Norwegian School of Economics

Bergen, Fall 2024

Chasing Superior Returns

An Analysis of the Norwegian Stock Market: Does a dividend yield strategy outperform the market in the long-term?

Kristine Hisdal Nautnes and Caroline Bao Han Vo

Supervisor: Ole-Andreas Elvik Næss

Master thesis, Economics and Business Administration
Major: Financial Economics

NORWEGIAN SCHOOL OF ECONOMICS

Abstract

High dividend yields are often associated with strong performance in stock markets, as companies paying higher dividends tend to generate stable returns. The relationship may vary between different markets, and this study investigates whether this holds true for the Norwegian stock market. Four portfolios were constructed based on dividend yield levels of 0%, 0-2.5%, 2.5-4%, and above 4% to evaluate their performance relative to the OSEBX. This analysis covers a 21-year period from 2003 to 2023, encompassing various economic cycles, including the Financial Crisis and the Covid-19 Pandemic.

Our findings indicate that the portfolio with a low to moderate dividend yield of 0-2.5% have delivered the strongest performance, outperforming all the other portfolios and the OSEBX. The portfolio with no dividend payout has underperformed compared to the other portfolios with dividends and the OSEBX. This underperformance is not compensated for by lower risk, as the portfolio continues to exhibit weaker performance even when adjusted for various risk measures. However, it is important to note that the majority of these results were not statistically significant, suggesting that dividend yield alone is not a reliable predictor of long-term investment success. This underscores the complexity of portfolio performance, highlighting that factors such as market conditions, economic cycles, and portfolio composition play a more significant role in driving consistent success over time.

Acknowledgments

This master thesis was written in the fall of 2024 as the final part of the master program in Economics and Business Administration at the Norwegian School of Economics, specializing in Financial Economics.

The process has been both exciting and demanding, allowing us to acquire a wealth of new knowledge. This thesis reflects our strong interest in dividend-paying companies and their role in portfolio performance. Our fascination with how dividends influence investment strategies and their potential to generate stable returns over time inspired us to explore this topic in depth. Writing this thesis has allowed us to delve into a subject we are passionate about while also broadening our understanding of financial markets and investment dynamics.

The thesis required significant time to gather and process the data, as well as to construct the portfolios. We used "R" and "Excel" to process and analyze the data. Having had little prior experience with "R," the learning curve was steep and challenging, but also incredibly interesting and rewarding.

We would like to extend a special thanks to our supervisor, Ole-Andreas Elvik Næss, for his excellent support and guidance throughout the process. We also wish to thank Robert Næss for his valuable input on portfolio construction. Finally, we would like to express our gratitude to the IT department at NHH for providing the necessary access to gather the data.

Norwegian School of Economics

Bergen, December 2024

Kristine Hisdal Nautnes | Caroline Bao Han Vo

Contents

List of Figures

List of Tables

1. Introduction

1.1 Introduction to the research topic

"*Of the 30 most traded stocks on DNB Markets' online trading platform since the beginning of 2020 through April 2023, 1 in 3 can be defined as dividend stocks*" (Olaussen, 2024a). This statistic underscores the growing appeal of dividend-paying stocks among investors, reflecting a broader trend in the global financial markets. Dividend-paying stocks have gained significant popularity among investors over the past decade, especially during periods of economic uncertainty. Their appeal lies in providing reliable income and potentially lower volatility compared to non-dividend-paying stocks. A study by Coeffin (2022) has shown that during episodes of market volatility, dividends can offer a cushion for investors, helping to offset stock price depreciation. In decades where annualized returns were less than 10%, dividends contributed an average of 76% of the total return for the S&P 500. An intriguing question is whether this trend also holds true for the Norwegian Stock Market, which is considerably smaller and less diverse than the American Stock Market. By examining portfolios ranging from non-dividend-paying stocks to high-dividend-yield stocks, we aim to determine whether dividend-focused strategies deliver superior returns over the long-term. With this thesis we aim to answer the following question:

Does a dividend yield strategy outperform the market in the long-term and during periods of economic crisis?

By studying a 21-year period from January 2003 to December 2023, analyzing 196 companies, we aim to uncover insights into how non-dividend and dividend-paying stocks have performed compared to the broader market. Four portfolios were constructed based on dividend yield of 0%, 0-2.5%, 2.5-4%, and above 4% and rebalanced annually to reflect updated market conditions. To provide a comprehensive analysis, both market-weighted and equal-weighted methodologies were employed, offering insights from practical and theoretical perspectives. The study further evaluates the resilience of these portfolios during significant economic disruptions, including the Financial Crisis and the Covid-19 Pandemic, to assess their performance across varying market conditions.

To evaluate whether a dividend yield strategy outperformed the broader market, we employed a comprehensive performance analysis methodology to measure long-term performance. Performance was evaluated using robust metrics, including Sharpe ratio, Treynor ratio and Jensen's alpha, which collectively assess returns relative to risk. To validate the statistical significance of the results, we applied Wilcoxon Signed-Rank Tests and T-tests, ensuring rigorous evaluation of the observed differences between the portfolios and OSEBX.

The findings reveal that Portfolio 2, representing low to moderate dividend yield of 0-2.5%, consistently delivered superior results across performance metrics, indicating that higher dividends do not necessarily lead to better performance. Stocks that do not pay dividends exhibited the lowest returns, and this underperformance is not compensated by lower risk. Even when accounting for risk-adjusted measures, this portfolio continue to deliver the weakest results. Although several of the dividend portfolios outperformed the OSEBX in terms of total performance, the OSEBX delivered a higher Sharpe ratio due to the diversification benefits of holding the entire market. Even when consolidating all dividend-paying stocks into a single portfolio, they fail to outperform the market. This is further underscored by the fact that the majority of the tests do not show statistically significant outperformance relative to the market.

The thesis is structured as follows: Section 2 provides an overview of dividend stocks and the Norwegian Stock Market, including key concepts and market characteristics, along with an exploration of the Financial Crisis and the Covid-19 Pandemic. Section 3 reviews literature and theoretical frameworks related to our research question. Section 4 outlines the research methodology used to evaluate performance and limitations. Section 5 presents the findings and discussion, before we conclude and present the main findings along with future research.

2. Background

2.1 Dividend and dividend stocks

A dividend is a portion of a company's profit that is distributed to its shareholders as a direct return on their investment (Nordnet, n.d.-b). This allocation represents a critical decision point for companies: whether to reinvest earnings into the business to fuel growth or distribute them as dividends to reward shareholders. Dividends are most commonly paid in cash, where shareholders receive a set amount per share owned. However, some companies opt to distribute dividends in the form of additional shares, known as stock dividends, allowing investors to increase their holdings without incurring additional costs. The frequency and amount of dividend payments vary, with most companies adhering to a quarterly, semi-annual, or annual schedule. These decisions are typically approved by the board of directors and reflect the company's financial health, growth prospects, and commitment to shareholder value (Olaussen, 2024a, 2024b). The stability and predictability of dividend payments often serve as a signal of strong governance and consistent profitability, making dividends an essential component of corporate financial strategy (Grullon et al., 2002).

Dividend stocks are shares in companies that regularly pay dividends to their shareholders, offering a dual benefit of income generation and potential capital appreciation. These stocks are particularly attractive to investors seeking a steady income stream, such as retirees or those looking to reinvest dividends for compounded growth. Companies that pay dividends are often mature and financially stable, operating in established industries with predictable cash flows (Olaussen, 2024a). Examples include sectors such as utilities, consumer staples, and financials, where growth opportunities are moderate, and surplus profits are distributed to shareholders.

2.2 Oslo Børs

Oslo Børs is Norway's only stock exchange, a regulated marketplace for trading stocks, bonds, and other financial instruments. The exchange was established in 1819 and has since evolved into a central institution in the Norwegian Financial Market (Gram, 2024). Today, Oslo Børs is part of the Euronext Group, a major European stock exchange operator. The total market value of Oslo Børs is nearly 4 trillion NOK, with the 10 largest companies accounting for 60% of the total market capitalization. Including the next 10 largest companies raises this figure to 73% of the exchange's total value. For perspective, the value of the Norwegian Oil Fund is approximately 3.5 times greater than the total value of Oslo Børs (AksjeNorge, 2023). The exchange comprises several indexes, with this study focusing on the Oslo Benchmark Index (OSEBX), which will be further detailed in part 4.2.1.

2.3 The Financial Crisis and Covid-19 Pandemic

The 2008 Financial Crisis, triggered by the collapse of the U.S. housing market and the subsequent bankruptcy of Lehman Brothers, had a significant impact on global stock markets. The Norwegian Stock Market fell by 58.56% between May and December 2008, with key sectors such as oil, gas and shipping significantly impacted by reduced demand. Norges Bank acted quickly by providing liquidity to the market through loans and cutting interest rates. Although the crisis caused significant short-term losses, Norway's strong economy, welfare system and monetary policies helped avoid a deeper crisis (Norges Bank, 2008).

The Covid-19 Pandemic, caused by the coronavirus, was a global health crisis that emerged in early 2020, leading to widespread economic disruptions and societal challenges (World Health Organization, 2020). The crisis had a profound impact on global stock markets, including Norway where the market fell 31.98%, characterized by sharp declines and extreme volatility in early 2020. The oil and energy sector was also heavily impacted here as oil prices declined significantly (Nordea, 2024). The Norwegian government implemented extensive stimulus packages to stabilize the economy and support the stock market. Measures included financial aid to businesses, loan guarantees and liquidity injections helped restore investor confidence and contributed to the recovery of the Oslo Stock Exchange (Norges Bank, 2021).

3. Litterature Review

This section presents key financial theories, offering diverse perspectives on how investors develop investment strategies, manage dividends, and respond to market dynamics. We explore topics such as the distinctions between active and passive strategies, the implications of dividend yield, market efficiency, and the relevance of portfolio theory. Furthermore, the lifecycle and valuation of dividends are discussed to highlight their role in corporate strategy and shareholder value. In addition, theories on dividend irrelevance and signaling are examined to understand how firms navigate information asymmetry and influence investor perceptions. Finally, we review existing literature on the performance of dividend-paying stocks during crises.

3.1 Investment Strategy

An investment strategy is a crucial decision that outlines the allocation between different asset classes while also reflecting your investment horizon, risk tolerance, and financial goals. The strategy serves as the foundation for how funds are allocated and managed over time, ensuring a balance between risk and return (Nordnet, n.d.-a).

3.1.1 Active and Passive Investment Strategies

Active and passive investment strategies represent two distinct approaches to portfolio management, each with unique objectives, costs, and risk profiles. Active management focuses on outperforming the market through stock selection and analysis, while passive management aims to replicate market returns at lower costs (Korterud, 2022). A study by Malkiel (2003a) concludes that passive investment strategies are highly effective across all types of markets and outperform actively managed funds primarily because of their significantly lower costs. Over long periods, the majority of actively managed funds fail to outperform passive index funds. 71% of actively managed equity funds underperformed the Vanguard S&P 500 Index Fund over a 10-year period ending in 2001. Further, Amundi Asset Management explores the benefits of combining active and passive investment strategies within multi-asset portfolios. The research suggests that active management can add value in inefficient markets or during periods of market dislocation, while passive management offers cost-effective exposure in more efficient markets (Taze-Bernard & Germano, 2021). By integrating both approaches, investors can tailor theire portfolios to align with specific objectives and market conditions, potentially enhancing overall performance.

3.1.2 Dividend Yield Strategy

A dividend yield strategy is an investment approach centered on selecting stocks based on their dividend yield. Higher dividend yield reflects a greater income relative to the stock price, making it particularly appealing to income-focused investors. Meanwhile, a moderate payout ratio indicates that the company is effectively balancing the reinvestment of profits for growth with providing consistent returns to shareholders (VanEck, 2023)

Within the broader framework of dividend yield strategies, the high dividend yield strategy focuses on identifying stocks with above-average dividend yields to achieve superior returns through both income and capital growth. Fakir (2013) analyzed this strategy in the South African stock market from 2004 to 2012, finding that high-yield portfolios outperformed low-yield portfolios after adjusting for risk and taxes, aligning with earlier studies by McQueen et al. (1997) and Dimson et al. (2002). Similarly, Qiu et al. (2013) demonstrated that the "Dogs of the Dow" (DoD) strategy, selecting the 10 highest dividend-yielding stocks, outperformed the Nikkei 225 in Japan from 1981 to 2010, with statistically significant results. However, other research, such as Kim (2019), challenges the reliability of the DoD strategy, showing that it did not consistently outperform an equally weighted portfolio in the U.S. market from 2000 to 2017 when accounting for trading costs and taxes. These studies suggest that while dividend yield strategies can succeed in certain contexts, their effectiveness varies across markets and time periods.

3.1.3 Why do investors seek dividend stocks?

Dividend stocks provide regular cash payments, which are attractive to investors seeking a steady and consistent income stream. This is particularly appealing for those looking to reinvest dividends to build wealth over time. Dividend stocks can also offer some protection against market volatility, as regular payments provide investors with a return even when stock prices are weak.

Dong et al. (2005) conducted an empirical investigation into the motivations behind individual investors' preferences for dividends, utilizing survey data from Dutch investors. The study identifies transaction costs as a key factor influencing these preferences, with investors viewing dividends as a more cost-effective means of accessing returns compared to selling shares. The findings provide robust empirical support for signaling theories, which posit that dividend payments serve as credible indicators of management's confidence in the firm's future performance. Conversely, the results challenge the validity of agency cost theories and the uncertainty resolution hypothesis in explaining dividend preferences. Additionally, the study reveals that investors primarily reinvest dividend income rather than consuming it, casting doubt on the effectiveness of dividend tax reductions as a mechanism for stimulating economic activity. By integrating insights from signaling and transaction cost perspectives, this research contributes to a more comprehensive understanding of the dividend puzzle and its implications for corporate payout policies.

Jain (2007) explores the differing preferences between institutional and individual investors regarding dividends and share repurchases. The findings reveal that individual investors tend to prefer high-dividend-yield stocks and firms that pay dividends, as these provide a steady income stream. This aligns with their financial goals, particularly for retirees or those seeking predictable returns. In contrast, institutional investors, who often have lower tax liabilities and access to sophisticated investment strategies, prefer low-dividend-yield stocks and are more inclined toward firms that engage in share repurchases. This preference is largely driven by tax efficiency, as share repurchases offer capital gains, which can be deferred and are often taxed at a lower rate than dividends. Additionally, institutional investors value the flexibility of share repurchases, which avoid the signaling risks associated with dividend cuts, and align better with their focus on total return rather than immediate income.

3.2 Efficient Market Hypothesis (EMH)

Fama (1970) established the foundation for understanding efficient capital markets by introducing the framework of the "Efficient Market Hypothesis" (EMH). According to this framework, financial markets are "efficient" in the sense that stock prices always reflect all available information. This implies that stocks are always traded at their fair value on exchanges, making it impossible for investors to take advantage of arbitrage opportunities. Fama identifies three levels of market efficiency, based on the extent to which information is reflected in stock prices (Fama, 1970):

1. **Weak form efficiency** asserts that prices already reflect all historical price and volume data, rendering technical analysis ineffective.
2. **Semi-strong form efficiency** incorporates all publicly available information into prices, making fundamental analysis unlikely to generate consistent outperformance.
3. **Strong form efficiency** implies that prices reflect private or insider information, implying that no investor can consistently earn abnormal returns.

Empirical study by Ball and Brown (1968, p.150) provides robust support for the EMH. They demonstrated that stock prices begin to adjust to earnings expectations before official announcements, indicating that markets efficiently incorporate publicly available information. Their findings align with the semi-strong form of EMH, showing that unexpected earnings significantly influence stock prices, further validating the hypothesis. The common belief today is that well-functioning markets operate largely under semi-strong market efficiency. This is because some insider information will always exist and remain accessible only to a select few (Gårseth-Nesbakk, 2023).

Despite the broad support for the theory of market efficiency in the financial world, it has also faced criticism. A significant portion of this criticism stems from questions about the rationality of investors and the psychological biases they exhibit, as highlighted by Kahneman and Tversky in behavioral economics. Their work demonstrated how cognitive biases and heuristics can lead to irrational decision making, challenging the assumption of fully rational market participants that underpins efficient market theory (Kahneman & Tversky, 1979). Furthermore, studies have identified market anomalies, such as the January Effect, which challenge the efficient market hypothesis. Haug and Hirschey (2006) examined this anomaly using data from 1802 to 2004, finding that abnormally high January returns are primarily observed in small-cap stocks. The study supports the notion that behavioral factors, such as individual investors' buying and selling patterns at the turn of the year, contribute significantly to the January effect. Notably, the January Effect persists as a statistically significant anomaly in equal-weighted returns, despite tax law changes and extensive academic scrutiny. In contrast, Malkiel (2003b) highlights that, while market anomalies and behavioral biases exist, they are insufficient to disprove the fundamental premise of the EMH, that stock prices reflect all available information, making it difficult for investors to consistently achieve abnormal returns.

3.3 Markowitz Portfolio Theory

Harry Markowitz's modern portfolio theory, a cornerstone of modern finance, introduced the principle that investors should aim to maximize expected returns while minimizing risk through diversification. By spreading investments across various assets that are not perfectly correlated, investors can significantly reduce unsystematic risk, which is associated with individual stocks or sectors. Markowitz's theory emphasizes that a well-diversified portfolio mitigates unsystematic risk by eliminating it through diversification. This contrasts with systematic risk, which affects the entire market and cannot be diversified away. This approach aligns with his concept of the efficient frontier, which represents portfolios offering the optimal balance between risk and return, making them ideal for investors seeking to optimize performance (Mangram, 2013; Markowitz, 1991).

Frank Reilly and Keith Brown (2003, p.213) point out that approximately 90% of the benefits of diversification can be achieved with just 12-18 stocks, as long as these stocks are equally weighted in the portfolio. This demonstrates that it is not necessary to hold a large number of stocks to benefit from diversification. The finding aligns closely with Markowitz portfolio theory, which emphasizes the importance of diversification in reducing unsystematic risk. It is also argued that holding a larger number of stocks can make it impractical to monitor each individual investment, which is one of the reasons many investors prefer funds.

Despite the significant influence Markowitz's theory has had on the financial world and the way investors structure their portfolios, the theory has faced criticism. The critique primarily revolves around the assumptions underlying the theory, which do not always hold true in the real world. For instance, it assumes that investors are always rational and that markets are efficient, which is not always the case if we look at theories in behavioral economics (Mangram, 2013). Elton and Gruber (1977) argue that while Markowitz's framework suggests the ideal scenario of holding a market portfolio for maximum diversification, transaction costs and diminishing marginal risk reduction imply that smaller, well-selected portfolios can often achieve near-optimal results. This nuance underscores the need to balance diversification benefits against practical considerations like cost efficiency, aligning their findings with a critical yet constructive view of modern portfolio theory.

3.4 Lifecycle and Valuation of Dividends

The lifecycle and valuation of dividends provide a framework for understanding how companies grow, allocate resources and create value over time. These concepts explore how firms transition through stages of growth, maturity and decline, and how these stages influence financial decisions, including dividend policies and valuation approaches.

3.4.1 Dividend and Growth Stocks: A Lifecycle Perspective

The life cycle theory of dividends provides a comprehensive framework for understanding the distinction between non-dividend-paying (growth) stocks and dividend-paying (income) stocks. According to this theory, a company's dividend policy is closely aligned with its stage in the corporate lifecycle. Growth stocks, typically younger companies, prioritize reinvestment of profits into the business to capitalize on abundant investment opportunities. These firms typically exhibit high growth rates and limited retained earnings, making them less likely to distribute dividends. In contrast, income stocks are generally mature companies with stable cash flows and fewer attractive growth opportunities. These firms accumulate substantial retained earnings over time, allowing them to self-finance operations and prioritize returning excess profits to shareholders through dividends (DeAngelo et al., 2006).

DeAngelo et al. (2006) empirically demonstrate the lifecycle dynamic, showing that the proportion of retained earnings relative to total equity $\left(\frac{RE}{TE}\right)$ is a strong predictor of a firm's propensity to pay dividends. Firms with lower $\frac{RE}{TE}$-ratios are significantly less likely to pay dividends, as they are typically in the growth stage of their lifecycle. These companies prioritize reinvesting earnings into future growth opportunities rather than distributing profits to shareholders. In contrast, firms with higher $\frac{RE}{TE}$-ratios are more likely to transition to the distribution stage, where they cater to income-oriented investors by providing steady returns through dividends. This distinction between growth and income stocks reflects differing investor preferences, with growth-oriented investors seeking capital appreciation, while income-oriented investors value consistent dividend payments.

3.4.2 The Dividend Discount Model (DDM)

The Dividend Discount Model (DDM) is a method for valuing stocks based on the present value of future dividend payments. This model rests on the principle that the value of a company is the sum of all its future dividends, discounted to today's value. If the value calculated using the dividend model is higher than the current market price of the stock, it indicates that the stock is undervalued. The opposite applies if the value is lower than the trading price. The cash flows generated from a company's operations serve as a critical indicator of its financial health and play a central role in determining its stock price. For dividend-paying companies, these cash flows are partially distributed as dividends, which, under the dividend discount model, are a key measure of the company's intrinsic value. The most well-known formula for the dividend discount model is the Gordon Growth Model (Mwangi, 2017):

$$P_0 = \frac{DIV_1}{r - g}$$

Where: P_0 = Today's share price, DIV_1 = Expected dividend next period, r = Discount rate and g = Annual dividend growth.

The model suggests that an increase in dividends leads to a higher stock price, while a decrease in dividends results in a lower stock price. Empirical support for this relationship is found in several studies. Grullon et al. (2002) analyzed over 7,000 dividend changes between 1967 and 1993 and found that increased dividends systematically reduce risk and thus the required rate of return, resulting in higher stock prices. Conversely, when dividends decrease, systematic risk and the required rate of return increase, leading to lower stock prices.

DDM offers a widely accepted method for valuing stocks by calculating the present value of future dividends. However, Ma et al. (2023) highlights significant limitations of the DDM, which challenge its practical applicability. The authors emphasize that forecasting dividends into the distant future is inherently uncertain, making the model less reliable, particularly for companies with volatile or unpredictable dividend policies. This limitation arises because the DDM assumes a consistent dividend stream, which rarely aligns with the realities of fluctuating company performance and economic conditions.

3.5 Dividend Irrelevance Theory

The Dividend Irrelevance Theory was first introduced by economists Franco Modigliani and Merton Miller in 1961 and is a part of the Modigliani-Miller theorem. This theory in corporate finance asserts that a company's dividend policy does not affect the value of the company, provided there are no taxes or other market imperfections. The dividend irrelevance theory posits that a company's market value and stock price are primarily determined by its earnings capacity, growth potential, and risk, rather than dividend payments. The theory suggests that dividends offer no additional benefit to investors, as shareholders can replicate their preferred cash or reinvestment outcomes by buying or selling shares. However, the theory assumes perfect market conditions, which are often unrealistic due to factors such as taxes, transaction costs, and information asymmetry (Miller & Modigliani, 1961).

Empirical research on the relationship between dividend yield and stock returns has produced mixed results, offering different perspectives on the theory's applicability. Supporting the irrelevance hypothesis, Black and Scholes (1974) analyzed the effects of dividend yield and dividend policy on stock prices and returns. Their findings showed no systematic evidence to suggest differences in expected returns between high- and low-yield stocks, either before or after taxes. Their findings highlighted three main factors influencing this relationship. First, the tax effect, where investors with varying tax situations may have preferences for high- or low-yield stocks. Second, the diversification effect, which suggests that concentrating a portfolio on either high- or low-yield stocks reduces diversification and increases risk. Finally, the uncertainty effect, where both investors and corporations lack clear evidence on how dividend yield impacts stock returns, leading them to often disregard dividend yield as a key factor in decision-making. These results align with the dividend irrelevance theory, emphasizing that dividend yield alone should not drive investment strategies or corporate policies.

In contrast, Corzo Santamaría et al. (2014) found evidence that challenges the irrelevance theory. Their study of European and Spanish markets from 2000 to 2009 identified a inverted U-shaped relationship between dividend yield and stock returns. Portfolios with moderate dividend yields (0–4%) achieved higher returns and lower risk compared to portfolios with no dividends or very high yields (above 4%), which exhibited greater risk. The superior Sharpe ratios of moderate-yield portfolios underscored their superior risk-adjusted performance. These findings suggest that dividend policy can significantly influence returns within specific yield ranges, contradicting the claim that dividend yield is irrelevant to a company's value. This study highlights the relevance of dividend policy as a critical factor in portfolio construction, particularly for investors seeking optimal risk-return trade-offs.

3.6 Signaling Theory

For dividends, three dates are significant: the declaration date, the ex-dividend date, and the payment date. On the declaration date, the market learns two key pieces of information: the amount of the dividend or any potential increase, and management's view of the company's situation and outlook (Bergh, 2020, p. 113). The Signaling Theory suggests that a change in dividend policy conveys information about changes in future cash flows. The theory is further based on the concept of asymmetric information between management and investors. The higher the level of information asymmetry, the more sensitive dividends become to the company's future prospects. Several empirical studies have attempted to test the informational content of dividend changes (Dionne & Ouederni, 2011).

A notable example of dividend signaling and investor reaction is General Electric's (GE) dividend cut in 2009, its first since 1938, during the financial crisis. The decision led to frustration among investors who had relied on GE's stable payouts, prompting many to sell their shares, which further depressed the stock price (Uchitelle, 2009). This incident illustrates the powerful role of dividends in shaping investor expectations and market reactions. Lintner (1956) explored this relationship in greater depth, showing that companies are often reluctant to change dividend policies due to the signals such changes send about future earnings. He introduced the concept of dividend smoothing, where firms strive to maintain stable payouts despite earnings fluctuations, providing predictable income for shareholders, but potentially straining financial resources during economic downturns. Building on this, John and Williams (1985) showed how dividend payments serve as signals in markets with information asymmetry. Companies with strong future cash flow expectations may pay higher dividends to demonstrate confidence, whereas weaker firms avoid such commitments. This signaling mechanism explains why dividend changes often influence stock prices, depending on how investors interpret the underlying message about the company's prospects.

3.7 Dividend Stocks During Crisis

The study by Fuller and Goldstein (2011), *Do Dividends Matter More in Declining Markets?*, explores the performance of dividend-paying stocks compared to non-dividend-paying stocks during market downturns. Using data from the S&P 500 between 1970 and 2007, they found that dividend-paying stocks outperform non-dividend-paying stocks by 1–2% more per month in declining markets than in advancing markets. This outperformance is statistically and economically significant across various industries and risk adjustments. Interestingly, the authors highlight that the existence of dividends, rather than the dividend yield, drives this asymmetric behavior. Dividend increases and stability are particularly valued during downturns, suggesting that dividends signal financial stability to investors in times of economic uncertainty. These findings demonstrate that dividends play a crucial role in enhancing shareholder confidence during market crises, challenging traditional theories that consider dividend policy irrelevant in all conditions.

Additionally, The "Dogs of the Dow" strategy exemplifies the practical application of dividend yield strategies across varying market conditions. While this approach faced substantial losses during the 2008 Financial Crisis and underperformed relative to the Dow Jones Industrial Average, it demonstrated a strong recovery in the subsequent years. Empirical evidence further indicates that such strategies tend to perform resiliently during periods of market distress, capitalizing on the relative stability and defensive characteristics of high-dividend-paying stocks (Gehi, 2024).

4. Research Method

This chapter will review the methods used in the analysis, aiming to address the research question. We will present the data collected, the process of constructing the portfolios, and the chronological structure of the analysis. Additionally, we will outline the models and evaluation methods applied to derive the findings and assess statistical significance.

4.1 Assumptions

We have based our analysis on the following assumptions:

- The portfolios will always remain fully invested, regardless of the number of stocks that it holds.
- Each stock is assumed to have sufficient liquidity to facilitate trading on the specified dates and times without constraints.
- All dividends are assumed to be reinvested, consistent with the methodology of the OSEBX, which presumes dividend reinvestment.
- All trades are assumed to be executed simultaneously on the first trading day of each year.
- Transaction costs and taxes are excluded from the analysis.

4.2 Data Sample

We utilized Bloomberg terminals and TITLON database to gather the relevant data for this analysis. The study covers a comprehensive period from 2003 to 2023. By covering such a long period, the analysis can account for cyclical trends, structural changes in the market, and the performance of portfolios under varying economic environments. This timeframe also provides sufficient data points for statistical reliability and enhances the generalizability of the findings. We have utilized the programming software "R" and the spreadsheet application "Excel" to process the collected data and to perform analyses and calculations for the results.

All observations in the datasets are complete. For any missing data, we manually supplemented the information by retrieving relevant details from Bloomberg and TITLON databases. To ensure data accuracy, random sampling was performed to cross-check the information and verify its reliability. The datasets used in this analysis are derived from credible and trustworthy sources and have been carefully validated to ensure consistency and accuracy throughout the study. If a company changed its name or ticker during the analysis period, this has been manually adjusted to ensure the collected data is accurate for the company throughout the entire period.

Key metrics for our analysis were gathered weekly for all companies included in the portfolio, except during crisis periods, where data was collected on a daily basis. These measurements comprise Dividend yield, Market Value, Price per Share, and Total Return. The inclusion of these variables provides a foundation for analyzing the performance and characteristics of the portfolio.

4.2.1 Oslo Børs Benchmark Index - OSEBX

Oslo Børs Benchmark Index (OSEBX) is one of the most well-known and widely used benchmark indexes on the Oslo Stock Exchange. This index represents a market-weighted overview of the most liquid and significant stocks listed on the Oslo Stock Exchange. It represents the overall market trends and serves as a benchmark for the performance in the Norwegian Stock Market (Sirnes, 2021). The OSEBX is reviewed semiannually, with the number of shares per security remaining fixed between reviews, except for adjustments due to corporate actions benefiting existing shareholders. It also accounts for dividend payments in its calculations (Euronext, 2024).

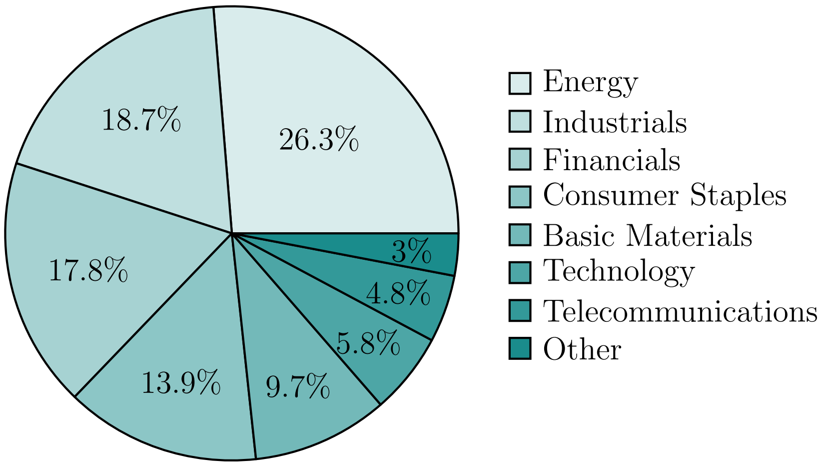

Figure 1: Sector distribution of the OSEBX as of September 30, 2024 (EuroNext, 2024)

4.2.2 Total Return

Total return represents the overall return of an investment over a specific period, incorporating both capital gains or losses and income generated from the investment. By including price appreciation or depreciation and dividend income, total return provides a comprehensive evaluation of the portfolios' return relative to the market index. This allows us to account for the full value generated by the portfolios and determine whether dividend focused strategies offer a competitive advantage over the index. Total return is calculated using the closing price on the first and last trading day of each week. The formula of total return is as follows (Bajaj Finserv, 2024):

$$R = \frac{P_T - P_{T-1}}{P_{T-1}} + \frac{D_T}{P_{T-1}}$$

Where: R: Total return, P_T: Closing price of the investment at the end of the period, P_{T-1}: Closing price of the investment at the start of the period, and D_T: Dividend paid during the period.

4.2.3 Risk-Free Interest Rate

The risk-free interest rate represents the rate at which investors can borrow or lend without incurring any risk of default, making it a fundamental component in financial analysis. In Norway, the risk-free rate is typically derived from either treasury bills (short-term securities) or government bonds (long-term securities). Treasury bills have maturities of 3, 6, and 12 months, while government bonds are available with maturities of 3, 5, 7, and 10 years. Among these, the 10-year government bond is the most commonly used proxy for the risk-free rate in the Norwegian market. Its popularity has grown in recent years, with 54% of respondents in a recent survey identifying it as their preferred measure for long-term risk-free returns, up from 50% in the previous year (PWC, 2023). For this study, data on the 10-year Norwegian government bond yield was sourced from Bloomberg. Given the long-term scope of our analysis, which spans from 2003 to 2023, the 10-year government bond was chosen as the risk-free rate due to its alignment with the extended investment horizon of our portfolio strategy.

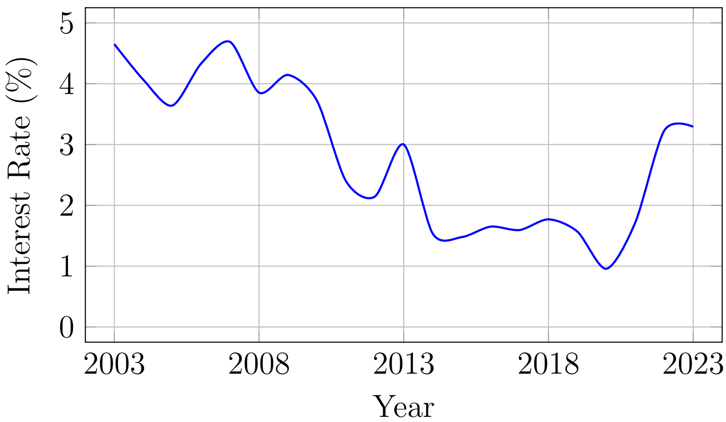

Figure 2: 10-Year Government Bond Rate (2003-2023)

4.3 Formation of The Portfolios

We have chosen to construct four portfolios based on dividend yield of companies listed on the OSEBX:

- Portfolio 1: No Dividend
- Portfolio 2: 0-2.5% Dividend Yield
- Portfolio 3: 2.5-4% Dividend Yield
- Portfolio 4: Above 4% Dividend Yield

In Portfolio 1, we include all stocks that have not paid dividends. Companies with a dividend yield greater than 0% and up to and including 2.49% are allocated to Portfolio 2. Once a company's dividend yield reaches or exceeds 2.5%, it is included in Portfolio 3. Similarly, companies with a dividend yield of up to and including 3.99% remain in Portfolio 3, but if their yield reaches or exceeds 4%, they are moved to Portfolio 4. From now on, the portfolios will be referred to as P1, P2, P3, and P4.

The OSEBX is reviewed semiannually, however we rebalance the portfolios only annually to simplify the analysis. On the first trading day of each year, we review the composition of the OSEBX to identify which companies are included and classify them into the respective portfolios based on their dividend yield. This process ensures that the portfolios captures any changes in the dividend policies or index composition. By rebalancing on the first trading day of each year, the portfolios remain dynamic and reflective of the evolving dividend characteristics of companies in the index. In Appendix A, an overview is provided detailing which companies are included in each portfolio for each respective year. Additionally, Appendix B presents an annual overview of the number of stocks in each portfolio.

4.3.1 Weighting Scheme

This thesis includes analyses of both equal-weighted and market-weighted portfolios to provide a comprehensive perspective on portfolio performance. By examining both methodologies, the analysis captures how smaller-cap and larger-cap stocks contribute differently to returns and risk, offering a balanced view of portfolio dynamics.

When comparing the two weighting methodologies, it is important to recognize that market weighting more closely reflects real-world investment practices, as larger-cap companies naturally dominate portfolio allocations. This approach aligns with how indexes like the OSEBX are structured, offering a practical benchmark for performance comparison. In contrast, equal weighting provides valuable theoretical insights by removing the size effect and highlighting the contribution of smaller companies to overall returns. Together, these methodologies offer complementary perspectives on portfolio performance.

4.4 Ordinary Least Squares (OLS)

Ordinary Least Squares (OLS) is a statistical method used in regression analysis to estimate the relationship between independent (explanatory) variables and a dependent variable (response) variable. The primary goal of OLS is to find the line that minimizes the sum of the squared differences (residuals) between the observed values and the values predicted by the model. OLS is one of the most widely used techniques in linear regression due to its mathematical simplicity and robust theoretical foundation (Stock & Watson, 2020, p.148-149). A simple linear regression model using OLS takes the form (Stock & Watson, 2020, p.145):

$$y_i = \beta_0 + \beta_1 x_i + u_i$$

Where: y_i: Dependent variable, x_i: Independent variable, β_0: Intercept term, β_1: Coefficient and u_i: Error term

With the sum of squared mistakes:

$$SSR = \sum_{i=1}^{n} (y_i - \bar{y})^2$$

Where: y_i: The actual observed value of the dependent variable for observation, $\hat{y}_i$: The predicted value of the dependent variable for observation, n: Number of observations in the dataset

OLS regression can be used to address two distinct but related questions: whether one variable causes changes in another (causal analysis) and whether the variables are correlated or associated (predictive analysis). The distinction between these two objectives is essential, as it influences the structure of the analysis, the assumptions required and the interpretation of the results. In the context of dividend-paying stocks we want to analyse whether dividends are correlated with higher returns, therefore we do a predictive analysis. Portfolio returns are the dependent variable, while OSEBX is the independent variable used to explain the variation in portfolio returns. For a predictive OLS to provide unbiased and efficient estimates, certain assumptions must hold:

1. **No perfect multicollinearity**: The independent variables must not be perfectly

collinear, meaning no variable can be expressed as an exact linear combination of others. Perfect multicollinearity makes it impossible to estimate the coefficients uniquely (Stock & Watson, 2020, p. 226). Multicollinearity can inflate the variance of the coefficients, even if it is not perfect.

2. **Zero conditional mean of error term**: The expected value of the error term (u_i) given the independent variables must be zero. This assumption ensures that the independent variables are not correlated with the error term, which would otherwise lead to biased estimates (Stock & Watson, 2020, p. 157).

3. **No autocorrelation of errors**: The error terms must not be correlated across observations. This assumption is particularly relevant in time-series data. Violations lead to inefficient estimates and unreliable statistical inference (Stock & Watson, 2020, p. 620).

4.5 Risk-Adjusted Returns

Risk-Adjusted Return is a key financial metric used to evaluate the performance of an investment by considering the amount of risk taken to achieve the return. It provides a more comprehensive measure than total return, as it accounts for the trade-off between risk and reward. The level of risk is often measured relative to a risk-free investment. Investors use risk-adjusted return to determine whether the additional risk they are taking on is justified by higher returns (Roland & Xiang, 2004).

4.5.1 Sharpe Ratio

The Sharpe Ratio is a widely used metric in finance that evaluates return relative to total risk, represented by the investment's standard deviation. It measures how much excess return is earned per unit of total risk. Developed by William F. Sharpe, this ratio is particularly useful for comparing different investments or portfolios, as it accounts for both return and volatility (Sharpe, 1966).

$$(SR) = \frac{r_p - r_f}{\sigma_p}$$

Where: r_p: Return of Portfolio, r_f: Risk-Free Rate and σ_p: Standard Deviation of Porfolio

When comparing multiple investments, the one with the highest Sharpe Ratio is generally more desirable, assuming similar risk tolerances. While the Sharpe Ratio is a powerful tool, it relies on several assumptions that simplify the complexities of the market. First, it assumes that investment returns are normally distributed, which may not always hold true in real-world markets where returns can exhibit skewness. Second, the ratio treats all volatility as risk, assuming that investors are equally averse to both upside and downside volatility, even though most investors are primarily concerned with downside risk as demonstrated in behavioral economics. Lastly, it presumes that the risk-free rate is constant over the investment period, which may not reflect fluctuations in real interest rates. These simplifications can limit the accuracy of the Sharpe Ratio (Yang, 2021).

4.5.2 Treynor Ratio

Treynor Ratio is a key financial metric used to evaluate the risk-adjusted performance of an investment portfolio or individual asset. Unlike the Sharpe Ratio, which uses the standard deviation of a portfolio to adjust returns, the Treynor Ratio uses the portfolio's beta, which measures the systematic risk. The Treynor Ratio shows how much excess return a portfolio generates per unit of systematic risk (Hübner, 2005).

$$(TR) = \frac{r_p - r_f}{\beta_p}$$

Where: r_p: Return of Portfolio, r_f: Risk-Free Rate and β_p: Beta of Porfolio

The investment with the highest Treynor Ratio is generally more preferable, assuming similar levels of systematic risk. The Treynor Ratio is a valuable tool, but has limitations. It only accounts for systematic risk, ignoring unsystematic risk, which makes it unsuitable for non-diversified portfolios. Additionally, it relies on an accurate estimation of beta, which can change over time. As a result, the Treynor Ratio is most meaningful when comparing portfolios with similar characteristics and risk profiles (Tamplin, 2023).

4.5.3 Wilcoxon Signed-Rank Test

The Wilcoxon Signed-Rank Test is a non-parametric statistical test used to evaluate whether the median difference between two related samples is significantly different from zero (Rosner et al., 2006). For this study the two related samples are our portfolios and the OSEBX. Sharpe ratio and Treynor ratio both measure the risk adjusted returns and we want to test if these measurements are significantly better for our portfolios than for OSEBX. To test for a significantly difference, we have the following null hypothesis and alternative hypothesis:

$$H_0 : \text{The median of the paired differences is zero } (d_i = 0)$$

$$H_1 : \text{The median of the paired differences is not zero } (d_i \neq 0)$$

The test works by first calculating the differences in the Sharpe Ratio and Treynor ratio between our portfolios and OSEBX for every year in the analysis period:

$$d_i = x_i - y_i$$

Where: d_i: Difference Between The Sample, x_i: Sample One, y_i: Sample Two

We will ignore pairs where the difference is zero. The absolute values of these differences are then ranked in ascending order, with the smallest difference assigned a rank of 1. If two or more observations are equal, their ranks are averaged of the tied observations and we will reduce the variance for each group of tied ranks by $\frac{t^3-t}{48}$ (Shier, 2004). Next, we assign each rank to either the positive or negative side based on the original sign of the difference. The next step is to calculate the sum of the positive ranks (W^+) and the sum of the negative ranks (W^-) to measure the test statistic.

When the sample size is large $n > 20$, the Wilcoxon Signed-Rank Test can be approximated by a standard normal distribution. We will then choose max (W^+, W^-) and a z-value is calculated instead of directly using the critical value from the table (Shier, 2004):

$$z = \frac{\max(W^+, W^-) - \frac{n(n+1)}{4}}{\sqrt{\frac{n(n+1)(2n+1)}{24}}}$$

Once the z-score is calculated, it is compared against the critical value. We will use a 5% significance level in a two-tailed test, where the critical values are ± 1.96. If the calculated z-score exceeds the critical value, we reject the null hypothesis and conclude that there is a significant difference. The direction of the difference is determined by which value, (W^+) or (W^-) ,is used in the calculation of the z-score. If $W^- > W^+$, it indicates that the portfolio has more negative differences relative to the OSEBX, suggesting underperformance. Conversely, if $W^- < W^+$, it implies that the portfolio has more positive differences, indicating outperformance.

4.6 Abnormal Return

Abnormal return refers to the difference between an asset's actual return and its expected return based on a particular benchmark or model. This measure is critical in finance as it allows for the evaluation of whether an investment has outperformed or underperformed relative to its expected performance. Abnormal returns are often used to assess the effectiveness of investment strategies, identify market inefficiencies, and evaluates the impact of specific events on asset prices (Fama, 1970).

4.6.1 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) is a model used to calculate the expected return on an investment based on the investment's risk relative to the overall market. The model accounts for risk through beta (β), which measures a stock's sensitivity to market movements. The formula of the CAPM is (Fama & French, 2004):

$$r_i = r_f + \beta_i(r_m - r_f)$$

Where: r_i: Expected return on stock i, r_f: Risk-free rate, β_i: Beta for stock i, r_m: Expected return on the market and $(r_m - r_f)$: Market risk premium

The model is based on assumptions of efficient markets, rational investors, homogeneous expectations, a single investment period, and that all risk can be measured by beta. Due to these assumptions, the model has faced significant criticism for not holding up in real-world scenarios. The assumption of efficient markets is rarely observed due to taxes, transaction costs, and asymmetric information. Much of the criticism targets beta as the sole measure of risk, as research shows that other factors, such as firm size, value, and momentum, also influence stock prices. Additionally, CAPM assumes that all investors are rational, but as previously noted, behavioral economics has demonstrated that investors often act irrationally (Levy, 2010). Despite the criticism, CAPM remains a central model in financial economics. This is partly due to its historical significance and its role in forming the foundation for more advanced models like the Fama-French factor model. Moreover, CAPM is relatively simple to use and provides an understandable way to estimate the expected return of an investment, making it a practical tool.

4.6.2 Beta

Beta is a fundamental concept in finance that measures the sensitivity of an asset's returns to movements in the overall market (Bodie et al., 2013, p.170). By quantifying how much an asset's returns fluctuate relative to the market, beta helps investors understand an investment's risk profile in the context of broader market movements. We calculate the beta values by performing a regression analysis between the returns of our portfolios and the OSEBX. The resulting beta coefficient provides the following interpretations (Bodie et al., 2013, p.170-173):

- $\beta = 0$: The asset moves in line with the market.
- $\beta > 1$: The asset is more volatile than the market, amplifying gains and losses relative to market movements.
- $\beta < 1$: The asset is less volatile than the market, meaning its returns fluctuate less than those of the overall market.
- $\beta < 0$: Rarely, some assets may have a negative beta, indicating they move inversely to the market.

High-beta stocks are typically chosen by risk-tolerant investors seeking higher returns, as these stocks outperform during bullish markets but underperform during downturns. Conversely, low-beta stocks are favored by conservative investors looking for stability, as they experience smaller fluctuations during market volatility (Reilly & Brown, 2003, p.229). However, beta has limitations. Since it is calculated using historical data, it may not accurately predict future performance. Additionally, beta is dependent on the chosen market benchmark, which can affect the interpretation of results. Furthermore, beta does not account for behavioral factors, such as investor sentiment, which can also drive asset prices (Fama & French, 2004). Despite these limitations, beta remains a cornerstone in investment analysis, offering insights into volatility and market sensitivity.

4.6.3 Jensen's Alpha

Jensen's Alpha is a measure of a portfolio's abnormal return relative to its expected return under the CAPM. It evaluates whether a portfolio has outperformed or underperformed after adjusting for systematic risk. A positive alpha indicates that the portfolio has generated excess returns beyond what was expected given its risk, while a negative alpha suggests underperformance. It is commonly used to assess the performance of fund managers or investment strategies (Jensen, 1968). The formula for Jensen's Alpha

(Dayaratne et al., 2010):

$$\alpha = r_i - (r_f + \beta_i (r_m - r_f))$$

Where: α: Jensen's Alpha, r_i: Expected Return On Stock i, r_f: Risk-Free Rate, β_i: Beta For Stock i, r_m: Expected Return On The Market and $(r_m - r_f)$: Market Risk Premium

After calculating Jensen's Alpha for each year across all portfolios, we compute the standard deviation of the alphas for each portfolio to assess the variability in their abnormal returns. Next, we calculate the standard error for each portfolio to account for the uncertainty in the mean alpha, using the formula (Lee et al., 2015):

$$SE = \frac{\sigma}{\sqrt{n}}$$

Where: σ: Standard Deviation of The Alphas, n: Number Of Observations

To test for significantly abnormal returns, we use a sample t-test. We have the following null hypothesis and alternative hypothesis:

$$H_0 : \text{The mean Jensen's Alpha is equal to zero } (\mu = 0)$$

$$H_1 : \text{The mean Jensen's Alpha is not equal to zero } (\mu \neq 0)$$

For the 21 observations and a two-tailed test, the degrees of freedom are 19 ($21 - 2 = 19$). Using a 5% significance level ($\alpha = 0.05$), the critical t-value is ± 2.093 (DATAtab, n.d.). To reject the null hypothesis (H_0), the calculated $|t|$-value must exceed the critical t-value ($|t| > 2.093$). If this condition is not met, we fail to reject H_0, indicating that there is no sufficient evidence to conclude that the mean Jensen's Alpha is significantly different from zero.

4.7 Paired T-test

A paired t-test is a statistical method used to compare the means of two related groups. This test is often employed to evaluate whether the differences in paired observations are statistically significant. We will apply the test to determine whether the portfolios differs in Sharpe- and Treynor ratio from the OSEBX under the Financial Crisis and Covid-19 Pandemic. This allows us to determine if the portfolio's performance deviates from the index in a meaningful way during times of financial instability, rather than due to random variation (Hedberg & Ayers, 2015). We formulate the following null hypothesis and alternative hypothesis:

H_0 : The difference between the OSEBX and the portfolio's Sharpe ratio/Treynor ratio is zero.

H_1 : The difference between the OSEBX and the portfolio's Sharpe ratio/Treynor ratio is not equal to zero.

The resulting t-value will then be compared to a critical value, which is determined based on the chosen significance level of 95% and the degrees of freedom, which will vary from period to period during the crises reflecting the number of observations in the dataset. If the absolute value of the t-value ($|t|$) exceeds the critical t-value, we reject the null hypothesis (H_0), indicating that the mean differences in Sharpe or Treynor ratios are statistically significant. On the other hand, if the calculated t-value ($|t|$) does not exceed the critical value, we fail to reject the null hypothesis (H_0), suggesting that the observed differences are likely due to random variation.

4.8 Limitations

A limitation of this study is that the analysis does not account for taxes or transaction costs, which are critical factors in real-world investment performance. Taxes on dividends and capital gains can significantly impact the net returns investors receive, especially in the Norwegian markets with high dividend taxation of 37.84% (Skatteetaten, n.d.). Similarly, transaction costs, such as brokerage fees and bid-ask spreads, can reduce portfolio returns over time, particularly for strategies involving frequent rebalancing or trading. By excluding these elements, the results of this study reflect theoretical returns rather than the actual returns an investor would experience.

The Norwegian market is relatively small and concentrated, with unique characteristics that may not be representative of larger, more diversified markets. It is heavily influenced by industries such as oil, energy, and shipping, which play a dominant role in the economy and stock market. These sectors are highly cyclical and sensitive to global macroeconomic conditions, commodity price fluctuations, and geopolitical factors. As a result, the market's performance and the behavior of dividend-paying stocks may be disproportionately affected by the dynamics of these key industries, limiting the generalizability of the findings to markets with a more diverse industrial base.

The portfolios in this study were constructed using dividend yield values determined at the beginning of each year, with annual rebalancing. This methodology does not account for intra-year fluctuations in dividend yield or the effects of corporate actions, such as dividend reductions or share repurchases, which could significantly impact returns. In contrast, the OSEBX is rebalanced semiannually, allowing it to better capture mid-year changes in market dynamics and stock performance. This difference in rebalancing frequency could lead to an inaccurate representation of the portfolios' true performance, as critical changes occurring during the year might alter the yield profile or risk characteristics of individual stocks. Consequently, the findings may not fully capture the dynamic and evolving nature of dividend-paying stocks within shorter time frames.

5. Findings and discussion

This chapter presents the findings from our analysis, focusing on portfolio performance and key insights. It begins with a comparison of average total returns across dividend yield portfolios and the OSEBX for a long-term investment perspective, followed by risk-adjusted returns using the Sharpe and Treynor Ratios, evaluated by the Wilcoxon Signed Rank Test. Furthermore, the chapter examines abnormal returns, applying Jensen's Alpha evaluated by a sample T-test to assess performance beyond market expectations. Finally, it explores the behavior of dividend portfolios during periods of crisis, providing insights into their resilience and short-term investment potential.

5.1 Portfolio Returns

This section will begin by examining the total return of the portfolios and the OSEBX, along with their respective differences. Next, we will present the cumulative return to provide a comprehensive view of growth over time. Finally, the results will be discussed in the context of portfolio return. A detailed table presenting the yearly return and standard deviation can be found in Appendix C and Appendix D. Additionally, a overview of the annual differences between the portfolios and the OSEBX can be found in Appendix E and Appendix F.

5.1.1 Total Returns

Table 1 and 2 presents descriptive statistics of the portfolios and OSEBX arithmetic average return and standard deviation, respectively for market- and equal-weighted.

	P1		**P2**		**P3**		**P4**		**OSEBX**	
	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD
Average	10.84	0.257	16.22	0.221	12.80	0.195	14.74	0.235	13.69	0.186

Table 1: Average Return and Standard Deviation for Market-Weighted Portfolios and OSEBX

The market-weighted portfolio return reveal that P2 delivered the highest return outperforming the OSEBX with a yearly average return of 16.22% and a standard deviation of 0.221. P4 also outperformed OSEBX with a yearly average return of 14.74% and a slightly higher standard deviation of 0.235 compared to P2. P1 and P3 exhibit lower returns than OSEBX while also having higher standard deviations, making them a less attractive investment option.

	P1		P2		P3		P4		OSEBX	
	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD
Average	11.40	0.234	14.55	0.189	15.27	0.183	11.88	0.190	13.69	0.186

Table 2: Average Return and Standard Deviation for Equal-Weighted Portfolios and OSEBX

In the equal-weighted portfolios, P3 achieved the highest average yearly return of 15.27% with the lowest standard deviation of 0.183. Following closely, P2 also outperforms the market with a return of 14.55%. However, P2 has a standard deviation of 0.189, which is higher than both P3 and OSEBX. P1 and P4 do not outperform the index and also exhibit higher standard deviations compared to the index.

Tables 3 and 4 compare the differences in the average total return between our four portfolios and the OSEBX over the analysis period from 2003 to 2023.

	P1	**P2**	**P3**	**P4**
Average (%)	-2.854	2.527	-0.892	1.052

Table 3: Difference in Average Total Return Between Market-Weighted Portfolios and OSEBX

In the market-weighted portfolios, P2 and P4 have consistently outperformed the market, as shown by their positive differences, amounting to 2.527% and 1.052%, respectively. In contrast, P1 and P3 show negative differences of -2.854% and -0.892%, respectively, indicating that they consistently underperforming the market on average.

	P1	**P2**	**P3**	**P4**
Average (%)	-2.293	0.859	1.577	-1.808

Table 4: Difference in Average Total Return Between Equal-Weighted Portfolios and OSEBX

In the equally weighted portfolios, P3 demonstrated the most consistent outperformance, with an average return difference of 1.577% relative to OSEBX. P2 also performed well, delivering a small positive difference of 0.859%, where P1 and P4 underperformed on average, with return differences of -2.293% and -1.808%, respectively. The observed difference from the market-weighted approach can be explained by how the weighting method impacts the portfolios.

5.1.2 Cumulative Returns

A graphical representation of the cumulative return will be presented, illustrating the return of both market- and equally-weighted portfolios, as well as OSEBX, over the entire analysis period. This visualization provides a clear and comprehensive overview of the portfolios' overall growth and return throughout the analysis period.

5.1.1.1 Portfolio 1 - No Dividend

P1 includes all stocks that did not pay dividends in the previous year.

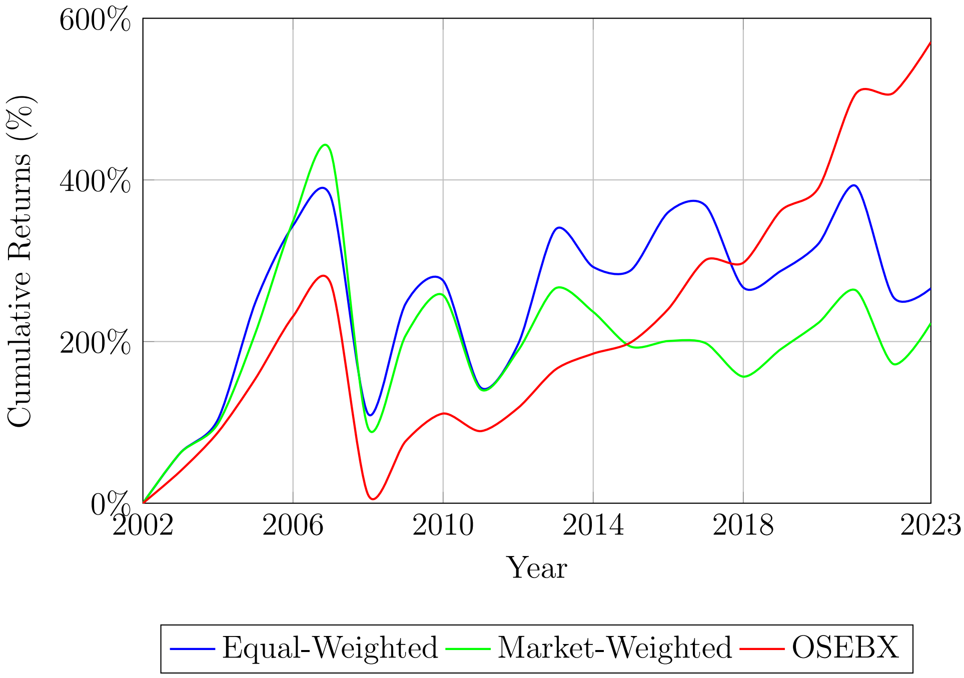

Figure 2: Cumulative Returns for Portfolio 1 - No Dividend

Figure 2 shows that up until 2013, the cumulative return of the equally- and market-weighted portfolios are following a comparable pattern. Both portfolios demonstrate periods of growth and decline, with no significant divergence between the two. This indicates that the return of no-dividend-paying stocks during this period was not strongly influenced by the weighting approach. After 2013, the equally-weighted portfolio outpace the market-weighted portfolio in a greater extent, suggesting that smaller no-dividend-paying companies performed better relative to their larger counterparts in the years that followed. After 2018, OSEBX outperforms both portfolios, demonstrating steady and consistent growth, whereas the two portfolios remain volatile and fail to keep pace with OSEBX's performance.

5.1.1.2 Portfolio 2 - 0-2.5% Dividend Yield

P2 includes all stocks with a dividend yield between 0% and 2.5% in the previous year.

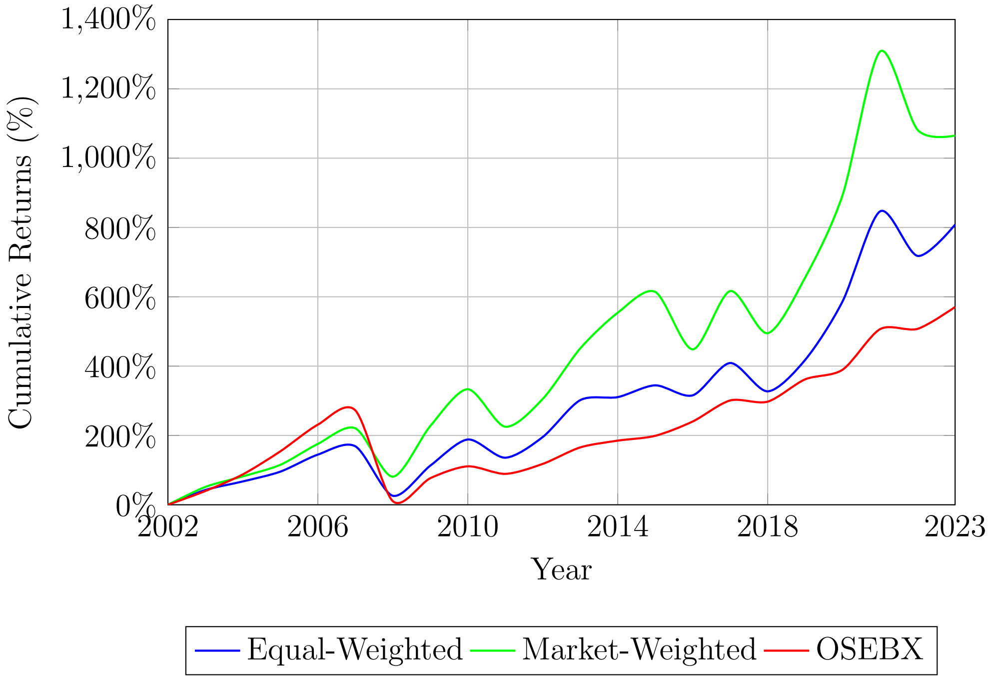

Figure 3: Cumulative Return for Portfolio 2 - 0-2.5%

From 2008 the market-weighted portfolio significantly outperformed both the equal-weighted portfolio and OSEBX over the entire period. The equal-weighted portfolio also outperformed OSEBX but lagged behind its market-weighted equivalent, reflecting the less pronounced impact of smaller stocks in this weighting methodology. OSEBX showed steady growth during the period but had lower cumulative return compared to the two other portfolios. This suggests that focusing on specific dividend strategies may offer better results than following the broader market index.

5.1.1.3 Portfolio 3 - 2.5-4% Dividend Yield

P3 includes all stocks with a dividend yield between 2.5% and 4% in the previous year.

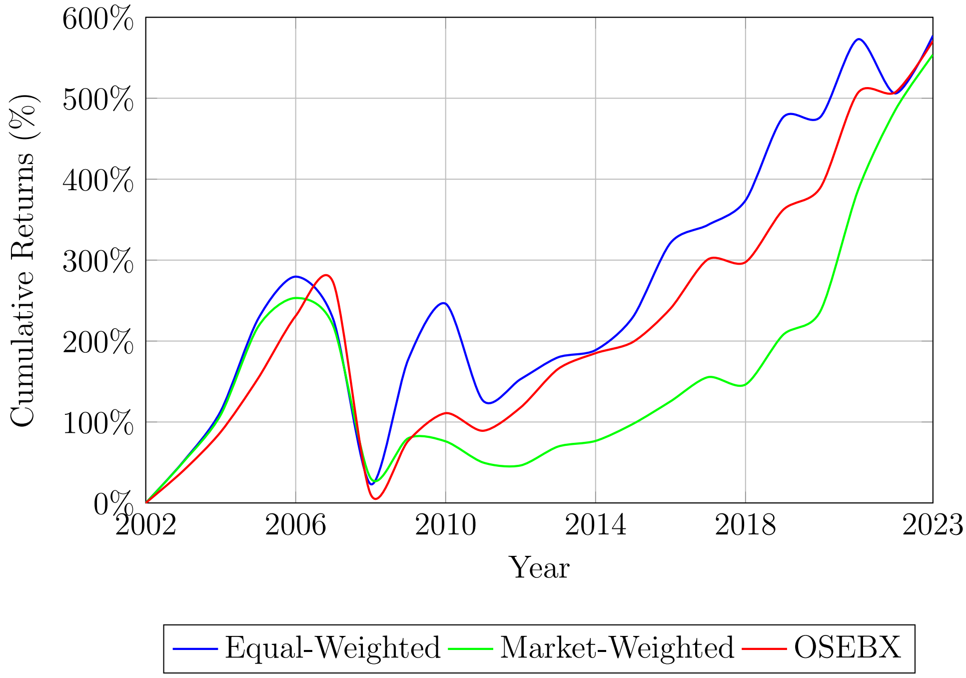

Figure 4: Cumulative Return for Portfolio 3 - 2.5-4%

Right after the Financial Crisis in 2008 to 2011 the equally-weighted portfolio begins to significantly outperform both OSEBX and the market-weighted portfolio. This suggests that smaller companies within this dividend yield range generated higher returns, contributing to the superior return of the equally weighted portfolio. After 2011, the return of the equally weighted portfolio aligns more closely with OSEBX. A notable gap remains between the equal- and market-weighted portfolios, indicating sustained differences in returns driven by portfolio weighting. The market-weighted portfolio highlights the weaker contribution of larger dividend-paying stocks in this yield category. In contrast, OSEBX demonstrates steady and consistent growth, reflecting the stability and diversification of a broader market approach. In 2023, both portfolios and OSEBX are at approximately the same level.

5.1.1.4 Portfolio 4 - Above 4% Dividend Yield

P4 includes all stocks with a dividend yield above 4% in the previous year.

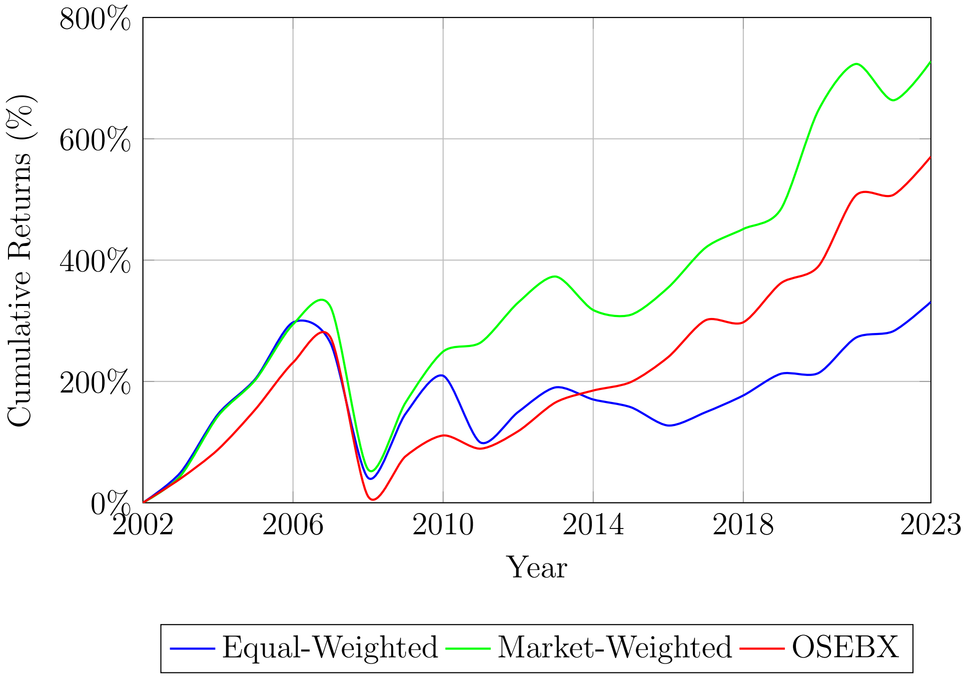

Figure 5: Cumulative Return for Portfolio 4 - Above 4%

For P4 the equal-weighted, market-weighted and OSEBX follows a relatively similar pattern from 2003 to 2008. Starting from 2008, the market-weighted portfolio starts to diverge significantly from OSEBX, demonstrating consistently higher returns. In contrast, the equal-weighted portfolio closely alignes with the return of OSEBX until 2014. After this the equally-weighted portfolio lags significantly behind both the market-weighted portfolio and OSEBX, showing weaker return and a flatter growth trajectory. OSEBX grows steadily but stays below the market-weighted portfolio, highlighting the strength of focusing on larger high-dividend-paying companies in this yield category. Overall, the chart demonstrates that market-weighted high-dividend portfolios provide the strongest long-term returns, particularly after 2011, while smaller-cap high-dividend stocks struggle to keep pace.

5.1.3 Discussion of findings

Under the market-weighted methodology, P2 emerges as the top-performing portfolio, closely followed by P4. Both portfolios outperforming the OSEBX in terms of total returns, but also demonstrate higher standard deviations than P3 and OSEBX. This suggests that achieving higher returns requires a greater tolerance for risk, aligning with established economic theory. However, P1 and P3 delivers lower return and higher standard deviation compared to OSEBX. The combination of reduced returns and elevated volatility indicates that these portfolios does not provide sufficient compensation for the additional risk assumed by investors. The optimal choice between these options depends on individual risk preferences, as investors seeking higher returns may prefer P2 and P4, while those prioritizing lower volatility might find P3 or OSEBX more suitable.

In the equally weighted portfolio, P3 emerges as the most compelling option. It combines the highest return with the lowest standard deviation, offering a unique balance of superior return and minimal risk, making it particularly attractive to investors seeking both stability and profitability. Similarly, P2 outperform the OSEBX in terms of total return, but with a marginally higher standard deviation compared to the index. In contrast, P4 delivers a lower return and higher standard deviation compared to the index, making the portfolio a less rational investment choice. Our analysis thus indicates that portfolios with low to moderate dividend yields are the most favorable investment options over the long term, considering both returns and volatility.

Across both weighting methodologies, portfolios that include dividend-paying stocks consistently outperform P1 in terms total return. P1 consistently exhibited the highest volatility across both methodologies, emphasizing its unpredictability. This higher standard deviation is likely a reflection of the instability often associated with growth companies, which typically reinvest profits into expansion rather than distributing dividends. In contrast, OSEBX provides a diversified benchmark, demonstrating steady and consistent growth throughout the analysis period, which aligns with expectations and economic theory. The results indicate that focusing on specific dividend yield ranges can enhance returns relative to the index while maintaining comparable levels of risk.

5.2 Risk-Adjusted Return

This section will first present descriptive statistics of the average Sharpe ratio and Treynor ratio, both for market- and equal-weighted. Following this, a Wilcoxon Signed-Rank Test is conducted to determine whether the results are statistically significant. Finally, we will discuss the findings for the risk-adjusted performance measures. A detailed table presenting the yearly Sharpe ratio can be found in Appendix G and Appendix H. For Treynor ratio it can be found in Appendix I and Appendix J, and for Wilcoxon Signed-Rank Test complete tables can be found in Appendix K.

5.2.1 Sharpe Ratio

Tables 5 and 6 provide the average Sharpe ratios and number of superior returns for our four dividend-yield portfolios and OSEBX over the 2003–2023 period. Table 5 focuses on market-weighted portfolios and Table 6 on equal-weighted portfolios. Table 7 shows the average in Sharpe ratio when the dividend-paying portfolios are combined into one.

	P1	**P2**	**P3**	**P4**	**OSEBX**
Average	0.453	0.726	0.656	0.581	0.830
Numbers of Superior Return	6	12	8	8	3

Table 5: Sharpe Ratio Market-Weighted Portfolios

The OSEBX, despite outperforming all market-weighted portfolios in only 3 out of 21 years, achieved the highest average Sharpe ratio of 0.830. None of the market-weighted portfolios managed to surpass the index's long-term performance. This underscores the critical role of consistency and diversification provided by an index. In comparison, P2 delivered the best performance of the portfolios, with an average Sharpe Ratio of 0.726 and outperforming OSEBX in 12 years. P3 and P4 showed slightly lower average Sharpe ratios of 0.656 and 0.581, respectively, indicating decent risk-adjusted performance. P1 remained the weakest performer, with an average Sharpe ratio of 0.453, underperforming the index in 15 years. These findings suggest that while dividend-paying portfolios can provide competitive returns, consistency and diversification are key factors in achieving superior risk-adjusted performance over time.

	P1	**P2**	**P3**	**P4**	**OSEBX**
Average	0.465	0.782	0.687	0.630	0.830
Numbers of Superior Return	6	12	9	9	3

Table 6: Sharpe Ratio Equal-Weighted Portfolios

The equally weighted portfolios shows similar results as in the market-weighted analysis. The OSEBX exhibits the highest value, with the rankings of the other portfolios remaining consistent. This suggests that the weighting method has a minimal impact on the calculation of the Sharpe ratio.

It is interesting that none of the portfolios outperformed the OSEBX in terms of both market- and equal-weighted Sharpe ratio. We therefore decided to combine the dividend-paying portfolios into a single portfolio to evaluate the results. This approach aims to assess whether the combined diversification of dividend-paying stocks can enhance overall risk-adjusted performance.

	No Dividend	Dividend	OSEBX
Average Market-Weighted	0.453	0.618	0.830
Average Equal-Weighted	0.465	0.747	0.830

Table 7: Sharpe Ratio Market- and Equal-Weighted No Dividend and Dividend Portfolios

The combined dividend portfolio achieved a Sharpe Ratio of 0.618 for the market-weighted approach and 0.747 for the equal-weighted approach, meaning it still does not outperform the OSEBX, but performs better than the non-dividend portfolio. The underperformance of the combined dividend portfolio relative to the index may stem from structural limitations of dividend-focused strategies, including a tendency toward concentration in mature, low-volatility companies. Since the results are consistent with those observed when the portfolio was divided into four segments, we have decided not to proceed with this composition.

5.2.2 Treynor Ratio

Tables 8 and 9 present the Treynor ratios for market-weighted and equal-weighted portfolios alongside the OSEBX.

	P1	P2	P3	P4	OSEBX
Average	0.108	0.183	0.135	0.130	0.109
Numbers of Superior Return	8	14	10	8	-

Table 8: Treynor Ratio Market-Weighted Portfolio

The results show that the dividend-paying portfolios, P2, P3 and P4, outperform the OSEBX in terms of average Treynor ratio over the analysis period, with the index achieving an average ratio of 0.109. Among the portfolios, P2 delivers the highest average Treynor Ratio of 0.183, outperforming the index in 14 out of 21 years. This consistency highlights its ability to balance moderate market exposure with stable returns, making it the most efficient portfolio in terms of risk-adjusted performance relative to market risk. P3 and P4 has a slightly lower average Treynor Ratio of respectively, 0.135 and 0.130, and outperforms OSEBX in 10 and 8 years. P1 with an average Treynor Ratio of 0.108, underperforming the portfolios and OSEBX, making it a poor investment choice when considering systematic risk. These results indicate that portfolios with lower to moderate dividend yields, such as P2, tend to provide more consistent and efficient risk-adjusted returns.

	P1	P2	P3	P4	OSEBX
Average	0.093	0.165	0.154	0.127	0.109
Numbers of Superior Return	8	14	11	10	2

Table 9: Treynor Ratio Equal-Weighted Portfolio

The equally weighted portfolios shows results similar to those observed in the market-weighted analysis, with P2 maintaining the highest Treynor ratio. Since the ranking remains the same for both the market-weighted and equally weighted portfolios, it suggests that the weighting method has little impact on the Treynor Ratio similar to its effect on the Sharpe ratio.

5.2.3 Wilcoxon Signed-Rank Test

The results presented in Tables 10 and 11 provide an overview of the Wilcoxon Signed-Rank Test for the Sharpe and Treynor Ratios of the four portfolios, both for market- and equal-weighted. The key value in the tables is the z-score. According to the rule of a two-sided Wilcoxon Signed-Rank Test, the null hypothesis is rejected if the absolute value of the z-score exceeds the critical value of ±1.96.

	Max(W^+, W^-)	z-value SR	Max(W^+, W^-)	z-value TR
P1	W^-: 181.5	2.29	W^-: 142.5	0.94
P2	W^-: 122.5	0.24	W^-: 152.5	1.29
P3	W^-: 145.0	1.03	W^+: 120.5	0.17
P4	W^-: 162.5	1.63	W^-: 131.5	0.56

Table 10: Results for Wilcoxon Signed-Rank Test Market-Weighted

The results of the Wilcoxon Signed-Rank Test for market-weighted portfolios reveal that P1's Sharpe ratio is the only metric with a statistically significant z-value of 2.29. Notably, the negative value of W^- for P1 indicates a consistent underperformance relative to the OSEBX. In contrast, the remaining portfolios, P2, P3, and P4, do not exhibit significant z-value for either the Sharpe ratio or the Treynor ratio. This lack of statistical significance implies that we fail to reject the null hypothesis (H_0) for these portfolios, suggesting no conclusive evidence of outperformance or underperformance compared to the index. The observed differences between the portfolios and the index may, therefore, be attributed to random fluctuations rather than systematic factors. These results reinforce the challenges of achieving consistent, statistically significant outperformance in a market-weighted context.

	Max(W^+, W^-)	z-value SR	Max(W^+, W^-)	z-value TR
P1	W^-: 178.0	2.17	W^-: 143.0	0.96
P2	W^-: 118.5	0.10	W^+: 125.0	1.21
P3	W^-: 135.5	0.70	W^+: 130.5	0.52
P4	W^-: 151.5	1.25	W^-: 107.5	0.09

Table 11: Results for Wilcoxon Signed-Rank Test Equal-Weighted

The results for the equal-weighted portfolios are consistent with those observed in the market-weighted analysis, indicating that the choice of weighting methodology has minimal impact on the overall findings. Similarly, P1 is the only portfolio with a negative statistically significant z-value of 2.17. This result allows us to reject the null hypothesis (H_0) for P1, confirming its significant underperformance relative to the index. For the remaining portfolios, the lack of statistically significant values suggests that their deviations from the index are not substantial and can likely be attributed to random variations rather than systematic differences.

5.2.4 Discussion of findings

OSEBX, as a broad market portfolio, inherently diversifies away much of its unsystematic risk. This contributes to a lower standard deviation allowing it to achieve a superior Sharpe ratio compared to the portfolios. Dividend-paying portfolios, as well as the portfolio consisting of non-dividend-paying stocks, exhibit lower Sharpe ratios compared to the index, both when measured individually and when aggregating all dividend-paying portfolios. Our analysis suggests that this can be attributed to their more concentrated and less diversified nature compared to OSEBX. The inability of the individual portfolios to consistently outperform the index aligns with theoretical expectations, which suggest that more concentrated portfolios are exposed to greater risk without necessarily delivering higher returns.

In terms of the Treynor ratio, the dividend-paying portfolios performance better relative to the OSEBX. The superior performance of P2 highlights the potential benefits of investing in portfolios with lower to moderate dividend yields, as they strike a balance between market exposure and return stability. This balance may appeal to investors seeking efficient allocation of capital relative to systematic risk. However, the relatively lower Treynor ratios of P3 and P4, suggest that higher dividend yields might not consistently translate into better risk-adjusted returns than low to moderate portfolios. Furthermore, the underperformance of P1 in terms of both Treynor ratio and consistency emphasizes the drawbacks of portfolios lacking dividend payouts.

The Wilcoxon Signed-Rank Test revealed that only P1 had a statistically significant negative performance in Sharpe ratio compared to OSEBX. The findings for P1 underscore the trade-offs between growth-oriented strategies and risk management. While growth stocks may offer potential for higher absolute returns, their failure to compensate for additional volatility with higher risk-adjusted returns aligns with theoretical expectations. All other portfolios showed no significant differences in Sharpe ratios and Treynor ratio relative to the OSEBX, suggesting that variations may be attributed to random factors such as market fluctuations, sector-specific volatility, or changes in dividend policies. These fluctuations could also stem from short-term macroeconomic events or shifts in investor sentiment.

From an investment perspective, these findings highlight the trade-off between diversification and dividend yield strategies. While the OSEBX achieves its superior Sharpe ratio through broad diversification, dividend-paying portfolios excel in compensating for systematic risk, challenging aspects of the Dividend Irrelevance Theory. P1, which consists of non-dividend-paying stocks, underperforms compared to dividend-paying portfolios, suggesting that dividend payments may play a role in enhancing portfolio efficiency. This contradicts the notion that dividends have no impact on investment performance and implies that investors value the stability and tangible returns associated with dividends. However, dividend-paying portfolios, particularly P2, which demonstrated the highest consistency, underscores that a dividend yield strategy can appear appealing. Furthermore, the consistency of results across both market-weighted and equally-weighted methodologies indicates that the weighting method has minimal influence on the calculation of risk-adjusted returns.

5.3 Abnormal return

This section examines abnormal returns through Jensen's Alpha to evaluate portfolio performance beyond market expectations. The results is further reviewed using a t-test and a discussion of their implications for assessing abnormal returns. Yearly calculations of Jensen's Alpha can be found in Appendix L and Appendix M.

5.3.1 Jensens Alpha

The results presented in Tables 12 and 13 provide an analysis of Jensen's Alpha for market- and equal-weighted portfolios. A sample t-test is conducted to assess whether the alpha values for each portfolio were statistically significant different from zero. The critical t-value is ±2.093, meaning that any absolute t-value greater than 2.093 would indicate a statistically significant result.

	P1	**P2**	**P3**	**P4**
Average (%)	-0.641	6.288	1.638	2.650
Standard Deviation	0.190	0.191	0.142	0.191
Standard Error	0.041	0.042	0.037	0.031
T-test	-0.155	1.506	0.444	0.856

Table 12: Jensen's Alpha Market-Weighted Portfolios

The average Jensen's Alpha indicate that P2 has the highest average of 6.288%, suggesting that this portfolio delivers the most consistent excess returns relative to the CAPM predictions. In contrast, P1 shows a slightly negative average alpha of -0.641%, indicating underperformance relative to CAPM predictions. P3 and P4 exhibit positive, but modest, average alphas of 1.638% and 2.650%, respectively, reflecting limited potential for generating abnormal returns. Across all four portfolios, the sample t-test results indicate that none of the calculated Jensen's Alpha values were statistically significant. Since all the $|t| < t_{0.025}$, we cannot reject the null hypothesis (H_0) and consequently, cannot conclude that the portfolios generate statistically significant abnormal returns beyond what is predicted by the CAPM model. This suggests that the abnormal returns of these portfolios, whether positive or negative, are likely attributable to random variation rather than systematic outperformance or underperformance relative to the CAPM benchmark.

	P1	**P2**	**P3**	**P4**
Average (%)	-0.150	4.998	4.803	1.193
Standard Deviation	0.213	0.150	0.226	0.172
Standard Error	0.046	0.033	0.049	0.037
T-test	-0.032	1.524	0.975	0.319

Table 13: Jensen's Alpha Equal-Weighted Portfolios

For the equally weighted analysis, we observe largely similar results, with P3 and P4 have exchanged positions in terms of performance. Nevertheless, P2, characterized by a low to moderate dividend yield, continues to deliver the highest excess returns, while P1 underperforms relative to expectations based on the CAPM. However, as with the market-weighted analysis, these results fail to achieve statistical significance.

5.3.2 Discussion of findings

The analysis of Jensen's Alpha for the market- and equal-weighted portfolios underscores the persistent difficulty of achieving statistically significant abnormal returns, as predicted by the CAPM model. Although P2 emerges as the strongest performer in terms of excess returns, it is accompanied by the highest standard deviations in market-weighted, which is consistent with economic theory suggesting that higher returns are typically associated with higher risk. Nevertheless, P2 remains the portfolio closest to achieving statistical significance, underscoring its relative strength despite the volatility. While portfolios with moderate to high dividend yield, P3 and P4, exhibit positive average Jensen's Alpha values, their results remain modest and far from achieving statistical significance, as evidenced by the t-test values. In the market-weighted portfolio analysis, P3 exhibits the lowest standard deviation, suggesting that its risk-adjusted returns are relatively stable when larger-cap stocks dominate the portfolio. However, in the equal-weighted analysis, P3 shows the highest standard deviation, indicating that the risk profile shifts significantly when smaller-cap stocks are given equal importance in the portfolio. This discrepancy highlights the critical role that the weighting method plays in determining the risk characteristics of a portfolio. Portfolios with higher dividend yields often consist of mature, low-growth companies that provide stable payouts but may lack the dynamism required to generate significant excess returns. P1, with a slightly negative alpha, reflects the weaker performance of non-dividend-paying stocks.

Collectively, these findings suggest that while certain portfolios exhibit promising characteristics, such as stability or moderate returns, none provide conclusive evidence of consistent market outperformance, reinforcing the efficiency of the market as reflected in the CAPM model. Overall, the lack of statistically significant Jensen's Alpha across all portfolios supports the Efficient Market Hypothesis (EMH), which suggests that systematic risk is appropriately priced in the market, leaving little room for consistent excess returns.

5.4 Portfolio Performance During Crises

This part of the thesis will examine and analyse how the portfolios perform during crises. The focus is exclusively on market-weighted portfolios, evaluating their performance during two major crises: the 2008 Financial Crisis and the Covid-19 pandemic. By using market-weighted portfolios, the analysis reflects a more realistic representation of portfolio performance, as it accounts for the relative size of companies and aligns with common investment practices. We seek to explore the differences in portfolio performance during the recession characterized by falling prices and the stabilization period when prices begin to recover. Therefor the analysis is structured around two key periods for each crisis:

Event	Period	Start Date	End Date	Months
Financial Crisis	Recession	22.05.2008	22.12.2008	7
	Stabilization	23.12.2008	31.12.2010	24
Covid-19	Recession	20.02.2020	23.03.2020	1
	Stabilization	24.03.2020	30.11.2020	8

Table 14: Periods during the Financial Crisis and Covid-19 Pandemic

For this analysis, we utilize daily data for all stocks and the OSEBX to ensure sufficient observations for robust statistical evaluation. To evaluate performance, we first calculate total returns for the portfolios and the OSEBX for all defined periods, and subsequently compute the cumulative returns to illustrate the overall performance over each crisis period. Additionally, we compute weekly risk-adjusted performance based on the total return, to evaluate the risk-return trade-off. Finally, we perform paired t-tests to determine the statistical significance of performance differences between the portfolios and the OSEBX during these periods.

5.4.1 The Financial Crisis (2008)

5.4.1.1 Recession

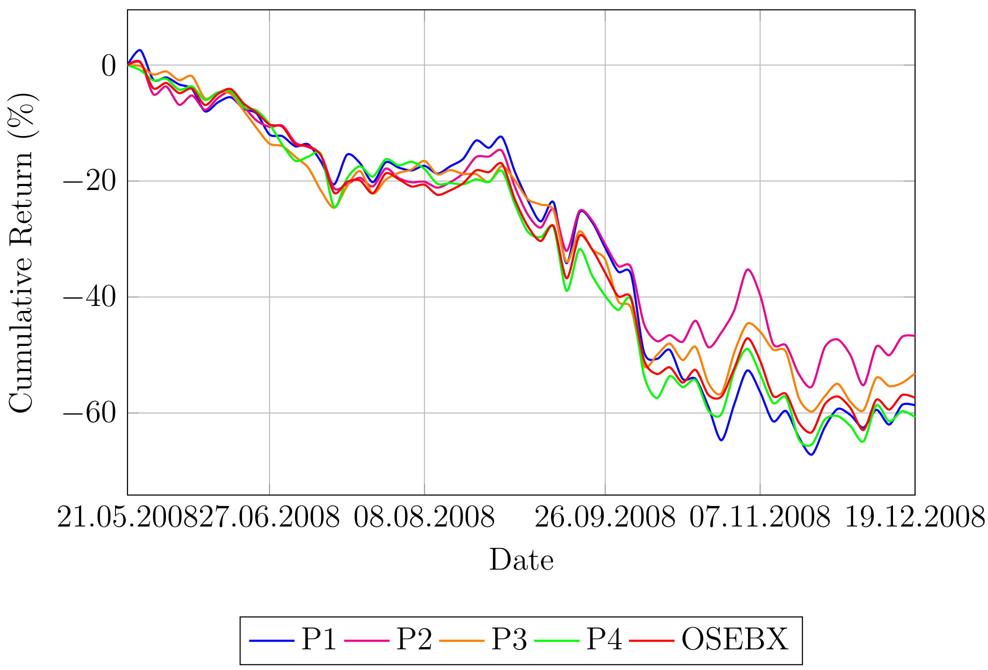

Figure 6: Cumulative Return During The Financial Crisis Recession

During the 2008 Financial Crisis, P2 and P3 demonstrated the best performance, with cumulative losses of -47.78% and -53.86%, respectively, outperforming the OSEBX, which fell by -58.57%. The performance of P2 and P3 relative to the OSEBX underscores the defensive qualities of dividend-paying stocks, particularly those with low and moderate yields. The resilience of P2 can largely be attributed to its significant exposure to Equinor (56.51%), a company that, despite challenging market conditions, benefited from its strong balance sheet and strategic position in the energy sector. Similarly, P3's performance was supported by substantial allocations to Storebrand (27.94%) and Dolphin Drilling (21.54%). Storebrand, as a major financial services provider, maintained relative stability due to its diversified operations, while Dolphin Drilling's positioning in the energy sector provided some buffer against broader market declines.

P1 and P4 were the worst performing portfolios during the Financial Crisis, each experiencing cumulative losses exceeding 60%. P1 was heavily exposed to Telenor (34%) and REC Silicon (22%). While Telenor, in the telecommunications, faced pressures from reduced consumer spending, REC Silicon, in the solar energy downturn, suffered from declining industrial demand and investment in renewables. P4 with significant allocations to DNB (36%) and Norsk Hydro (30%), was deeply impacted by the banking crisis and the collapse of commodity prices. DNB struggled with tighter credit markets and defaults, while Norsk Hydro was affected by reduced industrial demand and falling aluminum prices. The concentrated exposures in both portfolios amplified their vulnerability during the downturn, highlighting the importance of diversification to reduce risk during economic crises. While high-dividend stocks (P4) were more vulnerable to downturn-specific risks, and no dividend stocks (P1) struggled with their lack of investor appeal during volatile periods, the balanced characteristics of P2 and P3 appeared to offer investors a degree of protection.

5.4.1.2 Stabilization

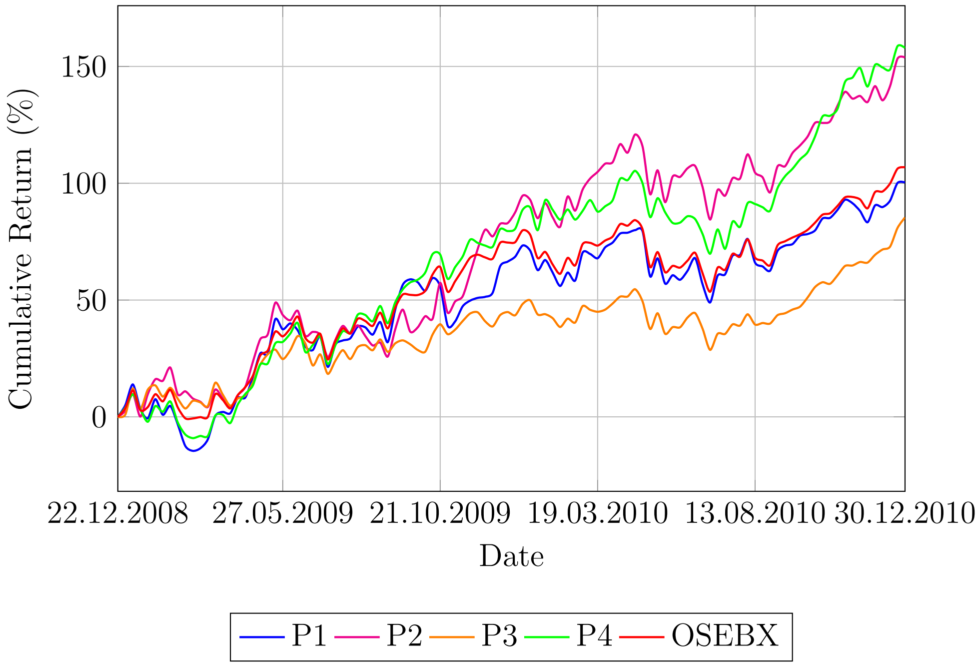

Figure 7: Cumulative Return During The Financial Crisis Stabilization

During the stabilization phase following the Financial Crisis, P2 and P4 exhibited the strongest performance, with cumulative returns of 153.81% and 157.91%, significantly outpacing the OSEBX of 106.83%. This outperformance can be attributed to their portfolio composition. In 2009, P2 was heavily concentrated, with 64.70% allocated to Yara, which remained dominant in 2010 at 53.35% as the portfolio expanded from five to eight companies. Yara's recovery in global agricultural markets and fertilizer demand drove its strong performance. Similarly, P4's performance was influenced by its composition, with Telenor and Orkla making up 24.98% and 15.64%, respectively, of the portfolio's 23 companies in 2009. By 2010, the portfolio became highly concentrated, with Seadrill accounting for a dominant 61.68% of the portfolio's holdings, driven by the company's aggressive operational expansion. Such concentrated allocations amplify the impact of individual company performance, which can be advantageous during periods of recovery if these companies outperform the broader market. However, this also introduces higher risk due to the lack of diversification, making these portfolios more vulnerable to underperformance if their dominant companies face downturns, as we observed with Telenor during the recession period.

In comparison, P1 and P3 lagged behind, with cumulative returns of 100.32% and 85.36%, respectively, indicating a weaker recovery and an inability to fully match the market's upward momentum during this period. P1 was heavily weighted in 2009 by REC Silicon, which accounted for 25.21% of the portfolio among 26 companies, and in 2010 by Telenor at 26.30% among 33 companies. Similarly, P3 was dominated by Equinor, representing 95.60% of the portfolio in 2009 among 5 companies and 81.11% in 2010 among 8 companies. With such significant concentration in a single large company, the performance of the entire portfolio closely mirrored the movements of these dominant stocks, limiting broader diversification benefits.

5.4.1.3 Sharpe Ratio and Treynor Ratio

	P1	**P2**	**P3**	**P4**	**OSEBX**
Sharpe Ratio	-0.021	-0.018	-0.027	-0.028	-0.026
Treynor Ratio	-0.008	-0.004	-0.049	-0.008	-0.006

Table 15: Average Sharpe and Treynor Ratio during the Financial Crisis Recession

The negative weekly average Sharpe and Treynor ratios during the recession period indicate that all portfolios, including the OSEBX, experienced negative risk-adjusted returns, reflecting the severe impact of the economic downturn. Among the portfolios, P2 emerges as the most resilient, recording the least negative Sharpe ratio (-0.018) and Treynor ratio (-0.004), suggesting that it managed both total risk and systematic risk more effectively than the others. P1 performed similarly in terms of Sharpe ratio (-0.021) but lagged behind on the Treynor ratio (-0.008), indicating slightly weaker compensation for systematic risk. In contrast, P3 and P4 exhibited the most negative Sharpe ratios of -0.027 and -0.028, respectively, reflecting weaker performance when accounting for total risk. The Treynor ratios further emphasize this trend, with P3 recording a notably poor result of -0.049, while P4 recorded a Treynor ratio identical to that of P1 at -0.008.

The overall findings highlight the widespread negative impact of the recession, with none of the portfolios or the OSEBX achieving positive risk-adjusted returns. However, the relatively better performance of P2, suggests that portfolio with a low to moderate dividend yields may have offered a degree of resilience, even in an environment of declining returns and heightened risk. Conversely, the weaker results for moderate to high dividend yields portfolios underscores the vulnerability of these portfolios during periods of economic stress.

	P1	**P2**	**P3**	**P4**	**OSEBX**
Sharpe Ratio	0.009	0.011	0.007	0.013	0.009
Treynor Ratio	0.002	0.014	0.001	0.005	0.003

Table 16: Average Sharpe and Treynor Ratio during the Financial Crisis Stabilization

The weekly average Sharpe and Treynor ratios during the stabilization period reveal positive risk-adjusted returns across all portfolios and the OSEBX, indicating improved performance as markets recovered. P4 has the highest Sharpe ratio of 0.013, followed by P2 with a ratio of 0.011. However, when considering the Treynor ratio, the rankings reverse, with P2 achieving the highest ratio of 0.014, and P4 trailing with 0.005. This indicates that while P4 excels in generating returns relative to total risk, P2 is more efficient in compensating for systematic market risk. Both P1 and OSEBX exhibit similar Sharpe ratios of 0.009, suggesting comparable risk-adjusted returns. In terms of Treynor ratios, they are also relatively close, with P1 at 0.002 and the OSEBX at 0.003, showing that the OSEBX is slightly more efficient in generating returns relative to systematic risk. P3 has the lowest values in both Sharpe and Treynor ratios, indicating that it struggled more than the other portfolios in managing both total and systematic risk during the stabilization period.

These findings highlight the varying strengths of the portfolios during the recovery period. P2 and P4 emerge as the most effective at leveraging market stability to generate risk-adjusted returns, with P2 excelling in systematic risk compensation and P4 balancing risk and return most effectively. Meanwhile, P3's lower ratios suggest it struggled to capitalize on the recovery, whereas the OSEBX provided stable but unremarkable performance, emphasizing their broad-based exposure and diversification. Overall, the stabilization period demonstrates the importance of portfolio composition and risk management in navigating the transition from recession to recovery.

5.4.1.4 Paired T-test

We performed a paired t-test at a 95% confidence level. The critical value for the recession period is ±2.042, based on 30 degrees of freedom, while for the stabilization period, it is ±1.983, with 105 degrees of freedom. These critical values will be compared against the calculated t-values for both the recession and stabilization phases of the Financial Crisis. The purpose of this analysis is to determine whether the observed differences in risk-adjusted returns are statistically significant or simply the result of random variation.

	P1	**P2**	**P3**	**P4**
Sharpe T-value	0.693	2.304	-0.330	-0.619
Treynor T-value	-1.128	2.413	-0.815	-1.731

Table 17: T-value for Sharpe and Treynor Ratio during the Financial Crisis Recession

The t-test results for risk-adjusted returns during the recession period reveal notable differences in statistical significance across the portfolios. With a critical value of ±2.042, only P2 achieves statistical significance, allowing us to reject the null hypothesis for this portfolio. P2 demonstrates a Sharpe t-value of 2.304 and a Treynor t-value of 2.413, indicating that its risk-adjusted returns are significantly different from those of the OSEBX. This suggests that P2's portfolio composition and performance during the recession provided a meaningful advantage in compensating for both total and systematic risk. In contrast, the other portfolios fail to reach significance, as their t-value remain below the critical threshold. This suggests that their performance during the recession was not meaningfully distinct from the OSEBX. The negative values for these portfolios highlight their inability to deliver positive excess returns when adjusted for risk.

	P1	**P2**	**P3**	**P4**
Sharpe T-value	-0.311	0.404	-0.569	0.971
Treynor T-value	-0.376	-0.990	-0.501	0.865

Table 18: T-value for Sharpe and Treynor Ratio during the Financial Crisis Stabilization

The t-test results for risk-adjusted returns during the stabilization period indicate that none of the portfolios achieve statistical significance, with a critical value of ± 1.983. This means the null hypothesis cannot be rejected for any of the portfolios, suggesting that their risk-adjusted returns are not significantly different from those of the OSEBX during this phase. P4, with the highest Sharpe t-value of 0.971, comes closest to significance but still falls short. The negative Sharpe t-values for P1 and P3 further suggest weaker performance compared to the OSEBX, while the positive t-values for P2 and P4 indicate some alignment with the OSEBX. The Treynor t-values shows a similar pattern. P4 shows the highest Treynor t-value at 0.865. The negative t-values for P1, P2, and P3 indicate underperformance relative to systematic risk, while P4's positive value suggests slight alignment but without significant outperformance.

These findings highlight the limited differentiation between the portfolios and the OSEBX in terms of risk-adjusted returns during the stabilization phase. The inability to reject the null hypothesis for any portfolio suggests that their observed differences in performance are likely due to random variation rather than meaningful distinctions. This underlines the challenges of generating statistically significant abnormal returns during periods of market stabilization, where broader recovery trends dominate and diversification within the OSEBX likely minimizes any pronounced deviations.

5.4.2 The Covid-19 Pandemic (2020)

5.4.2.1 Recession

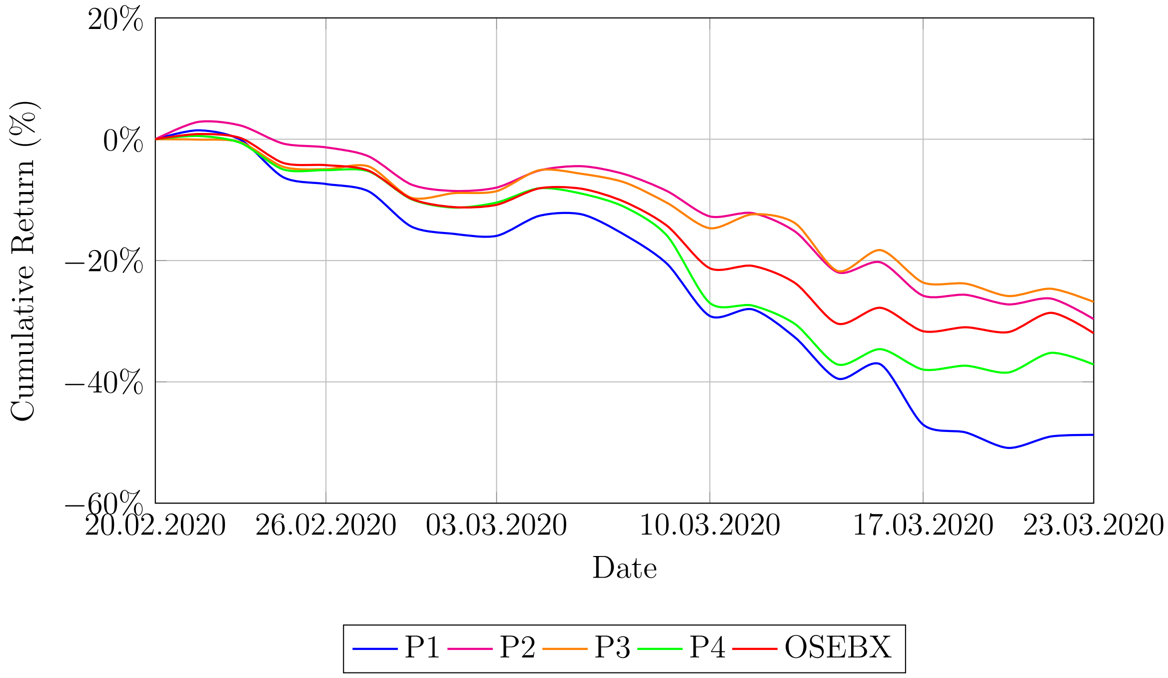

Figure 8: Cumulative Return During Covid-19 Recession

Figure 8 illustrates the performance of the portfolios and the OSEBX during the Covid-19 recession, spanning from February 20th to March 23th 2020. All portfolios and OSEBX experienced sharp declines during this period, reflecting the extreme market volatility over a short period and broad uncertainty caused by the pandemic. P1 suffered the largest losses, declining 48.74%, indicating that growth-oriented or non-dividend-paying stocks were particularly vulnerable during the market crash. P4 followed as the second-lowest performer, decreasing by 37.14%. This may reflect concerns over the sustainability of high payouts during a period of economic instability. The portfolio's performance was heavily influenced by its composition, with Equinor and DNB being the dominant companies, accounting for 40.96% and 40.56%, respectively, of the total 19 companies in the portfolio. The OSEBX performed slightly better, with a decline of 31.98%, reflecting its diversified composition, which provided moderate risk reduction. P2 had a lower decline of 29.65%, compared to the index. This may suggest that low to moderate dividend yield stocks were perceived as slightly more stable in this short downturn period. P3 exhibited the most resilience, with a decrease of 26.82%, experiencing the least decline among the portfolios. This resilience can be attributed to the portfolio's composition, where Elmera Group and Stolt-Nielsen were dominant, accounting for 20.06% and 18.92%, respectively, of the total 16 companies in the portfolio. This is likely due to a balance between stability and moderate income generation that appealed to investors during this volatile period. Overall, the results highlight the severe impact of the COVID-19 downturn across all portfolios and OSEBX, while suggesting that portfolios with moderate dividend yields were better able to weather the crisis than those with no or high dividend yields.

5.4.2.2 Stabilization

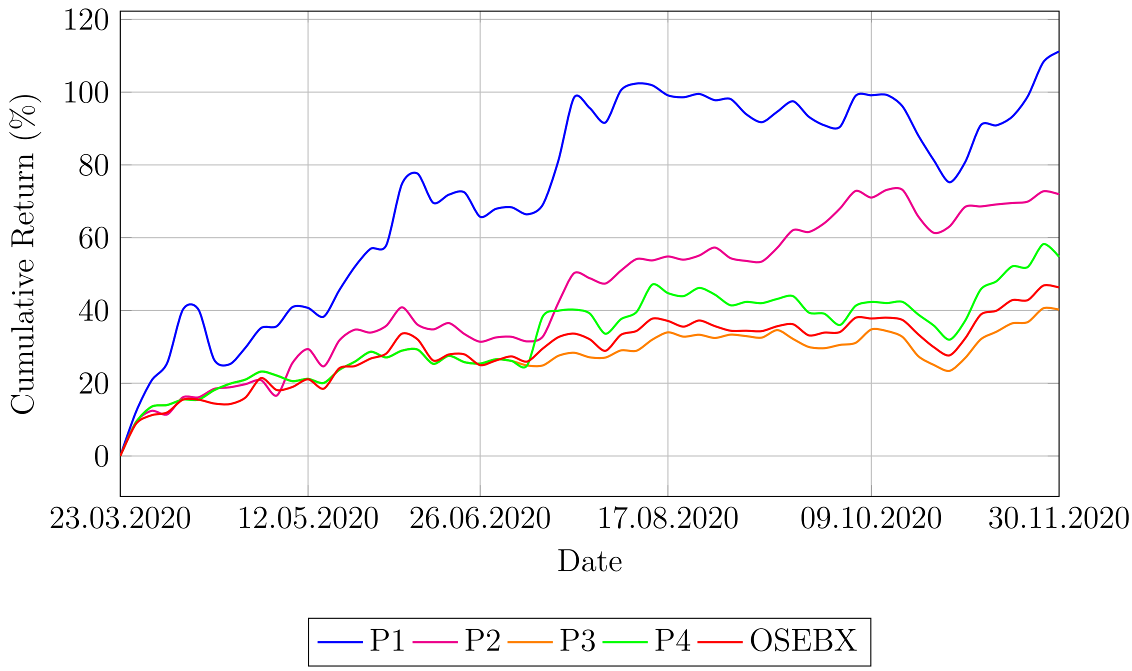

Figure 9: Cumulative Return During Covid-19 Stabilization

Figure 9 illustrates how the portfolios and the OSEBX performed during the stabilization phase after the Covid-19 recession, covering the period from March 24th to November 30th 2020. P1 outperformed all other portfolios and OSEBX, showing the highest cumulative return of 111.14% over the period. The companies, Tietoevry, Subsea 7 and Adevinta represent 60% of this portfolio and therefore account for a significant portion of market fluctuations during both recession and stabilization. P2 followed with strong return of 71.92%, reflecting the appeal of its portfolio composition, which balances stability and moderate income generation. P4 also outperformed the OSEBX with return of 54.72%, demonstrating resilience. Even though the OSEBX lagged behind with an increase of 46.30%, it still delivered substantial gains, reflecting the broader market recovery. P3 showed the lowest cumulative return of 40.21%. This may indicate that moderate-dividend-paying stocks lacked the strong growth characteristics of P1, leaving them less competitive in capturing the gains of the stabilization phase.

It is interesting to observe the contrasting performance patterns of P1 and P3 between the recession and stabilization phases, which can be explained by their portfolio composition and shifting investor preferences across these market conditions. P1, which suffered the largest losses during the recession, performed best among the portfolios during the stabilization phase. This can be attributed to its growth-oriented composition, with companies like Adevinta (29.54%) playing a dominant role in the portfolio. Growth stocks typically experience sharp declines in turbulent periods due to their higher risk and reliance on future earnings potential. However, during the stabilization phase, as market optimism returns, these stocks often rebound strongly, attracting investors seeking higher returns from potential growth opportunities. In contrast, P3, which was the most resilient during the downturn, showed weakest performance during the stabilization phase. This can be linked to its balanced composition, with companies like Elmera Group (20.06%) and Stolt-Nielsen (18.92%) providing a mix of defensive stability and cyclical exposure. While this balance helped mitigate losses during the downturn by providing a buffer against volatility, it limited the portfolio's potential for rapid growth during the recovery, as more aggressive growth stocks led the rebound. This pattern highlights how growth-oriented portfolios like P1 can suffer substantial losses during downturns but recover quickly when market conditions improve. Conversely, P3's performance demonstrates that a more balanced portfolio can cushion against losses in volatile periods but may have a more restrained recovery during stabilization phases. These findings underscore the importance of aligning investment strategies with market phases, balancing risk tolerance with return objectives.

5.4.2.3 Sharpe Ratio and Treynor Ratio

	P1	**P2**	**P3**	**P4**	**OSEBX**
Sharpe Ratio	-0.514	-0.449	-0.366	-0.497	-0.490
Treynor Ratio	-0.017	-0.013	-0.013	-0.017	-0.015

Table 19: Sharpe and Treynor ratio during Covid-19 Recession

Table 19 presents the Sharpe- and Treynor ratios for the portfolios and the OSEBX during the Covid-19 recession. All portfolios and OSEBX recorded negative ratios, reflecting poor risk-adjusted returns during the extreme market volatility. P3 showed the least negative Sharpe ratio at -0.366, indicating it performed best on a total risk-adjusted basis. P2 followed with a Sharpe ratio of -0.449, slightly outperforming the OSEBX, which recorded -0.490. P1 and P2 had the most negative Sharpe ratios at respectively -0.514 and -0.497, suggesting these stocks were more vulnerable during the downturn. The Treynor ratios further reflect the systematic risk-adjusted performance of the portfolios. Both P1 and P4 recorded the lowest Treynor ratios of -0.017, closely followed by the OSEBX at

-0.015, suggesting that these portfolios and the index struggled to effectively compensate for systematic risk during the period. P2 and P3, however, showed the highest Treynor ratios of -0.013, indicating stronger compensation for systematic risk. The results highlight that low to moderate dividend yielding stocks offered better risk-adjusted performance during the recession, while non-dividend and high-dividend portfolios were more exposed to the adverse market conditions.

	P1	**P2**	**P3**	**P4**	**OSEBX**
Sharpe Ratio	0.257	0.187	0.172	0.102	0.169
Treynor Ratio	0.033	0.010	0.008	0.003	0.002

Table 20: Sharpe and Treynor-Ratio during Covid-19 Stabilization

Table 20 shows the Sharpe- and Treynor ratios for the portfolios and the OSEBX during the stabilization period following the Covid-19 recession. P1 stands out with the highest risk-adjusted returns with a Sharpe ratio of 0.257 and Treynor ratio of 0.033, indicating its superior ability to efficiently generate returns relative to both total and systematic risk. P2 and P3 exhibit moderate risk-adjusted returns, with P2 having a Sharpe ratio of 0.187 and a Treynor ratio of 0.010, and P3 showing similar performance with a Sharpe ratio of 0.172 and a Treynor ratio of 0.008. While both portfolios outperformed the OSEBX, they were less efficient than P1 in translating risk into returns, particularly when considering systematic risk. P4, on the other hand, demonstrated the weakest performance among the portfolios, with a Sharpe ratio of 0.102 and a Treynor ratio of 0.003. The OSEBX recorded a Sharpe ratio of 0.169 and a Treynor ratio of 0.002, indicating that the index performed relatively better in systematic risk-adjusted terms than P4 but lagged behind the other portfolios. These results underscore the strong performance of non-dividend and low-dividend portfolios during the recovery phase, likely due to their growth-oriented stocks. In contrast, high-dividend portfolios struggled to match the returns of their peers, reflecting a market preference for growth over stability during a period of rapid recovery.

5.4.2.4 Paired T-test

For the Covid-19 Pandemic, we will also conduct a paired T-test to determine whether the risk-adjusted returns of the portfolios are statistically significant. The critical value for the recession period is ± 2.776 based of 4 degrees of freedom and for the stabiliztion period the critical value is ± 2.030 based on 35 degrees of freedom. These thresholds will be compared against the calculated t-values. To evaluate the significance of risk-adjusted returns, we apply the same hypothesis as outlined in part 4.7.

	P1	P2	P3	P4
Sharpe T-value	-0.241	0.286	1.150	-0.008
Treynor T-value	-0.391	0.289	0.465	-0.122

Table 21: T-value for Sharpe and Treynor Ratio during Covid-19 recession

The T-test results for risk-adjusted returns during the recession period show that none of the portfolios achieve statistical significance with a critical value of ±2.776. The Sharpe t-value range from -0.241 for P1 to 1.150 for P3, while the Treynor t-value range from -0.391 for P1 to 0.465 for P3, with all values falling below the critical threshold. These results indicate that the observed differences in risk-adjusted returns between the portfolios and the OSEBX are not statistically significant, suggesting that the portfolios do not provide returns that substantially differ from those of the OSEBX. The positive values observed for P2 and P3 suggest that these portfolios have outperformed OSEBX. However, due to the lack of statistical significance, we cannot confidently draw such a conclusion. The lack of significance underscores the challenge of generating risk-adjusted outperformance during the recession, where market-wide volatility likely overwhelmed individual portfolio strategies.

	P1	P2	P3	P4
Sharpe T-value	1.309	0.918	0.830	0.679
Treynor T-value	1.222	0.599	0.981	0.991

Table 22: T-value for Sharpe and Treynor Ratio during Covid-19 stabilization

During the Covid-19 stabilization period, the T-test results for risk-adjusted returns indicate that none of the portfolios reached statistical significance. With a critical t-value of ±2.030, the Sharpe t-value range between 0.679 (P4) and 1.309 (P1), while the Treynor t-value vary from 0.599 (P2) to 1.222 (P1). As all calculated t-values fall below the critical threshold, the findings suggest no statistically significant differences in risk-adjusted returns for any of the portfolios. This implies that, during the stabilization phase, the portfolios did not demonstrate clear outperformance compared to the benchmark. The absence of significant results may be attributed to market uncertainty. This suggest that while certain portfolios performed notably better, the overall market conditions during the stabilization period likely generated variability that undermined the ability to achieve robust statistical significance.

6. Conclusion

This study aimed to examine the performance of dividend-paying portfolios relative to the OSEBX over a 21-year period from 2003 to 2023, encompassing a range of economic cycles. The primary focus was to investigate whether a dividend yield strategy could serve as a reliable indicator of a portfolio's potential to achieve superior returns relative to the broader market. To achieve this, we have analyzed how dividend-paying portfolios perform as a long-term investment over the entire period, as well as their resilience during economic crises like the Financial Crisis in 2008 and the Covid-19 Pandemic with short-term market fluctuations. Our goal was to determine whether statistically significant results of outperformance could be identified.

Our findings indicate that Portfolio 2, with low to moderate dividend yield of 0-2.5%, consistently outperforming OSEBX in terms of overall portfolio performance, risk-adjusted returns, and abnormal returns across various market conditions. Its resilience was evident during the recession periods of both the Financial Crisis and Covid-19, with particularly strong performance during the Financial Crisis, where it demonstrated statistically significant superior risk-adjusted returns. This performance suggests that portfolios with lower dividend yields may strike an effective balance between retaining earnings for growth and offering moderate income stability, making them well-suited for navigating volatile economic conditions.

Portfolio 1 with non-dividend-paying stocks, performed the worst among all portfolios and the OSEBX. When considering risk-adjusted measures, it also fails to compensate for the risk associated with its low returns, as it exhibits higher volatility compared to other portfolios. This higher volatility, coupled with its underperformance, makes Portfolio 1 a poor investment choice. Although Portfolio 1 experienced a notable improvement during the stabilization phase of the Covid-19 pandemic, this pattern did not hold true during the Financial Crisis, suggesting that any temporary gains were more likely due to specific, isolated factors rather than a sustained advantage. Portfolio 1 is the only portfolio with a statistically significant result, showing a negative significance. This indicates that the portfolio underperformed relative to the OSEBX, highlighting its weaker risk-adjusted performance during the broader period of analysis.

Based on signaling theory, one might expect that higher-dividend-yield portfolios like P3 (2.5-4%) and P4 (Above 4%) to demonstrate more consistent and stable performance. However, our findings indicate that the higher-dividend portfolios did not consistently exhibit the anticipated stability or superior risk-adjusted returns as might be expected.

These portfolios exhibit fluctuating performance relative to the OSEBX, alternating between outperforming and underperforming the OSEBX across different market conditions. This may be attributed to factors such as sector-specific volatility, macroeconomic shifts, or differing levels of sensitivity to market cycles, which appear to have outweighed the stabilizing effects typically associated with high dividend payouts.

The OSEBX consistently positioned itself as a middle performer across the analyzed portfolios, rarely taking the lead or falling to the bottom in terms of overall performance. This is consistent with expectations for an index, as its diversified nature tends to smooth out extreme fluctuations, providing a balanced return. Although several of the dividend-paying portfolios yield higher returns, the diversification achieved by holding the entire market ultimately results in a superior Sharpe ratio. This point is further reinforced by the observation that even when all dividend portfolios are aggregated, their combined risk-adjusted performance still does not surpass that of the OSEBX. These findings align with the assumptions of the Efficient Market Hypothesis, which posits that it should not be possible to consistently outperform the market.

In essence, this study highlights the complex dynamics of dividend yield and portfolio performance in the Norwegian Stock Market. It is worth mentioning that the relatively small size of this Stock Market, combined with the dominance of a few large companies accounting for a significant share of the market value, can lead to skewed results. While low to moderate dividend-yield portfolios, consistently outperformed the OSEBX, higher-dividend-yield portfolios did not deliver the expected stability or superior risk-adjusted returns. These findings suggest that dividend yield alone is not a reliable predictor of long-term investment success, as evidenced by the lack of statistically significant outperformance. Notably, the non-dividend-paying portfolio was the only one to exhibit a statistically significant negative result, emphasizing its weaker risk-adjusted performance relative to the OSEBX. Factors such as market conditions, economic cycles, and portfolio composition play a significant role in shaping investment outcomes. Therefore, this study underscores the need for a comprehensive investment strategy that considers more than just dividend yield to achieve optimal long-term performance.

6.1 Future research

This study has provided valuable insight into the performance of dividend-paying stocks relative to the OSEBX over a 21-year period. However, several avenues for further research could build upon these findings and deepen our understanding of dividend strategies. Norway, as a relatively small market, has certain structural limitations that could affect the performance of dividend-paying stocks. The market includes a smaller pool of listed companies and a high concentration in specific industries like energy and industry. By examining larger and more diverse markets, researchers could assess whether the observed patterns are consistent across different regulatory, economic, and market structures. This approach could help reveal the broader applicability of dividend-focused strategies.

Another potential area for future research is to expand the analysis by incorporating more advanced asset pricing models, such as the Carhart four-factor model. The model incorporates momentum as one of the additional factors. This could provide a deeper understanding of whether dividend-paying stocks' performance is influenced by momentum effects or other unexplored factors. By integrating these factors into the analysis, researchers could better capture the dynamics driving returns. This approach would also help assess whether the outperformance of dividend-paying portfolios is robust when additional explanatory variables are considered.

An alternative suggestion for further studies could be to incorporate transaction costs and taxes to more accurately assess their influence on portfolio performance. As Kim (2019) demonstrated, accounting for these factors can substantially alter whether portfolios appear to outperform their benchmarks. Therefore, it could be interesting to explore how portfolio returns would be affected by these factors, which are commonly seen in real-world markets.

Furthermore, future research could explore the performance of dividend-paying stocks across a broader range of financial crises and economic downturns. By examining other periods of market instability, such as the dot-com bubble or geopolitical crises, it could provide a more comprehensive view of how dividend strategies perform under varying stress conditions. This could help identify patterns of resilience or vulnerability specific to dividend-paying stocks, offering valuable insights for investors aiming to navigate uncertain market environments.

AI as a tool – permitted use of AI-based aids in the work on the master's thesis

Name (and version) of the AI tool: ChatGPT, 4.0

The purpose of the use of the tool: Providing assistance in resolving coding errors, refining written content for grammatical accuracy, and facilitating brainstorming for idea generation.

We acknowledge that we are fully responsible for all content in this master's thesis, including sections where AI tools have been utilized. We are accountable for ensuring that the thesis complies with ethical standards for privacy and publication.

Bibliography

AksjeNorge. (2023, February). Største selskaper på Oslo Børs. https://aksjenorge.no/aktuelt/2023/02/06/storste-selskaper-pa-oslo-bors/

Bajaj Finserv. (2024). Total Return - Meaning, Formula and Calculation. https://www.bajajfinserv.in/investments/total-return

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, *6*(2), 159–178. https://doi.org/10.2307/2490232

Bergh, F. Ø. (2020, September). *Aksjeskolen*. Universitetsforlaget.

Black, F., & Scholes, M. (1974). The effects of dividend yield and dividend policy on common stock prices and returns. *Journal of Financial Economics*, *1*(1), 1–22. https://doi.org/10.1016/0304-405X(74)90006-3

Bodie, Z., Kane, A., & Marcus, A. J. (2013). *Essentials of investments* (9th ed). McGraw-Hill/Irwin.

Coeffin, M. (2022, July). *Dividend Stocks May Be an Effective Response to Market Uncertainty* (tech. rep.). Lord Abbett. https://www.lordabbett.com/content/dam/lordabbett-captivate/documents/insights/Dividend%20Stocks%20May%20Be%20an%20Effective%20Response%20to%20Market%20Uncertainty.pdf

Corzo Santamaría, T., Lagoa-varela, D., & Portillo García, I. (2014). Ten years of dividend yields in Europe: 2000-2009. *Journal of Asset Management*, *15*(2), 83–91. https://doi.org/10.1057/jam.2014.14

DATAtab. (n.d.). T-distribution Table. https://datatab.net/tutorial/t-distribution

Dayaratne, D., Dharmaratne, D., & Harris, S. (2010). Measuring the Risk and Performance in Plantation Sector Using CAPM Based Jensen's Alpha. *Sabaragamuwa University Journal*, *6*(1), 68–81. https://doi.org/10.4038/suslj.v6i1.1690

DeAngelo, H., DeAngelo, L., & Stulz, R. M. (2006). Dividend policy and the earned/contributed capital mix: A test of the life-cycle theory. *Journal of Financial Economics*, *81*(2), 227–254. https://doi.org/10.1016/j.jfineco.2005.07.005

Dionne, G., & Ouederni, K. (2011). Corporate risk management and dividend signaling theory. *Finance Research Letters*, *8*(4), 188–195. https://doi.org/10.1016/j.frl.2011.05.002

Dong, M., Robinson, C., & Veld, C. (2005). Why individual investors want dividends. *Journal of Corporate Finance*, *12*(1), 121–158. https://doi.org/10.1016/j.jcorpfin.2004.04.006

Elton, E. J., & Gruber, M. J. (1977). Risk Reduction and Portfolio Size: An Analytical Solution. *The Journal of Business*, *50*(4), 415–437. https://www.jstor.org/stable/2352173

Euronext. (2024). *Oslo Børs Benchmark GI Index* (tech. rep.). https://live.euronext.com/sites/default/files/documentation/index-fact-sheets/Oslo_Bors_Benchmark_GI_Index_Factsheet.pdf

Fakir, R. (2013, November). *Dividend Yield as a Superior Investment Strategy* (tech. rep.). University of Pretoria. https://www.proquest.com/openview/aeb3b8a912649fbfba2fe55bc082a7c1/1?cbl=2026366&diss=y&pq-origsite=gscholar

Fama, E. F. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), 383–417. https://doi.org/10.2307/2325486

Fama, E. F., & French, K. R. (2004). The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives*, *18*(3), 25–46. https://doi.org/10.1257/0895330042162430

Fuller, K. P., & Goldstein, M. A. (2011). Do dividends matter more in declining markets? *Journal of Corporate Finance*, *17*(3), 457–473. https://doi.org/10.1016/j.jcorpfin.2011.01.001

Gårseth-Nesbakk, L. (2023). Markedseffisiens. *Store norske leksikon*. https://snl.no/markedseffisiens

Gehi, T. (2024). Dogs of the Dow. *Wall Street Oasis*. https://www.wallstreetoasis.com/resources/skills/trading-investing/dogs-of-the-dow

Gram, T. (2024). Oslo Børs. *Store norske leksikon*. https://snl.no/Oslo_B%C3%B8rs

Grullon, G., Michaely, R., & Swaminathan, B. (2002). Are Dividend Changes a Sign of Firm Maturity? *The Journal of Business*, *75*(3), 387–424. https://doi.org/10.1086/339889

Haug, M., & Hirschey, M. (2006). The January Effect. *Taylor & Francis*, *62*(5), 78–88. https://doi.org/https://doi.org/10.2469/faj.v62.n5.4284

Hedberg, E. C., & Ayers, S. (2015). The power of a paired *t*-test with a covariate. *Social Science Research*, *50*, 277–291. https://doi.org/10.1016/j.ssresearch.2014.12.004

Hübner, G. (2005). The Generalized Treynor Ratio. *Review of Finance*, *9*(3), 415–435. https://doi.org/10.1007/s10679-005-2265-x

Jain, R. (2007). Institutional and individual investor preferences for dividends and share repurchases. *Journal of Economics and Business*, *59*(5), 406–429. https://doi.org/10.1016/j.jeconbus.2007.04.004

Jensen, M. C. (1968). The Performance of Mutual Funds in the Period 1945-1964. *The Journal of Finance*, *23*(2), 389–416. https://doi.org/10.2307/2325404

John, K., & Williams, J. (1985). Dividends, Dilution, and Taxes: A Signalling Equilibrium. *The Journal of Finance*, *40*(4), 1053–1070. https://doi.org/10.1111/j.1540-6261.1985.tb02363.x

Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–291. https://doi.org/10.2307/1914185

Kim, D.-K. (2019). The Dogs of the Dow Theory – Is It Valid? *International Journal of Economics and Finance*, *11*(5), p43. https://doi.org/10.5539/ijef.v11n5p43

Korterud, S. (2022). Aktiv eller passiv forvaltning – to ulike måter å investere på. *Nordea.* https://www.nordeafunds.com/no/innhold/aktiv-eller-passiv-forvaltning-to-ulike-mater-a-investere-pa

Lee, D. K., In, J., & Lee, S. (2015). Standard deviation and standard error of the mean. *Korean Journal of Anesthesiology*, *68*(3), 220–223. https://doi.org/10.4097/kjae.2015.68.3.220

Levy, H. (2010). The CAPM is Alive and Well: A Review and Synthesis. *European Financial Management*, *16*(1), 43–71. https://doi.org/10.1111/j.1468-036X.2009.00530.x

Lintner, J. (1956). Distribution of Incomes of Corporations Among Dividends, Retained Earnings, and Taxes. *The American Economic Review*, *46*(2), 97–113. https://www.jstor.org/stable/1910664

Ma, L., Xie, Z., & Zhang, H. (2023). An Evaluation of the Dividend Discount Model and its Extensions. *Advances in Economics, Management and Political Sciences*, *4*(1), 165–173. https://doi.org/10.54254/2754-1169/4/20221049

Malkiel, B. G. (2003a). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives*, *17*(1), 59–82. https://doi.org/10.1257/089533003321164958

Malkiel, B. G. (2003b). Passive Investment Strategies and Efficient Markets. *European Financial Management*, *9*(1), 1–10. https://doi.org/10.1111/1468-036X.00205

Mangram, M. E. (2013). A Simplified Perspective of the Markowitz Portfolio Theory. *Global Journal of Business Research*, *7*(1), 59–70. https://papers.ssrn.com/abstract=2147880

Markowitz, H. M. (1991). Foundations of Portfolio Theory. *The Journal of Finance*, *46*(2), 469–477. https://doi.org/10.1111/j.1540-6261.1991.tb02669.x

Miller, M. H., & Modigliani, F. (1961). Dividend Policy, Growth, and the Valuation of Shares. *The Journal of Business*, *34*(4), 411–433. https://www.jstor.org/stable/2351143

Mwangi, W. M. (2017). Testing the Gordon's Growth Model. *Research Journal of Finance and Accounting*, *8*(14), 94–100. https://core.ac.uk/download/pdf/234632083.pdf

Nordea. (2024, September). The Norwegian economy and an energy price shock. https://www.nordea.com/en/news/the-norwegian-economy-and-an-energy-price-shock

Nordnet. (n.d.-a). Slik lager du en god investeringsstrategi. https://www.nordnet.no/no/kunnskap/academy/fond/slik-lager-du-en-investeringsstrategi

Nordnet. (n.d.-b). Utbytteaksjer 2024. https://www.nordnet.no/aksjer/utbytte

Norges Bank. (2008). Finanskrisen i 2008. https://www.norges-bank.no/tema/Om-Norges-Bank/historien/Pengepolitikk-finansiell-stabilitet-og-kapitalforvaltning/Finansiell-stabilitet/2008-krisen/

Norges Bank. (2021). Financial Stability Report 2021: Vulnerabilities and risks. https://www.norges-bank.no/en/news-events/news-publications/Reports/Financial-Stability-report/2021-financial-stability/content/

Olaussen, K. (2024a). Fordeler og ulemper ved å investere i utbytteaksjer [DNB Nyheter]. *DNB Nyheter*. https://www.dnb.no/dnbnyheter/no/bors-og-marked/hva-er-utbytteaksjer-og-hvorfor-investere-i-dem

Olaussen, K. (2024b). Hva er utbytteaksjer, og hvorfor kjøpe dem? *DNB Nyheter*. https://www.dnb.no/dnbnyheter/no/bors-og-marked/hva-er-utbytteaksjer

PWC. (2023). *Risikopremien i det norske markedet 2023* (tech. rep.). https://www.pwc.no/no/publikasjoner/risikopremien-2023.pdf

Qiu, M., Song, Y., & Hasama, M. (2013). Empirical analyses of the "Dogs of the Dow" strategy: Japanese evidence. *International Journal of Innovative Computing, Information and Control*, *9*(9). https://doi.org/9(9):3677-3684

Reilly, F. K., & Brown, K. C. (2003). *Investment analysis and portfolio management* (10 ed). Thomson South-Western.

Roland, R., & Xiang, G. (2004). The Risk-Adjusted Return Theory. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.524162

Rosner, B., Glynn, R. J., & Lee, M.-L. T. (2006). The Wilcoxon Signed Rank Test for Paired Comparisons of Clustered Data. *Biometrics*, *62*, 185–192. https://doi.org/10.1111/j.1541-0420.2005.00389.x

Sharpe, W. F. (1966). Mutual Fund Performance. *The Journal of Business*, *39*(1), 119–138. https://www.jstor.org/stable/2351741

Shier, R. (2004). Statistics: 2.2 The Wilcoxon signed rank sum test. *Mathematics Learning*. https://www.statstutor.ac.uk/resources/uploaded/wilcoxonsignedranktest.pdf

Sirnes, E. (2021). Aksjekursindeks. *Store norske leksikon*. https://snl.no/aksjekursindeks

Skatteetaten. (n.d.). Gevinst, tap eller utbytte på aksjer. https://www.skatteetaten.no/satser/faktor-for-oppjustering-av-gevinsttap-eller-utbytte-pa-aksjer/

Stock, J. H., & Watson, M. W. (2020). *Introduction to econometrics* (Fourth edition, global edition). Pearson.

Tamplin, T. (2023). Treynor Ratio — Definition, Components, Calculation, Applications. *Finance Strategists*. https://www.financestrategists.com/wealth-management/financial-ratios/treynor-ratio/

Taze-Bernard, E., & Germano, M. (2021). Combining active and passive investing in Multi Asset: An institutional investor framework. *Amundi Research Center*. https:

//research-center.amundi.com/article/combining-active-and-passive-investing-multi-asset-institutional-investor-framework

Uchitelle, L. (2009). GE slashes its dividend for 1st time since 1938. *The New York Times*. https://www.nytimes.com/2009/03/01/business/worldbusiness/01iht-ge.1.20503518.html

VanEck. (2023, April). How to Develop a Dividend Investing Strategy: A Comprehensive Guide. https://www.vaneck.com/corp/en/news-and-insights/blogs/income-investing/how-to-develop-a-dividend-investing-strategy-a-comprehensive-guide/

World Health Organization. (2020). WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020. https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Yang, Z. (2021). Analysis on CAPM and Sharpe Ratio in Market Investment. *Advances in Economics, Business and Management Research*, *166*. https://doi.org/10.2991/aebmr.k.210319.002

Appendix

A:	Overview of Dividend Portfolio Classification by Year and Company
B:	Annual Distribution of Stocks by Portfolio and Total Dividend-Paying Stocks
C:	Yearly Return and Standard Deviation for Market-Weighted Portfolios and OSEBX
D:	Yearly Return and Standard Deviation for Equal-Weighted Portfolios and OSEBX
E:	Difference in Return Between Market-Weighted Portfolios and OSEBX
F:	Difference in Return Between Equal-Weighted Portfolios and OSEBX
G:	Sharpe Ratio Market-Weighted
H:	Sharpe Ratio Equal-Weighted
I:	Treynor Ratio Market-Weighted Portfolio
J:	Treynor Ratio Equal-Weighted Portfolio
K:	Wilcoxon Signed-Rank Test for all portfolios and both weighting methodologies
L:	Jensen's Alpha Market-Weighted Portfolios
M:	Jensen's Alpha Equal-Weighted Portfolios

Negative numbers in the appendix are presented in parentheses.

Appendix A

Year	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23
ABG	P4	P4	P4	P4	P4	P4	P4	P1	P4	P4	P1	P1	P1	P4					P3	P4	P3
ADE																		P1	P1	P1	P1
AFG												P3	P3	P4	P3	P4	P4	P4	P3	P4	P4
AKAST			P1	P1	P2	P2	P4	P2	P3	P4	P3	P3	P4								
AKER			P1		P2	P4	P4	P3		P4	P4	P4	P4	P4	P3	P3	P3	P4	P2	P3	P4
AKBM			P4																		
AKRBP											P1	P1	P1	P1	P3	P3	P4	P4	P3	P4	P4
AKH																				P1	P1
AKSO													P1	P4	P1	P1	P1	P1	P1	P1	P2
ALGETA								P1	P1	P1	P1	P1									
ALX					P1																
AHM	P2	P2																			
AMSC				P1									P4	P4	P4			P4	P4		
ATG				P1																	
AZT													P1	P1	P1					P1	P1
AFK																					P2
ARR		P1	P1	P4	P4	P4	P4	P1	P1												
ASTK												P1			P1	P2	P1	P1	P1		
ATEA	P1	P1	P1	P1	P1	P1	P1	P2	P2	P4	P4	P4	P4	P4	P1	P4	P4	P4	P4	P3	P4
AUSS						P1	P3	P1	P2	P4	P3						P3	P3			
AUTO																					P1
AGAS														P4					P4	P4	
AVA	P1																				
ACR					P1										P1	P1	P1	P1	P1		
STP	P1	P1	P1		P1	P1	P1														
ASD			P1	P1	P1	P1															
B2I															P1	P2	P1	P4	P1	P2	P4
BAKKA										P4	P2		P3	P3	P3	P3	P3	P2	P1	P2	P2
BANO															P1	P1	P1	P1	P4		
BGBIO																	P1	P1	P1	P1	P1
BEB	P4																				
BEA	P4																				
BONHR																		P2	P2	P2	P2
BORR																P1	P1	P1			
BRG																				P2	P2

Year	’03	’04	’05	’06	’07	’08	’09	’10	’11	’12	’13	’14	’15	’16	’17	’18	’19	’20	’21	’22	’23
BOUV																			P2	P2	P2
GAS					P2																
BWLPG													P4	P4		P1	P1	P4	P4	P4	P4
BWO						P1			P1								P1	P1	P3		
BWG					P1	P4		P1	P1	P4	P1	P1									
CADLR																					P1
CARA		P1	P1	P1	P1															P1	P1
CEQ					P2	P4	P2	P1	P2	P4	P4	P2									
CRNEA																P1					
SFR									P1	P4											
CLOUD																					P1
COP						P1		P1													
AWO					P1	P1															
CRAYN																			P1	P1	P1
CRU					P1																
DAT	P1			P1	P1	P1	P1											P2			
DNB	P4	P4	P3	P3	P3	P4	P4	P1	P2	P4	P3	P2	P2	P3	P3	P3	P4	P4	P1	P4	P4
DNO				P2	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P2	P3	P1	P2	P2
DDASA				P1	P1	P3	P4	P4	P3	P4	P4	P4	P4								
EKO	P4	P4	P4	P4	P4	P4	P4	P3	P4	P4	P4	P4	P4	P4	P3	P4					
EMGS											P1										
ELK																		P4	P2	P2	P4
ELMRA																		P3	P3	P4	P4
ELT		P1	P1	P1	P1	P1			P1	P1	P4	P4	P4								
ENSU														P1	P1	P1	P1				
ENTRA													P1	P3	P4	P3	P3	P3	P2	P3	P4
EQNR	P4	P3	P3	P2	P4	P2	P3	P3	P4	P3	P4	P4	P4	P4	P4	P4	P4	P4	P3	P3	P2
EPR														P1	P1	P4	P4	P4	P3	P3	P3
1514907D	P1	P1	P1	P2	P2	P3	P4	P1	P1	P1	P4	P1	P3								
FIND			P3																		
FJO			P1	P1																	
FJORD																	P4	P4	P4		
FLNG																				P4	P4
FBU									P1												
FRO	P1	P4	P4	P4	P4	P4	P4	P2	P3	P1	P1			P4	P4	P4	P1	P3	P1	P1	P2
FUNCOM					P1	P1										P1					
G2MNO																P1	P1	P1	P1	P1	
GJF									P1	P4	P4	P4	P1	P1	P4	P4	P4	P3	P3	P3	P4
GNO	P4																				
GOL	P1	P1	P1			P1				P3											
GOGL														P1	P1	P1	P4	P4	P1	P4	P4

Year	’03	’04	’05	’06	’07	’08	’09	’10	’11	’12	’13	’14	’15	’16	’17	’18	’19	’20	’21	’22	’23
1254900D					P1	P4	P4	P1	P4	P4	P1	P2	P3	P1	P1	P1	P4	P4	P1	P4	P4
GRE	P1	P4	P3																		
GSF																P4	P2	P3	P1		
HAFNI																					P4
HNA	P4	P1			P2	P2	P4														
HNB	P4	P1	P3	P2	P2	P2	P4	P3	P3	P4	P4				P3						
HEX															P1	P1		P1	P1	P1	P1
IBAS			P1																		
IDEX														P1	P1	P1	P1	P1	P1		
IMAREX						P1	P1														
IFC	P1																				
ITERA						P4															
JSHIP				P3	P3	P1	P4														
JIN			P1	P4		P1			P1												
KAHOT																			P1	P1	
KID																				P4	P4
KIT															P3	P3	P4	P3	P3	P3	P3
KOM	P1	P2	P3		P2	P2															
KOA				P1	P3	P3	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1
KOG	P1	P2	P2	P2			P2		P2	P3	P3	P3	P3	P3	P3	P2	P3	P2	P2	P2	P2
KVI	P1	P1	P1																		
KVE			P2																		
LHO	P2																				
LSG				P2	P2	P2	P3	P3	P3	P4	P4	P3			P3	P3	P2	P3	P2	P3	P4
1838703D																P1					
MGN					P1	P1	P1	P1	P1	P1											
MAMUT						P1	P1	P1													
MEDI																			P2		
FAST	P1	P1	P1	P1	P1	P1															
MORPOL									P1	P1											
MOWI	P1			P1	P1	P1	P1	P4	P4	P4	P1	P2	P4	P4	P4	P1	P4	P4	P1	P2	P4
MPCC																	P1	P1	P1	P1	P4
MULTI														P1	P3					P4	P4
NKR				P1																	
NEL				P1	P1												P1		P1	P1	P1
NER	P1	P1	P2	P1																	
NEXT															P1	P1	P1				
0881479D			P1	P1																	
NOD		P1		P1		P1			P2	P2	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1
NORGAN					P1																
NORMAN		P1	P1																		

Year	’03	’04	’05	’06	’07	’08	’09	’10	’11	’12	’13	’14	’15	’16	’17	’18	’19	’20	’21	’22	’23
2286295Q	P1	P4																			
NHY	P4	P4	P4	P4	P4	P4	P4	P1	P2	P3	P3	P3	P2	P3	P2	P3	P4	P3	P3	P2	P4
NSG	P4	P4	P4	P4	P4	P4	P1	P1		P1											
NAS					P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1
NPRO					P1	P3	P4	P1	P1	P2	P2	P3	P1	P1	P2	P3					
NRC				P1		P1	P1	P1													
NYKD																					P1
OCR				P1	P1	P1															
ODF	P4	P4	P2	P2	P3	P3			P1	P1	P1	P1									
ODFB		P4	P2	P2	P3		P4														
OLT	P3	P2	P2	P2	P2							P2	P2	P2	P2	P2	P2	P3	P1		
1045871D	P1		P1	P1																	
ORO		P1			P1	P1	P1														
ORK	P3	P2	P2	P3	P2	P2	P4	P2	P3	P4	P4	P4	P4	P3	P3	P3	P3	P3	P3	P3	P4
OTEC			P1	P1	P1	P1	P1	P2	P2	P2	P2	P2	P2	P2	P1	P1					
PAR					P1	P1															
PCIB																	P1	P1	P1	P1	
265143Q	P1																				
PEXIP																			P1		
PGS		P1	P1	P1	P1	P1	P1	P1	P1	P1	P2	P2	P4	P2	P1	P1	P1	P1	P1		
PHO	P1	P1	P1	P1	P1	P1			P1	P1				P1	P1	P1	P1	P1	P1	P1	P1
PLCS												P1									
EXPERT	P4	P3	P2	P3	P2																
AIK	P3	P4	P2	P3	P4	P1	P4	P1		P4											
PRO	P1			P2	P1	P1															
PRON						P1	P1	P1	P1	P1	P3										
PRS	P1	P3	P4	P3	P2	P2	P1	P3	P3	P4	P4	P4	P4	P4							
QFR				P1					P1	P1	P1	P1		P1							
QEC							P1		P1							P1					
RECSI					P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1			P1	P1
RECSOL												P1	P1								
RIE					P2																
RCL	P3	P2	P2	P2	P2	P2	P1	P1	P1	P2	P2	P2	P2	P2							
SALM						P1	P4	P2	P3	P4	P1	P1	P4	P4	P3	P4	P4	P4	P3	P3	P4
SASNO	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1									
SATS																			P1	P1	P1
SCATEC													P1	P2	P2	P2	P2	P2	P2	P2	P3
SCHB														P1	P2	P2	P2	P2	P1	P2	P2
SCHA	P3	P2	P2	P2	P2	P2	P4	P1	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P1	P2	P2

Year	’03	’04	’05	’06	’07	’08	’09	’10	’11	’12	’13	’14	’15	’16	’17	’18	’19	’20	’21	’22	’23
1643322D				P1	P1	P1	P1	P4	P4	P4	P4	P4	P1	P1	P1	P1					
SEN	P1																				
SME			P2	P2																	
SOI	P1	P1	P1																		
SOLON									P1	P1	P1	P1	P1								
SONG						P1		P1	P1		P1										
SB1NO																P3	P4	P4	P4	P2	P4
SST	P1	P1																			
SNI	P4	P1	P1	P4	P3	P3	P4	P3	P2	P4	P3	P3	P4	P4	P4	P4	P4	P3	P2	P4	P4
STB	P1	P1	P2	P4	P4	P3	P4	P1	P1	P3	P1	P1	P1	P1	P1	P2	P4	P4	P1	P3	P4
STXEUR				P2	P3	P4															
SUB				P1	P1	P1	P1	P1	P1												
SUBC				P1	P1	P2	P3	P2	P2	P1	P1	P3	P4	P1	P1	P1	P1	P1	P1	P1	P2
SUO				P4	P3	P4															
TAA	P1	P1	P2	P2	P2	P2															
TAD		P1																			
TAT		P1	P1	P1	P1																
ECHEM						P1	P1														
TECH			P1	P1	P1	P1															
TEL	P2	P2	P2	P2	P2	P1	P4	P1	P3	P3	P4	P4	P4	P4	P4	P3	P4	P4	P4	P4	P4
TGS	P1		P1	P2	P3	P4	P5	P6	P2	P2	P3	P4	P4	P4	P3	P1	P3	P3	P3	P4	P4
TRMED														P1	P1	P1	P1	P1	P1	P1	
TIETO																		P1	P1		
TOM	P2	P2	P2	P3	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2	P2
TRE															P1	P2					
TRI							P1														
ULTI																				P1	P1
VAR																					P4
VEI	P3	P4	P3	P4	P4			P4			P4	P4	P4	P3	P3	P4	P4	P4	P1	P4	P4
VIZ					P1	P1	P1	P1	P1												
VIS	P2	P2	P3	P3																	
TCO	P1	P1	P1	P1	P1																
VOW																				P1	
WAWI									P1	P3	P3	P3	P4	P3	P1	P1	P1	P3	P1	P1	P2
WAVE						P1															
WEIFA									P1	P1	P1		P1	P4	P4						
WWI	P4	P4	P4	P3	P3	P3	P3	P1	P2	P4	P4	P3	P3	P3	P2	P2	P3	P3			
WWIB	P4	P4	P4	P3	P3	P4				P3	P4	P2	P3	P3	P2	P2					
XXL													P1	P2	P2	P2	P4	P1	P1	P1	
YAR			P1	P2	P2	P2	P2	P2	P2	P2	P3	P4	P3	P3	P4	P3	P2	P2	P4	P4	P4

Appendix B

Year	No dividend	0-2.5%	2.5-4%	Above 4%	SUM Dividend-stocks	SUM Total
2003	29	5	6	16	27	56
2004	25	10	3	14	27	52
2005	31	16	8	9	33	64
2006	34	16	10	11	37	71
2007	39	20	10	10	40	79
2008	44	13	9	15	37	81
2009	26	5	5	23	33	59
2010	33	8	8	4	20	53
2011	32	15	9	6	30	62
2012	19	8	8	24	40	59
2013	21	7	10	18	35	56
2014	18	11	10	14	35	53
2015	19	7	7	20	34	53
2016	21	8	11	18	37	58
2017	27	10	15	10	35	62
2018	29	15	12	11	38	67
2019	25	10	9	19	38	63
2020	23	9	16	19	44	67
2021	36	9	13	8	30	66
2022	27	15	11	16	42	69
2023	20	16	2	30	48	68

Appendix C

	No Dividend		0-2.5%		2.5-4%		Above 4%		OSEBX	
Year	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD
2003	62.26	0.234	51.50	0.239	50.45	0.175	44.26	0.189	39.76	0.183
2004	22.32	0.142	20.09	0.148	38.83	0.181	68.34	0.206	34.31	0.150
2005	56.66	0.183	18.33	0.144	52.20	0.134	24.67	0.207	35.41	0.163
2006	44.36	0.267	28.01	0.209	11.10	0.174	30.17	0.270	30.26	0.204
2007	19.28	0.228	16.35	0.170	(9.77)	0.157	7.30	0.238	12.47	0.181
2008	(63.91)	0.503	(43.50)	0.492	(59.05)	0.443	(63.35)	0.520	(70.31)	0.474
2009	59.05	0.441	80.60	0.386	37.84	0.290	71.20	0.366	59.78	0.321
2010	16.26	0.257	32.44	0.275	(2.12)	0.208	31.64	0.239	19.40	0.220
2011	(32.59)	0.249	(24.95)	0.287	(14.86)	0.237	4.28	0.242	(10.31)	0.244
2012	19.97	0.224	24.66	0.182	(2.40)	0.143	18.10	0.140	15.23	0.137
2013	26.65	0.127	35.93	0.157	15.96	0.145	9.96	0.108	21.82	0.096
2014	(8.00)	0.231	18.68	0.199	4.10	0.189	(11.67)	0.201	7.34	0.173
2015	(12.75)	0.224	9.21	0.178	11.93	0.214	(1.89)	0.202	4.88	0.151
2016	2.33	0.205	(23.22)	0.177	14.08	0.186	10.99	0.222	13.81	0.177
2017	(0.91)	0.167	30.68	0.169	13.25	0.095	14.50	0.105	17.86	0.086
2018	(13.86)	0.185	(16.96)	0.197	(3.55)	0.133	5.85	0.176	(0.87)	0.142
2019	13.23	0.241	26.97	0.158	24.86	0.123	5.92	0.139	16.19	0.114
2020	11.19	0.450	31.56	0.290	9.64	0.219	27.92	0.780	6.03	0.277
2021	12.48	0.161	41.61	0.149	44.18	0.182	10.23	0.182	23.88	0.121
2022	(25.11)	0.368	(16.05)	0.226	20.47	0.214	(7.27)	0.133	0.14	0.155
2023	18.64	0.307	(1.40)	0.205	11.62	0.263	8.43	0.136	10.38	0.138
Average	10.84	0.257	16.22	0.221	12.80	0.195	14.74	0.235	13.69	0.186

Appendix D

	No Dividend		0-2.5%		2.5-4%		Above 4%		OSEBX	
Year	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD	R (%)	SD
2003	62.39	0.222	42.66	0.238	51.08	0.176	49.76	0.163	39.76	0.183
2004	25.42	0.174	17.32	0.146	41.33	0.180	64.23	0.154	34.31	0.150
2005	71.26	0.184	16.88	0.148	53.43	0.137	23.79	0.161	35.41	0.163
2006	27.15	0.169	25.10	0.144	15.87	0.166	30.51	0.181	30.26	0.204
2007	8.15	0.180	9.81	0.132	(13.82)	0.152	(8.63)	0.196	12.47	0.181
2008	(56.11)	0.372	(53.10)	0.475	(62.33)	0.406	(61.13)	0.403	(70.31)	0.474
2009	64.75	0.301	68.92	0.257	124.85	0.287	74.86	0.327	59.78	0.321
2010	8.24	0.250	35.43	0.256	24.90	0.205	25.38	0.230	19.40	0.220
2011	(35.23)	0.247	(18.20)	0.272	(34.65)	0.278	(35.61)	0.256	(10.31)	0.244
2012	22.09	0.221	25.30	0.155	11.84	0.130	25.32	0.136	15.23	0.137
2013	47.83	0.159	35.98	0.106	10.65	0.122	16.27	0.081	21.82	0.096
2014	(10.61)	0.196	2.19	0.178	3.18	0.149	(6.90)	0.164	7.34	0.173
2015	(1.07)	0.185	8.28	0.173	14.23	0.137	(4.69)	0.164	4.88	0.151
2016	18.55	0.221	(6.48)	0.171	27.72	0.131	(11.74)	0.223	13.81	0.177
2017	1.71	0.136	22.41	0.103	5.26	0.095	9.71	0.092	17.86	0.086
2018	(21.60)	0.222	(16.05)	0.163	6.82	0.130	11.03	0.144	(0.87)	0.142
2019	5.59	0.248	21.23	0.137	21.65	0.122	12.89	0.123	16.19	0.114
2020	8.65	0.527	32.68	0.250	0.10	0.288	0.37	0.328	6.03	0.277
2021	17.01	0.181	37.73	0.142	16.62	0.139	18.61	0.139	23.88	0.121
2022	(27.93)	0.269	(13.58)	0.187	(9.94)	0.154	2.90	0.180	0.14	0.155
2023	3.08	0.257	11.03	0.137	11.79	0.257	12.61	0.128	10.38	0.138
Average	11.40	0.234	14.55	0.190	15.27	0.183	11.88	0.189	13.69	0.186

Appendix E

Year	No Dividend (%)	0-2.5% (%)	2.5-4% (%)	Above 4% (%)
2003	22.50	11.74	10.69	4.50
2004	(12.00)	(14.22)	4.51	34.03
2005	21.25	(17.08)	16.79	(10.75)
2006	14.10	(2.25)	(19.16)	(0.09)
2007	6.81	3.88	(22.24)	(5.18)
2008	6.41	26.81	11.27	6.96
2009	(0.73)	20.82	(21.94)	11.42
2010	(3.14)	13.04	(21.52)	12.24
2011	(22.28)	(14.64)	(4.55)	14.59
2012	4.74	9.43	(17.63)	2.87
2013	4.83	14.11	(5.86)	(11.86)
2014	(15.34)	11.34	(3.24)	(19.01)
2015	(17.64)	4.32	7.04	(6.77)
2016	(11.48)	(37.04)	0.27	(2.82)
2017	(18.77)	12.82	(4.61)	(3.36)
2018	(12.99)	(16.09)	(2.69)	6.72
2019	(2.96)	10.77	8.66	(10.27)
2020	5.16	25.53	3.61	21.89
2021	(11.40)	17.73	20.30	(13.65)
2022	(25.25)	(16.19)	20.33	(7.41)
2023	8.26	(11.78)	1.24	(1.95)
Average	(2.85)	2.53	(0.89)	1.05

Appendix F

Year	No Dividend (%)	0-2.5% (%)	2.5-4% (%)	Above 4% (%)
2003	22.63	2.90	11.32	10.00
2004	(8.89)	(16.99)	7.01	29.92
2005	35.85	(18.53)	18.01	(11.62)
2006	(3.12)	(5.17)	(14.40)	0.25
2007	(4.32)	(2.67)	(26.30)	(21.10)
2008	14.21	17.21	7.99	9.18
2009	4.97	9.14	65.08	15.09
2010	(11.16)	16.03	5.50	5.98
2011	(24.92)	(7.89)	(24.34)	(25.30)
2012	6.87	10.07	(3.39)	10.09
2013	26.01	14.16	(11.17)	(5.55)
2014	(17.95)	(5.15)	(4.16)	(14.24)
2015	(5.95)	3.39	9.34	(9.58)
2016	4.74	(20.29)	13.90	(25.55)
2017	(16.15)	4.55	(12.60)	(8.15)
2018	(20.74)	(15.18)	7.69	11.90
2019	(10.60)	5.03	5.46	(3.31)
2020	2.62	26.64	(5.93)	5.66
2021	(6.87)	13.85	(7.26)	(5.26)
2022	(28.07)	(13.72)	(10.08)	2.76
2023	(7.30)	0.65	1.40	2.23
Average	(2.29)	0.86	1.58	(1.81)

Appendix G

Year	No Dividend	0-2.5%	2.5-4%	Above 4%	OSEBX
2003	2.458	1.963	2.611	2.095	1.918
2004	1.282	1.080	1.924	3.115	2.015
2005	2.892	1.021	2.614	1.018	1.946
2006	1.502	1.132	0.390	0.958	1.270
2007	0.639	0.685	(0.923)	0.109	0.431
2008	(1.346)	(0.963)	(1.420)	(1.293)	(1.565)
2009	1.246	1.980	1.161	1.831	1.731
2010	0.487	1.045	(0.281)	1.170	0.714
2011	(1.405)	(0.954)	(0.730)	0.078	(0.521)
2012	0.797	1.237	(0.318)	1.137	0.955
2013	1.858	2.096	0.895	0.642	1.954
2014	(0.414)	0.858	0.135	(0.658)	0.335
2015	(0.634)	0.434	0.488	(0.166)	0.226
2016	0.033	(1.407)	0.668	0.421	0.688
2017	(0.150)	1.725	1.223	1.227	1.900
2018	(0.843)	(0.951)	(0.401)	0.231	(0.186)
2019	0.484	1.603	1.899	0.314	1.288
2020	0.227	1.055	0.396	(0.370)	0.183
2021	0.665	2.686	2.332	0.756	1.833
2022	(0.770)	(0.853)	0.805	(0.791)	(0.199)
2023	0.499	(0.229)	0.317	0.377	0.513
Average	**0.453**	**0.726**	**0.656**	**0.581**	**0.830**

Appendix H

Year	No Dividend	0-2.5%	2.5-4%	Above 4%	OSEBX
2003	2.602	1.594	2.641	2.765	1.918
2004	1.226	0.907	2.072	2.217	2.015
2005	2.674	0.892	2.626	1.250	1.946
2006	1.351	1.440	0.693	1.443	1.270
2007	0.193	0.388	(1.216)	(0.680)	0.431
2008	(1.611)	(1.200)	(1.631)	(1.611)	(1.565)
2009	2.010	2.524	2.201	2.161	1.731
2010	0.180	1.240	1.034	0.942	0.714
2011	(1.526)	(0.758)	(1.333)	(1.485)	(0.521)
2012	0.903	1.495	0.746	1.698	0.955
2013	2.815	2.111	0.627	1.632	1.954
2014	(0.621)	0.037	0.110	(0.473)	0.335
2015	(0.137)	0.393	0.930	(0.375)	0.226
2016	0.764	(0.475)	1.988	(0.600)	0.688
2017	0.008	2.019	0.384	0.878	1.900
2018	(1.052)	(1.096)	0.390	0.644	(0.186)
2019	0.162	1.438	1.650	0.918	1.288
2020	0.146	1.266	(0.030)	(0.018)	0.183
2021	0.844	2.534	1.073	1.218	1.833
2022	(1.160)	(0.900)	(0.853)	(0.018)	(0.199)
2023	(0.008)	0.564	0.331	0.728	0.513
Average	**0.465**	**0.782**	**0.687**	**0.630**	**0.830**

Appendix I

Year	**No Dividend**	**0-2.5%**	**2.5-4%**	**Above 4%**	**OSEBX**
2003	0.984	0.701	0.760	0.952	0.351
2004	0.227	0.197	0.520	0.724	0.302
2005	0.939	0.188	0.868	0.219	0.318
2006	0.435	0.346	0.083	0.269	0.259
2007	0.164	0.154	(0.203)	0.026	0.078
2008	(0.895)	(0.477)	(0.781)	(0.763)	(0.742)
2009	0.502	0.760	0.325	0.779	0.556
2010	0.126	0.239	(0.062)	0.222	0.157
2011	(0.403)	(0.245)	(0.212)	0.019	(0.127)
2012	0.144	0.203	(0.054)	0.163	0.131
2013	0.285	0.687	0.108	0.084	0.188
2014	(0.095)	0.139	0.023	(0.158)	0.058
2015	(0.197)	0.069	0.123	(0.038)	0.034
2016	0.010	(0.273)	0.127	0.101	0.122
2017	(0.022)	0.415	0.126	0.126	0.163
2018	(0.188)	(0.238)	(0.054)	0.038	(0.026)
2019	0.111	0.319	0.355	0.041	0.146
2020	0.141	0.450	0.146	(0.136)	0.051
2021	0.111	0.446	0.383	0.107	0.222
2022	(0.282)	(0.200)	0.117	(0.098)	(0.031)
2023	0.180	(0.038)	0.135	0.050	0.071
Average	**0.108**	**0.183**	**0.135**	**0.130**	**0.109**

Appendix J

Year	No Dividend	0-2.5%	2.5-4%	Above 4%	OSEBX
2003	0.819	0.578	0.500	0.718	0.351
2004	0.229	0.163	0.574	0.837	0.302
2005	0.805	0.155	0.895	0.246	0.318
2006	0.267	0.314	0.153	0.296	0.259
2007	0.041	0.078	(0.310)	(0.163)	0.078
2008	(0.878)	(0.624)	(1.133)	(0.850)	(0.742)
2009	0.651	0.875	1.370	0.899	0.556
2010	0.050	0.340	0.256	0.225	0.157
2011	(0.476)	(0.236)	(0.452)	(0.379)	(0.127)
2012	0.230	0.253	0.149	0.307	0.131
2013	0.463	0.373	0.081	0.184	0.188
2014	(0.147)	0.007	0.019	(0.099)	0.058
2015	(0.031)	0.074	0.173	(0.067)	0.034
2016	0.201	(0.118)	0.362	(0.171)	0.122
2017	0.001	0.470	0.061	0.102	0.163
2018	(0.264)	(0.322)	0.071	0.169	(0.026)
2019	0.043	0.253	0.329	0.155	0.146
2020	0.082	0.485	(0.011)	(0.008)	0.051
2021	0.134	0.435	0.147	0.164	0.222
2022	(0.270)	(0.157)	(0.147)	(0.003)	(0.031)
2023	(0.002)	0.072	0.138	0.096	0.071
Average	**0.093**	**0.165**	**0.154**	**0.127**	**0.109**

Appendix K

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.54	10		0.63	21	
2004	(0.73)		14	(0.08)		5
2005	0.95	19		0.62	20	
2006	0.23	7.5		0.18	15.5	
2007	0.21	5		0.09	6.5	
2008	0.22	6		(0.15)		12.5
2009	(0.49)		9	(0.05)		4
2010	(0.23)		7.5	(0.03)		2
2011	(0.88)		18	(0.28)		19
2012	(0.16)		4	0.01	1	
2013	(0.10)		3	0.10	8	
2014	(0.75)		15	(0.15)		12.5
2015	(0.86)		17	(0.23)		17
2016	(0.65)		12	(0.11)		10
2017	(2.05)		21	(0.18)		15.5
2018	(0.66)		13	(0.16)		14
2019	(0.80)		16	(0.04)		3
2020	0.04	2		0.09	6.5	
2021	(1.17)		20	(0.11)		10
2022	(0.57)		11	(0.25)		18
2023	(0.01)		1	0.11	10	
SUM		**49.5**	**181.5**		**88.5**	**142.5**
W		**181.5**			**142.5**	
z		**2.29**			**0.94**	

Table 1: Wilcoxon Signed-Rank Test for Market-Weighted P1: No Dividend

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.05	1		0.35	18	
2004	(0.93)		20	(0.11)		7.5
2005	(0.92)		19	(0.13)		10
2006	(0.14)		2.5	0.09	6	
2007	0.25	6.5		0.08	4	
2008	0.60	13		0.26	17	
2009	0.25	6.5		0.20	13	
2010	0.33	10		0.08	4	
2011	(0.43)		11	(0.12)		9
2012	0.28	8		0.07	2	
2013	0.14	2.5		0.50	21	
2014	0.52	12		0.08	4	
2015	0.21	5		0.03	1	
2016	(2.09)		21	(0.39)		19
2017	(0.17)		4	0.25	16	
2018	(0.76)		16	(0.21)		14
2019	0.31	9		0.17	11.5	
2020	0.87	18		0.40	20	
2021	0.85	17		0.22	15	
2022	(0.65)		14	(0.17)		11.5
2023	(0.74)		15	(0.11)		7.5
SUM		**108.5**	**122.5**		**152.5**	**78.5**
W		**122.5**			**152.5**	
z		**0.24**			**1.29**	

Table 2: Wilcoxon Signed Rank Test for Market-Weighted P2: 0-2.5%

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.69	15		0.41	20	
2004	(0.09)		2	0.22	16.5	
2005	0.67	13		0.55	21	
2006	(0.88)		16	(0.18)		13
2007	(1.35)		21	(0.28)		19
2008	0.15	3		(0.04)		4
2009	(0.57)		11	(0.23)		18
2010	(1.00)		17.5	(0.22)		16.5
2011	(0.21)		6.5	(0.09)		9
2012	(1.27)		20	(0.19)		14
2013	(1.06)		19	(0.08)		7
2014	(0.20)		4.5	(0.04)		4
2015	0.26	9		0.09	9	
2016	(0.02)		1	0.01	1	
2017	(0.68)		14	(0.04)		4
2018	(0.22)		8	(0.03)		2
2019	0.61	12		0.21	15	
2020	0.21	6.5		0.09	9	
2021	0.50	10		0.16	12	
2022	1.00	17.5		0.15	11	
2023	(0.20)		4.5	0.06	6	
SUM		**86**	**145**		**120.5**	**111**
W		**145**			**120.5**	
z		**1.03**			**0.17**	

Table 3: Wilcoxon Signed Rank Test for Market-Weighted P3: 2.5-4%

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.18	3.5		0.60	21	
2004	1.10	20		0.42	20	
2005	(0.93)		16	(0.10)		12.5
2006	(0.31)		7	0.01	1	
2007	(0.32)		8	(0.05)		7
2008	0.27	5.5		(0.02)		3
2009	0.10	1		0.22	18.5	
2010	0.46	11		0.07	10	
2011	0.60	14		0.15	16	
2012	0.18	3.5		0.03	5	
2013	(1.31)		21	(0.10)		12.5
2014	(0.99)		18	(0.22)		18.5
2015	(0.39)		9	(0.07)		10
2016	(0.27)		5.5	(0.02)		3
2017	(0.67)		15	(0.04)		6
2018	0.42	10		0.06	8	
2019	(0.97)		17	(0.11)		14.5
2020	(0.55)		12	(0.19)		17
2021	(1.08)		19	(0.11)		14.5
2022	(0.59)		13	(0.07)		10
2023	(0.14)		2	(0.02)		3
SUM		**68.5**	**162.5**		**99.5**	**131.5**
W		**162.5**			**131.5**	
z		**1.63**			**0.56**	

Table 4: Wilcoxon Signed Rank Test for Market-Weighted P4: Above 4%

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.68	11		0.47	20	
2004	(0.79)		13	(0.07)		5.5
2005	0.73	12		0.49	21	
2006	0.08	4.5		0.01	1	
2007	(0.24)		6	(0.04)		3
2008	(0.05)		2.5	(0.14)		13
2009	0.28	7		0.09	8.5	
2010	(0.53)		10	(0.11)		12
2011	(1.00)		19	(0.35)		19
2012	(0.05)		2.5	0.10	10.5	
2013	0.86	14		0.28	18	
2014	(0.96)		16.5	(0.21)		15
2015	(0.36)		8	(0.06)		4
2016	0.08	4.5		0.08	7	
2017	(1.89)		21	(0.16)		14
2018	(0.87)		15	(0.24)		16.5
2019	(1.13)		20	(0.10)		10.5
2020	(0.04)		1	0.03	2	
2021	(0.99)		18	(0.09)		8.5
2022	(0.96)		16.5	(0.24)		16.5
2023	(0.52)		9	(0.07)		5.5
SUM		**53**	**178**		**88**	**143**
W		**178**			**143**	
z		**2.17**			**0.96**	

Table 5: Wilcoxon Signed Rank Test for Equal-Weighted P1: No Dividend

Year	Difference in Sharpe			Difference in Treynor		
	Value	Rank (+)	Rank (-)	Value	Rank (+)	Rank (-)
2003	(0.32)		10	0.23	14	
2004	(1.11)		20	(0.14)		9
2005	(1.05)		18	(0.16)		10
2006	0.17	6.5		0.05	2.5	
2007	(0.04)		1	0.00	-	
2008	0.37	11		0.12	6.5	
2009	0.79	16		0.32	18	
2010	0.53	12		0.18	11.5	
2011	(0.24)		8	(0.11)		4.5
2012	0.54	13		0.12	6.5	
2013	0.16	5		0.18	11.5	
2014	(0.30)		9	(0.05)		2.5
2015	0.17	6.5		0.04	1	
2016	(1.16)		21	(0.24)		15
2017	0.12	3		0.31	17	
2018	(0.91)		17	(0.30)		16
2019	0.15	4		0.11	5.5	
2020	1.08	19		0.43	19	
2021	0.70	14.5		0.21	13	
2022	(0.70)		14.5	(0.13)		8
2023	0.05	2		0.00	-	
SUM		**112.5**	**118.5**		**125**	**65**
W		**118.5**			**125**	
z		**0.10**			**1.21**	

Table 6: Wilcoxon Signed Rank Test for Equal-Weighted P2: 0-2.5%

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.72	15		0.15	13	
2004	0.06	1		0.27	16	
2005	0.68	13		0.58	20	
2006	(0.58)		10.5	(0.11)		9.5
2007	(1.65)		21	(0.39)		18.5
2008	(0.07)		2	(0.39)		18.5
2009	0.47	9		0.81	21	
2010	0.32	7		0.10	7	
2011	(0.81)		17	(0.32)		17
2012	(0.21)		4.5	0.02	1	
2013	(1.33)		19	(0.11)		9.5
2014	(0.22)		6	(0.04)		2
2015	0.70	14		0.14	12	
2016	1.30	18		0.24	15	
2017	(1.52)		20	(0.10)		7
2018	0.58	10.5		0.10	7	
2019	0.36	8		0.18	14	
2020	(0.21)		4.5	(0.06)		3
2021	(0.76)		16	(0.07)		4.5
2022	(0.65)		12	(0.12)		11
2023	(0.18)		3	0.07	4.5	
SUM		**95.5**	**135.5**		**130.5**	**100.5**
W	**135.5**			**130.5**		
z	**0.70**			**0.52**		

Table 7: Wilcoxon Signed Rank Test for Equal-Weighted P3: 2.5-4%

Year	Difference in Sharpe			Difference in Treynor		
	Value	**Rank (+)**	**Rank (-)**	**Value**	**Rank (+)**	**Rank (-)**
2003	0.85	17		0.37	19	
2004	0.20	4.5		0.53	20	
2005	(0.70)		13	(0.07)		8.5
2006	0.17	2		0.04	4	
2007	(1.11)		20	(0.24)		15
2008	(0.05)		1	(0.11)		11
2009	0.43	10		0.34	18	
2010	0.23	7		0.07	8.5	
2011	(0.96)		18	(0.25)		16
2012	0.74	14		0.18	13	
2013	(0.32)		8	0.00	-	
2014	(0.81)		15	(0.16)		12
2015	(0.60)		11	(0.10)		10
2016	(1.29)		21	(0.29)		17
2017	(1.02)		19	(0.06)		6
2018	0.83	16		0.20	14	
2019	(0.37)		9	0.01	1	
2020	(0.20)		4.5	(0.06)		6
2021	(0.61)		12	(0.06)		6
2022	0.18	3		0.03	3	
2023	0.21	6		0.02	2	
SUM		**79.5**	**151.5**		**102.5**	**107.5**
W	**151.5**			**107.5**		
z	**1.25**			**0.09**		

Table 8: Wilcoxon Signed Rank Test for Equal-Weighted P4: Above 4%

Appendix L

Year	No Dividend	0-2.5%	2.5-4%	Above 4%
2003	0.511	0.445	0.422	0.342
2004	(0.060)	(0.086)	0.145	0.374
2005	0.351	(0.101)	0.308	(0.095)
2006	0.162	0.059	(0.143)	0.009
2007	0.077	0.058	(0.200)	(0.051)
2008	(0.116)	0.263	(0.032)	(0.019)
2009	(0.059)	0.205	(0.240)	0.191
2010	(0.030)	0.099	(0.207)	0.082
2011	(0.239)	(0.132)	(0.069)	0.145
2012	0.016	0.080	(0.155)	0.031
2013	0.235	0.328	(0.096)	(0.087)
2014	(0.154)	0.100	(0.040)	(0.181)
2015	(0.167)	0.039	0.076	(0.064)
2016	(0.079)	(0.360)	0.006	(0.019)
2017	(0.208)	0.177	(0.034)	(0.038)
2018	(0.134)	(0.166)	(0.027)	0.069
2019	(0.037)	0.138	0.137	(0.113)
2020	0.066	0.272	0.057	0.162
2021	(0.107)	0.201	0.179	(0.091)
2022	(0.252)	(0.163)	0.218	(0.072)
2023	0.093	(0.134)	0.040	(0.021)
Average	**-0.006**	**0.063**	**0.016**	**0.027**
Standard Deviation	**0.190**	**0.191**	**0.142**	**0.191**
Standard Error	**0.041**	**0.042**	**0.037**	**0.031**
T-test	**-0.155**	**1.506**	**0.444**	**0.856**

Appendix M

Year	No Dividend	0-2.5%	2.5-4%	Above 4%
2003	0.521	0.367	0.432	0.406
2004	(0.068)	(0.114)	0.176	0.384
2005	0.409	(0.139)	0.321	(0.056)
2006	0.006	0.036	(0.080)	0.033
2007	(0.031)	0.000	(0.232)	(0.197)
2008	(0.093)	0.108	(0.228)	(0.083)
2009	0.088	0.236	0.717	0.270
2010	(0.098)	0.171	0.082	0.066
2011	(0.276)	(0.095)	(0.266)	(0.253)
2012	0.086	0.112	0.012	0.133
2013	0.443	0.163	(0.100)	(0.003)
2014	(0.169)	(0.049)	(0.034)	(0.134)
2015	(0.054)	0.037	0.102	(0.093)
2016	0.067	(0.165)	0.173	(0.229)
2017	(0.137)	0.136	(0.061)	(0.048)
2018	(0.210)	(0.164)	0.069	0.107
2019	(0.098)	0.083	0.112	0.006
2020	0.030	0.284	(0.047)	(0.049)
2021	(0.099)	0.177	(0.076)	(0.060)
2022	(0.276)	(0.135)	(0.104)	0.028
2023	(0.071)	0.001	0.041	0.024
Average	**-0.002**	**0.050**	**0.048**	**0.012**
Standard Deviation	**0.213**	**0.150**	**0.226**	**0.172**
Standard Error	**0.046**	**0.033**	**0.049**	**0.037**
T-test	**-0.032**	**1.524**	**0.975**	**0.319**