DIVIDEND YIELD STRATEGIES IN EUROPE 1988 – 2008: Performance in Bull and Bear Markets

Finance
Master's thesis
Ilari Hietanen
2009

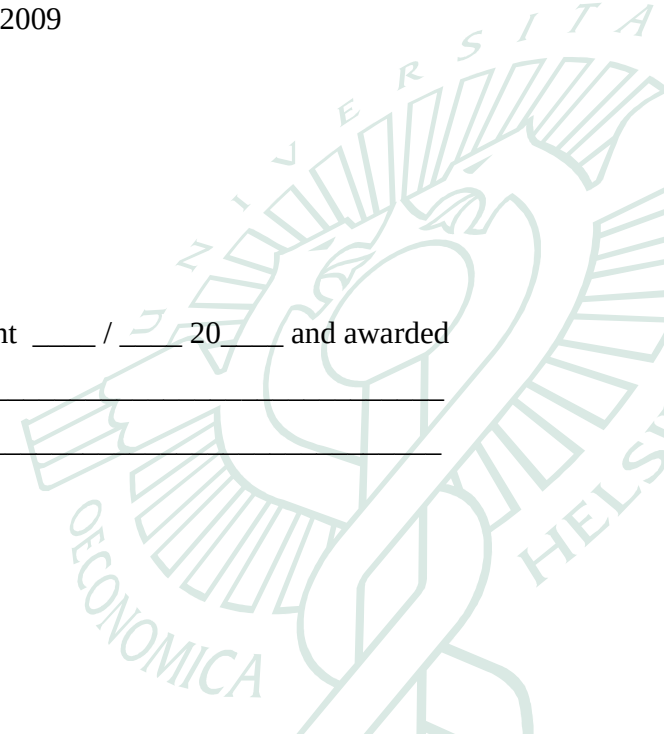
Department of Accounting and Finance
HELSINGIN KAUPPAKORKEAKOULU
HELSINKI SCHOOL OF ECONOMICS

HELSINKI SCHOOL OF ECONOMICS (HSE)
Department of Accounting and Finance

DIVIDEND YIELD STRATEGIES IN EUROPE 1988 - 2008

Performance in Bull and Bear Markets

Finance
Master's thesis
Ilari Hietanen
Spring 2009



Approved by the Council of the Department ____ / ____ 20____ and awarded the grade_____

_____

Helsinki School of Economics
Helsinki School of Economics Abstract
Master's Thesis July 1, 2009
Ilari Hietanen

DIVIDEND YIELD STRATEGIES IN EUROPE 1988 – 2008: Performance in Bull and Bear Markets

PURPOSE OF THE STUDY

In this study I am examining the efficiency and performance of high dividend, zero dividend and repurchase yield investing strategies in developed European markets from 1988 to 2008. Between these three portfolios I am to discover the relationship between different payout strategies to portfolio returns. I am also studying the performance of these three strategies in bull and bear market.

DATA

I studied 1,880 companies from 16 European countries between 1988 and 2008. I constructed a Euro 750 index, which comprised of 750 largest companies in each year measured by their market capitalization. From the Euro 750 I formed Top 25, Zero and Repo portfolios.

RESULTS

The main findings in this study are that the high dividend yield portfolio earns higher raw compound returns and risk-adjusted returns than market portfolio in the full time period but this is mainly due to the excellent performance in the first decade. The positive return margin is later diminished but the defensive characteristics have improved. Furthermore, prolonging the investing period improves the performance. High dividend yield strategy is superior in the bear market especially in the 1998 to 2008 time period and it has the lowest beta. Zero dividend strategy is inferior to the market portfolio and it is not able to outperform the market portfolio in the bull market periods in spite of the higher beta. Repurchase strategy is as a stand-alone risky but when combined with high dividend yield strategy it improves the excess return to the market portfolio at the cost of higher volatility and risk.

KEYWORDS

Dividends, stock repurchase, investing strategy, European stock market, zero dividends

TABLE OF CONTENT

1. Introduction

Many investors and academics have spent countless number of hours finding an investment strategy that could beat the market. Constant ground for a debate has been whether such investment strategies even exist in the efficient markets and can such strategies prevail in the long run. Every now and then such strategies are discovered but when scrutinized they are accused to be efficient due to datamining or only to work with the past data. There appear to be also trends in the strategies which are employed and covered in the scholarly journals and public press. In 1980 Keim brought the small-firm effect and the January effect in the spotlight and they received a lot of academic attention. In 1992 Fama and French presented value investing in their paper. One subsection of the value investing is the high dividend yield investing strategy. In this strategy stocks with the highest dividend yields are selected into the portfolio. The high dividend yield strategy has been actively covered by the financial press partially because of the sub prime crisis in 2008 and the recession thereafter. This strategy has received lot of media coverage as the stock prices have drastically declined and investors desperately seek safe havens for their investment. The essential rationale for this behavior might be in the fundamentals of the high dividend yield companies or then it might be driven by the price-to-price feedback model, where investors bid up prices against each other in the similar manner as in the speculative bubbles (Shiller, 2003).

Even though the sole idea of investing in high dividend yield stocks is not new, it was first time introduced as stand-alone investing strategy in *Wall Street Journal* in 1988 by the name ‘Dogs of the Dow’. This was an investing strategy where a portfolio of stocks was constructed by selecting ten companies with the highest dividend yield in Dow Jones Industrial Average index. Conclusion was that the for the 1972 – 1987 period the average return was almost 800 basis points higher then the DJIA index return. Even though that specific study did not meet all the academic standards it was later proven to be accurate in more scientific researches.

Zero dividend strategy is quite the contrary to the high dividend yield strategy by definition and has interested at least in the same magnitude. Even though zero dividend companies are not that appealing in the bear market, they tend attract investors well enough during booms, because they

are though to hold enormous growth and future cash flow potential. As studies by Litzenberger and Ramaswamy (1979; 1982), Blume (1980), Elton *et al.* (1983) and Keim (1985, 1986) have suggested zero dividend and low dividend companies perform at least as well as the highest dividend yield companies, therefore it is interesting to study whether zero dividend strategy could act as the complement in bull market to the high dividend strategy is thought to perform better during bear market.

1.1. Objectives and contribution of the study

In this study I am examining the efficiency and performance of high dividend, zero dividend and repurchase yield investing strategies in developed European markets from 1988 to 2008. I am also studying the performance of these two strategies in bull and bear market periods. Although after the aforementioned study the high dividend yield strategies have been tested again in US stock markets and also in British and Canadian stock markets, no academic study been done with Europe wide data. All-European market study is fundamentally very different compared to the uni-market studies since taxation systems, investing cultures as well as history are very heterogeneous. Moreover, these heterogeneous conditions have changed and varied greatly the 21 year time span which offers interesting grounds for the results. Furthermore, some of the countries in the early part of the time period were heavily regulated and had very undeveloped public stock markets. Also in none of the studies before, these two opposite and one complementary strategies have not been compared in one paper. This is interesting since some authors have suggested that zero and high dividend yield companies yield approximately same returns yet being fundamentally very different type of companies (Jagannathan *et al.*, 2000, Grullon and Michaely, 2002). Another interesting aspect related to value investing and thus also to the high dividend yield strategy is their performance in bull and bear market. Because value and high dividend yield companies are usually more mature, have stable cash flows and low debt ratio (Grullon and Michaely, 2002), it can be assumed that this leads to better performance in bear market because their characteristics able them to sustain bear market conditions better than zero dividend companies. From this perspective including repurchasing companies into the study extends the examination since these companies have qualities from both high dividend and zero dividend companies. Furthermore, as Grullon and Michaely (2002) suggested that repurchases have become substitutes for dividends in U.S. and von Eije and Megginson (2008) in the

European Union, including stock repurchases into examination may reveal more from the development of the payout choice of European companies.

1.2. Scope and limitations of the study

The set up proposes also huge challenges and caveats for the results. Firstly, unlike the other similar studies, which have been conducted on single stock market, the presence of several very different countries increases the possibility of extreme values in this study. Also it is easier to take into account the effect of unfavorable tax treatment of dividend when only one tax system needs to be examined. There is a lot to adjust even with one tax system that has evolved during the course of 21 years, not to mention adjusting 16 different tax systems. That is why the effects of taxes have been neglected in this study. The same reasoning applies to the transaction costs. Because of these restrictions the interpretation of economical significance of the results is harder. The comparison of stock repurchases to dividend payment is also challenging because the amount of data samples of stock repurchases is rather scarce.

The main findings in this study are that the high dividend yield portfolio earns higher raw compound returns and risk-adjusted returns than market portfolio in the full time period but this is mainly due to the excellent performance in the first decade. The positive return margin is later diminished from the first decade but in return the defensive characteristics of high dividend yield strategy have improved as the volatility and beta are lower than in market portfolio. Furthermore, prolonging the investing period improves the results compared to the market and peer portfolios. High dividend yield strategy is superior in the bear market especially in the 1998 to 2008 time period and it has the lowest beta. Zero dividend strategy is inferior to the market portfolio. It has higher beta but is not able to outperform the market portfolio in the bull market periods. Repurchase strategy is as a stand-alone risky but when combined with high dividend yield strategy it improves the excess return to the market portfolio at the cost of higher volatility and risk.

The paper is organized as follows; Chapter II will represent the theories and studies that have influenced the study of dividend yields. In Chapter III are the hypotheses formed and justified which are then tested in Chapter V. In Chapter IV I will describe the data set used in the study

and the alterations that has been done to it. Furthermore, the methods are justified and illustrated. In addition the equations and descriptive statistics of the data are presented. Chapter V presents the result for the Europe-wide study and the study of the performance in bull and bear market. In Chapter VI are conducted sensitivity analyses of the results, which able to validate the results to be robust in more general framework. Chapter VII summarizes the study and presents the conclusions.

2. Literature review and theories

In the preceding chapters more general theories are discussed. The Chapter 2.1 starts with the brief introduction of Miller-Modigliani theorem which was a starting point for dividend choice study. This lays foundation for a discussion of the more modern theories why companies pay dividend at all. As the traditional financial theories have still not solved the dividend puzzle, I examine the issue through behavioral finance, which also sheds some light on the investor behavior related to the investing sentiment towards high dividend companies. As the high dividend companies belong to a broader category of value investing, it is discussed in Chapter 2.4 with the comparison of value and growth stocks. Thereafter I present the most important studies relating the overall power of dividend predicting stock returns and close this chapter with discussion of zero dividend companies and the bull and bear market performance of both high and zero dividend companies. In Chapter 2.8 the previous studies on high dividend yield investment strategies are presented.

2.1. Why companies pay dividends?

An interesting question is why companies are paying dividend at all? If we consider the Miller-Modigliani theorem (Miller and Modigliani, 1961) which states that the dividends paid by the company do not affect the value of shares or the return to the investor. Because the higher the dividend the less the investor receives as capital gains, regardless of the decisions the company makes, assuming, that the dividend decision does not affect the company's business decisions. As an example: the choice between common stock that pays dividend and one that does not, is similar, if we neglect taxes and transaction costs. The price of common stock that pays dividend is reduced on ex-dividend by the amount of the dividend paid out. The investor who receives the

dividend ends up in a situation where she holds the dividend and common stock worth less by the paid out dividend. The M&M theorem was a pioneering study on the dividend choice field, but it was constructed on restrictive assumptions it is not the perfect depiction of the real world situation. Still, the academics have not found coherent reasons for why companies pay dividends. This and the underlying problematic are known as dividend puzzle which is even today not resolved.

The Miller-Modigliani paradigm has been generally approved and it has even been showed that when investors are considerable homogeneous, have time-additive utility functions and when markets are complete and perfect, dividends, if associated with positive costs, are actually harmful to the value of the company (Bhattacharya, 1982). This was found regardless of whether dividends contain information value or not. In real world this is usually not the case: investors are heterogeneous, their utility function is non-additive or markets are not complete.

The managers in the company can be considered as insiders who hold the perfect information in the world of asymmetric information versus to owners. Models developed by Bhattacharya (1979), John and Williams (1985) and Miller and Rock (1985) suggest that managers need to choose and adjust the dividend levels to signal private information to investors. Managers have incentive to signal this information to the market when they believe that the price of the firm's stock is below its intrinsic value. When managers decide on dividend level increase this signals a persistent improvement in the future cash flows and it is something that the competitors cannot follow as they do not want later encounter a dividend cut. An implication of this is that dividend increase has a positive effect on stock price and vice versa. The evidence on this matter is rather controversial as some studies find this signaling model hold in empirical studies and some of the studies find no relationship.

The second reason close to the signaling models is the agency costs hypotheses. Easterbrook (1984) suggest in his study that firms pay dividends to reduce the agency costs between the managers and the shareholders. By paying the regular dividend this forces the managers to enter the markets to raise funds and then their actions and plans are scrutinized more carefully than funding the operations and investments with internal funds. Also if investors believe that the

company can utilize the retained earnings at a higher rate of return then they can, then not paying any dividends should increase company's value. On the other hand, if the investors do not see possibilities of more efficient allocation of retained earnings, e.g. the retained earnings are used for empire building; should this decrease the intrinsic value of the common stock.

But firms do have other vehicles to distribute retained earnings to investors than paying dividends, such as buying back their own shares. This is also nowadays in most countries more tax beneficial because usually capital gain taxes are lower than dividend taxation. But these other means than dividends require investors to enter the markets and sell the stocks to realize the earning paid out by the company. In perfect world this also associated with costs: transaction costs for self-made dividend, underwriting costs for tender offer etc. For other investors, such as pension funds and trusts this might be restricted or even forbidden, thus they prefer dividends over capital gains. Jagannathan et al. (2000) studied stock repurchases and dividends in U.S. stock market from 1985 to 1996 and found out that firms increase their stock repurchases disproportionately relative to dividends during booms and reduce them during recessions. Dividends still make up most of the payouts but repurchases contribute much to year-to-year variation. This is explained by the fact that dividends are paid from permanent earnings whereas repurchases are paid out from temporary cash flows such high non-operating cash flows. Firms with higher operating cash flows are more likely to increase dividends, while companies with high non-operating cash flows more likely increase repurchases. Opposite to Jagannathan et al. (2000) Grullon and Michaely (2002) find out that among U.S. firms the primary payout vehicle has shifted from dividends towards stock repurchases. They also found companies that either pay only dividends or pay both dividends and do repurchases are much bigger in size and more profitable than companies that do not use either or use only repurchases. These findings are also associated with high earnings volatility which could imply that the latter group consist younger companies. They also studied the market reaction to dividend cut and concluded that the reaction is less negative when investors perceive that the dividend cut is compensated in repurchases. Renneboog and Trojanowski (2006) studied payout policies in U.K. from 1992 to 2004 and found out rather similar results as in the studies done in U.S. The firms in U.K. use in increasing amount stock repurchase but contrary to the findings in Grullon and Michaely (2002) have not outweighed the dividends as the primary payout method. As in Grullon and Michaely (2002)

firms that execute stock repurchases also usually pay dividends and are bigger in size and more profitable. Very important aspect especially when interpreting the early results is that how market efficiency and market liquidity affects the repurchase decisions. Brockman *et al.* (2008) concluded in their study that stock market liquidity plays significant role in repurchase and dividend iniations. They show that repurchases have recently become important payout vehicle in part of rising stock market liquidity. Also must be noted that there exists much more similarities between U.S. and U.K. than with U.S. and other European countries. The legal system is similar common law system in both U.S. and U.K. while most other European countries have civil law systems. The taxation systems and tax clienteles are different in U.S. and U.K. which could explain the different to some extent but not thoroughly. The taxation issues are discussed in the next chapter.

2.2. Dividend taxation issues

In perfect world the taxation should drive the preferences of investors towards capital gains from dividends due to the higher taxation of dividends, but this has not been the case in real life. It has been said that (depending on the tax burden) one dollar in capital gains equals to $1.67 in dividend payment. Contrary to this general belief Gordon and Bradford (1980) found out that amid stocks listed in New York Stock Exchange (NYSE) from 1926 to 1978 the market regarded the dollar value of dividend as a cyclical path around one for capital gains. Supporting these findings, that the taxation does not provide enough grounds to do draw conclusions that taxes dictate or should dictate dividend policy, also completely other models have been presented.

Porta *et al.* (2000) studied dividend policies of large firms in 33 countries providing no conclusive evidence of different taxation would have effect on dividend policies. Instead they distinguished alternative agency models of dividends. In first, the dividend policy is a result of effective protection of shareholders, which enables the minority shareholders to extract the dividends from the corporate insiders. In the second model, the dividends can be viewed as a substitute for proper legal protection, which permits corporations to establish reputations for good treatment of their owners through dividend policies. Porta *et al.* (2000) find that companies in countries with proper protection of minority shareholders pay higher dividends, regardless of the taxation in the country. In these countries growth companies pay lower dividends than value

companies, which is, according to them, consistent with the idea that that legally protected are willing suspend their income until the investment opportunities are good. In contrary, when investors are legally poorly protected the take whatever dividend they can obtain, regardless of the upcoming and perhaps better investment opportunities.

Even though the tax reasons might be the main driver for a rational marginal investor, academics have suggested that some investors are driven another motives than rational ones. Shefrin and Statman (1984) argue that some investors prefer dividend in spite of the unfavorable tax treatment due to self-control reason. This means that they rather receive dividends than sell the initial holding. Also regret avoidance (Long, 1978) might drive investor's decision as they prefer obligatory dividend to capital gains because selling of stock for "a self-made dividend" before potential bull market. Long argue that investors are willing to accept lower after-tax returns for these reasons. These themes are discussed in the next chapter.

2.3. Behavioral aspects

For almost forty years ago Fama (1970) presented the efficient market hypotheses (EMH) which has ever since been a central proposition for finance until the recent two decades when this theory has been more widely challenged. The EMH states that in larger real-world financial markets, such as U.S. stocks and bond markets are efficient in accordance with the EMH by definition. It states that investors cannot consistently beat the market thus analyzing, selecting and trading securities being just waste of time and money. In the early years of EMH many financial studies found evidence supporting the theory. However, the newer studies have challenged the view of markets being efficient and the behavioral finance field of studies has emerged. Studies have shown that systematic and persistent deviations from efficiency do exist.

The weak form of EMH proposes that investor cannot make excess profits based on past information. De Bondt and Thaler (1985) studied this statement examining two set of portfolios for each year from 1933. The extreme loser portfolio was constructed so that it contained the worst performing stocks over the past three years and the extreme winner portfolio so that it contained the best performing over the last three years. They found that the loser portfolio

outperformed the winner portfolio on average beyond the greater riskiness which investor had to bear for holding loser stocks.

The semi-weak form of EMH has not performed any better which presumes that stock prices adjust to publicly available new information rapidly un in unbiased manner. It implies that neither fundamental nor technical analyses cannot be used to earn consistent excess profits. One of the most recent counterargument for the semi-weak form of EMH is the value investing which is based on the securities fundamentals such as book-to-market ratios. This is discussed in more detail in the next chapter.

One of the oldest theories in finance, yet rarely, mentioned in the academic journals is the price-to-price feedback model (Shiller, 2003). It proposes that as speculative prices go up, it creates economical success for some investors hence attracting public attention promoting word-to-mouth enthusiasm and heightens the expectations of the future prices. When more investors get involved and as the price bidding rounds revolves, it soon creates a speculative bubble. The first and perhaps the most famous speculative economic bubble was the Tulip mania in 1730's. These feedback models could also work in reverse. As the stock prices decline as rapidly as they rise during the speculative bubbles investors and media start to find stocks and securities in each asset class that decline the least. This at first slows down the decline in price of certain stocks and as the major public observe that some stocks or assets decline less than the others, more investors get involved deviating the decline even more. At the end this can result some stocks to yield positive returns without any additional information or change in their outlook.

The theoretical models of efficient financial markets rely on the fact that there exist the marginal trader that can offset action of an irrational investor which prevents mispricing and speculative bubbles. This means that when irrational investor buys an overpriced stock the marginal investor sells or short sells and when irrational investor sells underpriced stock the marginal investors buys it eliminating the effect of the irrational investors on the market price of the stock. From this theoretical point of view the marginal investors has the power the drive the stock price to its fundamental value. However there are many caveats in the theory. The power of the irrational investors might be so strong on the stock price that the rational marginal investor does not allow

to perform the counter buying or selling to fully offset the price effect because of the higher risk. The risk emerges from the limits of the arbitrage. The power of the irrational investors might be se strong that the marginal investors need to bear the risk of holding their position for a long time as the deviation from the intrinsic value lasts. In addition this requires fully functional short-selling markets. If irrational investor is buying overpriced stock it requires for the marginal investor to sell the stock short. And if the mispricing is takes time the rational investor requires risk premium for the possibility that she has to cover the short position. And in many cases these limitations prevents the marginal investors to offset the irrational price movement (Shiller, 2003).

2.4. Growth versus value strategies

Behavioral finance arguments are often used when justifying the discussion and comparison between growth and value companies. In academic literature the firms can be classified as value stocks when they have characteristics such as high book-to-market (B/M), high earnings to price (E/P) or high cash flows to price (C/P) ratios. Many studies have shown that there is a strong value premium on U.S. stocks in average returns (Fama and French [1992, 1996], Lakonishok *et al.* [1994]). For these reasons Fama and French (1995) and Lakonishok *et al.* (1994) offer relative distress as an explanation for the higher average returns. Value companies have consistently low earnings whereas growth firms have consistently high earnings. This distress creates a value premium on the value companies. Lakonishok *et al.* (1994) also argues that the value premium in average returns occur when the market persistently undervalues these distressed value stocks and overvalues growth stocks. As these pricing errors are corrected, distressed value stocks tend appreciate thus having high returns and growth stocks tend to have low returns. Fama and French (1993, 1995, 1996) offer different explanation as they argue that the value premium is compensation for the risk that is not captured by the capital asset pricing model. They developed their Fama-French three factor model which more accurately captures the risks.

Previously value stocks and growth stocks comparison has been conducted only with U.S. data. Fama and French (1998) studied the phenomenon with international data using in addition to the U.S. data also 12 major EAFE[1] countries from 1975 to 1995. They find that internationally value

[1] Europe, Australia and the Far East

stocks tend to have higher returns than growth companies, regardless of the multiple (E/P, C/P or D/P) used. They also find the similar value premium on the emerging markets. They argue that since the results in that study are out-of-sample from the earlier ones done on U.S. data, return premium for value stocks is real. So far some light has been shed on the dividend policy, dividend taxation and the behavioral finance issues and next is discussed whther the dividends able to predict any common stock returns.

2.5. Predictive power of dividends

The issue of whether some variables or factors can be used to forecast stock returns has been studied for many decades. This topic has interested many investors, analysts and academics as they have been trying to find a mechanism which could predict the stock prices. Furthermore, the matter whether dividend yields can be used to forecast stock prices has been researched for fifty years, starting from 1950's when Walter (1956) questioned the relationship between dividend yields and common stock prices. He studied three groups of stock classes: growth stocks, intermediate class and creditor stocks (which could be considered to be close equivalent to value stocks) and the dividend policies in these classes. Even though, Walter (1956) did not try to establish predictions of dividend yields on common stock prices, he tried to understand the relationship between the dividend policy and common stock price.

As in many studies on that field, the results have been mixed also when it comes to the relationship between dividend yield and stock prices. Only small or non-existent positive relationship was shown in Black and Scholes (1974), Campbell and Shiller (1988) and Goetzmann and Jorion (1993, 1995). Black and Scholes (1974) studied with two different time periods: first one was from 1947 to 1966 and the second data set of 1050 firms from 1950 to 1970. They were unable to show in neither of the data samples any differences in dividend yield leading to differences in stock returns. According to the study, this meant, that they did not observe any ability to influence stock price with dividend policy. Black and Scholes considered dividend policy matters only when changing the level of dividend payment, because the market indicates this change as a change in future prospects. This refers to the aforementioned signaling theory. Cambell and Shiller (1988) studied even longer time period from 1871 to 1986 for aggregate U.S. stock markets. They find that a long moving average of real earnings helps to

forecast future real dividends. This earnings variable was proven to be a powerful predictor of the return on stock, especially when the return is measured over longer time period.

Goetzmann and Jorion (1993) questioned the different methods that have been used in those studies which argue for the prediction power of the dividend yields on a common stock price. They used monthly NYSE data from 1927 to 1990 and different statistical methods to re-examine the predicting power of the dividend yields when adjusted for the different caveats in the statistical methods. Findings in their study were that after adjusting the methods correctly there cannot be observed any power of prediction of dividends on common stock prices.

Goetzmann and Jorion (1995) studied the predictive power of dividends on common stock prices for a time long period from 1871 to 1993 with NYSE and UK data. They found mixed results respective to different time periods. The results indicated no predictability on pre-1926 U.S. data, but on the contrary, very strong predictability for post-1926 U.K. data. On the other hand the U.K. results are rather problematic since the coefficients were significant but had negative sign. They found the results to be hardly consistently explanatory, and offer survivorship as one, due to the long time period.

On the contrary, in studies by Fama and French (1988), Hodrick (1992) and Kothari and Shanken (1992) found evidence supporting the positive relationship. Fama and French (1988) studied value-weighted and equally-weighted NYSE portfolio for different intervals from one month to four years. They discovered that dividend yields typically explain less than 5 % of the monthly and quarterly common stock returns. Yet an interesting finding was that dividend yield accounts often more than 25 % of the variance of two- to four-year returns. Hodrick (1992) re-analyzed three different methods forecasting the common stock returns with dividend yields. He tried to undertake the problematic in the models, when executing long term forecasts. What he found was, that the changes in dividend yield can forecast significant and enduring changes in expected common stock returns. Kothari and Shanken (1992) studied stocks listed at either NYSE or American Stock Exchange (AMEX) from 1927 to 1985. They examined to what extent the variables, which were chosen to proxy for expectation of dividends; explain the variation in aggregate stock returns. Their findings were that a simple model accounts for 72 % of the annual

return variation. Kothari and Shanken (1992) also revealed that the marginal explanatory power of the growth rates of industrial production is insignificant when the dividend variables are used. This is consistent with the idea that managers and investors have some ability to make distinction between lasting and temporary components of output in determining prices and dividends. They also carried out a cross-sectional study using portfolios formed on the basis of return performance in a given year, and find that almost 90 % of that variation is due to the dividend and expected return variables.

Researchers have been unable to agree on whether the dividends can explain the future returns. Even if the studies have been conducted mainly on U.S. data, the time periods and methods have varied greatly from study to study. Moreover issue which is not exhaustively discussed here, are the different caveats that can be cast upon the models used in the aforementioned studies. An interesting flavor to these studies has been given when not only studying the dividends explanatory power, but the effect on stock return performance when no dividends are paid at all.

2.6. Zero-dividend companies

Since the first studies academics have been interested in zero-dividend companies. Litzenberger and Ramaswamy (1979; 1982), Blume (1980), Elton *et al.* (1983) and Keim (1985, 1986) found that when adding a coefficient to capture the dividend amount into a after-tax adjusted formulation of the capital asset pricing model (CAPM), the coefficient is significantly positive and increases both the significance and magnitude of the coefficient that captures the excess return of dividend yield and risk-free return. This relation implies that among firms that are paying dividends there is a positive linear relationship between expected returns and dividend yields. If zero-dividend companies are introduced into the sample as an independent factor, the linearity is vanished, since these companies have higher than equilibrium returns in all but the highest-yielding stocks, hence forming a U-shaped form of yields.

Other view to this issue was presented in a study of Christie (1990) where he found that zero-dividend companies actually earn negative excess return. He studied companies from NYSE from 1926 to 1985 and found that the negative excess return is consistent is all size deciles and all months besides January. These results were significantly different from the previous studies.

Although, these differences might be a result from different period studied and other factors, Christie (1990) showed that including zero-dividend stocks into the sample results in rather a natural extension of the yield-return function rather than the U-shaped form, which might have been just a result from the recovering from the Depression.

No study dug into the characteristics of the zero dividend companies. This would be an interesting to investigate since one might assume zero dividend companies possesing completely different qualities multiplewise as the high dividend yield companies. Even though dividend policy is founded on more issues than mere ability to pay dividends, among zero dividend companies this could be driven by inability to do so than just a simple choice. They might be dependent on the cheap external capital, which tend to dry out during bear markets. Furthermore, zero-dividend companies might be riskier in general since their valuation is based on the future prospects which always contain many uncertain variables and are sensitive to change.

2.7. High dividend yield companies during bull and bear markets

Whether beta differs during bull and bear markets has been explored by Fabozzi and Francis (1977) and Moon and Zumwalt (1979) both concluding that the beta values in single-index market model did not differ significantly. Yet, Moon and Zumwalt (1979) showed that, regression coefficients being correct and statistically significant, investors received a premium for accepting a downside risk. Similarly, investors faced negative premium for having upside risk.

Intuitively, since many high dividend yield companies also qualify as value companies; having relatively stable cash flows, high B/M ratios, their performance during bull and bear markets has been particularly interesting topic to explore. Investors could interpret high dividend payments as a signal of lower risk, which is held at value during bear markets. Also high dividend yield can be considered as a buffer to the decline of stock price during the down market. The rationale in this is that the dividend yield provides similar floor to the stock price as does the yield on a convertible bond. Even though the stock prices decline the high dividend yield companies usually have more buffers to sustain the current dividend levels and distribute this cash flow to their shareholders even during the economically hard times.

This has been shown in Gombola and Lui (1993a) where they concluded that high dividend yield had positive relationship with the stock price during bear markets and negative relationship during bull markets for the entire sample period from 1970 to 1984. The results were consistent even after controlling for market risk, firm size and the January effect. In their sequent study (1993b) they studied in addition the dividend size and the dividend stability. Using data set including 1080 companies in U.S. markets from 1969 to 1984 they found out that the risk of stable, high dividend yield stocks could not be adequately explained by beta. They also showed that beta has tendency to increase for the low dividend yield stocks and on the contrary, decrease with the increasing dividend stability. This implies that the higher the dividend yield and the more stable the dividend stream the lower the beta, which makes these stocks having some of the same characteristics as bonds.

With some of the prerequisite qualities fulfilled, dividends could be also considered to be an equity safe haven during bear markets. As aforementioned, dividend yield provides a floor to the common stock return as the yield in a convertible bond. During bull market the capital gains outrun the dividend yield by a wide margin e.g. average annual stock return on the S&P 500 portfolio was 16.6 % during 1980 – 1989 where capital gains contributed for 12.6 % whereas dividend and reinvestments produce only 4.04 %. On the contrary the dividend yield was higher on the previous ten years time period from 1970-1979, where capital gains and dividends and reinvestments were 1.6 % and 5.14 %, respectively, (Binswanger, 1999). The higher dividend yield during bear market can be explained with dividend payout smoothing, where companies with steady cash flow and solid debt structure can manage their way better and induce money from investors with higher dividend yields.

Even though the broad field of academic dividend related study is quite well covered, the studies concentrating exclusively to high dividend yield investment strategy on empirical data have not been very widely explored. Only four academic studies have been conducted and all of these have been done on single stock market and the results have been rather controversial. This might be because of the nature and the level of the market efficiency in the different markets. Also the results might be sensitive to different time periods in which the studies have been done.

2.8. Past studies on high dividend yield investing strategies

First study conducted outside U.S. stock market study was done in the UK stock market where Filbeck and Visscher (1997) studied the efficiency of the high dividend yield strategy in FTSE-100 in the period from March 1984 to February 1994. They constructed their Top Ten Portfolio from ten highest dividend yielding companies out of the one hundred companies included in the FTSE-100 and compared the raw as well as the risk-adjusted returns. Their findings were that Top Ten Portfolio did not perform worse than the market but it did not offer better returns than the market either. The dividend yield strategy beat the FTSE-100 index only on four year out of ten which hardly counts as a consistent outperformance of the market portfolio. The Top Ten portfolio failed to beat market in the longer investing periods as well. They explained their differing results from the previous studies on the different composition of the benchmark index as the previous studies had been made on DJIA data. Due to smaller size of DJIA index it did not cover all the industries, which the larger FTSE-100 did. Moreover, FTSE-100 is value-weighted[2] index whereas DJIA is price-weighted[3], and according to the trading strategy high dividend yield stocks tend to be underpriced thus they have small effect on the index value.

Second study was done again on U.S. data with a longer time period than before. McQueen *et al.* (1997) re-examined the dividend yield strategy with DJIA data for a long time period ranging from 1946 to 1995. They constructed their Dow-10 portfolio of the ten highest dividend yield companies out of the 30 companies included every year in the DJIA. They found out that the high dividend yield strategy has statistically significantly higher average annual returns. This outcome was yet results of superb performance of the Dow-10 portfolio in few subperiods and they were unable to show that this was not occurring by chance. Their contribution to the previous studies was to study whether the average annual return difference is economically significant after adjusting it to high dividend portfolio's higher risk, higher transaction costs and unfavorable tax treatment. Their adjustments, except for the risk, were based on some aggregated assumptions.

[2] A value-weighted index is a stock market index where each stock makes up a proportion of the index in proportion to its value of its outstanding equity.

[3] A price-weighted index is a stock market index where each stock makes up a proportion of the index according to its quoted price. Thus a stock trading at $50 will be making five time more of the total index compared to a stock trading at $10.

They stated that after the adjustments for risk, transaction costs and taxes the difference was not economically significant.

Because of the interesting results of the high dividend yield strategy in the U.S. stock market Filbeck and Visscher (2003) performed a study in the Canadian stock market, on which they constructed the Top 10 portfolio of high dividend yield companies out of the Toronto 35 Index. Their findings were that for the first 10 years from 1987 to 1997 of the index existence the Top 10 portfolio outperformed the benchmark index. The Top 10 portfolio's compounded return was sufficient to compensate for the taxes and the higher transaction costs. They also found that the Top 10 portfolio was better even when adjusted for the risk. Filbeck and Visscher (2003) also repeated the strategy on a larger Toronto Stock Exchange 300 index and found results consistent with the smaller Toronto 35 index. They showed in addition that the high dividend yield strategy was even more efficient when the investing horizon was prolonged from one year into four years. And the performance was even better when the high dividend yield companies were selected out of the larger TSE300 index and held for longer period.

Until now the most recent study is by Brzeszczynski *et al.* (2008) who repeated the Filbeck and Visscher (1997) study in the British stock markets. Unlike Filbeck and Visscher (1997) Brzeszczynski *et al.* (2008) concluded that the dividend yield strategy was able to beat the benchmark index in the entire period from 1994 to 2007. Moreover, the difference was significant both statistically and economically when adjusting for the taxes, transaction costs and risk. They also underlined the importance of the investing horizon, as the high dividend yield portfolios proved to be a profitable investment in the longer run while its return fluctuated more in the shorter periods. The better performance in the longer investment periods might be justified as the excess return of the high dividend portfolio is due to undervaluation of the value companies, and it might take more time to materialize than 12 months.

The past studies have suggested that it might or it might not be possible to beat the market with this strategy, then what could this study do differently? The previous studies have been concentrating on a single market such as U.S., Canada or U.K., which are liquid, large in market capitalization and considered to be highly efficient. I am expanding the field of study by

introducing 16 different stock markets in a one study. This set of countries also include some less liquid, smaller in total market capitalization, and more regulated markets, which could allow, due to market inefficiency, such market strategies to work in practice. Also the time period offers some interesting features. It contains two major booms (IT bubble, pre-subprime crisis) and the two major market crashes followed by those. Also some of the countries, especially Nordic countries, have gone through major deregulation of their financial systems. As explained in the introduction I examine the zero dividend and repurchasing portfolio along the high dividend portfolio. Furthermore, high and zero dividend yield and repurchasing companies posses some interesting qualities, which could justify their different performance during bull market and bear market, making an interesting topic to examine how the performance connects to different market conditions.

3. Hypotheses and research question

Several studies (e.g. Trojanowski & Renneboog, 2006) have shown that companies paying out excess capital to shareholders are usually larger, more profitable, less levered and growing more slowly. Previous studies have shown controversial yet supportive results (Filbeck and Visscher (2003), Brzeszczynski *et al.* (2008)) on whether high dividend yield strategies have beaten the market, although they all have been conducted on single market. Furthermore, the general performance of value strategies motivates to study this specific sub area. Concentrating on the risk-adjusted measures is motivated by the assumption that high dividend yield companies are more defensive and have less earnings and return volatility, which improves their return especially when it is adjusted for the risk. Moreover, in previous studies has been showed that the results are not insensitive to time period so that the results may have developed and changed. The unique characteristics and heterogeneity in European market proposes grounds for my first hypothesis:

> *H1: Portfolio of companies with high dividend-to-price ratio earns higher risk-adjusted returns than market portfolio.*

As aforementioned, the special characteristics of high payout firms provide them to have better means to cope during economic hardships than companies with opposite qualities. High dividend yield companies also benefit from the increased demand during bear market created partially by price-to-price feedback model, which was introduced in Chapter 2.3. Blume (1980) showed that high dividend yield companies outperform low dividend yield companies during bear market. Gombola and Liu (1993) confirmed these findings and noticed in addition a downward shift in betas during bear market. The second hypothesis can be stated as:

H2: High dividend yield companies have lower betas and higher returns in bear market.

It should be noted here that in this study I do not take into account whether the zero dividend policy in a company is a payout choice so that they use other payout vehicles, such as share repurchases, to distribute cash to shareholder or is it just because the companies are unable to pay dividends. Even though it is not as intuitively clear, whether companies with zero dividend policy should hold the opposite characteristics being smaller, less profitable, more leveraged and growing faster, I yet hypothesize that these companies are riskier in respect to higher beta and thus benefiting from the economic upswing and thus outperform the market portfolio during bull market. Blume (1980) found that betas are higher on companies that do not pay or pay low dividends. I hypothesize that that the higher returns in low dividend companies which manifests in the U-shaped relationship between dividend yields and stock returns reported in earlier studies by Blume (1980) and Keim (1985) is due to better performance during bull market. Hence my third hypothesis is:

H3: Zero dividend yield companies have higher betas and higher returns in bull market.

4. Data and methods

In this chapter I present the data and methods used in this study and modification that was done to it. The definitions and risk-adjusted measures are presented in Chapter 4.2. I introduce the four portfolios that I compare and study. I also provide the descriptive statistics of the data which includes country and sector decomposition of the four portfolios. The descriptive statistics is interesting as it shows the heterogeneity and development in European market. The dividend yields and portfolios constituents are examined in the preceding chapter.

4.1. Data description

I use monthly data of companies that are or ever have been listed on stocks exchanges from January 1988 to December 2008 from Thomson DataStream. The data is comprised of 16 countries including all the initial Eurozone countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain) and in addition UK, Switzerland, Sweden, Norway and Denmark. The countries in the study were selected so that they would provide the thorough representation of the current developed European stock markets.

The full data sample comprised of 12,977 companies from the 16 aforementioned countries. From the full sample I will construct a market portfolio ("Euro 750"), which is set up so that for every year the 750 largest companies measured by their market capitalization in the beginning of the year are included in the index. From the 12,977 companies there were 1,886 companies which in included in the Euro 750 at least in one year in the 21 year time period. The Euro 750 is balanced annually 1st of January. The index construction was done as described to reduce the small-firm effect, because even though small firms might have high dividend yields and high returns, they might not provide enough liquidity to actually allow proper investing strategies. Otherwise the distinction between high dividend yield and small-firm effect would be unambiguous.

From the Euro 750 were selected 25 companies which made up the Top Portfolio ("Top 25") and were characterized by the highest dividend yield at the time of rebalancing. The dividend yield

measure was calculated as the rolling 12 previous month's average. This reduces the effect of distorting fluctuation in dividends and the effect of drastic stock price movement onto the dividend yield. The annual balancing of the portfolio was done every year on 1st of April. The annual rebalancing date was selected to be 1st of April because it would then be free of January effect and as it is the first quartile start after 1st of January.

To provide more complete study, I also studied investing strategy where capital was placed in companies that did not pay any dividends at all. This portfolio was called Zero portfolio. Every year on 1st of April from the Euro 750 portfolio the companies that had not paid any dividends in the previous 12 months were selected into the Zero portfolio. The number of companies included every year varied from 29 to 62 companies. This proposes a small caveat to the comparison of the Euro 750 and Top 25 portfolios, but cannot be considered to entirely invalidate the results, especially when the returns were adjusted for the risk.

As discussed in Chapter 2 the companies can use either dividends or stock repurchases to distribute cash to shareholders. The stock repurchase data was acquired from Securities Database Company for all the companies it was available. Out 1880 companies in the total Euro 750 sample 1657 were found on SDC. I looked for M&A actions that were categorized as stock repurchases. The total number of repurchase announcement was 700. The number included intended, withdrawn i.e. repurchase announcements which did not end up in distributing capital to shareholders therefore they were removed from the sample leaving 200 completed repurchases. The repurchase yield was calculated as a fraction of all the repurchase carried out in a year to the market capitalization in the end of that year. That yield was then used in the following year otherwise it would have caused hindsight bias. The Repo portfolio is balanced every year on 1st of April from the Euro 750 portfolio. All of these four portfolios are discussed in more detail later in this chapter.

The return measure is the total return index from Thomson DataStream which calculates the monthly return dividends reinvested. This was considered to give better depict as company value should be at least to some extent be indifferent of the dividend policy. And otherwise each dividend paid out would cause the company value at least theoretically, to drop by the equal

amount on ex-dividend day, which would bias the results towards capital gains as they stay to increase the value of the company whereas paid-out dividends do not.

All the returns and currencies are converted into U.S. dollars and hence the U.S. Treasury 3 months T-bill return is used as the risk free return. The monthly risk free return is calculated by taking the twelfth root of the quantity one plus the 90-day U.S. Treasury bill return each month. The currency conversion is necessary to make the returns from different countries measurable and comparable against each other. The U.S. dollar is obvious choice since all the currencies have (at least a computational) quote against U.S. dollar for the whole 21 years period. Moreover, this solves the problem of the risk-free rate definitions for the different countries, because the U.S. Treasury T-bill can be used as a risk-free rate, instead of having currency-specific risk-free rates for all the currencies.

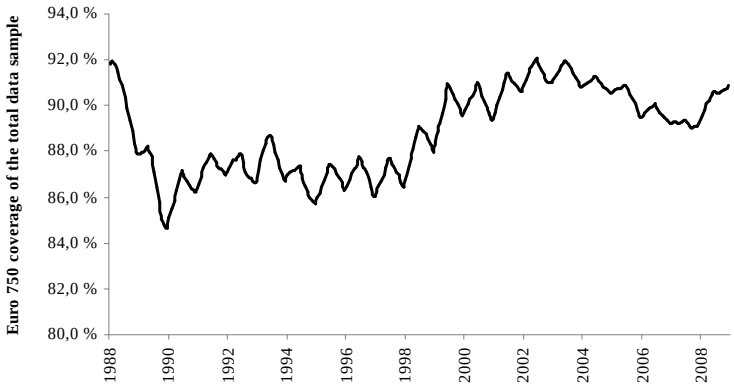
To study the bull and bear market performance the results are broke down into the individual bull market and bear market months and examined again from that perspective. I also will perform different sensitivity analyses to the data. As the small-firm effect and the January effects are controlled by the selection and modification of the data, yet other measures need to be done. To test the other measures I construct and repeat the comparison with longer investing periods where $1,000 was invested in each of the stock and held for a three, ten or 21-year period. Secondly, I study the high dividend yield portfolio with alternative number of companies included in the high dividend yield portfolio i.e. when 50 or 75 highest dividend yield companies were selected. Thirdly, I study alternative definitions for the selections criteria into the high dividend yield portfolio. The last sensitivity test is to examine the different portfolio rebalancing dates when the $1,000 was invested in January, July or October.

Euro 750 representativeness

Out of the 12,977 companies with the adequate information on their common stocks and that are or ever have been listed on the stock exchanges in the 16 countries, only 750 of the biggest measured by their market capitalization were selected into the index. This meant a huge numeral reduction of the companies. Yet, most of the eliminated companies were small and illiquid, meaning that the total representativeness of the Euro 750 remained high. The average coverage of the total market from 1988 to 2008 was 88.8% with the low and high values of 84.2% and 92.5%, respectively.

Even though decreasing the total market representativeness by dropping the smallest companies out of the sample, pursues this a few points. Firstly, some of the smallest companies are so small by their market capitalization that trading with their stock would be impossible for the institutional and wealthier investors, because even a small proportion to be allocated in a larger stock portfolio leads to buying the whole company. Similarly, the small companies might be also very illiquid. So that buying or selling the intended block of shares is not even possible because there are not enough market operators to perform the counter operation, which does not provide fairly executable ground for a proper investing strategy. Thirdly, including only the biggest companies removes the small-firm effect from the results.

Figure 1. The representativeness of the Euro 750 index as of percentage coverage to the all-data sample



4.2. Definitions

In this section I present the measures that I will use in the study. I will use these methods in order have the correct risk-adjusted return as the portfolios are very different by definition and this type of portfolio study is very sensitive to the set-up.

Sharpe Ratio

Although comparison of the raw return data gives some information about the performance of the portfolio, it doesn't give any information about the level of risk contained in the portfolios. The Sharpe ratio emerged with the Capital Asset Pricing model in 1966 to allow better comparison of returns between portfolio managers of similar style. The Sharpe ratio gives the excess return obtained per the unit of total risk to bear:

$$S = \frac{d_1}{s_{d_1}} \times \sqrt{12} \qquad (1)$$

where:

d_1 = mean monthly difference between the portfolio, or market, return and the risk free return (T-bill in this case) calculated over 12 months, 36 months, 120 months or 252 months.

s_{d_1} = the standard deviation of the samples monthly return differences.

The standard deviation captures the total risk, as opposed to systematic or market risk. Thus, the Sharpe ratio gives the better measure of the portfolio performance when the investor is not well-diversified and is hence exposed to some level on idiosyncratic risk.

Jensen's alpha

Jensen's alpha is the average return on the portfolio over and above that predicted by the CAPM, when portfolio's beta and the market return are known. Jensen's alpha gives the excess return when the portfolio is adjusted for the excess risk:

$$\alpha_j = R_i - (R_f + \beta_{iM} \times (R_M - R_f)) \quad (2)$$

where:

R_i = mean return of the portfolio

R_f = mean return of the risk-free asset

β_{iM} = beta of the portfolio

R_m = mean return of the market portfolio

Treynor ratio

Treynor (1966) developed his measure evaluating the mutual fund manager's performance at the same time with the CAPM and Sharpe ratio. Treynor ratio uses systematic risk, which is measured by beta, instead of total risk when calculating the risk-adjusted returns. Thus Treynor ratio gives better measurement of risk-adjusted return when the investor is well-diversified and is not exposed to idiosyncratic risk. Treynor ratio adjusts the excess of portfolio to have same risk as the market portfolio:

$$T = \frac{d_1}{\beta} \quad (3)$$

where:

d_1 = mean monthly difference between the portfolio, or market, return and the risk free return (T-bill in this case) calculated over 12 months, 36 months, 120 months or 252 months.

β = portfolio beta, or market beta (= 1.0)

3.4. Market beta

The beta coefficient measures the extent to which returns of the security and the market move along. Beta coefficient is calculated as a relation of covariance of the security and the market to the standard deviation of the market:

$$\beta_i = \frac{Cov(r_i, r_M)}{\sigma_M^2} \quad (4)$$

where:

r_i = return of a security

r_M = return of the market portfolio

σ_M^2 = standard deviation of the market portfolio

Student t-test

The student t-test was done to test a paired difference with n -1 degrees of freedom. This test is used when there is only one sample (in this case it is the total market portfolio) that has been paired with its subsample (in this case it is the Top 25, Zero and Repo portfolios).

$$t = \frac{\bar{d}}{s_d} \times \sqrt{n} \quad (5)$$

where

$\bar{d}$ = the mean difference between the market and portfolio return in each month

s = the standard deviation of the difference between the returns in each month, and

n = equals the number of months (12, 36, 120 and 252).

Dividend yield

The dividend yield expresses the dividend per share as a percentage of the share price. The underlying dividend intended to represent the anticipated payment over the following 12 months and for that reason may be calculated on a rolling 12-month basis, or as the "indicated" annual amount, or it may be a forecast. It excludes special and once-off dividends.

Dividend yield is calculated on gross dividends (including tax credits) where available except for Germany where the dividend yield excludes the tax credit, which is applicable for domestic investors only.

4.3. Methods

As explained above, I construct the Top 25 of the 25 highest dividend yielding companies every year and the Zero portfolio from the companies that have not paid any dividends in the past 12 month. The Repo portfolio is formed out of companies that have executed stock repurchases in the previous year. Then the returns are compared with the returns of the Euro 750 benchmark portfolio i.e. the market portfolio. I calculate the compound annual return for Euro 750, Top 25, Zero and Repo and then compare the performance of the investment. Since the portfolios are very different, mere comparison of the raw compound returns is not adequate to obtain the robust results. Student's t-test is done in order to find out whether the differences in portfolio returns were statistically significant and not just occurring by chance due to a normal variation. The returns are also compared when adjusted for the risk by calculating Sharpe ratio, Treynor ratio and Jensen's Alpha for Euro 750, Top 25 and Zero benchmark index as described in Chapter 4.2.

The returns were acquired by investing $1,000 in the beginning of the period into Euro 750, Top 25, Zero and Repo after which the portfolio return was calculated for one, three, ten or 21-year investing periods. Moreover, because the choice of 25 companies in Top 25 is more or less arbitrary I repeat all the tests with 50 and 75 highest dividend yield companies included in the portfolio. In same manner the choice of rolling 12 month dividend yield might affect the results thus I repeat the tests with different definitions for the dividend yield.

When studying the bull market and the bear market; the market conditions were defined according to three alternative definitions, which provide classifications for three different time dimension: short-term, intermediate term and long-term.

The first definition is used by Kim and Zumwalt (1979) and Chen (1982). It provides comparison of up markets versus down markets to the risk-free rate in specific month. If the market return exceeds risk-free rate for that month, the month is categorized as an up-market month. If not, it is

categorized as a down-market month. Because the characterization is done separately for each month and it does not take into account any trends, it can be considered as a short-term definition of market movements.

The second definition is used by Cohen, Zinbarg and Zeikel (1973). It defines bull and bear markets more comprehensively and captures the intermediate term trends in market movements. This definition divides the months into bull and bear months depending on the market trends in the surrounding months. Most months are categorized as bull market month, but an up-market month during contiguous down-market months would be defined as bear market month (Fabozzi and Francis, 1977). Since bull market and bear market periods can last for several months, this can be defined as an intermediate term measure of the market movement.

The third definition is used by Weisenberg (1984) and Lockwood and McInish (1990). In this definition a bull market month period starts when the market has moved 10 % from its previous low position. Similarly, a bear market month and period is defined when 10 % decline has been observed from the previous markets' high position. Because a 10 % change may take over a year to materialize, can this definition be considered as a long-term measure of market movement (Gombola and Liu, 1993).

Index description Euro 750

The fact that Euro 750 consists only of the biggest companies measured by their market capitalization affects the Figure 1. Especially during the booms the small companies inflate the market capitalization, which if added to the data would cause the market capitalization to pike and fall more drastically during 2000 and during 2007. Still this did not affect the overall representativeness of the index as discussed in the earlier in this chapter.

From the Figure 1 can be seen IT-boom and the crash from that as well as the steep economic boom after 2003 and the sub prime crisis, which initiated the credit crunch and world recession after it. At the peak of the graph in 2007 the index had 14-folded since the start in 1988. The graph also follows adequately well the more recognized Dow Jones STOXX and MSCI US dollar

nominated European indexes. This is in spite of the fact that aforementioned indexes use other, more complex methods to create and balance the index than just changes in market capitalization. These criteria are such as maintaining certain country representation and industry focus. So even though Euro 750 is balanced without any of above mentioned criteria, it is sufficient to act as developed European index portfolio.

The European stock markets and financial system was very different in 1988 from the one that it is today. As can be observed from the Table 1 in 1988 42.4% of the companies and 46.9% of the total market capitalization came from the United Kingdom. The second largest markets by the market capitalization were Germany and France, counting 15.7% and 9.6% of the index, respectively. These three countries accounted for almost three quarters of the total European stock markets in 1988. These countries were also the most developed, liquid and efficient stocks markets in Europe. There were two countries, Luxembourg and Portugal, which did not have sufficiently large companies to be included into the index.

Figure 2. The market capitalization of the Euro 750 index from January 1st 1988 to December 31st 2008

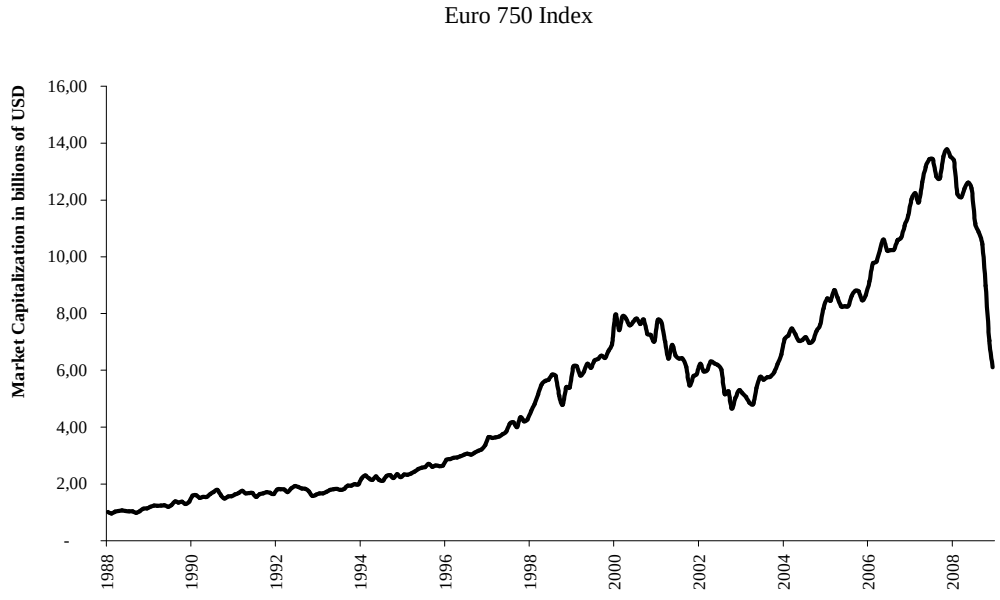


Figure 2 shows the development of the market capitalization of companies included in the Euro 750 from 1988 to 2008.

Table 1. Description of the Euro 750 Index (as of 1st of April 1988 and 1st April 2008)

	1988			2008		
Country	No. of companies	Total market cap.	Average company size	No. of companies	Total market cap.	Average company size
Austria	10	3.88	0.39	18	187.02	10.39
Belgium	24	22.29	0.93	19	259.38	13.65
Denmark	14	6.59	0.47	20	182.60	9.13
Finland	1	0.37	0.37	20	300.25	15.01
France	79	96.69	1.22	114	2 553.00	22.39
Germany	93	158.22	1.70	91	1 871.10	20.56
Ireland	9	3.81	0.42	10	87.61	8.76
Italy	60	65.92	1.10	58	914.82	15.77
Luxembourg	-	-	-	9	86.46	9.61
Netherlands	31	81.65	2.63	39	904.37	23.19
Norway	8	4.31	0.54	17	254.03	14.94
Portugal	-	-	-	10	99.41	9.94
Spain	31	34.11	1.10	60	1 016.23	16.94
Sweden	17	15.68	0.92	31	398.28	12.85
Switzerland	55	43.02	0.78	61	1 069.66	17.54
United Kingdom	318	473.62	1.49	173	3 208.72	18.55
Sum	750	1 010.17	-	750	13 392.96	-
Average	53.57	72.15	1.00	46.88	837.06	14.95

Table 1 shows the number of companies included into the Euro 750 index. It also shows the total market capitalization in billions of U.S. dollars of each country in the index. Average company size is in billions of U.S. dollars and is calculated as the total market capitalization divided by the number of the companies.

In 2008 United Kingdom corresponded only of 23.07 % of the total number the companies and 23.96 % of the total market capitalization. Also other noticeable changes has taken place. France has outgrown Germany measured both in the number of companies or the total market capitalization. Now France contributes 19.06 % of the European markets whereas Germany does only for 13.97 %. Also the dominance of these three countries has eroded as they only account for half of the total market capitalization, which is due to arise of new, now more liquid, efficient and larger stock markets. The total market capitalization of the developed European market has 13-folded by 2008 before the sub prime crisis. This was also seen from the Figure 2. The average company size has grown even more as it is 15-fold in 2008 compare to 1988.

Table 2. Euro 750 Country decomposition of the average dividend yields

Country	Average dividend yield 1988	Average dividend yield 1998	Average dividend yield 2008
Austria	2.10 %	1.01 %	2.59 %
Belgium	2.86 %	1.70 %	3.76 %
Denmark	1.80 %	1.33 %	1.95 %
Finland	0.96 %	2.65 %	4.55 %
France	3.83 %	2.23 %	3.13 %
Germany	2.55 %	1.62 %	2.45 %
Ireland	3.53 %	1.94 %	3.63 %
Italy	3.54 %	1.01 %	4.27 %
Luxembourg	-	1.82 %	1.41 %
Netherlands	3.99 %	2.09 %	2.91 %
Norway	3.67 %	1.81 %	3.31 %
Portugal	-	0.97 %	3.72 %
Spain	2.57 %	1.67 %	2.68 %
Sweden	2.35 %	2.06 %	3.70 %
Switzerland	1.88 %	1.26 %	2.08 %
United Kingdom	3.93 %	3.06 %	3.36 %
	-		
Average	2.83 %	1.77 %	3.09 %
Median	2.71 %	1.76 %	3.22 %

The average dividend yields were calculated on 1st of April in every year shown in the table. The average dividend yields were calculated as a unweighted average in a respective country. The zero-dividend companies were also included in to the equation. Luxembourg and Portugal were not included in the index in 1988, thus lacking the value.

This difference between the growth of total market capitalization and average company size could be derived to index composition. As only the biggest companies from each country are selected in the index it does not provide accurate depiction of the average company size in respective country.

Table 2 provides a country decomposed outlook onto the dividend yields in different countries in the Euro 750 index. The Table 2 shows, that dividend yields in different countries are somewhat stable and no country significantly stands out from the general population. The largest dividend yield in 1988 was in Netherlands, where the average dividend yield was 3.99% and lowest

dividend yield was in Finland amounting 0.90%. In 1998 the largest dividend yield was in United Kingdom where it was 3.06% and lowest was in Portugal 0.97%. In 2008 the highest dividend yield was paid in Finland as the average dividend yield was 4.55% and the lowest dividend yield was acquired in Luxembourg where the average dividend yield was only 1.41%. Also when looking into the changes in the dividend yields between the time periods some very noticeable changes can be observed. For example, in Finland the average dividend yield has almost quadrupled from 1988 to 2008 whereas in other countries the dividend yields have grown but still on average only by 33%.

Different issues drive the dividend policies in different countries. The general economic situation defines some boundaries to the amounts that can be paid out to the shareholders as dividends. If the economic cycle is in a favorable position in a certain country, the companies can distribute the excess cash to their shareholders more easily than in the times when the country is going through hard times. The investor behavior might also drive the companies' preferences whether to distribute excess cash as dividends, stock repurchases or capital gains. Yet probably the most influential reason for the investor behavior and the dividend yield levels and thus to changes in the dividend yields is derived from the respective legislation and dividend taxation. The thorough discussion behind this is beyond on the scope of this study.

Index description Top 25 portfolio

The country decomposition of the Top 25 portfolio reveals the true heterogeneity in the Europe wide sample, which can be seen in Table 3. In 1988 Top 25 portfolio included companies from only five countries of out 16. In 2008 the Top 25 is more diversified in country-wise as is the Euro 750 index. Now companies from 8 countries are included in the Top 25 portfolio. In 1988 48% of the companies in Top 25 portfolio came from France. This is quite noticeable as France made up only 10.5% of the Euro 750 index. Second largest number of companies into the Top 25 portfolio came from United Kingdom with 6 companies. When measured by the average size of the companies, the companies from France and United Kingdom equal pretty well with average size 1.07 and 1.01 billion US dollars, respectively. The small numeral size of Top 25 means that even in the most balanced scenario not even two companies from the same country are selected.

Table 3. Description of the Top 25 Portfolio (as of 1st of April 1988 and 1st April 2008)

	1988			2008		
Country	No. of companies	Total market cap.	Average company size	No. of companies	Total market cap.	Average company size
Belgium	-	-	-	3	77.33	25.78
Denmark	-	-	-	1	6.00	6.00
Finland	-	-	-	1	15.84	15.84
France	12	12.83	1.07	3	97.91	32.64
Italy	4	2.49	0.62	4	80.51	20.13
Netherlands	2	4.51	2.25	-	-	-
Norway	1	0.37	0.37	1	3.51	3.51
Spain	-	-	-	3	14.64	4.88
United Kingdom	6	6.04	1.01	9	158.98	17.66
Sum	25.00	26.23	-	25.00	454.72	-
Average	5.00	5.25	1.06	3.13	56.84	15.80

Table 3 shows the number of companies included into the Top 25 index both in 1988 and 2008. It also shows the total market capitalization in billions of U.S. dollars of each country in the index. Average company size is in billions of U.S. dollars and is calculated as the total market capitalization divided by the number of the companies.

This could result in extreme cases and returns. Furthermore, as the overall population of 16 different countries means 16 different investment environments and tax systems, the portfolio selection does not take into account any relative dividend yields across countries. This implies that even though a company pays twice the dividend to its stock price compared to average e.g. in Norway, it would not be included in the index if the dividend yield europewide is still low.

If these differences within the Top 25 are examined, can be observed that only two companies from Netherlands made to the 1988 Top 25 portfolio but the average size of those two companies was almost twice the size of the average company from France and United Kingdom. In 2008 the number of the companies from United Kingdom had outgrown the companies from France. But companies from France are on average bigger when measured by their total market capitalization. This was greatly because Top 25 portfolio included in 2008 France Telecom which was 26th largest company measured by its market capitalization at the time.

Table 4. Top 25 country decomposition of the average dividend yields

Country	Average dividend yield 1988	Average dividend yield 1998	Average dividend yield 2008
Belgium	-	-	7.77 %
Denmark	-	-	4.03 %
Finland	-	-	6.82 %
France	9.56 %	7.45 %	8.70 %
Italy	9.28 %	-	11.62 %
Netherlands	8.21 %	6.52 %	-
Norway	18.64 %	6.30 %	14.40 %
Spain	-	-	8.11 %
United Kingdom	8.63 %	6.35 %	8.51 %
Average	9.55 %	6.62 %	8.88 %
Median	9.28 %	6.44 %	8.31 %

The average dividend yields were calculated on 1st of April in every year shown in the table. The average dividend yields were calculated as a unweighted average in a respective country. The zero-dividend companies were also included in to the equation. Luxembourg and Portugal were not included in the index in 1988, thus lacking the value.

On average the companies in Top 25 portfolio are only slightly bigger in size. This is yet consistent with the idea that companies that pay bigger dividends are more mature, established and larger companies (e.g. Trojanowski & Renneboog. 2006). The difference is almost 6% but still so small that any far-reaching conclusions cannot be based on this finding. This difference remains quite the same and is approximately 6% also in 2008. However since the size difference is not any bigger, it can be argued that the results are not driven by the larger or smaller size of the companies, which increases the causality of pure dividend yield to the investor profits.

Table 4 presents the country decomposed average dividend yields in Top 25. It provides an interesting comparison with the average dividend yields in Euro 750 in Table 2. In each of the time points the average dividend yield in Top 25 is almost three times the dividend yield in Euro 750. The comparison shows also the extreme dividend yields such the Storebrand ASA from Norway which had average dividend yield amounting 18.64% even though the average dividend

yield in Norway was 3.67%. A Norwegian company offers extreme value again in 2008 when Frontline Ltd. is included as the only Norwegian company in Top 25. It has an average dividend yield of 14.40% while the average dividend yield in Norway in 2008 was 3.31%.

The Top 25 portfolio illustrates similar curtsy in the average dividend yields in 1998 as the Euro 750 portfolio. Yet the ratio remains at 3-to-1 in size. The moving average of dividend yields removes the absolute extreme values from the Top 25 and from the Euro 750. The lowest 12-month average dividend yield in 2008 was 4.03% which is quite close to the 3.09% average dividend yield in Euro 750.

Index description of Zero portfolio

Because of its definition[4] the composition in Zero portfolio varies more than in Euro 750 and in Top 25 portfolios e.g. Zero portfolio contained only 29 companies in 1991 and 62 companies in 2004. Also the definition does not take into account whether company had paid only one dividend in the 12 month period. It is still classified as dividend-paying company. Also the definition does not lay any restrictions on the size of the companies. Nevertheless even the smallest companies in Euro 750 are rather large in overall scale.

Table 5 shows that the Zero portfolio contained companies from all the other 16 countries except Finland, Luxembourg and Portugal in 1988. Finland and Portugal remain to be excluded from the Zero portfolio in 2008 as well. Altogether in 1988 Zero portfolio comprised of 42 companies. The largest number of companies came from France, Switzerland, United Kingdom and Germany with 8, 7, 7 and 6 companies, respectively. This group forms 65.12% of the total number of companies. When the proportion of this group's total market capitalization is examined in 1988 they comprise a share of 67.48% of the total market capitalization. In 2008 these four countries still make up the largest proportion both in numbers and in market capitalization. However, now they comprise only 55.10% when ranked in number of the companies and 50.04% when measured by their total market capitalization, which is similar as in the Euro 750.

[4] Every year on 1st of April from the Euro 750 portfolio the companies that did not pay any dividends in the previous 12 months were selected into the Zero portfolio

Table 5. Description of the Zero Portfolio (as of 1st of April 1988 and 1st April 2008)

	1988			2008		
Country	No. of companies	Total market cap.	Average company size	No. of companies	Total market cap.	Average company size
Austria	1	0.17	0.17	1	8.11	8.11
Belgium	1	1.62	1.62	1	2.43	2.43
Denmark	1	0.06	0.06	4	31.84	7.96
France	8	8.53	1.07	5	16.67	3.33
Germany	6	3.26	0.54	6	20.33	3.39
Ireland	1	0.23	0.23	1	4.58	4.58
Italy	3	1.77	0.59	2	4.34	2.17
Luxembourg	-	-	-	2	13.56	6.78
Netherlands	1	0.29	0.29	4	26.48	6.62
Norway	2	0.52	0.26	3	8.71	2.90
Spain	2	1.40	0.70	3	9.90	3.30
Sweden	3	4.38	1.46	1	3.25	3.25
Switzerland	7	3.13	0.45	8	40.34	5.04
United Kingdom	7	6.72	0.96	8	36.03	4.50
Sum	43.00	32.07	-	49.00	226.58	-
Average	3.31	2.47	0.65	3.50	16.18	4.60

Table 5 shows the number of companies included into the Zero portfolio both in 1988 and 2008. It also shows the total market capitalization in billions of U.S. dollars of each country in the index. Average company size is in billions of U.S. dollars and is calculated as the total market capitalization divided by the number of the companies.

An interesting, however not surprising, observation is that the average company size is significantly smaller in Zero portfolio than in Top 25 or in Euro 750 portfolios. In 1988 the average company size in Zero portfolio was almost 40% smaller than in Top 25 portfolio and 35% smaller than in Euro 750 portfolio. In 2008 this difference has spread even further and it is compared to Top 25 portfolio 71% and to Euro 750 it is 69%. This supports the idea that companies that do not pay any dividends are smaller in size and still growth stage in their business life cycle (Trojanowski & Renneboog. 2006). Moreover, this difference is much larger than the positive size difference between Top 25 and Euro 750.

Index description of Repo portfolio

Since stock repurchases have increased in Europe not until 1997, it is not relevant to show descriptive statistics from the first decade. Also as the number of the companies varies even more than in Zero portfolio proper comparison to the other portfolios is challenging yet adds value to the study. The study by von Heje and Meggingson (2008) showed that stock repurchases have increased more compared dividends as payout vehicle, leaving stock repurchase out of the study would leave some aspects unexplored. Table 6 shows the concentration of stock repurchases to occur only in few countries. In 1997 altogether eight companies completed stock repurchases and those eight companies came from just three different countries. These results are motivated mainly on legislation. In some countries (e.g. Germany and France) stock repurchase have been illegal until recently and in other countries taxes on dividends are much higher than on capital gains (e.g. the Netherlands) but there exist specific tax provisions to discourage stock repurchases. Also in many European countries companies do not have to disclose their stock repurchase authorizations and they are only mentioned in the annual report if completed.

Even though the small number of sample companies in Repo portfolio makes the results rather sensitive and one must be careful when drawing very far-reaching conclusions, it is noticeable that in 1997 the repurchasing companies are bigger in market value than in Euro 750, Top 25 or Zero portfolio. The average size of repurchasing company was almost twice the size of an average company in Top 25 portfolio. Even when Barclays PLC, which had market value of 25.3 billion USD and contributed 54% of the total portfolio size, is removed from the comparison the average company size in Repo portfolio stays 40% higher than in Top 25.

In 2008 the changes in legislation enabled companies better to utilize stock repurchases as payout vehicles and now the Repo portfolio held 15 companies from seven different countries. Although the size comparison is under same caveats as in 1997, the average company size in Repo portfolio is 48% higher than in Top 25, which implies that companies which repurchase their own stock are bigger in size than companies which pay out large dividends relative to their stock price.

Table 6. Description of the Repo Portfolio (as of 1st of April 1997 and 1st April 2008)

	1997			2008		
Country	No. of companies	Total market cap.	Average company size	No. of companies	Total market cap.	Average company size
France	-	-	-	1	4.04	4.04
Germany	-	-	-	1	2.43	2.43
Italy	-	-	-	1	85.84	85.84
Luxembourg	-	-	-	1	11.52	11.52
Netherlands	2	3.5	1.75	6	148.96	24.83
Switzerland	1	3.6	3.62	2	49.92	24.96
United Kingdom	5	39.8	7.97	3	28.83	9.61
Sum	8.00	46.96	-	15.00	331.54	-
Average	2.67	15.65	4.45	2.14	47.36	23.32

Table 6 shows the number of companies included into the Repo portfolio both in 1997 and 2008. It also shows the total market capitalization in billions of U.S. dollars of each country in the index. Average company size is in billions of U.S. dollars and is calculated as the total market capitalization divided by the number of the companies. The first year is 1997 because it is the first time portfolio contains more than four companies.

Additional index comparison

The Euro 750, Top 25, Zero and Repo portfolios differ in many other ways than just in country decomposition and size measured in market capitalization. Thus it is interesting to investigate the break-down between different industries, since it might help to explain both the results and the aforementioned descriptive statistics. Furthermore, the number of companies in the portfolios is different. Euro 750 and Top 25 have 750 and 25 companies included in the portfolio every year, respectively, but Zero and Repo portfolio have varying number of companies which in any case is remarkably lower than in the Euro 750 index. This has direct connection to the economical significance of the results since the annual turnover of the companies is much smaller in the large Euro 750 portfolio than in the three other smaller portfolios. This is intuitively reasonable since the rebalancing in Euro 750 is done according to total market value of the companies which fluctuates less then the restriction of companies having paid high or no dividends or had executed stock repurchases in the past 12 months.

Table 7. Index constituents' turnover in Euro 750, Top 25, Zero and Repo Portfolio

Number of years in the index	Euro 750	Top 25	Zero	Repo
15 to 21	403	0	1	0
8 to 20	450	9	13	0
1 to 7	1027	215	396	75
Annual turnover	11.9 %	42.7 %	43.4 %	89.3 %
Av. years in the index	8.38	2.34	2.31	1.32

Table 7 shows the number of companies as they appear in the index. The annual turnover is calculated is calculated as a relation of the average number of the companies during the 21 year time period to the number of companies in every single year.

The turnover on the other hand has a positive relation to the transaction costs as in the smaller portfolio a large proportion of the stocks must be sold and the newcomers must be bought every year or at the rebalancing point.

As can been seen from the Table 7 the annual turnover is almost four times smaller in Euro 750 than in Top 25 and Zero portfolios and almost nine times smaller than in Repo portfolio. Moreover, no company stays in the Top 25 portfolio for the full time period i.e. 21 years or even for 15 years. Zero portfolio has only one company, Eurotunnel S.A., which remains in the index for 17 years. In Euro 750 21.7% of the companies are in the index for 15 to 21 years. The average years that a single company is included in the portfolio are in Euro 750 8.38 years which 3.5 times longer than the 2.34 years in Top 25 and 2.31 years in Zero portfolios. Repo portfolio is completely different from its peers since no companies stays in the portfolio over four years and even in that case the time in the portfolio is not consecutive. The annual turnover is almost the double to Top 25 and Zero portfolio which depicts the fluctuation and flexibility in stock repurchase compared to dividend policies.

Table 8. Sector break-down of Euro 750, Top 25, Zero and Repo Portfolio (as of 1st of April 1988 and 1st April 2008)

	1988			2008			
Country	Euro 750	Top 25	Zero	Euro 750	Top 25	Zero	Repo
Basic Materials	5.9 %	-	11.6 %	7.2 %	-	9.3 %	13.3 %
Consumer Goods	14.3 %	12.0 %	11.6 %	10.4 %	-	7.0 %	6.7 %
Consumer Services	14.0 %	12.0 %	7.0 %	12.8 %	24.0 %	16.3 %	20.0 %
Financials	26.5 %	52.0 %	25.6 %	25.9 %	40.0 %	20.9 %	26.7 %
Healthcare	2.4 %	-	-	4.1 %	-	7.0 %	-
Industrials	25.1 %	-	18.6 %	19.5 %	4.0 %	18.6 %	13.3 %
Oil & Gas	3.2 %	16.0 %	14.0 %	5.9 %	8.0 %	18.6 %	-
Technology	1.6 %	4.0 %	7.0 %	3.2 %	-	9.3 %	6.7 %
Telecommunications	1.3 %	-	-	3.1 %	16.0 %	4.7 %	6.7 %
Utilities	3.5 %	4.0 %	-	6.7 %	8.0 %	2.3 %	6.7 %
Unclassified	1.5 %	-	4.7 %	0.7 %	-	2.3 %	-
Average	9.0 %	16.7 %	12.5 %	9.0 %	16.7 %	10.6 %	12.5 %
Median	3.5 %	12.0 %	11.6 %	6.7 %	12.0 %	9.3 %	10.0 %

Table 8 shows the break-down into ICB sectors in Euro 750, Top 25, Zero and Repo portfolio in 1st of April 1988 and 1st of April in 2008. Repo portfolio has values only in 2008 since it had only one company in 1988.

Looking into the sector break-down of the portfolios in Table 8 reveals that the sector composition has remained quite stable in absolute terms at first glance. When examining more carefully the structural change can be observed. For example, the Consumer goods and Industrials sector have decreased by 27.1% and 22.3%, respectively, whereas Healthcare, Oil & Gas, Technology, Telecommunications and Utilities have developed and grown on average by 95.6%. In 1988 this aforementioned group accounted for 12.0% of total sectors and in 2008 this was almost doubled to 22.9%.

In 1988 the most of the highest dividend yields in Top 25 were in Financials sector, which accounted for over half of the sectors in Top 25 portfolio. Even though the weight of Financials sectors has decreased in 21 years, it still comprises 40.0% of the sectors in Top 25 portfolio in 2008. Together with Consumer Services and Telecommunications rises the sector sum to 80.0%.

Noticeable is that this 80% provide services rather than goods. The reasons behind this are numerous as it might be because of the capital intensity of other sectors or that companies providing services had accumulated large reserves of cash that is then possible to distribute to the shareholders as no real investment opportunities are available.

In Zero portfolio the development of the sectors follows pretty close that of Euro 750. Here interesting is that in 1988 the Oil & Gas and Technology sectors are more strongly represented than in Euro 750 portfolio. This might base to the same but opposite reasoning as in Top 25 that these two sectors require large amount of capital which is needed to invest and thus cannot be distributed to the shareholders. The sectors providing services are on contrary underrepresented in Zero portfolio compared to Euro 750.

Repo portfolio is quite diversified sectorwise even though it held only 15 companies in 2008. From those results cannot be drawn any conclusions that stock repurchases would be concentrated to any specific sectors.

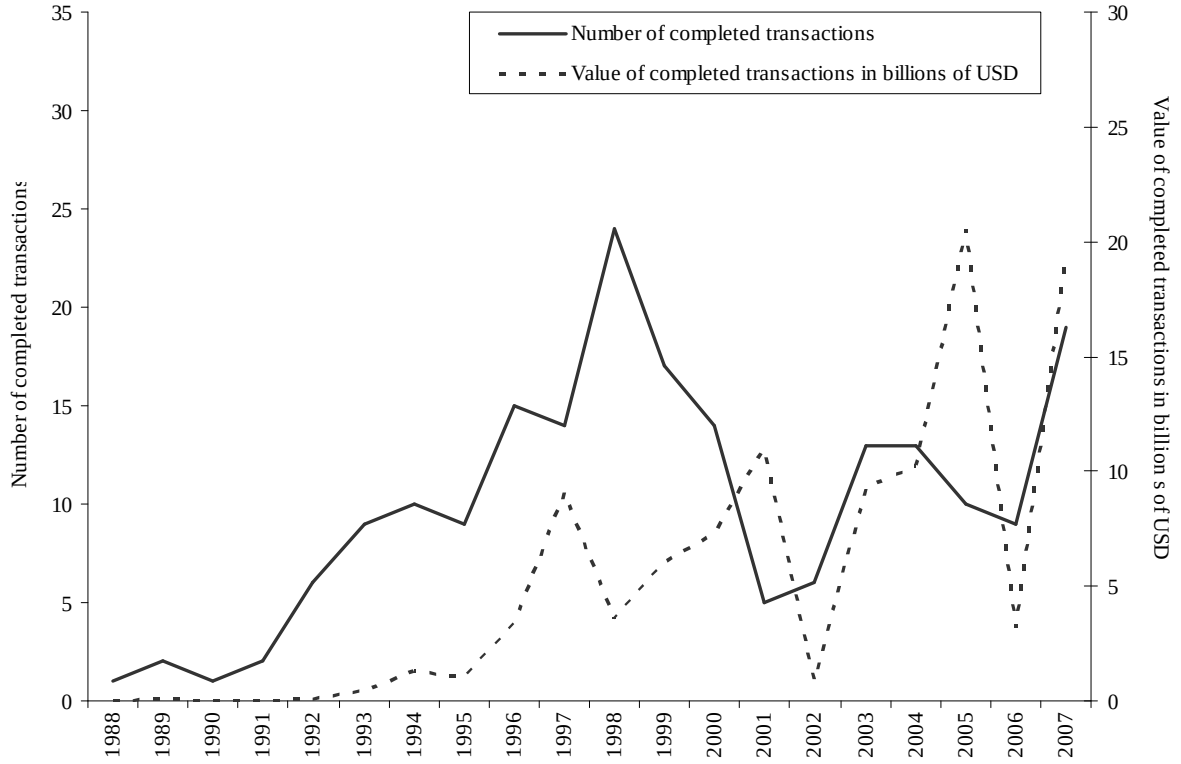
Stock repurchases versus dividends in Europe

Figure 3 depicts the number and the USD value of completed stock repurchase transactions in Europe from 1988 to 2008. Two interesting observations can be seen. First, the number of completed stock repurchases started to increase in the early 1990's but the value of those transactions not until 1997. Before 1991 there was only four stock repurchases completed and they all were done in U.K. The total value of those four transactions was $128.38 million so they were very small compared to the paid dividends which in the same time period amounted $1,489.25. Second observation relates to the finding documented in the past studies that both the number and the value of the completed transactions fluctuate greatly over the years. These findings are similar those in Jagannathan *et al.* (2000) where they studied stock repurchase in U.S. stock market. They concluded that firms use stock repurchases relatively more during booms and reduce them during recessions. Even though, Jagannathan *et al.* studied different time period from 1985 to 1996 the results are very different from U.S. market to European. In U.S. market 55% of the repurchase announcements were actually carried out whereas in my study

from 1988 to 2008 only 22 % of the authorizations were executed. Furthermore, the difference in size of the completed transactions is enormous between U.S. and Europe. From 1988 to 1996 in U.S. the size of the completed transactions was $229 billion compared to $0.7 billion ($1.5 billion total authorizations) in Europe. These results might derive from various sources but Grullon and Michaely (2002) concluded that U.S. corporations have substituted dividends with stock repurchases. And this is especially the case with established companies. They also concluded that dividends and stock repurchases and substitutes rather than complements in U.S. companies.

This fluctuation is especially noticeable when compared to the development of the dividend payments which are represented in Figure 4. The total dividend payments has increased steadily at an annual rate of 14.58%. This is almost double the rate at which dividend grew in U.S. between 1980 to 2000 in Grullon and Michaely (2002).

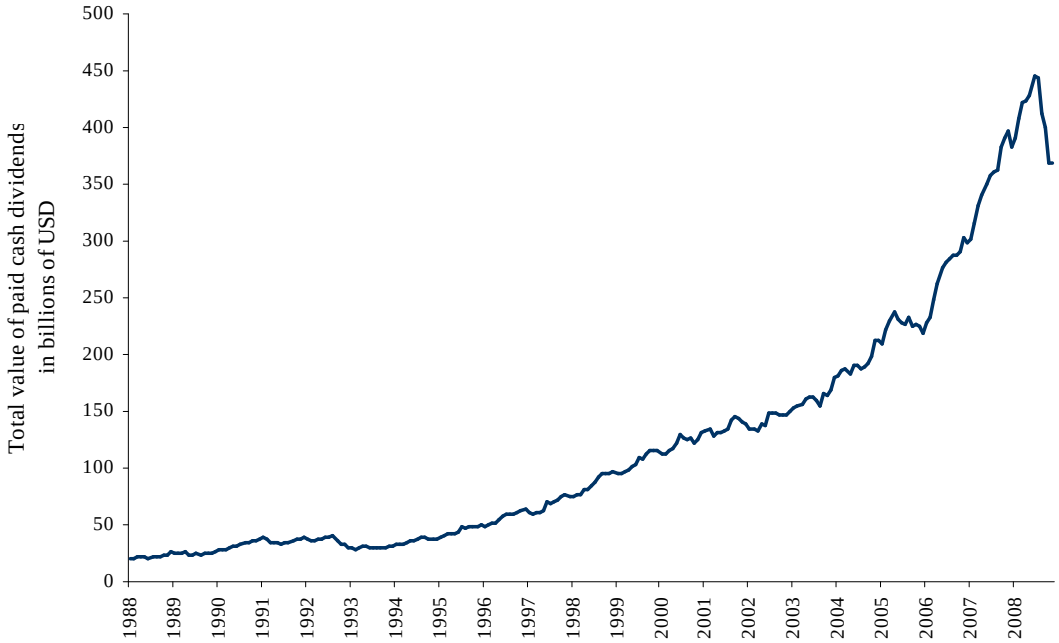
Figure 3. Development of stock repurchases in Europe in 1988 – 2007



The dividends adjust to booms and recessions but changes are much more modest. From the figure 4 can be seen that dividend payments follow rather closely the overall performance of the stock market which can be seen in Figure 2. The logarithmic development (not disclosed here) confirms the same steady growth in dividends

The dividends differ as well from the Jagannathan *et al.* (2000) but the difference is not as drastic. U.S. companies paid out cash as dividends from 1988 to 1996 altogether $1040 billion whereas respective amount for European companies was $316 billions. Noticeable is yet the proportion of repurchases compared to dividends. While in U.S. the companies paid 20% of their cash distribution in form of stock repurchases at the same time European companies paid only 2.02% as stock repurchases. Still this is inline with the Figure 3 where it is very distinctive that the total level of stock repurchases was very low before 1997 where after the level has fluctuated over the years but on average steadily increased. In Appendix D is presented in Figure 3 the comparison of dividends, announced stock repurchases and completed repurchases in Euros. The figure follows similar pattern as in von Heje and Meggingson (2008).

Figure 4. Development of paid cash dividends in Europe 1988 - 2008



5. Results

5.1. Europe wide study

In this chapter the results from the study are presented. The Euro 750, Top 25, Zero and Repo portfolio results are compared with four different measures. First, in Table 9 are the raw annual returns where no adjustments to the risk have been made. In Table 10 the portfolio returns are adjusted with Sharpe ratio. This measure adjusts the additional volatility investor bears when holding an undiversified portfolio. Third, in Table 11, are the risk-adjusted Treynor Ratios where returns are adjusted to the overall riskiness of the portfolio and Jensen's alpha values that are in Table 12 and depict the excess returns over the ones predicted by the CAPM.

Raw annual returns

In Table 9 are presented the raw yearly compounded returns for the Euro 750, Top 25, Zero and Repo portfolios. Total payout ("Total Payout") portfolio is also calculated which is a combination of Top 25 and Repo portfolios[5]. Table 9 shows the comparison of portfolio returns where $1,000 was invested in each of the portfolio according to their portfolio descriptions in Chapter 4.1. In Table 9 is shown the portfolios volatility excess to Euro 750 and the t-statistics.

The highest full period average return is earned in Total Payout portfolio and on average the yearly returns of Top 25 portfolio is 320 basis points higher than in Euro 750 portfolio. The difference is even higher when comparing Top 25 to Zero or Repo portfolio. Also the annualized return calculated from the 21-year period monthly returns is 136 bps higher than Euro 750 and 776 bps higher than Zero portfolio's. Zero and Repo portfolios earn negative annualized return which means that if investor used this strategy for the 21-year period, she would have ended up with less nominal amount of cash in 2008 than she originally invested in 1988. Noteworthy is that although Top 25 does better in returnwise (excluding Total Payout portfolio); it also has smaller volatility

[5] Total payout was calculated with similar principles as Top 25 but the ranking measure was the sum of dividend yield and repurchase yield. The repurchase yield was calculated as a sum of repurchases carried out in one year divided by the market value in the end of that year.

Table 9. Raw compound returns of the Euro 750, Top 25, Zero and Repo portfolios 1st April 1988 - 1st of December 2008

						t-test			
Year	Euro 750	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout
1988	34.2 %	51.4 %	54.6 %	-6.3 %	51.4 %	-2.16*	-2.72*	1.01	-2.27*
1989	9.2 %	9.5 %	28.4 %	22.7 %	18.0 %	0.02	-2.11*	-1.07	-1.03
1990	-14.7 %	-10.9 %	-26.6 %	-45.6 %	-10.8 %	-0.77	1.78*	1.08	-0.69
1991	12.2 %	-8.6 %	0.3 %		-3.2 %	1.53*	1.46*	0.64	0.99
1992	16.3 %	24.4 %	10.0 %	-50.9 %	14.5 %	-0.89	0.97	1.11	-0.29
1993	37.2 %	110.9 %	26.8 %	86.2 %	106.4 %	-3.39*	1.09	-1.77*	-3.34*
1994	-17.0 %	-23.0 %	-20.3 %	-13.5 %	-21.3 %	0.85	0.99	-0.42	0.66
1995	15.6 %	10.5 %	-2.7 %	27.0 %	9.0 %	0.38	2.24*	-0.79	0.65
1996	32.3 %	42.2 %	28.6 %	-5.1 %	45.4 %	-1.06	0.38	0.78	-0.19
1997	36.0 %	22.0 %	39.9 %	38.9 %	32.4 %	0.88	-0.29	-0.19	0.29
1998	-2.3 %	-27.7 %	16.7 %	-7.0 %	-30.6 %	1.47*	-1.36	0.26	1.63*
1999	37.1 %	14.1 %	53.6 %	-5.5 %	-4.1 %	1.26	-1.09	3.01*	2.03*
2000	3.9 %	41.6 %	-44.8 %	19.5 %	40.7 %	-2.81*	3.96*	-0.95	-2.49*
2001	-7.8 %	9.1 %	-27.2 %	2.9 %	9.0 %	-1.36*	1.18	-0.92	-1.43*
2002	-43.2 %	-34.2 %	-50.7 %	-43.6 %	-31.8 %	-1.61*	0.72	-0.53	-1.88*
2003	26.7 %	12.4 %	35.5 %	19.8 %	64.2 %	1.12	-0.84	0.08	-1.98*
2004	9.2 %	11.0 %	-2.1 %	6.4 %	4.8 %	-0.23	1.99*	0.46	0.52
2005	41.0 %	48.6 %	46.1 %	44.9 %	40.5 %	-0.84	-0.81	-0.34	0.15
2006	3.8 %	-8.8 %	14.2 %	-1.4 %	-6.6 %	1.06	-0.49	0.71	0.73
2007	-21.9 %	-23.6 %	-28.4 %	-26.5 %	-27.0 %	0.28	1.59*	0.66	0.91
2008	-25.6 %	-21.7 %	-43.4 %	-37.2 %	-30.4 %	-0.56	1.82*	1.53*	0.71
Average full period	8.66 %	11.86 %	5.17 %	1.28 %	12.88 %				
Average 1988 - 1998	16.11 %	22.83 %	13.92 %	5.92 %	24.18 %				
Average 1998 - 2008	1.89 %	1.89 %	-2.79 %	-2.51 %	2.61 %				
Annulized	5.93 %	7.44 %	-0.48 %	-4.05 %	7.51 %				
Volatility 1988 - 1998	-	0.15 %	0.21 %	2.89 %	0.85 %				
Volatility 1998 - 2008	-	-0.48 %	2.36 %	3.43 %	0.21 %				

Raw returns for each portfolio is calculated from the monthly realized returns and it shows the return in one year when $1,000 was invested in each of the security in the portfolio in the beginning of the year. The standard deviation differences shows the excess standard deviation to the Euro 750 standard deviation. Student's t-test was calculated as shown in Equation 5. * Statistically significant result at 10% level.

than other portfolios. Zero and Repo portfolios have noticeable higher standard deviations to the market. Even though it does not seem follow any pattern, they have higher returns in the years when the standard deviation is high as well.

If the timeline is divided into two decades and only the latter one is under scrutiny two interesting observations can be brought up. First, the Euro 750 and Top 25 earn the same average annual

return but Zero and Repo portfolios yield over -250 bps negative return on average in each year. On the other hand, the Total Payout portfolio earns higher average annual returns than any other portfolio. This implies that concentrating only on dividend yield leaves something essential out of the scope. Secondly, if the Top 25 loses in the last ten year period in returnwise, it gains in even lower volatility than in full time period to market since its standard deviation to market portfolio is -0.48% compared to Euro 750 and -0.69% compared to Total Payout portfolio. The Total Payout portfolio does not posses the same characteristics as Top 25 since it has volatility higher than market portfolio. This is consistent with the idea that companies that pay steady, high dividend are more defensive by nature than companies that pay dividends and repurchase their own stock (Trojanowski & Renneboog 2006, Jagannathan *et al.*, 2000).

Top 25 outperformed the two other portfolios 8 years, Euro 750 2 years, Zero portfolio 6 years, Repo portfolio 2 years and Total Payout portfolio 3 years out of 21. From this perspective it cannot be affirmatively stated that any of these strategies would be superior in all circumstances. When examining the t-statistics of the returns for the portfolios can be observed that none of those have consistently different returns from Euro 750. In Table 9 the levels statistically different at 10% are marked with an asterisk. Top 25, Zero, Repo and Total Payout portfolios have statistically different returns in 7, 9, 3 and 8 years out of 21, respectively. The Total Payout portfolio has a streak of statistically significant annual returns from 1998 to 2003 but thereafter the difference is even less significant than in Top 25.

From these results it is hard to find any similarities to the previous studies in the overlapping time periods. Filbeck and Visscher (1997) covered the time period from 1985 to 1994 and Brzeszczynski *et al.* (2008) period from 1994 to 2007. Combining their results could be argued that high dividend yield portfolio dominated FTSE-100 during 1985 to 1988. The FTSE-100 was long dominant from 1989 to 1999 and high dividend yield portfolio dominated again between 2000 and 2007. Even if the Zero portfolio is removed from the results data set is so different that any resembles are non-existent. Interesting is that when Zero portfolio is excluded from the examination the Top 25 outperformed the market only 12 years out of 21 i.e. 57%. This implies that introducing Zero portfolio as an alternative it is mainly competing with Euro 750 than with Top 25.

Sharpe ratios

In Table 10 is presented the annual Sharpe ratios for Euro 750, Top 25, Zero, Repo and Total Payout portfolios. The Sharpe ratio shows how much excess return investor receives for taking one additional unit of risk. The Sharpe ratio is explained in more detail in Chapter 4.2. The portfolio returns and the standard deviation of the returns were the same as in raw returns comparison.

On average the Top 25 and Total Payout portfolios outperform other portfolios; the latter one on the first decade and the first one on the last decade. The figures could be interpreted e.g. so that when utilizing high dividend yield or Total Payout investing strategy investor receives almost 30% more excess return for bearing more risk on her investment than placing her money on the market portfolio. And if investor utilizes zero or pure repurchase portfolio strategy instead of investing in market portfolio she is not rewarded but penalized when bearing more risk in her portfolio.

In the examination of the last ten years Sharpe ratios the Top 25 beats all the other portfolios since it is the only one with a positive Sharpe value. The Sharpe values fluctuates the most in the Zero and Total Payout portfolios. The least fluctuation is in the Repo portfolio, which means that the Sharpe values are constantly low. When examining the portfolios with Sharpe ratio, Top 25 outperformed the other portfolios 7 years, Euro 750 1 years and Zero portfolio 5 years, Repo portfolio in 4 years and Total Payout portfolio in 4 years out of 21. Even though Top 25 portfolio beats other portfolios using Sharpe risk-adjusted measure the pattern is not consistent enough to draw firm conclusions that Top 25 portfolio is better than its comparison portfolios.

Comparing Sharpe ratios to ones obtained by Filbeck and Visscher (1997), Filbeck and Visscher (2003), Brzeszczynski *et al.* (2008) no resembles cannot be found. Only the similar pattern of Sharpe ratios following the raw return in annual domination is consistent with these results and the previous ones.

Table 10. Sharpe index of the Euro 750, Top 25, Zero and Repo (1st April 1988 - 1st December 2008)

Year	Euro 750	Top 25	Zero	Repo	Total payout
1988	1.28	1.88	2.08	-0.14	1.88
1989	0.14	0.16	1.05	0.70	0.59
1990	-0.76	-0.65	-1.23	-1.79	-0.65
1991	0.40	-0.34	-0.11		-0.14
1992	0.55	0.69	0.36	-0.60	0.45
1993	1.99	3.22	1.50	2.37	3.28
1994	-1.72	-2.04	-2.14	-0.90	-2.07
1995	0.74	0.34	-0.36	1.12	0.27
1996	1.56	1.69	1.13	-0.05	1.62
1997	1.56	1.14	1.73	1.80	1.53
1998	-0.11	-1.54	0.45	-0.31	-1.38
1999	1.65	0.56	2.07	-0.61	-0.38
2000	-0.11	2.76	-2.75	0.77	2.50
2001	-0.35	0.43	-0.72	0.12	0.43
2002	-2.34	-1.84	-1.95	0.03	-1.62
2003	1.26	0.71	1.18	0.65	2.18
2004	0.72	0.87	-0.20	0.45	0.30
2005	2.03	2.40	1.97	2.19	2.14
2006	-0.01	-0.90	0.43	-0.34	-0.63
2007	-1.85	-1.79	-2.30	-1.81	-2.15
2008	-1.40	-1.00	-1.97	-1.61	-1.33
Average full period	0.25	0.32	0.01	0.10	0.33
Average 1988 - 1998	0.58	0.61	0.40	0.28	0.68
Average 1998 - 2008	-0.05	0.06	-0.35	-0.04	0.01

The Sharpe ratio is a measure of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year.

Treynor and alpha measure

In Table 11 are the Treynor measures and beta values. Using the Treynor measure, where the portfolio beta is adjusted to be the same as in the market portfolio, the Top 25 and TP portfolio outperform the other portfolios. The average annual realized returns[6] are also shown in the

[6] The Treynor measure adjusts the excess return of the portfolio for the risk thus the realized return is just the Treynor measure added with the average risk-free return.

Table 11. Treynor measures and beta values of the Euro 750, Top 25, Zero and Repo portfolio 1st April 1988 - 1st December 2008.

	Treynor measure					Beta values			
Year	Euro 750	Top 25	Zero	Repo	Total Payout	Top 25	Zero	Repo	Total Payout
1988	27.2 %	49.3 %	55.3 %	-10.1 %	49.3 %	0.86	0.86	1.30	0.89
1989	1.2 %	2.2 %	24.0 %	15.6 %	12.0 %	0.84	0.85	0.94	0.83
1990	-22.0 %	-21.7 %	-36.4 %	-188.5 %	-21.9 %	0.72	0.93	0.28	0.83
1991	7.1 %	-11.6 %	-5.3 %	-	-7.1 %	1.04	0.91	-	1.18
1992	12.9 %	18.8 %	8.1 %	-29.4 %	9.3 %	1.15	0.82	1.84	1.17
1993	34.2 %	88.9 %	30.3 %	70.0 %	91.3 %	0.98	0.79	1.19	1.13
1994	-21.6 %	-33.1 %	-30.3 %	-16.8 %	-33.6 %	0.98	0.82	1.08	0.77
1995	10.2 %	4.3 %	-7.4 %	25.1 %	3.2 %	0.88	1.09	0.86	1.13
1996	27.2 %	36.0 %	21.3 %	-9.3 %	41.6 %	0.86	1.11	1.09	0.87
1997	30.9 %	34.6 %	45.2 %	48.7 %	44.1 %	0.60	0.77	0.70	0.60
1998	-7.0 %	-67.0 %	8.9 %	-17.8 %	-58.8 %	0.46	1.35	0.66	0.59
1999	32.3 %	15.3 %	56.4 %	-18.1 %	-15.3 %	0.71	0.87	0.57	0.62
2000	-1.9 %	82.0 %	-35.9 %	19.5 %	85.1 %	0.28	1.41	0.70	0.41
2001	-10.8 %	10.7 %	-21.3 %	-0.1 %	10.6 %	0.67	1.41	0.89	0.56
2002	-44.8 %	-44.3 %	-43.1 %	-19.1 %	-40.6 %	0.82	1.21	2.37	0.82
2003	25.7 %	17.3 %	26.7 %	17.6 %	69.8 %	0.72	1.29	1.07	0.91
2004	7.6 %	13.3 %	-3.4 %	5.5 %	3.5 %	0.74	1.07	0.88	0.88
2005	37.6 %	54.3 %	41.3 %	51.4 %	45.2 %	0.85	1.03	0.81	0.83
2006	-1.0 %	-22.1 %	10.9 %	-6.9 %	-17.1 %	0.67	0.86	0.90	0.67
2007	-26.0 %	-30.0 %	-35.8 %	-30.5 %	-35.7 %	0.90	0.91	1.00	0.87
2008	-26.7 %	-25.5 %	-43.5 %	-34.1 %	-29.1 %	0.88	1.02	1.12	1.08
Average full period	4.40 %	8.17 %	3.14 %	-6.36 %	9.80 %	0.79	1.02	1.01	0.84
Average 1988 - 1998	10.73 %	16.76 %	10.48 %	-10.53 %	18.82 %	0.89	0.89	1.03	0.94
Average 1998 - 2008	-1.36 %	0.37 %	-3.54 %	-2.95 %	1.59 %	0.70	1.13	1.00	0.75
Realized	8.66 %	13.27 %	6.24 %	-2.10 %	14.06 %				

Treynor measure adjusts the return when the portfolio holds the same systematic risk as fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Returns are calculated on yearly basis. Beta coefficient is calculated as portfolio returns' relation to the market portfolio.

Table 11. Although Top 25 and Total Payout portfolios outperform their peer group by a wider margin than on raw average annual returns, they only outperform the two other portfolios in 6 and 4 years out of 21 years, respectively. From this perspective it cannot be stated affirmatively that any of these strategies would be superior in all circumstances. When looking into the beta values of these two portfolios can be affirmed that the 0.79 beta for Top 25 and 0.84 beta for Total Payout portfolio are in line with the theory (e.g. Trojanowski & Renneboog 2006). The lowest beta is in pure high dividend yield portfolio where including high repurchase yield

companies increases the risk as the repurchases are paid from temporary earnings which fluctuate more (Jagannathan *et al.,* 2000). This is valid also when the two other, Zero and Repo portfolios, are examined since their beta values are 1.0 and higher. Although, the higher beta values might derive from different sources, since Zero portfolio companies are smaller (Table 5 and Grullon and Michaely, 2002 for U.S. data) and Repo companies are bigger, both have higher earnings volatility.

When examining only the last ten year period the beta values are more diverge. The average annual beta value for Top 25 portfolio from 1998 to 2008 is on average 0.70 and in none of the years does its beta value exceed 0.90 and in general it has shifted downwards. In Total Payout portfolio the beta value is 0.75 and but it has more extreme values than Top 25. This implies that including high repurchase yield companies into the portfolio increases the total level of risk as well. As for the Zero and Repo portfolios, the average annual beta values are 1.13 and 1.00, respectively. And only in three years out of ten the Zero portfolios beta values go below 1.0.

Jensen's alpha measures are calculated in Table 12 to find out the excess return over the SML return predicted by the CAPM. The Jensen's alpha measures are the highest for the Top 25 and Total Payout portfolios. Even though, the average annual alpha values for Top 25 and Total Payout portfolios are positive, it is not the case consistently and statistically this result could have occurred by chance. Yet, if the 10% of the extreme positive and negative alpha values are excluded from the study the annual average alpha value remains still positive for each of the periods. The same applies to the Zero portfolio. If 10% of the extreme positive and negative alpha values are removed the Zero portfolio the average annual alpha value remains negative. The great improvement in Repo alpha values for the second decade is driven mainly by the huge 60.9% alpha in 2002. If this is excluded from the sample the alpha value becomes negative. Also noteworthy is that for the last ten year period from 1998 to 2008 the alpha values retain their sign but Top 25 and Total Payout portfolios average annual alpha value is now much lower now equaling only 61 bps and 109 bps, respectively. For Zero the divergence from SML and its average annual alpha value is -374 bps and for Repo divergence is in the opposite direction as (even the 2002 alpha value excluded) the gap diminishes.

Table 12. Jensen's Alpha values of the Euro 750, Top 25, Zero and Repo portfolio 1st April 1988 - 1st December 2008

	Jensen's alpha values			
Year	Top 25	Zero	Repo	Total Payout
1988	19.9 %	24.2 %	-48.8 %	19.9 %
1989	0.7 %	19.3 %	13.5 %	9.0 %
1990	0.2 %	-13.4 %	-46.7 %	0.1 %
1991	-22.1 %	-11.2 %	-	-16.7 %
1992	6.6 %	-3.9 %	-78.0 %	-4.4 %
1993	66.4 %	-3.0 %	42.6 %	64.7 %
1994	-9.6 %	-7.2 %	5.2 %	-9.3 %
1995	-7.0 %	-19.2 %	12.8 %	-8.1 %
1996	9.0 %	-6.6 %	-39.8 %	14.0 %
1997	1.8 %	11.0 %	12.3 %	8.2 %
1998	-29.0 %	21.5 %	-7.1 %	-31.1 %
1999	-10.2 %	20.8 %	-28.6 %	-27.8 %
2000	36.6 %	-47.9 %	15.1 %	35.7 %
2001	12.2 %	-15.0 %	9.5 %	12.0 %
2002	0.4 %	2.0 %	60.9 %	3.4 %
2003	-5.5 %	1.3 %	-8.6 %	40.0 %
2004	4.0 %	-11.8 %	-1.8 %	-3.8 %
2005	13.9 %	3.8 %	11.1 %	6.2 %
2006	-13.0 %	10.2 %	-5.3 %	-10.7 %
2007	-3.7 %	-8.9 %	-4.5 %	-8.5 %
2008	1.1 %	-17.2 %	-8.4 %	-2.7 %
Average full period	3.46 %	-2.44 %	-4.73 %	4.29 %
Average 1988 - 1998	6.58 %	-1.01 %	-14.09 %	7.73 %
Average 1998 - 2008	0.61 %	-3.75 %	2.94 %	1.17 %

Jensen’s alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on yearly basis.

Conclusion with Treynor ratios is similar with the examination of Sharpe ratios when comparing to Filbeck and Visscher (1997), Filbeck and Visscher (2003), Brzeszczynski *et al.* (2008). In all studies the Treynor ratio adjusted returns retain their order of yearly dominance quite consistently. In the previous studies only Brzeszczynski *et al.* (2008) calculated the Jensen’s alpha measure as well in their study the alphas were positive 62% of the time which is the exact same frequency as in this study. When Zero portfolio is excluded from the assessment the Top 25

dominates 62% of the time i.e. 13 years out of 21 thus can be argued that the Top 25 performs at least as well risk-adjusted, as measured with raw compound returns.

5.2. Longer investing periods

As the one year investing period is rather short to draw any affirmative conclusions of a strategy to be efficient or inefficient, I also form the portfolios so that $1,000 is invested in each of the portfolios according to their investing description and the performance is evaluated over three-year, ten-year and 21-year investing period. I am motivated to do so because the previous studies (Filbeck and Visscher (2003), Brzeszczynski *et al.* (2008)) have exhibited that longer investment period offer some interesting results as the dominance of high dividend yield portfolios is clearer with the longer investing horizon. In the comparison of these multiyear results to the previous one-year studies, must be stressed that they are executed on a single market whereas I have in this study 16 different markets included. I also compare the results with the same risk-adjusted measures as with the one-year portfolios.

Raw returns for longer investing periods

Table 13 presents raw returns for the three, ten and 21-year investing periods. On average the Top 25 and Total Payout portfolios have over 9% higher average three-year returns than Euro 750 and over 10% higher returns than Zero and Repo portfolios. These two portfolios clearly underperform the Top 25 and Total Payout portfolios since their annualized return is significantly lower i.e. if the investor had followed the three-year investing strategy from 1988 to 2008 the annual return would have been almost ten times lower. The volatilities compared to Euro 750 are in longer investing periods higher (and also almost the same) on Top 25 and Total Payout portfolios and lower in Zero and Repo portfolios. In ten year investing period the Top 25 portfolio outperforms the peer group by wider margin in absolute return terms. In the latter ten-year period it is also the only portfolio along with Total Payout portfolio that managed to yield positive return, yet the return is almost four times higher than in Total Payout portfolio.

In the 21-year period the Repo portfolio does not have any values since it contained only one company and thus the comparison would have been trivial. Also the Total Payout portfolio

Table 13. Raw compound returns of the Euro 750, Top 25, Zero and Repo portfolios multi-year portfolios

	Compound multiyear returns					t-test			
Year	Euro 750	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout
1988 - 1991	29.4 %	59.6 %	40.3 %	31.2 %	59.6 %	-1.73*	-0.67	-0.28	-1.73*
1991 - 1994	80.9 %	108.4 %	33.6 %	-	142.8 %	-0.91	2.17*	-	-1.67*
1994 - 1997	28.6 %	5.9 %	13.4 %	32.3 %	6.3 %	0.97	0.96	-0.21	1.07
1997 - 2000	98.8 %	55.4 %	108.3 %	-22.3 %	36.4 %	0.79	-0.36	1.55*	1.17
2000 - 2003	-33.7 %	31.3 %	-73.8 %	-4.0 %	27.0 %	-2.81*	3.21*	-1.88*	-3.53*
2003 - 2006	109.6 %	120.9 %	108.6 %	98.9 %	202.0 %	-0.33	-0.15	-0.04	-2.01*
2006 - 2008	-34.5 %	-36.8 %	-38.9 %	-36.9 %	-26.4 %	0.08	0.14	0.25	-0.61
Annulized 3Y	*10.7 %*	*11.8 %*	*1.9 %*	*2.9 %*	*14.2 %*				
1988 - 1998	296.0 %	404.6 %	313.4 %	-	404.6 %	-1.21	-0.32	-	-1.21
1998 - 2008	-13.3 %	53.3 %	-63.7 %	14.0 %	13.0 %	-1.15	1.18	1.18	-0.56
Annulized 10Y	*8.9 %*	*10.4 %*	*2.0 %*	-	*8.8 %*				
1988 - 2008	251.8 %	405.3 %	398.2 %	-	405.3 %	-0.97	-1.08	-	-0.97
Annulized 20Y	*7.2 %*	*8.1 %*	*8.0 %*	-	*8.1 %*				

Raw returns from a portfolio are calculated from the monthly realized returns and it shows the return in the period when $1,000 was invested in each of the security in the portfolio in the beginning of the three-year, 10-year or 21-year period. The standard deviation differences shows the excess standard deviation to the Euro 750 standard deviation. Repo portfolio did not have enough companies in each of the year to have value calculated. Student's t-test was calculated as shown in Equation 5. * Statistically significant result at 10% level.

contained exactly the same companies as the Top 25 portfolio did. In the full 21-year period the Top 25 beats the Euro 750 and Zero portfolios. Interesting in the 21-year period is that although Zero portfolio underperforms in all other investing periods, it now beats the Euro 750 and achieves practically the same returns as the Top 25 portfolio. This is mainly result from the extraordinary performance during the IT boom from 1st of September 1999 to 1st of September 2000.

When the portfolios were held for three years there was no clear dominance by any of the three. Top 25 and Total Payout portfolios dominated together in 18 years out of 21. If Repo and Total Payout portfolios are excluded the Top 25 beat the others in 12 years, Euro 750 six years and Zero in one three year period. The Top 25 portfolio outshines all the other portfolios by a wider margin when the investing period in prolonged to 10 years.

In the first ten year period Top 25 beats Euro 750 and Zero portfolios over 100%. Annually the difference to Euro 750 and Zero portfolios is 140 bps and 840 bps, respectively. As mentioned in the previous paragraph, in the full 21-year period the composition is very different. In the 21-year period the Top 25 is winner when winner must be announced but the Zero portfolio is the second with only 710 bps margin, which can be considered to be fairly small margin in investing period spanning over two decades. This difference means on annual level a difference of 7 bps. The superior 21-year performance of Zero portfolio is mainly because of one single stock, Ericsson AB, which contributed almost 30% of the portfolios performance. If the investor had purchased Ericsson AB in 1st of April 1988 it would have peaked at 314 times more valuable than at the time of initial purchase. If that single stock is excluded from the portfolio the Zero portfolio's return is still fair resulting 284.5%. It would be still higher than market portfolio return but much lower than the reported in Table 13.

The volatilities are not insensitive to the longer investing periods although the pattern of Zero portfolio having higher volatility compared to Euro 750 and Top 25 holds true for all the longer periods. As mentioned in Chapter 5.1 the volatility of Top 25 was on average lower than for Euro 750, but now in the longer investing periods the volatilities of Top 25 to the Euro 750 are higher in all multiyear periods. Nonetheless it cannot be said the volatility to exceeding market portfolio would linearly rise as a function to the length of the investing period.

The t-statistics for the longer periods are somewhat parallel to the t-statistics for the one-year returns. For Top 25, Zero and Repo portfolios two three-year periods and for Total Payout portfolio four three-year periods out of 7 the statistics are significant on 10% level and in none of the portfolios the returns in 10-year or 21-year periods are statistically significantly different from Euro 750 portfolios returns.

Sharpe ratio for the longer investing periods

Quick summary from the previous chapter was that Top 25 beat the other portfolios especially in the two longest, 10-year and 21-year investing periods but at the cost of higher volatility. In this chapter the returns are adjusted this volatility and the portfolios are compared with Sharpe ratio.

Table 14. Sharpe index of the Euro 750, Top 25, Zero and Repo multi-year portfolio 1st April - 1st December

Year	Euro 750	Top 25	Zero	Repo	Total payout
1988 - 1991	0.17	-0.69	-1.27	-0.19	-0.69
1991 - 1994	0.86	1.51	1.21	-	1.58
1994 - 1997	0.31	1.39	1.79	0.86	1.12
1997 - 2000	0.92	1.41	1.42	-0.72	0.59
2000 - 2003	-0.78	-0.33	-2.31	-1.59	-1.28
2003 - 2006	1.54	2.95	1.87	1.61	2.03
2006 - 2008	-0.91	-1.08	-2.09	-1.40	-0.31
1988 - 1998	0.53	0.60	0.52	-	0.60
1998 - 2008	-0.14	0.13	-0.29	0.01	0.01
1988 - 2008	0.19	0.27	0.26	-	0.27
Average	0.30	0.74	0.09	-0.24	0.43

The Sharpe ratio is a measure of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for the three-year, 10-year or 21-year period.

In Table 14 are presented the multiyear period Sharpe ratios for all the portfolios. The Sharpe ratio was explained in more detail in Chapter 4.2. The results align with the ones from the comparison of the raw returns presented in Table 13. The Sharpe ratio, the reward for volatility, declines in Euro 750 and Top 25 portfolios when the investing periods lengthens. Also the positive difference for the Top 25 to Euro 750 diminishes as the periods are longer. Still Top 25 offers over double the reward compared to Euro 750 or Total Payout portfolios for the additional risk that investor bears when the investing periods is either three or ten years long.

Zero and Repo portfolios behave quite the opposite as the two other portfolios. In Table 14 the difference of Top 25 and Zero portfolios Sharpe ratios were 32-to-1 for the one-year, for the three year period 8-to-1, for the 10-year period 3-to-1 and for the 21-year period the Sharpe ratios are at par. The Repo portfolios average three-year Sharpe is negative and in the latter ten-year period

it is marginally positive but still much lower than in any other portfolios. So the behavior is quite the opposite from Top 25 and Euro 750, the Sharpe ratios declines as the investing period prolongs. Investor is less rewarded for the taken additional risk, yet the difference of Top 25 to Euro 750 almost 40%. The poor performance of the Repo portfolio when measured in Sharpe ratio might be explained the fact the repurchases are paid out of the temporary, non-operating cash flows and do not provide that much information for the longer investing periods. Furthermore, the greater volatility in repurchases compared to dividend impairs the performance for the Repo portfolio (Jagannathan *et al.*, 2002).

Treynor measure and Jensen's alpha for longer investing periods

Prolonging the investing period has an effect on many variables of the portfolios such as returns and volatilities. The beta is not insensitive variable either as it changes in relation to the period length. The beta values are discussed later in this chapter but first is examined the Treynor measure when the portfolio is adjusted to have the same systematic risk as the market portfolio as in this case the Euro 750.

In Table 15 are presented the Treynor measures for the five portfolios. The average three-year return for Top 25 and Total Payout portfolios is almost double compared to Euro 750. In Zero portfolio the difference to market portfolio is two times lower and in Repo portfolio the average Treynor measure is negative. The winners are the same as they were when ranked with raw returns same as in Visscher and Filbeck (2003) and Brzeszczynski *et al.* (2008). And now while the returns are adjusted the Top 25 outperform the other portfolios also in the 21-year period. The reason for Zero portfolio's reduced performance is found in the high beta value, which is inline with the hypotheses that zero dividend companies have higher beta values same as in Blume (1980). Based on the results this holds also in the longer investing periods.

The beta values are in line with hypotheses when the investing period was only one year long. Top 25 and Total Payout portfolios had beta values below and Zero portfolio above 1.0. In both portfolios the betas increase as the investing period prolongs. The beta for Top 25 was on average 0.79 in one year periods and for three year periods it is 0.92 and it rises to 1.02 as the investing

Table 15. Treynor measure of the Euro 750, Top 25, Zero and Repo multi-year portfolio 1st April - 1st December

	Treynor measure					Beta values			
Year	Euro 750	Top 25	Zero	Repo	Total Payout	Top 25	Zero	Repo	Total Payout
1988 - 1991	5.4 %	34.6 %	17.0 %	6.6 %	34.6 %	1.03	0.95	1.09	1.03
1991 - 1994	69.0 %	85.6 %	23.3 %	-	111.3 %	1.13	0.93	-0.03	1.18
1994 - 1997	12.9 %	-9.0 %	-2.2 %	19.5 %	-9.4 %	1.09	1.06	0.85	1.00
1997 - 2000	83.5 %	56.6 %	91.2 %	-74.4 %	30.6 %	0.71	1.02	0.51	0.69
2000 - 2003	-44.4 %	27.2 %	-74.1 %	-16.7 %	19.6 %	0.76	1.14	0.88	0.83
2003 - 2006	103.6 %	146.4 %	85.3 %	79.9 %	209.0 %	0.78	1.20	1.16	0.94
2006 - 2008	-44.7 %	-50.7 %	-52.0 %	-58.7 %	-44.7 %	0.93	0.94	0.80	0.82
1988 - 1998	227.3 %	404.6 %	242.1 %	-	316.1 %	1.06	1.01	-	1.06
1998 - 2008	-46.8 %	53.3 %	-78.7 %	22.6 %	37.6 %	0.68	1.26	0.80	0.73
1988 - 2008	112.4 %	260.4 %	216.9 %	-	260.4 %	1.02	1.19	-	1.02
Average	47.8 %	100.9 %	46.9 %	-3.0 %	96.5 %	0.92	1.07	0.76	0.93

Treynor measure adjusts the return when the portfolio holds the same systematic risk as fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on three-, ten- and 21-year basis. Beta coefficient is calculated as portfolio returns' relation to the market portfolio.

period extends to 21-year long. Noteworthy is that both in Top 25 and in Total Payout portfolios the high beta values are greatly influenced by the first decade from 1988 to 1997 and are much lower if only the last decade is examined. For Zero portfolio the beta was 1.02 in one year period and it is now 1.04 for three-year period and increases to 1.19 in the 21-year period.

Jensen's alphas presented in Table 16 follow quite the similar pattern as the other risk-adjusted measures. Top 25 and Total Payout portfolios have average three-year alpha 12.6% and 24.7%, respectively, compared to Zero and Repo portfolios' negative alpha values of over -14.0%. On annual level excess return to the SML over 4.0% for Top 25 and Total Payout and -5.1% for Zero and Repo portfolio. In this contrast, the alpha values seem to increase in absolute value as the investing period lengthens. In one-year period the average annual alphas were over 3.4% for both Top 25 and Total Payout, and over -2.40% for Zero and Repo portfolios. For the 10-year period the alphas are 71.5% for Top 25 and -10.5% for Zero. Top 25 portfolios ten-year average alpha is even higher than the one of Total Payout portfolios. In all portfolios except

Table 16. Jensen's Alpha measure of the Top 25, Zero and Market Portfolio 1st April - 1st December multi-year portfolios

	Jensen's alpha values			
Year	Top 25	Zero	Repo	Total Payout
1988 - 1991	30.0 %	11.1 %	1.3 %	30.0 %
1991 - 1994	18.8 %	-42.6 %	-	49.8 %
1994 - 1997	-23.9 %	-16.0 %	5.6 %	-22.4 %
1997 - 2000	-19.1 %	7.8 %	-79.8 %	-36.5 %
2000 - 2003	54.5 %	-33.8 %	24.4 %	53.3 %
2003 - 2006	33.6 %	-21.9 %	-27.5 %	98.8 %
2006 - 2008	-5.5 %	-6.9 %	-11.2 %	0.0 %
1988 - 1998	94.4 %	15.0 %	-	94.4 %
1998 - 2008	48.7 %	-35.9 %	16.5 %	11.4 %
1988 - 2008	151.1 %	124.7 %	-	151.1 %
Average	38.3 %	-14.6 %	-10.1 %	24.7 %

Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on three-, ten- and 21-year basis.

in Zero portfolio the annualized alphas stay the same or decrease as the investing periods prolongs. The Zero portfolio exhibits improvement in alphas as the investing period lengthens. In the 21-year investing period the alpha value for Zero portfolio is less than Top 25 portfolios 151.1% but it is far from negative amounting 124.7%.

Combining the results from Filbeck and Visscher (1997) and Brzeszczynski *et al.* (2008) where the longer investing period were dominant in the U.K. stock market from 1985 to 1990 and then again from 1996 to 2008. In-between the periods the FTSE-100 outperformed the high dividend yield portfolios. In Filbeck and Visscher (1997) the FTSE-100 also dominated the full 11-year period whereas in Brzeszczynski *et al.* (2008) the Top Ten portfolio outperformed the FTSE-100 between 1994 and 2007 by a wide margin. In the multiyear investing periods the betas are higher than in one year investing periods in the two aforementioned studies as well as in the Filbeck and Visscher (2003). In the latter one the high dividend portfolio dominated the Toronto 35 and 300

indexes in the longer investing periods. In all three studies the results in the longer periods are also valid after adjusting for the risk.

5.3. Performance during bull and bear market

The special and very opposite characteristics of high and zero dividend yield companies makes them interesting subjects to study how they in different market conditions. Including the repurchase and combination portfolio (of Top 25 and Repo portfolios) completes examination and sheds more light on the development during the 21 years. The results were compared with three different definitions of bull and bear as aforementioned in Chapter 4.3. The time period was divided into four five-year periods as well as one full 21-year period to reveal the changes in the returns and betas over the 21-year period. The returns are calculated as logarithmic returns of the individual returns belonging to either bull or bear market. Rather than taking mere arithmetic averages this method takes into account the previous performance as well. The arithmetic averages were calculated as well (not disclosed in this study) and they did not reveal any drastic differences. The chronological break-down was chosen to give the best picture so that the period were short enough to show the timeline variation and long enough to hold enough data points to give accurate estimates for portfolio returns and beta values.

The first definition for bull and bear market

Table 17 shows the comparison of average time period returns and beta coefficients of the Euro 750, Top 25, Zero and Repo portfolios when their unadjusted monthly returns are sorted to belong to either bull market or to bear market period based on the first definition. In the first definition bull and bear market periods are defined monthly whenever the market portfolio return exceeds or goes below risk-free return. In the first five-year period from April 1988 to April 1993 the results are somewhat inline with the hypotheses. Top 25 portfolio outperforms its peers with a clear margin during bear markets and Total Payout portfolio during bull markets. Interesting is that both of the dominating portfolios have rather high beta values and especially during bear markets. Moreover, against the hypotheses is that Zero portfolio has lower betas than these two

Table 17. Timeline breakdown of Euro 750. Top 25, Zero and Repo portfolios. First definition of bull and bear market.

	Average returns					Difference to market portfolio				Beta values				
Year	Euro 750	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Winner
1988-1993														
Bull market	41.9 %	45.1 %	39.7 %	20.2 %	46.4 %	3.18 %	-2.19 %	-21.72 %	4.52 %	1.08	0.98	0.84	1.01	Total P
Bear market	-23.2 %	-11.3 %	-21.5 %	-36.3 %	-24.9 %	11.92 %	1.69 %	-13.02 %	-1.67 %	1.15	1.05	0.22	1.22	Top 25
1993-1998														
Bull market	39.1 %	45.1 %	32.3 %	45.3 %	45.6 %	5.95 %	-6.80 %	6.16 %	6.45 %	1.13	1.13	0.94	1.14	Total P
Bear market	-12.3 %	-11.3 %	-12.9 %	-15.2 %	-10.8 %	0.95 %	-0.65 %	-2.90 %	1.49 %	0.83	0.96	0.49	0.89	Total P
1998-2003														
Bull market	31.5 %	18.3 %	36.6 %	36.7 %	18.9 %	-13.20 %	5.03 %	5.13 %	-12.64 %	0.46	1.77	0.87	0.35	Repo
Bear market	-28.5 %	-18.0 %	-40.1 %	-34.3 %	-20.3 %	10.58 %	-11.53 %	-5.79 %	8.21 %	0.91	0.96	0.66	0.91	Top 25
2003-2008														
Bull market	29.0 %	23.8 %	28.7 %	29.2 %	29.7 %	-5.12 %	-0.31 %	0.25 %	0.76 %	0.80	1.16	0.94	1.00	Total P
Bear market	-20.2 %	-19.1 %	-23.7 %	-24.9 %	-21.0 %	1.14 %	-3.50 %	-4.67 %	-0.80 %	0.89	1.61	1.22	1.06	Top 25
1988-2008														
Bull market	35.0 %	31.5 %	34.0 %	32.4 %	34.5 %	-3.56 %	-1.00 %	-2.66 %	-0.57 %	0.93	1.22	0.83	0.94	Euro 750
Bear market	-21.2 %	-18.1 %	-25.2 %	-28.0 %	-19.5 %	3.14 %	-3.95 %	-6.78 %	1.77 %	0.91	1.25	0.95	0.99	Top 25

First definition describes short term market movements. It shows a comparison of up markets versus down markets to the risk-free rate in specific month. If the market return exceeds risk-free rate for that month, the month is categorized as an up-market month. If not, it is categorized as a down-market month. Because the characterization is done separately for each month and it does not take into account any trends, it can be considered as a short-term definition of market movements. The returns are continously compounded returns for bull and bear market periods. Beta coefficients are calculated from monthly bull or bear market returns of Top 25, Zero, Repo and Total Payout portfolio and plotted to market portfolio returns from the respective time period.

winner portfolios in both bull and bear market. Repo portfolio comprised of on average three companies which makes the results less reliable and comparable. The results in the first period could derive from the undeveloped market conditions and from the lack of diversification as Top 25 and Repo portfolio were country wise less diversified than Euro 750, Zero or Total Payout portfolios. In the second period from April 1993 to April 1998 the Total Payout portfolio dominates both bull and bear market periods. If only Top 25 and Zero portfolios are to be compared the outcome is halfway in line with the hypotheses. The Top 25 dominates Zero portfolio and the market portfolio during bear market but it also dominates Zero and the market portfolio during bull market. The betas are also shifted from the first period. Now, three of the portfolios: Top 25, Zero and Total Payout have higher than one beta during bull market and lower than one during bear market. This implies that during bull market these three portfolios react more strongly to market portfolio's upward movement and are less sensitive to decline in bear market than Euro 750.

In the first period of the last decade from April 1998 to April 2003 results are more supportive to the hypotheses and can be considered to be more reliable since the Repo is larger measured by the number of companies thus it is also better diversified and less prone to firm-specific risk. Also the Zero and the Top 25 portfolios are more diversified country-wise and hence less prone to country-specific risk. The Repo portfolio beats the other portfolios during bull market. It must be reminded that Repo portfolio contains only four companies on average in the third period and the examination does not account for risk, which could greatly affect the results. If Repo portfolio is excluded from the comparison, the Zero portfolio prevails with almost similar returns. Noticeable difference between these two is the opposite beta values. While the Repo achieved its 5.13% excess to the market return with a beta of 0.87, the Zero portfolio had beta value almost the double. During bear market Top 25 prevails with beta value below zero which is inline with the hypotheses. Interesting is that when looking back at the beta values of Repo portfolio during bear market periods it is significantly below zero in all first three periods. While the performance is inferior to the market, it still posses some defensive characteristics which could derive from the size factors: the fact that firms that repurchase are bigger in market capitalization are less prone to general market movements than others. Similar results about the size characteristics also in Grullon and Michaely (2002). Results in the last period from April 2003 to April 2008 are

notably different from the previous three. Three remarks can be made. First, results are in accordance with the hypotheses. Top 25 loses to market portfolio in bull market but during bear market it outperforms the market portfolio and the peer portfolios and also has beta below one. Second, the Zero portfolio is generally riskier measured by its beta value. This is noticeable during bear market when its beta is over 1.5. Opposite to the hypotheses it does not prevail either in the bull market. Third, the Repo portfolio follows the pattern from the previous time periods that it has positive excess returns to the market in bull market and negative in bear market. Remarkable is that now the beta in Repo portfolio is much higher; especially in bear market.

The second definition for bull and bear markets

The results for the second definition bull and bear market period are presented in the Table 18. The second definition classifies bull and bear market periods on monthly basis but defines bear market month surrounded by bull market months as bull market as well and vice versa. When bull and bear markets are defined to follow intermediate time period the results are consistent in the last decade but results from the first decade are very different. The excess returns to market portfolio are consistently smaller in bull market periods and less negative during bear market periods.

In the first period from 1988 to 1993 Top 25 beats the market portfolio and the peer group in bear market as in the first definition but it now prevails during bull market as well, which is quite surprising considering the hypotheses. Top 25 earns positive excess returns to the market portfolio both in bull and bear market periods. These results could derive also from the lack of diversification in the Top 25 where the country concentration was significant. The beta values are also different than in the first definition. Now, Top 25, Zero, Repo and Total Payout portfolios have lower betas but Zero portfolio has remarkably higher beta. The betas imply that investing into high dividend yield companies would have been a risky investing strategy whereas investing into companies not paying any dividends would have been a defensive one. Again remark must be made that Repo portfolio contained only three firms on average in the first period which could drive the results.

Table 18. . Timeline breakdown of Euro 750. Top 25, Zero and Repo portfolios. The second definition of bull and bear market.

	Average returns					Difference to market portfolio				Beta values				
Year	Euro 750	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Winner
1988-1993														
Bull market	34.0 %	37.8 %	36.3 %	22.1 %	37.4 %	3.72 %	2.27 %	-11.92 %	3.36 %	1.02	0.88	1.03	0.64	Top 25
Bear market	-18.7 %	-6.6 %	-19.3 %	-35.3 %	-20.0 %	12.14 %	-0.58 %	-16.61 %	-1.25 %	1.07	0.86	1.15	0.91	Top 25
1993-1998														
Bull market	28.7 %	37.8 %	25.5 %	32.2 %	38.8 %	9.08 %	-3.22 %	3.47 %	10.14 %	0.95	0.93	0.96	0.99	Total P
Bear market	-5.1 %	-6.6 %	-10.7 %	-7.7 %	-6.4 %	-1.47 %	-5.53 %	-2.61 %	-1.28 %	1.12	0.92	1.06	1.08	Euro 750
1998-2003														
Bull market	20.2 %	12.1 %	19.6 %	26.2 %	10.8 %	-8.12 %	-0.62 %	5.94 %	-9.45 %	0.50	1.52	0.59	1.32	Repo
Bear market	-21.8 %	-13.4 %	-32.0 %	-28.2 %	-14.5 %	8.42 %	-10.24 %	-6.39 %	7.33 %	0.84	1.03	0.80	0.39	Top 25
2003-2008														
Bull market	13.8 %	10.6 %	16.1 %	9.1 %	14.7 %	-3.24 %	2.32 %	-4.73 %	0.90 %	0.89	1.10	1.01	0.98	Zero
Bear market	-9.6 %	-9.4 %	-15.5 %	-11.0 %	-10.7 %	0.24 %	-5.90 %	-1.43 %	-1.08 %	0.80	1.18	1.01	1.35	Top 25
1988-2008														
Bull market	23.6 %	22.7 %	23.8 %	21.6 %	24.4 %	-0.85 %	0.28 %	-1.98 %	0.83 %	0.87	1.14	0.93	0.99	Total P
Bear market	-13.9 %	-12.3 %	-19.6 %	-21.1 %	-13.0 %	1.68 %	-5.72 %	-7.15 %	0.97 %	0.90	1.08	0.96	0.90	Top 25

The second definition captures the intermediate term trends in market movements. It divides the months into bull and bear months depending on the market trends in the surrounding months. Bull market month is a month where market portfolio return exceeds risk-free return, but an up-market month during contiguous down-market months would be defined as bear market month. Bear market month is a month where risk-free return exceeds market portfolio return, but an down-market month during contiguous up-market months would be defined as bull market month. The returns are continously compounded returns for bull and bear market periods. Beta coefficients are calculated from monthly bull or bear market returns of Top 25, Zero, Repo and Total Payout portfolio and plotted to market portfolio returns from the respective time period.

The second five year period from April 1993 to April 1998 is interesting when examined through second definition compared to the first definition. The bull-bear market spread[7] widens in Top 25 and Total Payout portfolio and also shifts upwards towards bull market and narrows in Zero and Repo portfolios. None of the portfolios possess defensive qualities or characteristics and all have negative excess returns in bear market. The betas in Top 25 and Total Payout portfolio are now higher when using intermediate bull-bear definition. The excess returns to market portfolio are consistently smaller in bull market periods and less negative during bear market periods.

Similarly when using the first definition the results are more reliable in the first period of the last decade from April 1998 to April 2003 as the portfolios are better diversified. The results are again partly supportive to the hypotheses. The beta value for Top 25 is now lower than in first definition and it earns positive excess return to the market during bear market. And even though Zero portfolio earns negative excess returns both in bull and bear market, it has high beta especially in bull market periods. Interesting is that Repo portfolio has again betas below one both in bull and bear market periods. Also the fact that including repurchase yields increases beta values during bull market periods and decreases betas in bear market periods is worth noticing. In this period this makes Total Payout portfolio to be aggressive during bull market and defensive in bear market. In the last five year period all the excess returns to the market portfolio are smaller than in the previous subperiods as they were according to the first definition. Now Top 25 earns only small positive excess return. Zero portfolio has high beta values and the highest excess return in bull market, which is in accordance with the hypotheses. Including repurchase yields into dividend yields seem to work positively in some periods but as can be seen, when comparing results from the first and the second definition, it also increases volatility into the beta values and the returns. This might derive from the fact that dividend payment are more stabile and repurchases which are paid out from the non-operating cash flows (Jagannathan *et al.* (1999), Grullon and Michaely (2002).

[7] The excess return difference between return difference to market portfolio during bull market less the excess return difference to market portfolio during bear market.

The third definition for bull and bear market

The third definition for bull and bear market is interesting to investigate since it is as a definition very different from the two previous ones. It defines the bull and bear market periods retrospectively as the market has moved 10% from the previous low or high position, respectively. As can been seen from Table 19 the results vary more and are different from the first and the second definitions. The third definition smoothes away most of the single month variation, revealing the bull and bear market performance over a longer time span. It reveals whether an investing strategy has been consistently effective during the course of long-term market patterns. In the first five-year period from April 1988 to April 1993 the Top 25 prevails both in bull and bear market. Interesting is that its beta value is below 1.0 during bull market and above 1.0 during bear market. The Repo portfolio suffers, especially in bear market periods, from the poor diversification which is reflected also to the Total Payout portfolio. Noticeable is also that throughout the portfolios the beta values are higher except in the Top 25 portfolio. This might imply that if the bull and bear market is defined more broadly, the portfolios start to go more along with the market portfolio. In the second five-year period from April 1993 to April 1998 different combinations of repurchase portfolios dominate. The Total Payout portfolio beats its peers in bull market with a clear margin except for the Top 25 portfolio. This is intuitive since they to the most part hold the same constituents. These results suggest that including repurchasing companies increases returns both in bull and bear market at the cost of slightly higher beta. During bear market the Repo portfolio is the only portfolio that outperforms the market portfolio. Since it has beta over unity it cannot be considered as purely defensive portfolio instead the result could again originate from the lack of diversification.

The third definition shuffles the pattern from the previous definitions so that from 1998 onwards the Top 25 does not anymore consistently prevail in bear market. In the period from April 1998 to April 2003 the Repo portfolio dominates in bear market but has remarkably high beta value. Again the results of Repo portfolio might arise from idiosyncratic risk. If the Repo portfolio is excluded from the comparison then the best performers in bear market are Total Payout and Top 25 portfolio. Zero portfolio fails to outperform the market portfolio both in bull and in bear market and in addition has high beta values in both market conditions. In the last five-year period

Table 19. Timeline breakdown of Euro 750. Top 25, Zero and Repo portfolios. The third definition of bull and bear market.

	Average returns					Difference to market portfolio				Beta values				
Year	Euro 750	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Top 25	Zero	Repo	Total payout	Winner
1988-1993														
Bull market	19.1 %	32.3 %	17.9 %	7.1 %	29.3 %	13.22 %	-1.17 %	-11.99 %	10.16 %	0.93	0.92	0.71	0.96	Top 25
Bear market	-7.4 %	-5.2 %	-6.7 %	-26.3 %	-13.3 %	2.26 %	0.68 %	-18.86 %	-5.90 %	1.03	0.89	1.22	1.20	Top 25
1993-1998														
Bull market	22.8 %	32.3 %	18.8 %	20.6 %	33.3 %	9.51 %	-4.03 %	-2.17 %	10.46 %	0.94	0.95	1.04	1.00	Total P
Bear market	-3.3 %	-5.2 %	-5.6 %	1.1 %	-4.1 %	-1.90 %	-2.37 %	4.33 %	-0.85 %	0.95	0.94	1.18	0.94	Repo
1998-2003														
Bull market	15.5 %	12.5 %	7.0 %	-3.1 %	6.5 %	-2.95 %	-8.44 %	-18.56 %	-9.00 %	0.44	1.54	0.96	0.48	Euro 750
Bear market	-18.7 %	-14.2 %	-24.1 %	-6.5 %	-12.6 %	4.53 %	-5.33 %	12.20 %	6.08 %	0.80	1.17	1.71	0.77	Repo
2003-2008														
Bull market	10.1 %	6.7 %	11.1 %	7.0 %	10.9 %	-3.42 %	1.03 %	-3.07 %	0.75 %	0.82	1.13	0.98	0.96	Zero
Bear market	-6.6 %	-6.1 %	-11.7 %	-9.4 %	-7.6 %	0.49 %	-5.14 %	-2.78 %	-1.02 %	0.93	1.08	1.22	1.06	Top 25
1988-2008														
Bull market	16.5 %	18.6 %	13.5 %	7.6 %	19.1 %	2.11 %	-3.01 %	-8.95 %	2.56 %	0.85	1.09	0.89	0.90	Total P
Bear market	-9.1 %	-9.4 %	-12.3 %	-10.8 %	-9.4 %	-0.35 %	-3.24 %	-1.71 %	-0.33 %	0.90	1.12	1.40	0.97	Euro 750

The third definition depicts the long term trend in market movements. It classifies a bull market month period to start when the market has moved 10 % from its previous low position. Similarly, a bear market month and period is defined when 10 % decline has been observed from the previous markets' high position. The returns are continously compounded returns for bull and bear market periods. Beta coefficients are calculated from monthly bull or bear market returns of Top 25, Zero, Repo and Total Payout portfolio and plotted to market portfolio returns from the respective time period.

Zero portfolio barely beats Total Payout portfolio, the only other portfolio that was able to earn positive excess return to market portfolio in bull market. Yet, Zero portfolio has higher beta value in bull and bear market than Total Payout portfolio. During bear market, the Top 25 outperform its peer with a small positive margin to market portfolio and is the only portfolio that manages to do so. All-in-all, according to the third definition the outperforming the market portfolio, Euro 750, is harder for any of the investing strategies.

So what does these results imply put together. Three observations can be drawn. First, the results and the outcomes depend to some extent on the definitions. To achieve the results in real life would require nearly perfect foresight in all of the definitions but level of foresight decreases with definitions. The first definition, since it classifies bull and bear market based on one-month periods, is the most theoretical and hardest to employ in the real world. Investor would have to spot the bull and bear market before the month begins. In the second definition investor would have to recognize whether trend is permanently shifted or it is just a skew in the row. The third definition requires ability to identify long-term trend shift before they happen. And usually this is easiest when looking the past data. From April 1998 onwards the investor would have earned excess returns to the Euro 750 by buying Top 25 during bear market in any of the definitions and selling it off before bull market periods. The best investing practice during bull market is a bit more controversial since depending on the definition all the other portfolios except Top 25 dominate at least one of the five-year bull market period. The second observation is that these patterns are stronger and more in line with hypotheses in the recent decade from 1998 to 2008. This could derive from various reasons. For example, the European market was very different and less diversified in 1988 to 1998 than it was in the latter decade. Also the because of the common currency the countries and markets have become even more unified which especially could mean streamlining the taxation systems. The market liquidity and integration has increased after launching the EMU in 1999 (Yiang *et al.*, 2002). The third observation is a continuum from the previous reasoning. As the markets in Europe have become more liquid, efficient and unite the excess return differences to market portfolio have diminished when the longest time period definition are used and also the excess returns were larger and varied more in the first decade from 1988 to 1998 than in the latest one.

6. Sensitivity analyses

In the following chapter the robustness checks are carried out. It is important to check these since the methods do not control for the variables. Moreover since many of the choices in the study are purely arbitrary e.g. number of high dividend portfolio companies or the definitions for the dividend yield. Also the starting date might have affect on the results, thus it is crucial to study these in order rule out their effect. I first check the number of companies, then the different definitions and last I show that different starting dates do not have a major influence on the results.

6.1. Different number of portfolio companies

As the number of the companies included in the Top 25 was arbitrary, it is important to validate the results studying whether increasing the number of the companies alters the results. I studied the performance of a high dividend yield portfolio where there were the original 25 but in addition 50 and 75 highest dividend yield companies.

Raw returns for different number of portfolio companies

Appendix A.1 shows the raw returns, volatility to market and t-statistics for portfolios with 25, 50 or 75 highest dividend yielding companies in each rebalancing dates. From the Appendix A.1 can be seen that none of the portfolio compositions dominate consistently another but every single portfolio outperforms the Euro 750 and Zero portfolio. Three interesting observations can be noticed. First, positive excess return that existed in the first decade diminishes in all of the Top 25 portfolios. Although, all of the high dividend yield portfolios beat market portfolio, the margin has become thinner. Second, as the return margin faded, has the volatilities decreased as well in all three portfolios. The high dividend yield portfolio had higher than market volatility in the first decade, but lower than market in the recent decade. Third, it seems that the requirements for diversification have increased during the years. While from 1988 to 1998 25 companies was enough to earn higher than market returns with moderately higher volatility that does not hold any more. Now 50 or 75 high dividend yield companies are required to form a properly diversified portfolio.

The examination of the t-statistics does not reveal any additional information to the previous tests as on average only 40% of the yearly returns differ statistically significantly from the Euro 750 returns.

Risk-adjusted returns for different number of portfolio companies

The findings from the raw compound returns holds true when examined with Sharpe ratio in Appendix A.2. All of the high dividend yield portfolios have higher Sharpe ratios in all of the periods. Moreover, the Sharpe ratios are positive even in the last decade. The similar effects can be seen with Sharpe ratios as with the raw returns as they have declined both in market portfolio and in every dividend yield portfolio when studying the recent decade. In Appendix A.3 the Treynor measure confirms the previous findings as well. All of the portfolios beat market portfolio but difference has decreased and is only slightly positive. Treynor measure shows that better diversification improves the risk-adjusted performance. The beta values on the other hand increases with number of constituents. This implies two things. First, the Top 25 portfolio is the most defensive one. Second, as the number of constituents in high dividend yield portfolio comes near to the number of constituents in the market portfolio that beta values increases. In Appendix A.4 are presented the Jensen's alpha values which also confirm the previous results. All of the alphas are positive on average even though no consistent pattern can be found, but alphas as well as the Sharpe ratio and Treynor measure, are lower in the last decade.

6.2. Alternative definitions for high dividend yield portfolios

As in the previous chapter, where different numbers of high dividend yield companies in the portfolio were examined, it is important to study whether changing the criteria for selecting the companies change the results. The first one is the normal Top 25 portfolio where the companies are selected based on their rolling 12 month average dividend yield. The second portfolio, 20% dividend yield ("20% DY portfolio"), is a portfolio where the maximum dividend yield is capped to 20% for a company to be selected into the portfolio. Any companies having higher 12-month average dividend yield are excluded. In the last portfolio, ("unmodified DY portfolio"), no alterations are done and the companies were selected based on their dividend yield in that specific

month without any rolling smoothing. In this chapter I only compare the two aforementioned portfolios as the results for the original Top 25 have been discussed in Chapter 5.1.

Raw returns for alternative definitions of high dividend yield portfolios

When comparing raw returns in Appendix B.1, it seems that using alternative definitions for the dividend yield has only small effect on the results when studying the raw compound returns. Especially capping the maximum dividend yield has only minor effect as it earns practically the same return and volatility in the recent decade and slightly higher return and volatility number in the first decade than Top 25. The unmodified DY portfolio earns higher returns in the last decade at the cost of higher volatility.

Risk-adjusted returns for alternative definitions of high dividend yield portfolios

Sharpe ratios shown in Appendix B.2 partially validate the aforementioned results. All of the portfolios beat the market portfolio in both decades and the unmodified DY portfolio has lower Sharpe ratio than the other high dividend yield portfolios. From this perspective can be said that looking at the dividend yield with a longer perspective is beneficial at risk-return point of view. On the other hand capping the maximum dividend yield does not improve the defensive qualities in risk-return perspective. Treynor ratios in Appendix B.3 confirm that all high dividend yield portfolios beat market portfolio when they are adjusted to hold similar systematic risk as the market portfolio. All portfolios beat market portfolio compared with Treynor measure. In the first decade the Top 25 outperformed its peers but in recent decade the 20% DY portfolio is ten times more efficient. From the beta values in Appendix B.3 can be seen that the unmodified DY portfolio is the riskiest when risk is measured by beta value. Jensen's alpha measure offers different kind of results in Appendix B.4. When measured with Jensen's alphas the Top 25 portfolio is the best in all time periods except in the last ten year subperiod. This interesting since the unmodified DY portfolio loses in all the other measures except in the last decade when measured with alpha.

6.3. Alternative portfolio starting date

Since this type of portfolio study is very sensitive to the underlying assumptions I have already tested different investing periods, alternative definitions for the high dividend yield portfolio selection criteria, and the last to be tested are the different starting dates for the Euro 750, Top 25, Zero and Repo portfolios. The results for Repo portfolio are reported in the Appendix C but receive less attention since the small number of companies in the Repo portfolio makes the results unreliable and very sensitive to changes. Thus any conclusions based on those results cannot be made. I present the results which include the same raw returns and risk-adjusted measures as in the previous chapters.

In Appendix C.1 are presented the raw annual portfolio returns for Euro 750, Top 25, Zero and Repo portfolios. There can be observed that Top 25 portfolio beats all the other portfolios in every starting month both in average annual return as well as with annualized return, except for the July where Euro 750 earns slightly higher average annual and annualized return. The Zero portfolio loses to the two other portfolios in every alternative starting month both in average annual and annualized return. Interesting is that every alternative starting period yields negative annualized return which is quite a poor performance for 21-year investing period.

If only the last decade is examined the results are not as clear and analogous. Top 25 portfolio beats Euro 750 in January and April portfolios but loses in July and October portfolios. From this point of view it seems that nowadays the portfolio initiation date plays significant role and the performance of the portfolio is sensitive to this. Volatility to market is constant as well both in Top 25 and Zero portfolios. In Top 25 the volatility does change in respect to the alternative starting month but stays constantly negative i.e. smaller than in market portfolio, in the recent decade. For Zero portfolio the results are as consistent but the opposite as the volatility to market stays persistently larger than in Euro 750.

Top 25 risk-adjusted measures for alternative starting dates

The results proposed by the raw returns are confirmed by the Sharpe ratio in Appendix C.2. The highest Sharpe ratios are in January and April portfolios and in the July portfolio the Sharpe ratio

is the lowest. Similarly, if only the last decade is under scrutiny the Sharpe ratios decrease noticeably. In July the average annual Sharpe ratio is even negative. In Appendix C.2 are in addition the beta values for the Top 25 portfolio. In the full time period the betas seem be insensitive to initiation dates, but studying 10-year subperiods reveal changes. Betas seem to be lower in the periods where the Top 25 outperforms the market, and increase as the performance fades. If only last decade is examined, the beta values diminish as the average annual beta for 1998 to 2008 is approximately 0.70.

Treynor measure, where Top 25 was adjusted to have the same systematic risk as the market portfolio i.e. Euro 750 is presented in Appendix C.2. Compared with Treynor measure the result are somewhat different from the previous ones. Now all the Top 25 portfolios, except in January, beat the market portfolio and the realized adjusted return is between 8.8% and 13.3%. Even the July portfolio beats the Euro 750. The Jensen's alpha values follow the similar pattern as the raw returns and Sharpe ratio. Although, in every starting month the average annual alpha is positive, it is the largest in January and April and the lowest in July. When only the last decade is studied the average annual alphas are smaller but still remain positive.

Zero portfolio risk-adjusted measures for alternative starting dates

The Sharpe ratios for Zero portfolio alternative starting dates are presented in Appendix C.3. As with Top 25 the results for Sharpe ratios are consistent with the pattern in raw returns. For each of the starting months Sharpe ratios are on average negative or only slightly positive. In the last decade the average annual Sharpe ratios are clearly negative for each of the starting dates. Thus it can be stated that the poor performance of Zero portfolio is not only due to the selection of the starting date. As with the Sharpe ratios the beta values are also consistently over 1.0. The highest value of average annual beta is in January and lowest in April. The average annual beta from 1998 to 2008 is 1.21 which implies that the betas have increased the past ten years compared to the full 21-year period. When the return for Zero portfolio is adjusted with Treynor measure the average annual returns are positive for each of the alternative starting dates. Nevertheless, the adjusted returns remain below market portfolio return. And average annual Treynor adjusted returns are significantly negative for the 1998-2008 period. Jensen's alpha measure indicates that

Zero portfolio was unable to achieve any excess return that of predicted by the SML. The alphas are clearly negative for every single alternative starting date and are even more if only last decade is examined.

Repo portfolio risk-adjusted measures for alternative starting dates

As aforementioned in the beginning the values and results for Repo portfolio are greatly sensitive and do not provide grounds for proper analysis and conclusions. There is a positive bias in the July and the October initiation dates since years 1989, 1990 and 1991 are excluded since there were no companies to be included into the Repo portfolio. Some observations can be made which are presented in the Appendix C.4. The Sharpe ratios for the Repo portfolio exhibit the pattern as the Top 25 and Zero portfolio, as the Sharpe ratios have decreased from the first decade. The beta values on the other hand does not seem to follow any fixed pattern and fluctuates around unity in the full and in the both subperiods. Treynor measures also vary greatly since the beta values, used in the denominator, in some years were close to zero. The alpha values vary less and appears to be more positive in the latter decade.

7. Conclusions

I studied companies in 16 European countries from 1988 to 2008. In constructed a Euro 750 index, which comprised of 750 largest companies in each year measured by their market capitalization. From the Euro 750 I formed Top 25, Zero and Repo portfolios. Between these four portfolios I conducted a study that aimed to discover the relationship between different payout strategies to portfolio returns. I also studied the performance in the longer horizons and the performance in bull and bear market.

The high dividend yield portfolio earns higher returns than market portfolio in the full time period but this is mainly due to excellent performance in the first decade. In the second decade high dividend portfolio is able to outperform the market portfolio but the difference margin is diminished. On the other hand the volatility has become lower than in the market portfolio in the latter decade as well as the betas are consistently lower in the latter decade compared to the first one. In addition, as the beta value for the high dividend yield portfolio is much lower, it can be concluded that return characteristics have eroded but the defensive characteristics have improved. As in Filbeck and Visscher (1997) and Brzeszczynski *et al.* (2008) these results are valid also after adjusted for the risk. Furthermore, the results are in line with the previous studies as the performance of the high dividend yield strategy enchases as the investing period prolongs. Especially in the 10 and 21-year periods the high dividend yield outperforms the market portfolio. The longer investing period results are robust to the risk-adjustment measures.

The zero dividend strategy is inferior almost in every aspect. It is riskier and earns less than market portfolio when compared either with raw compound or risk-adjusted returns. In the longer investing periods the zero dividend strategy performs worse than market portfolio except for the longest 21-year period. But this finding might be a mere result of the data selection.

The repurchase yield strategy is inferior even to zero dividend strategy both in raw compound and risk-adjusted measures. This might derive also from lack of data. Noteworthy is that combining repurchase and dividend yields produce the best performance in returns but at the cost of the defensive characteristics as the beta and volatility rise. In the longer investing periods the repurchase yield portfolio does not perform any better and it does not have enough data to

include all the periods. Combining the repurchase and dividend yields improves the performance in the 3-year periods but the stand-alone high dividend yield strategy is the best in the longest periods.

The study of the performance in the portfolios in bull and bear market is sensitive to the length of defining bull and bear market periods. Moreover, the results can be considered to be more reliable in the latter decade due to development of the European markets. The high dividend yield strategy performs the best in bear market and has the lowest beta except for the longest definition of the bull and bear market. Results in the bull market are not that coherent. Each of the other portfolios except high dividend yield strategy dominated one of the five-year bull market period in the latter decade. The Zero portfolio fails to consistently beat the market portfolio but it has higher than one beta on average both in bull and in bear market periods in each of the definitions.

In conclusion, this study shows that the European stock market has changed and developed. Alongside with this have changed the different payout related investing strategies. The high dividend yield strategy is now more defensive but does not earn great excess returns to market portfolio. Moreover, the zero dividend strategy is riskier but does not act as complement for the aforementioned strategy neither in bull markets.

References

Baker, H.K., Powell, G.E. and Veit, E.T., (2002), Revisiting the Dividend Puzzle: Do all the pieces now fit?, *Review of Financial Economics*, 11, 241-261.

Battachraya, S., (1982), Dividend Policy and Valuation: Theory and Tests, *The Journal of Finance*, XXXVII(2), 415-428.

Bernheim, B.D. (1991), Tax Policy and Dividend Policy, *The Journal of Economics*, 22(4), 455-476.

Black, F. and Scholes, M. (1974), The Effects of Dividend Yield and Dividend Policy on Common Stock Prices and Returns, *The Journal of Financial Economics*, 1, 1-22

Blume, M. (1980), Stock Returns and Dividend Yields: Some More evidence, *The Review of Economics and Statistics*, 62(4), 567-577.

Bodie, Z., Kane, A. and Marcus, A.J. (2005), Investments 6th edition, *McGraw-Hill*

Brzeszczynski, J., Archibald, K., Gajdka, J. and Brzeszczynska, J., Dividend Yield Strategy in the British Stock Market 1994–2007, Working Paper Series.

Campbell, J.Y. and Shiller, J.R., (1988), Stock Prices, Earnings, and Expected Dividends, *The Journal of Finance*, XLII(3), 661-676.

Campbell, J.Y. and Shiller, J.R., (1989), The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors, *The Review of Financial Studies*, 1(2), 195-228.

Christie, W.G. (1990), Dividend Yield and Expected Return: The Zero-Dividend Puzzle, *The Journal of Financial Economics*, 28, 90-125

Fabozzi, J.F and Francis, J.C., (1977), Stability Tests for Alphas and Betas over Bull and Bear Market Conditions, *The Journal of Finance,* XXXII(4), 1093-1099

Fama, E.F. (1970), Efficient capital markets: A review of theory and empirical work, *The Journal of Finance,* 25, 383-417

Fama, E.F. and French, K.R., (1998), Dividend Yields and Expected Stock Returns, *The Journal of Financial Economics,* 22, 3-25

Fama, E.F. and French, K.R., (1998), Value versus Growth: The International Evidence, *The Journal of Finance*, LIII(6), 1975-1999

Filbeck, G. and Visscher S. (1997), Dividend Yield Strategies in the British Stock Market, *European Journal of Finance,* 3, 277-289.

Gombola, M.J. and Liu F.-Y.L, (1993a), Dividend Yields and Stock Returns: Evidence of Time Variation between Bull and Bear Markets, *The Financial Review*, 28, 303–327.

Gombola, M.J. and Liu F.-Y.L, (1993b), Considering Dividend Stability in the Relation between Dividend Yields and Stock Return, *The Journal of Financial Research*, 16, 139–150.

Grullon, G. and Michaely, R., (2002), Dividends, Share Repurchases, and the Substitution Hypothesis, *The Journal of Finance*, 57, 4, 1649 – 1684.

Jagannathan, M., Stephens, C.P. and Weisbach, M.S., (2000), Financial Flexibility and the Choice between Dividends and Stock Repurchases, *Journal of Financial Economics*, 57, 355 – 384.

Lakonishok, J., Shleifer, A. and Vishny, R.W. (1994), Contrarian Investment, Extrapolation and Risk, *The Journal of Finance*, XLIX(5), 1541-1578

McQueen, G., Shields, K. and Thorley, S.R. (1997), Does the "Dow-10 Investment Strategy" Beat the Dow Statistically and Economically?, *Financial Analysts Journal*, 53, 66-72.

von Eije, H. and Megginson, W.L., (2008), Dividends and share repurchases in the European Union, *Journal of Financial Economics*, 89, 347-374.

Miller, M.H. and Modigliani, Franco (1961), Dividend Policy, Growth, and the Valuation of Shares, *The Journal of Business*, XXXIV(4), 411-433

Moon, K.K. and Zumwalt, J.K. (1979), An Analysis of Risk in Bull and Bear Markets, *The Journal of Financial and Quantitative Analysis*, 14(5), 1015-1025

Shleifer, A. (2000), Inefficient Markets: An Introduction to Behavioral Finance 1st edition, *Oxford University Press.*

Shiller, R.J. (2003), From Efficient Markets Theory to Behavioral Finance, *The Journal of Economic Perspective*, 17, 1, 83-104.

Visscher, S. and Filbeck G. (2003), Dividend-Yield Strategies in the Canadian Stock Market, *Financial Analysts Journal*, 59. 99-106.

Appendix A

Appendix A.1. Raw compound returns of different number of constituents in high dividend yield portfolios and the market Portfolio 1st April 1988 - 1st of December 2008

		Top 25 portfolios			Top 25 student's t-test		
Year	Euro 750	25 constituents	50 constituents	75 constituents	25 constituents	50 constituents	75 constituents
1988	34.2 %	51.4 %	38.0 %	37.2 %	-2.16*	-2.47*	-0.64
1989	9.2 %	9.5 %	3.7 %	7.3 %	0.02	0.40	0.23
1990	-14.7 %	-10.9 %	-10.7 %	-11.1 %	-0.77	0.56	-0.92
1991	12.2 %	-8.6 %	-2.0 %	-0.6 %	1.53*	1.96*	1.46*
1992	16.3 %	24.4 %	27.9 %	32.5 %	-0.89	-0.13	-1.73*
1993	37.2 %	110.9 %	77.4 %	69.9 %	-3.39*	-1.48*	-3.34*
1994	-17.0 %	-23.0 %	-22.2 %	-19.4 %	0.85	0.86	0.88
1995	15.6 %	10.5 %	12.3 %	16.7 %	0.38	1.63*	-0.20
1996	32.3 %	42.2 %	37.5 %	33.9 %	-1.06	-1.65*	1.22
1997	36.0 %	22.0 %	28.8 %	33.6 %	0.88	-0.96	0.49
1998	-2.3 %	-27.7 %	-21.1 %	-12.9 %	1.47*	1.45*	0.66
1999	37.1 %	14.1 %	4.5 %	3.7 %	1.26	-0.11	1.40*
2000	3.9 %	41.6 %	40.6 %	30.1 %	-2.81*	-2.29*	-1.87*
2001	-7.8 %	9.1 %	4.2 %	8.9 %	-1.36*	-0.81	-1.60*
2002	-43.2 %	-34.2 %	-38.3 %	-36.5 %	-1.61*	-1.30	-1.76*
2003	26.7 %	12.4 %	51.4 %	42.9 %	1.12	-1.35	-0.50
2004	9.2 %	11.0 %	12.5 %	13.1 %	-0.23	0.32	-1.69*
2005	41.0 %	48.6 %	37.7 %	39.2 %	-0.84	-1,00	0.13
2006	3.8 %	-8.8 %	-7.4 %	-6.0 %	1.06	-0.55	1.34
2007	-21.9 %	-23.6 %	-24.3 %	-26.9 %	0.28	0.57	1.53*
2008	-25.6 %	-21.7 %	-29.7 %	-27.3 %	-0.56	2.60*	0.06
Average	8.7 %	11.9 %	10.5 %	10.9 %			
Average 1988 - 1998	16.1 %	22.8 %	19.1 %	20.0 %			
Average 1998 - 2008	1.9 %	1.9 %	2.7 %	2.6 %			
Annulized	5.9 %	7.4 %	6.6 %	7.5 %			
Volatility 1988 - 1998	-	0.2 %	0.5 %	0.1 %			
Volatility 1998 - 2008	-	-0.5 %	-0.3 %	-0.4 %			

Raw returns for each portfolio is calculated from the monthly realized returns and it shows the return in one year when $1,000 was invested in each of the securities in the portfolio in the beginning of the year. The standard deviation differences shows the excess standard deviation to the Euro 750 standard deviation. Student's t-test was calculated as shown in Equation 1. * Statistically significant result at 10% level.

Appendix A.2. Sharpe index of the Euro 750 and different number of constituents in Top 25 portfolio 1st April - 1st December

		Top 25 Portfolios		
Year	Euro 750	25 constituents	50 constituents	75 constituents
1988	1.28	1.88	1.39	1.44
1989	0.14	0.16	-0.13	0.05
1990	-0.76	-0.65	-0.67	-0.68
1991	0.40	-0.34	-0.12	-0.08
1992	0.55	0.69	0.73	0.83
1993	1.99	3.22	3.03	3.13
1994	-1.72	-2.04	-2.07	-1.78
1995	0.74	0.34	0.51	0.86
1996	1.56	1.69	1.78	1.77
1997	1.56	1.14	1.66	1.67
1998	-0.11	-1.54	-1.32	-0.91
1999	1.65	0.56	0.07	0.03
2000	-0.11	2.76	3.12	2.26
2001	-0.35	0.43	0.15	0.38
2002	-2.34	-1.84	-1.98	-2.00
2003	1.26	0.71	2.11	1.92
2004	0.72	0.87	1.14	1.14
2005	2.03	2.40	1.96	2.04
2006	-0.01	-0.90	-0.99	-0.86
2007	-1.85	-1.79	-1.95	-2.23
2008	-1.40	-1.00	-1.40	-1.28
Average full period	0.25	0.32	0.34	0.37
Average 1988 - 1998	0.58	0.61	0.61	0.72
Average 1998 - 2008	-0.05	0.06	0.08	0.04

The Sharpe ratio is a measure of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year.

Appendix A.3. Treynor measure and beta values of different number of constituents in high dividend yield portfolios and Market Portfolio 1st April 1988 - 1st December2008

		Top 25 Treynor measure			Top 25 beta value		
Year	Euro 750	25 constituents	50 constituents	75 constituents	25 constituents	50 constituents	75 constituents
1988	27.2 %	49.3 %	33.2 %	34.7 %	0.90	0.93	0.87
1989	1.2 %	2.2 %	-4.6 %	-0.8 %	0.65	0.94	0.87
1990	-22.0 %	-21.7 %	-22.4 %	-22.7 %	0.84	0.80	0.81
1991	7.1 %	-11.6 %	-6.1 %	-5.1 %	1.18	1.17	1.11
1992	12.9 %	18.8 %	20.2 %	24.1 %	1.12	1.21	1.21
1993	34.2 %	88.9 %	72.4 %	70.8 %	1.21	1.03	0.94
1994	-21.6 %	-33.1 %	-29.5 %	-25.2 %	0.83	0.91	0.95
1995	10.2 %	4.3 %	7.5 %	14.2 %	1.19	0.92	0.80
1996	27.2 %	36.0 %	39.2 %	37.6 %	1.03	0.83	0.77
1997	30.9 %	34.6 %	41.6 %	40.3 %	0.49	0.57	0.71
1998	-7.0 %	-67.0 %	-51.8 %	-34.9 %	0.48	0.50	0.50
1999	32.3 %	15.3 %	-0.5 %	-1.6 %	0.60	0.65	0.70
2000	-1.9 %	82.0 %	80.9 %	63.8 %	0.44	0.43	0.38
2001	-10.8 %	10.7 %	1.7 %	8.1 %	0.57	0.72	0.73
2002	-44.8 %	-44.3 %	-45.5 %	-46.1 %	0.81	0.88	0.83
2003	25.7 %	17.3 %	57.8 %	48.8 %	0.66	0.87	0.86
2004	7.6 %	13.3 %	15.3 %	15.1 %	0.71	0.72	0.77
2005	37.6 %	54.3 %	41.8 %	42.3 %	0.83	0.82	0.85
2006	-1.0 %	-22.1 %	-20.9 %	-13.5 %	0.62	0.58	0.80
2007	-26.0 %	-30.0 %	-32.3 %	-34.9 %	0.92	0.88	0.89
2008	-26.7 %	-25.5 %	-32.0 %	-29.8 %	0.90	0.96	0.95
Average full period	0.04	0.08	0.08	0.09	0.81	0.83	0.82
Average 1988 - 1998	0.11	0.17	0.15	0.17	0.94	0.93	0.90
Average 1998 - 2008	-0.01	0.00	0.01	0.02	0.69	0.73	0.75

Treynor measure adjusts the return when the portfolio holds the same systematic risk as market fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on yearly basis. Beta coefficient is calculated as portfolio returns' relation to the market portfolio.

Appendix A.4. Jensen's alpha measure for the Euro 750 and different number of constituents in Top 25 portfolio 1st April 1988 - 1st December 2008

	Top 25 alpha value		
Year	25 constituents	50 constituents	75 constituents
1988	19.9 %	5.6 %	6.5 %
1989	0.7 %	-5.5 %	-1.7 %
1990	0.2 %	-0.3 %	-0.5 %
1991	-22.1 %	-15.5 %	-13.6 %
1992	6.6 %	8.9 %	13.5 %
1993	66.4 %	39.3 %	34.6 %
1994	-9.6 %	-7.2 %	-3.5 %
1995	-7.0 %	-2.5 %	3.2 %
1996	9.0 %	9.9 %	7.9 %
1997	1.8 %	6.1 %	6.7 %
1998	-29.0 %	-22.3 %	-14.0 %
1999	-10.2 %	-21.4 %	-23.7 %
2000	36.6 %	35.6 %	25.0 %
2001	12.2 %	9.0 %	13.7 %
2002	0.4 %	-0.6 %	-1.1 %
2003	-5.5 %	28.0 %	19.9 %
2004	4.0 %	5.5 %	5.7 %
2005	13.9 %	3.4 %	3.9 %
2006	-13.0 %	-11.6 %	-10.0 %
2007	-3.7 %	-5.6 %	-7.9 %
2008	1.1 %	-5.2 %	-3.0 %
Average	3.46 %	2.56 %	2.94 %
Average 1988 - 1998	6.58 %	3.89 %	5.31 %
Average 1998 - 2008	0.61 %	1.35 %	0.78 %

Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return.

Appendix B

Appendix B.1. Raw compound returns of alternative definitions of high dividend yield portfolios and the market Portfolio 1st April 1988 - 1st of December 2008

		Top 25 Portfolios			Top 25 student's t-test		
Year	Euro 750	25 constituents	20 % dividend yield	unmodified dividend yield	25 constituents	20 % dividend yield	unmodified dividend yield
1988	34.2 %	51.4 %	42.2 %	38.9 %	-2.16*	-1.54*	-0.91
1989	9.2 %	9.5 %	8.2 %	9.1 %	0.02	0.16	0.06
1990	-14.7 %	-10.9 %	-10.5 %	-14.5 %	-0.77	-0.52	0.04
1991	12.2 %	-8.6 %	-5.2 %	-7.4 %	1.53*	1.89*	2.75*
1992	16.3 %	24.4 %	32.5 %	29.7 %	-0.89	-1.44*	-0.95
1993	37.2 %	110.9 %	56.8 %	50.1 %	-3.39*	-2.90*	-2.17*
1994	-17.0 %	-23.0 %	-20.1 %	-21.2 %	0.85	0.83	1.46*
1995	15.6 %	10.5 %	14.0 %	14.2 %	0.38	0.30	0.13
1996	32.3 %	42.2 %	31.0 %	25.9 %	-1.06	0.23	0.94
1997	36.0 %	22.0 %	26.2 %	21.7 %	0.88	0.88	1.19
1998	-2.3 %	-27.7 %	-15.4 %	-19.5 %	1.47*	0.94	1.15
1999	37.1 %	14.1 %	8.1 %	5.4 %	1.26	1.66*	2,00*
2000	3.9 %	41.6 %	37.2 %	39.0 %	-2.81*	-2.16*	-2.41*
2001	-7.8 %	9.1 %	4.0 %	-0.2 %	-1.36*	-1.20	-0.87
2002	-43.2 %	-34.2 %	-36.7 %	-36.7 %	-1.61*	-1.31	-1.59*
2003	26.7 %	12.4 %	19.7 %	51.2 %	1.12	0.75	-1.35
2004	9.2 %	11.0 %	18.3 %	20.6 %	-0.23	-1.37*	-1.83*
2005	41.0 %	48.6 %	38.7 %	36.7 %	-0.84	0.32	0.68
2006	3.8 %	-8.8 %	-2.9 %	0.9 %	1.06	0.86	0.51
2007	-21.9 %	-23.6 %	-24.7 %	-28.4 %	0.28	0.60	1.41*
2008	-25.6 %	-21.7 %	-25.1 %	-35.8 %	-0.56	-0.12	1.46*
Average	8.7 %	11.9 %	9.4 %	8.6 %			
Average 1988 - 1998	16.1 %	22.8 %	17.5 %	14.6 %			
Average 1998 - 2008	1.9 %	1.9 %	1.9 %	3.0 %			
Annulized	5.9 %	7.4 %	6.4 %	5.0 %			
Volatility 1988 - 1998	-	0.2 %	0.1 %	0.4 %			
Volatility 1998 - 2008	-	-0.5 %	-0.5 %	0.0 %			

Raw returns for each portfolio is calculated from the monthly realized returns and it shows the return in one year when $1 was invested in each of the securities in the portfolio in the beginning of the year. The standard deviation differences shows the excess standard deviation to the Euro 750 standard deviation. Student's t-test was calculated as shown in Equation 1. * Statistically significant result at 10% level.

Appendix B.2. Sharpe index of alternative definitions for high dividend yield portfolios and Market Portfolio 1st April 1988 - 1st December 2008

		Top 25 Portfolios		
Year	Euro 750	25 constituents	20 % dividend yield	unmodified dividend yield
1988	1.28	1.88	1.66	1.42
1989	0.14	0.16	0.09	0.13
1990	-0.76	-0.65	-0.78	-0.81
1991	0.40	-0.34	-0.29	-0.46
1992	0.55	0.69	0.85	0.73
1993	1.99	3.22	3.02	2.70
1994	-1.72	-2.04	-1.71	-2.03
1995	0.74	0.34	0.64	0.55
1996	1.56	1.69	1.49	1.24
1997	1.56	1.14	1.36	1.06
1998	-0.11	-1.54	-1.20	-1.39
1999	1.65	0.56	0.25	0.11
2000	-0.11	2.76	2.46	2.56
2001	-0.35	0.43	0.14	-0.05
2002	-2.34	-1.84	-2.00	-1.92
2003	1.26	0.71	1.08	1.48
2004	0.72	0.87	1.59	1.75
2005	2.03	2.40	2.00	1.81
2006	-0.01	-0.90	-0.59	-0.28
2007	-1.85	-1.79	-1.98	-2.28
2008	-1.40	-1.00	-1.26	-1.61
Average	0.25	0.32	0.33	0.22
Average 1988 - 1998	0.58	0.61	0.63	0.45
Average 1998 - 2008	-0.05	0.06	0.05	0.02

The Sharpe ratio is a measure of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year.

Appendix B.3. Treynor measure and beta values of alternative definitions for high dividend yield portfolios and Market Portfolio 1st April 1988 - 1st December 2008

		Top 25 Treynor measure			Top 25 beta value		
Year	Euro 750	25 constituents	20 % dividend yield	unmodified dividend yield	25 constituents	20 % dividend yield	unmodified dividend yield
1988	27.2 %	49.3 %	41.0 %	34.3 %	0.90	0.86	0.93
1989	1.2 %	2.2 %	0.2 %	1.4 %	0.65	0.84	0.77
1990	-22.0 %	-21.7 %	-24.9 %	-25.6 %	0.84	0.71	0.85
1991	7.1 %	-11.6 %	-9.9 %	-13.7 %	1.18	1.04	0.92
1992	12.9 %	18.8 %	25.2 %	19.1 %	1.12	1.16	1.38
1993	34.2 %	88.9 %	64.2 %	55.6 %	1.21	0.84	0.85
1994	-21.6 %	-33.1 %	-24.1 %	-28.0 %	0.83	1.02	0.92
1995	10.2 %	4.3 %	10.0 %	7.9 %	1.19	0.86	1.11
1996	27.2 %	36.0 %	29.3 %	24.4 %	1.03	0.89	0.86
1997	30.9 %	34.6 %	33.3 %	25.8 %	0.49	0.63	0.65
1998	-7.0 %	-67.0 %	-46.4 %	-55.3 %	0.48	0.43	0.44
1999	32.3 %	15.3 %	4.7 %	1.0 %	0.60	0.72	0.62
2000	-1.9 %	82.0 %	112.2 %	93.1 %	0.44	0.28	0.36
2001	-10.8 %	10.7 %	1.4 %	-4.2 %	0.57	0.68	0.76
2002	-44.8 %	-44.3 %	-46.6 %	-44.0 %	0.81	0.82	0.87
2003	25.7 %	17.3 %	25.8 %	38.7 %	0.66	0.73	1.30
2004	7.6 %	13.3 %	23.8 %	25.8 %	0.71	0.70	0.74
2005	37.6 %	54.3 %	42.8 %	37.3 %	0.83	0.82	0.89
2006	-1.0 %	-22.1 %	-11.7 %	-5.6 %	0.62	0.66	0.70
2007	-26.0 %	-30.0 %	-32.1 %	-36.1 %	0.92	0.90	0.90
2008	-26.7 %	-25.5 %	-29.9 %	-34.4 %	0.90	0.87	1.07
Average	4.4 %	8.2 %	9.0 %	5.6 %	0.81	0.78	0.85
Average 1988 - 1998	10.7 %	16.8 %	14.4 %	10.1 %	0.94	0.88	0.92
Average 1998 - 2008	-1.4 %	0.4 %	4.0 %	1.5 %	0.69	0.69	0.79

Treynor measure adjusts the return when the portfolio holds the same systematic risk as market fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Returns are calculated on yearly basis.The betas were regressed against the Euro 750 portfolios return.

Appendix B.4. Jensen's alpha measure for the alternative definitions of Top 25 portfolios 1st April 1988- 1st December 2008

	Top 25 Alpha value		
Year	25 constituents	20 % dividend yield	unmodified dividend yield
1988	19.9 %	11.8 %	6.6 %
1989	0.7 %	-0.8 %	0.1 %
1990	0.2 %	-2.1 %	-3.1 %
1991	-22.1 %	-17.6 %	-19.1 %
1992	6.6 %	14.3 %	8.6 %
1993	66.4 %	25.2 %	18.1 %
1994	-9.6 %	-2.6 %	-5.9 %
1995	-7.0 %	-0.2 %	-2.5 %
1996	9.0 %	1.8 %	-2.4 %
1997	1.8 %	1.5 %	-3.3 %
1998	-29.0 %	-17.1 %	-21.1 %
1999	-10.2 %	-19.8 %	-19.3 %
2000	36.6 %	31.9 %	33.9 %
2001	12.2 %	8.4 %	5.0 %
2002	0.4 %	-1.5 %	0.7 %
2003	-5.5 %	0.1 %	16.9 %
2004	4.0 %	11.4 %	13.4 %
2005	13.9 %	4.3 %	-0.3 %
2006	-13.0 %	-7.0 %	-3.2 %
2007	-3.7 %	-5.5 %	-9.1 %
2008	1.1 %	-2.8 %	-8.3 %
Average	3.5 %	1.6 %	0.3 %
Average 1988 - 1998	6.6 %	3.1 %	-0.3 %
Average 1998 - 2008	0.6 %	0.2 %	0.8 %

Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return.

Appendix C.1. Raw compound returns of different starting dates for Euro 750, Top 25, Zero and Repo portfolios (1st April 1988 - 1st of December 2008)

	Euro 750 portfolios				Top 25 Portfolios				Zero portfolio				Repo portfolio			
Year	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October
1988	34.4 %	34.2 %	46.4 %	45.9 %	35.8 %	51.4 %	60.5 %	47.4 %	44.0 %	54.6 %	80.2 %	63.4 %	46.3 %	-6.3 %	4.6 %	15.6 %
1989	37.9 %	9.2 %	-1.1 %	-27.7 %	36.1 %	9.5 %	-2.7 %	-25.3 %	64.5 %	28.4 %	8.9 %	-13.8 %	43.6 %	22.7 %	32.0 %	-14.6 %
1990	-27.0 %	-14.7 %	-4.5 %	18.8 %	-0.9 %	-10.9 %	-1.4 %	16.8 %	-30.7 %	-26.6 %	-16.4 %	-0.2 %	-51.6 %	-45.6 %	-	-
1991	17.1 %	12.2 %	-4.6 %	-30.7 %	12.3 %	-8.6 %	-13.2 %	-38.2 %	-7.2 %	0.3 %	-13.6 %	-32.0 %	-	-	-	-
1992	7.4 %	16.3 %	12.3 %	90.2 %	14.8 %	24.4 %	22.8 %	150.4 %	2.3 %	10.0 %	9.1 %	77.8 %	-35.7 %	-50.9 %	-36.5 %	102.4 %
1993	52.8 %	37.2 %	27.3 %	5.6 %	92.9 %	110.9 %	38.3 %	7.2 %	37.9 %	26.8 %	20.6 %	-7.2 %	87.4 %	86.2 %	50.9 %	1.9 %
1994	-4.6 %	-17.0 %	-6.3 %	-2.4 %	-4.9 %	-23.0 %	-12.2 %	-5.3 %	-14.3 %	-20.3 %	-25.5 %	-20.2 %	8.5 %	-13.5 %	4.9 %	6.2 %
1995	1.7 %	15.6 %	18.2 %	9.4 %	5.0 %	10.5 %	15.6 %	9.9 %	-17.7 %	-2.7 %	4.7 %	-5.7 %	18.8 %	27.0 %	16.0 %	-5.5 %
1996	20.5 %	32.3 %	31.0 %	50.2 %	15.5 %	42.2 %	24.2 %	37.1 %	-0.2 %	28.6 %	25.2 %	44.3 %	-16.2 %	-5.1 %	48.0 %	57.5 %
1997	40.0 %	36.0 %	44.1 %	7.3 %	28.9 %	22.0 %	39.6 %	5.5 %	46.0 %	39.9 %	66.8 %	34.3 %	44.8 %	38.9 %	33.5 %	1.6 %
1998	8.1 %	-2.3 %	-3.9 %	21.7 %	8.1 %	-27.7 %	-14.4 %	15.0 %	42.1 %	16.7 %	13.8 %	38.3 %	-6.7 %	-7.0 %	17.1 %	47.9 %
1999	32.8 %	37.1 %	29.8 %	34.2 %	26.3 %	14.1 %	3.5 %	4.0 %	50.3 %	53.6 %	27.4 %	14.3 %	9.8 %	-5.5 %	0.9 %	10.7 %
2000	20.1 %	3.9 %	2.9 %	-17.9 %	20.0 %	41.6 %	20.1 %	5.1 %	-6.2 %	-44.8 %	-44.4 %	-63.1 %	22.1 %	19.5 %	47.3 %	29.8 %
2001	-17.4 %	-7.8 %	-19.9 %	-26.8 %	-4.4 %	9.1 %	-2.3 %	-19.4 %	-43.4 %	-27.2 %	-49.0 %	-44.0 %	-11.4 %	2.9 %	-23.7 %	-18.3 %
2002	-24.8 %	-43.2 %	-36.2 %	-2.2 %	-17.4 %	-34.2 %	-33.5 %	2.6 %	-42.7 %	-50.7 %	-36.9 %	11.6 %	-60.7 %	-43.6 %	3.5 %	96.8 %
2003	-3.0 %	26.7 %	16.1 %	-0.4 %	-1.4 %	12.4 %	15.9 %	-2.4 %	0.7 %	35.5 %	11.0 %	-15.5 %	-12.1 %	19.8 %	15.2 %	-4.7 %
2004	1.8 %	9.2 %	19.3 %	23.7 %	11.7 %	11.0 %	27.6 %	25.8 %	-16.8 %	-2.1 %	1.1 %	14.2 %	6.2 %	6.4 %	19.7 %	3.9 %
2005	42.3 %	41.0 %	20.1 %	17.3 %	39.1 %	48.6 %	13.8 %	17.5 %	48.0 %	46.1 %	29.0 %	27.0 %	51.7 %	44.9 %	17.9 %	16.6 %
2006	10.2 %	3.8 %	24.5 %	8.9 %	4.0 %	-8.8 %	13.9 %	6.0 %	17.0 %	14.2 %	30.2 %	16.5 %	6.4 %	-1.4 %	18.2 %	5.4 %
2007	-2.7 %	-21.9 %	-29.0 %	-25.7 %	-4.4 %	-23.6 %	-33.3 %	-29.1 %	-1.3 %	-28.4 %	-33.7 %	-33.9 %	-7.2 %	-26.5 %	-32.8 %	-30.0 %
2008	-35.9 %	-25.6 %	-26.3 %		-34.9 %	-21.7 %	-26.5 %		-55.9 %	-43.4 %	-46.3 %		-48.5 %	-37.2 %	-36.7 %	
Average	10.1 %	8.7 %	7.6 %	10.0 %	13.4 %	11.9 %	7.4 %	11.5 %	5.5 %	5.2 %	3.0 %	5.3 %	4.8 %	1.3 %	10.5 %	18.0 %
Average 1988 - 1998	18.0 %	16.1 %	16.3 %	16.7 %	23.6 %	22.8 %	17.1 %	20.6 %	12.5 %	13.9 %	16.0 %	14.1 %	16.2 %	5.9 %	19.2 %	20.6 %
Average 1998 - 2008	2.9 %	1.9 %	-0.3 %	3.3 %	4.3 %	1.9 %	-1.4 %	2.5 %	-0.7 %	-2.8 %	-8.9 %	-3.5 %	-4.6 %	-2.5 %	4.2 %	15.8 %
Annulized	7.3 %	5.9 %	5.1 %	6.3 %												
Volatility 1988 - 1998					0.6 %	0.2 %	0.3 %	0.2 %	0.6 %	0.2 %	0.5 %	0.5 %	5.0 %	2.9 %	4.4 %	2.0 %
Volatility 1998 - 2008					-0.7 %	-0.5 %	-0.5 %	-0.4 %	4.0 %	2.4 %	3.4 %	2.7 %	2.6 %	3.4 %	3.7 %	3.7 %

Raw returns for each portfolio is calculated from the monthly realized returns and it shows the return in one year when $1 was invested in each of the securities in the portfolio in the beginning of the year. The standard deviation differences shows the excess standard deviation to the Euro 750 standard deviation. Repo portfolio is missing values in years 1990 and 1991 since it did not have any companies matching the criteria.

Appendix C.2. Risk-adjusted measures of different starting dates for Top 25 portfolio (1st April 1988 - 1st of December 2008)

	Top 25 Portfolios				Top 25 beta value				Top 25 Treynor measure				Top 25 Alpha value			
Year	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October
1988	1.43	1.88	2.45	2.10	0.85	0.90	0.84	0.80	34.7 %	49.3 %	63.0 %	49.0 %	5.6 %	19.9 %	20.3 %	8.9 %
1989	1.18	0.16	-0.58	-2.39	0.94	0.65	0.81	0.76	29.7 %	2.2 %	-13.1 %	-43.5 %	0.0 %	0.7 %	-3.4 %	-6.1 %
1990	-0.19	-0.65	-0.18	0.49	0.76	0.84	0.83	0.90	-11.3 %	-21.7 %	-9.9 %	11.7 %	17.6 %	0.2 %	1.2 %	-0.8 %
1991	0.34	-0.34	-0.70	-1.78	1.04	1.18	1.12	1.03	6.3 %	-11.6 %	-15.9 %	-41.1 %	-5.3 %	-22.1 %	-7.5 %	-6.5 %
1992	0.45	0.69	0.66	3.99	1.06	1.12	1.13	1.20	10.6 %	18.8 %	17.5 %	123.0 %	7.2 %	6.6 %	9.3 %	42.9 %
1993	4.21	3.22	1.58	0.28	0.90	1.21	1.05	1.01	100.1 %	88.9 %	33.4 %	3.7 %	45.2 %	66.4 %	9.8 %	1.6 %
1994	-0.36	-2.04	-0.96	-0.54	1.04	0.83	0.99	1.03	-8.5 %	-33.1 %	-17.4 %	-10.4 %	0.1 %	-9.6 %	-6.0 %	-2.7 %
1995	0.02	0.34	0.80	0.40	0.91	1.19	0.89	0.86	-0.6 %	4.3 %	11.7 %	5.6 %	2.9 %	-7.0 %	-1.2 %	1.1 %
1996	0.76	1.69	1.13	1.66	0.93	1.03	0.87	0.82	11.2 %	36.0 %	21.9 %	39.2 %	-3.9 %	9.0 %	-3.5 %	-4.8 %
1997	1.44	1.14	2.25	0.11	0.65	0.49	0.53	0.63	36.5 %	34.6 %	64.7 %	0.7 %	1.0 %	1.8 %	13.7 %	-1.0 %
1998	0.25	-1.54	-1.10	0.77	0.49	0.48	0.45	0.44	6.6 %	-67.0 %	-42.5 %	23.9 %	1.6 %	-29.0 %	-15.2 %	2.9 %
1999	1.21	0.56	-0.01	-0.03	0.75	0.60	0.59	0.49	29.0 %	15.3 %	-2.8 %	-2.8 %	0.6 %	-10.2 %	-16.1 %	-15.4 %
2000	1.24	2.76	1.08	0.08	-0.12	0.44	0.26	0.62	-115.1 %	82.0 %	56.8 %	0.4 %	16.1 %	36.6 %	15.3 %	14.5 %
2001	-0.34	0.43	-0.19	-0.79	0.69	0.57	0.63	0.78	-12.0 %	10.7 %	-7.4 %	-27.4 %	6.5 %	12.2 %	9.3 %	1.0 %
2002	-0.84	-1.84	-1.60	0.17	0.84	0.81	0.82	0.83	-22.7 %	-44.3 %	-42.7 %	1.6 %	3.2 %	0.4 %	-4.2 %	4.2 %
2003	-0.07	0.71	0.70	-0.16	0.66	0.66	0.95	0.82	-3.8 %	17.3 %	15.8 %	-4.2 %	0.2 %	-5.5 %	0.7 %	-2.3 %
2004	0.92	0.87	2.00	1.67	0.89	0.71	0.73	0.76	11.8 %	13.3 %	35.0 %	30.8 %	9.9 %	4.0 %	13.0 %	7.2 %
2005	1.96	2.40	0.65	0.84	0.83	0.83	0.78	0.85	43.4 %	54.3 %	12.7 %	15.5 %	3.4 %	13.9 %	-2.8 %	2.1 %
2006	0.02	-0.90	0.79	0.14	0.88	0.62	0.67	0.82	-0.7 %	-22.1 %	13.3 %	1.4 %	-5.5 %	-13.0 %	-4.2 %	-2.1 %
2007	-0.54	-1.79	-3.38	-1.48	0.82	0.92	0.82	0.92	-11.0 %	-30.0 %	-44.3 %	-34.4 %	-3.1 %	-3.7 %	-9.9 %	-5.7 %
2008	-1.69	-1.00	-1.31		0.86	0.90	1.08		-39.8 %	-25.5 %	-25.2 %		-4.2 %	1.1 %	2.0 %	
Average	0.54	0.32	0.19	0.28	0.79	0.81	0.80	0.82	4.5 %	8.2 %	5.9 %	7.1 %	4.7 %	3.5 %	1.0 %	1.9 %
Average 1988 - 1998	0.93	0.61	0.65	0.43	0.91	0.94	0.91	0.90	20.9 %	16.8 %	15.6 %	13.8 %	7.0 %	6.6 %	3.3 %	3.3 %
Average 1998 - 2008	0.19	0.06	-0.22	0.12	0.69	0.69	0.71	0.73	-10.4 %	0.4 %	-2.8 %	0.5 %	2.6 %	0.6 %	-1.1 %	0.6 %

The Sharpe ratio measures of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year. The betas were regressed against the Euro 750 portfolios return. Treynor measure adjusts the return when the portfolio holds the same systematic risk as market fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on yearly basis.

Appendix C.3. Risk-adjusted measures of different starting dates for Zero portfolio (1st April 1988 - 1st of December 2008)

	Zero portfolio				Zero beta values				Zero Treynor measure				Zero alpha value			
Year	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October
1988	1.49	2.08	2.58	2.02	1.00	0.86	0.92	1.00	37.7 %	55.3 %	78.8 %	55.5 %	9.7 %	24.2 %	36.9 %	17.6 %
1989	1.88	1.05	0.13	-1.31	0.96	0.85	0.62	0.65	58.4 %	24.0 %	1.8 %	-32.9 %	27.7 %	19.3 %	6.6 %	1.7 %
1990	-2.06	-1.23	-0.63	-0.09	0.86	0.93	0.94	1.03	-44.3 %	-36.4 %	-24.6 %	-6.2 %	-8.4 %	-13.4 %	-12.5 %	-19.4 %
1991	-0.37	-0.11	-1.15	-2.16	0.97	0.91	0.67	0.68	-13.4 %	-5.3 %	-27.2 %	-53.2 %	-23.9 %	-11.2 %	-12.1 %	-12.5 %
1992	0.07	0.36	0.33	3.26	0.81	0.82	0.90	0.94	-1.6 %	8.1 %	6.6 %	80.0 %	-4.4 %	-3.9 %	-2.3 %	-6.7 %
1993	2.08	1.50	0.98	-0.76	0.84	0.79	0.84	0.69	41.4 %	30.3 %	20.7 %	-15.6 %	-7.1 %	-3.0 %	-2.8 %	-12.2 %
1994	-1.03	-2.14	-2.04	-1.54	0.90	0.82	0.84	0.91	-20.3 %	-30.3 %	-36.5 %	-27.9 %	-10.6 %	-7.2 %	-21.0 %	-18.4 %
1995	-1.56	-0.36	0.03	-0.67	0.98	1.09	0.88	0.89	-23.6 %	-7.4 %	-0.6 %	-12.2 %	-19.5 %	-19.2 %	-11.9 %	-14.6 %
1996	-0.25	1.13	0.93	1.59	1.01	1.11	1.07	0.96	-5.1 %	21.3 %	18.8 %	41.0 %	-20.8 %	-6.6 %	-7.6 %	-4.0 %
1997	1.59	1.73	1.99	0.99	0.91	0.77	1.08	0.98	45.1 %	45.2 %	57.2 %	30.0 %	9.3 %	11.0 %	19.6 %	27.1 %
1998	0.89	0.45	0.40	0.94	1.27	1.35	1.29	1.36	29.3 %	8.9 %	7.2 %	24.9 %	33.1 %	21.5 %	20.3 %	10.4 %
1999	1.37	2.07	0.95	0.42	1.04	0.87	0.99	1.43	44.0 %	56.4 %	22.4 %	6.2 %	16.5 %	20.8 %	-2.2 %	-32.2 %
2000	0.08	-2.75	-1.48	-3.14	3.04	1.41	2.14	1.46	-3.9 %	-35.9 %	-23.3 %	-46.6 %	-55.6 %	-47.9 %	-44.5 %	-34.8 %
2001	-1.21	-0.72	-1.46	-1.08	1.52	1.41	1.51	1.34	-31.2 %	-21.3 %	-34.1 %	-34.3 %	-15.0 %	-15.0 %	-17.7 %	-7.5 %
2002	-1.59	-1.95	-0.94	0.44	1.13	1.21	1.36	1.41	-39.3 %	-43.1 %	-28.3 %	7.4 %	-14.5 %	2.0 %	12.6 %	15.1 %
2003	0.12	1.18	0.49	-0.86	1.13	1.29	1.16	1.02	-0.3 %	26.7 %	8.7 %	-16.3 %	4.2 %	1.3 %	-7.5 %	-15.1 %
2004	-1.07	-0.20	0.04	0.63	1.22	1.07	1.24	1.25	-14.8 %	-3.4 %	-0.7 %	9.3 %	-18.8 %	-11.8 %	-22.3 %	-14.9 %
2005	1.98	1.97	1.22	1.17	1.01	1.03	0.95	0.96	44.4 %	41.3 %	26.6 %	23.8 %	5.2 %	3.8 %	9.7 %	10.3 %
2006	0.51	0.43	0.82	0.89	0.60	0.86	0.66	0.75	20.9 %	10.9 %	38.1 %	15.5 %	9.1 %	10.2 %	12.3 %	8.6 %
2007	-0.05	-2.30	-2.51	-1.63	1.36	0.91	1.13	0.99	-4.3 %	-35.8 %	-32.6 %	-36.9 %	4.0 %	-8.9 %	-0.4 %	-8.6 %
2008	-2.65	-1.97	-3.35		0.96	1.02	0.81		-74.9 %	-43.5 %	-57.7 %		-21.6 %	-17.2 %	-25.0 %	
Average	0.01	0.01	-0.13	-0.05	1.12	1.02	1.05	1.03	2.1 %	3.1 %	1.0 %	0.6 %	-4.8 %	-2.4 %	-3.4 %	-5.5 %
Average 1988 - 1998	0.18	0.40	0.32	0.13	0.92	0.89	0.88	0.87	7.4 %	10.5 %	9.5 %	5.8 %	-4.8 %	-1.0 %	-0.7 %	-4.1 %
Average 1998 - 2008	-0.15	-0.35	-0.53	-0.22	1.30	1.13	1.20	1.20	-2.7 %	-3.5 %	-6.7 %	-4.7 %	-4.9 %	-3.7 %	-5.9 %	-6.9 %

The Sharpe ratio measures of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year. The betas were regressed against the Euro 750 portfolios return. Treynor measure adjusts the return when the portfolio holds the same systematic risk as market fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on yearly basis.

Appendix C.4. Risk-adjusted measures of different starting dates for Repo portfolio (1st April 1988 - 1st of December 2008)

	Repo portfolio				Repo beta values				Repo Treynor measure				Repo alpha value			
Year	January	April	July	October	January	April	July	October	January	April	July	October	January	April	July	October
1988	0.78	-0.14	0.13	0.36	0.80	1.30	1.64	2.27	49.7 %	-10.1 %	-1.9 %	3.3 %	17.4 %	-48.8 %	-66.7 %	-78.4 %
1989	1.13	0.70	0.91	-0.69	1.18	0.94	1.19	1.34	29.9 %	15.6 %	20.4 %	-16.7 %	0.3 %	13.5 %	34.8 %	25.1 %
1990	-2.17	-1.79	-	-	0.04	0.28		0.00	-1534.1 %	-188.5 %	-	-	-57.8 %	-46.7 %	-	-
1991		-	-	-				0.00	-	-	-	-		-	-	-
1992	-0.18	-0.60	-0.31	1.71	1.71	1.84	1.58	0.06	-23.0 %	-29.4 %	-25.1 %	1794.3 %	-45.9 %	-78.0 %	-54.0 %	94.6 %
1993	4.00	2.37	1.34	0.11	0.58	1.19	1.30	1.45	145.8 %	70.0 %	36.7 %	-1.1 %	55.6 %	42.6 %	16.4 %	-4.7 %
1994	0.28	-0.90	0.10	0.13	1.27	1.08	1.09	0.96	3.6 %	-16.8 %	-0.2 %	0.8 %	15.3 %	5.2 %	12.2 %	8.3 %
1995	0.73	1.12	0.55	-0.41	1.00	0.86	0.51	0.51	13.2 %	25.1 %	21.1 %	-21.0 %	17.1 %	12.8 %	4.1 %	-12.8 %
1996	-0.41	-0.05	1.23	1.40	0.85	1.09	1.15	0.84	-25.1 %	-9.3 %	37.3 %	62.3 %	-34.3 %	-39.8 %	13.1 %	14.4 %
1997	1.95	1.80	1.53	-0.05	0.71	0.70	0.68	0.75	56.3 %	48.7 %	42.1 %	-4.5 %	15.1 %	12.3 %	2.0 %	-5.1 %
1998	-0.33	-0.31	0.49	0.84	0.71	0.66	2.08	2.27	-16.2 %	-17.8 %	6.0 %	19.1 %	-13.9 %	-7.1 %	30.2 %	4.3 %
1999	0.39	-0.61	-0.17	0.36	0.43	0.57	0.52	0.64	12.1 %	-18.1 %	-8.1 %	8.3 %	-7.0 %	-28.6 %	-17.0 %	-13.1 %
2000	0.98	0.77	3.38	1.66	0.03	0.70	0.43	0.81	573.9 %	19.5 %	97.6 %	30.8 %	15.9 %	15.1 %	42.9 %	43.5 %
2001	-0.62	0.12	-1.14	-0.60	0.81	0.89	0.85	0.88	-18.9 %	-0.1 %	-30.6 %	-22.9 %	2.0 %	9.5 %	-7.0 %	5.1 %
2002	-0.36	0.03	0.51	1.11	2.25	2.37	1.92	1.52	-27.8 %	-19.1 %	1.1 %	62.7 %	-2.9 %	60.9 %	74.3 %	100.8 %
2003	-0.21	0.65	0.83	-0.27	1.09	1.07	0.61	0.66	-12.1 %	17.6 %	23.4 %	-8.6 %	-8.8 %	-8.6 %	5.1 %	-4.8 %
2004	0.41	0.45	1.25	0.17	1.04	0.88	0.86	1.17	4.8 %	5.5 %	20.7 %	1.2 %	4.4 %	-1.8 %	2.9 %	-23.4 %
2005	2.82	2.19	0.94	0.76	0.74	0.81	0.60	0.66	66.2 %	51.4 %	23.6 %	18.8 %	19.8 %	11.1 %	4.4 %	3.8 %
2006	0.19	-0.34	0.92	0.11	0.75	0.90	1.18	1.07	2.3 %	-6.9 %	11.3 %	0.5 %	-2.4 %	-5.3 %	-9.8 %	-3.8 %
2007	-0.56	-1.81	-2.69	-1.60	1.01	1.00	0.85	0.81	-11.6 %	-30.5 %	-42.2 %	-40.3 %	-4.4 %	-4.5 %	-8.5 %	-9.8 %
2008	-1.97	-1.61	-2.20		1.15	1.12	0.99		-47.7 %	-34.1 %	-37.8 %		-7.0 %	-8.4 %	-10.7 %	
Average	0.34	0.10	0.40	0.28	0.91	1.01	1.05	0.93	-37.9 %	-6.4 %	10.3 %	104.8 %	-1.1 %	-4.7 %	3.6 %	8.0 %
Average 1988 - 1998	0.68	0.28	0.69	0.32	0.90	1.03	1.14	0.82	-142.6 %	-10.5 %	16.3 %	227.2 %	-1.9 %	-14.1 %	-4.8 %	5.2 %
Average 1998 - 2008	0.07	-0.04	0.19	0.25	0.91	1.00	0.99	1.05	47.7 %	-3.0 %	5.9 %	7.0 %	-0.4 %	2.9 %	9.7 %	10.3 %

The Sharpe ratio measures of the excess return per unit of risk in the portfolio. It characterizes how well the return of a portfolio compensates for the taken risk. It is calculated from the monthly excess return and adjusted for a one year. The betas were regressed against the Euro 750 portfolios return. Treynor measure adjusts the return when the portfolio holds the same systematic risk as market fully-diversified market portfolio. It relates the excess returns in a year to the beta coefficient of the portfolio. Jensen's alpha determines the excess return of the portfolio of securities over the portfolio's theoretical expected return. Returns are calculated on yearly basis.

Appendix D

Figure 3. Comparison of payout vehicles in Euro 750 from 1988 to 2007 in Euros

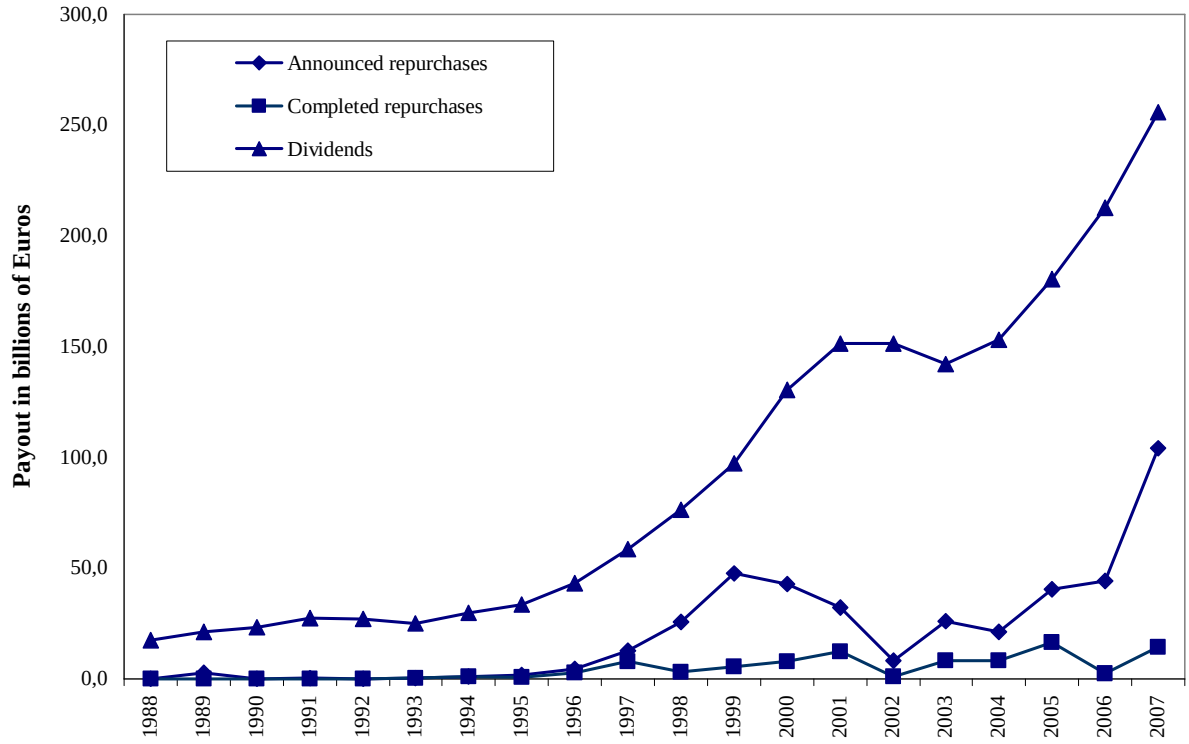


Figure 3 depicts the paid out dividends, announced repurchases and completed repurchases by the Euro 750 companies from 1988 to 2007. The US dollar amount were converted to Euros using yearly average spot rate. For before 1999 years a computational EURUSD rate was used.