connected based on the historical data of the portfolios in arrange to create moment forecasts and expectations about which course to continue within the future.

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INTRODUCTION

Nearly half of nearly all professionally managed funds adopt optimized portfolio design principles, an application of Grinold's "Foundation for Active Management". Use many factors to invest in many securities, predict revenue, trade frequently, and optimize with minimal constraints. We present rigorous simulation evidence that these proposals, with their simple examples, are invalid and defeat ourselves. This is because derived errors are ignored and economically valid limits are ignored.

The study is largely composed of three parts. The first part provides a review of the portfolio management literature and the steps in the portfolio management process. Selection of portfolios is critical for investment decisions. The management of portfolios is presently a necessary portion of the investment process. There are several risks involved in investing in single security in the capital market. In this manner, investors need to construct a portfolio to diversify risk and invest in other stocks.

The second part defines the basics of active portfolio management. Grinold argues that the maximum IR attainable is the information factor (IC) multiplied by the strategy's square root width (BR). Clarke, de Silva and Thorley (CST) use a "transfer coefficient" (TC) to summarize Grinold equation. The TC may be a scaling figure that measures how "information" is transferred to an optimized portfolio by individual securities. The foremost critical thing is the modern portfolio approach to Markowitz. To provide immediate forecasts and forecasts of future direction, proactive portfolio analysis techniques are based on the portfolio the historical data.

In the third part of our investment strategy, we conclude that the combination of tactical and strategic asset allocation is a fitting investment strategy for active portfolio management because it limits long-term portfolio venture openings and permits for short-term portfolio redeployment.

CHAPTER 1. BASIC CONCEPTS ON PORTFOLIO MANAGEMENT

Portfolio and Portfolio Management

A portfolio can be characterized as a new financial asset consisting of multiple securities. The portfolio should be considered as an independent and measurable asset because of the relation between the financial assets that make up the portfolio. Portfolio management is portfolio management created on behalf of the investor by the financial assets to ensure maximum efficiency within the risk rate and duration set by the investors. The most important goal in creating and managing managed portfolios to achieve maximum efficiency is to reduce the risk. In portfolio theory, this is called the diversity effect. Traders' attitudes towards risk vary. According to this difference, some investors take extreme risks while others avoid risk or remain indifferent to risk. Investors' attitude towards risk affects portfolio preferences. Investors who want to take risks prefer risky assets such as stocks and derivatives, while risk-avoiding investors prefer low-risk investment instruments such as bonds. The selection of securities to be included in a portfolio and the determination of investment amounts are an important element in order for investors to achieve these objectives. In addition, it should be determined whether the portfolio's expectations are met by measuring the risks and returns of the portfolio. Since the securities portfolio consists of risks, the portfolio management process must be carried out professionally by a scientific method.

Financial markets have the primary function of providing funds to economic units that provide savings by saving less by generating less money than their income and by saving savings that tend to spend more than its income economically. Investors aim to generate revenue by evaluating their savings in the financial markets. Financial markets are the capital market, the derivative market, the gold market and the foreign currency market. The capital market is where the demand and supply for short - term funding occurs. The capital market is defined as the place of demand and supply for medium and long - term funds. Derivative markets consist of forwarding transactions, futures, options and swaps. Derivative

markets are speculative investments as well as markets that serve hedging purposes. It is known that there is an important relationship between the economic development of countries and the development of money, capital and derivative markets. Investors invest in various assets such as stocks, bonds, warrants, securities backed by assets, foreign currency, and gold. The portfolio's meaning is “wallet”. The portfolio is defined in terms of securities as a new financial asset consisting of a securities combination and a combination of more than one financial asset.¹ A broader portfolio of definitions can also be expressed as a particular person's financial asset or securities groups, such as securities, securities, stocks, bonds, and derivatives.²

As it is known, investments are made to securities to reach specific targets. Although the portfolio consists of certain securities, there is a relationship between securities and the portfolio is a self-sufficient, measurable asset. Therefore, the portfolio is not a sum of simple securities it contains. Generally, we can consider portfolio sum of the “bulge” of the financial assets. Financial assets may be categorized as the following:

Figure 1.1. Financial Assets

Traditional Investments	Alternative Investments
Cash	Hedge Funds
Equity (stocks)	Physical Assets (commodities, art, etc)

¹ Ceylan, Ali - Korkmaz, Turhan; Borsada Uygulamalı Portföy Yönetimi, Ekin Kitabevi, 3. Baskı, Bursa, 1998, s.12.

² Christy, A. George - Clendenin, C. John; Introduction to Investments, Sixth Edition, New York: Mcgraw-Hill Book Company, 1974, s. 645

Real Estate	Managed Funds
Fixed Income	Private Equity Funds
Foreign Exchange	Securitized Products (debt obligations etc)

In a changing economy over time, regulating and selling certain assets and replacing new assets is necessary. A change in portfolio management is called change.

Investors planning to invest in securities face the challenge of choosing multiple securities. This choice is based on security's risk-return nature. Investors will, of course, want to transfer their savings to these securities groups by choosing the most preferred securities. But this time, you are faced with investment decisions to invest. At this point, investors have an infinite number of securities or portfolio options. The risk-return nature of a portfolio differs from that of a portfolio. In this manner, investors need to choose the foremost appropriate portfolio taking under consideration the risk-return nature of all other conceivable portfolios. Continuous changes in the economical and financial environment change the securities' risk-return characteristics and their portfolio.³ This requires investors to review and modify the portfolio on a regular basis.⁴

You need to create a portfolio of investments for reasonable investment activity. Portfolio management consists of securities analysis, portfolio analysis, portfolio selection, portfolio review and portfolio assessment processes. It also uses analytical techniques and conceptual theories for the rational distribution of savings. Portfolio management is a more profitable and less risky complex process of investing.

³ GÜNGÖR, ZÜLAL; Yatırım Yönetimi Ders Notları, Gazi Üniversitesi Fen Bilimleri Enstitüsü, Ankara, 2003.

⁴ Kevin, S.; Portfolio Management, Prentice-Hall of India Private Limited, Second Edition, 2006, s. 2

Investors leave portfolio management in two ways.

1. The portfolio is entrusted to the manager, but the manager is not authorized to decide. In this case, a manager is generally a passive person who fulfils all orders of the portfolio owner. The manager shall finalize the trading activities based on the orders given by the investor. The power to order and decide on all these works belongs to the portfolio owner. Routine works such as the collection of dividends and interests and the timely collection of the costs of the redeemed bonds are made without giving orders by the manager. There may be some drawbacks to this type of management. As is known, large changes, ups and downs can occur in the financial markets in a very short period of time. The timing error can, therefore, be made, especially as assessing opportunities or reducing losses depends on the investor's own order.

2. The second application in portfolio management is the full authorization of the portfolio manager on securities. In this case, the portfolio has no real owner. However, the manager may act as the owner of the portfolio, even though it is not legal. The relations between the owner and the manager are regulated by a contract to be made between them. It is possible to give the manager all kinds of authority by contract. In this case, a manager sells the securities he wishes in the portfolio. The administrator uses or sells portfolio securities rights. Briefly, the manager can perform all transactions related to the portfolio, such as the actual owner of the portfolio with a contract.

This second type of portfolio management has great benefits in terms of ensuring the speed of buying and selling. In any case, this type of management is more effective because it is a remedy for the first type of practice's shortcomings. Evaluating market trends, the opportunities brought by timely trading are often important. In the first case, however, it is always possible to lose the appropriate time or lose income. When the investor is faced with losses in the face of negative

developments, the manager cannot be claimed to have failed. As stated earlier, it is the investor who gives the order and the failed one is the investor himself.

Steps of the Portfolio Management Process

The portfolio management process consists of five steps:

- Planning
- Investment analysis
- Portfolio Selection
- Portfolio Implementation
- Performance Evaluation

Figure 1.2. Portfolio Management Process



Planning

The primary stage of portfolio management involves transactions such as determining investor status, determining investment professionals and portfolio

managers status, and identifying investment criteria that guide portfolio managers on behalf of investors.⁵

An investigation of the investor's situation requires disclosure of the investment period, the designation of the investor's wishes and goals, and estimation of the fund's movements during the investment period. When evaluating the status of a portfolio manager, you should investigate factors such as getting better results than what you can get in a portfolio created by investors, or getting better results than what you get with a proven investment method. For investors, the responsibilities and duties of the portfolio manager become clear. The final step in portfolio planning is to determine the investor's investment criteria and the investment criteria the portfolio manager wants to achieve on behalf of the investor.

Investment analysis

The second part of portfolio management is the investment analysis phase. Investment analysis is an analysis of the securities qualifications to be involved in the portfolio and a quantitative estimation of what the performance of various securities could be within a certain time period. In this analysis, it is not only the analysis and evaluation of past performances of financial assets that can be invested. In addition, it is necessary to make clear and mathematical predictions prospectively by using different information. (1) economic analysis, (2) sector analysis, (3) securities selection and (4) forecast analysis, respectively.

In economic analysis, economic conjuncture, inflation, money supply, increase in influence, unemployment and the effects of these indicators are investigated.

In arrange to form rational decisions, it is necessary to scrutinize the sector in which the company is operating, and the situation in the sector. Therefore, sector

⁵ Akbaş, Cengiz; Hisse Senedi Portföy Yönetimi ve Portföy Takip Programı, Atatürk Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi, Erzurum, 1999, s. 40-41.

analysis is the main area of interest in securities analysis. Because of the economic fluctuations, the degree of impact of the sectors is different. For example, some sectors such as automotive and construction are very sensitive to economic fluctuations, while some sectors such as pharmaceuticals and food are not sensitive to cyclical fluctuations.

When making the first election among the securities, the securities which can be a candidate for entering the portfolio are determined in the economy and sector analysis. Securities can be selected qualitatively by taking advantage of the personal information and experience of portfolio managers and by selecting a number of quantitative data. For example; the first distinction can be made by looking at the variables such as the turnover of many enterprises, annual profits and changes in the last few years' profits. The computer could be used to make the first selection due to a large number of securities on the market and a large number of comparisons.

An investment expert is attempting to make quantitative estimates of a security's performance at the final stage of the investment analysis. The expert's estimates can be as follows:

- Estimates of profit, dividend, interest and market values at the end of each year.
- Possible deviations from these estimates and relations between securities.

Portfolio Selection

In portfolio selection, the asset for which the portfolio is to be constructed is determined. In other words, the general composition of the portfolio is determined. After that, it is about securities selection. At this point, the funds apportioned to each group will be determined in what proportion they will be

allocated to the first separated asset. This choice is a significant step forward. Because investment analysis, economic analysis, sector analysis, primary distinction, inference analysis and general composition decisions are preliminary studies of this election.

Portfolio Implementation

Portfolio implementation is the process of assessing portfolio performance against risks and returns over a chosen time period. This includes quantitative measures of return on investment and risks from the investment horizon. The results should be compared with objective measures to evaluate the portfolio's relative performance. Alternative performance measures have also been developed for use by investors and portfolio managers.⁶

Portfolio assessment is also useful in other areas. Define investment process weaknesses and provide a mechanism to develop these vulnerable areas. This provides feedback on the whole process of portfolio management.

Performance Evaluation

After the Portfolio Revision, which is the final stage of portfolio management, portfolio performance measures will be determined, the action to be taken and the necessary changes will be made. A portfolio review is aimed at optimizing portfolio returns at specific risk levels. Investors who create the most appropriate portfolios must continually monitor their portfolio to ensure optimal continuity of the portfolio. The situation can alter time over in past attractive securities and new high - yield, low - risk new securities due to the dynamic nature of the economic and financial markets. In this case, the investor must modify his portfolio in light of market developments. Some new securities will be purchased with this

⁶ Kevin; a.g.e., s. 5.

amendment and some securities will be sold in the portfolio. The portfolio mix of securities and weights is changing at the end of the revision.

Portfolio analysis may also be necessary for investor-related changes such as additional savings opportunities, changes in risk behaviour, and the need for cash for other alternative uses. Whatever the cause, the portfolio analysis must be scientific and objective to ensure the suitability of the portfolio. That is, portfolio revision is not an arbitrary process that is implemented carelessly and is as important as analysis and selection within the portfolio management process.

Types and features of Portfolio Management strategies

One of the stages of portfolio management is determining the portfolio management strategy. A portfolio management strategy can be characterized as a set of rules, behaviours or strategies to direct the portfolio choice of a financial specialist.

The strategy is generally determined around the risk-return preference of the investor. Some investors prefer investing in risky assets and want their expected returns to be maximized. Some investors want to minimize their risks by opting for investments in low-risk assets. But some of the investors prefer strategies between these two. In determining portfolio management strategies, there are many factors. These; The purpose of the investor can be counted as the size of the portfolio, holding period, investor's person or institution, tax status, legal restrictions, the sum of money the investor needs in the future and the sum of money he needs in the future, the expectations in the market, expected return on investment, the information about the investors and the special demands of the investors. Portfolio management companies take under consideration the reality that the customers they serve as individuals or institutions when deciding their investment strategies. While individuals want to manage their funds by paying

attention to a balance between risk and return, in addition to the balance between risk and return, corporate customers also require maturity adjustment.

Corporate investors can be given as examples of insurance funds or fund managers of companies. The main reason why institutional investors demand additional maturity compliance is that they have certain obligations to the assets they have. In addition, the restrictions on the investment decisions of the institutions governing private pension and other insurance funds have been determined by law. Such corporate portfolio management companies shouldn't exceed the legal limits for the amount of investment to be made by a firm, and there is an obligation to invest in those whose bonds are above a certain level.

Once the factors listed above have been identified, the components of the investment strategy are created. The components of investment strategy; the extent to which the asset will be included in the portfolio consists of purchasing-selling policies and risk policies. Once the investor is perceived as a process and the investor has identified his goals and policies in this process, the critical point is the selection stages in portfolio management, in which he faces a choice in terms of both investment strategy and securities to be invested. The election to be determined determines how the investor would diversify his portfolio, how he would take a risk based on this diversification, and how he expected a return on the risk he accepted to endure. If the investor requires investment in risky assets with the potential to increase prices in a short time, the portfolio manager will establish a rapid growth strategy. If the investor makes a request that gives priority to the protection of his wealth, the portfolio manager will establish a secure investment strategy. The attitude towards risk and expectation is important in determining the portfolio management strategy; the investor's goal. There are generally two main strategies for portfolio management. These are passive portfolio management and active portfolio management.

Passive Portfolio Management Strategy

The passive management strategy is based on the assumption of partially efficient securities markets. Passive portfolio management is the financial strategy that is invested in a predetermined strategy without any prediction. Passive portfolio management is also called passive investment. In passive portfolio management, the strategy of holding and holding is monitored in general. In this strategy, a portfolio is created and the content of the portfolio is not changed during the holding period, except for minor adjustments.⁷To minimize transaction costs, passive portfolio management strategies are often used. One of the methods frequently used in this strategy is to create an index fund covering all securities traded on the stock exchange. Investors who do not have the opportunity to create such a fund have the opportunity to diversify with a small investment by taking part in the index funds. In particular, individual investors are investing in one or more index funds to provide the return of the index. Following an index provides a good portfolio diversification as well as lowering the cost of purchases and portfolio management. Passive portfolio management is mostly used in the stock market. The reason for this is the creation of indices in stock exchanges. An example of this is the ISE 100 index. However, the use of passive management in bond, commodity and hedge funds continues to increase. The passive approach to portfolio management is based on the hypothesis of efficient markets. According to the efficient markets theory, the securities markets are effective. All kinds of information are reflected in the market very quickly and evaluated by the market and reflected on the prices. Therefore, prices are increased or decreased according to new information. The new information is unpredictable. In this respect, based on the passive management approach based on the effective market hypothesis, basic and technical analysis is not required, but the cost of these analyses will not be of benefit. Accordingly, in the passive management approach, the best behaviour that can be made is to create a well-diversified portfolio and to keep it

⁷ Jacop, Nancy L. - Pettit, R. Richardson; Investment, Homewood, Illinois, 1988, s. 647.

after the purchase, rather than searching for securities that will decrease or fall in price in portfolio selection and creation.

Active Portfolio Management Strategy

The asset portfolio management strategy is to establish and assume the risks associated with the portfolio based on return and risk of certain securities.⁸ Contrary to the idea of passive portfolio management, the idea of actively managing the portfolio is that the market is not effective; it is based on the idea of selling expensive securities. In addition, the managers who follow this method believe that market players are in different market expectations, so the market leaders expect the success of the market and they can beat the market.

An investor who thinks that the market is not effective assumes that any price movements that may occur in the future can be derived from the market prices at any time. There is active management if the investor believes that security is low priced and that he/she can make a profit from price movements. The main problem for an investor in implementing an active management strategy is to identify low-priced stocks in the market. This could be done by using different valuation methods such as price/earnings, market value/book value and profit share yield. If the investor determines the shares that he believes are low-priced, he is expected to include these stocks predominantly in the portfolio he will create. Creating such a portfolio requires the investor to take more risks than a passively managed portfolio investor, which is intended to achieve a higher return on the market. This is because the evaluation of the securities involved in the portfolio is the investor's own subjective evaluation, and such assessments are unlikely to materialize. As a result, in line with the fundamental relationship between risk and return, the level

⁸ Treynor J. L. - Mazuy K. K. - Black M. F.; How to Use Security Analysis to Improve Portfolio Selection?, Journal of Business, 6686, January, 1973, s. 73.

of chance attempted by the dynamic portfolio chief, which targets a return over the yield of passively overseen portfolios, is expanding.

The active investor's long-term success is that it yields the next yield than the normal yield (market yield). To achieve that success, the active manager is in two types of activities, which is "the selection of securities" and "market timing". To a huge extent, the timing of the manager's market introduction depends on the manager's experience and skills, and the main factor determining the success is the correct selection of securities to be involved in the portfolio. This is not independent of the techniques applied for the selection of securities. There are many portfolios that are actively managed in securities markets but are created using different methods of selection. For this reason, measuring the performance levels of active managers has become an important issue.

There are some basic features of asset portfolio management. These:

- As there is high transaction cost in asset portfolio management, it is mostly used in the management of large portfolios.
- Depending on whether portfolio securities are changed frequently or increased or decreased, there is a high turnover rate.
- Active portfolio management involves more time, expertise, close monitoring, the pressure to achieve targets, performance measurement, preparation and presentation of reports, and higher administrative costs.
- High-risk securities can be included in the portfolio in asset management as it is intended to obtain a return above the market yield. In this case of not meeting the expectations or expectations, high-risk assets can cause big losses.

CHAPTER 2. “MODELS OF FUNDAMENTAL LAW OF ACTIVE PORTFOLIO MANAGEMENT” IS NO LAW OF ANYTHING

Grinold’s Fundamental Law of Active Portfolio Management

The Grinold (1989) formula is a rough decomposition of information ratios (IR) generally link to active investment management. Grinold shows that the mean-variance (MV) optimization of the residual return investment strategy

without inequality constraints is roughly proportional to the product of the breadth (BR) and the square root of the information correlation (IC). Mathematically,

$$IR = IC * \sqrt{BR}$$

where IR = information ratio = (alpha) / (residual or active risk)

IC = information correlation (ex-ante, ex-post return correlation)

BR = breadth or number of independent sources of information.

The unquestionable wisdom of the formula is that successful proactive management depends on both the level of predictive intelligence and the breadth associated with optimization strategies. However, Kahn and Grinold (GK) (1995, 1999) and Clarke, Thorley and DeSilva (CST) (2002, 2006) go further. They apply the Grinold formula to increase the number of assets in the optimization world sufficiently, increase the number of elements in the multi-valuation framework, trade more often and reduce optimization constraints.

There are two fundamental reasons for the limitations of the Grinold law-related principles for practical asset management.

1) The formula ignores the effect of the estimation error of the investment information on the optimized investment performance outside the sample.

2) The formula assumes a secondary utility unlimited optimization framework that ignores the need to include economically meaningful inequality constraints that are actually needed to define portfolio optimization. We prove that the formula-related Kahn and Grinold (1995, 1999) and Clarke, Thorley and DeSilva (2002, 2006) (CST) prescriptions are invalid, self-defeating and not recommended for practice.

The rationale of casino games

GK uses casino roulette gaming to actually streamline the application of the Grinold formula into asset management.⁹ The odds of playing a roulette game (for a casino) or IC are small but led to the possibility of the greater wealth of plays (width). However, there is an important difference between playing a roulette game at a casino and playing a real investment game. In the casino context, ICs are stable, known, positive, and constant throughout the game. In investment games, ICs are unstable, have estimated errors, and may be insignificant or negative for revenues. Investment games cannot be independent, and increasing the number may not be desirable. While it is interesting to rationalize the application of the Grinold formula to investment practices, the rationale for casino games is not valid.

Theory and Discussion Grinold and Kahn and Clarke, DeSliva and Thorley prescriptions

GK and CST propose 4 standards of optimized portfolio design for improved investment value in the index-related MV optimization framework. We discussed the limitations of each prescription in turn from an intuitive point of view.

Large-scale optimization space fiction

GK argues that, depending on the size of the optimizing universe, the value of the investment increases under the condition that the IC is about the same for all securities of the optimizing universe. How realistic is this assumption?

For small-scale securities, the assumption of a uniform average IC is tolerable. The small universe can have a fairly homogeneous personality. However, in a large and expanding optimization world, it seems impossible to assume a uniform average IC across all subsets. All managers naturally use securities that contain

⁹ Grinold and Khan (1995, 1999, Ch. 6.)

the best information. Theoretically, adding more assets can increase the width a little more, and everything else can appear the same. In addition, predictable oil prices may be lower and the average IC level of the entire universe may be lower. If the average IC is low, you can undo the gain from the larger width

This problem can be found in a more general practical framework. Consider an analyst who suddenly needs to cover twice as many stocks. Given the time and resource constraints, it is likely that the analyst's average IC will not be the same for expanded stocks. Resources and time issues reasonably explain why analysts specialize in areas of investment strategy that limit the number of securities covered by a market or manager. Indeed, many traditional managers limit the number of securities in an active portfolio to 20 or 50. With the exception of the relatively small asset universe, the average IC and IR overall level can often be a decreasing function of the number of shares in the Optimization World, and everything else is the same. Grinold and Kahn seem to be aware of these limitations. For example, it states, "Under the Basic Law, if technology can be maintained, it will be wider." Nevertheless, the average IC and optimized universe size are inevitably large, especially in this case of large-scale assets.

Multi-factor model fiction

High-volume universe optimization typically uses benchmarks such as the S & P500, Russell 1000, or global stock index. In this case, individual analysis of each stock is generally not possible and analysts generally rely on a factor assessment framework for alpha prediction. For example, a stock ranking or valuation may be based in part on a revenue yield factor.¹⁰ As GK noted, if profit generation is the only factor in ranking stocks, there is only one independent source of information and breadth.

¹⁰ Michaud (1998)

In the Grinold equation IR increases with the number of independent positive critical elements in the multi-valued prediction model. In practice, in any case, asset valuation variables are frequently exceedingly related and may not be factually critical in the event that sample expectations are reasonable. It is not a simple task to find a reasonably positive factor that is reasonably unrelated to post-mortem returns.

Factors are often relatively unrelated and are often chosen in a little number of categories that are considered positively related to returns such as value, momentum, quality, profits and discounted cash flows. The width of the inexperienced multi-valuation model is generally very limited and is not much larger than 5 independent of the size of the optimization world. Just as adding stocks to the optimization world, adding factors at some point will include increasingly unreliable factors that are likely to reduce or increase the average IC of your investment strategy.

Michaud provides a simple example of adding factors to various assessment models. Adding significant investment in return can be added to the IC, but it can actually be harmful. There is no free lunch. Adding factors can not only improve predictability but can also easily reduce it, and the number of elements that can be added while maintaining a desirable overall IC is virtually limited.

Investment Fallacy

GK recommends increasing the investment period or increasing the "play" of investment games to increase the BR and increase the IR of the MV optimal portfolio. The Grinold equation assumes transaction decision period independence and a constant IC level. However, almost all investment strategies are naturally limited in trading frequency. For example, asset managers who sell on a book or book value have significant limitations in increasing the frequency of transactions less than a month or a quarter. Reducing the duration of a

transaction to below a certain limit generally increases transaction costs and in most portfolios decreases effectiveness.

Fundamentally, trading frequency is constrained by investment process constraints on the investment style. Deep value managers can often be reluctant to trade more than once a year when growth inventory managers want to trade multiple times in a given year. In order to be effective, you need to maintain the same level of technology while increasing transaction volume, while increasing the independence of transaction decisions. If possible, you should generally increase resources and everything else should be the same. In order to extract relatively independent and reliable information about a given trading strategy and market conditions, normal trading decision periods should be frequent enough but often not.

It is worth noting that the concept of a trading period for an investment strategy does not imply a rigorous trade-off. New optimal investment portfolio volatility and market volatility may require trading earlier or later than the investment strategy "normal" period. Administrators may also need to consider transactions whenever new information is provided or customer goals change. Portfolio monitoring for ordinary trading periods, including selling mistakes, is assist talked about in Michaud et al.

Eliminate constraint fallacy

Merton (1987) provides a rational market framework to optimize index-related MV. In real investment practice, an MV-optimized portfolio typically includes many linear constraints. An unrestricted MV-optimized portfolio is often an investment intolerable and impractical. Constraints are often imposed to manage instability, ambiguity, incomplete diversity characteristics, and to limit performance outside the bad sample. However, constraints added only for marketing or cosmetic purposes are of little or no investment value and can

interfere with deployment Risk - provides useful information for estimating your profit.

In general, inequality constraints are essential to practice. Inequality constraints reflect the fact that even the largest financial institutions have economic shortcomings and limitations. Recently, Markowitz (2005) shows the importance of practical linear inequality constraints in defining portfolio optimality for theoretical financing and defining the validity of many of the tools in practical investment management. Long-only constraints limit the risk of liability, often an unmeasured calculate in most portfolio risk models, and often limit institutional requirements. Regulatory issues can often require the use of short-term inequality constraints. Performance benchmarks can often require a set of index-related constraints to control and monitor investment objectives. In addition, inequality constraints often limit the negative impact of estimation errors on performance outside the sample.

GK and CST proposal test

Investment managers often use backtests to demonstrate the potential value of the proposed investment strategy. In this procedure, a factor or strategy is evaluated for how it was performed on some historical data over a period of time. Backtesting can often be the only practical framework for testing investment hypotheses, but reliable potential information is not possible by definition. Moreover, backtesting is notorious for misguided investors, leading to property loss, job loss, and corporate demise. Investors should be keenly aware of the serious limitations of backtesting as evidence of the reliability of any factor or investment strategy.

Simulation studies can be a much more reliable alternative framework for testing the value of optimized investment strategies. These procedures assess the unexpected performance of an optimized portfolio within a sample in many

realistic investment scenarios. If done properly, you can provide solid evidence of the value of the proposal outside the sample to add value to your investment.

The following sections describe the out-of-sample performance of the Fundamentally Recognized Investment, describe the simulation test framework in more detail, and describe the summary statistics used to discuss the results of three important simulation experiments that support us.

Index-related properties

Index Relative MV optimization is a total revenue MV optimization using exponential weighting constraints. The index has no risk and returns by definition. If not constrained, the IR efficient wilderness may be a straight line beginning at the origin and starting at the same slope as IR. If the sign is restricted, the IR efficient frontier may be a straight line rising from the origin with the same slope as the maximum IR to the first profitable frontier's first pivot portfolio.

Roll (1992) provides a classic critique of the IR active return MV optimization framework. He shows that the IR optimal portfolio is dominated by a portfolio of MV total return space. Merton (1987) provides a judicious market framework to optimize index-related MV. Under relatively simple conditions, consistent with many proactive asset management strategies, common benchmarks often return MV efficiency, considered as a total risk. Assuming an economically reasonable agent, we assume that the selected index returns the total risk and returns a high MV. This assumption is the best scenario for the investment value of an active investment strategy.

Assuming Merton MV efficiency, all exponential-relative MV optimization portfolios are equal MV total revenue efficiency. There is an infinite possible IR-efficient portfolio that represents the investment value of an optimized investment strategy versus the index. This is because the maximum IR efficiency is ambiguous. This is consistent with the index-relative optimization practice in

which the IR maximized portfolio is defined in relation to the specific level of tracking errors for the benchmark. It is convenient to focus on one relevant optimized portfolio to compare the characteristics out of the sample of the optimized investment strategy. The MSR portfolio is IR efficient, both under unbundled autonomy and on an efficient border with limited constraints. It is also a convenient single portfolio that represents portfolio optimizations related to MV input. The following represents the out-of-sample investment value of the maximum IR investment strategy for both unrestricted investment strategies and limited constrained investment strategies using the optimal MSR portfolio within the sample.

Portfolio Simulation Research Framework

In a typical simulation study, the referee assumes true mean, standard deviation, and correlation estimates for a set of consequences and assets know the actual MSR for the portfolio of assets. Player representing the investment strategy does not know the true parameters of the referee. Instead, they receive simulated results from the referee. Therefore, they can only observe the truth hidden by estimation errors, as is true for all real-world investment managers. The player then calculates the optimal weight for his strategy and returns it to the referee to score. The referee determines the winner of the simulation. This procedure is repeated a number of times for a series of referee scenarios and repeats the average and various statistics calculated for each player. In this way, you can compare the performance out of each of the strategies, and you can more accurately determine your overall strategy.

Three important MV optimization simulation studies

Jobson and Korkie (1981) (JK) provides a classic study of the effect of estimation of value errors of out-of-sample investments in an MV optimization portfolio without inequality constraints. The JK study applies equally to a

framework that is widely used in the development of unequally constrained secondary utility portfolio optimization, financial theory and many investment strategies. In their study, the truth of the judgment is based on historical MV input for 20 stocks. They compute a simulated MV input that reflects the monthly revenue data for five years. They found that the average of the actual SRs in the simulated MSR optimal portfolio was 25 per cent of the actual MSR optimal portfolio. We have also found that the same weights outperform the optimized portfolio. They conclude that unrestricted MV optimization is not recommended.

Frost and Savarino (1988) (FS) conducts a similar simulation study comparing unconstrained inequalities to a long-only MV optimization portfolio. They have long known that MV-optimized portfolios do not dominate inequality. This is because code constraints limit the impact of sample errors on improving sampling performance. This initial result directly contradicts the conclusion of CST. Economically valid constraints act like Bayesian candidates that focus on portfolio structure enforcement rules that represent legitimate information not included in the optimization input. These constraints can implicitly alleviate the estimation error in the risk-profit estimate by forcing the solution into a more probable optimal portfolio.

Markowitz and Usmen (2003) demonstrate the superiority of the Michaud resampling methodology over classic MV optimization, even when the MV player uses good input estimation methodology. This study uses the simulation research framework described in the previous section and provides convincing evidence that resampling increases the value of investments in asset allocation with imperfect information settings that are realistic.

These three studies have a strong impact on the research hypothesis across different investment scenarios, unlike the backtest that represents performance only in one specific market scenario. Our simulation experiments, detailed in the next section, confirm all these important results.

Proof of GK and CST simulation

This section develops rigorous simulation studies to address the limitations of GK and CST prescriptions for practice.

Simulate width while maintaining information level

The Grinold equation represents the square root relationship between width (BR) and IR for a given level of skill (IC). Increasing the size of the optimization area is often considered to be a simple way to add breadth to your investment strategy and to equally improve everything else if specific information is available for additional information. To test the effect of adding width to your investment performance, you need to simulate additional width while maintaining the specified IC.

The number of assets is not conceptually the same as the width specified in GK and CST, but a specific configuration for a simulation experiment ensures that a range of one unit is added for each asset added to the case. This is because the signal components of a particular IC to a new asset are added to the system independently and the corresponding asset-specific information is added to the covariance simulation. We are still adding widths to the last increment of the portfolio size, and we cannot account for the lack of added width when we increase the universe size as compared to the predictions of the basic law.

Simulation methodology

We calculate the truth for simulation purposes based on recent monthly data obtained from major US stock exchanges. Using estimates derived from actual market data for our simulation parameters provides good coverage of revenue allocation from the recent history of the US market data (1994-2013), while our methodology provides simulation ensuring an unlimited supply of available widths.

Using a direct estimate of the actual 20-year history, we provide a realistic range and probability distribution for the simulated return lottery. In this so-called "uber-truth" we simulate the various "truths" used to simulate observed profits, and in particular simulate the MV input given to each optimization algorithm processing. Each truth is an alternative, but still a plausible market scenario. Our special simulation process ensures a specific average IC20 for expected revenue estimates.

A specific IC means a specific signal-to-noise ratio in the alpha estimation process. All estimation processes lie in the spectrum from no information (IC = 0) to information completion (IC = 1). Therefore, there is a certain level of information in the covariance estimation process, which may or may not exactly match the information in the alpha estimate, resulting in an incomplete estimation of the covariance. However, since IC as a measure of noise is not suitable for characterizing the evaluation of dispersion parameters, it is unclear how the noise levels implied in the IC design coincide with the simulation of the covariance matrix in the simulation experiments. Also, in practice, covariance estimates often come from completely different information sources, such as the commercial factor model, so you can naturally have an alpha estimation process and other informational content. Best practices for estimating the covariance matrix are discussed extensively in the financial community and there are specific estimates that are preferred over other estimates depending on how the estimates are used. We do not want to be involved in the argument in this article, but we can find more issues in Fan and Lv (2008). Fan and Lv (2008) recommend a factor-based estimate of the covariance of stability in reversals. We did not follow the recommendations for generating covariance estimates in our study because our simulation process was not extended naturally to include the FamaFrench (1992) element without a controversial distribution assumption. Regardless of the negative impact of the covariance estimate on the performance of the

optimization, we used two different approaches to covariance input in the experiment. First, we use Ledoit (2003) estimates from data to demonstrate realistic situations with controlled estimation errors. This estimate has some characteristics that limit the damage done by inversion or optimization, but nevertheless has a small impact on performance as the cardinality of the optimization increases. Second, we used perfectly estimated error-free covariance matrices in some of the simulated optimizations to completely eliminate the suspicion that covariance can cause observed failures of fundamental laws. In this case, the observed lack of performance must be attributed to errors implied by noise-compensated alpha estimates that have been corrected by a specific IC, and therefore errors in the basic law itself must occur. A perfect covariance provides clear evidence that the Fundamental Law is a function of IC and BR and is not an accurate description of the value of the investment.

For every subset of large master data sets, we match securities to form the basis of each truth. That is, return and covariance parameters are simulated from the same security to maintain a natural relationship between the mean and variance present in the data source.

The IC alone is not enough to determine the suitability of a revenue estimate for optimization. The corresponding estimates using a particular IC for a set of securities can be actively adjusted or added to any constant without changing the IC. Therefore, a highly improperly and improperly optimized quote set can be generated as an optimized and well-executed quote with the same IC. In addition to the IC, the location (average) and scale (standard deviation) of the quote sets also affect the investment value of the optimized portfolio. To demonstrate consistent, real-world performance for a specific level of IC, you should generally adjust the estimates appropriately based on information available to analysts and maintain a reasonable overall average. Setting the average and standard deviation of expected return vector vectors to be the same as the simulation record of short

(for example, 5 years) is a reasonable way to ensure good performance. A portfolio that optimizes inputs in this way is almost identical to the result obtained from Sharpness "cheating" and uses information derived from the truth in simulated optimization to scale the simulated input.

Thus, through the full average and variance inputs, we create an optimized portfolio with three methods: unlimited maximum Sharpe ratio, maximum Sharpe ratio with positive constraints, and equivalent weight. Of course, a number of other methods are possible but are not presented here due to space limitations. The Optimizer process then uses the unknown truth to calculate the maximum Sharpe ratio for each method. This differs from the Sharpe ratio in the sample, which is calculated using the investor's own estimates and not available in the real world. In general, the estimates in the samples generated from the inputs of the manager are too optimistic and dominate the graphs that are not actually displayed in the graph but have different ranges of graphs.

In the following simulation studies, we differentiate between asset allocation and stock portfolio optimization strategies, which reflect two investment practices. Asset allocation strategies typically include 5 to 30 securities and rarely more than 50. On the other word, equity, portfolio optimization strategies can include even thousands or hundreds of assets in the optimization world. Aggressive equity asset managers may argue that the IC level of about 0.10 is an important assumption in the induction of the Grinold formula, but it may be useful to abandon the results to 0.25 more optimistic ICs described in small universe assets allocation cases.

Simulation result

Figures 2 and 3 consists of two panels, each with simulated results for different IC levels and two sizes of optimization universe. Figures 2.1 and 2.2 show the average Sharpe ratios for up to 50 inventories of universe size representing asset

allocation cases with IC levels of 0.10 or 0.25. Figures 2.3 and 2.4 show ratios for up to 500 stocks representing IC portfolio level optimization examples of IC level 0.10 for one of two different valuation methods for covariance. Each value shown in the graph is averaged over 10,000 optimizations from 1000 simulated simulations in the selected universe. The three graph series in each panel show the progression of the average Sharpe ratio due to three different optimization methods. The "unrestricted" series represents the average out of a sample of the simulated unconstrained MSR portfolio and the "equivalent" series represents the average Sharpe ratio of the equal-weighted portfolios and the "limited" series reflects the average Sharpe ratio of the foreign transactions. The sample is simulated long-only MSR portfolio.

Our experimental results on the example of asset allocation in Figure 2.1 and 2.2 show a definite failure of the Framework Act on the GK and CST specifications. In particular, it is less than the improvement in width and IC. Increasing the width improves the average Sharpe ratio, but reduces the margins and is less than the square root of the width. Increasing the IC from 0.10 to 0.25 will result in a surprisingly slight improvement in Sharpe ratio performance outside the sample. In Figure 2.1, the unconstrained portfolio significantly reduces both the restricted symbol and its weight. Adding assets will insist that the Sharpe ratio of the unrestricted portfolio increases differently from the sample, but the gain is insignificant and below impractical. The way in which positive constraints can help the optimization process depends on the quality of the information and the size of the universe, but the results are generally in contradiction to the CST view that removing constraints adds investment value. An innocent analyst may think that increased computational IR predictions will improve performance. Such calculations in the sample can assume perfect information and estimation capabilities and are clearly impractical for investors

of all skill levels. Our results vividly demonstrate the risk of ignoring estimated errors in optimization.

Figure 2.3 and 2.4 show a simulation experiment similar to Figure 2.1 and 2.2 for an optimized universe expanded to 500 securities. One obvious difference in a large universe case is the overall inferiority of equal weights when there is a significant level of information. The second important difference is that the benefit of positive constraints depends critically on the level of predicted information. At the general level of $IC = 0.10$, a limited large space optimization signature provides better performance than an unlimited size spectrum. Figure 2.4 shows the result using the covariance of the refs as an optimization input. We can see that the effect of the estimation error on the covariance has a positive effect on the performance outside the sample of the optimization. For larger universe sizes, the out-of-sample penalty for Sharpe ratio performance for covariance estimation in positive constraints is greater than the negligible constraints in this constraint. However, the constraint optimization is still dominant outside the unconstrained sample in experiments on cosmological up to 500 assets for covariance processing. In this experiment, the use of referee covariance weakens the performance improvement due to the basic failure of the law, regardless of the covariance estimate, and maintains the reversal of the performance relationship as claimed by the CST. These results are not surprising. Adding securities adds little value to the investment, and does not represent a serious contradiction to our basic thesis that everything else is the same. The figures 2.1 and 2.2 are shown below;

Figure 2.1: 0.10 IC, 50 Assets, Estimated Covariance

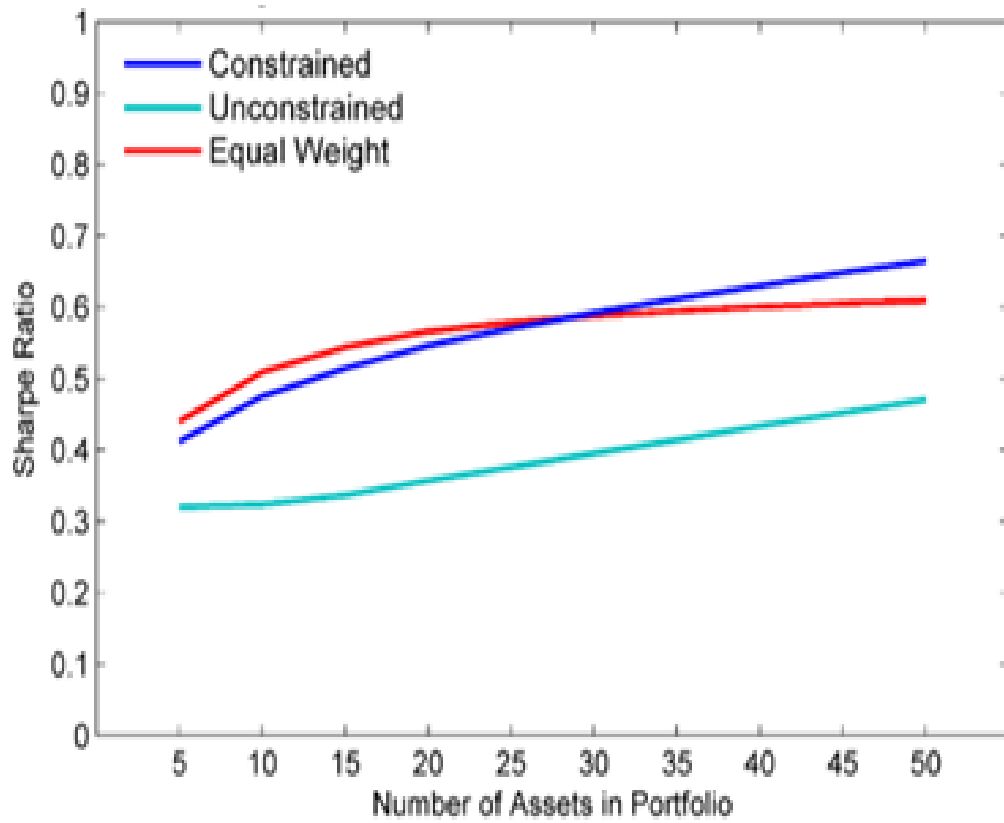
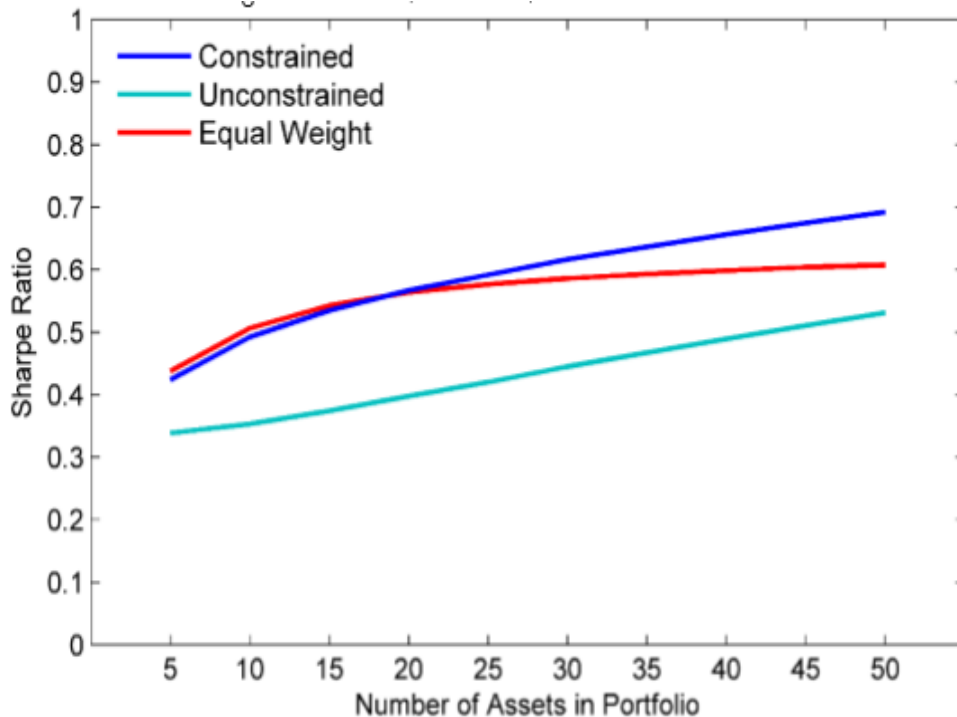


Figure 2.2: 0.25 IC, 50 Assets, Estimated Covariance



Source: Richard O. Michaud, David N. Esch, and Robert O. Michaud

Simulation discussion

At this point, it should be emphasized that this experiment depicts an idealized version of portfolio management and ignores the inevitability of practices that affect some important performance. In this experiment, we provide equally good quality information free of charge. The scope of the application of additional securities will always incur costs and reduce the overall quality (IC) of the system. In addition, transaction costs and other friction related to portfolio management practices have been completely ignored in this analysis.

Our deliberate optimism of setting up simulations has important implications. Unrestricted can actually degrade performance. Since virtually all of the assets in the simulation world are likely to have some investment value, investors are hardly harmed by putting portfolio weights on "false" assets. In the real world, constraints often limit damage due to incorrect information. This effect was clearly demonstrated and measured in Jobson and Korkie (1981). In a truly confusing world with many guessing errors and biases, an equally weighted

portfolio that does not use the information to distinguish assets cannot win. The figures 2.3 and 2.4 are shown below;

Figure 2.3: 0.10 IC, 500 Assets, Estimated Covariance

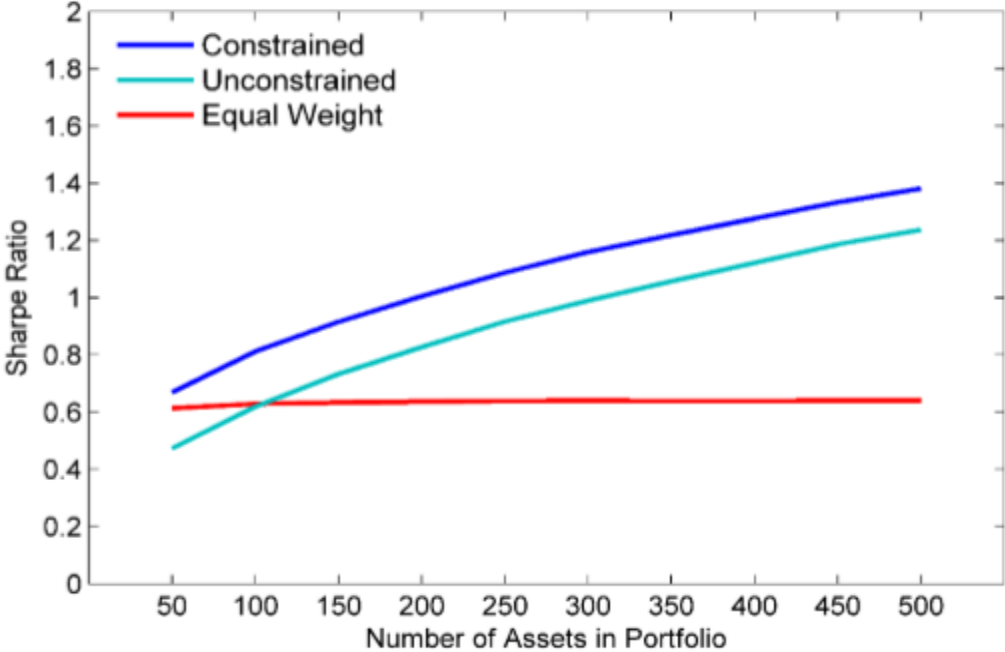
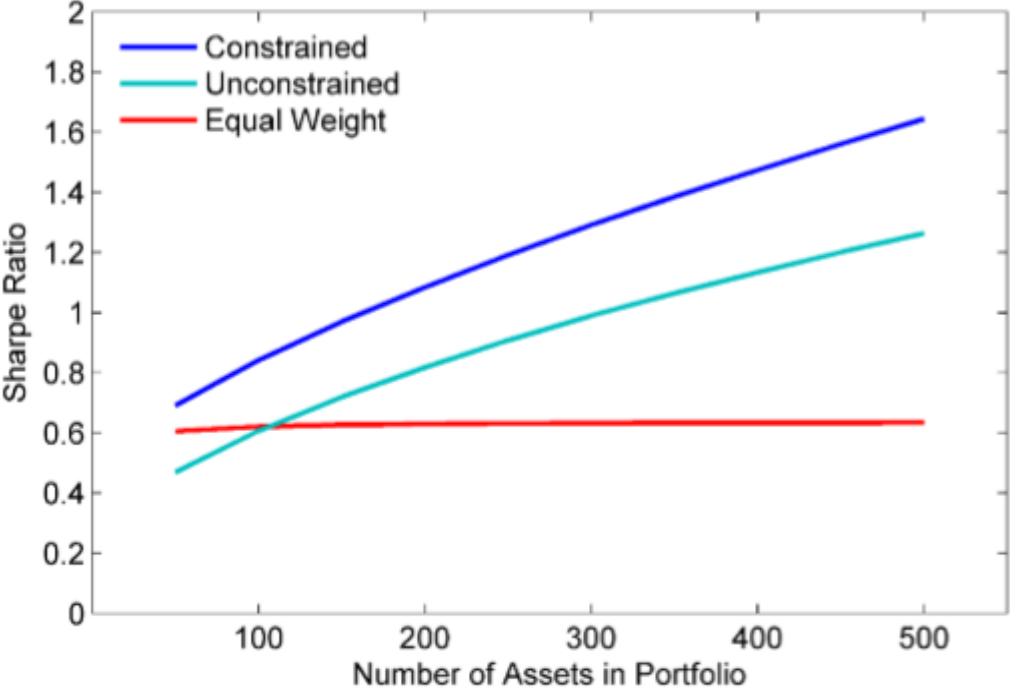


Figure 2.4: 0.10 IC, 500 Assets, Referee Covariance (Error-Free)



Source: Richard O. Michaud, David N. Esch, and Robert O. Michaud

Our simulations ignore realistic limitations of manager information, maintaining a constant level of IC, regardless of space size. In our simulations, the big universe implicitly needs more general investment information from the manager, and everything else is the same. The slowly rising level of unlimited average maximum Sharpe ratio with increasing universe size is an essential artefact of the simulation framework. In fact, adding assets does not add investment value beyond the optimal size range that matches all other situations that match the investor's level of information. In fact, beyond the optimal point, the unconstrained curve tends to bend down as the size of the optimizing universe increases in applications. Actually, the cumulative cost associated with increasing the size of the universe overcomes the performance improvements seen in the experiment, which can result in reduced performance and consequently degraded performance. Increasing the size of the universe with uncertain quality information is by no means a recommended method.

In summary, our simulation experiments present some important conclusions. In a real investment environment, a 0.10 IC is often considered optimistic but nonetheless seems to be most relevant to the execution of the case in our study. Based on our experiments, we provide the following guidelines.

- 1) Equal weights are better than unlimited optimizations for the level of information that can be achieved, and overall for smaller optimization universes, they are much less risky. Compared to equivalent weights, the poor performance of unconstrained optimization is sufficient to warrant a general avoidance of unconstrained MV optimization in a small space.

- 2) Long dedicated constraints often provide more stable performance improvements than unconstrained optimizations.

- 3) The size of the universe is not a problem beyond a single point and is generally much smaller than the entire universe and much smaller than many

existing investment management practices. If the width of the curve is greater than the horizontal saturation point, there is no additional benefit and only unnecessary costs can be incurred.

Markowitz Portfolio Theory

Markowitz (1953) developed a portfolio model. This model includes not only estimated earnings but also risk levels for specific revenue. Markowitz made the following assumptions about individual investment behaviour:

1. Given the same expected returns, investors choose the least risky investment.
2. The investor measures the risk in relation to the standard deviation or variance of the investment.
3. For each investment, the investor can quantify the expected return on the investment and the return over a specific time period.
4. Investors strive to maximize their usefulness. Because investors make decisions based on the risk and return of the investment, the investor's utility curve is based on risk and return.

Markowitz's study of individual investment behaviour is important not only in looking at individual investments but also in the context of the portfolio. The risk of a portfolio takes under consideration the risk and return of each investment as well as its correlation with other investments in the portfolio. The risk of a portfolio is affected not only by the risk of each investment on the portfolio but also by the correlation of each investment with other investments in the portfolio. A portfolio is considered efficient if it provides investors with higher expected returns with the same or lower risk than other investments (Fama, 1992). An efficient border is a simple plot of an efficient portfolio as described below. Efficient frontiers represent an efficient portfolio in terms of risk and return, respectively, but each efficient portfolio may not be appropriate for all investors.

Recall that profit and risk were the primary goals when establishing investment policies. The investor's risk profile is described by an indifference curve. An optimal portfolio is an efficient boundary line that ties the investor's highest indifference curve. Refer to the Portfolio Configuration Guide, which is an essential step in taking an orderly approach to portfolio building.

CHAPTER 3. IMPLEMENTING AN INVESTMENT STRATEGY

Investment strategy as a source of portfolio performance

Certain investment strategies are needed to define the concept of active portfolio management. Investors trade stocks because they are constrained by personal incentives or consumption and debt, such as a desire for normal return on investment. Therefore, there is no single defined approach to aggressively manage the portfolio, as asset allocation depends on the investment objectives. Therefore, an investment strategy that meets the research purpose is needed. We will adopt two discussion methodologies for strategic and tactical asset allocation concepts and portfolio management in order to establish a strategic system.¹¹

Approved advice on minimizing risk and spreading investments in multiple asset classes to prevent feelings or emotions from controlling the ongoing portfolio allocation process became common knowledge. Nonetheless, the opinions and expectations of individual investors still dominate the decision-making process when they form a portfolio.

According to Peter Sjontoft, identifying investors that outperform benchmarks is not rare or difficult when choosing investors to make investment decisions by choosing stocks, emotions, or randomly. On average, this investor is not a smart investor with extensive market insight but can outperform virtually any benchmark given that stock given during a given investment period performs better than the market for a period of time. Berk (2005) argued that there was little evidence of sustained performance in support of this statement.¹² Next year it is unlikely that investors with good performance over a year will perform. One possible explanation for this is that, as in this case, when the market is down and

¹¹ Schneeweis et.al. (2010): p. 91

¹² Berk (2005): p. 30

sold as positive revenue, the market opens the possibility for lucky investors to buy stocks. These scenarios promote the assumption that investment performance is due to luck rather than skill, and that active portfolio management can be as successful as random portfolio management. For example, Novo Nordisk or Apple may have outpaced most of the indexes a few years ago. It's a good idea to ask if there is a chance that the over-performers will be lucky or skilled, which is higher than the average next year. Based on this, the management skills of the investor will vary depending on the situation, as it is the performance gap between manual and active portfolio management. In this regard, aggressive portfolio returns are driven by investment strategies. An investment strategy builds asset allocation and security selection processes because it determines when to invest to generate positive active revenues.

Strategic Asset Allocation

A strategic asset allocation is a static approach to allocating assets based on long-term dividend estimates. The position of the asset is maintained for the period, so if the asset returns change, the portfolio weight changes accordingly and the investor recalibrates the portfolio by rebalancing the asset weight to its original position.¹³ When you select an asset for portfolio composition, you cannot introduce another asset at any time.

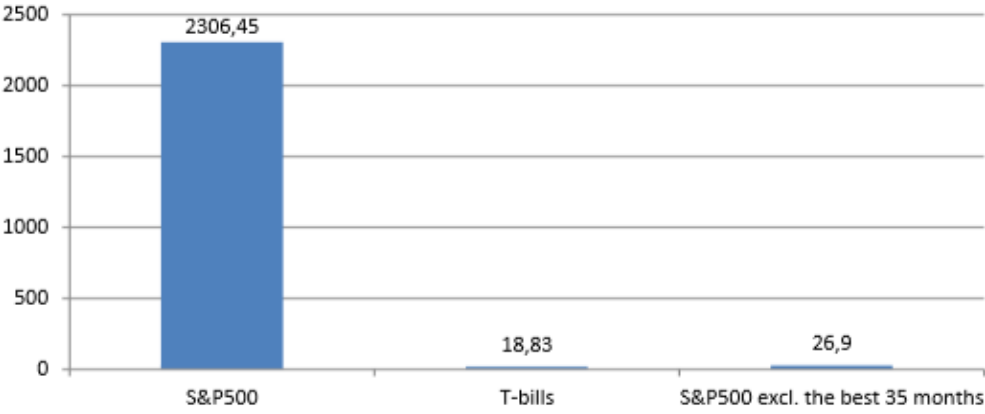
Markowitz's extensive research on modern portfolio theory has brought a dimension, or diversity, to asset management theory. These rewards appear when assets that are associated negatively or independently of each other come together in a portfolio.¹⁴ Strategic asset allocation presents a long-term allocation of assets with such characteristics.

¹³ Schneeweis (2010): p. 99

¹⁴ Markowitz (1959): p.102

The allocation process relies on the assumption that market timing is not appropriate because the market is efficient and the return on investment is abnormal. Conversely, aggressive transactions increase transaction costs and reduce realized revenues to less than expected. Ibbotson Associates conducted the following analysis to illustrate the argument for market timing.

Figure 3.1 How much did a \$ 1 increase from 1926 to 2006?



Source: Johan Christian Hilsted

Figure 3.1 shows that for a period of 35 months, investors who invested \$ 1 in the S & P 500 index in 1926 achieved significantly higher returns than investors who tried to set a market time. As a result, if you try to set a market time, you get almost the same rate of return as the T-bills.

Brinson et al. (1986) conducted an empirical analysis that examined the extent to which investment policy, market timing, and the choice of a particular asset affected deviations in total portfolio revenues. Based on historical data from US pension funds, they examined whether investment decisions had the greatest impact on observed returns and volatility.

The first study was based on data from 1974-1983 and concluded that focusing on a passive strategic asset allocation approach would yield better returns.¹⁵ Passive means maintaining asset position by portfolio rebalancing. According to

¹⁵ Brinson et.al (1986): p. 136

their calculations, portfolio managers who attempted to enter the market or buy certain stocks had lower returns than manual investment strategies. This conclusion emphasizes that asset classes with weighted similarities to the benchmarks represent the largest portion of the portfolio's total return. In other words, Brinson et al (1986) argue that in the long run, it will buy a market portfolio with a fixed asset position that is superior to other portfolio combinations.

In addition to providing better returns, 93.6% of the variance in revenue can be explained by strategic asset allocation. Therefore, in terms of long-term investment, portfolio investment is the best idea in terms of returns, and it has been proven that we do not regularly change our investment position. Also, the resources invested in the investment decisions should be focused on strategic decisions - the determination of the investment opportunities that are set because the risks of the investments can be observed here.

Brinson et al. (1991) conducted a new analysis on behalf of the US pension funds during 1977-1987 to prove these results. They reached the same result as just discussed. During this period, 91.5% of the standard deviation of revenues can be explained in strategic asset allocation. Excess undervaluation Portfolio sectors only 18% of the return variance was explained by the asset allocation of the sector.¹⁶

In addition to explaining the majority of revenue allocations, a strategic approach to asset allocation contributes to a better risk-adjusted return, as opposed to setting market times. This approach provides investors with the potential to earn higher returns with lower risk. It developed an efficient portfolio based on long-term historical data in accordance with Markowitz (1952) portfolio theory.

Tactical asset allocation

¹⁶ Brinson et.al. (1991): p. 45

Unlike strategic asset allocation strategies, other practices within asset allocation take a more aggressive approach to asset management. Other strategies are considered to conduct a thorough investigation of whether active investment management is superior to benchmarking. The main contents of tactical asset allocation are as follows.

According to the strategic asset allocation approach, portfolio changes are an only post-mortem, which means that the investor modifies the portfolio in response to events that arise from rebalancing the asset weight to the initial target weight. Therefore, the initial portfolio composition will change as a result of general market development. For some assets, you should balance your portfolio and recreate the optimal percentage of assets for periods of negative returns. However, asset allocations should be based on expectations of short-term future returns in order to ensure positive active returns. In 1971 William Fouse released the first index fund. His work allowed him to control different asset classes at the same time and this technique was later called tactical asset allocation. When compared to strategic asset allocation, strategic asset allocation is a pre-investment strategy in which the investor actively adjusts the portfolio according to the market's historical development and expectations. Therefore, the dynamic nature of tactical asset allocation should be aggressive. Adjust investment opportunities in response to short-term changes in the economic environment. The objective is to adjust the allocation to take advantage of the temporary market inefficiency.¹⁷

Unlike strategic asset allocation, the investor does not determine optimal asset allocation but adjusts his portfolio according to his expectations for market development. The key to tactical asset allocation is, therefore, to positively position portfolio assets based on changes in expected returns. Therefore, assets with higher expected returns tend to be inverse to the set of remaining

¹⁷ Schneeweis (2010): p. 101

opportunities, and assets with lower expected returns are less desirable. The main source of advantages and popularity of tactical asset allocation is the combination of Graham and Dodd's value investment strategy with Markowitz's modern portfolio theory.

Graham and Dodd's value investment concept was an aggressive investment strategy. Investors look for undervalued shares with low price returns. Markowitz, on the other hand, considers investment within a certain period of time, so only the market portfolio can be considered a risky portfolio. Through tactical asset allocation, these two strategies can be combined into one, enabling proactive management, which will result in superior revenues.

Expert Review on Asset Allocation

As discussed above, there is no doubt that strategic asset allocation constitutes an associated investment strategy and has the advantages of a predetermined long-term investment horizon. From the perspective of an active investor, however, strategic asset allocation appears to be an appropriate investment strategy because it relocates the portfolio periodically according to investor expectations. When building an optimal portfolio, investors remain unaware of the extent to which they follow a strategic or tactical approach or even both. The following includes a review of Claus Vorm's assessment of the asset allocation process and emphasizes how Nordea Investment Management applies portfolio theory.

Regarding a balanced portfolio, initial asset allocation is based on strategic asset allocation and consistent long-term investment decisions. The asset allocation process begins with a balanced level of interest rate structure, inflation rate, and so on. In these estimates, Nordea seeks to determine the long-term risk premium for each stock selected. Equilibrium expectations enable the projected revenue calculations for strategic base periods to be within a business cycle of approximately 10 years.

Nordea then initiates the optimization by allocating funds to stock-undervalued shares that are considered to be below long-term equilibrium. Based on this, it is reasonable to establish a strategy to compare the state of the economy with the long-run equilibrium. Claus Vorm believes that strategic analysis is valuable in creating a highly diversified optimal portfolio based on expected returns and covariances of assets. Clearly, like other portfolio models, this method has pitfalls, but Claus Vorm believes that the results of these models combined with investor common sense can create a strong diversified portfolio.

Claus Vorm, on the other hand, believes that this can be used to allocate tactical assets. Stocks are expensive when considered in strategic asset allocation, but may need to be priced lower before returning to equilibrium. So Nordea has to buy stocks two months later.

An important conclusion here is that strategic and tactical asset allocation does not necessarily have to be in the same investment strategy. We implement long-term investment strategies with changes in short-term portfolio positions within the boundaries of predetermined risk parameters. This approach can add value and relocate the portfolio tactically in terms of allocating funds on a strategic long-term basis. As portfolio assets are regularly relocated, strategic and tactical approaches are implemented in a balanced portfolio. Claus Vorm suggests that balancing assets within the determined boundaries is a useful strategy. Portfolio assets can be reassessed $\pm 20\%$ of the initial portfolio weight per month.

Strategic and tactical asset allocations are all implemented as part of an investment strategy with a balanced investment strategy. Strategic asset allocation provides benefits in terms of limiting the investment opportunities that can be periodically relocated in accordance with strategic asset allocation.

Benchmark and Investment Opportunities

Choosing a benchmark is crucial in determining the success of your investment strategy. In addition, investment opportunities must be carefully considered because they require a more attractive investment compared to the benchmark.

Benchmark

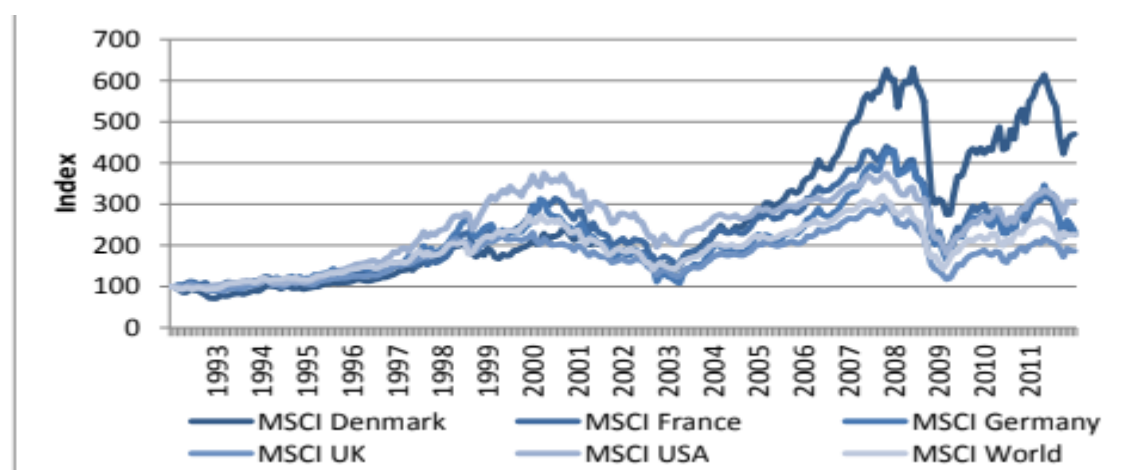
If a small index is used as a benchmark indicator, investors should consider domestic market dominance based on market capitalization. On the other hand, the same scenario can occur in small to medium-sized European markets that have a significant impact on exponential development due to rising market cap.

You have to take high market risks. Peter Sjøntoft suggests that investing in high beta stocks is one way to actually achieve high returns, but investing in low-beta stocks with low yields is not a smart investment decision because of its high returns. As Claus Vorms mentions about portfolio construction, it can generate profits by choosing different stocks at systematic risk levels and build a portfolio with systematic risk at a level justified by revenue realization based on this input data can. Stock options are determined and limited by investment opportunities.

Investment Opportunities

Active portfolio management typically changes portfolio asset position and compares portfolio performance to the overall market, such as Dow Jones, which comprises the S & P 500 or a multinational corporation. Therefore, the shares included in the portfolio and benchmarks are the same, and potential excess returns are generated by changing the asset position of the portfolio. Since the market is relatively small in terms of capitalization, few companies dominate each industry and, in some cases, few companies dominate the entire market.

Figure 3.2 Selected Country Indices (92M1=100)



Source: Johan Christian Hilsted

The high correlation and market capitalization of these companies appear to be attributable to these stocks when the industry or market changes. It is difficult to manage the portfolio effectively if it has a narrow diversification opportunity and it has a big impact on benchmark development. Therefore, we need broader investment opportunities for active portfolio management.

Seek international opportunities

Variations in a variety of assets provide investors with return volatility in the portfolio and reduce risk. To achieve portfolio optimization, an investor must assign a different asset class to the portfolio. According to Litterman (2003), investors need to consider other markets in order to find the independence between assets and reduce the risk of the portfolio. Markowitz (1959) also argues that it is important to consider different types of sectors and industries in order to achieve optimization at the international level. Therefore, the most profitable way to allocate assets is to invest worldwide. Portfolio optimization traditionally requires independence among the various asset choices, so assigning assets to different types of sectors and industries appear to be beneficial in achieving optimization. When investing in common stocks, investors tend to categorize the vast stock universe based on common business lines and classify them within the business line. One way to split this stock universe is to provide a classification for

industrial companies, financial institutions and other industries. Another classification system separates the US and foreign common stock. The industry split has avoided the latter sector because it is more useful when constructing a global common stock portfolio. Classifying stocks by industry rather than geography can provide a more comprehensive picture of enterprise-level performance. You can easily identify which stocks perform better than other stocks because you can react to global macroeconomic events as well as individual sector events. As a result, revenue patterns are assumed to evolve somewhat differently, so you can identify opportunities for diversification. The focus in the global capital markets should include all companies in the industry when viewed in a global environment. Broad market integration supports this decision by reducing the importance of the geographic location of key enterprises and better characterizing sectorial locations.

Establish an investment strategy

In addition to Claus Vorm's view of aggressive portfolio management, given the strategic and tactical asset allocation benefits, the investment strategy combines two different allocation methods with respect to investment opportunities. The process of actively managing a portfolio is a short-term process that can be compared with tactical asset allocation, but Brinson et al. (1986, 1991), based on the results of extensive empirical studies. As a result, long-term investment opportunities are limited, but they are traded in the short term and are allocated to portfolios based on expected returns and covariance with other sectors. Figure 3.1 constitutes the application elements of the investment strategy.

Asset allocation is considered a recurring process from a long-term perspective because it is imperative to implement continuous strategic asset and asset allocation to define the different stages of the asset allocation process. Figure 3.3 shows this strategy. The repetitive nature of the asset allocation process implies active portfolio management.

Figure 3.3: Investment Strategy

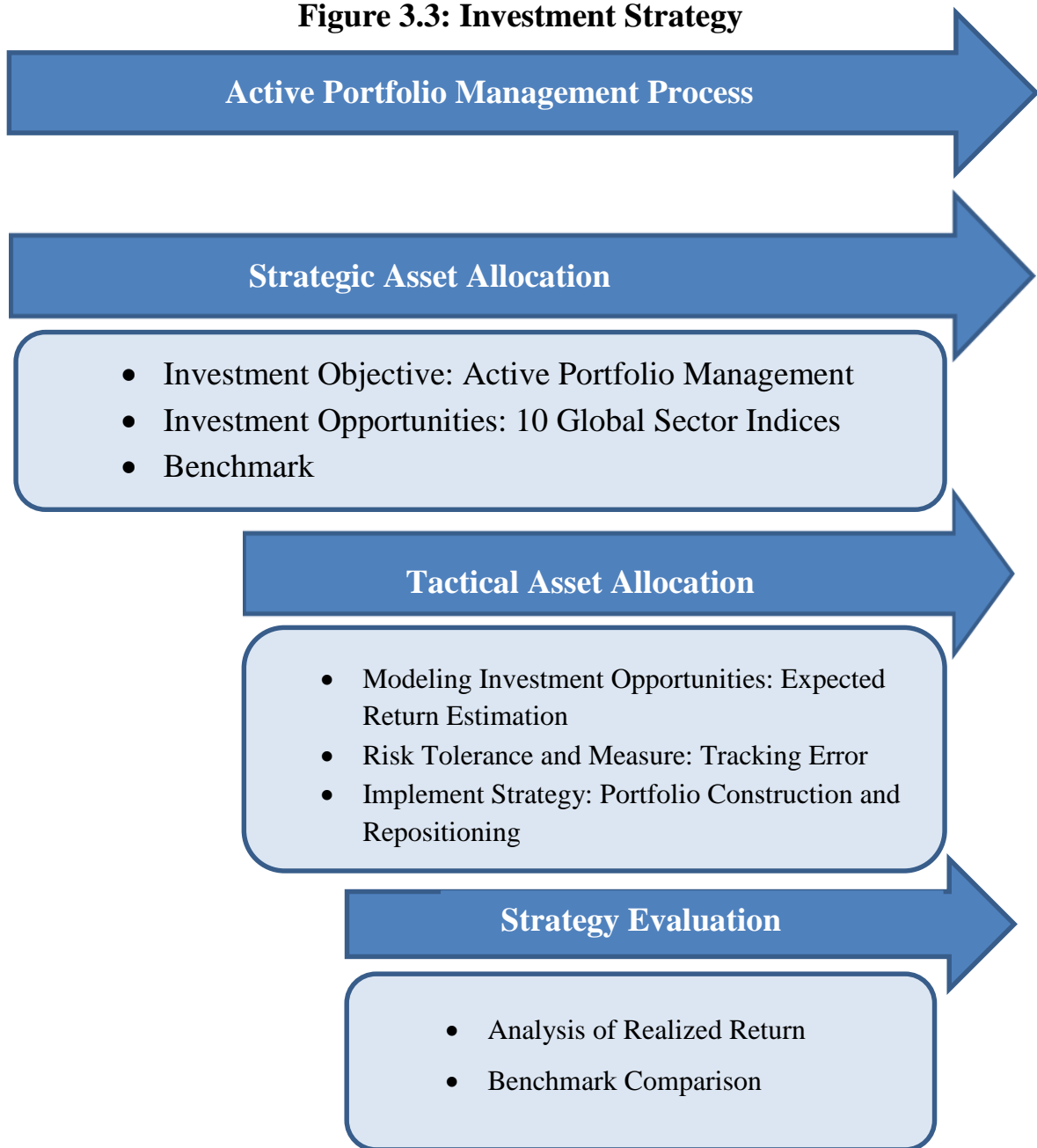


Figure 3.1 illustrates the four steps of the investment strategy, each introduced in different stages of the process and thus, is of different lengths. It starts with strategic asset allocation. It is considered the most important part of the success of the investment strategy. It defined the investment objective and the investment opportunity set. Thus, strategic asset allocation is based on a long-term focus. Therefore, this part of the strategy has a much lower frequency in terms of asset allocation.

The next step is the modelling of investment opportunities. For frequent portfolio construction if the investment opportunities do not comply with the investment objective, i.e. if they are expected to deliver a negative active return, they are excluded from the portfolio at that given time. In that manner, the new information about the involvement of the prices of the different sectors compared to the benchmark is incorporated in the optimization problem, i.e. the model parameters are updated and portfolio repositioning is conducted under the constraints of the investors risk tolerance in addition to the absence of short sale and financial gearing.

The final step involves the evaluation of the portfolio positions and analysis of its performance in comparison to the benchmark. No alterations are made from this point as the mean-variance model ensures no violation of the investment constraints and the portfolio construction is conducted with no regards to the transaction costs, as they are deducted from the realized portfolio return.

CONCLUSION

The aim of this research is to determine the four investment strategy principles associated with formulas such as frequent trading, large-scale stock universes, adding predictive factors, and removing constraints are invalid and usually self-destruct. Grinold's "law" is not a law and does not help you make better investments. Beyond that point, the universe size and additional elements are irrelevant. It is also a good idea to avoid unrestricted MV optimization strategies. The following are the necessary conditions for winning a sure win in an

investment game. 1) Investment in critical information about assets in the optimization world. 2) economically meaningful constraints; 3) We have implemented portfolio optimization techniques that are sensitive to estimation errors.

The Grinold square law is a theoretical construct that does not take into account the effects of estimation errors on MV portfolio optimization. Almost 25 years of academic and practitioner research groups based on formulas and extensions are not valid. Many hedge funds, long and short strategies, and the rationality of investing in unlimited strategies are likely to be invalid. The implications of applying the Grinold law can have a negative impact on the AUM above \$ 1 trillion in current practice. Many of the laws and the laws of physics must remain somewhere without being precisely maintained. However, "fundamental law" is not a failure because it is not an approximation, it is based on a fundamentally defective system for practical asset management and should no longer be learned or used for practice.

The roots of the failure of the Grinold formula affect much of the 20th-century finance, statistical science and much more. It is the result of the assumption of a known probability distribution similar to the use of analytical methods and the certainty of casino games. Grinold is just one example of modern science about fundamental and ubiquitous errors associated with inference in sample statistics and fixed probability models as a whole measure of uncertainty.

The overall conclusion of this paper is as follows: An active portfolio management investment strategy can provide inferior returns on investments in other countries. Selecting and applying the right strategy is considered to be the most important factor. However, portfolio returns are inferior to benchmarks because they require systematic risk to maintain high levels of return on a benchmark while maintaining some level of systemic risk. Also, if system risk for a given portfolio exceeds the benchmark system risk, portfolio returns are

positively significant in this case. In this regard, active portfolio management adds value to investors.

Strategic Road Map on Development of Financial Services in the Republic of Azerbaijan, approved by the Decree of the President of the Republic of Azerbaijan No 1138 dated December 6, 2016 "On Approval of Strategic Roadmap for National Economy and Major Sectors of Economy" and "Development of the securities market in the Republic of Azerbaijan in 2011-2020" important work has been done to ensure the development of this infrastructure in the framework of the adopted State Program. As a continuation of these measures, the development of a package of proposals for the preparation of a financial asset management specialist can be considered appropriate. In other words, it is unambiguous that the level of expertise in the context of outsourcing has a significant positive impact on the development of the field.

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