COMBINING DIVIDEND YIELD INDICATORS AND PROFITABILITY RATIOS TO ENHANCE PORTFOLIO PERFORMANCE

The Finnish Evidence

Lappeenranta–Lahti University of Technology LUT

Master's Programme in Strategic Finance and Analytics, Master's Thesis

2021

Jesse Salmi

Examiners: Professor, Eero Pätäri

Post-doctoral researcher, Timo Leivo

ABSTRACT

Lappeenranta–Lahti University of Technology LUT

LUT School of Business and Management

Business Administration

Jesse Salmi

Combining dividend yield indicators and profitability ratios to enhance portfolio performance: The Finnish evidence

Master's thesis

2021

58 pages, 2 figures and 6 tables

Examiners: Professor Eero Pätäri and Post-doctoral researcher Timo Leivo

Keywords: Dividend yield, profitability, dividend payout ratio, Helsinki Stock Exchange

The purpose of this thesis is to study how different dividend yield-based investment strategies have performed on the Helsinki Stock Exchange in 1996-2019. Based on the previous literature, different combinations of dividend yield, dividend payout ratio and profitability ratios are used in portfolio formation to declare whether excess returns could have been achieved in the Finnish stock markets.

Dual-criteria portfolios are formed annually by dividing Helsinki Stock Exchange companies into quantile portfolios, first by their dividend yield, and then further on the basis of either dividend payout ratio or profitability. The profitability ratios used for the study are return on equity, return on assets, operating margin, and operating profitability. Equally weighted portfolios are reformed annually on the first of May based on the last year's financial statement information. The benchmark portfolios are OMXH Cap Total Return Index and the sample average return.

The results of this thesis are mostly consistent with the findings from previous literature. The top portfolios formed solely based on dividend yield are performing as well as expected in the Finnish stocks markets. Besides that, the use of profitability ratios as the second portfolio formation criterion further enhances the portfolio performance, as previous studies from other markets have shown. The best performance and statistically significant excess return is achieved by combining companies with high dividend yield and high operating profitability. On the other hand, the use of a high dividend payout ratio as the second allocation criterion produces worse outcome than low dividend payout ratio, which is inconsistent with the results of the previous literature.

TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

LUT-kauppakorkeakoulu

Kauppatieteet

Jesse Salmi

Osinkotuotto- ja kannattavuusindikaattoreiden kombinointiin perustuvien sijoitusstrategioiden suoriutumisvertailu Suomen osakemarkkinoilla

Kauppatieteiden pro gradu -tutkielma

2021

58 sivua, 2 kuvaa ja 6 taulukkoa

Tarkastajat: Professori Eero Pätäri ja Tutkijatohtori Timo Leivo

Avainsanat: Osinkotuotto, kannattavuus, osingonjakosuhde, Helsingin pörssi

Tämän tutkielman tarkoituksena on analysoida osinkotuotto- ja kannattavuusindikaattoreiden kombinoinnin sijoitusstrategista lisäarvoa Suomen osakemarkkinoilla aikavälillä 1996–2019. Tutkielmassa luodaan yhdistelmäportfolioita jakaen vuosittain Helsingin pörssin yritykset ensin osinkotuoton perusteella laajempiin fraktiiliportfolioihin ja tämän jälkeen edelleen kapeampiin fraktiileihin joko osingonjakosuhteen tai kannattavuusindikaattoreiden perusteella. Käytettävät kannattavuuden tunnusluvut ovat oman pääoman tuottoaste, kokonaispääoman tuottoaste, liikevoittoprosentti ja operatiivinen kannattavuus. Tasapainotetut portfoliot luodaan vuosittain toukokuun ensimmäisenä päivänä edellisen vuoden tilinpäätöslukuihin perustuen. Portfolioiden pitoaika on yksi vuosi, minkä jälkeen ne tasapainotetaan uudestaan samoin kriteerein. Vertailuindekseinä käytetään OMXH CAP -kokonaistuottoindeksiä ja otoksen tasapainotettujen kuukausituottojen keskiarvoista muodostettua indeksiä.

Tutkimuksen tulokset ovat pääosin linjassa aiempien tutkimustulosten kanssa, sillä korkea osinkotuotto näyttää portfoliotasolla säilyttäneen ennustevoimansa tulevien osaketuottojen suhteen Suomen osakemarkkinoilla. Kuten viimeaikaisissa kansainvälisissä tutkimuksissakin on raportoitu, kannattavuuden tunnuslukujen sisällyttäminen sekundääriseksi valintakriteeriksi tuo joissakin tapauksissa lisäarvoa portfolio-osakkeiden valintaan verrattuna yksivaiheiseen osakkeiden valintaan, joka perustuu pelkästään osinkotuoton tai kannattavuusindikaattorin tasoon. Sijoittajan kannalta parhaaseen lopputulokseen ja tilastollisesti merkitsevään ylisuoriutumiseen olisi Suomen osakemarkkinoilla päästy poimimalla salkkuun korkean osinkotuoton fraktiilista korkean operatiivisen kannattavuuden yhtiöitä.

SYMBOLS AND ABBREVIATIONS

Greek characters

σ	Standard deviation (or volatility of returns)

Abbreviations

ADR	American depository receipt
DY	Dividend yield (dividends-to-price)
DJIA	Dow Jones Industrial Average index
DPR	Dividend payout ratio
EBITDA	Earnings before interest, taxes, depreciation, and amortization
GPA	Gross profits-to-assets
OM	Operating margin
OMXH TRI	Total returns index of all the stocks in Helsinki Stock Exchange
OP	Operating profitability
PDY	Profitable dividend yield -strategy
REIT	Real estate investment trust
ROA	Return on assets
ROE	Return on equity
SKASR	Skewness- and kurtosis-adjusted Sharpe ratio
SKAD	Skewness- and kurtosis-adjusted deviation
S&P 500	Standard & Poor’s 500 Index, consisting of 500 largest publicly traded companies in the U.S. markets, weighted by their market-capitalization

Table of contents

Tables

Figures

1. Introduction

People are typically more sensitive to losses than gains. Investors' risk aversion leads to investment choices mitigating possible losses. (Kahneman et al. 1979; Benartzi et al. 1995) Dividend-paying stocks have attracted the popularity of investors, and loss aversion could be the main reason for it, as high dividend-yield stocks have shown superior performance especially during declining markets (Fuller et al. 2011). Dividend yield investment strategies have been widely studied across the stock markets. Various different approaches have been adopted, while some strategies seem to work better than the others depending on the market and time frame under research. Also, methodologies seem to differ between the authors, which makes it difficult to evaluate robustness and results between the papers. The aim of this thesis, by reflecting on the earlier literature and different approaches that have proven their ability in prediction of future returns, is to study whether dividend yield based investment anomalies have existed in the Finnish stock market, and if they have, whether it is possible to enhance the portfolio performance by combining different dividend yield indicators and profitability ratios.

Motivation for this thesis is originally derived from the findings of Fong and Ong (2016a). Their study "The Profitable Dividend Yield Strategy" (PDY) showcased how the returns of a traditional dividend yield investment strategy could be significantly enhanced by incorporating gross profitability (gross profits-to-assets i.e., GPA) of the companies to the strategy. Using comprehensive sample of all ordinary common stocks (excluding REITs, financials, foreign shares, ADRs, and closed-end funds) traded in the New York Stock Exchange (NYSE), American Stock Exchange (Amex) and Nasdaq-US over the period of 1963-2013, they found that portfolio consisting of stocks with high dividend yield (DY) and high GPA clearly outperformed pure DY, GPA and market portfolios. Consistent with the findings of Fuller et al. (2011), the PDY strategy markedly outperformed markets during the poor states of economy, with an average monthly return of 1.5% higher than the market. An interesting and perhaps the most important observation was that, choosing high gross profitability firms amongst the ones with high dividend yield resulted in much smaller underperformance during the booming states of economy than with the pure high DY portfolio. It seemed that the

PDY strategy would capture almost fully the defensive nature of high dividend yield stocks without the big downturn during economic expansion periods. Overall, the top PDY portfolio had 2.8% higher annualized mean return than the top DY portfolio and even higher outperformance over the top gross profitability portfolio. Also, the Sharpe ratios were considerably higher than with either of the standalone strategy. The idea for the use of companies' gross profitability measure to enhance the performance of defensive DY strategies was motivated by the findings of Novy-Marx (2013). He concluded that value investing strategies could significantly be enhanced by incorporating a measure of profitability to them, as controlling for firms' gross profits-to-assets had tremendous explanatory power in predicting cross section of average returns. Despite growth and value investing strategies being very different in firms' characteristics and covariances of returns, finding stocks with high book-to-market ratios and productive assets at the same time was possible when gross profits were used as a proxy for productivity. When Novy-Marx combined these two strategies the results showed value-like returns with the full profitability premium. While investor's exposure to risky assets was notably increased compared to a pure value strategy, additional risk was not taken in terms of portfolio volatility. Interestingly, the overall volatility of portfolio was even further reduced.[1]

The Profitable Dividend Yield Strategy, to the best of the author's knowledge, has generated only few follow-up studies to be done on it, and none in the context of Finnish stock markets. The strategy itself is rather new, while another reason for the lack of further research might be the availability of data that Novy-Marx GP indicator uses. Unfortunately, the measure of gross profit (revenues minus cost of goods sold), is not easily accessible information, at least for Finnish companies. However, findings from Ball et al. (2015) suggest that the effectiveness of the GP indicator rather lies in the denominator (total assets) of the measure. In their study "Deflating profitability" Ball et al. questioned the methodology used by Novy-Marx (2013) and showcased that the reason why gross profitability better predicted future returns

---

[1&2] Considering robustness of these findings, it is noteworthy to mention that studies from Novy-Marx (2013) and Ball et al. (2015) had similar data samples from the U.S. markets, with the same specifications and the time frame as used by Fong and Ong (2016a).

than net income is the difference in deflator term that was used.[2] As Ball et al. deflated net income by the book value of total assets (rather than book value of equity), the two profit variables had similar return predicting capabilities. Novy-Marx's argument that the gross profit would be the cleanest measure for "true economic profitability", because items after that on the income statement contain more noise, was shown spurious, as explanatory power of the measure did not diminish after accounting for selling, general, and administrative expenses (Ball et al. 2015). Furthermore, as they included all the components between gross profit and income before extraordinary items (excluding only R&D expenditures) and created a measure called "operating profit", their regression found significantly greater predictive ability than gross profit when the measures were used alone as explanatory variables for predicting monthly returns. These findings are essential for the sake of future research, including this thesis, as if they hold true in other markets as well, an examination of the PDY strategy's effectiveness may not require the use of Novy-Marx's GP indicator.

Another strategy under examination in this thesis is the effect of dividend payout ratio to stock returns. McManus et al. (2004) found that the payout ratio has a significant impact on dividend yield's capability to explain future stock returns. Their research provides encouraging evidence for the seemingly positive relationship between high dividend yield, high payout ratio and stock returns, suggesting that payout ratio conveys important additional signaling information. Literature on this subject is sparse, and thus, worth investigating in the context of Finnish stock markets.

1.1 Objectives and research questions

Main objective for this thesis is to study whether dividend yield pricing anomaly have existed in the Finnish stocks markets during the sample period of 1996-2019, and if it has, is it possible to enhance the approach by using methodologies adopted from earlier literature.

Another objective for the thesis is to also test whether a change in the methodology of estimating abnormal returns causes disappearance of an anomaly. Fama (1998) argued that the

result of many studies that had shown evidence against the efficient market hypothesis (introduced by Fama in 1970), were due to a bad-model problem. Chin-Sheng et al. (2014) state that dividend yield investment strategies have usually exhibited evidence of abnormal returns in the United States and European markets under equally-weighted portfolio returns. However, Fama (1998) argued that one source of the bad-model problem can be showcased if value-weighted returns are used. He states that results of the studies tend to become statistically insignificant whenever small cap stocks have lower weight in the model being used. To test this, abnormal returns of the portfolios are compared against an equally-weighted benchmark portfolio and a value-weighted market wide index portfolio.

The main research question for this thesis is following:

1) Has dividend yield anomaly existed in the Finnish stock market during the research period?

and the sub-questions include:

2) If the anomaly exists, is it possible to enhance the excess returns by incorporating profitability ratios or dividend payout ratio to the portfolio formation process?
3) How does the possible bad-model problem affect the results?

all of which are answered in the conclusions section of the paper.

1.2 Delimitations

Besides the approaches under examination in this thesis, also other dividend yield-based investment strategies and anomalies have found support on the existing literature but are left

out of review at the scope of this paper. Examples of these approaches include dividend aristocrats, stability of dividends, and Ex-Dividend Day trading anomaly.

In line with Fong and Ong (2016a), Novy-Marx (2013), Ball et al. (2015), among others, financial firms are excluded from the sample. Financial firms such as Nordea, Sampo, etc. have a relatively large market cap weight in the Helsinki Stock Exchange, which might have affected the results of the study. However, this is taken into consideration with the usage of two different market benchmark portfolios.

2. Literature Review

Purpose of this chapter is to introduce earlier literature and most relevant findings on studies concerning dividend yield, dividend payout ratio, profitability of a company and investment strategies conducted based on these financial statement key figures. First section gives a brief introduction to basics of dividend yield and profitability, then earlier findings from different markets are covered, and finally the main motivation for this thesis, which is the previous evidence of the possibility to enhance basic dividend yield investment strategies, is taken under examination.

Some additional approaches have also been adopted in the earlier literature, such as investing in dividend aristocrats, ex-dividend date anomaly etc., but are left out of examination at the scope of this thesis.

2.1 Dividend yield and profitability

This section gives a brief introduction to the basic concepts important for the study. First will be discussed on the meaning of dividend yield and dividends paid out by a company. After that, profitability of a company is introduced and pondered whether it is somehow connected to the dividends being paid.

2.1.1 Dividend yield

Dividend payments are a way of distributing profits made and accumulated, by a company in its business activities, for its shareholders i.e., the company owners. Dividend yield is the annualized ratio between dividends paid per share and the price of a stock at a certain moment. For example, if company A decides to pay out $5 dividend per share and company B $3 dividend per share, while both has current stock price of $100, dividend yield for company A is 5% (5/100 = 0.05) and 3% (3/100 = 0.03) for company B, respectively.

The suggestion of dividend payment is made by the company's board of directors and agreed upon in the company's annual meeting by the shareholders. Dividend payout ratio tells how much of the company's net income is paid out as dividends. Other options than returning money to owners, would be paying off debt, reinvesting in growth or adding to cash reserves (Investopedia, 2021). The amount of dividends being paid is a strategic decision for a company, since another option would be allocating the accumulated profits to investments, that could grow the future earnings of the company. One could argue that paying out high dividend signals that the company does not believe in its ability to reinvest in its current business with high enough expectation of return (Barclay et al. 1995).

Since stocks with high dividend yield seem to have low expected growth rates, they are often characterized as value stocks (Visscher et al. 2003). Investing is often divided into two main approaches: value investing and growth investing. Both styles have gathered extensive amount of research, while dividend yield strategies are usually categorized as value investing. Other typical characteristics for value stocks are low price-to-earnings and low-price-book ratios (Visscher et al. 2003). Value investor typically tries to find companies that are undervalued on basis of their current cash flows, earnings, and/or assets.

Although paying out dividends is a strategic decision between sharing earnings to company owners or reinvesting in growth opportunities, and one could argue that the decision should be made solely based on valuing the possible investment cases, other factors tend to affect the decision-making process. For example, dividend stability over time seems to be more important for some companies than the short-term balance between earnings, reinvestment possibilities and dividend pay-outs, thus making the rationality behind managers' decisions questionable, or at least complicated to understand. Gwilym et al. (2000) argued that some managers believe that dividend cuts would be harmful for the company reputation, since dividend size and stability can be seen informative in forecasting of the firm's future prospects. Their study is one of the many investigating the so-called dividend signaling hypothesis, introduced by Miller et al. (1985) and John et al. (1985), in which the dividend decisions are seen as signals for the outsiders of the company, indicating whether the management

believes in the company's future or not. According to Gwilym et al. (2000), earlier theoretical literature had already established the importance of dividend signaling, but impact of the stability of dividend policy still lacked empirical research. Their findings confirmed the hypothesis of significant relationship between dividend stability and distribution of realized risk and return for ranked portfolios of UK stocks.

For investors, there are number of reasons why different stocks or investment styles appeal them. Regardless of the return-wise outcome, different strategies may vary drastically over the riskiness i.e., volatility of the returns. It is often recommendable that investors choose their investment strategy based on their risk-aversion profile. Conover et al. (2016) documented risk-reduction benefits of investing in dividend-paying stocks. First, risk of an investment strategy can significantly be reduced regardless of the investment style (value vs. growth & small- vs. mid- vs. large-cap portfolios). Second, higher returns could be achieved on growth and small-cap investment strategies, when focusing on dividend-paying stocks. Also, "Dogs of the Dow" strategy[3] worked better when applied to small- and medium-sized companies.

2.1.2 Profitability of a company

What is the main purpose for the existence of a company? To maximize its shareholders' wealth, at least some would argue. For the company to maximize wealth of its shareholders, it could either try to raise its own market value, measured by the price of each outstanding share, or it could pay out dividends. In order for a company to be able to pay out dividends, it has to make profits first. To make profits, the company has to generate more revenue in its business activities, than the activities are requiring resources i.e., costs. Costs are typically further divided into fixed and variable costs. An example of the former could be fixed lease

[3]Dogs of the Dow is an investment strategy originally found by an analyst John Slatter and published in The Wall Street Journal article titled "Study of Industrial Averages Finds Stocks With High Dividends Are Big Winners" by Dorfman in 1988. The strategy suggests buying the top ten dividend yield stocks from the Dow Jones Industrial Average index (DJIA) in order to gain substantial abnormal returns.

payments of machinery being used for production, and of the latter, salaries or raw material costs that depend on the production volume.

However, it is crucial for an investor to understand that despite a company could be making vast amount of profits, it does not necessarily mean that the company is profitable. Profit is an absolute metric, which tells how much earnings was made after the expenses are deducted from the revenue, whereas profitability is a relative measure, used to describe how efficiently the profits were made in terms of different resources of the company being used (Horton 2021).

Besides the costs and revenue in question, there is also other ways to measure company profitability. Some businesses require more assets to operate than others. One approach to compare profitability between companies is to calculate how efficiently each firm is able to generate earnings compared to the assets in use, and taken further, how the assets are financed. How the assets are financed, can be reviewed from the company balance sheet, which is divided into equity i.e., own capital and liabilities i.e., debt capital (Corporate Finance Institute 2021a).

In conclusion, to determine whether an investment looks intriguing on paper, mere comparison of profits will likely mislead the investor. Instead, the use of profitability ratios enables to distinguish how efficiently the company resources and capital were and are being used. (Horton 2021) These ratios allow the investor to better compare different sized companies, and especially companies amongst the same industry, regardless of the absolute numbers.

Research findings from Hughen et al. (2017) strongly support the effectiveness of using different profitability ratios in selection of firms and sectors amongst the S&P 500 Index constituents. The approach for the study was to investigate three profitability measures that use earning metrics above net income on the income statement: gross profit, operating profit, EBITDA, and a composite average of the three variables. Reason behind this specific approach was to assess whether the findings from Dichev et al. (2013) would have real

significance on them. Dichev et al. had a comprehensive survey round of CFOs, from which they concluded that "high-quality earnings" would be closer to revenue on the income statement, as they are more sustainable and contain less noise or manipulation. Besides that, Hughen et al. wanted to extend previous work from Novy-Marx (2013) and Ball et al. (2015) by connecting the characteristics of high-quality earnings to their performance. Their sample covered 35 years from the turn of the decade in 1980s till the year 2014, in which time the allocation selections based on the three profitability measures generated excess return two-thirds of the time over simple buy-and-hold strategy on the benchmark. Long/short portfolios based on EBITDA, gross profit, and the composite metric performed especially well, as each of their Sharpe ratios beat the benchmark by over 50 percent.

2.2 Evidence from different markets

Dividend yield investment strategies have been studied in various markets. This section summarizes some of the global evidence from earlier literature.

Pätäri and Leivo (2017) summarize findings on dividend yield (D/P) anomaly from the earlier literature, dividing the review to U.S and non-U.S. stock markets. An important observation documented is that dividend yield anomaly seems to have diluted in the U.S. markets during past decades, which has not been the case in the non-U.S. markets. Evidence of differences in returns among stocks with high and low or zero-dividend yields in the U.S. markets has been mixed. Blume (1980) and Keim (1985) documented a U-shaped relationship between risk-adjusted returns and D/Ps, with zero-dividend stocks generating larger returns than dividend-paying stocks and higher D/P stocks realizing larger risk-adjusted returns than lower D/P stocks. By contrast, Christie (1990) showed that the anomalous returns of zero-dividend stocks were largely due to the performance of stocks with a price of less than two dollars during the 1930s. By comparing the returns between zero-dividend and dividend-paying stocks of equal market capitalization, he documented significantly higher size-adjusted returns for the latter type of stocks. Elton et al. (1983) also documented a strong positive relationship between D/P and expected returns. In addition, Keim (1985, 1986) found a significant though not linear relationship between D/P and abnormal returns (i.e., Jensen's

alphas) in the U.S. market. Naranjo et al. (1998) found that both absolute and risk-adjusted returns for NYSE stocks increased with an increasing dividend yield. Consistent with Blume (1980) and Keim (1985), the authors documented higher absolute returns for zero-dividend stocks than for low-dividend stocks, but after the Fama–French 3-factor risk-adjustment, the former stocks performed the worst. (Pätäri and Leivo, 2017)

Huang et al. (2014) examined Chinese stock markets. They used data from Shanghai and Shenzhen exchanges (period 2005-2011) and found excess returns from dual and cash dividend yield samples. Their findings suggests that abnormal return of the dividend yield anomaly was not entirely explained by the Three-Factor Model Fama and French (1993) introduced nor by the momentum factor. It rather seemed that the high dividend yield portfolios tended to outperform markets during bearish, low momentum periods. Similar results were also obtained in earlier research from Fuller et al. (2011), as their extensive data from U.S. stock markets suggests that dividend-paying stocks had a tendency to outperform non-dividend-paying ones in bear markets by 1-2% more per month than in bull markets.

You et al. (2010, 2017) studied dividend yield investment strategies in Taiwanese stock markets with following major findings: (1) pure cash dividend yield portfolios statistically significantly outperformed Taiwanese market indices, (2) information effect of dividend announcements seemed to be the most important source of abnormal returns, (3) high-dividend-yield stocks are especially favored during the first half of the year, even though (4) typically the investors' response to the dividend announcement graduated rather slowly.

Another study from Asian stock markets was conducted by Chin-Sheng et al. (2014). Their research included markets from China, Honk Kong, and Taiwan. One goal of the paper was to question Fama's (1998) argument, that including value-weighted portfolio returns would diminish the abnormal returns considerably. To study this argument, Chin-Sheng et al. first adopted equally weighted measure and then value-weighted measure using the three-factor model. Their findings were consistent with Fama, showing the prevalence of the phenomenon in Asian markets. However, using the value-weighted measure still resulted in a

statistically significant return difference between the dividend yield portfolio and the market index, favoring the former over the latter.

Evidence from Canadian stock market was introduced as Visscher et al. (2003) applied Dogs of the Dow strategy in the Toronto Stock Exchange. The original strategy involves selecting the top-10 highest dividend-yield stocks in the Dow Jones Industrial Average index (in U.S. markets) at the end of the year and rebalancing the portfolio annually. Applying the strategy in Canadian stock markets outperformed both Toronto 35 Index and the broader TSE 300 Index. An interesting finding was that the strategy yielded abnormal returns even after taxes, transaction costs and risk-adjusted returns (Sharpe ratio) were considered.

Brzeszczyński and Gajdka (2007, 2008) studied dividend-driven investment strategies in Polish stock markets with their two separate articles. The first publication was focused on selecting stocks characterized by the highest growth rate of the dividend yield, while the second adopted the same methodology as Visscher et al. (2003). Results from these studies were quite similar; both strategies managed to beat the market portfolio as the whole sample period (1994-2004 & 1997-2007) was considered. However, the results were not consistent over time, which according to the authors, indicates that investors should consider dividend-yield-driven strategies as long-term, rather than short-term investments.

Another study from emerging markets was conducted as Wolmarans (2000) investigated whether dividend investing has value for South African investor. Methodology of this research did not compare returns from dividend yield portfolios to a market benchmark, but against portfolios composed based on other strategies under evaluation. The main finding was that earnings yield (price-to-earnings ratio) seemed to have a clearly better ability in forecasting future returns than dividend yield for the South African investor.

One approach examined in the previous literature is the effect of consistent dividend growth and dividend stability on stocks returns. Using U.S. stock data, Gombola et al. (1993) showed that stocks with high dividend yield are not homogenous. They found that firms with

consistent dividends and high yields had different risk characteristics than firms with only high dividend yields. Surprisingly, in the case of high dividend stability, relation between yield and systematic risk was reinforced. However, Gwilym et al. (2000) found some methodological shortcomings concerning the study from Gombola et al. (1993). Until then, it was the only study assessing importance of dividend stability in a regression context, and according to Gwilym et al., it did not include firms that were wiped out during the sample period (1969-1984), leading to presence of "survival bias". Interestingly, after correcting the methodological shortcomings, Gwilym et al. (2000) had quite the opposite results. Using UK stock data (1975-1997), they found significant inverse relation between systematic risk and dividend stability. Another study supporting the risk reduction stemming from stable dividends is Henne et al. (2009). They found evidence from German stock markets, suggesting that a portfolio consisting of stocks with high dividend yield and stable dividend payments was able to reduce risk during a highly volatile market period between 2000 and 2008. Finally, it is also shown (Gwilym et al. 2009) that stocks with consistent dividend growth of more than ten consecutive years have outperformed UK equity markets as whole in terms of realized return and lower volatility.

2.3 Finnish evidence

Earlier studies from Finnish stock markets have also shown strong evidence in advocacy of the existence of dividend yield pricing anomaly in the Helsinki Stock Exchange. Leivo (2012b) summarizes findings on dividend yield anomaly (pp. 34) from Pätäri and Leivo (2009), Leivo and Pätäri (2009, 2011) and Leivo (2012a) stating that, portfolios created based on the D/P criterion had the best risk-adjusted performance and greatest value premium generated, in the comparison of individual valuation ratios, in all the publications mentioned. Also, the findings of Rinne and Vähämaa (2011) support the triumph of dividend yield anomaly, as they examined performance of the Dogs of the Dow strategy in Finnish stock markets, covering period from 1988 to 2008. The authors document a convincing 4.5% (7.5%) average (median) excess return over the market index. Their results were in line with the earlier literature, as the strategy worked especially well in declining markets.

2.4 Enhancing dividend yield investment strategies

The focus of this thesis concentrates on the possibility of enhancing dividend yield investment strategies either through adding profitability ratios to the portfolio-formation process, or by taking account of the dividend payout ratio beside dividend yield. Earlier literature has shown promising evidence on behalf of both approaches. This section covers articles that inspired the author of this thesis to test whether these findings would also hold for the Finnish stock markets.

Since the so-called Profitable Dividend Yield Strategy was first introduced by Fong and Ong in 2016, it has yet to attract contribution from other authors. However, author(s) of the original article have done some additional publications on the subject. On their second article from the same year Fong and Ong (2016b) provided a comprehensive analysis of risk-return characteristics. Consistent with the findings of their earlier study, Fong and Ong show that the top PDY portfolio had a clear advantage, with higher monthly average returns (almost 0.4% more per month) and Sharpe ratios, when compared to market benchmark or top portfolios of pure dividend yield or gross profitability-based strategies. Their second goal was to assess the performance of the strategy over longer holding periods. They conclude that the superior performance is not limited to short term, as holding periods of five years and even longer produced abnormal cumulative returns. Finally, Fong and Ong (2016b) examined whether the excess returns are driven by the behavioral biases detected in studies concerning beta anomaly. The conclusion was that the profitable dividend yield strategy's alpha, to a sizeable extent, is explained by the beta anomaly due to mispricing of the "boring" low beta stocks, although low betas did not fully explain the abnormal returns.

Besides the two studies Fong and Ong wrote together, Fong has continued on the subject with three additional articles by himself. On the same year as the main article was published, Fong (2016) wrote on the advantages of the strategy for retirement portfolios. He concludes that the defensive nature of high-dividend yield stocks (especially in declining markets), combined with the steady cash flow of dividends, low volatility, and the long-lasting quality of high gross-profits-to-assets stocks stands out as an investment strategy for retirement

portfolio purposes. On a simulation set up, the PDY strategy had a much lesser shortfall risk than conventional retirement portfolio investment strategies.

Fong's second independent article (2017) on the PDY strategy studied the usage of it through dollar-cost averaging with monthly $1000 investments. Results showcased that an investment portfolio with high Sharpe ratio could even beat a matching lump-sum investment on a market portfolio, despite the fact that empirical evidence has consistently shown the superior performance for lump-sum investing compared to the more affordable dollar-cost averaging.

Third article from Fong (2018) concentrated on the safety advantages of PDY strategy. Despite the low betas, PDY portfolios achieved high Sharpe ratios. Besides that, the DY-aspect of the strategy seemed to mitigate the tail risks of highly profitable firms, with more positive skewness and lower kurtosis than the market portfolio's returns. Fong suggests that PDY portfolios almost fully reach the definition of safe assets, as described in the paper.

The second approach of this thesis concerns possible benefits of dividend payout ratio. Complementing the research by McManus et al. (2004), Seaton et al. (2005) examined UK markets to observe whether the portfolios of stocks with high payout ratio, combined with a high dividend yield, would yield excess returns. The goal of their study was to detect whether a pure high dividend yield portfolio's performance could be enhanced by selecting only the top half of the stocks, determined by their payout ratios. The study was based on the hypotheses that pure dividend yield portfolio would not outperform the UK stock market indices after risk adjustment and transaction costs. The result confirmed that combining high payout ratio with high dividend yield outperformed the pure dividend yield strategy and market index. However, the outperformance of this strategy was also diminished after risk adjustment.

Another interesting approach, albeit out of the scope of this thesis, was adopted as Gray and Vogel (2014) studied the possibility of improving dividend yield based investment

strategies. Their article relates to the findings from Boudoukh et al. (2007), which indicated that dividend yield had a poor predictive ability on future returns compared to two alternative measures: dividends plus repurchases and dividends plus net repurchases. Gray and Vogel (2014) extended previous study on the subject and showcased, that more complete measures of shareholder yield perform better in forecasting of above-average risk-adjusted returns. Including a measure of net-debt paydown to the two above-mentioned alternative approaches yielded even better investment performance.

3. Methodology and Data

This chapter covers methodology behind the portfolio formation, the different measures used to describe portfolio performance and description of the data for the thesis. Excess returns are examined on annual basis together with the cumulative overall gains. Methodology of this thesis is an adaption of practices used in earlier research. Portfolios are created using similar logic on double-sorts as Leivo (2012a), when he studied combinations of value and momentum indicators in Finnish stock markets, by dividing tercile portfolios (constructed on basis of the first criterion) further into sextiles (based on the second criterion). Profitability ratios under examination are motivated by the findings of Novy-Marx (2015) and Ball et al. (2015), while the investment strategies are adoptions from the studies of Fong and Ong (2016a, 2016b) and Fong (2016, 2017, 2018) on the PDY strategy, and McManus et al. (2004) and Seaton et al. (2005) on the dividend payout ratio strategy. As a result, double-sorted portfolios on dividend yield and profitability are created to form sextile portfolios with combinations of either high, intermediate, or low DY and high or low profitability ratio, in addition to single criterion sextile portfolios based on dividend yield and dividend payout ratio.

3.1 Key indicators of the study

This section introduces the financial statement key figures under examination in this thesis. First, a brief introduction of dividend yield, dividend payout ratio, and each profitability measure being used is given, and then will be shown how the ratios are calculated based on the income statement and balance sheet information. Dividend yield, together with the other ratios, will be used to form the double-sorted portfolios needed for the empirical analysis.

3.1.1 Dividend yield

Dividend yield (DY) is the ratio between dividends paid per share to a price of a stock:

$$Dividend\ yield = \frac{Dividend\ per\ share}{Price\ per\ share} \quad (1)$$

In context of the data being used for the study, dividend per share is the share issuance adjusted amount of dividends on a calendar year-end basis. Price per share is the closing price for the financial year.

3.1.2 Dividend payout ratio

Dividend payout ratio (DPR) is the percentage of dividends paid to shareholders from the net income generated during the financial year, or in other words the amount of dividend per share in relation to earnings per share:

$$Dividend\ payout\ ratio = \frac{Dividends\ per\ share}{Earnings\ per\ share} \quad (2)$$

A low payout ratio usually means that the company is seeking for growth and reinvesting back to its business to do so, while a company with high payout ratio is typically at a more mature stage in its business and therefore prefers to share larger proportion of its earnings to shareholders, instead of reinvesting to expand (Corporate Finance Institute 2021c).

3.1.3 Return on equity

Return on equity (ROE) is the first of the four profitability indicators being used. It relates the company's capability to generate income compared to the shareholders' equity needed:

$$ROE = \frac{Net\ income}{Shareholders'\ equity} \quad (3)$$

Net income is the result for the financial year after income taxes and minority interest, whereas shareholders' equity is the sum of restricted and unrestricted equity capital, including e.g., share capital and retained earnings from previous financial years.

ROE tells how effectively the owners' assets are being used. It is a ratio that usually attracts particular interest from stock analysts and investors, since it also tells the rate of return on the money being put into the business by equity investors (Corporate Finance Institute 2021b). While ROE only looks at the equity side of balance sheet, companies using more debt to operate can usually attain better return on equity ratios. However, investing in leveraged business models could also be riskier for the investor.

3.1.4 Return on assets

Similar to ROE, return on assets (ROA) ratio also tells how efficiently earnings are generated compared to the assets required:

$$ROA = \frac{Net\ income}{Total\ assets} \tag{4}$$

The difference between the two ratios is that ROA includes all assets from the balance sheet at the end of financial year. Total assets is the sum of shareholders' equity and total liabilities, which further divides into current and non-current liabilities. In conclusion, two companies with similar ratios of ROE could have completely dissenting ratios of ROA, depending primarily on the debt ratio.

3.1.5 Operating margin

The third measure of profitability in this study is the operating margin (OM). The ratio looks at earnings before deduction of interest expenses and taxes as a percentage of the total sales.

Higher margins usually lead to better capability of surviving over economic downturn or rising price competition (Corporate Finance Institute 2021b).

Calculating operating margin for a company uses earnings before interest rates and taxes (EBIT) as numerator and total revenue for the fiscal year as denominator:

$$Operating\ margin = \frac{EBIT}{Revenue} \tag{5}$$

EBIT is the result after subtracting operating costs and depreciations from revenue, while revenue itself is the amount of money generated through normal business operations i.e., total sales during the financial year.

3.1.6 Operating profitability

Out of the four profitability ratios being used in this thesis, operating profitability is the closest equivalent to the Novy-Marx GP indicator. The biggest difference to the original Profitable Dividend Yield strategy (by Fong & Ong 2016a) is the use of EBIT instead of gross profit in the numerator of the profitability ratio. EBIT is used due to the fact that cost of goods sold is not mandatory information to declare in Finnish companies' financial statements, which makes it difficult to approximate the gross profit of a company. Luckily, Ball et al. (2015) suggest that magic of the GP indicator rather lies in the denominator (total assets) of the ratio. Thus, the measure of operating profitability (OP) is formed as follows:

$$Operating\ profitability = \frac{EBIT}{Total\ assets} \tag{6}$$

Even though the OP measure is not an exact match for the GP indicator nor for the "operating profit" measure employed by Ball et al. (2015), it should capture similar explanatory power

in predicting of future returns if the findings from previous literature hold for Finnish markets as well.

3.2 Portfolio formation

This section introduces the portfolio formation process used for the purpose of conducting empirical analysis. Equally-weighted portfolios are created and reformed annually on the first trading day of May, based on the latest calendar year's annual statement information from the companies. The holding period before rebalancing is one year for each portfolio.

In the first phase of empirical analysis, stocks are divided into tercile portfolios (the first sort) based on their dividend yield ranking, after which, the second sort is done based on the profitability ratio, as shown in Table 1. Besides that, pure dividend yield and dividend payout ratio sextiles are created.

As the results of the first phase of empirical analysis indicate that majority of the excess returns accumulate to the top sextile of pure dividend yield approach, further division of the top sextile in question seems necessary. As a result, portfolios presented in Table 2 are created in a similar double-sort fashion in the second phase of portfolio formation. At this point, also dividend payout ratio is included as the second-stage criterion.

Table 1. Portfolios formed in the first phase of empirical analysis.

	Dividend Yield (first sort)					
	Top tercile		**Mid tercile**		**Bottom tercile**	
Second sort	Top quantile	Bottom quantile	Top quantile	Bottom quantile	Top quantile	Bottom quantile
Return On Equity	ROE1	ROE2	ROE3	ROE4	ROE5	ROE6
Return On Assets	ROA1	ROA2	ROA3	ROA4	ROA5	ROA6
Operating Margin	OM1	OM2	OM3	OM4	OM5	OM6
Operating Profitability	OP1	OP2	OP3	OP4	OP5	OP6
Single sorted portfolios						
Dividend Payout Ratio	DPR1	DPR2	DPR3	DPR4	DPR5	DPR6
Dividend Yield	DY1	DY2	DY3	DY4	DY5	DY6

Profitability ratios used for the second sort include return on equity (ROE), return on assets (ROA), operating margin (OM), and operating profitability (OP). In addition, portfolios based solely on dividend payout ratio (DRP), and dividend yield (DY) are formed. DY sextiles are formed in order to assess whether the performance of pure DY top sextile is beaten by the twin-criteria approach under examination. (Table 1)

Table 2. DY1 sextile split further based on the 2nd criteria indicators in the second phase of portfolio formation, resulting as $1/12^{th}$ portfolios.

2nd criterion sort	Top quantile	Bottom quantile
Dividend Yield	DY1top	DY1bottom
Dividend Payout Ratio	DPRtop	DPRbottom
Return On Equity	ROEtop	ROEbottom
Return On Assets	ROAtop	ROAbottom
Operating Margin	OMtop	OMbottom
Operating Profitability	OPtop	OPbottom

All of the top/bottom ($1/12^{th}$) portfolios in the second phase of formation are created from high-dividend yield companies, as all of the companies belong to DY1 sextile. The second sort is done either based on profitability, dividend yield, or dividend payout ratio.

3.3 Portfolio performance

This section covers the different performance indicators used in this study to describe the investment success of the portfolios. Besides the indicators covered in the following subsections, the thesis also presents descriptive statistics of the returns, annual excess returns (returns above risk-free rate) and cumulative returns for the whole investment period.

3.3.1 The Sharpe ratio

The Sharpe ratio is one of the most commonly used performance indicators to assess risk adjusted portfolio performance. It was introduced by Sharpe (1966) to measure the performance of mutual funds, by comparing the excess returns to their variability. Sharpe first named the measure as *reward-to-variability ratio*, but it has since established the name of the Sharpe Index or the Sharpe Ratio on hands of other authors (Sharpe 1994). As Sharpe (1994) wrote himself, “the ratio is designed to measure the expected return per unit of risk for a *zero-investment strategy*”, the mentioned strategy being a theoretical set-up where a long position is taken to an asset with the money obtained from short-selling another asset (e.g., the risk-free asset), returning either a positive, negative or zero amount of profit.

Equation for the Sharpe ratio is following:

$$Sharpe\ ratio = \frac{R_p - R_f}{\sigma_p} \tag{7}$$

where R_p is return of the portfolio, R_f the risk-free rate of return, and σ_p standard deviation (i.e., volatility or risk) of the portfolio's excess return. To summarize: the lower the volatility of a portfolio or an asset, and higher the return, the better the Sharpe ratio.

3.3.2 Skewness and Kurtosis Adjusted Sharpe Ratio (SKASR)

Although the traditional Sharpe ratio is one of the most used risk adjusted portfolio performance measures, it also has some limitations. Due to the assumption of normally distributed returns, the Sharpe ratio penalizes all the deviations from mean, including the right-skewed positive deviation, which from the investor's perspective would rather be desirable (Pätäri et al. 2012).

To tackle with the criticism associated with the original Sharpe ratio, Pätäri (2011) introduced the skewness- and kurtosis-adjusted Sharpe ratio (SKASR):

$$SKASR = \frac{R_p - R_f}{SKAD_p^{\left(\frac{\mathrm{ER}}{|\mathrm{ER}|}\right)}} \tag{8}$$

In the equation, standard deviation of the return is replaced with the so-called SKAD-measure, coupled with the Israelsen's (2005) modification procedure for negative Sharpe ratios. The role of skewness- and kurtosis-adjusted deviation (SKAD) is to adjust for the possible problems arising from returns deviating from the normal distribution. Calculation of the

SKAD-measure starts from solving the so-called Cornish-Fisher expansion for the Z-value (Z_{CF}) that adjusts for deviation from normal distribution:

$$Z_{CF} = Z_C + \frac{1}{6}(Z_C^2 - 1)S + \frac{1}{24}(Z_C^3 - 3Z_C)K - \frac{1}{36}(2Z_C^3 - 5Z_C)S^2 \quad (9)$$

where Z_C is the critical value of the probability based on standard normal distribution, K denotes kurtosis and S skewness of return distribution. Equations for kurtosis and skewness are as follows:

$$K = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{ER-\overline{ER}}{\sigma}\right)^4 - 3 \quad (10)$$

$$S = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{ER-\overline{ER}}{\sigma}\right)^3 \quad (11)$$

where N refer to the number of outcomes, and $\overline{ER}$ to the absolute value of excess return. After this, the SKAD is calculated as the product of standard deviation and the ratio of Cornish-Fisher's Z-value divided by the critical value of probability:

$$SKAD = \sigma\frac{Z_{CF}}{Z_C} \quad (12)$$

After this, SKARS can be calculated as described in Equation (8).

3.3.3 Statistical significance of abnormal return

The performance of two portfolios can be compared by means of the Jobson-Korkie (1981) test, which indicates whether the Sharpe ratios of two portfolios are statistically different. The test is implemented as suggested by Memmel (2003) as follows:

$$Z = \frac{\hat{S}h_i - \hat{S}h_n}{\sqrt{\hat{V}}} \quad (13)$$

$\hat{S}h_i$ and $\hat{S}h_n$ refer to the Sharpe ratios of the portfolios *i* and *n*, and $\hat{V}$ is the asymptotic variance of Sharpe ratio difference in the numerator, calculated as follows:

$$\hat{V} = \frac{1}{T}[2 - 2\rho_{in} + \frac{1}{2}(Sh_i^2 + Sh_n^2 - 2Sh_i Sh_n \rho_{in}^2)] \quad (14)$$

where *T* is the number of periodic returns within a sample period and ρ_{in} is the correlation of the portfolio returns:

$$\rho_{in} = \frac{\sigma_{in}}{\sigma_i \sigma_n} \quad (15)$$

Pätäri (2021) shows that the same test design is also valid for testing the significance of difference of the skewness- and kurtosis adjusted Sharpe ratios of two portfolios if standard Sharpe ratios in the above-described formulas are replaced with their skewness- and kurtosis adjusted counterparts.

3.3.4 Information ratio and SKAIR

The information ratio adjusts the portfolio returns with the market returns. It is defined in several alternative ways in financial literature. In this thesis, it is calculated in its simplest form by dividing the portfolio's mean excess return relative to its benchmark portfolio (which in this case is the sample average portfolio) by the volatility of that excess return:

$$IR = \frac{R_p - R_b}{\sigma_{ER}} \quad (16)$$

where R_b is the annualized geometric mean return of the benchmark portfolio, and σ_{ER} is the annualized standard deviation of the monthly excess returns (over the benchmark portfolio) of portfolio p (σ_{ER} is also known as tracking error). (Pätäri et al. 2021)

Because the information ratio is calculated analogously to the Sharpe ratio, with the only difference being in the definition of excess returns, it is also subject to a similar critique. Therefore, also the skewness- and kurtosis-adjusted information ratios are calculated (henceforth SKAIRs) for each of the examined portfolios similarly to the methodology employed for deriving the SKASRs based on the standard Sharpe ratios and the skewness and kurtosis statistics of the excess return distributions being evaluated. (Pätäri et al. 2021)

3.4 Data

The purpose of this section is to introduce the data being used for the study. Company-specific financial statement information data is mainly collected from the stock books published by OP Corporate Bank's trading and investment research department. Besides that, Thomson Reuters Datastream is used for collecting some of the missing financial statement information data and all of the historical monthly returns[4] of the companies, the market benchmark, and the risk-free rate used in the study.

[4] All of the company-specific and market returns used for the study are total return indices, meaning that besides the price movements of the underlying security, also the effect of all cash distributions is accounted for, as if the dividends paid, or any equivalent cash flows for the owner of the security in question, were reinvested in the security.

3.4.1 Sample description

The sample of the thesis covers annual statement information data of all the listed companies (except financial firms and few others with inadequate data) in the Helsinki Stock Exchange over the 23-year period from 1995 to 2017. Overall, 181 companies are included for the research. All the historical returns are company and index specific total return indices. The risk-free rate used in this thesis is the Finland Three Month Interbank Rate. Return-specific data covers the period from start of May 1996 (when the first investments are made based on the 1995 financial statement information) till the end of April 2019 (as the last one year holding period ends).

Table 3 presents descriptive statistics of the key indicators used for the portfolio formation. Average, median, minimum, and maximum values for the portfolio-specific measures are shown, whilst *N* denotes for the average number of companies in the respective portfolio throughout the study-period. Descriptive statistics of the portfolio formation measures enable utilization of the results for real-world applications in case someone wishes to do so.

Average dividend yield for the top tercile of the initial DY division is 6.50 percent, while the highest-yield DY sextile (DY1 quantile) has a dividend yield just above 8 (10) percent. Respectively, average profitability ratios for the top portfolios in the first phase (2nd phase) of empirical analysis for the double-sort sextiles (DY1 quantiles) are 21.70% (22.67%) return on equity, 11.76% (13.05%) return on assets, 25.07% (31.93%) operating margin, and 15.02% (15.88%) operating profitability. The top-sextile pure dividend payout ratio-based portfolio has average payout ratio of over 200 percent, while the top (bottom) quantile of the double sort on DY1 split has average dividend payout ratio of 181.87 (36.43) percent.

Table 3. Descriptive statistics of the key indicator ratios used for portfolio formation.

Key measure	Portfolio	Average (%)	Median (%)	Minimum (%)	Maximum (%)	*N* (average/year)
Dividend yield	DY1	8.07	7.00	3.80	57.69	16.91
	DY2	4.88	4.79	3.10	8.00	16.39
	DY3	3.72	3.71	2.43	5.36	15.78
	DY4	2.69	2.68	0.86	4.07	16.26
	DY5	0.76	0.40	0.00	2.67	16.70
	DY6	0.00	0.00	0.00	0.50	16.13
Initial terciles:	DY 1st tercile	6.50	5.60	3.10	57.69	33.30
	DY 2nd tercile	3.20	3.15	0.86	5.36	32.04
	DY 3rd tercile	0.39	0.00	0.00	2.67	32.83
DY1 split:	DY1top	10.07	8.22	5.40	57.69	8.22
	DY1bottom	6.18	5.94	3.80	9.43	8.70
Dividend payout ratio	DPR1	206.04	125.00	52.08	5000.00	16.13
	DPR2	73.61	72.92	39.56	138.61	16.13
	DPR3	53.96	52.63	31.58	90.91	16.13
	DPR4	36.99	39.52	0.00	65.79	16.13
	DPR5	11.10	0.00	0.00	40.00	16.13
	DPR6	-45.35	0.00	-4500.00	18.09	17.70
DY1 split:	DPRtop	181.87	127.12	35.59	1538.65	8.22
	DPRbottom	36.42	56.05	-714.29	147.06	8.70
Return on equity	ROE1	21.70	19.42	9.52	92.11	16.91
	ROE2	6.76	7.65	-31.07	19.99	16.39
	ROE3	19.75	17.43	4.53	78.09	16.78
	ROE4	5.01	6.83	-56.54	15.70	16.26
	ROE5	23.07	11.28	-14.29	800.00	16.70
	ROE6	-58.27	-14.20	-5523.19	718.37	16.13
DY1 split:	ROEtop	22.67	21.02	8.56	73.71	8.22
	ROEbottom	7.30	7.60	-26.38	19.99	8.70
Return on assets	ROA1	11.76	10.52	4.37	54.50	16.91
	ROA2	3.20	3.39	-20.65	13.26	16.39
	ROA3	9.60	8.28	2.59	48.97	16.78
	ROA4	2.22	2.84	-25.39	9.81	16.30
	ROA5	9.19	4.54	-4.57	817.35	16.70
	ROA6	-12.52	-6.02	-349.33	578.41	16.13
DY1 split:	ROAtop	13.05	11.80	4.10	54.50	8.22
	ROAbottom	3.62	3.54	-20.65	15.29	8.70
Operating margin	OM1	25.07	15.67	1.63	616.67	16.91
	OM2	3.30	4.82	-230.00	14.19	16.39
	OM3	16.61	11.57	1.20	165.30	16.78
	OM4	3.59	3.95	-36.97	11.79	16.26
	OM5	11.27	6.06	-6.20	196.96	16.65
	OM6	-38.50	-4.42	-3865.80	10.36	16.13
DY1 split:	OMtop	31.93	20.23	1.97	616.67	8.22
	OMbottom	2.97	5.09	-230.00	17.65	8.70
Operating profitability	OP1	15.02	13.63	2.95	61.99	16.91
	OP2	5.02	5.41	-26.15	13.02	16.39
	OP3	13.97	12.38	2.09	118.14	16.78
	OP4	4.17	4.67	-26.11	11.87	16.26
	OP5	9.24	6.80	-5.19	134.49	16.70
	OP6	-9.38	-4.61	-173.35	7.92	16.13
DY1 split:	OPtop	15.88	14.26	3.86	61.99	8.22
	OPbottom	5.21	5.46	-26.15	15.42	8.70

3.4.2 Benchmark portfolios

For this study, there are two benchmark indexes being used: OMXH CAP Total Return Index and the sample average return. There are multiple reasons for this approach. One could ask whether the use of broad market index is relevant for comparison of abnormal returns, since index of that kind is basically out of reach for any market participant. OMXH CAP Total Return Index is value-weighted index (with one stock limited to maximum weight of 10%) that comprises of all the companies in Helsinki Stock Exchange. Since following an index like this would mean one should balance their portfolio constantly, few obvious problems arise:

1) trading costs

2) liquidity of small companies

3) value weighting of the portfolio

4) difficulty of constant allocation changes.

Another problem in comparing to OMXH TRI is the fact that some of the large companies (mostly financial sector firms) in the index are excluded from the research scope. For example, Nordea is one of the largest companies in the Helsinki Stock Exchange, and excluded from the scope of the study, since it is a financial company.

For these reasons, sample average return is incorporated as another benchmark for the comparison of returns. Sample average return is simply the average return of the companies each year. Value-weighting is not considered. As Karell (2018) argued, using a portfolio like this is better proxy for market return, when the strategy under examination is also using equal-weighting.

4. Empirical Results and Analysis

This chapter covers the empirical results of the thesis. Performance of the different portfolios and approaches is compared through descriptive statistics of the absolute returns, risk-adjusted measures, and cumulative return with an illustrative timeline graphic. While the following tables (4 and 5) present results for the whole study, it is worth noting that the findings from the initial phase of empirical analysis are displayed first on every table (P1-P6), whereas the latter (top & bottom) portfolios are the result of splitting the highest dividend yield DY sextile further based on the second sort criteria.

4.1 Portfolio performance

This section introduces the descriptive statistics of portfolio returns, and the risk-adjusted performance of the portfolios. Descriptive statistics include average annual returns, which are annualized geometric mean returns, and median, minimum, and maximum monthly returns. Also, annualized standard deviation (i.e., volatility), and skewness and kurtosis of the monthly portfolio returns are presented.

Looking at the Table 4, the first observation on average annual returns is that the higher dividend yield portfolios (P1-P4) clearly outperform the low yield (P5-P6) ones. Also, the portfolios with low dividend yield and low profitability (ROE6, ROA6, OM6 & OP6) have performed particularly weakly, as they have generated negative average returns. The best annual returns of the dividend payout ratio sextiles concentrate on the intermediate (P3-P4) payout ratio portfolios, while the absolute best annual returns of the first phase sextiles concentrate on the P1 portfolio of pure dividend yield division. While the first-phase double-criteria portfolios indicate that splitting the top DY tercile based on profitability measures separate better returns for the P1 sextiles, none of the double-sorts, nor pure dividend payout ratio top sextile is actually capable of outperforming the pure dividend yield based top sextile.

Table 4. Descriptive statistics of portfolio returns.

Portfolio formation criteria	Portfolio	Average annual return (%)	Median monthly return (%)	σ (%)	Skewness	Kurtosis	Minimum monthly return (%)	Maximum monthly return (%)
DY (dividend yield)								
	P1	13.86	1.46	15.82	-0.89	2.98	-21.39	14.30
	P2	9.60	1.43	16.14	-0.51	1.62	-16.22	16.28
	P3	11.16	1.14	17.41	-0.33	1.35	-15.50	17.28
	P4	9.30	1.22	18.58	-0.85	3.43	-28.14	17.57
	P5	3.15	0.47	22.26	0.24	2.81	-21.21	32.34
	P6	1.19	0.04	22.33	0.04	1.39	-26.39	23.59
DPR (dividend payout ratio)								
	P1	9.24	1.16	16.04	-0.69	2.30	-17.56	14.31
	P2	11.15	1.22	15.87	-0.26	1.06	-14.45	16.19
	P3	11.26	1.35	17.25	-0.51	1.91	-16.33	15.93
	P4	12.49	1.22	19.92	-0.63	3.49	-29.95	22.81
	P5	1.30	-0.06	21.18	0.31	2.72	-20.73	29.27
	P6	4.16	0.16	20.67	-0.02	1.63	-24.73	19.37
ROE (dividend yield [1st] and return on equity [2nd])								
	P1	12.05	1.23	15.95	-0.89	2.47	-18.91	13.98
	P2	11.47	1.17	15.82	-0.50	1.41	-14.79	16.64
	P3	9.10	1.09	17.87	-0.77	2.20	-22.97	15.28
	P4	11.26	0.88	18.10	-0.32	2.31	-19.91	19.42
	P5	6.19	0.62	21.93	0.45	4.53	-22.73	37.51
	P6	-1.91	-0.08	22.80	0.04	0.50	-22.75	20.48
ROA (dividend yield [1st] and return on assets [2nd])								
	P1	11.53	1.24	15.57	-0.93	2.55	-19.13	13.68

P2	12.01	1.31	16.28	-0.50	1.43	-16.11	16.06
P3	7.81	1.05	18.22	-0.92	3.29	-27.15	15.77
P4	12.43	0.93	17.90	-0.13	1.64	-16.14	20.73
P5	5.35	0.92	22.18	0.33	4.10	-22.03	36.99
P6	-1.23	-0.29	22.67	0.18	1.07	-23.53	22.10
OM (dividend yield [1st] and operating margin [2nd])							
P1	11.92	1.13	14.98	-0.69	1.83	-17.30	12.71
P2	11.35	1.43	17.06	-0.69	2.29	-19.67	16.46
P3	10.78	1.34	17.80	-1.09	3.91	-25.67	16.74
P4	9.61	0.86	18.15	-0.04	1.14	-16.90	18.05
P5	6.70	0.88	21.37	0.31	3.69	-21.85	34.32
P6	-2.66	-0.43	23.81	0.11	0.99	-23.84	23.67
OP (dividend yield [1st] and operating profitability [2nd])							
P1	13.05	1.43	15.33	-0.91	2.66	-19.48	13.88
P2	10.43	1.25	16.42	-0.56	1.54	-16.46	16.22
P3	8.24	1.05	18.26	-0.68	2.61	-24.00	17.51
P4	12.16	1.06	17.74	-0.36	2.06	-19.01	21.13
P5	6.37	0.79	21.98	0.42	4.20	-21.22	36.99
P6	-2.30	-0.58	23.04	0.18	1.31	-25.10	23.67
DY1 portfolio split to quantiles (top dividend yield sextile divided further based on the other ratios)							
DY (1st dividend yield P1 and 2nd dividend yield)							
Top	12.67	1.27	17.89	-0.72	3.59	-25.35	18.28
Bottom	14.37	1.30	16.53	-0.55	1.19	-16.91	11.83
DPR (1st dividend yield P1 and 2nd payout ratio)							
Top	11.49	1.29	16.86	-0.78	3.93	-22.53	19.83
Bottom	15.34	1.31	17.53	-0.42	1.39	-20.20	15.13
ROE (1st dividend yield P1 and 2nd return on equity)							

	Top	14.69	1.77	17.43	-0.85	2.60	-25.14	12.31
	Bottom	12.05	1.20	16.88	-0.40	1.85	-17.97	18.28
ROA (1st dividend yield P1 and 2nd return on assets)								
	Top	13.98	1.48	16.87	-0.70	1.96	-21.40	13.56
	Bottom	13.02	1.41	17.22	-0.59	2.23	-21.37	16.55
OM (1st dividend yield P1 and 2nd operating margin)								
	Top	14.13	1.21	17.06	-0.51	3.72	-26.39	18.13
	Bottom	12.66	1.42	17.81	-0.85	2.97	-24.72	16.06
OP (1st dividend yield P1 and 2nd operating profitability)								
	Top	15.27	1.49	16.85	-0.74	2.39	-23.98	11.29
	Bottom	11.60	1.44	17.03	-0.70	2.50	-18.86	17.31
Benchmarks								
Sample average		8.40	0.84	16.61	-0.46	2.23	-20.30	18.31
OMXH Total Return Index		10.66	1.05	19.56	0.13	2.34	-19.35	26.46

After discovering that the highest return is concentrated in the top DY-sextile, it was obvious that the initial division to terciles based on dividend yield is not enough when the sample covers all of the listed companies. Thus, further division of the top dividend yield sextile seemed necessary. As a result, top and bottom quantiles of the DY1 sextile are created based on the profitability ratios, and at this point also based on the dividend payout ratio. Other noteworthy observation from the initial sextile division include the tendency of lesser volatility, but more negatively skewed (distribution is shifted to right) returns of the top sextiles.

Statistics for the second-phase double-sorted portfolios indicate controversial results, as division of the top-yielding DY1 sextile does not end up in better performance for the top quantile (i.e., $1/12^{th}$ portfolio) using dividend yield as the criterion, while all of the top dual-criteria profitable-dividend-yield portfolios beat the DY1 portfolio in terms of average annual returns. At this point, it actually seems that incorporating a measure of profitability as the second criterion of portfolio formation for the highest dividend yield sextile subset of companies enhances the performance of the investment allocation.

As a conclusion for the descriptive statistics, the best investment performance from the top portfolios, in terms of average returns, is obtained with very high dividend yield (8.07% on average, as shown in Table 3) companies with high profitability, whilst too high dividend yield reduces the average return obtained from high-yield (DY1) companies (Table 4). The best results are obtained with the combination of very high dividend yield and high operating profitability (OPtop with 15.27% average annual return). At the same time, the lowest-yield low profitability portfolios (P6) have clearly underperformed every other portfolio formed in the study, as they have generated negative average returns. In the sample, high dividend payout ratio does not enhance returns of the DY1 portfolio, but conversely the absolute best returns are actually obtained from the DPRbottom portfolio composed of very high dividend yield companies with low payout ratios.

Another important observation made from the Table 4 is the difference in skewness of the monthly portfolio returns vs the market benchmarks. Every single top portfolio, together with the sample average portfolio, is negatively skewed, whilst the OMXH TRI is positively skewed. Also, OMXH TRI has over two percentage points higher annual average return than the sample average benchmark. These findings could influence, and should be noted, when considering statistical significance of the abnormal returns versus OMXH TRI benchmark.

Table 5 presents the risk-adjusted and market-adjusted measures of portfolio performance. Annualized return adjusted with risk-free rate of return, the Sharpe ratio, the skewness- and kurtosis-adjusted Sharpe ratio, the information ratio, and the skewness- and kurtosis-adjusted information ratio are displayed for each portfolio. Also, statistical significance of

abnormal return versus both of the market benchmarks is interpreted with the modification of Jobson-Korkie (1981) and Memmel (2003) test, introduced by Pätäri (2021).

The best performance of the initial division to sextile portfolios is shown by the highest dividend yield (DY1) portfolio with the highest annualized excess return (11.61 percent), Sharpe ratio (0.73), SKASR (0.58), information ratio (0.59), and SKAIR (0.58). As already stated, none of the initial double criteria portfolios has been able to beat the pure dividend yield-based top sextile. In terms of annualized excess return, each top sextile formed as the combination of high dividend yield and high profitability, surpasses returns of both market benchmarks (with sample average returning 6.23% and OMXH TRI 8.46%), while the return of pure dividend payout ratio top sextile is able to beat the sample average but loses to OMXH TRI. Meanwhile, clear underperformance compared to both of the benchmark indexes in terms of all of the risk-adjusted measures, is shown by all of the bottom sextile portfolios of the initial division, addressing the importance of dividend yield, dividend payout ratio, and profitability of a company in forecasting of stock returns, at least in one-year horizon (which is the holding period before rebalancing).

The statistical significances of overperformance of the initial sextiles show that the only top portfolios capable of having beaten the sample average with 95% confidence interval are the DY1 and OP1 portfolios, while no statistically significant overperformance against the OMXH TRI is documented. At the same time, all of the bottom sextiles show clear statistically significant underperformance against both benchmarks.

After further division of the top the performing DY1 sextile to $1/12^{th}$ portfolios, the importance of profitability actually starts to appear, as all of the top profitability (DY1-splitted) quantiles show superior performance in terms of annualized excess return compared to the initial DY1 sextile, while the top DY $1/12^{th}$ portfolio shows weaker performance (10.44%) compared to the bottom one (12.11%), as shown in Table 5.

Table 5. Performance of the portfolios.

Portfolio formation criteria	Portfolio	Excess return (%)	Sharpe ratio	SKASR	SKASR (sign.) P_i vs sample average	SKASR (sign.) P_i vs OMXH TRI	Information ratio	SKAIR
DY (dividend yield)								
	P1	11.61	0.73	0.58	(0.018)**	(0.257)	0.59	0.58
	P2	7.42	0.46	0.39	(0.497)	(0.926)	0.09	0.07
	P3	8.95	0.51	0.46	(0.154)	(0.737)	0.33	0.33
	P4	7.13	0.38	0.30	(0.829)	(0.406)	0.13	0.12
	P5	1.09	0.05	0.05	(0.008)***	(0.005)***	0.00	-0.01
	P6	-0.84	-0.002	-0.002	(0.006)***	(0.011)**	-0.01	-0.01
DPR (dividend yield and dividend payout ratio)								
	P1	7.08	0.44	0.36	(0.722)	(0.747)	0.06	0.05
	P2	8.95	0.56	0.51	(0.056)*	(0.435)	0.30	0.28
	P3	9.06	0.52	0.45	(0.226)	(0.786)	0.33	0.31
	P4	10.26	0.51	0.41	(0.393)	(0.997)	0.47	0.45
	P5	-0.73	-0.002	-0.002	(0.001)***	(0.005)***	-0.01	-0.01
	P6	2.07	0.00	0.03	(0.030)**	(0.037)**	0.00	0.00
ROE (dividend yield and return on equity)								
	P1	9.83	0.61	0.49	(0.095)*	(0.566)	0.39	0.38
	P2	9.27	0.58	0.51	(0.088)*	(0.497)	0.30	0.29
	P3	6.93	0.39	0.32	(0.981)	(0.464)	0.09	0.10
	P4	9.06	0.50	0.43	(0.238)	(0.870)	0.34	0.38
	P5	4.07	0.19	0.18	(0.229)	(0.108)	0.00	0.00
	P6	-3.88	-0.01	-0.01	(0.004)***	(0.008)***	-0.01	-0.01
ROA (dividend yield and return on assets)								
	P1	9.32	0.60	0.48	(0.125)	(0.652)	0.32	0.30
	P2	9.80	0.60	0.52	(0.071)*	(0.441)	0.36	0.35
	P3	5.66	0.31	0.24	(0.402)	(0.192)	0.00	0.00
	P4	10.21	0.57	0.52	(0.042)**	(0.445)	0.46	0.47
	P5	3.25	0.15	0.14	(0.125)	(0.051)*	0.00	0.00
	P6	-3.21	-0.01	-0.01	(0.005)***	(0.010)***	-0.01	-0.01
OM (dividend yield and operating margin)								
	P1	9.71	0.65	0.54	(0.059)*	(0.393)	0.31	0.27
	P2	9.15	0.53	0.44	(0.211)	(0.829)	0.33	0.34
	P3	8.58	0.48	0.37	(0.585)	(0.740)	0.30	0.27
	P4	7.43	0.41	0.39	(0.416)	(0.887)	0.15	0.17

	P5	4.58	0.21	0.20	(0.366)	(0.154)	0.00	0.00
	P6	-4.62	-0.01	-0.01	(0.003)***	(0.008)***	-0.01	-0.01
OP (dividend yield and operating profitability)								
	P1	10.81	0.70	0.56	(0.021)**	(0.313)	0.50	0.49
	P2	8.24	0.50	0.43	(0.297)	(0.888)	0.19	0.19
	P3	6.08	0.33	0.27	(0.619)	(0.273)	0.00	0.00
	P4	9.95	0.56	0.49	(0.083)*	(0.611)	0.45	0.47
	P5	4.25	0.19	0.19	(0.279)	(0.115)	0.00	0.00
	P6	-4.26	-0.01	-0.01	(0.004)***	(0.009)***	-0.01	-0.01
DY1 portfolio split to quantiles (top dividend yield sextile divided further based on the other ratios)								
DY (split based on dividend yield)								
	Top	10.44	0.58	0.46	(0.352)	(0.790)	0.31	0.31
	Bottom	12.11	0.73	0.63	(0.012)**	(0.132)	0.57	0.57
DPR (split based on dividend payout ratio)								
	Top	9.29	0.55	0.43	(0.456)	(0.916)	0.22	0.21
	Bottom	13.06	0.74	0.65	(0.012)**	(0.145)	0.61	0.64
ROE (split based on return on equity)								
	Top	12.42	0.71	0.57	(0.071)*	(0.350)	0.53	0.56
	Bottom	9.84	0.58	0.50	(0.179)	(0.572)	0.28	0.29
ROA (split based on return on assets)								
	Top	11.72	0.69	0.58	(0.077)*	(0.358)	0.44	0.46
	Bottom	10.79	0.63	0.52	(0.114)	(0.476)	0.41	0.43
OM (split based on operating margin)								
	Top	11.88	0.69	0.56	(0.133)	(0.416)	0.39	0.36
	Bottom	10.43	0.58	0.46	(0.224)	(0.731)	0.42	0.42
OP (split based on operating profitability)								
	Top	12.99	0.77	0.63	(0.030)**	(0.209)	0.57	0.58
	Bottom	9.39	0.55	0.45	(0.303)	(0.801)	0.28	0.29
Benchmarks								
Sample average		6.23	0.37	0.32				
OMXH Total Return Index		8.46	0.43	0.41				

**p<0.1, **p<0.05, ***p<0.01*

In case of dividend payout ratio (DPR), the bottom quantile ($2^{nd}/12^{th}$ portfolio) also shows superior performance (13.06% vs. 9.29%), indicating that better returns are obtained from the firms with low dividend payout ratio when the dividend yield is extremely high.

While the top profitability quantiles ($1/12^{th}$ portfolios) of DY1-split show superior annualized excess return compared to the initial DY1 sextile, the only top dual-criteria portfolio able to beat DY1, in terms of the risk-adjusted ratios (Sharpe and SKASR), is the one divided based on operating profitability. With the Sharpe ratio of 0.77 and SKASR of 0.63, OPtop portfolio shows the best risk-adjusted performance amongst all of the top portfolios under review in this thesis, while also showing statistically significant (95% confidence interval) overperformance compared to the sample average benchmark. Other top (DY1-splitted) quantiles showing statistically significant overperformance are ROEtop and ROAtop, but with slightly lower (90%) confidence interval. In addition, also DY1bottom and DPRbottom beat the benchmark in terms of significant overperformance. In terms of information ratio and SKAIR, none of the top dual-criteria portfolios are able to beat the DY1 portfolio. The only portfolio with better information ratio and SKAIR over DY1 is the DPRbottom fractile.

4.2 Cumulative returns

This section introduces the cumulative overall returns for the portfolios. The overall gains in percentages for each of the top and bottom sextiles, DY1-splitted quantiles, and the benchmark portfolios examined in this thesis are presented in Table 6, while Figure 1 and Figure 2 showcase the same statistics in illustrative timeline graphs.

Table 6. Cumulative returns(%) of the portfolios. Investment period from start of May 1996 till end of April 2019.

	Initial sextiles		DY1 split	
	P1	**P6**	**Top**	**Bottom**
DY	1878.86	31.16	1453.30	2093.59
DPR	663.98	155.10	1121.44	2562.46
ROE	1270.17	-35.81	2239.96	1270.51
ROA	1129.56	-24.77	1926.36	1568.66
OM	1234.01	-46.20	1990.51	1450.19
OP	1577.96	-41.38	2525.42	1147.46
Benchmarks				
Sample average	537.26			
OMXH TRI	927.09			

The first noticeable thing is the big difference between market benchmark portfolios, as OMXH TRI has significantly higher cumulative overall gains compared to sample average portfolio (927.09% vs. 537.26% as shown in Table 6). Also, from the timeline graphics (Figures 1 and 2) can be seen the relatively extreme volatility of the OMXH TRI during the turn of the century dot-com bubble, which none of the other portfolios presented seemed to capture to the same extent.

Best overall gain from the initial sextiles is captured from the DY1 sextile (1878.86%), while the best performance amongst all of the top portfolios is achieved with the combination of very high dividend yield and high operating profitability (OPtop portfolio with 2525.42% overall return). The DPRbottom portfolio, with the combination of very high dividend yield and low dividend payout ratio, performed even slightly better than any of the top portfolios with 2562.46% overall gains. Also, noteworthy is that all of the portfolios with low dividend yield and low profitability have negative cumulative returns over the investment period.

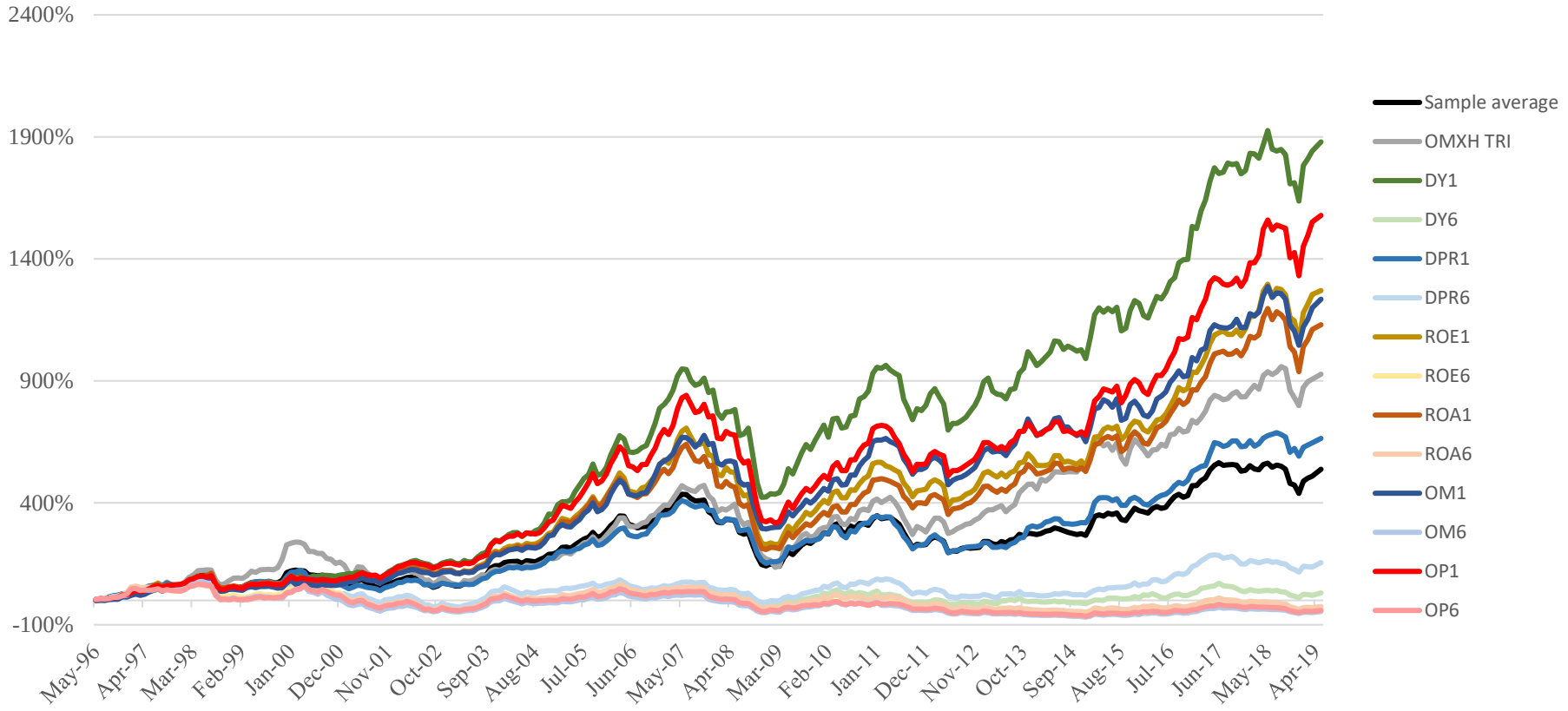

Figure 1. Cumulative returns of the first phase top/bottom sextile portfolios.

Best performance is seen from DY1 and OP1 sextiles. All of the bottom sextiles show weak performance throughout the whole study period from May 1996 to April 2019 (Figure 1).

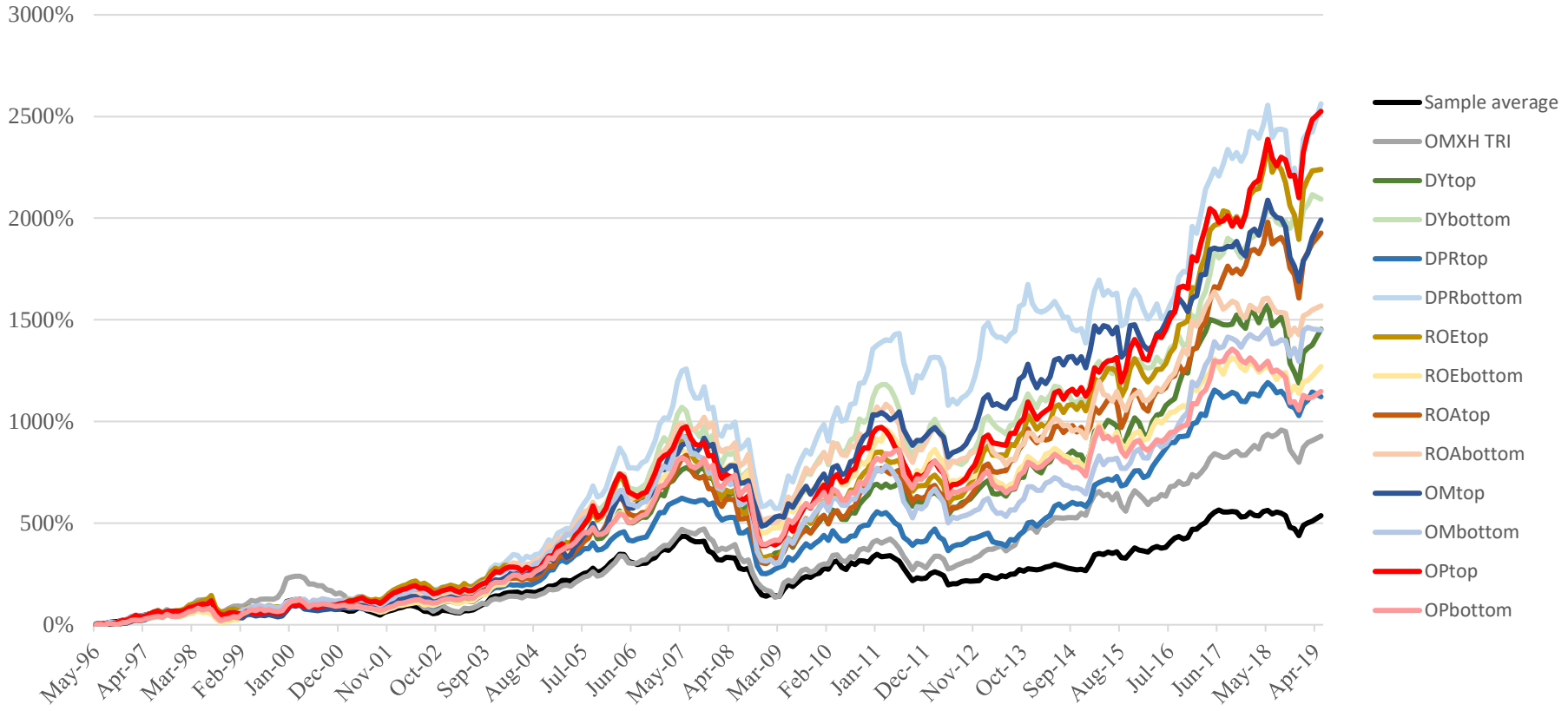

Figure 2. Cumulative returns of the second phase (DY1 split) top/bottom portfolios.

All of the DY1-splitted quantiles surpass both of the benchmarks. OPtop and DPRbottom show best cumulative gains, while the sample average portfolio has the weakest overall returns amongst the ones shown in Figure 2.

5. Summary and Conclusions

The aim for this thesis was to evaluate whether dividend yield based investment strategy has yielded excess return in Finnish stock markets during the sample period of the study, and if so, whether the portfolio performance could have been enhanced by using the double-sort methodologies adopted from previous studies, using dividend payout ratio or a profitability ratio as the second-stage portfolio-formation criterion. The profitability ratios used for the study included return on equity (ROE), return on assets (ROA), operating margin (OM), and operating profitability (OP).

Motivation for the thesis was originally ignited from the findings of Fong and Ong (2016a), as they showcased how a traditional "safe" investment strategy of investing in top-dividend yield companies could significantly be enhanced by incorporating a profitability measure as the second criterion when choosing constituent stocks into a portfolio. What made this approach particularly interesting in the context of Finnish stock markets, was the fact that previous studies from Leivo (2012b) and Rinne and Vähämaa (2011) had already showcased the superior performance of dividend-yield-based investment strategies in the Helsinki Stock Exchange. Besides that, the "Profitable dividend yield" strategy that Fong and Ong (2016a) presented, still lacks evidence from other than U.S. markets. In addition, the possibility of enhancing a dividend yield based investment strategy by incorporating high dividend payout ratio with high dividend yield criterion, previously studied by McManus et al. (2004) and Seaton et al. (2005), was convenient to add to the research design.

As an answer for the first research question, findings of the thesis are consistent with the previous studies from the Finnish stock markets (Leivo [2012b], and Rinne and Vähämaa [2011]), in the sense that dividend yield solely has a major explanatory power in prediction of future stock returns in the Helsinki Stock Exchange.

What comes to the second research question, combining profitability ratios with dividend yield enhances portfolio performance when using high enough dividend yield as the first-stage criterion. While the initial division of the companies to terciles based on the dividend yield was not enough, as the top-dividend yield DY sextile outperformed all of the double-sort sextile portfolios, the same methodology was applied for the top dividend yield DY sextile (DY1). Consequently, the use of the profitability ratios as the second-stage criterion clearly distinguished the best performing companies amongst the ones in the top dividend yield DY1 sextile. Every top DY1-quantile ($1/12^{th}$ portfolio) split based on a profitability ratio outperformed both DY1 and DY1top portfolios in terms of annualized return, while the best return was achieved with the OPtop portfolio. While the incorporation of profitability with high enough dividend yield worked well, further increase in dividend yield actually reduced performance of the pure dividend yield portfolio, as the DY1bottom portfolio outperformed the DY1top portfolio by over one percent in terms of average annual returns.

Evaluating the performance of an investor or a portfolio is not simply a matter of determining the overall return but return relative to the risks taken. Investors have different risk-aversion profiles, and the decision of choosing a suitable investment strategy should be made accordingly. To measure the relationship between risk and return, the Sharpe ratio and the SKASR are calculated for the portfolios. Consistent with the findings from earlier research (Fong and Ong [2016a, 2016b], and Fong [2016, 2017, 2018]), the best risk-adjusted portfolio performance is achieved with the combination of very high dividend yield (~8%) and high operating profitability (~15%), as the highest Sharpe ratio (0.77) and SKASR (0.63) is generated by the OPtop portfolio.

Although the methodology with profitability ratios as the second-stage portfolio-formation criterion worked as supposed, the use of dividend payout ratio did not result as expected. Contradictory with the findings from McManus et al. (2004) and Seaton et al. (2005), combining high dividend yield with high dividend payout ratio did not outperform the portfolio constructed of pure high dividend yield stocks. Evidence from this thesis rather suggests investing in low payout ratio firms amongst the high dividend yield stocks in the Finnish stock market.

The third research question of the thesis raises the doubt of the existence of possible bad-model problem, introduced by Fama in 1998. The problem seems to be valid, as the statistical significance of abnormal returns diminishes after the introduction of value-weighted market benchmark (OMXH CAP Total Return Index). However, as argued earlier in section 3.4.2, none of the real investors participating to the markets are able to replicate and follow broad value-weighted market index like OMXH TRI. Today through ETFs, investor could replicate the returns of the 25 largest market cap weighted companies in the Helsinki Stocks Exchange, but not the returns of the market as a whole.

In follow-up studies, it could be worthwhile to include a measure of dividend stability among the examined portfolio-formation criteria.

References

Ball, R., Gerakos, J., Linnainmaa, J. & Nikoleav, V. (2015) Deflating profitability. *Journal of Financial Economics. Volume 117, issue 2,* pp. 225-248.

Barclay, M.J., Smith, C.W. & Watts, R. L. (1995) The determinants of corporate leverage and dividend policies. *Journal of Applied Corporate Finance, 7*(4), pp. 4-19.

Benartzi, S. & Thaler, R. (1995) Myopic loss aversion and the equity premium puzzle. *The Quarterly Journal of Economics, 110*(1), pp. 73-92.

Blume, M.E. (1980) Stock Returns and Dividend Yields: Some More Evidence. *Review of Economics and Statistics, 62,* pp. 567-577.

Boudoukh, J., Michaely, R., Richardson, M. & Roberts, M.R. (2007) On the Importance of Measuring Payout Yield: Implications for Empirical Asset Pricing. *Journal of Finance, 62*(2), pp. 877-915.

Brzeszczyński, J. & Gajdka, J. (2007) Dividend-Driven Trading Strategies: Evidence from the Warsaw Stock Exchange. *International Advances in Economic Research, 13*(3), pp. 285-300.

Brzeszczyński, J. & Gajdka, J. (2008) Performance of high dividend yield investment strategy on the Polish Stock Market 1997-2007. *Investment Management and Financial Innovations, 5*(2), pp. 86-92.

Chin-Sheng, H., Chun-Fan, Y., Jiang-Chuan, H. & Su-Wen, K. (2014) The Practice of Dividend-Yield Strategies in the Greater China Region. *Asian Economic and Financial Review, 4*(11), pp. 1607-1621.

Christie, W. (1990) Dividend Yield and Expected Returns: The Zero-Dividend Puzzle. *Journal of Financial Economics, 28,* pp. 95–125.

Conover, M., Jensen, G., Simpson, M. (2016) What Difference Do Dividends Make? *Financial Analysts Journal. Volume 72, Number 6,* pp. 28-40.

Dichev, I.D., Graham, J.R., Harvey, C.R., & Rajgopal, S. (2013) Earnings Quality: Evidence from the Field. *Journal of Accounting and Economics, Vol. 56, No. 2–3.* pp. 1-33.

Dorfman, J.R. (1988) Study of Industrial Averages Finds Stocks With High Dividends Are Big Winners: YOUR MONEY MATTERS. *The Wall Street Journal. Eastern edition*, pp. 29.

Elton, E.J., Gruber, M.J. & Rentzler, J. (1983) A Simple Examination of the Empirical Relationship between Dividend Yields and Deviations from the CAPM. *Journal of Banking and Finance, 7,* pp. 135-146.

Fama, E.F. (1970) Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance, Volume 25, Number 2,* pp. 383-417.

Fama, E.F. (1998) Market efficiency, long-term returns, and behavioral finance. *Journal of Financial Economics, 49(3),* pp. 283-306.

Fama, E.F., French, K.R. (1993) Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics, 33(1),* pp. 3-56

Fong, W.M. (2016) A Profitable Dividend Yield Strategy for Retirement Portfolios. *The Journal of Retirement, 3(3),* pp. 51–61.

Fong, W.M. (2017) Beating the Market: Dollar-Cost Averaging with the Profitable Dividend Yield Strategy. *The Journal of Wealth Management, 20(2),* pp. 54–66.

Fong, W.M. (2018) "Safe" Stocks. *Journal of Asset Management, 19(2),* pp. 93–98.

Fong, W.M. & Ong, Z. (2016a) The Profitable Dividend Yield Strategy. *Journal Of Investment Management, Volume 14, Number 3,* pp. 51–61.

Fong, W.M. & Ong, Z. (2016b) The Long and Short of Profitable Dividend Yield Strategies. *The Journal of Wealth Management, 18(4),* pp. 124-137.

Fuller, K.P. & Goldstein, M.A. (2011) Do dividends matter more in declining markets? *Journal of Corporate Finance, 17(3),* pp. 457-473.

Gombola, M.J. & Liu, F. (1993) Considering Dividend Stability in the Relation Between Dividend Yields and Stock Returns. *Journal of Financial Research, 16(2),* pp. 139-150.

Gray, W. & Vogel, J. (2014) Enhancing the Investment Performance of Yield-Based Strategies. *Journal of Investing, 23(2),* pp. 44-50.

Gwilym, O., Clare, A., Seaton, J. & Thomas, S. (2009) Consistent Dividend Growth Investment Strategies. *The Journal of Wealth Management, 12(3),* pp. 113-124.

Gwilym, O., Morgan, G. & Thomas, S. (2000) Dividend Stability, Dividend Yield and Stock Returns: UK Evidence. *Journal of Business Finance & Accounting, 27(3-4),* pp. 261-281.

Henne, A., Ostrowski, S. & Reichling, P. (2009) Dividend yield and stability versus performance on the German stock market: A descriptive study. *Review of Managerial Science, 3(3),* pp. 225-248.

Huang, C., You, C. & Lin, H. (2014) Dividend-Yield Trading Strategies: Evidence from the Chinese Stock Market. *International Journal of Economics and Financial Issues, 4(2),* pp. 382-399.

Hughen, J.C. & Strauss, J. (2017) Portfolio Allocations Using Fundamental Ratios: Are Profitability Measures More Effective in Selecting Firms and Sectors? *Journal of Portfolio Management, 43(3),* pp. 87–101.

Israelsen, C. (2005) A Refinement to the Sharpe Ratio and Information Ratio. *Journal of Asset Management, 5(6),* pp. 423-427.

Jobson, J.D. & Korkie, B.M. (1981) Performance Hypothesis Testing with the Sharpe and Treynor Measures. *The Journal of Finance 36(4),* pp. 889–908.

John, K. & Williams, J. (1985) Dividends, Dilution, and Taxes: A Signalling Equilibrium. *The Journal of Finance, 40(4),* pp. 1053–1070.

Kahneman, D. & Tversky, A. (1977) Prospect Theory. An Analysis of Decision Making Under Risk. *Econometrica, 47,* pp. 263–291.

Karell, V. (2018) Essays on Stock Market Anomalies. *Doctoral dissertation. Lappeenranta, Acta Universitatis Lappeenrantaensis 533,* pp. 57.

Keim, D.B. (1985) Dividend Yields and Stock Returns: Implications of Abnormal January Returns. *Journal of Financial Economics, 14,* pp. 473–489.

Keim, D.B. (1986) Dividend Yields and the January Effect. *Journal of Portfolio Management, 12,* pp. 54-60.

Leivo, T.H. (2012a) Combining Value and Momentum Indicators in Varying Stock Market Conditions: the Finnish Evidence, *Review of Accounting and Finance, Volume 11, Number 4,* pp. 400-447.

Leivo, T.H. (2012b) Pricing anomalies in the Finnish stock market. *Doctoral dissertation. Lappeenranta, Acta Universitatis Lappeenrantaensis 505.*

Leivo, T.H. & Pätäri, E.J. (2009) The Impact of Holding Period Length on Value Portfolio Performance in the Finnish Stock Markets, *Journal of Money, Investment and Banking, Number 8,* pp. 71-86.

Leivo, T.H. & Pätäri, E.J. (2011) Enhancement of Value Portfolio Performance using Momentum and the Long-Short Strategy: the Finnish Evidence, *Journal of Asset Management, Volume 11, Number 6,* pp. 401-416.

McManus, I., Ap Gwilym, O. & Thomas, S. (2004) The Role of Payout Ratio in the Relationship Between Stock Returns and Dividend Yield. *Journal of Business Finance & Accounting, 31(9-10)*, pp. 1355-1387.

Memmel, C. (2003) Performance Hypothesis Testing with the Sharpe Ratio. *Finance Letters, 1*, pp. 21-23.

Miller, M.H. & Rock, K. (1985) Dividend Policy Under Asymmetric Information. *The Journal of Finance, 40(4),* pp. 1031–1051.

Naranjo, A., Nimalendran, M. & Ryngaert, M. (1998) Stock Returns, Dividend Yields, and Taxes. *Journal of Finance, 53,* pp. 2029-2057.

Novy-Marx, R. (2013) The other side of value: The gross profitability premium. *Journal of Financial Economics, 108(1),* pp. 1-28.

Pätäri, E.J. (2011) Does the risk-adjustment method matter at all in hedge fund rankings? *International Research Journal of Finance and Economics, 75,* pp. 69–99.

Pätäri, E.J. (2021) A dynamic test design for determining statistical significance of the Sharpe ratio difference. *Working paper, LUT University.*

Pätäri, E.J. & Leivo, T.H. (2009) Performance of the Value Strategies in the Finnish Stock Markets, *Journal of Money, Investment and Banking, Number 8,* pp. 5-24.

Pätäri, E.J. & Leivo, T.H. (2017) A closer look at value premium: Literature review and synthesis. *Journal of Economic Surveys 31*, pp. 79–168.

Pätäri, E.J., Leivo, T.H. & Ahmed, S. (2021) Can the FSCORE add value to anomaly-based portfolios? A reality check in the German stock market. *Forthcoming in Financial Markets and Portfolio Management (published online: 18 August, 2021). doi: 10.1007/s1140*

Pätäri, E.J., Leivo, T.H. & Honkapuro, S. (2012) Enhancement of Equity Portfolio Performance Using Data Envelopment Analysis. *European Journal of Operational Research, 220(3)* pp. 786–797.

Rinne, E. & Vähämaa, S. (2011) The 'Dogs of the Dow' strategy revisited: Finnish evidence. *European Journal Of Finance, 17(5-6),* pp. 451-469.

Seaton, J. & Thomas, S. (2005) Dividend Yield Investment Strategies, the Payout Ratio, and Zero-Dividend Stocks. *Journal of Investing, 14(4),* pp. 69-74.

Sharpe, W.F. (1966) Mutual Fund Performance. *The Journal of Business, 39(1),* pp. 119–138.

Sharpe, W.F. (1994) The Sharpe Ratio. *Journal of Portfolio Management, 21(1),* pp. 49–58.

Visscher, S. & Filbeck, G. (2003) Dividend-yield strategies in the Canadian stock market. *Financial Analysts Journal, 59(1),* pp. 99-106.

Wolmarans, H. (2000) Does "dividend investing" have value for the South African investor? *Meditari Accountancy Research, 8(1),* pp. 229-247.

You, C., Huang, C. & Huang, J. (2017) Abnormal Dividend-Yield Returns and Investment Strategy. *Emerging Markets Finance and Trade, 53(3),* pp. 544-553.

You, C., Lin, S. & Hsiao, F. (2010) Dividend yield investment strategies in the Taiwan stock market. *Investment Management and Financial Innovations, 7(2),* pp. 72-80.

Web documents:

Corporate Finance Institute (2021a) What is the Balance Sheet? [Website]. [Cited 2021-10-27]. Available: https://corporatefinanceinstitute.com/resources/knowledge/accounting/balance-sheet/

Corporate Finance Institute (2021b) What are Profitability Ratios? [Website]. [Cited 2021-11-04]. Available: https://corporatefinanceinstitute.com/resources/knowledge/finance/profitability-ratios/

Corporate Finance Institute (2021c) What is Dividend Payout Ratio (DPR)? [Website]. [Cited 2021-11-04]. Available: https://corporatefinanceinstitute.com/resources/knowledge/finance/dividend-payout-ratio-formula/

Horton, M. (2021) The Difference Between Profitability and Profit. [Website]. [Cited 2021-10-27]. Available: https://www.investopedia.com/ask/answers/012715/what-difference-between-profitability-and-profit.asp

Investopedia (2021) How to Calculate the Dividend Payout Ratio from an Income Statement. [Website]. [Cited 2021-10-25]. Available: https://www.investopedia.com/ask/answers/012015/how-do-i-calculate-dividend-payout-ratio-income-statement.asp