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DIVIDEND YIELD INVESTMENT STRATEGIES: Empirical Evidence from the S&P 500 index

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TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

page

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ABSTRACT

This study analyzes the performance of different dividend yield strategies against the S&P 500 index. Time period for the study is from the year 2001 to the year 2017. Dividend yield strategies used in the study are commonly known as the 'Dogs of the Dow' strategies, where investor chooses the top 10 highest dividend yield companies (DoD–10) from an index and holds the equally balanced portfolio for one year. Additionally, the DoD–5, where investor chooses from the DoD–10 portfolio the five cheapest stocks and holds them for one year, and the DoD–1, where investor chooses from the DoD–5 portfolio the second least expensive stock and holds it for one year, strategies are examined.

The performance of the portfolios are analyzed on absolute and risk–adjusted bases. Market–adjustment model and 'Modigliani–squared'–adjustment are used to measure abnormal returns, and for the risk–adjustments both the Sharpe ratio and Treynor index are used. Tax and transaction costs are also calculated for economically accurate results. Finally, the DoD portfolios are tested against market downturns.

The empirical results indicate that the DoD portfolios clearly outperform the market index. The average annual abnormal return for the DoD–10 portfolio is 15.9 %, for the DoD–5 portfolio 21.6 % and for the DoD–1 portfolio 35.6 %. However, none of the annual returns are statistically significant. Returns analyzed on monthly basis show statistical significance and the DoD portfolios outperforming the market. After the tax and transaction costs the DoD portfolios returns analyzed on both annual and monthly basis are still positive, and only the DoD–10 portfolio is statistically significant on monthly basis. Finally, this study provides information that the DoD portfolios cope extremely well during market downturns.

KEYWORDS: Dividend yield, Dogs of the Dow, S&P 500 index, abnormal return, market downturn

1. INTRODUCTION

Investors and academics are constantly trying to examine how to beat the market by using and testing different investment strategies. Some of those strategies have worked rather well, while others have not proved to be effective. Some strategies work well in the short run, and others strive in the long run.

The high dividend yield strategy has been regularly reported by the financial press, partially because of financial crisis in 2008 and the recession followed by it. The high dividend yield strategy received a lot of media coverage as the stock prices went down so rapidly and investors tried to find safe havens for their investments. Main reason for this kind of behavior might be in the fundamentals of the high dividend yield companies. Alternatively, it might be driven by the price–to–price feedback model, where speculative prices go up, creating successes for some investors and more word–of–mouth enthusiasm and others will expect the prices to increase even more. Price–to–price feedback model also makes investors bid up prices against each other in the same way as in the speculative bubbles. (Shiller 2003.)

One of the dividend yield strategies is the "Dogs of the Dow" (DoD). The DoD strategy is so simple that many investors assume it could not create abnormal returns. The DoD is a contrarian value–oriented investment strategy, which was found by John Slatter and published in *The Wall Street Journal* by Dorfman in August 1988. Slatter states that you can find out favor stocks by looking at the stocks' dividend yields. Dividend yield can be calculated by dividing annual dividend by the underlying stock price at a certain time.

(1) $$Dividend\ yield = \frac{Annual\ dividend}{Stock\ price}$$

If the dividend yield is high, it is usually a signal that the stock's price has gone downward while the stock's dividend remains at the same level. High dividend yield includes certain information:

1. *High dividend yield is a result from a recent stock price decline.*

Out–of–favor stocks decline significantly over certain time, which leads to higher dividend yields. Companies that are experiencing financial difficulties could even

have excessively high dividend yields. For example, dividend yield for a large global insurance company XL Group was 20.54 % at the end of 2008. Their stock price declined during the financial crisis quite significantly, from January year 2007 to January year 2008 from $ 69.96 to $ 29.55, and in the start of the year 2009 it was only $ 5.46.

2. *High dividend yield is the dividend policy of the company.*

Statement means that companies that are paying dividends are wealthy, large companies who want to reward their shareholders with annual payments. The stock prices of those wealthy and large companies are higher and less volatile, thus the dividend yields are not excessively high, yet stable. These two points shows that the motive for investing in stocks with high dividend yields could be that after a stock price decline the stock is slightly more likely to rise in the next quartile, or investors want to earn a stable and sustainable return on their investment.

The formation of a DoD portfolio is relatively easy and straightforward (Dorfman 1988):

1. Calculate the dividend yields of all the stocks in the index at the end of the year.
2. Rank dividend yields to order and identify the top 10 dividend yield stocks.
3. Buy the 10 stocks in equal cash amounts or equally weight them in portfolio containing the 10 stocks.
4. Hold the portfolio for one year.
5. After one year redo the list and sell the stocks, which are not in the top 10 and buy those, which are in top 10 again in equal amounts.
6. Repeat steps 4–5, as long as you will.

Dow Jones Industrial Average's (DJIA) blue–chip stocks often rise promptly after being out of favor when investors' minds change. Slatter examined the performance of the DoD strategy over period of 1972 to 1987 in the U.S. stock market and found out that the strategy outperformed DJIA index by 7.6 % on annual basis. (Dorfman 1988.) After Slatter's contribution, there have been numerous of different articles, books and researches investigating the performance of the rather simple investment strategy. The DoD has become more popular by Barry (1993), Barry

(1994) and O'Higgins and Downes (1991). The main idea in the strategy is that the dividend yield is often an inverse indicator of popularity, and that choosing stocks that are briefly out of favor can create an opportunity to beat the market.

Nowadays, the DoD strategy occurs in different forms. The three most popular ones are (O'Higgins and Downes 1991):

1. *The "Dogs of the Dow"* (DoD).
2. *The "Puppies of the Dow"* (PoD).
3. *The "Penultimate Profit Prospect"* (PPP).

The PoD strategy, also known for the High Yield 5 strategy or the Flying Five means that investor buys only the five highest dividend yielding stocks of the DoD strategy, which are also the five cheapest ones. The PoD strategy is built on value investing, and it benefits from investors' mind changes, as then it is possible to buy stocks, which are currently out of favor at bargain prices. The PPP strategy selects the second least expensive stock from the PoD portfolio. The reason why not to choose the least expensive is that it may be troubled company that should be avoided. This type of strategy is rather too risky when all your assets are invested in only one stock. (O'Higgins and Downes 2000.)

The PoD and the PPP strategy have been tested between years 1973 and 1991, and during that time the PoD beat DJIA index by 9.0 % and the PPP beat the DJIA index by 13.98 %. Both strategies work in the same way time wise as the DoD: hold the same stock or stocks for one calendar year, then rebalance the portfolio and start again. (Wunder and Mayo 1995.)

Academics have proposed possible explanations for the outperformance of dividend yield strategies. O'Higgins and Downes (1991) state that after the 1970s there was more institutional investors than before. When the year or quarter was near to end, institutional investors sold the worst stocks, so that they could show to their customers only the stocks that were performing well. This phenomenon is also called as "*window dressing".*

1.1. Purpose of the study

Purpose of this thesis is to find out how different dividend yield strategies cope against the Standard & Poor's 500 (S&P 500) stock index during the years 2001–2017. The S&P 500 stock index includes companies, which are traded in some significant U.S. based stock exchange, e.g. New York Stock Exchange (NYSE) or NASDAQ. The S&P 500 index is widely used in financial literature and often regarded as the most suitable single measure of large–gap U.S. equities and an appropriate proxy for the market. There is over $ 7.8 trillion benchmarked to the index, with index assets totaling roughly $ 2.2 trillion of this total. The index includes 500 leading companies and seizes roughly 80 % coverage of available market capitalization. (S&P Dow Jones Indices LLC 2018.) The different dividend yield strategies, which will be tested against the S&P 500 are the DoD (DoD–10), the PoD (DoD–5) and the PPP (DoD–1).

The performances of the dividend yield strategies will be analyzed on both absolute and risk adjusted bases. The risk adjustment will be done with market–adjusted model and the 'Modigliani–squared'–adjusted model. In addition, standard portfolio performance measures of Sharpe (1966) and Treynor (1965) will be used for risk–adjustments for the DoD strategies.

The timeframe for the data in this study is from the year 2001 to the year 2017. This timeframe creates different business cycles and market conditions. Period after financial crisis in 2007 has put investors on the alert, and investing in value companies that can offer dividends might be safer bet, than to invest in growth companies.

Dividend yield investment strategies have been under many academics' scope over the years; however, the PoD strategy has not had a lot of attention in those studies. The PoD strategy has usually been a side product of the larger and more explored DoD strategy. In this study, also the PoD will be analyzed and tested as intensively as the regular DoD strategy.

With this thesis the research gap of picking the DoD portfolios from a large index like S&P 500 will be addressed. Many previous researches have concentrated only on the top 10 DoD stocks rather than the top 5 or top 1. In this thesis the concentration is equally divided to all three DoD portfolios. The time period contains the time after the global financial crisis and best of author's knowledge this is the first time that the DoD strategies have been tested in time period after the

financial crisis, and when the DoD portfolios are chosen from the S&P 500 index. Previous studies have concentrated more on smaller indices and to the U.S. markets rather than on other markets. Consistently, due to the significance of the S&P 500 index, this study will also concentrate on the U.S. markets. In addition to U.S. markets, dividend yield strategies have been researched in other countries such as Poland (Brzeszczyński and Gajdka 2009), United Kingdom (Filbeck and Visscher 1997) and (Ap Gwilym, Seaton and Thomas 2005), Canada (Filbeck and Visscher 2003), Latin America (Da Silva 2001) and in Finland (Rinne and Vähämaa 2011).

1.2. Research hypotheses

The hypotheses will be analyzed and introduced more specifically in chapter six under the data and methodology part. The hypotheses are discussed in the summary and conclusions chapter and it is evaluated whether they are accepted or rejected.

H_1: The DoD portfolios' returns exceed the market return on both risk–adjusted and absolute bases.
H_2: The DoD portfolios' returns exceed the market return after transaction costs and tax–adjustments.
H_3: The DoD portfolios outperform index in market downturns.

1.3. Structure of the study

The structure of this study goes as follows. First chapter is the introduction chapter, which provides background information about the topic and gives brief introduction of the research problem. The second chapter explains the Efficient Market Hypothesis and more precisely the market efficiency and its three different forms created by Fama (1965). Chapter number three presents and explains some of the most significant anomalies that occur in the stock markets. After that, chapter four will discuss the dividend puzzle and different relationships between dividend yields and stock returns. Chapter five is about fundamentals of portfolio management, models and basic formulas that are used in finance literature and articles. These chapters are the theoretical part of the thesis.

Last chapters compose the empirical part of the thesis. The data and methodology that are used in the research are introduced in chapter six. Additionally, the hypotheses of this study are presented in chapter six. Chapter seven presents and discusses the empirical results of the study, and the last chapter number eight summarizes the results and concludes this thesis.

2. MARKET EFFICIENCY

As stated earlier, investors and academics are trying to find out how to beat the market and usually the market efficiency is the reason why beating the market is so challenging. Fama (1970: 383) states that a market, where all the prices are fully reflecting available information can be called as an efficient market. When market is efficient, the available information is incorporated with the prices, and at the market, there are great number of participants that are constantly pricing the market. When participants are selling, or buying assets, prices quickly incorporate with the new information. The fundamental role of capital markets is to relocate funds between borrowers and lenders.

The informational part of efficiency is important to stock prices in two main ways. Firstly, investors are seeking for the best possible trading strategy as they are trying to beat the market, and secondly, if the stock prices are precisely reflecting all the available information, investors know that their investment capital goes to its highest–valued use. Fama (1991) notes that market efficiency is a continuum. The lower the transaction costs are in a capital market, the more efficient the capital market is. Costs of the capital market include for example obtaining the information and trading costs.

The meaning of efficient market is extremely important to understand because it is essentially the base of all investment theories. If markets are not efficient, there is a possibility to gain abnormal returns, which occurs when securities prices are not reflecting all the available information. Gaining abnormal returns from financial markets are called anomalies. Different anomalies will be more widely explained in chapter three. This chapter gives an overview of market efficiency. Firstly, the efficient market hypothesis is presented and along with a few articles, which opens the topic more widely. Secondly, different forms of market efficiency will be listed and explained through different examples and articles, which have analyzed the forms in different situations.

2.1. Efficient market hypothesis

Efficient market hypothesis is widely known and used in financial sector. It was first proposed by Fama (1965). He states that in efficient market, there are large

numbers of rational, actively competing investors who each are trying to predict future market values of individual securities assets, and important present information is almost freely available to all participants. Fama (1991: 1583) argues that the predictability of stock returns from dividend yields is not enough evidence for or against market efficiency. In an efficient market, the forecast power of dividend yields says that prices are high relative to dividends when expected returns and discount rates are low, and vice versa. Additionally, in a world of irrational bubbles, low dividend yields signal high stock prices that will move predictably back toward fundamental values. To find out whether the forecast power of dividend yields is the result of rational variation in irrational bubbles or expected returns, other information must be used. Even with such information, as always, the issue is questionable.

The efficient market hypothesis is associated with the idea of a random walk, which is a term widely used in the finance literature to explain a price series where all subsequent price movements represents random departures from previous prices. The idea behind the random walk is that if the stream of information is unlimited and rapidly reflected in stock prices, then tomorrow's price change will reflect only tomorrow's news and will be separated of the price changes today. News is unpredictable and, thus, the upcoming price changes should be unpredictable and random. As a result, prices fully reflect all available information, and even uninformed investors investing in diversified portfolio at the list of prices given by the market will gather a rate of return as big as that achieved by the experts. (Burton 2003: 59.) Fama (1965: 35) points out that the theory of random walks in stock prices involves two separate hypotheses. The first one is that successive price changes are independent. Second hypothesis that was pointed out is that the price changes adjust to some probability distribution.

The efficient market hypothesis is based on some preconditions (Fama 1970: 383):

1. There is no transaction cost in trading securities.
2. All available information is costless and available to all market participants.
3. All agree on the implications of current information for the current price and distributions of future prices of each security.

Those three preconditions stated are reflecting on the perfect situation, which is not rather realistic. In a more realistic situation, companies can thus make appropriate decisions regarding production–investment, and investors can regulate capital flows by making informed choices between stocks. Regulated capital flows leads to capital being invested in more value creating projects and to withdraw investments from projects that are not going to create so much value in the future. (Bushmann, Piotroski and Smith 2011.)

Shleifer (2000: 2) lists three assumptions of efficient markets:

1. Investors behave rationally and value securities rationally.
2. If some investors make irrational decisions, their trades subdue each other. Thus they do not affect prices.
3. Arbitrageurs make moves on the market when investors tend to be irrational and have an adequate impact, thus the prices do not move.

2.2. Different forms of market efficiency

Fama (1970) defines three forms of market efficiency. Three different forms explain what level information is reflected to prices. The three forms of efficiency are:

1. *Weak form of market efficiency*: Security prices reflect all historical information.
2. *Semi–strong form of market efficiency*: Security prices reflect all publicly available information.
3. *Strong form of market efficiency*: Security prices reflect all information, both private and public.

2.2.1. Weak form of market efficiency

In the weak form of market efficiency securities, prices reflect all past information, such as the history of past prices and trading volume. It shows that when markets are weak form efficient, it is impossible for investors to gain abnormal returns by analyzing historical data, since the historical trading data has already been reflected in current prices. One way to decide whether capital market is weak form efficient

is to use serial correlation. Bodie, Kane and Marcus (2014: 364) state that one way of discerning trends in stock prices is by calculating the serial correlation of stock market returns. Serial correlation refers to the tendency for stock returns to be connected to past with returns.

Technical analysis is basically the search for cyclical and predictable patterns in stock prices. Technical analysis can then be used for weak form market efficiency tests. Although technicians see the value of information about future economic expectations of a company, they are convinced that such information is not mandatory for a triumphant trading strategy. (Bodie et al. 2014: 354.)

2.2.2. Semi–strong form of market efficiency

In the semi–strong market efficiency, securities prices reflect all publicly available information, such as: past prices, quality of management, balance sheet composition, fundamental data on the firm's product line, patents held, earnings forecasts and accounting practices. If capital market is semi–strong efficient, then it must be also weak form efficient. It is impossible for investors to gain abnormal returns by using fundamental analysis, since all financial information like financial statements, dividends, economic conditions or past prices are already accurately and quickly reflected to the securities prices. (Bodie et al. 2014: 354.)

Fama (1991) creates a very common name for semi–strong form efficiency, called event studies. Bodie et al. (2014) explain that event study describes a technique of empirical financial research that enables an observer to examine the effect of an event on a company's stock price. For example, if a stock market analyst would want to examine the impact of dividend changes on stock prices, an event study would explain the relationship between stock returns and dividend changes. For the analysts who want to test the semi–strong market form efficiency, the sample size is extremely important, and they should calculate how rapidly the stock prices react to the information announcement.

2.2.3. Strong form of market efficiency

Last form of market efficiency is the strong form market efficiency. In the strong form market efficiency securities prices reflect both private and public information. If capital market is strong form efficient, then it also must be weak form efficient and

semi–strong efficient. Strong form efficiency indicates that the securities prices can reflect all the information that is relevant to the company, even the information, which only company insiders can access. One can define the company insiders as the managers of publicly traded firms or financial experts.

The strong form market efficiency is quite an extreme case. Few would argue the theory that corporate officers have access to relevant information way before public announcement to enable them to make profit from trading with that information. For that reason, much of the activity of the Securities and Exchange Commission (SEC) is directed toward preventing insiders from profiting from using their insider information. (Bodie et al. 2014: 354.) Fama (1970) states that while the strong form market efficiency holds, no one can outperform the market because all possible insider information is reflected in securities correctly and rapidly. Furthermore, no one could beat consistently the market and there would be only lucky and unlucky investors.

There have been a lot of studies on how insiders trade profitably with their company's own stocks. Jaffe (1974) was one of the first academics to study the tendency of stock prices and insiders trading. Results show that insiders, who intensively bought their own company's shares made their company's stock prices rise, and when insiders sold their company's shares it made their company's stock prices to fall. Fama (1991) changes the semi–strong form hypothesis to test for private information with the aim of revealing, if the company insiders can have the private information. Results show that corporate insiders can make more profits over normal investors with their inside information. At the same time, Fama (1991) also tries to find out how pension fund and mutual fund managers could generate abnormal profit. The results show that professional investors generally could not make more profit by following the corporate insiders.

3. STOCK MARKET ANOMALIES

Stock market anomalies are time series and cross–sectional patterns in security returns that are not predicted by a known theory or a central paradigm. Findings of stock market anomalies appear from empirical tests that rely on a joint null hypothesis. Financial markets are informationally efficient and returns behave according to an assumed equilibrium model. If the joint hypothesis is rejected, one cannot point the rejection to either branch of the hypothesis. Thus, even though anomalies are usually explained as evidence of inefficient market, such conclusion is wrong because the rejection may be due to incorrect equilibrium model. Some have argued that once researchers identify stock market anomalies, investors immediately try to profit from it somehow, which leads to the anomaly to disappear. Thus, anomalies can also disappear, if the researcher's original discovery was only a sample–specific artifact. Although this has happened for a few anomalies, some anomalies continue to persist. The fact that some anomalies have persisted for decades shows that they are not evidence of market inefficiencies. Rather, benchmark models might be less than complete descriptions of equilibrium price construction. (Keim 2008: 1.)

According to Schwert (2002: 1) anomalies are empirical results that seem to be on different tracks with maintained theories of asset–pricing behavior. Anomalies demonstrate opportunities to make profit, which means that markets are not efficient, or inadequacies in the underlying asset–pricing model. After anomalies are noticed and evaluated in the academic literature, they often tend to disappear, reverse or reduce. This raises the question of whether profit opportunities were present in the past, but have arbitraged away, or whether the anomalies were just statistical oddity that got the attention of investors and academics.

There are staggering numbers of researches made about anomalies. The reason why this subject is so interesting and widely reported is mainly because every investor is seeking ways to create abnormal returns from efficient stock markets. Anomalies can be categorized to cross–sectional and time series anomalies. Cross–sectional anomalies can be defined by exploring a cross section of companies that has some deviating key characteristics. Time series anomalies can be defined by using time series of data. Table 1 illustrates a few of the most known stock market anomalies.

Table 1. A few of the most known stock market anomalies.

Cross–sectional anomalies	Time series anomalies
P/E ratio effect	Momentum
Size effect	January effect
Value effect	The Weekend effect

3.1. Value effect

The two most studied cross–sectional anomalies are value effect and size effect. Value effect anomaly occurs when value stocks outperform growth stocks on average. The basic idea is to buy undervalued assets and sell overvalued ones. It is not as easy as it sounds, but can be quite straightforward. The traditional choice of value measure is the ratio of the book value to its market price, also known as B/M. The B/M ratio is not the only measure for value. Investors can compare for example earnings, cash flows, and sales, relative to price, for example, if you pick a set of stocks and sort them by some measure of fundamental value to price. After the sorting process, investor should go long or overweight the stocks that have high fundamental value to price, which can be described as cheap stocks, and short or underweight the ones that have low fundamental value to price, which can be described as expensive stocks. By being clearly long and short, the resulting portfolio has extremely low correlation with the overall equity market. (Asness, Ilmanen, Israel and Moskowitz 2015.) Basu (1977, 1983) states that firms that have high earning–to–price (E/P) ratios earn positive abnormal returns relative to the capital asset pricing model (CAPM). Many other papers have stated that positive abnormal returns seem to accumulate to portfolios of stocks with high dividend yields (D/P) or to stocks with high B/M ratios. Ball (1978) notices that such evidence was likely to indicate a fault in the CAPM rather than market inefficiency. Aspects that would cause an investor following this strategy to add a firm to his or her portfolio would be steady over time and easy to pay attention to. Turnover and transaction costs would be low and information collection cost would be low, if such a strategy earned stable abnormal returns, it would be available to many potential arbitrageurs at extremely low cost (Schwert 2002).

There is no real answer why the value effect anomaly still exists, but one answer that has been under a lot of research attention is investors' behavioral biases. For

example, Lakonishok, Shleifer and Vishny (1994: 1541) state that the value strategies yield higher returns because of the suboptimal behavior of the typical investor, and not because value strategies are fundamentally riskier. Barberis, Shleifer and Vishny (1998: 316) state that value effect anomaly occurs when a company has a consistent history of earning growth over several years, investors might think that the history is showing of an underlying earnings growth potential. Hence, a consistent pattern of high growth may be nothing but a random good run for a few lucky firms. Therefore, investors using the representativeness heuristic might disregard the reality that a history of high earnings growth is not likely to repeat itself, and as a consequence, investors will overvalue the company, and be disappointed in the future when the forecasted earnings growth fails to happen. Investors' behavioral biases are not the only reasons that have been stated. There has been studies about over–reaction to information (Daniel, Hirshleifer and Subrahmanyam 1998), risk–based explanation like value assets having greater default risk (Fama and French 1993) and higher long–run consumption risks (Malloy, Moskowitz and Vissing–Jorgensen 2009).

3.2. Size effect

Size effect is also widely studied cross–sectional anomaly. Size effect means that average returns to small firms' stocks are considerably higher than any known capital asset pricing model predicts. Size effect refers to the negative relation between stock returns and the market value of the common equity of a company. Size effect also shows that smaller companies tend to outperform larger companies. For instance, if larger company needs over $ 5 billion to achieve a 10 % growth rate, smaller company needs only $ 50 million extra sales for obtaining the same growth rate. Therefore, when looking the numbers, smaller companies can grow faster and be more flexible, which shows in smaller companies' stock prices.

The size effect anomaly is one of the best–known academic market anomalies. Large numbers of researchers and academics have tried to explain the ultimate reasons for the anomaly. (Horowitz, Loughran and Savin 2000.) The search for an explanation of the size effect anomaly has been unsuccessful. Fairly many researchers agree that size effect anomaly is evidence of misspecification of the CAPM, rather than evidence of inefficient capital markets (Schwert 1983: 9). Banz (1981) and Reinganum (1981) present that small–capitalization companies on the

New York Stock Exchange (NYSE) earned higher average returns than is predicted by the CAPM from 1936 to 1975. Banz (1981) was the first to notice size effect anomaly for U.S. stocks. This evidence played a major role in the development of small–cap mutual funds build to take advantage of the size premium. The important issue for investors is whether size premium for small cap stocks is still positive, and if so, whether its weight is large. Horowitz et al. (2000) suggest that size effect market anomaly may have vanished, and perhaps the size premium may even have gone into contrarian way. They show that large–cap companies appear to have higher returns than small companies.

3.3. Price to earnings effect

Basu (1977) states that the P/E ratio effect makes low price–earnings portfolios outperform the high price–earnings portfolios. During the years 1957 to 1971 investors earned higher absolute and risk–adjusted returns by owning low price–earnings securities. It is thought that information cannot be used quickly enough and there are frictions and lags. Therefore, investors could not take advantage of the market reaction due to transaction costs and tax costs.

La Porta (1996) reports that contrarian strategies which use analysts' assumptions to create portfolios yield high returns. When he analyzed portfolios based on the stock's P/E ratio, he found that an investment strategy which buys shares with a low price–to–earnings ratio and short sells shares with a high ratio creates abnormal returns.

3.4. Momentum

Momentum anomaly is one of the most known anomalies there is in the financial markets. At the same time, it is also one of the most studied anomalies by researchers and academics. Momentum is the tendency of securities, in every asset class and market, to show endurance in their performance for some period of time. After being reported in study in early 1990s in U.S. equities by Jegadeesh and Titman (1993), momentum has been documented more extensively in multiple different contexts. The typical approach to momentum is to look at the past 12 months of stock returns, going long position the ones that have outperformed and short

position the ones that have underperformed. By being long and short at the same time, the final portfolio has little correlation to passive exposure to traditional financial markets, and when used across multiple assets, it captures the aggregate return to momentum while diversifying away idiosyncratic security risk (Asness, Ilmanen, Israel and Moskowitz 2015). DeBondt and Thaler (1987) report that long–term past losers outperform long–term past winners over the following three to five years. Whereas, Jegadeesh (1990) and Lehmann (1990) find short–term return reversals.

Asness et al. (2015) state that like value anomaly, momentum does not need to be linked to single measure, for example to own–price momentum. Measures of fundamental momentum, such as earning momentum, changes in analysts' forecasts for stocks and changes in profit margins are also useful in creating profitable portfolios. For both, fundamentally and price based momentum strategies, the evidence of strong risk–adjusted returns is universal across markets and time. Two academic possible sets of explanations for momentum have been welling in academia: risk–biased and behavioral theories. Risk–biased theories state that high–momentum stocks are more risky, and therefore require higher discount rate. Berk, Green and Naik (1999) state that high–momentum stocks contain more growth options in earnings, which makes them more easily affected to aggregate shocks. In addition, strong correlations with momentum stocks suggest the existence of a common source of risk or liquidity risks (Asness, Moskowitz and Pedersen 2013).

Behavioral theories about momentum state an under reaction in the short–term to new information due to inattention or anchoring, and/or overreaction to price changes. Also, investor herding may cause momentum, since more investors are buying the same stock and creating it more desirable. To add, the disposition effect, which is the temptation for investors to sell winner stocks too soon and hold on to loser stocks too long time, may be a major reason for momentum (Frazzini 2006).

Chan, Jegadeesh and Lakonishok (1996) examine whether the predictability of future returns from past returns is because of the markets under reaction to information, particularly to past earnings news. It is normal to look to earnings to try to understand movements in stock prices, so Chan et al. (1996) view this path to rationalize the existence of momentum. Specially, the article relates the evidence of momentum in stock prices to the evidence on the markets under reaction to

information related to earnings. One possibility to the profitability of momentum strategies is because of the component of medium–horizon returns that is related to this earnings–related news. If this possibility is true, then momentum strategies will not be profitable after accounting previous innovations in earnings and earnings forecasts.

DeLong, Shleifer, Summers and Waldmann (1990) argue that momentum strategies create profitability because of overreaction generated by positive feedback trading strategies. Explanation indicates that "trend–seekers" strengthen their position in markets even though they might be lacking fundamental information, so that the returns for past losers and winners are partly brief in nature. Chan et al. (1996) state that there is a possibility for strategies based either on earnings surprises or past returns exploit market under–reaction to various pieces of information. For example, earnings surprises may surge from under reaction to information related to short–term earnings, while a price momentum strategy may surge from the market's slow reaction to a more extensive set of information, including longer–term profitability. When that happens, it can be expected that each of the momentum strategies is by itself successful, and that one effect is not incorporated by the other. True economic profits are imperfectly measured by accounting numbers, so reported profits may be lower even though the company's future sights are getting better. If the stock price consolidates other sources of information about future earnings, then there may be momentum in stock prices even with lower reported earnings.

3.5. January effect

The January effect means that, if the stock market rises in January, it is likely to keep rising during the same year's December also. The anomaly also indicates that it would be possible to earn abnormal returns during January. Bhardwaj and Brooks (1992) state that the January effect is mostly a low–share price effect and less so a market value effect. Numerous articles provide evidence supporting the view that the January effect is a company size phenomenon. However, different sources also indicate that share price may dominate company size in explaining January anomaly. Jaffe, Keim and Westerfield (1989) find share price significant in explaining abnormal January profits after control for company size. Kross (1985) state that the size effect is still is mainly a price effect.

Degree of neglect, miss–assessment of risk, transaction costs and infrequent trading have been among the reasons to explain the positive abnormal returns on small company's stocks. These reasons are equally suitable to low–priced stocks. The price effect explanation of the January effect may be in line with the gamesmanship and tax–loss–selling hypotheses. Both hypotheses predict a turn–of–the–year effect creating high returns for stocks in January, which are likely dominated by low–priced stocks. Furthermore, there has also been said to be overestimating of the January effect due to evidence of positive turn–of–the–year bid–ask effect in returns of low–priced stocks. Although there is all this suggestive evidence backing a possible price effect explanation of the January effect, no direct reason is available to answer the empirical question on whether the January effect is more reasoned with control for a price effect than control for a company size effect. (Bhardwaj and Brooks 1992.)

3.6. The weekend effect

When looking at seasonal anomalies, the most interesting pattern is shown in stock returns across the days of the week. Several researchers have stated that mean daily returns differ widely. Still, the most remarkable finding from different studies is that Monday returns are not only lower than other weekdays, but close–to–close returns on Mondays are negative averagely. Individual investors tend to use Monday as a chance to liquidate their assets, which makes selling activity higher on Monday than on any other weekday. Using intraday S&P 500 index returns, most of the liquidate needs happen before 11 a.m. on Monday morning. (Abraham and Ikenberry 1994.) Most of the studies made of the weekend effect include only the U.S. stock market. However, Jaffe and Westerfield (1985) investigated also U.K.'s, Japan's, Canada's and Australia's daily stock market returns to compare them with U.S. stock market to find out if all the countries are experiencing the weekend effect. Their results show that the weekend effect occurs in all stock markets.

Lakonishok and Maberly (1990) also state that there is a peak in trading activity by individual investors on Mondays. They document that NYSE trading volume is higher on other days of the week than Monday. On the other hand, individuals tend to be more active on Mondays, which indicates that low NYSE trading volume on Mondays is a conclusion of lower trading activity by institutions. To add, the

increased activity by individuals on Mondays is not the same for sell and buy transactions. There is a habit for individual investors to decrease the number of buy relative to sell transactions.

Keim and Stambaugh (1984) investigated if there are any connections between the company size and the weekend effect. They state that the weekend effect occurs for companies in all different sizes. The results show that the smaller the company the larger is the bias for average profits to be high on Friday.

4. DIVIDEND PUZZLE

Dividend is a portion of company's earnings, which the company distributes to a class of their shareholders, on a way that is decided by the board of directors. Dividends can be issued as shares of stock, as cash payments, or other property. Different companies have different kind of dividend payout policies. The choice what kind of policy to use depends on several factors. One, for example is to invest all the incoming money to new investments and researches, so that there is no dividend payout. This is usually the case, when the companies are start–ups or other high–growth companies, which invests all their profits to growth and expansion. Other, for example is to pay a certain percentage of company's earnings to shareholders yearly. Usually larger and more stable companies pay dividends on a yearly basis to their shareholders, since there might not be any need to invest to new projects or research. If the company does not pay dividend or uses it to new investments, they can also choose to use net profits to repurchase their own shares from the market in a share buyback. Share buybacks and dividend payouts do not change the fundamental value of company's shares. It still has been argued that a company can influence the price of its shares by switching it dividend policy. The most common statement is that the company can increase the value of its shares by increasing its payout ratio. Investors will bid up the prices of the common stock companies that pay larger dividends, relative to similar companies, which pay smaller dividends. This creates the feeling that investors prefer a dollar of dividends rather than dollar of capital gains, because "*a bird in the hand is worth more than one in the bush*". (Black and Scholes 1974.)

4.1. Dividend payout policies

The first empirical study of different dividend policies was by Lintner (1956), who analyzed how corporate managers handle dividend policy. He found out that corporate managers followed previous dividend rates actively. Management in most cases did not want to reduce dividends, since they had benchmarked previous dividend rates. Managers usually have reasonably definitive target payout ratios and did not want to change them. During the years, dividend payout ratio is increased slowly, so that the actual payout ratio moves closer to the target payout ratio, set by the managers: also known as dividend smoothing. There are numerous

different dividend policies which companies can follow depending on the frequency they will pay dividends. Some of the most used policies are:

1. Stable dividend policy.
2. Target payout ratio.
3. Residual dividend policy.

Under the stable dividend policy, companies aim to pay for a steady dividend payout every year. It does not change even if the earnings for the company are volatile some years. Leary and Michaely (2011) state that managers appear to believe firmly that the markets set a premium on companies with a stable dividend policy. Brav, Graham, Harvey and Michaely (2005) even state that managers are ready to raise external capital or even renounce positive net present value (NPV) investments to avoid cutting yearly dividends.

Companies set a target payout ratio, which they should try to get when paying dividends. For example, if a company is using a stable dividend policy already, they could set a goal for long–run dividend–to–earnings ratio. The target can be to payout stated amount of earnings, but the payout is given in a nominal dollar amount that adapts to its goal at the earnings baseline changes. (Leary and Michaely 2011.)

The residual dividend policy is specifying that managers pay dividends to shareholders after funding all profitable investments. Under a pure residual policy, the company avoids retaining internally created cash flow unless a project earns more than the required rate of return, meaning that the project has a positive NPV. When managers exhaust all opportunities to invest in positive NPV projects, they pay the residual cash flow as dividends. The dividend can also be zero if company is experiencing capital constraints or has more investment opportunities than it has cash flow. A residual dividend policy's default is to pay zero dividends, yet the company pays dividend whenever meeting conditions like no plans to retire debt or stock or smaller investment possibilities than cash flow. (Baker and Smith 2006.)

4.2. Can dividends predict stock returns?

The subject has been studied extensively and many analysts and investors have been trying to investigate, whether there is a mechanism that could predict the stock

prices. Watts (1973) state that the term '*information content of dividends*' has been frequently used in finance literature. The phrase leads to the hypothesis, which argues that dividends tell information about future earnings, which then helps market participants to predict future earnings more precisely. Lintner (1956) was one of the first academics to state that current dividends counted on future as well as current and past earnings.

Black and Scholes (1974) studied a data set of 1050 firms with two different periods, first from 1947 to 1966 and the second from 1950 to 1970. They were not able to demonstrate any differences in dividend yield pointing to differences in stock returns. Black and Scholes (1974) argued that dividend policy plays a bigger role when changing the level of dividend payment, since the market indicates this change as a change in future prospects.

Goetzmann and Jorion (1995) analyzed dividends' ability to predict future stock returns for a long time period from 1871 to 1993 with U.K. and NYSE data. Their results showed no predictability on pre–1926 U.S. data, but on the other hand, significant predictability for post–1926 U.K. data. They stated that due to the long time period, the results are hardly consistently explanatory and offered survivorship as an explaining factor. Rozeff (1984) found that the ratio of dividend yield to the short–term interest rate eases the explanation of future stock performance, thus rejecting the random walk hypothesis of stock prices.

4.3. Why do companies pay dividends?

An intriguing question is why companies pay dividends at all? An answer that pleases all academics has not yet been given. There are theories that dividends are irrelevant in a sense that any two promptly chosen dividend policies have equivalent results. Miller and Modigliani (1961) created the Modigliani–Miller theorem according to which the dividends paid by the company do not affect the return to the investor or the value of the shares. The higher the dividend, the less the investor makes as capital gains. When stated like that, it is assumed that the dividend paid does not have any impact on the company's business decisions. Paying the dividend either increases the amount of new money made by issuing securities, or reduces the amount of cash equivalents held by the company.

Black (1976) introduces an example of Modigliani–Miller theorem: if you are offered to have $ 2 today, and a fifty–fifty chance of $ 44 or $ 40 tomorrow. Or you may have $ 0 today, and a fifty–fifty chance of $ 46 or $ 42 tomorrow. Ignoring factors like the cost of holding $ 2 and one day's interest on $ 2, there would be no difference between those two choices. The choice between a common stock that pays dividend and a stock that pays no dividend is identical, if ignoring transaction costs and taxes. The price of the dividend paying stock drops on the ex–dividend date by around the same amount as the dividend. The dividend only drops the whole range of plausible stock prices by that amount. The investor, who gets a $ 2 dividend, gets shares that are worth around $ 2 less than they would have been if the company never paid the dividend. The vital assumption in Modigliani–Miller theorem is that the future market value will remain the same by current dividends.

Bhattacharya (1982) finds that with Modigliani–Miller theorem it can be even showed that dividends are harmful to the value of the company: when investors are homogenous, markets are perfect and complete, and investors have time–additive utility functions. It does not matter, if dividends contain information value or not. In real world things are slightly different: investors are heterogeneous, markets are not perfect and complete, or investors have non–additive utility function.

Traditionally, dividend payout policy of a company is said to be the result of dividend signaling or agency costs. Miller and Rock (1985) document that signaling models of dividend behavior argue that managers might use company's dividend payouts to signal private information about their expectation of future cash flows. Signaling models are based on the belief that dividends are costly and can be used by management as a dependable signal of private information. John and Williams (1985) discovered a signaling equilibrium with taxable dividends, where corporate insiders with more valuable private information optimally pays out more significant dividends and receives higher prices for their stock whenever the demand for cash by both their company and its current stockholders tops its internal supply of cash. In equilibrium, many companies distribute dividends, and at the same time issue new stocks, on the other hand, many companies pay no dividend at all. Since dividends reveal all private information not revealed by corporate audits, current stockholders capture in equilibrium all economic rents net of useless signaling costs. As managers decide on dividend increase, it signals a persistent improvement in the future cash flows. It creates a situation also to the competitors, since they cannot also increase dividend because they do not want to later cut the dividend.

Easterbrook (1984) argues that agency cost models make companies pay higher dividends when they encounter higher agency costs. If managers are free to use company's excess cash flows to their own benefits, the costs go straight to shareholders. Managers could be able to mitigate some of the agency costs by paying out the excess cash flows as dividends. He adds that dividends may keep the companies in the capital market, where monitoring of managers is possible at lower cost, and may be useful when adjusting the level of risk taken by the managers and the different classes of investors.

More recently researchers have considered other explanations for company's dividend payout policy. Baker and Wurgler (2004) propose a view of dividends, which is based on the market efficiency assumption of the dividend irrelevance. It proves that dividend policy is irrelevant to share value in efficient and perfect capital markets, first noted by Modigliani and Miller (1961). The core of Baker and Wurgler's (2004) catering theory is that managers answer to investors' needs for what they currently want. When looking at dividends, catering suggests that managers tend to give dividends when investors put a rather high stock price on dividend payers, and usually ignores dividends when investors prefer nonpayers.

One reason for dividend payouts addresses agency problems between company insiders and outside shareholders. According to different theories, unless company's profits are paid out to shareholders, they may be redirected by the company insiders for personal use, or executed to unprofitable investments, which creates private benefits for only the company insiders. Therefore, outside shareholders rather want the company's profits to be distributed as dividends, than retained as earnings. Theories differ on how outside shareholders really get the companies to pay–out the dividends. The main point of view from the outsider shareholders is that, if the company does not pay dividends, the profit, which stays in the company has a chance not to create any profitable investments for the future and could be wasted without any benefits to shareholders. The agency problem theory moves away from the Modigliani–Miller theorem by noticing two things. First, the allocation of all the profits of the company to shareholders on a pro rata basis cannot be assumed, and specifically, the company insiders may get favored treatment with transfer prices, asset diversion and theft, even if the company has a constant investment policy. Considering when dividends are paid on a pro rata basis, insiders benefit more than outside shareholders relative to the alternative of

expropriation of retained earnings. Secondly, the investment policy of the company cannot be thought as independent of company's dividend policy. When company is paying out dividends, it may reduce the inefficiency of marginal investments. (La Porta, Lopez–de–Silanes, Shleifer and Vishny, 2000: 2.)

4.4. Stock repurchases

When companies do not pay dividends to their shareholders, or there are no potential growth opportunities or investments arising, companies can repurchase its own stocks. Companies may repurchase stocks for a numerous of different reasons. The decision to do it is therefore affected by the company's distribution, capital structure, corporate control, investment and compensation policies. Most articles study how these corporate decisions influence the decision to repurchase. However, most articles focus on one or two reasons. When focusing on only a few reasons, researchers limit the results first by ignoring other potential motives, which may affect the repurchase decision significantly, and secondly, by ignoring the relation between these hypotheses and allowing for the option that companies will only repurchase stocks if more than one criterion is met. For example, multiple articles focus on company's distribution policy and the choice between dividends and repurchases. Yet, distribution policy is only one of the influences on company's choice to repurchase (Dittmar 2000).

There are numerous different articles about companies repurchasing their own stocks. For example, Jensen (1986) states that companies repurchase stocks to allocate excess cash flows. Stephens and Weisbach (1998) found a positive correlation between levels of cash flows and stock repurchases. Stephens and Weisbach (1998) also found that repurchase is negatively correlated with previous stock returns, showing that companies repurchase stock when their stock prices are recognized as undervalued. There are different ways for a company to repurchase its stocks. Brennan and Thakor (1990) talks about open market repurchases and tender offer repurchases, which are regulated by the Securities and Exchange Commission. Both involve corporate purchases of stocks through a broker at current market prices. There is no official need to announce open market repurchases, although most companies still announce them. For individual investors, it is hard to pinpoint the exact day when open market repurchases are actually happening, since the process can often extend over months and even years. Companies announce

when the repurchase program is completed. Other popular way for a company to repurchase its stocks is the tender offer repurchase, where typically the amount of stocks to be repurchased at a given price is usually higher than the current market price. The company usually reserves the right to prolong the offer from its original concept of three weeks to a month, the right to repurchase more stocks, and the right, if more than the stated amount of stocks is tendered, to repurchase more stocks on a pro–rata basis. Typical tender offer repurchases are usually substantially larger than typical open market repurchases. The way in which the repurchase is done will have ramifications for the wealth redistribution between the uninformed and informed shareholders, and therefore, will create different reasons for the gathering of information by shareholders. If there is a fixed cost of collecting information, large shareholders will have bigger incentive to get information than small shareholders. Therefore, stock repurchases will tend to be a redistribution of assets from small shareholders to large shareholders.

Dittmar (2000) examines different hypotheses why companies repurchase stocks. One hypothesis is *Excess Capital Hypothesis: Repurchases and Distribution Policy.* Repurchasing stock, like paying dividends, is one way to distribute excess capital to shareholders. A repurchase may be done before paying dividends for two reasons. First, in open market purchases, which are the most common type, the company does not have a commitment to repurchase. To add, unlike a dividend, there is no expectation that the repurchase would happen on a regular basis. Thus, a repurchase is a more flexible means of distributing capital since a penalty is included if distributions are subsequently diminished. Companies may therefore choose to repurchase to distribute excess capital. Secondly, stock repurchases may be preferred over dividends as a means of distribution due to the personal tax–rate advantage of capital gains. The tax advantage of stock repurchases exists because capital gains are often taxed at a lower rate than dividend income. Only the portion of the repurchase that is capital gain is taxed, and investors can waive the capital gains tax until they realize the return and sell their stock. Thus, an increase in the capital gains tax rate would decrease the relative advantage of repurchases. If repurchases and dividends are substitutes, then stock repurchases should be negatively related to company's dividend payout ratio.

Dittmar's (2000) other hypothesis is *Undervaluation Hypothesis: Repurchases and Investment Policy.* Stock repurchases offer movement not only in the choice to distribute excess funds, but also when to distribute these excess funds. This

flexibility in timing is favorable because companies can wait to repurchase until the stock price is undervalued. The *undervaluation hypothesis* assumes that information asymmetry between shareholders and company insiders may cause a company to be valued wrongly. If insiders believe that the stock is undervalued, the company can repurchase stock as a signal to the market, or on the other hand, invest in its own stock and buy mispriced shares. According to this hypothesis, the market defines the action as an indication that the stock is mispriced. The positive stock price reaction at the announcement of a stock repurchase should price the stock correctly. Ikenberry, Lakonishok and Vermaelen (1995) demonstrate that this increase may not be enough to correct the price since repurchasing companies, mainly low market–to–book companies, earn a positive abnormal return during the 4 years after the announcement. The amount of information available and the accuracy of the valuation companies by the market can influence companies repurchase decisions.

4.5. Dogs of the Dow

Different dividend yield strategies have been under the investors' and researchers' radars for a long time. The first academic research of the relationship between stock prices and dividend yields was done by Walter (1956). He studied three different groups of stocks: intermediate stocks, growth stocks and creditor stocks (comparable to value stocks) and the dividend policies in these groups. Filbeck and Visscher (1997) explain that dividend yield strategies are a part of an investment strategy generally known as '*value investing*'. The argument is that securities called as value stocks have low prices relative to current income and dividend levels, as well as slower than average growth. Value investing strategies state that to achieve superior long–term performance investor has to purchase stocks, which are currently a bargain relative to current underlying fundamental analysis.

The Dogs of the Dow (DoD) was first introduced by John Slatter, who suggested a simple investment strategy of calculating the dividend yields of all the stocks in the Dow Jones Industrial Average (DJIA) index, and then ranking dividend yields to order and identifying the top 10 dividend yield stocks, then buying the 10 stocks in equal dollar amounts or equally weighting them in portfolio containing the 10 stocks, then holding the portfolio for one year and after that repeat from the beginning. There are also other strategies that work like DoD, where investor

chooses high dividend yield stocks or underperformers. These strategies are *The Puppies of the Dow* (PoD, DoD–5), where investors buy the five highest dividends yielding and cheapest stocks of the DoD strategy, the *Penultimate Profit Prospect* (PPP, DoD–1) strategy, which selects the second least expensive stock from the PoD strategy. Dorfman (1988) investigated the performance of DoD portfolio through the years 1972 to 1988 and found that the DoD strategy outperforms the DJIA index by 7.6 % for each year. The DoD is quite popular among both individual as well as institutional investors, and among a number of financial academics as the Table 2 demonstrates.

Table 2. Some previous DoD strategies' market–adjusted returns in different countries and markets (Rinne and Vähämaa 2011):

Author(s)	**Time period**	**Market**	**Return**
Rinne & Vähämaa (2011)	1988–2008	Finland	4.5 %
Brzeszczyński & Gajdka (2008)	1997–2007	Poland	13.96 %
Ap Gwilym, Seaton & Thomas (2005)	1980–2001	United Kingdom	2.11 %
Filbeck & Visscher (2003)	1988–1997	Canada	6.62 %
Da Silva (2001)	1994–1999	Argentina	0.66 %
Da Silva (2001)	1994–1999	Brazil	–4.26 %
Da Silva (2001)	1994–1999	Chile	3.09 %
Da Silva (2001)	1994–1999	Colombia	0.56 %
Da Silva (2001)	1994–1999	Mexico	0.69 %
Da Silva (2001)	1994–1999	Peru	0.21 %
Da Silva (2001)	1994–1999	Venezuela	1.25 %
Hirschey (2000)	1961–1998	U.S.	1.77 %
Filbeck & Visscher (1997)	1985–1994	United Kingdom	–2.10 %
O'Higgins & Downes (1991)	1973–1991	U.S.	6.18 %
Dorfman (1988)	1972–1988	U.S.	7.59 %

The Table 2 shows that the DoD strategy has performed well in the Canadian and U.S. markets, and not so well in the UK and Latin American markets. Filbeck and Visscher (1997) were the first who investigated the DoD strategy outside the U.S. markets. Their data includes UK data from 1985 to 1994 and they create the DoD portfolios from the FTSE–100 index. In previous studies have been explanations for the outperformance of the DoD strategy due to the value premium or simply inadequate adjustments for risk, taxes and transaction costs; some researchers say that the outperformance of the DoD strategy is clearly a compensation for higher risks (Rinne and Vähämaa 2011).

Lin (2017) points out that there are mutual funds that track the performance of the DoD strategy. To list a few of them, the ELEMENTS Dogs of the Dow High Yield Select 10 Exchange–traded fund (ticker: DOD), Hennessy Balanced Fund (HBFBX), Hennessy Total Return Fund (HDOGX) and Invesco Select 10 Industrial Portfolio (SDOW) are funds which track the DoD strategy and tries to make profit from it.

4.6. Companies with high dividend yields during market upturns and downturns

Gombola and Lin (1993a) investigated the relationship between stock returns and dividend yields over bull (market upturn) and bear (market downturn) markets for time period from 1970 to 1984. They show that high dividend yield had positive relationship with the stock price during market downturns and negative relationship during market upturns for the whole time period. Even after they controlled for January effect, firm size and market risk, the results were still consistent. Gombola and Lin (1993b) added the dividend size and the dividend stability in to their continued study. They used data from time period from 1969 to 1984, including 1080 companies in the U.S. markets, and found that the risk of constant high dividend yield stocks could not be sufficiently explained by beta. They also demonstrated that beta has tendency to decrease with the increasing dividend stability and on the other hand, increase for the low dividend yield stocks.

Blume (1980) researched that high dividend yield companies are able to outperform low dividend yield companies during market downturns. He also found that stocks with anticipated yields in excess of the mean market dividend yield were able to create more return than non–dividend paying stocks at each level of beta.

4.7. Taxation issues

The dividends are as popular as ever, and during recent years, taxation on dividends has reduced. The exact amount of taxes varies by taxpayer, of course. For example, for most taxpayers, in the 25 % or higher tax bracket, dividends are taxed at 15 %. Assumed that some stock exchange index yields 3 % this year, if investor invests $ 10 000 in the index, investor would receive $ 300 in dividends that would be taxable. However, if the investor were in the 10 % or 15 % tax bracket investor's tax rate in dividends would be 0 %. The change in the tax law became active during the year 2013.

Poterba and Summers (1984) argue that many individual investors should value a dollar of company dividends less than a dollar of corporate retentions, since the former makes tax liabilities greater. However, companies face equal costs no matter if they pay dividends or retain earnings. As already stated, with Modigliani– Miller theorem, in the absence of taxes, dividend policy should not make difference on share valuation. When dividends are tax penalized, a value maximizing company should not pay dividends.

La Porta et al. (2000) state that there are two different views on the effects of taxes on the valuation of dividends. The more traditional view states that heavy taxation of dividends at both investor and company levels is a significant obstacle to paying out dividends rather than retaining the earnings. This view has an important objection raised by Miller and Scholes (1978). They state that investors can find multiple different dividend tax avoidance strategies that allow them to efficiently avoid dividend taxes partly. The second view is the new view of dividend and taxes, which states that cash must be paid out as dividends sooner or later. Therefore, paying cash as dividends earlier does not create greater tax burden on shareholders than paying it later (Auerbach 1979). According to this theory, taxes do not restrain dividend payouts.

5. FUNDAMENTALS OF PORTFOLIO MANAGEMENT

New information affects to market prices and are absorbed quickly. Especially nowadays when information is easy to find for everyone the prices reflect their true value within brief time period. There are different models to valuate stock returns and their risk. In this chapter examples of the most used models are displayed.

5.1. Modern portfolio theory

One of the main issues for investors is how to spread wealth among alternative assets. Many financial institutions have the same dilemma with the increased complication that they need to clearly include the aspects of their liabilities in the analysis. Both can be classified as portfolio theory, although the structure of the problems is a little dissimilar. Markowitz (1952) is the founder of modern portfolio theory. He defined the portfolio dilemma as a choice of the variance and mean of portfolio of assets. Markowitz showed the fundamental theorem of mean variance portfolio theory, specially holding constant variance, maximizing expected return, and keeping constant expected return minimizes variance. These two assumptions created the formulation of an efficient frontier from which the investor could pick a portfolio that meets investor's risk return preferences. Key point of the theory is that assets could not be chosen only on characteristics that are one of a kind to the security. An investor has to consider how one security co–move with all other securities. In addition, when investor considers the co–movements between securities, he or she can achieve a portfolio, which has the same expected return and less risk than a portfolio, where investor has not considered the co–movements. (Elton and Gruber 1997: 1743–1744.)

According to Bodie et al. (2014: 208), the expected return of a portfolio is a weighted average of expected returns on the component securities with portfolio proportions as weights:

(2) $$E(r_p) = \sum_{i=1}^{n} w_i \, E(r_i)$$

where $E(r_p)$ = Expected return of the portfolio p, w_i = Weight of the asset i in the portfolio, n = Number of assets in the portfolio and $E(r_i)$ = Expected return of the asset i

"The standard deviation of the rate of return (σ) is a measure of risk. It is defined as the square root of the variance, which is the expected value of the squared deviations from the expected return. The higher the volatility in outcomes, the higher will be the average value of these squared deviations. Therefore, variance and standard deviation provide one measure of the uncertainty of outcomes." (Bodie et al. 2014: 129.) Mathematically the variance can be calculated:

(3) $$\sigma^2 = \frac{\sum_{t=1}^{T}(R_t - \mu)^2}{T}$$

where R_t = Return for the period t, μ = the mean of T returns and T = the number or periods.

When investor is creating his or her portfolio, the risk of the portfolio has a large role. The nonsystematic risk decreases through diversification and portfolio volatility should continue to fall. Portfolio risk is measured by variance, which shows how much uncertainty there is in portfolio returns. The variance of the portfolio is a weighted sum of covariance, and each weight is the amount of the portfolio proportions of the pair of assets in the covariance term. (Bodie et al. 2014.) The variance of a e.g. two–asset portfolio can be calculated as follows:

(4) $$Var(R_p) = w_D^2\sigma_D^2 + w_E^2\sigma_E^2 + 2w_D w_E Cov(r_D, r_E)$$

where σ_D^2 = Variance of the returns for asset D, σ_E^2 = Variance of the returns for asset E, w_D = Weight of the portfolio allocated to asset D, w_E = Weight of the portfolio allocated to asset E and $Cov(r_D, r_E)$ = Covariance between the returns of the two assets.

5.2. Capital asset pricing model (CAPM)

One of the most widely known models in finance is the capital asset pricing model (CAPM). The CAPM was introduced by Jack Treynor (1961), William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966). The works by these academics broaden the work of Harry Markowitz (1952).

Bodie et al. (2014: 304) listed the assumptions of the CAPM:

1. Investors are rational mean–variance optimizers.
2. Investors planning horizon is a single period and they have homogeneous expectations.
3. All assets are publicly held and trade on public exchanges, short positions are permitted, and investors can borrow or lend at a common risk–free rate.
4. All information is publicly available and there are no transactions costs or taxes in the market.

Theoretically only systematic risk determines expected return since unsystematic risk can be excluded with diversification. The CAPM gives a prediction of the relationship between the risk of an asset and its expected return. It provides a benchmark rate of return for examining possible investments. It also gives an approximation to the expected return on assets that have not yet been traded in the market. Although the model does not completely withstand empirical tests, it is broadly used due to the insight it offers and because its accuracy is deemed acceptable for important applications. (Bodie et al. 2014: 291.)

(5) $$E(r_i) = r_f + \beta_i[E(r_m) - r_f]$$

where $E(r_i)$ = Expected return, r_f = Risk–free rate, β_i = Beta of the stock *I* and $E(r_m)$ = Expected return of the market.

5.3. Arbitrage pricing theory (APT)

The arbitrage pricing theory (APT) was created by Ross (1976). It is a one period model in which every investor believes that the hypothetical properties of capital securities returns are consistent with a factor structure. Ross (1976) argues that if equilibrium prices offer no arbitrage chances, then the expected returns on these capital securities are roughly linearly related to the factor loadings. The APT is a substitute for the CAPM in that both maintain a linear relation between securities expected returns and their covariances with other random variables. These covariances are explained as measures of risks, which an investor cannot avoid, by diversification. The slope coefficients of the linear relation between the covariances

and expected returns are explained as risk premium. (Huberman 1989: 72.) Mathematically the APT can be shown (Copeland, Weston and Shastri 2005: 176):

(6) $$r_j = r_i + b_{i1}F_1 + b_{i2}F_2 + \cdots + b_{in}F_n + \in_i$$

where, r_j = The random rate of return of the *i*th asset, r_i = The expected rate of return of the *i*th asset, b_{in} = The sensitivity of the return of the *i*th to the *k*th factor, F_1 = The mean zero *k*th factor common to the returns of all assets, $\in_i$ = A random zero mean noise term for the *i*th asset.

6. DATA AND METHODOLOGY

This chapter begins with presenting the research hypotheses followed by introduction on the data used in the study. The last subchapter presents the methodologies used in the study to achieve the empirical results that are explained in the chapter seven.

6.1. Research hypotheses

In previous studies, the risk–adjusted return of the DoD strategies has been questionable; however, previous studies have shown that DoD strategies create abnormal returns. Since investors and researchers always try to figure out ways to defeat market the first hypothesis is:

> H_1: The DoD portfolios' returns exceed the market return on both risk–adjusted and absolute bases.

Since the DoD portfolios have to be rebalanced yearly it creates higher transaction costs and also tax–adjustment is needed. After the transaction costs and tax–adjustments DoD portfolios returns will certainly decrease. Therefore, the second hypothesis is:

> H_2: The DoD portfolios' returns exceed the market return after transaction costs and tax–adjustments.

The time period of years 2001 to 2017 used in this study includes: the global financial crisis of 2008, and the years of 2001 and 2002 when the 9/11 terrorist attack, the internet bubble bursting and U.S. dollar´s decline against the euro occurred leading the S&P 500 index to being negative. Since a lot of high dividend yield companies also qualify as value companies, by having high B/M ratios and relatively stable cash flows, their performance during market downturns has been interesting topic to analyze. Investors could define high dividend payments as a signal of lower risk or as a buffer to the declining stock price during market downturn. Although the stock prices decline, the high dividend yield firms usually have more buffers to maintain the ongoing dividend levels and distribute cash flow

to their shareholders even during market downturns. Therefore, the third hypothesis will be:

H_3: The DoD portfolios outperform index in market downturns.

6.2. Data

In the study, research data covers the period from January 2001 to December 2017. The aim of the research is to empirically analyze the performance of the DoD strategy against the S&P 500 index. Data for the S&P 500 companies and dividend yields are obtained from the database of the University of Vaasa. Other data, such as the DoD portfolios and stocks closing prices are obtained from Yahoo Finance.

Since the DoD portfolios are made from as large index as S&P 500, there are a lot of different companies, compared to some of the previous studies, which have been conducted from smaller markets. Companies, which are in the DoD portfolios are mostly large or mid cap companies on consumer cyclical or utility areas. Since in the S&P 500 are only large cap companies, the mid and small cap companies found in the DoD portfolios have usually dropped temporally out from the index after decreasing in market capitalization, or just being temporally smaller. Companies' stocks are mainly exchanged in NYSE and rest in NASDAQ. To avoid mergers, survival bias or other skewing effects for the DoD portfolios' stocks, all the portfolios have been checked that the stocks are in the S&P 500 index at the start of the asset allocation year.

6.3. Methodology

The DoD–10 portfolio was made by standard DoD portfolio construction way first introduced by John Slatter (Dorfman 1988):

1. On the last trading day of the year, the dividend yields of all the stocks in the S&P 500 index are calculated.
2. After that, the dividend yields are ranked to order and the top 10 dividend yield stocks are identified, and an equally weighted

portfolio of the top 10 stocks is made, and the portfolio is held for one year.

3. After one year, the list is rebalanced and the stocks which are not in the top 10 anymore will be sold and those which are in top 10 are bought, so that in the portfolio, there is 10 stocks in equal amounts.
4. The steps 1–3 were repeated for 17 times.

To test the DoD–5 strategy (also known as PoD) the same procedures were made, except with only the top five highest dividend yielding stocks of the DoD strategy, which are also the five cheapest ones. Furthermore, to test the DoD–1 strategy (also known as the PPP) the second least expensive stock from the DoD–5 portfolio was chosen each year. Finally, to test how the DoD portfolios perform in market downturns, the years when S&P 500 returns were negative were chosen from the data, and tested how the DoD portfolios returns were compared to the index.

The time–series data used in the study comprises of monthly and yearly closing prices of individual stocks and S&P 500 index. All the cash dividends by companies in the DoD portfolios are reinvested when calculating the annual returns for the portfolio.

Next step in the analysis of the DoD strategies performance is to find out how DoD portfolios cope against S&P 500. The market–adjusted model can be used to measure the abnormal returns:

(7) $$AR_{MA} = R_{DoD} - R_M$$

Furthermore, as done by Rinne and Vähämaa (2011), also the M^2 or 'Modigliani–squared' adjustment is calculated as second measure of abnormal performance. The M^2 was firstly proposed by Modigliani and Modigliani (1997):

(8) $$AR_{M2} = (R_{DoD} - R_F)\frac{\sigma M}{\sigma DoD} - (R_M - R_F)$$

where R_{DoD} = *Return of the DoD portfolio,* R_F = *Risk–free interest rate,* R_M = *Return of market,* σM = *Volatility of market* and σDoD = *Volatility of DoD portfolio*

In addition to abnormal returns, also the risk–adjusted returns will be calculated. Like in previous DoD studies, the Sharpe ratio and Treynor index will be used to

analyze the risk–adjusted performance of the DoD portfolio. The Sharpe ratio shows portfolio returns to total risk and is calculated as:

(9) $$S_P = \frac{R_P - R_F}{\sigma_P}$$

where R_P = *Expected return of the portfolio*, R_F = *Risk–free interest rate* and σP = Standard deviation of the portfolio

The second risk–adjusted measurement is Treynor index, which shows portfolio returns to systematic risk and is calculated as:

(10) $$T_P = \frac{R_P - R_F}{\beta_P}$$

where R_P = *Expected return of the portfolio,* R_F = *Risk–free interest rate* and βP = Beta of the portfolio

7. EMPIRICAL RESULTS

Empirical results include the performance of DoD–10, DoD–5 and DoD–1 portfolios. First, the DoD–10 portfolio performance will be presented in both absolute and risk–adjusted basis, with Sharpe ratio and Treynor index, and transaction costs and taxes will be added. Secondly, the DoD–5 portfolio performance will be presented with same factors than the DoD–10 portfolio. The DoD–5 is like the DoD–10, except it has from the top 10 dividend yielding stocks only the five cheapest ones. Thirdly, the DoD–1 portfolio performance is showed with same factors than previous portfolios. The DoD–1 portfolio consists only of one stock, i.e. the second cheapest stock, from top 10 dividend yielding stocks. The last subchapter analyzes how the DoD portfolios cope against market downturns.

7.1. The DoD–10 portfolio performance

Table 3 reports the one–year buy–and–hold returns for the DoD–10 portfolio and the equivalent returns for the S&P 500 index. The periods for the returns are from the year 2001 to the year 2017. As can be seen from the Table 3, the mean annual return for DoD–10 portfolio is 23.8 %, and for the S&P500 index it is 7.9 %, which is significantly lower. Median for the DoD–10 is 31 %, which is also significantly higher than the S&P 500 index's 11.8 %. The reported maximum (141.9 %) and minimum (–49.1 %) for the DoD–10 shows that the strategy has a significant amount of movement yearly compared to index maximum (32.1 %) and minimum (–36.6 %). Table 3 also shows that the index had more positive years during the sample period with 14 out of 17, whereas the DoD–10 had 13 out of 17. When portfolio includes only 10 stocks, it is of course a lot riskier, since there is not much diversification, which increases the portfolio's systematic risk higher than the index. Therefore, the standard deviation of the DoD–10 has a lot higher standard deviation than the index (39.4 % compared to 17.9 %).

For the significance of the returns, the t–statistic is employed to find out the difference between returns and zero. The t–test demonstrates that the DoD–10 returns differs from zero at the 0.05 level being statistically significant, since the p–value is 0.024 and the index is statistically significant at 0.1 level with the p–value 0.088, but not statistically significant at 0.05 level. However, when the sample size is so small, annual returns should be interpreted with some caution.

The AR_{MA} is 15.9 %, which shows that the DoD–10 portfolio has created abnormal returns with the market–adjustment model and the AR_{M2} is 14.6 %, which also indicates that the DoD–10 portfolio has beaten the index with the M^2–adjustment. However, the mean returns are not statistically significant in a two–tailed test at the 0.05 level, but statistically significant at the 0.1 level (p–value of 0.063 for the AR_{MA} and 0.057 for the AR_{M2}). Table 3 shows that the AR_{MA} outperformed the index 10 out of 17 years and the AR_{M2} 9 out of 17 years.

Table 3. Annual returns of the DoD–10 portfolio.

Year	DoD–10	S&P 500	AR_{MA}	AR_{M2}
2001	0.414	–0.118	0.532	0.868
2002	0.163	–0.220	0.382	0.581
2003	0.393	0.284	0.110	0.109
2004	0.310	0.107	0.203	0.127
2005	0.052	0.048	0.004	0.004
2006	0.360	0.156	0.204	0.183
2007	–0.018	0.055	–0.073	–0.107
2008	–0.491	–0.366	–0.125	–0.148
2009	1.419	0.259	1.160	0.276
2010	0.341	0.148	0.193	0.198
2011	0.093	0.021	0.072	0.199
2012	0.102	0.159	–0.057	0.012
2013	0.475	0.321	0.154	0.081
2014	0.338	0.135	0.203	0.490
2015	–0.155	0.014	–0.169	–0.164
2016	0.315	0.118	0.197	0.097
2017	–0.071	0.218	–0.289	–0.329
Mean	0.238	0.079	0.159	0.146
t–statistic	2.489	1.819	1.996	2.052
p–value	0.024	0.088	0.063	0.057
Median	0.310	0.118	0.154	0.109
Minimum	–0.491	–0.366	–0.289	–0.329
Maximum	1.419	0.321	1.160	0.868
Standard deviation	0.394	0.179	0.328	0.293
No. of positive periods	13	14	12	13
No. of observations	17	17	17	17
Tax and transaction cost adjusted return	0.190		0.111	0.098
t–statistic	1.987		1.393	1.373
p–value	0.064		0.183	0.189

Figure 1 shows the annual return of the DoD–10 and S&P 500. The figure visually demonstrates during which years the DoD–10 outperformed the market and vice versa.

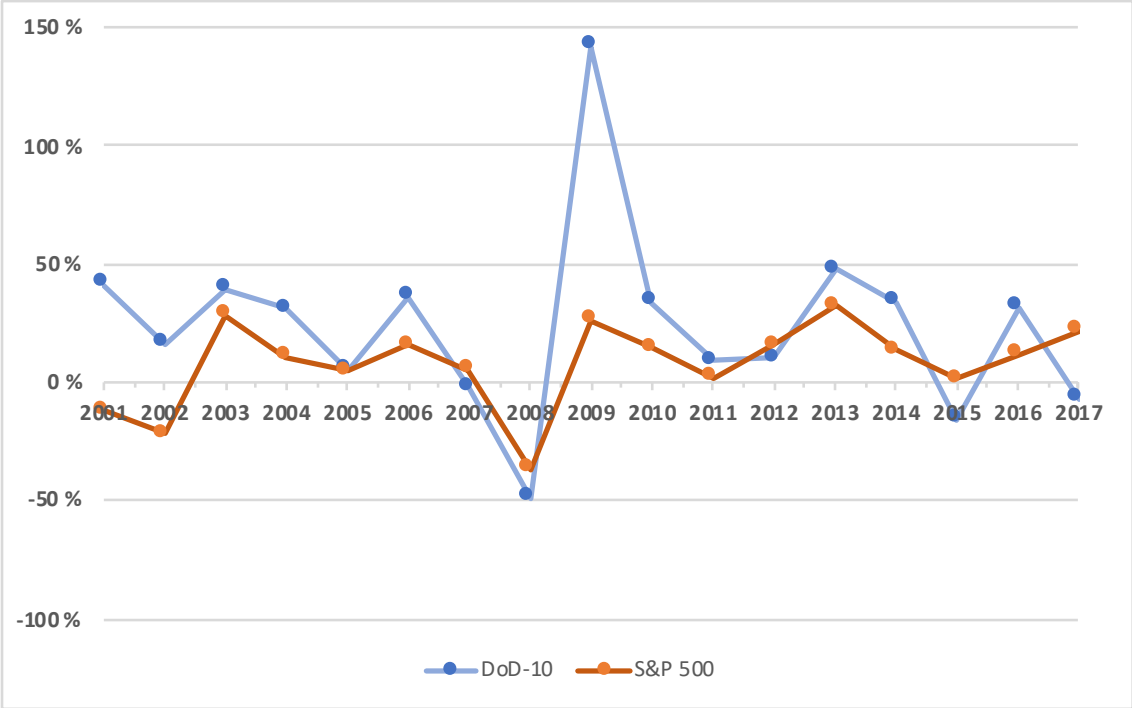

Figure 1. Annual returns of the DoD–10 portfolio and S&P 500 index.

To compensate only the 17 annual observations, the monthly returns of the DoD–10 portfolio will be presented next in order to get more observations, and to hopefully strengthen the statistical significance of the returns.

Table 4 shows how the DoD–10 portfolio performed against the market index on monthly basis. Table 4 presents also the market–adjusted abnormal return AR_{MA} and M^2–adjusted abnormal return AR_{M2}. The mean monthly return of the DoD–10 is 1.6 %, which is four times higher than the market index 0.4 %. Monthly mean return is highly significant for the DoD–10 portfolio (p–value 0.001) but not significant for the index (p–value 0.136). The median for the DoD–10 is 1.6 %, which is the same as mean and for the index it is 1.0 %, which is considerably higher than its mean. The outperformance of the DoD–10 is statistically highly significant with p–value of 0.002. The AR_{M2} is also highly significant with p–value of 0.001. The DoD–10 maximum (48.6 %) and minimum (–22.8 %) compared to S&P 500 maximum (10.8 %) and minimum (–16.9 %) shows the large variation of the DoD–

strategy even on monthly basis. Out of 204 possible months, the DoD–10 portfolio outperformed the index with AR_{MA} 114 times and with AR_{M2} 119 times.

Table 4. Monthly returns of the DoD–10 portfolio.

	DoD–10	**S&P 500**	**AR_{MA}**	**AR_{M2}**
Mean	0.016	0.004	0.012	0.012
t–statistic	3.451	1.495	3.207	3.345
p–value	0.001	0.136	0.002	0.001
Median	0.016	0.010	0.006	0.007
Minimum	–0.228	–0.169	–0.131	–0.176
Maximum	0.486	0.108	0.392	0.165
Standard deviation	0.232	0.143	0.182	0.051
No. of positive periods	135	127	114	119
No. of observations	204	204	204	204
Tax and transaction cost adjusted return	0.012		0.008	0.008
t–statistic	2.586		2.113	2.223
p–value	0.010		0.036	0.027

7.1.1. Transaction and tax costs of the DoD portfolios

Table 3 shows the tax and transaction cost adjusted return for the DoD–10 portfolio to be 19 %. It is not statistically significant at the 0.05 level, but it is significant at the 0.1 level (p–value 0.064). The adjusted return means are respectively AR_{MA} 11.1 % (p–value 0.183) and AR_{M2} 9.8 % (p–value 0.189), neither are statistically significant at the conventional level. The DoD–strategy requires a lot of annual rebalancing due to the changes of highest dividend yielding stocks in the S&P 500. A similar approach to transaction costs and taxes as Rinne and Vähämaa (2011) employed is also employed in this present research. The DoD strategy requires quite much annual rebalancing, no matter, if the portfolio includes the top 10 dividend yield stocks or just one stock of the top 10. Table 5 shows how the transaction costs for the DoD portfolios were determined. Over the time period from 2001 to 2017, an average of 5.35 stocks had to be replaced annually in the DoD–10 portfolio. In the DoD–5 portfolio, 3.61 stocks had to be replaced annually (0.722 * 5 stocks) and in the DoD–1 the amount was 0.94 stocks annually. A 2.5 % round–term per annum transaction cost was assumed through previous studies, where the cost has varied from 1 % to 3 %, which totals for the DoD–10 portfolio as 1.3 % annual transaction cost, for the

DoD–5 portfolio 1.8 % annual transaction cost and for the DoD–1 portfolio 2.4 % annual transaction cost.

Table 5. Transaction costs of the DoD portfolios.

			DoD–10	DoD–5	DoD–1
1		Turnover rate	0.535	0.722	0.941
2		Round–term transaction cost	0.025	0.025	0.025
3	1*2	Transaction cost of new stocks rebalancing	0.013	0.018	0.024

In addition to transaction costs, investors have to pay income and capital gains taxes. Tax policy in the U.S. has had some changes during the time period from 2001 to 2017. On average, the numbers are 15 % for the annual tax rate on dividends, and 25 % on capital gains. Therefore, those two percentages were used in the calculations to find out the tax costs for the DoD portfolios in the Table 6. Lower percentage for dividends creates advantage for the DoD investors, since dividend returns are the heart of the strategy. Table 6 demonstrates with annual turnover rate for the DoD–10 portfolio being 0.535, average annual tax rate on dividend 0.15, average annual tax rate on capital gains 0.25, annual return mean for the DoD 0.238 and dividend yield for the DoD 0.076 can be calculated that total annual tax on the DoD–10 portfolio is 3.5 %. For the DoD–5 portfolio, it is significantly higher 6.2 % and for the DoD–1 over two times higher 13.4 %. When combining transaction and tax costs, it can be stated that for the DoD–10 portfolio total costs per annum are 4.8 %, for the DoD–5 portfolio 8 % and for the DoD–1 highest 15.8 %.

Table 6. Tax costs of the DoD portfolios.

			DoD–10	DoD–5	DoD–1
1		Annual DoD turnover rate	0.535	0.722	0.941
2		Average annual tax rate on dividend	0.150	0.150	0.150
3		Average annual tax rate on capital gains	0.250	0.250	0.250
4		Annual return mean for DoD	0.238	0.294	0.435
5		Dividend yield for DoD	0.076	0.079	0.079
6	4–5	Capital appreciation average for DoD	0.162	0.216	0.356
7	1*2*6	Average annual tax rate on dividend of DoD	0.013	0.023	0.050
8	1*3*6	Average annual tax rate on capital gains of DoD	0.022	0.039	0.084
9		Total annual tax on DoD	0.035	0.062	0.134

7.1.2. Risk–adjustment for the DoD–10 portfolio

To find out the DoD–10 portfolio performance on risk–adjusted basis, Sharpe ratio and Treynor index were employed. Table 7 shows the DoD–10 and S&P 500 Sharpe ratios and Treynor indices from year 2001 to year 2017.

Table 7. Sharpe ratios and Treynor indices for the DoD–10 portfolio and S&P 500 index.

Panel A. Sharpe ratio

Year	DoD–10	S&P 500	Winner
2001	2.630	–0.711	DoD–10
2002	1.280	–0.901	DoD–10
2003	1.860	1.315	DoD–10
2004	1.500	0.489	DoD–10
2005	0.230	0.037	DoD–10
2006	2.190	0.943	DoD–10
2007	–0.380	0.064	S&P 500
2008	–1.560	–0.970	S&P 500
2009	1.770	1.019	DoD–10
2010	1.770	0.649	DoD–10
2011	1.700	0.009	DoD–10
2012	1.200	0.783	DoD–10
2013	2.480	2.121	DoD–10
2014	2.970	0.591	DoD–10
2015	–0.810	–0.049	S&P 500
2016	1.380	0.664	DoD–10
2017	–1.010	1.760	S&P 500

Panel B. Treynor index

Year	DoD–10	S&P 500	Winner	Portfolio beta
2001	1.344	–0.169	DoD–10	0.270
2002	1.776	–0.258	DoD–10	0.070
2003	0.256	0.241	DoD–10	1.370
2004	0.271	0.065	DoD–10	0.990
2005	0.006	0.004	DoD–10	1.500
2006	0.267	0.109	DoD–10	1.170
2007	–0.062	0.014	S&P 500	0.940
2008	–0.450	–0.388	S&P 500	1.140
2009	0.585	0.221	DoD–10	2.360
2010	0.380	0.115	DoD–10	0.810
2011	0.225	0.002	DoD–10	0.330
2012	0.129	0.141	S&P 500	0.650
2013	0.401	0.291	DoD–10	1.110
2014	0.546	0.114	DoD–10	0.580
2015	–0.202	–0.009	S&P 500	0.880
2016	0.189	0.093	DoD–10	1.540
2017	–0.079	0.194	S&P 500	1.200

Table 7 shows how the DoD–10 dominates the market index quite clearly on both panel A and panel B. Out of 17 years, the DoD–10 had a larger Sharpe ratio in 13 years, accounting for 76 % in total. Highest Sharpe ratio was in year 2014 where DoD–10 portfolio had 2.970, and market's largest Sharpe ratio was in year 2013 where it was 2.121. The worst Sharpe ratios for both the DoD–10 (–1.560) and S&P 500 (–0.970) were in year 2008 during the global financial crisis. On average for the whole time period from 2001 to 2017, the DoD–10 Sharpe ratio was 1.129 and market index 0.460.

The panel B presents the Treynor index for the DoD–10 portfolio and market index. Out of 17 years, the DoD–10 had larger Treynor index in 12 years, accounting for 71 % in total. On average, the Treynor index for the DoD–10 is 0.328 and for the market index 0.046. Portfolio's beta was on average 0.995, at its lowest 0.07 during the year 2002 and highest 2.36 during the year 2009. Beta numbers indicate that the movement of the portfolio is generally in the same direction as S&P 500, yet still less than the S&P 500. The level of systematic risk is lower in the DoD–10 portfolio than in the market.

To conclude the DoD–10 performance, the empirical results suggest that the DoD–10 is effective against the S&P500 index. The time period of course plays a large role, since the global financial crisis took place within that time period, and as overall, the time period is rather short. Statistically the DoD–10 annual mean return is significant, but after the market–adjustments it is only significant on the 0.1 level. When considering the tax and transaction costs, the DoD–10 annual mean return is statistically significant at the 0.1 level but after market–adjustments statistically not significant. On monthly basis, even after the market–adjustments, and tax and transaction costs, the mean results for the DoD–10 are all statistically significant at the 0.05 level. The numbers from the Table 7 illustrate that the DoD–10 is rather effective against the S&P 500 index after risk–adjustments.

7.2. The DoD–5 portfolio performance

The DoD–5 strategy has been studied in many of the same articles where the DoD–10 strategy has been under the scope. For instance, Lin (2017) and Rinne and Vähämaa (2011) investigated the performance of the DoD–5 strategy. Table 8

demonstrates the annual returns of the DoD–5 portfolio and the S&P 500 index during the time period from 2001 to 2017.

Table 8. Annual returns of the DoD–5 portfolio.

Year	DoD–5	S&P 500	AR_{MA}	AR_{M2}
2001	0.589	–0.118	0.707	1.017
2002	0.184	–0.220	0.404	0.615
2003	0.451	0.284	0.168	0.028
2004	0.275	0.107	0.167	0.110
2005	0.037	0.048	–0.012	–0.011
2006	0.306	0.156	0.150	0.080
2007	–0.025	0.055	–0.080	–0.086
2008	–0.400	–0.366	–0.034	–0.083
2009	2.221	0.259	1.962	0.458
2010	0.364	0.148	0.216	0.150
2011	0.059	0.021	0.038	0.089
2012	0.081	0.159	–0.078	–0.019
2013	0.822	0.321	0.501	0.200
2014	0.236	0.135	0.101	0.288
2015	–0.257	0.014	–0.271	–0.144
2016	0.270	0.118	0.153	0.040
2017	–0.209	0.218	–0.427	–0.360
Mean	0.294	0.079	0.216	0.139
t–statistic	2.083	1.819	1.694	1.802
p–value	0.054	0.088	0.110	0.090
Median	0.236	0.118	0.150	0.080
Minimum	–0.400	–0.366	–0.427	–0.360
Maximum	2.221	0.321	1.962	1.017
Standard deviation	0.583	0.179	0.525	0.319
No. of positive periods	13	14	11	11
No. of observations	17	17	17	17
Tax and transaction cost adjusted return	0.214		0.135	0.059
t–statistic	1.514		1.063	0.762
p–value	0.150		0.304	0.457

Table 8 shows that the DoD–5 portfolio's mean return is 29.4 %, with p–value of 0.054. The market–adjusted return is quite high being 21.6 %, thus it is not statistically significant (p–value 0.110). The M^2–adjusted return is 13.9 % being

statistically significant at the 0.1 level (p–value 0.090). The standard deviation of the strategy is high being 58.3 %, which is understandable when the portfolio is including only five stocks. The DoD–5 highest return was 222.1 % from the year 2009 right after the financial crisis and the worst year was 2008 during the financial crisis with –40 % return. The DoD–5 portfolio had 13 out of 17 positive periods, when the index had 14 out of 17. The DoD–5 outperformed the index 11 years out of 17, accounting for 65 %. After the tax and transaction costs the DoD–5 portfolio's mean return was 21.4 %, market–adjusted return being 13.5 % and M^2–adjusted return being 5.9 %, all statistically not significant.

Figure 2 shows the annual return of the DoD–5 compared to S&P 500. The figure 2 displays that even the DoD–5 outperformed the index 11 out of 17 observations, only the years 2001, 2009 and 2013 shows more large differences with the strategy and index performance.

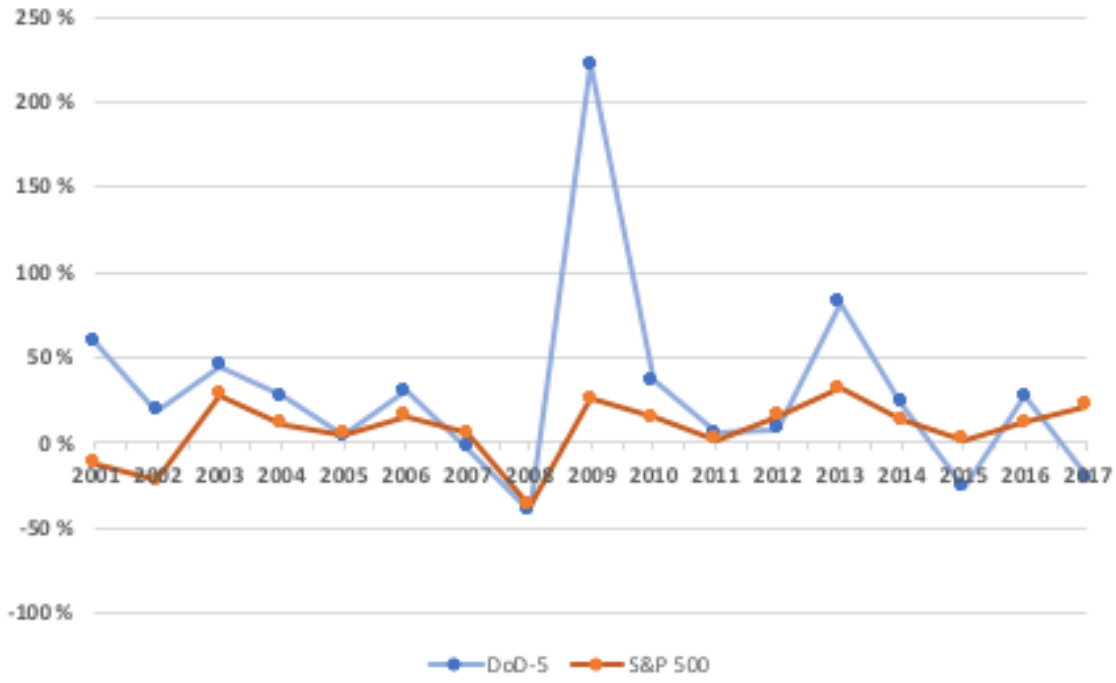

Figure 2. Annual returns of the DoD–5 portfolio and S&P 500 index.

Next, the monthly returns for the DoD–5 are analyzed. The Table 9 illustrates that the monthly mean returns for the DoD–5 is 1.9 % compared to the index 0.4 % or to the DoD–10 that is 1.6 %. The monthly mean return is statistically significant with the p–value 0.001 and even after the market–adjusted returns 1.4 % and 1.2 % both are statistically significant (p–value 0.003 and 0.000), which suggests that the DoD–

5 outperforms the market. The median for the DoD–5 is 1.5 % and the worst return is –22.6 % while the best month produced 55.2 % return. The mean return of the DoD–5 after tax and transaction costs is 1.2 % and statistically significant with p–value of 0.036. After the tax and transaction costs the DoD–5 still is able to outperform the market by 0.8 %, but not being statistically significant.

Table 9. Monthly returns of the DoD–5 portfolio.

	DoD–5	S&P 500	AR_{MA}	AR_{M2}
Mean	0.019	0.004	0.014	0.012
t–statistic	3.307	1.495	3.040	3.954
p–value	0.001	0.136	0.003	0.000
Median	0.015	0.010	0.010	0.008
Minimum	–0.226	–0.169	–0.148	–0.170
Maximum	0.552	0.108	0.458	0.161
Standard deviation	0.278	0.143	0.231	0.045
No. of positive periods	126	127	118	124
No. of observations	204	204	204	204
Tax and transaction cost adjusted return	0.012		0.008	0.006
t–statistic	2.106		1.599	1.817
p–value	0.036		0.111	0.071

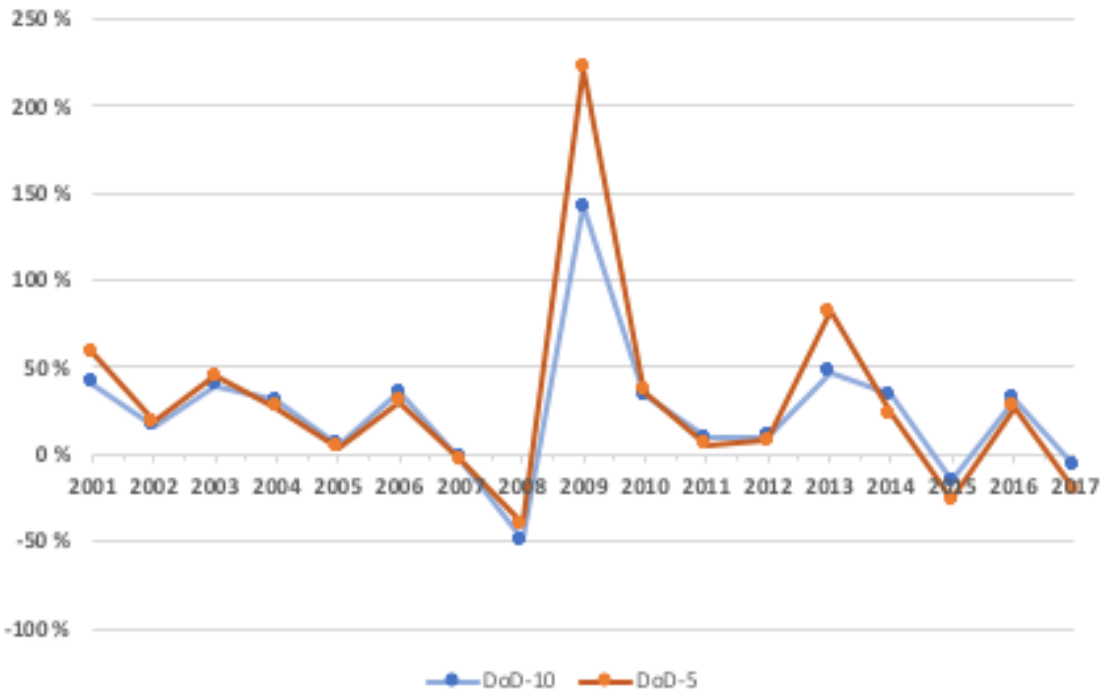

Figure 3. Annual returns of the DoD–10 portfolio and the DoD–5 portfolio.

Figure 3 shows the differences in annual returns for the DoD–10 portfolio and the DoD–5 portfolio. Since, both of the portfolios were able to outperform the market, it is interesting to compare how the two strategies performed against each other.

Next, the performance of DoD–5 is tested by using the risk–adjustments. The same risk–adjustments will be used for the DoD–5 and the DoD–10. Table 10 shows the DoD–5 and S&P 500 Sharpe ratios and Treynor indices from year 2001 to year 2017.

Table 10. Sharpe ratios and Treynor indices for the DoD–5 portfolio and S&P 500 index.

Panel A. Sharpe ratio

Year	DoD–5	S&P 500	Winner
2001	3.000	–0.711	DoD-5
2002	1.370	–0.901	DoD-5
2003	1.450	1.315	DoD-5
2004	1.410	0.489	DoD-5
2005	0.110	0.037	DoD-5
2006	1.480	0.943	DoD-5
2007	–0.250	0.064	S&P 500
2008	–1.260	–0.970	S&P 500
2009	2.400	1.019	DoD-5
2010	1.510	0.649	DoD-5
2011	0.600	0.009	DoD-5
2012	0.870	0.783	DoD-5
2013	2.880	2.121	DoD-5
2014	2.130	0.591	DoD-5
2015	–0.730	–0.049	S&P 500
2016	1.400	0.664	DoD-5
2017	–1.470	1.760	S&P 500

Panel B. Treynor index

Year	DoD–5	S&P 500	Winner	Portfolio beta
2001	13.453	–0.169	DoD-5	0.040
2002	1.623	–0.258	DoD-5	0.090
2003	0.195	0.241	S&P 500	2.100
2004	0.244	0.065	DoD-5	0.950
2005	–0.006	0.004	S&P 500	1.220
2006	0.180	0.109	DoD-5	1.440
2007	–0.051	0.014	S&P 500	1.290
2008	–0.235	–0.388	DoD-5	1.800
2009	0.836	0.221	DoD-5	2.610
2010	0.345	0.115	DoD-5	0.960
2011	0.106	0.002	DoD-5	0.380
2012	0.140	0.141	S&P 500	0.450
2013	0.638	0.291	DoD-5	1.240
2014	0.306	0.114	DoD-5	0.700
2015	-0.210	–0.009	S&P 500	1.330
2016	0.158	0.093	DoD-5	1.560
2017	-0.199	0.194	S&P 500	1.170

Table 10 shows that DoD–5 dominates the market index in both Sharpe ratios and in Treynor indices. The panel A shows that the DoD–5 has higher Sharpe ratio in 13 out of 17 observations, which totals to 76 %. Mean for the DoD–5 Sharpe ratio is 0.994 and median 1.400.

The panel B shows that the DoD–5 has higher Treynor index in 11 out of 17 years, which sums up to 65 %. The DoD–5 portfolio beta was on average 1.137 through the time period of from 2000 to 2017. Beta indicates that the DoD–5 portfolio moves rather the same way as, however little bit more, than the market index. The level of systematic risk is higher in the DoD–5 portfolio than in the market.

To sum up, the DoD–5 portfolio outperformed the market index measured in annually and monthly basis. In annual mean returns none are statistical significant in the 0.05 level, but in the 0.1 level annual return of 29.4 % and M^2–adjusted return 13.9 % are both statistically significant. After the tax and transaction costs, the returns are still high but none are statistically significant. Monthly returns are statistically significant at the 0.05 level and after tax and transaction costs the mean monthly return is statistically significant at the 0.05 level and M^2–adjusted return is statistically significant at the 0.1 level. The risk–adjustments also indicates that the DoD–5 portfolio copes well against the S&P 500. It can be stated that the DoD–5 portfolio is effective against the market index.

7.3. The DoD–1 portfolio performance

In the DoD–1 strategy only one stock, the second least expensive from the DoD–5 portfolio is chosen. The idea for not picking the cheapest one is to avoid a company, which potentially has financial issues, as the stock price might go skyrocketing down. It is not ordinary or even recommended to choose just one stock of the whole index and invest to it, therefore the DoD–1 portfolio strategy must be analyzed with caution. O'Higgins and Downes (1991) found that the DoD–1 performed even better than the DoD–5 against the DJIA.

Table 11 shows the annual returns for the DoD–1 portfolio. The mean return is staggering 43.5 %, hence not statistically significant. However, the median is 17.5 %, which is smaller than the DoD–5 portfolio's 23.6 % or the DoD–10 portfolio's 31

%. After the M^2–adjustment the mean return drops heavily due to the high volatility of the portfolio. The standard deviation of 116.8 % shows that the DoD–1 has a lot of systematic risk compared to the market index, or compared to the DoD–10 portfolio's 39.4 % and the DoD–5 portfolio's 58.3 % standard deviation.

Table 11. Annual returns of the DoD–1 portfolio.

Year	DoD–1	S&P 500	AR_{MA}	AR_{M2}
2001	0.449	–0.118	0.567	0.956
2002	0.074	–0.220	0.294	0.302
2003	–0.098	0.284	–0.381	–0.275
2004	0.339	0.107	0.231	0.127
2005	–0.016	0.048	–0.064	–0.044
2006	0.381	0.156	0.225	0.163
2007	0.033	0.055	–0.022	–0.022
2008	–0.441	–0.366	–0.075	0.043
2009	4.198	0.259	3.939	0.699
2010	0.134	0.148	–0.014	–0.063
2011	0.277	0.021	0.256	0.460
2012	0.175	0.159	0.016	0.046
2013	2.442	0.321	2.121	0.394
2014	0.235	0.135	0.099	0.065
2015	–0.701	0.014	–0.715	–0.169
2016	0.191	0.118	0.073	–0.054
2017	–0.275	0.218	–0.494	–0.270
Mean	0.435	0.079	0.356	0.139
t–statistic	1.536	1.819	1.335	1.719
p–value	0.144	0.088	0.200	0.105
Median	0.175	0.118	0.073	0.046
Minimum	–0.701	–0.366	–0.715	–0.275
Maximum	4.198	0.321	3.939	0.956
Standard deviation	1.168	0.179	1.100	0.333
No. of positive periods	12	14	10	10
No. of observations	17	17	17	17
Tax and transaction cost adjusted return	0.277		0.199	–0.019
t–statistic	0.979		0.744	–0.237
p–value	0.342		0.468	0.816

After the tax and transaction costs the DoD–1 mean return is 27.7 % with p–value of 0.342, being statistically not significant. When the market–adjustments are added the mean returns drop to 19.9 % and –1.9 %, both statistically not significant.

Since the DoD–1 annual returns were all statistically not significant, the results of monthly returns for the portfolio are presented next. Additionally, it is examined whether the DoD–1 can outperform the index with statistically significant returns. Table 12 shows the monthly returns of the DoD–1 portfolio. The mean monthly return is 2.2 %, which is also statistically significant with p–value of 0.024. After market–adjustments the mean is 1.8 % and 1 %, the first being statistically significant at 0.1 level and the second at 0.05 level. When tax and transaction costs are implemented, the returns are all statistically not significant. The monthly mean return is 0.9 % and after market–adjustments 0.4 % and –0.3 %.

Table 12. Monthly returns of the DoD–1 portfolio.

	DoD–1	**S&P 500**	$\mathbf{AR_{MA}}$	$\mathbf{AR_{M2}}$
Mean	0.022	0.004	0.018	0.010
t–statistic	2.278	1.495	1.956	3.748
p–value	0.024	0.136	0.052	0.000
Median	0.021	0.010	0.008	0.005
Minimum	–0.399	–0.169	–0.383	–0.115
Maximum	0.742	0.108	0.648	0.129
Standard deviation	0.477	0.143	0.446	0.039
No. of positive periods	116	127	113	119
No. of observations	204	204	204	204
Tax and transaction cost adjusted return	0.009		0.004	–0.003
t–statistic	0.911		0.492	–1.093
p–value	0.363		0.624	0.276

For the DoD–1 the same risk–adjustments are used as with the DoD–10 and the DoD–5. The risk–adjusted return is measured using Sharpe ratio and Treynor index. Table 13 illustrates the DoD–1 and S&P 500 Sharpe ratios and Treynor indices from year 2001 to year 2017.

Table 13. Sharpe ratios and Treynor indices for the DoD–1 portfolio and S&P 500 index.

Panel A. Sharpe ratio				
Year	DoD–1	S&P 500	Winner	
2001	2.910	–0.711	DoD–1	
2002	0.350	–0.901	DoD–1	
2003	0.210	1.315	S&P 500	
2004	1.480	0.489	DoD–1	
2005	–0.160	0.037	S&P 500	
2006	2.400	0.943	DoD–1	
2007	–0.040	0.064	S&P 500	
2008	–0.820	–0.970	DoD–1	
2009	2.150	1.019	DoD–1	
2010	0.530	0.649	S&P 500	
2011	1.950	0.009	DoD–1	
2012	1.130	0.783	DoD–1	
2013	2.880	2.121	DoD–1	
2014	1.300	0.591	DoD–1	
2015	–1.200	–0.049	S&P 500	
2016	0.550	0.664	S&P 500	
2017	–0.570	1.760	S&P 500	
Panel B. Treynor index				
Year	DoD–1	S&P 500	Winner	Portfolio beta
2001	–2.489	–0.169	S&P 500	–0.160
2002	–0.156	–0.258	DoD–1	–0.230
2003	–0.027	0.241	S&P 500	5.240
2004	0.225	0.065	DoD–1	1.320
2005	–0.054	0.004	S&P 500	1.100
2006	0.298	0.109	DoD–1	1.120
2007	–0.006	0.014	S&P 500	1.230
2008	1.188	–0.388	DoD–1	–0.390
2009	1.470	0.221	DoD–1	2.830
2010	0.067	0.115	S&P 500	1.500
2011	1.611	0.002	DoD–1	0.160
2012	0.000	0.141	S&P 500	0.000
2013	1.576	0.291	DoD–1	1.530
2014	0.150	0.114	DoD–1	1.420
2015	–0.245	–0.009	S&P 500	2.950
2016	0.073	0.093	S&P 500	2.260
2017	–0.066	0.194	S&P 500	4.530

Panel A presents that the DoD–1 portfolio's Sharpe ratio was higher than the index's 10 times out of total 17, totaling to 59 %. The Sharpe ratio ranges from –1.200 in 2015 to 2.910 in 2001 with an average of 0.885. Panel B shows that the DoD–1 portfolio's Treynor index changes from –2.489 in 2001 to 1.611 in 2011 with an average of 0.213. The DoD–1 had higher Treynor index only 8 out of total 17 times, so the market outperformed the DoD–1. The DoD–1 beta changes from –0.390 in 2008 to 5.240 in 2003 averaging for the whole time period to 1.554, meaning that the DoD–1 is significantly more volatile than the market.

To summarize, the performance of the DoD–1 portfolio is not statistically significant on any conventional level, except on monthly returns before tax and transaction costs, thus it does create high mean returns on annually and monthly basis. When the market–adjustments, taxes and transaction costs are considered, the returns are turned to negative or only slightly positive. The risk–adjustments Sharpe ratio and Treynor index numbers shows that the DoD–1 is a lot more volatile and riskier than market index and that it does not create much risk–adjusted return.

7.4. The DoD portfolios performance against market downturns

Gombola and Lui (1993a) stated that high dividend yield had positive relationship with the stock price during market downturns and Blume (1980) showed that high dividend companies outperform low dividend yield companies during market downturns. Therefore, the last subchapter is to analyze how the different DoD portfolios cope against market downturns.

Table 14. Annual returns of the DoD portfolios in market downturns.

Year	DoD–10	DoD–5	DoD–1	S&P 500	DoD–10 AR_{MA}	DoD–10 AR_{M2}	DoD–5 AR_{MA}	DoD–5 AR_{M2}	DoD–1 AR_{MA}	DoD–1 AR_{M2}
2001	0.414	0.589	0.449	–0.118	0.532	0.868	0.707	1.017	0.567	0.956
2002	0.163	0.184	0.074	–0.220	0.382	0.581	0.404	0.615	0.294	0.302
2008	–0.491	–0.400	–0.441	–0.366	–0.125	–0.148	–0.034	–0.083	–0.075	0.043
Mean	0.029	0.124	0.027	–0.235	0.263	0.434	0.359	0.516	0.262	0.434
t–statistic	0.151	0.612	0.149	–4.613	1.871	2.028	2.360	2.272	1.992	2.258
p–value	0.890	0.584	0.891	0.019	0.158	0.136	0.099	0.108	0.140	0.109
Median	0.163	0.184	0.074	–0.220	0.382	0.581	0.404	0.615	0.294	0.302
Minimum	–0.491	–0.400	–0.441	–0.366	–0.125	–0.148	–0.034	–0.083	–0.075	0.043
Maximum	0.414	0.589	0.449	–0.118	0.532	0.868	0.707	1.017	0.567	0.956
Standard deviation	0.381	0.406	0.365	0.101	0.281	0.428	0.304	0.455	0.263	0.385
No. of positive periods	2	2	2	0	2	2	2	2	2	2
No. of observations	3	3	3	3	3	3	3	3	3	3
Tax and transaction cost adjusted return	–0.019	0.044	–0.130		0.215	0.386	0.279	0.436	0.104	0.276
t–statistic	–0.072	0.153	–0.506		1.082	1.275	1.294	1.355	0.560	1.015
p–value	0.949	0.892	0.663		0.392	0.330	0.325	0.308	0.632	0.417

Table 14 shows the annual returns of the DoD portfolios performance against the S&P 500 index's downturns. The mean annual return for the market index during market downturns is –23.5 %, while the mean return for the DoD–10 is 2.9 %, for

the DoD–5 is 12.4 % and for the DoD–1 is 2.7 %. It can be noted from the Table 14 that the DoD portfolios were negative only one year during the market downturns. After the market–adjustments the returns are still highly positive. Statistically speaking, only the index's mean return is statistically significant at the 0.05 level and the DoD–5 market–adjusted mean is statistically significant at the 0.1 level. After the tax and transaction costs, the mean returns of the DoD portfolios still outperform the index's mean return. Thus, none of the returns are statistically significant. The DoD–5 performs best in the market downturns with 0.4 % return after the tax and transaction costs, and after the market–adjustments the mean returns are 27.9 % and 43.6 % respectively. Due to the extremely small number of annual observations, these results should again be analyzed with caution. In order to achieve more observations, the monthly returns of the DoD portfolios against market downturns are presented next.

Table 15 introduces the monthly mean returns of the DoD portfolios in market downturns. The mean return for the DoD–10 is 5.1 %, the DoD–5 is 6.6 % and the DoD–1 is 7.6 %, compared to the index mean return of –0.3 %. All of the DoD returns are statistically significant at the 0.05 level, whereas the index is not statistically significant at any conventional level. Median for the DoD portfolios are on average 3.8 % compared to index's significantly lower 0.3 %. The DoD portfolios has on average 76 % positive months against the index's 53 %.

Table 15. Monthly returns of the DoD portfolios in market downturns.

Year	DoD–10	DoD–5	DoD–1	S&P 500	DoD–10 AR_{MA}	DoD–10 AR_{M2}	DoD–5 AR_{MA}	DoD–5 AR_{M2}	DoD–1 AR_{MA}	DoD–1 AR_{M2}
Mean	0.051	0.066	0.076	–0.003	0.053	0.038	0.069	0.036	0.078	0.031
t–statistic	3.068	3.426	2.574	–0.287	3.910	3.094	4.150	3.181	2.881	2.974
p–value	0.004	0.002	0.014	0.776	0.000	0.004	0.000	0.003	0.007	0.005
Median	0.035	0.047	0.031	0.003	0.052	0.033	0.073	0.027	0.041	0.030
Minimum	–0.135	–0.075	–0.150	–0.110	–0.131	–0.176	–0.122	–0.170	–0.236	–0.115
Maximum	0.486	0.552	0.742	0.094	0.392	0.165	0.458	0.161	0.648	0.129
Standard deviation	0.097	0.114	0.173	0.060	0.081	0.072	0.098	0.066	0.161	0.062
No. of positive periods	28	27	27	19	28	27	29	26	26	23
No. of observations	36	36	36	36	36	36	36	36	36	36
Tax and transaction cost adjusted return	0.046	0.059	0.062		0.049	0.034	0.062	0.029	0.065	0.018
t–statistic	2.813	3.081	2.123		3.612	2.764	3.741	2.582	2.394	1.723
p–value	0.008	0.004	0.041		0.001	0.009	0.001	0.014	0.022	0.094

After the tax and transaction costs, all of the returns, except M^2–adjusted DoD–1 return of 1.8 % (statistically significant at 0.1 level), are positive and statistically significant at the 0.05 level. Even though there are not many observations either among the monthly observations, it is clear that the DoD portfolios cope extremely well during the market downturns.

8. SUMMARY AND CONCLUSIONS

The main purpose of this study is to investigate whether the DoD strategies can outperform the S&P 500 index over the time period from 2001 to 2017 and how the DoD strategies copes against market downturns. To be more precise, the DoD strategies involve; the DoD–10 where the top 10 highest dividend yield companies from the S&P 500 are picked and the equally balanced portfolio is held for one year, the DoD–5, where from the DoD–10 portfolio the five cheapest stocks are chosen and held for one year and the DoD–1, where from the DoD–5 portfolio the second least expensive stock is chosen and held for one year.

The first hypothesis of this study is that "The DoD portfolios' returns exceed the market return on both risk–adjusted and absolute bases". The annual mean returns of the DoD portfolios all outperform the index. The DoD–10 is also statistically significant, while the other portfolios are not. On monthly basis, all portfolios also outperform the market returns, and all except the DoD–1 market–adjusted return are statistically significant. When the risk–adjustments are taken into account, the DoD portfolios still outperform the market. Only the DoD–1 Treynor indices are weaker than the market's. When considering all the empirical results, the first hypothesis must be accepted.

The second hypothesis states "The DoD portfolios' returns exceed the market return after transaction costs and tax–adjustments". When considering the tax and transaction costs, the DoD–10 annual mean return is statistically significant at the 0.1 level, but after market–adjustments statistically not significant. On monthly basis, the mean results for the DoD–10 are all statistically significant at the 0.05 level, thus outperforming the index. After the tax and transaction costs, returns for DoD–5 are still higher than the market's, but none are statistical significant. Monthly returns are all higher than the market's return, and the monthly mean return before the market–adjustments is statistically significant at the 0.05 level. Since the DoD–1 has rather high tax and transaction costs due to high turnover rate, the returns are affected the most. The DoD–1'sx annual and monthly returns are all statistically not significant, and after 'Modigliani–squared'–adjustment, even creates negative return. Since the DoD–10 had statistically significant returns on monthly basis compared to the DoD–5, which had them only before market–adjustments, and as all the other observations were not significant, the second hypothesis has to be rejected.

The last hypothesis declared, “The DoD portfolios outperform index in market downturns”. None of the annual returns are statistically significant, even though they do outperform the index significantly. However, the monthly returns are all, except the DoD–1 M^2 –adjusted return, statistically significant at the 0.05 level. When considering the empirical results, the last and third hypothesis can be accepted.

Overall, the empirical results of this study are similar to previous studies of the DoD strategies. Like in previous studies, the DoD portfolios show abnormal returns on monthly and annual basis but not always statistically significant. After the transaction and tax costs the DoD portfolios does not outperform the index with statistically significant results. This study shows that the DoD portfolios does outperform the index during market downturns such as Rinne and Vähämaa (2011) shows. Even though the DoD portfolios were created from a large index like the S&P 500, the DoD strategy showed that it has potential to achieve abnormal returns from time to time. The time period in this study is relatively short, considering that the DoD has been said to be more of a long run investment strategy.

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