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Do Market Anomalies Add Up?

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Introduction

In an efficient market, stock prices and returns adjust quickly to economic events as new information becomes available to investors. Thus, stock prices and returns should be relatively unpredictable and random. In reality, global stock exchanges show returns that cannot be explained by the Efficient Market Hypothesis which was originally put forth up by Eugene Fama (1965). According to Eugene F. Fama and Kenneth R. French, a market anomaly is an abnormal characteristic within the stock market that cannot be explained by the Capital Asset Pricing Model or other risk adjusting models (Fama & French, Dissecting Anomalies). Donald B. Keim calls them exceptions to the rule, as they are return distortions (Keim, 2006). Although they do not follow the rules of common models, they do not, in any way, prove these theories wrong (Latif, Arshad, Fatima , & Farooq, 2011). After anomalies are discovered they are often exploited by investors which forces excess returns to converge back to normal. Nevertheless, some anomalies' abnormal returns remain over many years.

There is a vast literature on market anomalies. The most established abnormalities seem to be size, price-to-earnings (P/E) ratio, price-to-book (P/B) value, momentum, and volatility. Abnormal returns have been found for stocks that are defined as small cap, low P/E ratio, low P/B value, high momentum, and low volatility.

Existing literature provides information about the discovery of anomalies, evidence for their existence, and attempts to explain their existence. Some researchers have gone further and attempt to guide investors in investment decisions based on their knowledge of idiosyncrasies. These studies only test one or two anomalies simultaneously and some of their evidence found them to work well together. This study combines several anomalies within one portfolio and aims to find out whether a portfolio with many abnormal characteristics is able to outperform any other portfolio.

As the stock market becomes more and more competitive and the number of investors steadily increases, knowing how to invest in the market is a very important skill. To be successful, an investor needs to be extremely current in his or her knowledge about company news and global development. This is very difficult in the era of technology and having a different approach to investing may be a huge advantage. This study seeks to find a strategy that helps investors to use market anomalies in their portfolios. Individual anomalies are tested separately to first prove their existence and to ensure that they still exist. Individual portfolios are moreover separated by bullish and bearish market periods. This will indicate whether there is a difference in the anomalies' performance in market upswings and market downturns. Next, stable anomalies are combined into various portfolios to test and compare their returns to portfolios without abnormal characteristics. The outcomes of this study will provide investors with information about single anomalies and the possibility of combining portfolios of anomalies to be relatively confident they will earn higher returns than average portfolios.

Results suggest that the P/E anomaly, the P/B anomaly, and the size anomaly are still present and useful to create excess returns. This study was unable to provide evidence for the existence of the momentum anomaly or the volatility anomaly. Moreover, there is not enough evidence to assume that combining anomalies in a portfolio is helpful.

Literature Review

The first market anomalies were discovered in the 1940s. Subsequently, increasing numbers of them were found; some stronger and some that disappeared quickly after discovery. In 1977 Sanjoy Basu became the first person to study the price-to-earnings ratio. His study scans the relation of a stock's P/E ratio to its expected return. It shows that the lower the P/E ratio, the higher the expected return. As there is no justifiable reason for that to be the case, it is to be categorized as a market anomaly. Basu takes data from 1957 to 1971 and provides evidence that the P/E ratio anomaly exists (Basu, 1977).

Rolf W. Banz followed with a study of the size-effect in 1981 using historical data from over 40 years. He performed a data test of stock portfolios with similar risk measures. The size effect occurs when stocks of small companies outperform stocks of large companies. Banz proved that the smallest 20% of companies earn annual returns that are up to 5% greater than those of other companies (Zacks, 2011). His study shows that the anomaly exists, but fails to give reasonable explanations for its existence. He also discovers that the results fluctuate and is not stable over different time periods. In addition, Banz states that the price-to-earnings ratio is likely to be a proxy for the size-effect, since the size-effect is significant even after adjusting for the P/E ratio (Banz, 1981).

In his 2011 article "7 Market Anomalies Investors Should Know", Stephen D. Simpson includes seven different market anomalies. The three that are important for this study are market-to-book ratio, size effect, and momentum. A low market-to-book ratio indicates high future returns. Simpson did not find this anomaly to be very strong and was only able to demonstrate it in large portfolios. Momentum implies that investors should buy stocks that were performing well over the past six months and sell stocks that were performing poorly over the past 6 months to be successful. (Simpson, 2011). Len Zacks, CEO and co-founder of Zacks Investment Research,

states that momentum is the continuing success of those stocks that performed well recently over the subsequent 1-12 months. Additionally, those stocks that underperformed recently are most likely to be unsuccessful again. He suggests taking a long position in the top decile and a short position in the bottom decile (Zacks, 2011). This strategy is also studied by Laurens Swinkels. He asserts that there is a significant connection between the momentum effect and other anomalies, such as the size effect. Nevertheless, the study does not find a reasonable explanation for this correlation. Furthermore, Swinkels points out that transaction costs play a significant role in measuring the momentum excess return. Since strategies using momentum often involve relatively small stocks, the proportional costs substantially moderate the momentum effect (Swinkels, 2004).

Volatility is another anomaly that is studied by Andrew Ang, Robert J. Hodrick, Yuhang Xing, and Ziaoyan Zhang. They examine the relationship between volatility and expected return and discover abnormal patterns and distorted returns. The volatility anomaly implies that stocks with low volatility generate higher returns than stocks with high volatility. In an efficient market you would assume that the higher the risk, the higher the expected return. Ang, Hodrick, Xing, and Zhang approach the topic inversely, taking high volatility stocks and finding that those realize abnormally low returns. These results are stable through different holding periods, different economic states, recessions, expansions, volatile, and stable periods. Additionally, momentum analysis, size analysis, and value (market-to-book ratio) are included in this study to support the researchers' reasoning. (Ang, Hodrick, Xing, & Zhang, 2006). The research article by Eugene F. Fama and Kenneth R. French reconsiders size, value, growth, profitability, net stock issues, accruals, and momentum. They seek to find out how the size of the stocks affects the force of the anomalies. The size effect is strong for microcap stocks and marginal for both small and big stocks. Momentum has a relatively strong force for small and big stocks, but only half the force for microcap stocks. Book-to-market value appears to be similar through all different size stocks. While most previous studies looked at all of these factors separately, Fama and French aim to connect them to find explanations that are still missing (Fama & French, Multifactor Explanations of Asset Pricing Anomalies, 1996).

When market anomalies are discovered and known, experienced investors begin exploiting them. Because of this,the distorted return in most cases slowly returns to what would be expected by the efficient market theory. The efficient market theory expects returns to be unpredictable and to adjust to all the information available to investors at any given time. With exploitation, the anomalies fade and the market tends to become more efficient. John A. List's journal article tests whether market experience affects the existence of market anomalies. He reveals that it does have a remarkable influence. His findings were robust to change and effective in different marketplaces (List). Basing his assumptions on List's and other similar studies, Tisa Silver argues that no one is able to repetitively profit from investing in anomalies. His research seeks to predict whether exploiting anomalies is worth an attempt. His conclusion is that it is not worth it because anomalies are either not predictable enough, or they disappear. No one ever knows if the same scenario is going to happen again. Moreover, the studies that were done were not all adjusted for risk, and the higher returns therefore are not undoubtedly higher on a risk adjusted basis. Silver emphasizes the limitations to anomaly studies. Since the studies are all based on historical data, there is no certainty that the anomalies will continue to outperform in the future. Hence it is problematic to achieve a high level of confidence in giving strategic advice to investors (Silver, 2009).

Recent studies indicate that the anomalies that are reviewed in this research still exist. Volatility, size effect, P/E ratio, value, and momentum are still behaving inversely to familiar models and therefore can still be categorized as anomalies. According to an article in the Research Journal of Finance and Accounting (2011), market anomalies remain. The authors give evidence for different anomalies including price-to-earnings ratio, market-to-book value, and momentum. They say that buying winning stocks is more risky, but then again offers high excess return opportunities (Latif, Arshad, Fatima , & Farooq, 2011).

Research from the last 25 years in the field of market anomalies attempts to find strategies for investors on how to use them successfully. In 1993, Narasimhan Jegadeesh and Sheridan Titman explain that buying past

winners and selling past losers (momentum) is a performing strategy. Their attempts to explain the anomaly with investor behavior does not fully succeed (Jegadeesh & Titman, 1993).

Carrol D. Aby and Donald E. Vaughn published a book called "Asset Allocation Techniques and Financial Market Timing". It concentrates on investment techniques, trading strategies, and good timing in the stock market. Chapter 10 focuses on numerous stock market anomalies; such as the January effect, size-related anomalies, market momentum anomalies and other distinctive situations. Different portfolio strategies are tested to see if there is a pattern of anomalies outperforming other stocks. Buying strong momentum stocks and those with a high stock ranking do yield excess returns while low momentum stocks did poorly. Other strategies were found to merely work under short-term conditions (Aby & Vaughn, 1995).

Amir Amel-Zadeh reexamines the size effect. He samples the German stock market to address issues connected to the size-effect. A relationship between size of businesses and their return can be seen and is further related to the businesses' past performance. Therefore, size is connected to strong momentum. The author aims to explain the variation in stock returns by suggesting various possible reasons. He finds that the information flow, both positive and negative, from small businesses to the investors takes longer. This explains stronger upward and downward momentum at certain points of time (Amel-Zadeh, 2008). Having all of this in mind, Lehrer, an experienced portfolio manager who is currently doing research in this field, states in an interview that investment behavior is constantly changing, and investors must know how to stay up to date with all available information (Lehrer, 2013).

An additional study by Priscilla Luk, Xiaowei Kang, and Frank Luo describes a strategy in which advantage is taken of the low volatility anomaly, declaring that stocks with a low volatility outperform stocks with a high volatility. Additionally weights of the stocks within the portfolio are altered by using their intrinsic value rather

than their market capitalization. Between 2000 and 2011, the portfolio created using this strategy outperformed the market-weight portfolios (Luk, Kang, & Luo, 2012).

Len Zacks, CEO of Zacks Investment Research, and author of "The Handbook of Equity Market Anomalies", reveals that market anomalies do stand out. His book is based on information from over 600 studies on anomalies and states that portfolios based on anomalies show a 15% growth in returns both long-term and short-term. Thus, investors who want to profit from them would have to invest both long-term and short-term. Zacks put together different portfolios, called the Zacks Index, which include stocks that fit into different anomaly categories. His portfolios show a remarkable growth in return after 25 years. Nonetheless, there are no research studies done to prove his outcomes (Zacks, 2011).

Data and Methodology

Research Objectives

The main research objective of this study is to find out if a portfolio, which is formed with stocks that fit into different categories of anomalies simultaneously, outperforms a portfolio that does not have any of these characteristics. The anomalies studied are price-to book value, price-earnings ratio, momentum, size, and volatility. The study will reveal whether individual anomalies are existent and whether they maintain their advantage over different periods of time. Further, it will show whether it is a reliable strategy to combine different anomalies in one portfolio, and whether long-term holding would be recommendable. A beta portfolio in included to see whether this measure is related to returns.

Hypotheses

Testing the individual portfolios:

H_0: The slope is equal to zero.

$B_1 = 0$

H_1: The slope is not equal to zero.

$B_1 \neq 0$

Where B is the slope of the average returns on the individual portfolios that are based on one individual anomaly.

Testing the combined portfolios:

H_0: The mean return of the portfolio including the lowest fifth or quarter of values is lower or equal to the mean return of the portfolio including the highest fifth or quarter of values.

$$\mu_{low} \leq \mu_{high}$$

H_1: The mean return of the portfolio including the lowest fifth or quarter of values is higher than the mean return of the portfolio including the highest fifth or quarter of values.

$$\mu_{low} > \mu_{high}$$

Where μ_{low} is the average return on the designed portfolio including the lowest fifth or quarter of appropriate measures, and μ_{high} is the average return on a portfolio including the highest fifth or quarter of anomaly values.

Research Design and Statistical Tests

For this study the two main data sources used were Research Insight and Center for Research in Security Prices (CRSP). Both sources are high quality databases used in various financial research projects. Research Insight was screened for stocks in three anomaly categories. It provided information for approximately 6000 stocks: their market value, their price-earnings ratio, and their price-to-book value. The time periods for which the data was selected include every six months period starting with December 1991 and going until December 2012. Thus, it provided 41 six months periods. The database Center for Research in Security Prices was used to filter monthly return data for stocks within the same time periods. Having the previous six months cumulative

return made it possible to calculate momentum and volatility. Beta was calculated by using the previous three years monthly data. Data from both databases were merged into one spreadsheet. The process of merging left the main data pool containing 849 stocks that fit into the predetermined categories. Stocks that were missing at least one data set were eliminated. Additionally, stocks that showed negative P/E ratios in any of the periods, were ignored for that period.

For each one of the anomalies, values were ranked and deciles were created for every 6 months period. The spreadsheets show the return of each anomaly based on the preceding month's data for P/E, P/B, and size and based on the preceding 6-month's data for momentum and volatility. That means that, for example, the Size-Portfolio return for the six months period July 1992 to December 1992 is shown in the first line (dec91) of Figure 1 in the appendix. The return for the smallest ten percent of stocks is shown in decile 0.1, the return for the ten to twenty percent range is shown in decile 0.2, and so forth. Average returns in excess of the risk free rate are calculated for all values at the bottom. All stocks in each portfolio are weighted equally. Organizing the returns into blocks of ten percent helps to determine whether there is a significant difference in return for small caps versus large caps, which will then help to confirm or deny the existence of market anomalies. Price-earnings ratio, size, volatility, and price-to-book value have to show a significantly higher average return in the lower deciles versus higher deciles to be proven existent. Momentum, on the other hand, has to show higher average returns in the upper deciles to show any evidence of the anomaly's existence. Moreover, this method shows whether the degree of the individual performances tends to remain stable, or whether it varies. The statistical tests that were conducted were chosen based on the screened data. The slope was calculated for every six months period for every individual anomaly. This gives a first idea about the likely outcome of the tests. If the slope in negative, it means that the returns are greater in small deciles and decrease as they reach higher deciles. It is an inverse relationship. A positive slope indicates that the returns for the next period increase in correspondence with the decile increase. Next, a regression was run for every six months period for

every single anomaly in order to see whether the slope is significantly different from zero. R-Square is the coefficient of determination and helps to evaluate how well the regression line, the slope, fits to the given data points. It provides a percentage of how much of the variation in returns can be explained by the portfolio's degree of anomaly. It is calculated by using the least squares method and gives a measure of goodness of fit. R-Square can be any number between zero and one. The next two columns show values for F-Stat and P-Value respectively. Both are generated by conducting regression analysis (H_o: $B_1 = 0$, H_1: $B_1 \neq 0$). Generally, F-values of greater than 4 indicate significant evidence that the slope is significantly different from zero. The regression was performed, assuming the null hypothesis is true, to compare two unrelated samples. The test assumes independent random samples and normally distributed populations. Moreover, it is a two-tailed test which means that the slopes can be different from zero in either direction. These tests are conducted for all anomalies individually for every 6 months period. Additionally, the averages over the whole twenty year period are tested.

The column "No of success" in Figures 1, 3, 5, 7, 9 and 11 in the appendix shows a value of 1 for every six months period that gave evidence for the anomaly; i.e. return in decile 1 is greater than return in decile 10 (reversed for momentum). Additionally, it displays the percentage change in return from lowest to highest decile. At the bottom the percentages of successful periods within the whole 41 periods (20 years) and the last 20 periods (10 years) are calculated.

Furthermore, the data is filtered depending on the current market direction (benchmark S&P500). Figures 2, 4, 6, 8, 10, and 12 in the appendix display how the related data for the anomalies is matched to bullish and bear markets. This determines whether an anomaly is more observable within times of general upswing in the economy, or in times of recession. The same tests are run.

In addition, four possible trading scenarios are evaluated. Having found that the anomalies actually exist, those anomalies are used as classifications to filter new stocks that fit into different categories of

abnormal observations simultaneously. These stocks are chosen because they show the most sensitive reaction to abnormal values and will be most likely to show distinct results in further tests. Up to three anomalies are combined in one portfolio. Portfolio A (Figure 13) includes two different portfolios. The first one combines stocks of the smallest 25% of companies and the lowest 25% of price-earnings ratio and price-to-book value. The second one combines stocks with the highest 25% of values for those three categories. Here, the time periods are exactly the same as for the individual anomalies. The number of stocks that is used in each portfolio can be seen in the first column of each possible scenario. The lower quarter's stocks are the ones that follow the rules for the anomalies perfectly, the upper quarter's stocks are the opposite, and, therefore, furthest away from being abnormal. Mean and standard deviation are displayed for every single period, and regressions that test for a difference in means, are run (T-statistic and P-value). In this case a one-tail test is used because we know that the anomalies actually exist. Their return is expected to be higher in a combined portfolio (H_0: $\mu_{low} \leq \mu_{high}$, H_1: $\mu_{low} > \mu_{high}$).

Portfolio B, Portfolio C, and Portfolio D (Figures 14 – 16) are all based on the lowest and highest 20% instead of 25% of abnormal values. The percentages were adjusted based on the amount of output. It was made sure that the number of stocks that match the requirements of each portfolio does not fall under 30. This is a limitation to the study, since having these constraints made it difficult to find enough stocks for a diversified portfolio. Thus returns might be understated due to this limitation. The three portfolios based on 20% ranges are the combination of size and price-earnings ratio, the combination if size and price-to-book value, and the combination of price-to-book value and price-earnings ratio. The same statistical values (t-statistic and p-value) are calculated for each of the five scenarios for each six months period. If the absolute t-statistic is higher or equal to 2, it is significant. The higher the t-statistic, the more significant and reliable it is. The P-value depends on the confidence level. If the P-value is 0.05, we can be 95% confident with the result. If the P-value is .01, we can be 99% confident with the result. The column named "No of success" once again compares the mean of the

lower value portfolio with the mean of the higher value portfolio in every period. A value of 1 indicates that the first mean is actually lower than the second and the combined anomaly portfolio seems to work in this period. The percentage of successful periods is calculated below all periods. The very bottom row of the spreadsheet displays the averages of each column. The statistical tests show whether there is a significant difference in the means of each lower percentile portfolio and each higher percentile portfolio.

Results

Individual Portfolios

Size-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.151	0.101	0.085	0.082	0.069	0.071	0.065	0.062	0.064	0.052	-0.008	0.716	20.135	0.002**	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The Figure above shows the average values of output for the size-portfolio. The slope is slightly negative. Hence, returns in the smaller ten percent ranges are somewhat higher than returns in the greater ten percent ranges. This indicates the likelihood of the existence of an abnormal price movement, since smaller companies' stock seems to generate larger returns than big companies' stock. R-Square explains how well the slope or regression line fits to the observed data. The average R-square of 0.716 says that 71.6% of the variation in returns is explained by the size of the firm. F-stat is 20.135 and therefore greater than 4. This indicates a significant relationship between the returns and the size variable. A p-value of 0.002 over all periods that were tested is a significant result. There is enough evidence to reject the Null with 99% confidence, and, thus, there is significant evidence for the size anomaly to exist. Over the whole tested timeframe of 20 years, 73.2% of all half-year periods were successful. Over the last ten years (2002-2012) 75% of periods were successful. The benchmark Standards&Poors500 showed an average return of 0.047477 or 4.7% over the studied time period. Comparing this to the average returns observed for the size-portfolio shows that this anomaly outperformed the benchmark in every decile. The S&P500 includes the 500 largest companies in the United States. Seeing that the small stocks used for this study outperform the large firms in the S&P500 further proves that size is an important factor.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.194	0.130	0.112	0.116	0.098	0.109	0.104	0.104	0.105	0.096	-0.007	0.510	8.327	0.020*

* Indicates significance level of 5%; ** indicates significance level of 1%

In the periods when the market (S&P500) return is positive, the slope for this specific data is -0.007, indicating an abnormality once again. R-square is 0.510 which is lower than the average for all periods, but still showing that the regression line explains the data spread pretty well. 51% of fluctuations in the returns can be explained by size. F-stat of 8.327 and a P-value of 0.020 are both significant and, therefore, there is significant evidence to reject the Null and say that the size anomaly exists when the market is up.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.031	0.020	0.008	-0.015	-0.037	-0.039	-0.047	-0.055	-0.053	-0.073	-0.011	0.967	235.516	0.000**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market is down, the results look somewhat different. The slope is still negative with -0.011. Its absolute value is higher when the market has negative returns, compared to when the market has positive returns. Thus, the size anomaly seems to work even better in times of recessions. R-square is 0.967; consequently, the slope explains the observed data very well and is a strong measure. 96.7% of return movement can be explained by the size of a company. The F-stat is very high with 235.516. This indicates an extremely significant relationship between returns and size variable. The P-value is 0.000 which indicates a 99.9% confidence that there is enough evidence to reject the Null. The size anomaly does exist in times of recession.

P/E-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.134	0.115	0.084	0.076	0.064	0.063	0.066	0.051	0.059	0.047	-0.008	0.799	31.779	0.000**	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The table above shows the average output for the stocks based on P/E ratio. The slope is slightly negative with -0.008. Therefore, the returns tend to be higher, when the P/E ratio is low, and lower, when the P/E ratio is high. Thus, there is evidence for the existence of an anomaly here. The slope does explain the data spread fairly well (R-square = 0.799). 79.9% of return variations can be explained by the P/E ratio. The F-stat is 31.779 and, hence, significant. The P-value is 0.000 which rejects the Null with 99.9% confidence. 82.5% and 90% of periods were found successful for the last 20 years (1992-2012) and the last ten year (2002-2012) respectively. In comparison to the S&P500, the data returns outperform in the lower 90% of P/E ratios; the highest 10% show the same return as the benchmark. This is additional evidence for the existence of the anomaly.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.171	0.129	0.106	0.103	0.092	0.094	0.100	0.083	0.010	0.086	-0.007	0.593	11.640	0.009**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market has a positive return the slope is negative with -0.007. This number is close to the overall average discussed before. R-square is a little lower than the average for all periods (R-square = 0.593) indicating small fluctuations within the returns. 59.3% of these fluctuations can be explained by the P/E ratio. Looking at decile 0.6 and 0.7 we can see that the returns increased somewhat. The same occurs between 0.9 and 1. The regression line, hence, explains the data spread sufficiently, but not as well as it explains the data spread for all periods. F-stat is somewhat lower than before, but nonetheless significant with a value of 11.64. The P-value is 0.009 and indicates that there is sufficient evidence to reject the Null here too.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.018	0.065	0.015	-0.007	-0.022	-0.030	-0.035	-0.045	-0.062	-0.0667	-0.012	0.849	44.813	0.000**

* Indicates significance level of 5%; ** indicates significance level of 1%

In periods when the market is in a recession, the slope of the P/E- Portfolio returns is -0.012. It is considerably steeper than in periods of market upswing. This means that the anomaly is even more evident and gives more extreme returns whenever the market experiences a downward movement. This slope explains the data points well, since R-square is close to 1.0 with 0.849. 84.9% of the variations in returns can be explained by the P/E ratio. A value of 44.813 for F-stat specifies that there is a significant relationship between the two variables (returns and P/E). The P-value of 0.000 gives a 99.9% confidence level for rejecting the Null and, therefore, proving that the anomalies exist during recessions.

P/B-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.156	0.098	0.087	0.076	0.072	0.070	0.069	0.069	0.065	0.068	-0.007	0.575	10.835	0.011*	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The table above shows the average return and output for the stocks in the P/B-Portfolio. A slope of -0.007 indicates that there is evidence for the anomaly's existence. Since the R-square is 0.575, the regression line does explain the data spread fairly well. 57.5% of the fluctuations in returns can be explained by the P/B ratio. The F-stat has a significant value of 10.835. The P-value in this case is 0.011. We can reject the Null with a 99% confidence. There are 70.7% successful periods within the last twenty years and 65% of successful periods within the last ten years. All observed returns are outperforming the benchmark S&P500.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.199	0.130	0.123	0.111	0.010	0.110	0.106	0.110	0.109	0.112	-0.006	0.410	5.554	0.046*

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market is in an uptrend, the anomaly for price-to-book value appears to be weaker. The slope of the regression line is -0.006 which still indicates that lower price-to-book values lead to higher returns. The regression line does not explain the data spread as well as when it includes upswings and recessions (R-square = 0.410). Only 41% of return movements can be explained by the P/B ratio. There is quite a bit of fluctuation observable in the returns of higher percentage ranges. The F-stat just reached a level of significance with 5.554.The P-value is 0.046, meaning that there is enough evidence to reject the Null with 95% confidence.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.037	0.008	-0.014	-0.022	-0.007	-0.044	-0.037	-0.046	-0.060	-0.057	-0.010	0.866	51.738	0.000**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market is down, there is a larger decline of returns from small to large deciles (slope = -0.010). This slope explains the data points much better than the slope for the periods when the market is up (R-square = 0.866). 86.6% of variations in returns can be explained by the P/B ratio. The F-stat is 51.738 and, thus, highly significant. A P-value of 0.000 indicates that there is sufficient evidence to reject the Null based on a 99.9% confidence level.

The price-to-book value seems to work much better in times of recession than in times of market boom.

Momentum-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.123	0.082	0.077	0.065	0.075	0.072	0.073	0.073	0.077	0.095	-0.002	0.102	0.911	0.368	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The slightly negative slope of -0.002 indicates that the P-value is likely to be insignificant, since the Momentum-Portfolio has to have a positive slope with higher return in higher deciles. The R-square equals 0.102 and, therefore, the regression line does not explain the data spread very well. Only 10.2% of the fluctuations in returns can be explained by momentum. The F-stat is insignificant at 0.911, while the P-value equals 0.368 and is not significant either. The percentage of successful periods is only 53.7% and 55% for the last twenty and ten years respectively. There is not enough evidence to reject the Null. The returns in each decile are higher than the return on the market (S&P500). However, if the highest and lowest returns are ignored, there is only little difference between the returns.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.171	0.121	0.113	0.097	0.106	0.102	0.104	0.103	0.116	0.145	-0.002	0.058	0.493	0.503

* Indicates significance level of 5%; ** indicates significance level of 1%

In times of market boom, the statistical measures show similar results. The slope is slightly negative, indicating an insignificant P-value. The R-square here is 0.058 and only 5.8% of the variation in returns can be explained by momentum. The F-stat is below 4 with a value of 0.493 and, therefore, not significant. R-square indicates low confidence in the slope, an extreme data spread, and not surprisingly, the P-value is insignificant at 0.503. There is not enough evidence to reject the Null in times of market boom.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
-0.012	-0.027	-0.027	-0.023	-0.014	-0.010	-0.014	-0.012	-0.035	-0.046	-0.002	0.149	1.398	0.271

* Indicates significance level of 5%; ** indicates significance level of 1%

In times of recession, the statistical values show similar results once again. The slope is the same with -0.002; slightly negative. R-square is 0.149, meaning that merely 14.9% of the variation in returns can be explained by momentum. Therefore, the regression line does not explain the spread of the data points very well. The F-stat is 1.398, well below 4, and insignificant. The P-value is 0.271. There is not enough evidence to reject the Null in times of recession.

Volatility-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.050	0.061	0.056	0.069	0.070	0.069	0.094	0.094	0.118	0.134	0.009	0.884	60.871	0.000**	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The slope of the Volatility-Portfolio's returns is slightly positive at 0.009. This slope is representing the data spread pretty well (R-square = 0.884). 88.4% of the movement in returns can be explained by the degree of volatility. The F-stat though is significant with 60.871. The P-value is 0.000 and gives a confidence level of 99.9%, but the returns move exactly in the opposite direction than one would expect when assuming that it is an anomaly. Only 39% and 40% of periods are successful for twenty and ten years respectively.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.068	0.086	0.084	0.097	0.104	0.106	0.136	0.143	0.166	0.192	0.013	0.932	109.345	0.000**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market is seeing positive returns, the test measures show the same results as above. The slope is slightly positive with 0.013 and 93.2% of the variation on returns can be explained by volatility (R-square = 0.932). F-stat is even higher with 109.345 and indicates a significant relationship between the returns and volatility. Although, the P-value is 0.000, the returns are moving into the wrong direction.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
-0.000	-0.0103	-0.021	-0.011	-0.025	-0.036	-0.024	-0.043	-0.018	-0.031	-0.003	0.506	8.199	0.021*

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market is in a downtrend, the slope is negative with -0.003. The R-square is weaker than for times of market boom, but 50.6% of the fluctuation in returns can still be explained by the level of volatility. F-stat is weaker with 8.199, but still significant. The P-value is 0.021 which is substantial with a 95% confidence level.

Beta-Portfolio

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value	S&P500
0.093	0.069	0.070	0.075	0.078	0.083	0.076	0.089	0.084	0.098	0.001	0.217	2.211	0.175	0.047477

* Indicates significance level of 5%; ** indicates significance level of 1%

The beta portfolio was tested in order to see whether it is related to returns. The slope for the beta stock returns is somewhat positive with 0.001. This indicates the likelihood of an insignificant P-value, since it shows low beta stocks will perform worse than high beta stocks. This would indicate an inverse relationship.

Looking at the individual returns for the various deciles though, it is obvious that the returns are not going a certain direction but rather are somewhat mixed up. Starting with returns of 0.93 in the lowest 10%, returns are decreasing and increasing, ending in a very high return for the highest 10%. This fluctuation is also displayed by the R-square value. The R-square is close to zero with 0.217, meaning that the regression line does not explain the data spread very well. Only 21.7% of fluctuations in return can be explained by beta. The F-stat is insignificant at a value of 2.211. The P-value is 0.175 and insignificant as well. It implies that there is not enough evidence to reject the Null. Matching this, only 48.8% (20 years) and 40% (10 years) of periods are successful. The returns for all deciles are significantly higher than the S&P500 average return. Thus, beta does not appear to be related to returns.

Market Up:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.1173	0.094	0.098	0.109	0.114	0.119	0.111	0.132	0.129	0.156	0.005	0.635	13.930	0.006**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market has positive returns, the slope of the beta data is 0.005. The regression line does not explain the data spread perfectly (R-square = 0.635) but does do a decent job. 63.5% of the variations of returns can be explained by beta. The F-stat is above 4 in this case with a value of 13.930. The P-value is 0.006 and therefore significant with a 99% confidence level. Beta does appear to be related to returns in times of market upswing.

Market Down:

.1	.2	.3	.4	.5	.6	.7	.8	.9	1	Slope	R-square	F-stat	P-value
0.026	-0.003	-0.009	-0.021	-0.023	-0.018	-0.022	-0.035	-0.045	-0.068	-0.008	0.857	48.067	0.000**

* Indicates significance level of 5%; ** indicates significance level of 1%

When the market has negative returns, the slope of the regression line is negative with -0.008, and R-square is 0.857. This regression line does describe the data spread well, since beta can explain 85.7% of the variation in returns. The F-stat of 48.067 is highly significant. A P-value of 0.000 gives 99.9% confidence that beta is related to returns. One could say that beta is a good measure of risk, if one knows the direction of the market.

Generally, the above data analysis shows, that the most of the tested individual anomalies exist. The study was not able to prove all, with no evidence of momentum. Beta and volatility seem to be good risk measures, since high values perform well in positive markets and badly in negative markets. Hence, three of the six measures (Size, P/E, and P/B) are used in the combined portfolios A through E. Size, P/E, and P/B are robust to market changes and give excess returns at all times. Therefore, they are true anomalies. Size and P/E additionally show an increase in successful periods from the last twenty years to the recent ten years, indicating a rise in the force of the anomalies.

Combined Portfolios

After seeing that some individual anomalies outperformed, one would assume that combining these individual ones creates an even more successful portfolio.

	Portfolio low		Portfolio high			
	Mean	Std. Dev.	Mean	Std. Dev	T-stat	P-value
Size, P/E, P/B	16.6	37.9	4.6	21.8	20	0.000**
P/E, Size	17.1	41.5	4.7	22.5	22.4	0.000**
P/E, P/B	14.1	33	5.3	27.9	28.2	0.000**
P/B, Size	15.1	47.6	5.9	23.6	21.4	0.000**

* *Indicates significance level of 5%; ** indicates significance level of 1%

Portfolio A: Size, Price-to-Earnings Ratio, and Price-to-Book Value

Appendix Figure 13 compares the statistical results of a combined portfolio of size, P/E, and P/B stocks. The first mean and the first standard deviation are both based on the lowest 25% of values for each category. The second mean and standard deviation are based on the highest 25% of values (Portfolio A-low and Portfolio A-high). Portfolio A-low has an average return of 16.6%. This return outperforms size, P/E, and P/B returns in the first and second deciles. This means that the combined anomalies seem to perform better than the individual anomalies in the value ranges. The average return of Portfolio A-high is 4.6% and, therefore, 12% lower than Portfolio A-low. This indicates that combining the anomalies works, since the returns in the lower deciles are higher than the returns in the higher deciles. All three individual anomalies in the ninth and tenth deciles have higher returns than Portfolio A-high. This shows that the combination of anomalies exaggerates the abnormality.

The test statistics for the average over all forty-one periods reveal a significant T-stat and P-value with a 99.9% confidence that there is enough evidence to reject the Null.

Portfolio B: Size, Price-to-Earnings Ratio

Portfolio B-low and Portfolio B-high combine only those stocks that fit into the lowest and highest 20% of size and price-to-earnings ratio (Figure 14). The percentage was adjusted from 25% to 20% because the volume of output data was large enough. Portfolio B-low has a mean return of 17.1% and Portfolio B-high has a mean return of 4.7%. The individual portfolios for size and P/E fail to outperform the combined Portfolio B-low somewhat in the first and second decile. Both individual Portfolios' ninth and tenth decile returns outperform the combined Portfolio B-high. This again indicates a more extreme abnormality when the anomalies are combined.

The T-statistic for testing the average values is 22.4 and, therefore, significant. The P-value based on Portfolios B is 0.000 and therefore significant at the 99.9% confidence level.

Portfolio C: Price-to-Earnings Ratio, Price-to-Book Value

When combining price-to-earnings ratio and price-to-book value to form a portfolio, the test was based on the lowest and highest 20% for each value (Figure 15). The average means for Portfolio C-low and Portfolio C-high are 14.1% and 5.3% respectively. The P/B-Portfolio outperforms this combined portfolio in the first decile. The return for the P/E-Portfolio is lower. In the higher deciles the P/E-Portfolio fails to outperform the combined portfolio. However, the T-statistic is positive with 28.2 and obviously significant. This is supported by a P-value of 0.000, offering a confidence level of 99.9%.

Portfolio D: Size, Price-to-Book Value

The combination of looking at the size of the firm and the price-to-book value of a firm is based on the lowest and highest 20% in each category (Figure 16). Percentages were adjusted due to the volume of output data. Portfolio D-low and Portfolio D-high are formed. The average return for Portfolio D-low is 15.1%. This mean, although it outperforms the benchmark, fails to outperform the individual portfolios' returns. Both, Size Portfolio and P/B-Portfolio have greater first decile returns. The combined Portfolio D-high shows an average return of 5.9%, failing to outperform both single anomaly portfolios in their ninth and tenth deciles. Hence, combining the anomalies did not exaggerate the abnormal characteristic because the spread between low and high quintiles / quartiles is not greater than the individual portfolios spread between lowest and highest deciles. The T-statistic for the average means results in a significant value of 21.4 and the P-value supports this with a 99.9% confidence level.

Overall, all tested portfolios that combined anomalies were able to show at least 9% higher returns than their opposite portfolios. Nevertheless, only the two combinations of Size, P/E, P/B and Size, P/E succeeded in outperforming individual portfolios.

These results are due to some limitations. Screening for stocks that fit into several categories limited the number of stocks dramatically. Having to adjust the percentages from deciles to quintiles or quartiles is making it more difficult to achieve high returns.

Applications

The tests in this study first looked at the size anomaly, the price-earnings ratio anomaly, the price-to-book value anomaly, momentum, and volatility anomaly. Statistical tests are performed to give evidence for or against the existence of these abnormal phenomena. Size Portfolio, P/E-Portfolio, and P/B Portfolio showed significant P-values; there is enough evidence to reject the Null and conclude that the anomalies still exist. Volatility was proven to be a good risk measure. Momentum Portfolio did not show clear results and we fail to reject the Null. Since those last two anomalies are very weak and this study failed to prove them, they are not included in the combined portfolios.

Further, combined Portfolios A through D are formed. They include different combinations of the anomalies that were proved earlier. All the combined portfolios have significant P-values for their average returns. Nevertheless, combining anomalies does not seem to give the investor a spectacularly higher return than individual anomalies do.

This study aims to find out whether market anomalies add up. These results show that market anomalies do add up, but fail to be significantly more successful than single anomalies. One explanation for the difficulty in combining anomalies may be that this study had a percentage limitation. After having to adjust the portfolios due to volume, the compared portfolios included the lowest and highest 20% or even 25% of values. The difference in those is likely to not be as extreme as the difference in means of the individual portfolios that were based on deciles. Hence, through the increase in percentages it might be difficult to get a better return.

This study was trying to find the best way investors should behave regarding stock market anomalies. Although all the tested combined portfolios (Portfolio A through D) seemed to give high returns, it is not easy to fully rely on combined anomalies. Relaxing the constraints in order to find enough stocks weakens the returns.

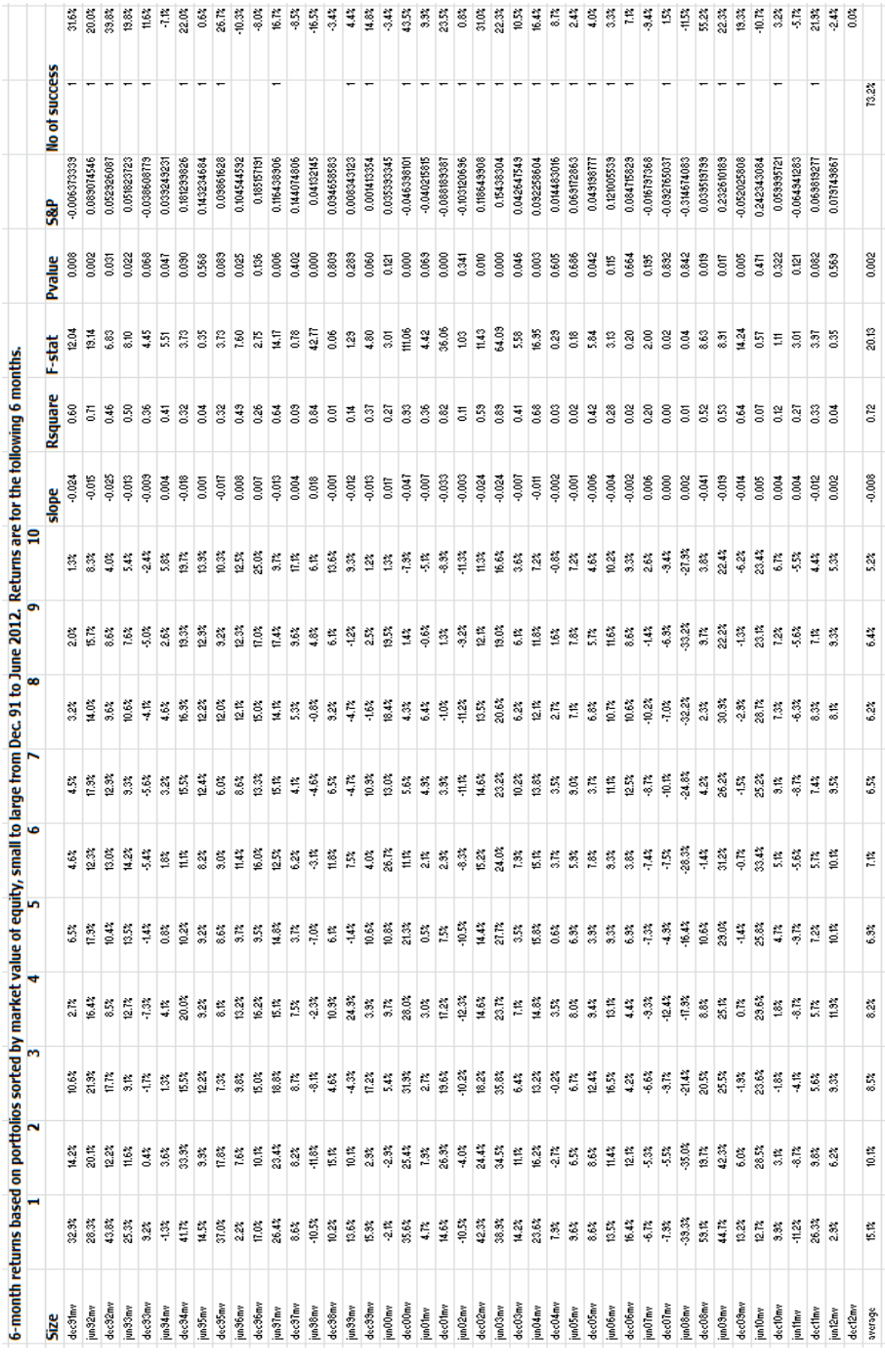
Basing portfolio strategy on this, therefore, might be critical for the average investor. More complicated model than the one used in this study might be successful.

Investors who are still interested in investing in market anomaly stocks should rather look at the individual performance. Portfolios that are based on low P/E, low P/B, and small size tend to outperform. They were proven to work in both, bull and bear markets. The size anomaly is a good strategy to base investments on. Especially when the benchmark was having trouble with showing positive returns, small companies were still able to grow. All three anomalies can be used for long-term holding, since they all show a significant proof of existence over the whole 20 year period. Moreover, size anomaly and P/E anomaly even increased in force over the course of the study.

The momentum anomaly is more difficult to implement in investment strategies. Momentum did not show significant results. This study was unable to prove the anomaly's existence and, therefore, would not recommend basing investment on it. Overall, although these stock market anomalies appear to exist, there is no guarantee they will continue to exist in the future.

Appendix

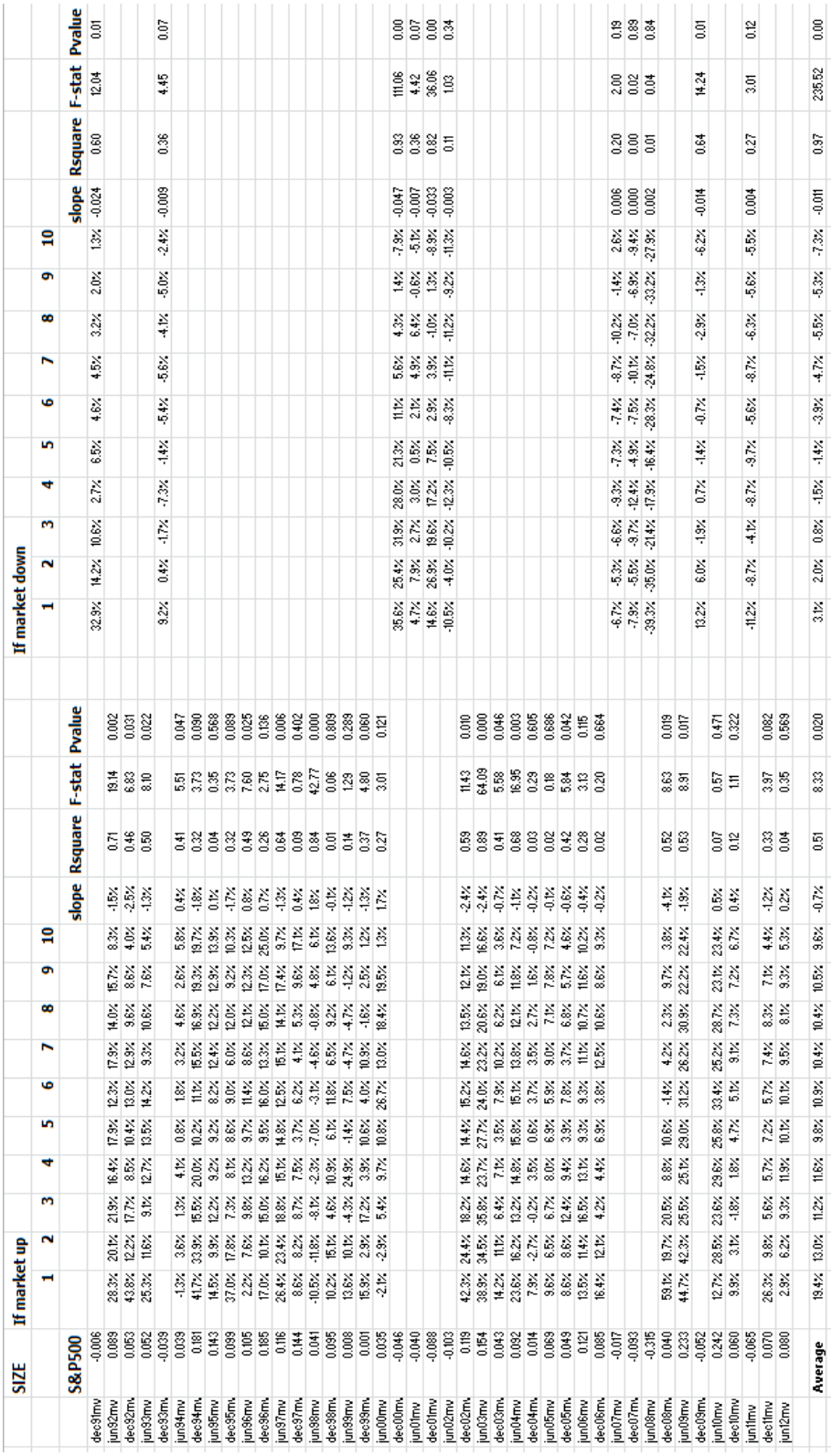
Figure 1: Size-Portfolios



6-month returns based on portfolios sorted by market value of equity, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.

	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	S&P	No of success	
Size																	
dec9mv	32.9%	14.2%	10.6%	2.7%	6.5%	4.6%	4.5%	3.2%	2.0%	1.3%	-0.024	0.60	12.04	0.008	-0.0063733339	1	31.6%
jun92mv	28.3%	20.1%	21.3%	16.4%	11.3%	12.3%	11.3%	14.0%	15.7%	8.3%	-0.015	0.71	19.14	0.002	0.069074546	1	20.0%
dec92mv	43.8%	12.2%	11.7%	8.5%	10.4%	13.0%	12.3%	9.6%	8.6%	4.0%	-0.025	0.46	6.83	0.031	0.052936097	1	33.8%
jun93mv	25.3%	11.6%	9.1%	12.7%	13.3%	14.2%	9.3%	10.6%	7.6%	5.4%	-0.013	0.30	8.10	0.022	0.051823723	1	19.8%
dec93mv	9.2%	0.4%	-1.7%	-7.3%	-1.4%	-5.4%	-5.6%	-4.1%	-5.0%	-2.4%	-0.009	0.36	4.45	0.068	-0.039608779	1	11.6%
jun94mv	-1.0%	3.6%	1.3%	4.1%	0.8%	1.6%	3.2%	4.6%	2.6%	5.6%	0.004	0.41	5.51	0.047	0.033243231		-7.1%
dec94mv	41.7%	33.3%	15.5%	20.0%	10.2%	11.1%	15.5%	16.3%	13.3%	13.7%	-0.008	0.32	3.73	0.090	0.181239826	1	22.0%
jun95mv	14.5%	9.3%	12.2%	3.2%	3.2%	8.2%	12.4%	12.2%	12.3%	13.3%	0.001	0.04	0.35	0.568	0.143234684	1	0.6%
dec95mv	37.0%	17.6%	7.3%	8.1%	6.6%	9.0%	6.0%	12.0%	9.2%	10.3%	-0.017	0.32	3.73	0.089	0.038616628	1	26.7%
jun96mv	2.2%	7.6%	3.8%	13.2%	3.7%	11.4%	8.6%	12.1%	12.3%	12.5%	0.008	0.43	7.60	0.025	0.104544592		-10.3%
dec96mv	17.0%	10.1%	15.0%	16.2%	9.5%	16.0%	13.3%	15.0%	17.0%	25.0%	0.007	0.26	2.75	0.136	0.18157191		-8.0%
jun97mv	26.4%	23.4%	16.8%	15.1%	14.8%	12.5%	15.1%	14.1%	17.4%	9.7%	-0.013	0.64	14.17	0.006	0.164389606	1	16.7%
dec97mv	8.6%	8.2%	8.7%	7.5%	3.7%	6.2%	4.1%	5.3%	9.6%	17.1%	0.004	0.09	0.78	0.402	0.144074806		-8.5%
jun98mv	-10.5%	-11.8%	-8.1%	-2.3%	-7.0%	-3.1%	-4.6%	-0.8%	4.8%	6.1%	0.016	0.84	42.77	0.000	0.04132145		-16.5%
dec98mv	10.2%	15.1%	4.6%	10.3%	6.1%	11.8%	6.5%	9.2%	6.1%	13.6%	-0.001	0.01	0.06	0.809	0.094658583		-3.4%
jun99mv	13.6%	10.1%	-4.3%	24.3%	-1.4%	7.5%	-4.7%	-4.7%	-1.2%	3.3%	-0.012	0.14	1.29	0.269	0.009343123	1	4.4%
dec99mv	15.3%	2.3%	17.2%	3.3%	10.6%	4.0%	10.3%	-1.6%	2.5%	1.2%	-0.013	0.37	4.80	0.060	0.001410354	1	14.8%
jun00mv	-2.1%	-2.3%	5.4%	9.1%	10.8%	26.1%	13.0%	18.4%	19.5%	1.3%	0.017	0.27	3.01	0.121	0.035393345		-3.4%
dec00mv	35.6%	25.4%	31.3%	28.0%	21.3%	11.1%	5.6%	4.3%	1.4%	-7.3%	-0.047	0.33	111.06	0.000	-0.046338101	1	43.5%
jun01mv	4.7%	7.3%	2.7%	3.0%	0.5%	2.1%	4.3%	6.4%	-0.6%	-5.1%	-0.007	0.36	4.42	0.063	-0.040215815	1	9.3%
dec01mv	14.6%	26.3%	19.6%	17.2%	7.5%	2.3%	3.3%	-1.0%	1.3%	-8.3%	-0.033	0.82	36.06	0.000	-0.088183387	1	23.5%
jun02mv	-10.5%	-4.0%	-10.2%	-12.3%	-10.5%	-8.3%	-11.1%	-11.2%	-3.2%	-11.3%	-0.003	0.11	1.03	0.341	-0.103120696	1	0.8%
dec02mv	42.3%	24.4%	18.2%	14.6%	14.4%	15.2%	14.6%	13.5%	12.1%	11.3%	-0.024	0.59	11.43	0.010	0.116643908	1	31.0%
jun03mv	38.3%	34.5%	35.8%	23.7%	27.7%	24.0%	23.2%	20.6%	19.0%	16.6%	-0.024	0.83	64.03	0.000	0.15438304	1	22.3%
dec03mv	14.2%	11.1%	6.4%	7.1%	3.5%	7.3%	10.2%	6.2%	6.1%	3.6%	-0.007	0.41	5.58	0.046	0.042647543	1	10.5%
jun04mv	23.6%	16.2%	13.2%	14.8%	15.8%	15.1%	13.8%	12.1%	11.8%	7.2%	-0.011	0.68	16.35	0.003	0.092258604	1	16.4%
dec04mv	7.3%	-2.7%	-0.2%	3.5%	0.6%	3.7%	3.5%	2.7%	1.6%	-0.8%	-0.002	0.03	0.29	0.605	0.014483016	1	8.7%
jun05mv	9.6%	6.5%	6.7%	8.0%	6.3%	5.3%	9.0%	7.1%	7.6%	7.2%	-0.001	0.02	0.18	0.686	0.063172863	1	2.4%
dec05mv	8.6%	8.6%	12.4%	9.4%	3.3%	7.8%	3.7%	6.8%	5.7%	4.6%	-0.006	0.42	5.84	0.042	0.043198777	1	4.0%
jun06mv	13.5%	11.4%	16.5%	13.1%	9.3%	9.3%	11.1%	10.7%	11.6%	10.2%	-0.004	0.28	3.13	0.115	0.121005533	1	3.3%
dec06mv	16.4%	12.1%	4.2%	4.4%	6.3%	3.8%	12.5%	10.6%	8.6%	3.3%	-0.002	0.02	0.20	0.664	0.084715823	1	7.1%
jun07mv	-6.1%	-5.3%	-6.6%	-9.3%	-7.3%	-7.4%	-8.7%	-10.2%	-1.4%	2.6%	0.006	0.20	2.00	0.195	-0.016797368		-9.4%
dec07mv	-7.3%	-5.5%	-9.7%	-12.4%	-4.3%	-7.5%	-10.1%	-7.0%	-6.3%	-3.4%	0.000	0.00	0.02	0.892	-0.032765037	1	1.5%
jun08mv	-33.3%	-35.0%	-21.4%	-17.3%	-16.4%	-28.3%	-24.6%	-32.2%	-33.2%	-21.3%	0.002	0.01	0.04	0.842	-0.314574083		-11.5%
dec08mv	53.1%	19.1%	20.5%	8.8%	10.6%	-1.4%	4.2%	2.3%	9.1%	3.8%	-0.041	0.52	8.63	0.019	0.033519193	1	55.2%
jun09mv	44.7%	42.3%	25.5%	25.1%	29.0%	31.2%	26.2%	30.8%	22.2%	22.4%	-0.019	0.53	8.91	0.017	0.232610183	1	22.3%
dec09mv	13.2%	6.0%	-1.9%	0.7%	-1.4%	-0.7%	-1.5%	-2.9%	-1.3%	-6.2%	-0.014	0.64	14.24	0.005	-0.052025808	1	19.3%
jun10mv	12.7%	28.5%	23.6%	29.6%	25.8%	33.4%	25.2%	28.7%	23.1%	23.4%	0.005	0.07	0.57	0.471	0.242343084		-10.7%
dec10mv	9.3%	3.1%	-1.6%	1.8%	4.7%	5.1%	9.1%	7.3%	7.2%	6.7%	0.004	0.12	1.11	0.322	0.059395721	1	3.2%
jun11mv	-11.2%	-9.7%	-4.1%	-9.7%	-9.7%	-5.6%	-9.7%	-6.3%	-5.6%	-5.5%	0.004	0.27	3.01	0.121	-0.064341263		-5.7%
dec11mv	26.3%	9.8%	5.6%	5.7%	7.2%	5.7%	7.4%	8.3%	7.1%	4.4%	-0.012	0.33	3.97	0.082	0.063619277	1	21.3%
jun12mv	2.3%	6.2%	9.3%	11.3%	10.1%	10.1%	9.5%	8.1%	9.3%	5.3%	0.002	0.04	0.35	0.563	0.075743867		-2.4%
dec12mv																	0.0%
average	15.1%	10.1%	8.5%	8.2%	6.3%	7.1%	6.5%	6.2%	6.4%	5.2%	-0.008	0.12	20.13	0.002		73.2%	

Figure2: Size-Portfolios in relation to benchmark returns



	SIZE	If market up												If market down															
		1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue
	S&P500															32.9%	14.2%	10.6%	2.7%	6.5%	4.6%	4.5%	3.2%	2.0%	1.3%	-0.024	0.60	12.04	0.01
dec91mv	-0.006																												
jun92mv	0.089	28.3%	20.1%	21.9%	16.4%	17.9%	12.3%	17.9%	14.0%	15.7%	8.3%	-1.5%	0.71	19.14	0.002														
dec92mv	0.053	43.8%	12.2%	17.7%	8.5%	10.4%	13.0%	12.9%	9.6%	8.6%	4.0%	-2.5%	0.46	6.83	0.031														
jun93mv	0.052	25.3%	11.6%	9.1%	12.7%	13.5%	14.2%	9.3%	10.6%	7.6%	5.4%	-1.3%	0.50	8.10	0.022														
dec93mv	-0.039															9.2%	0.4%	-1.7%	-7.3%	-1.4%	-5.4%	-5.6%	-4.1%	-5.0%	-2.4%	-0.009	0.36	4.45	0.07
jun94mv	0.039	-1.3%	3.6%	1.3%	4.1%	0.8%	1.8%	3.2%	4.6%	2.6%	5.8%	0.4%	0.41	5.51	0.047														
dec94mv	0.181	41.7%	33.9%	15.5%	20.0%	10.2%	11.1%	15.5%	16.9%	19.3%	19.7%	-1.8%	0.32	3.73	0.090														
jun95mv	0.143	14.5%	9.9%	12.2%	9.2%	9.2%	8.2%	12.4%	12.2%	12.9%	13.9%	0.1%	0.04	0.35	0.568														
dec95mv	0.099	37.0%	17.8%	7.3%	8.1%	8.6%	9.0%	6.0%	12.0%	9.2%	10.3%	-1.7%	0.32	3.73	0.089														
jun96mv	0.105	2.2%	7.6%	9.8%	13.2%	9.7%	11.4%	8.6%	12.1%	12.3%	12.5%	0.8%	0.49	7.60	0.025														
dec96mv	0.185	17.0%	10.1%	15.0%	16.2%	9.6%	16.0%	13.3%	15.0%	17.0%	25.0%	0.7%	0.26	2.75	0.136														
jun97mv	0.116	26.4%	23.4%	18.8%	15.1%	14.8%	12.5%	15.1%	14.1%	17.4%	9.7%	-1.3%	0.64	14.17	0.006														
dec97mv	0.144	8.6%	8.2%	8.7%	7.5%	3.7%	6.2%	4.1%	5.3%	9.6%	17.1%	0.4%	0.09	0.78	0.402														
jun98mv	0.041	-10.5%	-11.8%	-8.1%	-2.3%	-7.0%	-3.1%	-4.6%	-0.8%	4.8%	6.1%	1.8%	0.84	42.77	0.000														
dec98mv	0.095	10.2%	15.1%	4.6%	10.9%	6.1%	11.8%	6.5%	9.2%	6.1%	13.6%	-0.1%	0.01	0.06	0.809														
jun99mv	0.008	13.6%	10.1%	-4.3%	24.9%	-1.4%	7.5%	-4.7%	-4.7%	-1.2%	9.3%	-1.2%	0.14	1.29	0.289														
dec99mv	0.001	15.9%	2.9%	17.2%	3.9%	10.6%	4.0%	10.9%	-1.6%	2.5%	1.2%	-1.3%	0.37	4.80	0.060														
jun00mv	0.035	-2.1%	-2.9%	5.4%	9.7%	10.8%	26.7%	13.0%	18.4%	19.5%	1.3%	1.7%	0.27	3.01	0.121														
dec00mv	-0.046															35.6%	25.4%	31.9%	28.0%	21.3%	11.1%	5.6%	4.3%	1.4%	-7.9%	-0.047	0.93	111.06	0.00
jun01mv	-0.040															4.7%	7.9%	2.7%	3.0%	0.5%	2.1%	4.9%	6.4%	-0.6%	-5.1%	-0.007	0.36	4.42	0.07
dec01mv	-0.088															14.6%	26.9%	19.6%	17.2%	7.5%	2.9%	3.9%	-1.0%	1.3%	-8.9%	-0.033	0.82	36.06	0.00
jun02mv	-0.103															-10.5%	-4.0%	-10.2%	-12.3%	-10.5%	-8.3%	-11.1%	-11.2%	-9.2%	-11.3%	-0.003	0.11	1.03	0.34
dec02mv	0.119	42.3%	24.4%	18.2%	14.6%	14.4%	15.2%	14.6%	13.5%	12.1%	11.3%	-2.4%	0.59	11.43	0.010														
jun03mv	0.154	38.9%	34.5%	35.8%	23.7%	27.7%	24.0%	23.2%	20.8%	19.0%	16.8%	-2.4%	0.89	64.09	0.000														
dec03mv	0.043	14.2%	11.1%	6.4%	7.1%	3.5%	7.9%	10.2%	6.2%	6.1%	3.8%	-0.7%	0.41	5.58	0.046														
jun04mv	0.092	23.6%	16.2%	13.2%	14.8%	15.8%	15.1%	13.8%	12.1%	11.8%	7.2%	-1.1%	0.68	16.95	0.003														
dec04mv	0.014	7.3%	-2.7%	-0.2%	3.8%	0.6%	3.7%	3.8%	2.7%	1.6%	-0.8%	-0.2%	0.03	0.29	0.605														
jun05mv	0.069	9.6%	6.5%	6.7%	8.0%	6.9%	5.9%	9.0%	7.1%	7.8%	7.2%	-0.1%	0.02	0.18	0.686														
dec05mv	0.049	8.6%	8.6%	12.4%	9.4%	3.9%	7.8%	3.7%	6.8%	5.7%	4.6%	-0.6%	0.42	5.04	0.042														
jun06mv	0.121	13.5%	11.4%	16.5%	13.1%	9.3%	9.3%	11.1%	10.7%	11.6%	10.2%	-0.4%	0.28	3.13	0.115														
dec06mv	0.085	16.4%	12.1%	4.2%	4.4%	6.9%	3.8%	12.5%	10.6%	8.8%	9.3%	-0.2%	0.02	0.20	0.664														
jun07mv	-0.017															-6.7%	-5.3%	-6.6%	-9.3%	-7.3%	-7.4%	-8.7%	-10.2%	-1.4%	2.6%	0.006	0.20	2.00	0.19
dec07mv	-0.093															-7.9%	-5.5%	-9.7%	-12.4%	-4.9%	-7.5%	-10.1%	-7.0%	-6.9%	-3.4%	0.000	0.00	0.02	0.89
jun08mv	-0.315															-39.3%	-35.0%	-21.4%	-17.9%	-16.4%	-28.3%	-24.8%	-32.2%	-33.2%	-27.9%	0.002	0.01	0.04	0.84
dec08mv	0.040	59.1%	19.7%	20.5%	8.8%	10.6%	-1.4%	4.2%	2.3%	9.7%	3.8%	-4.1%	0.52	8.63	0.019														
jun09mv	0.233	44.7%	42.3%	25.5%	25.1%	29.0%	31.2%	26.2%	30.9%	22.2%	22.4%	-1.9%	0.53	8.91	0.017														
dec09mv	-0.052															13.2%	6.0%	-1.9%	0.7%	-1.4%	-0.7%	-1.5%	-2.9%	-1.3%	-6.2%	-0.014	0.64	14.24	0.01
jun10mv	0.242	12.7%	28.5%	23.6%	29.6%	25.8%	33.4%	25.2%	28.7%	23.1%	23.4%	0.5%	0.07	0.57	0.471														
dec10mv	0.060	9.9%	3.1%	-1.8%	1.8%	4.7%	5.1%	9.1%	7.3%	7.2%	6.7%	0.4%	0.12	1.11	0.322														
jun11mv	-0.065															-11.2%	-8.7%	-4.1%	-8.7%	-9.7%	-5.6%	-8.7%	-6.3%	-5.6%	-5.5%	0.004	0.27	3.01	0.12
dec11mv	0.070	26.3%	9.8%	5.6%	5.7%	7.2%	5.7%	7.4%	8.3%	7.1%	4.4%	-1.2%	0.33	3.97	0.082														
jun12mv	0.080	2.9%	6.2%	9.3%	11.9%	10.1%	10.1%	9.5%	8.1%	9.3%	5.3%	0.2%	0.04	0.35	0.569														
	Average	19.4%	13.0%	11.2%	11.6%	9.8%	10.9%	10.4%	10.4%	10.5%	9.6%	-0.7%	0.51	8.33	0.020	3.1%	2.0%	0.8%	-1.5%	-1.4%	-3.9%	-4.7%	-5.6%	-5.3%	-7.3%	-0.011	0.97	235.52	0.00

Figure 3: P/E-Portfolios

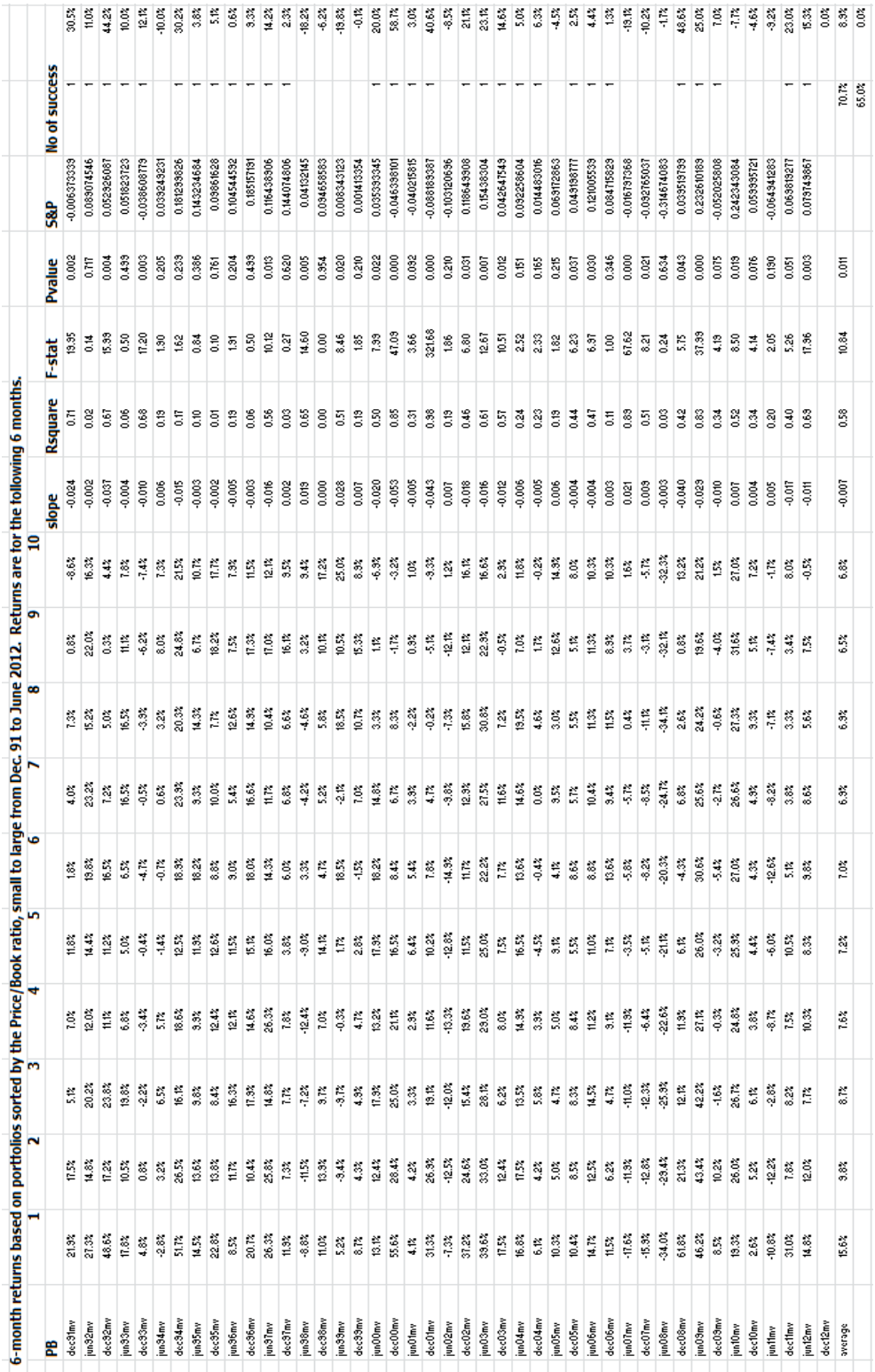
6-month returns based on portfolios sorted by the Price/Earnings ratio, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.

	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	S&P	No of success	
PE																	
dec91mv	-3.1%	51.5%	12.1%	11.6%	8.8%	5.6%	4.7%	2.5%	-3.1%	3.3%	-0.024	0.21	2.11	0.184	-0.006373333		-7.0%
jun92mv	14.3%	31.3%	23.4%	20.0%	17.2%	16.7%	14.3%	11.3%	14.2%	18.0%	-0.010	0.29	3.33	0.105	0.083074546		-3.1%
dec92mv															0.052926087		0.0%
jun93mv	12.3%	7.4%	8.8%	7.7%	15.0%	14.3%	18.0%	10.7%	17.0%	6.4%	0.003	0.06	0.49	0.502	0.051823723	1	5.8%
dec93mv	2.2%	4.5%	-2.0%	-3.4%	-2.7%	-3.3%	-5.6%	-7.0%	0.0%	-1.1%	-0.006	0.25	2.62	0.144	-0.038608773	1	3.3%
jun94mv	3.1%	2.3%	2.1%	4.4%	3.2%	-0.2%	6.8%	3.4%	3.3%	-0.6%	-0.001	0.02	0.15	0.710	0.039243231	1	3.7%
dec94mv	21.0%	20.3%	18.6%	16.0%	17.3%	18.2%	25.3%	15.3%	21.8%	18.0%	0.000	0.00	0.02	0.892	0.181239826	1	3.0%
jun95mv	19.0%	17.3%	14.4%	14.3%	7.8%	17.3%	10.8%	10.3%	14.4%	3.7%	-0.011	0.48	7.33	0.027	0.143234684	1	15.2%
dec95mv	11.4%	15.3%	8.0%	12.8%	8.4%	3.7%	10.0%	7.1%	13.8%	13.3%	0.000	0.00	0.01	0.921	0.09861628		-1.3%
jun96mv	21.6%	15.2%	10.7%	14.4%	6.7%	13.1%	10.0%	10.4%	4.0%	8.5%	-0.012	0.58	11.05	0.010	0.104544592	1	13.1%
dec96mv	19.3%	22.7%	19.5%	17.3%	18.5%	16.5%	13.4%	16.1%	15.2%	10.3%	-0.010	0.79	30.63	0.001	0.18515191	1	3.6%
jun97mv	22.6%	26.3%	21.3%	19.4%	21.6%	17.1%	17.2%	16.8%	12.3%	4.3%	-0.018	0.78	28.44	0.001	0.116438906	1	18.3%
dec97mv	16.8%	10.1%	4.2%	1.5%	14.7%	5.3%	5.3%	8.5%	10.0%	8.2%	-0.003	0.04	0.37	0.561	0.144074806	1	8.5%
jun98mv	-16.6%	-6.0%	-10.7%	0.3%	-1.6%	-5.2%	-1.8%	-0.3%	5.3%	-4.6%	0.014	0.46	6.30	0.030	0.0412145		-12.0%
dec98mv	12.4%	12.4%	7.1%	3.8%	5.6%	4.3%	6.1%	1.4%	5.3%	15.3%	-0.002	0.02	0.17	0.687	0.094658583		-3.5%
jun99mv	16.3%	-5.3%	-10.3%	-6.7%	-4.3%	-5.6%	-3.5%	0.2%	24.4%	10.4%	0.013	0.12	1.10	0.325	0.008343123	1	5.3%
dec99mv	8.1%	2.7%	4.7%	0.3%	-5.6%	3.4%	1.3%	2.8%	11.8%	20.1%	0.011	0.21	2.08	0.187	0.00413354		-12.0%
jun00mv	23.7%	12.3%	19.3%	24.2%	16.3%	13.5%	18.4%	8.2%	-3.0%	-3.8%	-0.029	0.64	14.04	0.006	0.035393345	1	33.5%
dec00mv	33.8%	32.5%	16.7%	10.7%	3.1%	9.3%	4.5%	3.5%	1.6%	7.2%	-0.033	0.75	23.41	0.001	-0.045398101	1	26.6%
jun01mv	8.0%	6.6%	9.3%	8.2%	2.9%	0.3%	3.7%	1.9%	4.0%	-2.2%	-0.010	0.66	15.56	0.004	-0.040216615	1	10.2%
dec01mv	26.7%	30.1%	12.4%	11.1%	5.3%	5.0%	1.7%	4.1%	0.8%	-3.5%	-0.033	0.82	36.67	0.000	-0.088183387	1	30.2%
jun02mv	-4.8%	-7.3%	-4.7%	-5.2%	-8.7%	-11.4%	-7.8%	-3.4%	-9.6%	-12.6%	-0.007	0.61	12.61	0.008	-0.103120636	1	7.8%
dec02mv	31.2%	15.1%	18.2%	9.6%	10.3%	10.3%	10.7%	9.5%	11.3%	10.2%	-0.016	0.48	7.43	0.026	0.118643908	1	21.0%
jun03mv	41.4%	27.8%	27.0%	20.1%	20.1%	19.1%	21.7%	19.1%	19.4%	23.0%	-0.016	0.48	7.25	0.027	0.15436304	1	18.4%
dec03mv	11.0%	14.6%	6.6%	5.7%	9.5%	6.6%	7.3%	9.0%	5.2%	10.6%	-0.003	0.12	1.07	0.332	0.042647543	1	0.4%
jun04mv	34.3%	16.0%	20.4%	11.8%	9.3%	13.1%	11.8%	10.0%	3.3%	3.8%	-0.023	0.66	15.25	0.005	0.039258604	1	31.1%
dec04mv	10.2%	6.3%	3.8%	5.5%	1.4%	-0.4%	0.1%	-1.7%	-4.1%	1.2%	-0.012	0.75	23.58	0.001	0.014483016	1	7.1%
jun05mv	14.4%	10.8%	5.8%	5.3%	3.2%	7.2%	8.1%	1.7%	10.3%	6.7%	-0.005	0.14	1.34	0.280	0.063172863	1	7.7%
dec05mv	8.2%	6.6%	5.0%	3.2%	5.0%	3.5%	5.2%	5.7%	8.7%	5.7%	-0.001	0.01	0.12	0.739	0.043198777	1	2.5%
jun06mv	15.7%	11.6%	9.3%	10.7%	9.4%	11.6%	11.6%	10.0%	8.2%	10.5%	-0.004	0.35	4.40	0.063	0.121005539	1	5.2%
dec06mv	15.3%	12.1%	9.8%	5.8%	6.3%	8.7%	5.2%	9.1%	8.0%	4.7%	-0.008	0.51	8.31	0.020	0.084715823	1	11.2%
jun07mv	-8.1%	-7.1%	-3.3%	-8.3%	-4.2%	-2.7%	-2.0%	-2.5%	-7.6%	-7.2%	0.002	0.04	0.36	0.563	-0.016797368		-0.3%
dec07mv	-5.7%	-5.7%	-6.0%	-7.3%	-6.6%	-10.5%	-6.6%	-10.0%	-9.3%	-11.5%	-0.006	0.70	18.40	0.003	-0.092765037	1	5.8%
jun08mv	-23.7%	-27.2%	-15.5%	-23.4%	-24.4%	-23.3%	-26.8%	-24.3%	-30.4%	-32.4%	-0.009	0.38	4.87	0.058	-0.314674083	1	8.7%
dec08mv	31.4%	20.6%	15.3%	5.1%	2.6%	-0.2%	4.0%	-5.7%	-2.3%	-0.6%	-0.034	0.77	26.85	0.001	0.039519139	1	32.0%
jun09mv	30.7%	32.4%	18.1%	25.2%	24.1%	19.7%	19.5%	20.6%	19.3%	22.3%	-0.010	0.40	5.40	0.043	0.232610163	1	7.8%
dec09mv	5.7%	-2.9%	-0.6%	5.3%	-1.9%	3.9%	-1.1%	-4.1%	-5.1%	-0.9%	-0.006	0.26	2.74	0.196	-0.052025808	1	6.6%
jun10mv	21.0%	24.3%	24.3%	23.3%	25.5%	26.5%	27.4%	23.5%	25.6%	34.4%	0.009	0.53	9.20	0.016	0.242343084		-13.5%
dec10mv	3.1%	5.1%	6.3%	8.0%	5.3%	8.2%	8.7%	5.8%	5.5%	0.1%	-0.005	0.28	3.09	0.117	0.053395721	1	9.0%
jun11mv	-11.6%	-3.0%	-1.8%	-6.7%	-1.9%	-6.5%	-3.3%	-4.4%	-9.6%	-12.9%	-0.004	0.09	0.77	0.406	-0.064341283	1	1.3%
dec11mv	23.8%	3.2%	8.7%	6.6%	3.3%	5.8%	7.3%	7.3%	7.3%	2.3%	-0.010	0.25	2.62	0.144	0.063813277	1	20.3%
jun12mv	24.7%	7.3%	8.8%	9.2%	7.0%	5.8%	9.3%	5.6%	5.3%	8.5%	-0.011	0.34	4.10	0.078	0.079143667	1	16.2%
dec12mv																	0.0%
average	13.4%	11.5%	8.4%	7.6%	6.4%	6.3%	6.6%	5.1%	5.9%	4.7%	-0.8%	0.80	31.78	0.000		82.5%	8.7%
																90.0%	0.0%

Figure 4: P/E-Portfolios in relation to benchmark returns

	PE	If market up																If market down													
		1	2	3	4	5	6	7	8	9	10							1	2	3	4	5	6	7	8	9	10				
	S&P500										slope	Rsquare	F-stat	Pvalue														slope	Rsquare	F-stat	Pvalue
dec91mv	-0.006																	-3.1%	51.5%	12.1%	11.6%	8.8%	5.6%	4.7%	2.5%	-3.1%	3.9%	-0.024	0.21	2.11	0.18
jun92mv	0.089	14.9%	31.3%	23.4%	20.0%	17.2%	16.7%	14.3%	11.9%	14.2%	18.0%	-1.0%	0.29	3.33	0.105																
dec92mv	0.053	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%																			
jun93mv	0.062	12.3%	7.4%	8.8%	7.7%	15.0%	14.9%	18.0%	10.7%	17.0%	6.4%	0.3%	0.06	0.49	0.502																
dec93mv	-0.039																	2.2%	4.5%	-2.0%	-3.4%	-2.7%	-3.3%	-5.6%	-7.0%	0.0%	-1.1%	-0.006	0.25	2.62	0.14
jun94mv	0.039	3.1%	2.9%	2.1%	4.4%	3.2%	-0.2%	6.8%	3.4%	3.9%	-0.6%	-0.1%	0.02	0.15	0.710																
dec94mv	0.181	21.0%	20.9%	18.6%	16.0%	17.3%	18.2%	25.3%	15.3%	21.8%	18.0%	0.0%	0.00	0.02	0.892																
jun95mv	0.143	19.0%	17.3%	14.4%	14.3%	7.8%	17.3%	10.8%	10.3%	14.4%	3.7%	-1.1%	0.48	7.33	0.027																
dec95mv	0.099	11.4%	15.3%	8.0%	12.8%	8.4%	9.7%	10.0%	7.1%	13.8%	13.3%	0.0%	0.00	0.01	0.921																
jun96mv	0.105	21.6%	15.2%	10.7%	14.4%	6.7%	13.1%	10.0%	10.4%	4.0%	8.5%	-1.2%	0.58	11.05	0.010																
dec96mv	0.185	19.9%	22.7%	19.5%	17.9%	18.5%	16.5%	13.4%	16.1%	15.2%	10.3%	-1.0%	0.79	30.63	0.001																
jun97mv	0.116	22.6%	26.9%	21.3%	19.4%	21.8%	17.1%	17.2%	16.8%	12.3%	4.3%	-1.8%	0.78	28.44	0.001																
dec97mv	0.144	16.8%	10.1%	4.2%	1.5%	14.7%	5.9%	5.3%	8.5%	10.0%	8.2%	-0.3%	0.04	0.37	0.561																
jun98mv	0.041	-16.6%	-6.0%	-10.7%	0.3%	-1.6%	-5.2%	-1.8%	-0.9%	5.9%	-4.6%	1.4%	0.46	6.90	0.030																
dec98mv	0.095	12.4%	12.4%	7.1%	3.8%	5.6%	4.9%	6.1%	1.4%	5.9%	15.9%	-0.2%	0.02	0.17	0.687																
jun99mv	0.008	16.3%	-5.3%	-10.9%	-6.7%	-4.9%	-5.6%	-3.5%	0.2%	24.4%	10.4%	1.3%	0.12	1.10	0.325																
dec99mv	0.001	8.1%	2.7%	4.7%	0.3%	-5.6%	3.4%	1.3%	2.8%	11.8%	20.1%	1.1%	0.21	2.08	0.187																
jun00mv	0.035	23.7%	12.3%	19.3%	24.2%	16.9%	13.5%	18.4%	8.2%	-3.0%	-9.8%	-2.9%	0.64	14.04	0.006																
dec00mv	-0.046																	33.8%	32.5%	16.7%	10.7%	9.1%	9.3%	4.5%	3.5%	1.6%	7.2%	-0.033	0.75	23.41	0.00
jun01mv	-0.040																	8.0%	6.8%	9.3%	8.2%	2.9%	0.9%	3.7%	1.9%	4.0%	-2.2%	-0.010	0.66	15.56	0.00
dec01mv	-0.088																	26.7%	30.1%	12.4%	11.1%	5.3%	5.0%	1.7%	4.1%	0.8%	-3.5%	-0.033	0.82	36.67	0.00
jun02mv	-0.103																	-4.8%	-7.9%	-4.7%	-5.2%	-8.7%	-11.4%	-7.8%	-9.4%	-9.6%	-12.6%	-0.007	0.61	12.61	0.01
dec02mv	0.119	31.2%	15.1%	18.2%	9.6%	10.3%	10.3%	10.7%	9.5%	11.3%	10.2%	-1.6%	0.48	7.43	0.026																
jun03mv	0.154	41.4%	27.8%	27.0%	20.1%	20.1%	19.1%	21.7%	19.1%	19.4%	23.0%	-1.6%	0.48	7.25	0.027																
dec03mv	0.043	11.0%	14.6%	6.6%	5.7%	9.5%	6.6%	7.9%	9.0%	5.2%	10.6%	-0.3%	0.12	1.07	0.332																
jun04mv	0.092	34.9%	16.0%	20.4%	11.8%	9.9%	13.1%	11.8%	10.0%	9.3%	3.8%	-2.3%	0.66	15.25	0.005																
dec04mv	0.014	10.2%	6.3%	3.8%	5.5%	1.4%	-0.4%	0.1%	-1.7%	-4.1%	1.2%	-1.2%	0.75	23.58	0.001																
jun05mv	0.069	14.4%	10.8%	5.8%	5.9%	3.2%	7.2%	8.1%	1.7%	10.9%	6.7%	-0.5%	0.14	1.34	0.280																
dec05mv	0.049	8.2%	6.6%	5.0%	9.2%	5.0%	9.5%	5.2%	5.7%	8.7%	5.7%	-0.1%	0.01	0.12	0.739																
jun06mv	0.121	15.7%	11.6%	9.9%	10.7%	9.4%	11.6%	11.6%	10.0%	8.2%	10.5%	-0.4%	0.35	4.40	0.069																
dec06mv	0.085	15.9%	12.1%	9.8%	5.8%	6.9%	8.7%	5.2%	9.1%	8.0%	4.7%	-0.8%	0.51	8.31	0.020																
jun07mv	-0.017																	-8.1%	-7.1%	-3.3%	-8.9%	-4.2%	-2.7%	-2.0%	-2.5%	-7.6%	-7.2%	0.002	0.04	0.36	0.56
dec07mv	-0.093																	-5.7%	-5.7%	-6.0%	-7.3%	-6.8%	-10.5%	-6.6%	-10.0%	-9.3%	-11.5%	-0.006	0.70	18.40	0.00
jun08mv	-0.315																	-23.7%	-27.2%	-15.5%	-23.4%	-24.4%	-23.3%	-26.8%	-24.3%	-30.4%	-32.4%	-0.009	0.38	4.87	0.06
dec08mv	0.040	31.4%	20.6%	15.9%	5.1%	2.8%	-0.2%	4.0%	-5.7%	-2.3%	-0.6%	-3.4%	0.77	26.85	0.001																
jun09mv	0.233	30.7%	32.4%	18.1%	25.2%	24.1%	19.7%	19.5%	20.6%	19.3%	22.9%	-1.0%	0.40	5.40	0.049																
dec09mv	-0.052																	5.7%	-2.9%	-0.6%	5.3%	-1.9%	3.9%	-1.1%	-4.1%	-5.1%	-9.3%	-0.006	0.26	2.74	0.14
jun10mv	0.242	21.0%	24.9%	24.9%	29.3%	25.5%	26.5%	27.4%	29.5%	25.6%	34.4%	0.9%	0.53	9.20	0.016																
dec10mv	0.060	9.1%	5.1%	6.3%	8.0%	5.3%	8.2%	8.7%	5.8%	5.5%	0.1%	-0.5%	0.28	3.09	0.117																
jun11mv	-0.065																	-11.6%	-3.0%	-1.8%	-6.7%	-1.9%	-6.5%	-3.3%	-4.4%	-9.6%	-12.9%	-0.004	0.09	0.77	0.41
dec11mv	0.070	23.8%	3.2%	8.7%	6.6%	3.9%	5.8%	7.3%	7.3%	7.3%	2.9%	-1.0%	0.25	2.62	0.144																
jun12mv	0.080	24.7%	7.9%	8.8%	9.2%	7.0%	5.8%	9.9%	5.6%	5.3%	8.5%	-1.1%	0.34	4.10	0.078																
	Average	17.1%	12.9%	10.6%	10.3%	9.2%	9.4%	10.0%	8.3%	10.0%	8.6%	-0.7%	0.59	11.64	0.009	Average		1.8%	6.5%	1.5%	-0.7%	-2.2%	-3.0%	-3.5%	-4.5%	-6.2%	-6.7%	-0.012	0.85	44.81	0.00

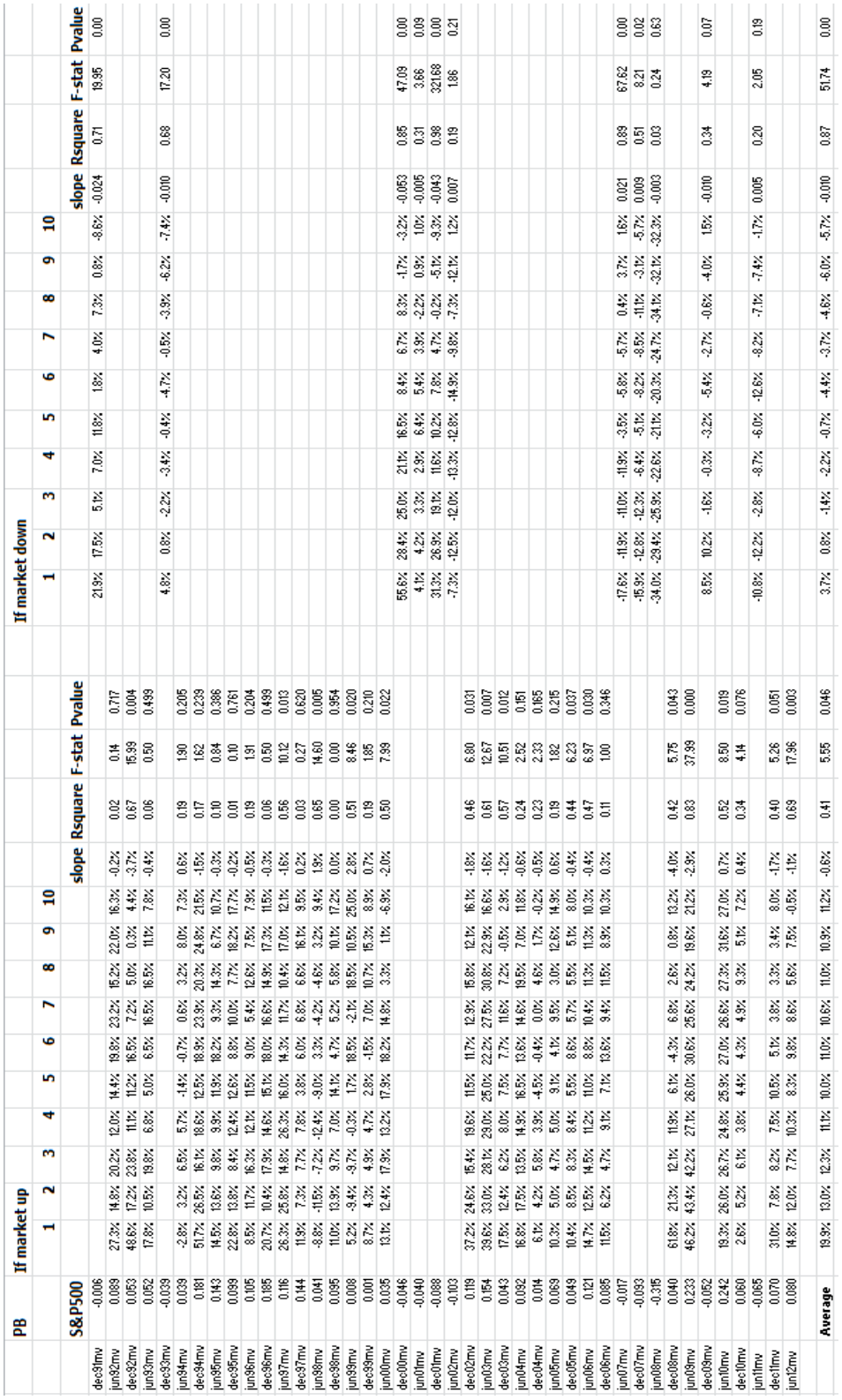
Figure 5: P/B-Portfolios



6-month returns based on portfolios sorted by the Price/Book ratio, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.

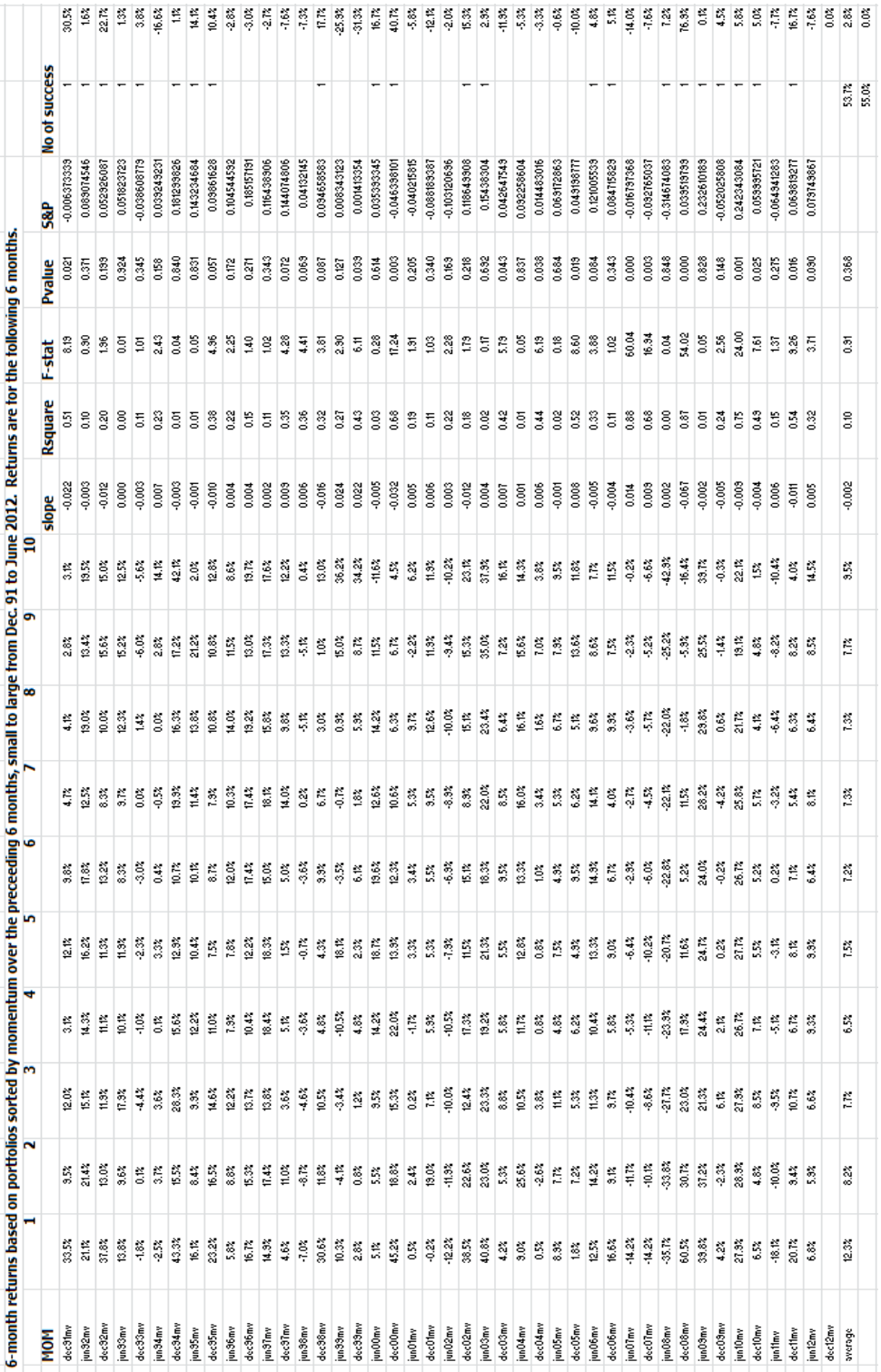
	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	S&P	No of success	
PB																	
dec91mv	21.3%	17.5%	5.1%	7.0%	11.8%	1.8%	4.0%	7.3%	0.8%	-8.6%	-0.024	0.71	19.35	0.002	-0.006373333	1	30.5%
jun92mv	27.3%	14.8%	20.2%	12.0%	14.4%	19.8%	23.2%	15.2%	22.0%	16.3%	-0.002	0.02	0.14	0.717	0.083074546	1	11.0%
dec92mv	48.6%	17.2%	23.8%	11.1%	11.2%	16.5%	7.2%	5.0%	0.3%	4.4%	-0.037	0.67	15.93	0.004	0.052826087	1	44.2%
jun93mv	17.8%	10.5%	19.8%	6.8%	5.0%	6.5%	16.5%	16.5%	11.1%	7.8%	-0.004	0.06	0.50	0.499	0.051823723	1	10.0%
dec93mv	4.8%	0.8%	-2.2%	-3.4%	-0.4%	-4.1%	-0.5%	-3.3%	-6.2%	-7.4%	-0.010	0.68	17.20	0.003	-0.038608779	1	12.1%
jun94mv	-2.8%	3.2%	6.5%	5.7%	-1.4%	-0.7%	0.6%	3.2%	8.0%	7.3%	0.006	0.19	1.90	0.205	0.033243231		-10.0%
dec94mv	51.7%	26.5%	16.1%	18.6%	12.5%	18.3%	23.3%	20.3%	24.8%	21.5%	-0.015	0.17	1.62	0.233	0.181233626	1	30.2%
jun95mv	14.5%	13.6%	9.8%	9.3%	11.3%	16.2%	9.3%	14.3%	6.7%	10.7%	-0.003	0.10	0.84	0.386	0.143234684	1	3.8%
dec95mv	22.8%	13.8%	8.4%	12.4%	12.6%	8.8%	10.0%	7.7%	18.2%	17.7%	-0.002	0.01	0.10	0.761	0.03861628	1	5.1%
jun96mv	8.5%	11.7%	16.3%	12.1%	11.5%	9.0%	5.4%	12.6%	7.5%	7.3%	-0.005	0.19	1.91	0.204	0.104544532	1	0.6%
dec96mv	20.7%	10.4%	17.3%	14.6%	15.1%	18.0%	16.6%	14.3%	17.3%	11.5%	-0.003	0.06	0.50	0.499	0.16515191	1	9.3%
jun97mv	26.3%	25.8%	14.8%	26.3%	16.0%	14.3%	11.7%	10.4%	17.0%	12.1%	-0.016	0.56	10.12	0.013	0.116438306	1	14.2%
dec97mv	11.9%	7.3%	7.7%	7.8%	3.8%	6.0%	6.8%	6.6%	16.8%	9.5%	0.002	0.03	0.27	0.620	0.144014606	1	2.3%
jun98mv	-8.8%	-11.5%	-7.2%	-12.4%	-9.0%	3.3%	-4.2%	-4.6%	3.2%	3.4%	0.019	0.65	14.60	0.005	0.04132145		-18.2%
dec98mv	11.0%	13.3%	3.7%	7.0%	14.1%	4.7%	5.2%	5.8%	10.1%	17.2%	0.000	0.00	0.00	0.954	0.034658583		-6.2%
jun99mv	5.2%	-3.4%	-3.7%	-0.3%	1.7%	18.5%	-2.1%	18.5%	10.5%	25.0%	0.028	0.51	8.46	0.020	0.008343123		-19.8%
dec99mv	8.7%	4.3%	4.3%	4.7%	2.8%	-1.5%	7.0%	10.7%	15.3%	8.3%	0.007	0.19	1.85	0.210	0.00141035		-0.1%
jun00mv	13.1%	12.4%	17.3%	13.2%	17.3%	18.2%	14.8%	3.3%	1.1%	-6.3%	-0.020	0.50	7.39	0.022	0.035333345	1	20.0%
dec00mv	55.6%	28.4%	25.0%	21.1%	16.5%	8.4%	6.7%	8.3%	-1.7%	-3.2%	-0.053	0.85	47.09	0.000	-0.045636101	1	58.7%
jun01mv	4.1%	4.2%	3.3%	2.3%	6.4%	5.4%	3.3%	-2.2%	0.3%	1.0%	-0.005	0.31	3.66	0.062	-0.040215615	1	3.0%
dec01mv	31.3%	26.3%	13.1%	11.6%	10.2%	7.8%	4.7%	-0.2%	-5.1%	-3.3%	-0.043	0.38	321.68	0.000	-0.068183387	1	40.6%
jun02mv	-7.3%	-12.5%	-12.0%	-15.3%	-12.6%	-14.3%	-9.6%	-7.3%	-12.1%	1.2%	0.001	0.19	1.86	0.210	-0.003120696		-9.5%
dec02mv	37.2%	24.6%	15.4%	19.6%	11.5%	11.7%	12.3%	15.8%	12.1%	16.1%	-0.018	0.46	6.80	0.031	0.118643308	1	21.1%
jun03mv	33.6%	33.0%	28.1%	29.0%	25.0%	22.2%	27.5%	30.8%	22.3%	16.6%	-0.016	0.61	12.67	0.007	0.15436304	1	23.1%
dec03mv	17.5%	12.4%	6.2%	8.0%	7.5%	7.7%	11.6%	7.2%	-0.5%	2.3%	-0.012	0.57	10.51	0.012	0.042647543	1	14.6%
jun04mv	16.8%	17.5%	13.5%	14.3%	16.5%	13.6%	14.6%	13.5%	7.0%	11.8%	-0.006	0.24	2.52	0.151	0.032258604	1	5.0%
dec04mv	6.1%	4.2%	5.8%	3.3%	-4.5%	-0.4%	0.0%	4.6%	1.7%	-0.2%	-0.005	0.23	2.33	0.165	0.014483016	1	6.3%
jun05mv	10.3%	5.0%	4.7%	5.0%	3.1%	4.1%	3.5%	3.0%	12.6%	14.3%	0.006	0.19	1.82	0.215	0.063172863		-4.5%
dec05mv	10.4%	8.5%	8.3%	8.4%	5.5%	8.6%	5.7%	5.5%	5.1%	8.0%	-0.004	0.44	6.23	0.037	0.043158777	1	2.5%
jun06mv	14.7%	12.5%	14.5%	11.2%	11.0%	8.8%	10.4%	11.3%	11.3%	10.3%	-0.004	0.47	6.97	0.030	0.121005533	1	4.4%
dec06mv	11.5%	6.2%	4.7%	9.1%	7.1%	13.6%	9.4%	11.5%	8.9%	10.3%	0.003	0.11	1.00	0.346	0.084715829	1	1.3%
jun07mv	-17.6%	-11.3%	-11.0%	-11.3%	-3.5%	-5.8%	-5.7%	0.4%	3.7%	1.6%	0.021	0.83	67.62	0.000	-0.016797368		-19.1%
dec07mv	-15.3%	-12.8%	-12.3%	-6.4%	-5.1%	-8.2%	-8.5%	-11.1%	-3.1%	-5.7%	0.009	0.51	8.21	0.021	-0.032765037		-10.2%
jun08mv	-34.0%	-23.4%	-25.3%	-22.6%	-21.1%	-20.3%	-24.7%	-34.1%	-32.1%	-32.3%	-0.003	0.03	0.24	0.634	-0.314674083		-1.7%
dec08mv	61.8%	21.3%	12.1%	11.3%	6.1%	-4.3%	6.8%	2.6%	0.8%	13.2%	-0.040	0.42	5.75	0.043	0.035519739	1	48.6%
jun09mv	46.2%	43.4%	42.2%	27.1%	26.0%	30.6%	25.6%	24.2%	19.6%	21.2%	-0.029	0.83	37.39	0.000	0.232610183	1	25.0%
dec09mv	8.5%	10.2%	-1.6%	-0.3%	-3.2%	-5.4%	-2.7%	-0.6%	-4.0%	1.5%	-0.010	0.34	4.19	0.075	-0.052025808	1	7.0%
jun10mv	19.3%	26.0%	26.1%	24.8%	25.9%	27.0%	26.6%	27.3%	31.6%	27.0%	0.007	0.52	8.50	0.019	0.242343084		-7.1%
dec10mv	2.6%	5.2%	6.1%	3.8%	4.4%	4.3%	4.3%	3.3%	5.1%	7.2%	0.004	0.34	4.14	0.076	0.059395721		-4.6%
jun11mv	-10.8%	-12.2%	-2.8%	-9.7%	-6.0%	-12.6%	-9.2%	-7.1%	-7.4%	-1.7%	0.005	0.20	2.05	0.190	-0.064941263		-9.2%
dec11mv	31.0%	7.8%	8.2%	7.5%	10.5%	5.1%	3.8%	3.3%	3.4%	8.0%	-0.017	0.40	5.26	0.051	0.063619277	1	23.0%
jun12mv	14.8%	12.0%	7.7%	10.3%	8.3%	3.8%	8.6%	5.6%	7.5%	-0.5%	-0.011	0.63	17.96	0.003	0.078743667	1	15.3%
dec12mv																	0.0%
average	15.6%	9.8%	8.7%	7.6%	7.2%	7.0%	6.3%	6.3%	6.5%	6.8%	-0.007	0.58	10.84	0.011		70.7%	8.3%
																65.0%	0.0%

Figure 6: P/B-Portfolios in relation to benchmark returns



	PB	If market up														If market down													
		1	2	3	4	5	6	7	8	9	10					1	2	3	4	5	6	7	8	9	10				
	S&P500											slope	Rsquare	F-stat	Pvalue											slope	Rsquare	F-stat	Pvalue
dec91mv	-0.006															21.9%	17.5%	5.1%	7.0%	11.8%	1.8%	4.0%	7.3%	0.8%	-8.6%	-0.024	0.71	19.95	0.00
jun92mv	0.089	27.3%	14.8%	20.2%	12.0%	14.4%	19.8%	23.2%	15.2%	22.0%	16.3%	-0.2%	0.02	0.14	0.717														
dec92mv	0.053	48.6%	17.2%	23.8%	11.1%	11.2%	16.5%	7.2%	5.0%	0.3%	4.4%	-3.7%	0.67	15.99	0.004														
jun93mv	0.052	17.8%	10.5%	19.8%	6.8%	5.0%	6.5%	16.5%	16.5%	11.1%	7.8%	-0.4%	0.06	0.50	0.499														
dec93mv	-0.039															4.8%	0.8%	-2.2%	-3.4%	-0.4%	-4.7%	-0.5%	-3.9%	-6.2%	-7.4%	-0.010	0.68	17.20	0.00
jun94mv	0.039	-2.8%	3.2%	6.5%	5.7%	-1.4%	-0.7%	0.6%	3.2%	8.0%	7.3%	0.6%	0.19	1.90	0.205														
dec94mv	0.181	51.7%	26.5%	16.1%	18.6%	12.5%	18.9%	23.9%	20.3%	24.8%	21.5%	-1.5%	0.17	1.62	0.239														
jun95mv	0.143	14.5%	13.6%	9.8%	9.9%	11.9%	18.2%	9.3%	14.3%	6.7%	10.7%	-0.3%	0.10	0.84	0.386														
dec95mv	0.099	22.8%	13.8%	8.4%	12.4%	12.6%	8.8%	10.0%	7.7%	18.2%	17.7%	-0.2%	0.01	0.10	0.761														
jun96mv	0.105	8.5%	11.7%	16.3%	12.1%	11.5%	9.0%	5.4%	12.6%	7.5%	7.9%	-0.5%	0.19	1.91	0.204														
dec96mv	0.185	20.7%	10.4%	17.9%	14.6%	15.1%	18.0%	16.6%	14.9%	17.3%	11.5%	-0.3%	0.06	0.50	0.499														
jun97mv	0.116	26.3%	25.8%	14.8%	26.3%	16.0%	14.3%	11.7%	10.4%	17.0%	12.1%	-1.6%	0.56	10.12	0.013														
dec97mv	0.144	11.9%	7.3%	7.7%	7.8%	3.8%	6.0%	6.8%	6.6%	16.1%	9.5%	0.2%	0.03	0.27	0.620														
jun98mv	0.041	-8.8%	-11.5%	-7.2%	-12.4%	-9.0%	3.3%	-4.2%	-4.6%	3.2%	9.4%	1.9%	0.65	14.60	0.005														
dec98mv	0.095	11.0%	13.9%	9.7%	7.0%	14.1%	4.7%	5.2%	5.8%	10.1%	17.2%	0.0%	0.00	0.00	0.954														
jun99mv	0.008	5.2%	-9.4%	-9.7%	-0.3%	1.7%	18.5%	-2.1%	18.5%	10.5%	25.0%	2.8%	0.51	8.46	0.020														
dec99mv	0.001	8.7%	4.3%	4.9%	4.7%	2.8%	-1.5%	7.0%	10.7%	15.3%	8.9%	0.7%	0.19	1.85	0.210														
jun00mv	0.035	13.1%	12.4%	17.9%	13.2%	17.9%	18.2%	14.8%	3.3%	1.1%	-6.9%	-2.0%	0.50	7.99	0.022														
dec00mv	-0.046															55.6%	28.4%	25.0%	21.1%	16.5%	8.4%	6.7%	8.3%	-1.7%	-3.2%	-0.053	0.85	47.09	0.00
jun01mv	-0.040															4.1%	4.2%	3.3%	2.9%	6.4%	5.4%	3.9%	-2.2%	0.9%	1.0%	-0.005	0.31	3.66	0.09
dec01mv	-0.088															31.3%	26.9%	19.1%	11.6%	10.2%	7.8%	4.7%	-0.2%	-5.1%	-9.3%	-0.043	0.98	321.68	0.00
jun02mv	-0.103															-7.3%	-12.5%	-12.0%	-13.3%	-12.8%	-14.9%	-9.8%	-7.3%	-12.1%	1.2%	0.007	0.19	1.86	0.21
dec02mv	0.119	37.2%	24.6%	15.4%	19.6%	11.5%	11.7%	12.9%	15.8%	12.1%	16.1%	-1.8%	0.46	6.80	0.031														
jun03mv	0.154	39.6%	33.0%	28.1%	29.0%	25.0%	22.2%	27.5%	30.8%	22.9%	16.6%	-1.6%	0.61	12.67	0.007														
dec03mv	0.043	17.5%	12.4%	6.2%	8.0%	7.5%	7.7%	11.6%	7.2%	-0.5%	2.9%	-1.2%	0.57	10.51	0.012														
jun04mv	0.092	16.8%	17.5%	13.5%	14.9%	16.5%	13.6%	14.6%	19.5%	7.0%	11.8%	-0.6%	0.24	2.52	0.151														
dec04mv	0.014	6.1%	4.2%	5.8%	3.9%	-4.5%	-0.4%	0.0%	4.6%	1.7%	-0.2%	-0.5%	0.23	2.33	0.165														
jun05mv	0.069	10.3%	5.0%	4.7%	5.0%	9.1%	4.1%	9.5%	3.0%	12.6%	14.9%	0.6%	0.19	1.82	0.215														
dec05mv	0.049	10.4%	8.5%	8.3%	8.4%	5.5%	8.6%	5.7%	5.5%	5.1%	8.0%	-0.4%	0.44	6.23	0.037														
jun06mv	0.121	14.7%	12.5%	14.5%	11.2%	11.0%	8.8%	10.4%	11.3%	11.3%	10.3%	-0.4%	0.47	6.97	0.030														
dec06mv	0.085	11.5%	6.2%	4.7%	9.1%	7.1%	13.6%	9.4%	11.5%	8.9%	10.3%	0.3%	0.11	1.00	0.346														
jun07mv	-0.017															-17.6%	-11.9%	-11.0%	-11.9%	-3.6%	-5.8%	-5.7%	0.4%	3.7%	1.8%	0.021	0.89	67.62	0.00
dec07mv	-0.093															-15.9%	-12.8%	-12.3%	-6.4%	-5.1%	-8.2%	-8.5%	-11.1%	-3.1%	-5.7%	0.009	0.51	8.21	0.02
jun08mv	-0.315															-34.0%	-29.4%	-25.9%	-22.6%	-21.1%	-20.3%	-24.7%	-34.1%	-32.1%	-32.3%	-0.003	0.03	0.24	0.63
dec08mv	0.040	61.8%	21.3%	12.1%	11.9%	6.1%	-4.3%	6.8%	2.6%	0.8%	13.2%	-4.0%	0.42	5.75	0.043														
jun09mv	0.233	46.2%	43.4%	42.2%	27.1%	26.0%	30.6%	25.6%	24.2%	19.6%	21.2%	-2.9%	0.83	37.99	0.000														
dec09mv	-0.052															8.5%	10.2%	-1.6%	-0.3%	-3.2%	-5.4%	-2.7%	-0.6%	-4.0%	1.5%	-0.010	0.34	4.19	0.07
jun10mv	0.242	19.3%	26.0%	26.7%	24.8%	25.9%	27.0%	26.6%	27.3%	31.6%	27.0%	0.7%	0.52	8.50	0.019														
dec10mv	0.060	2.6%	5.2%	6.1%	3.8%	4.4%	4.3%	4.9%	9.3%	5.1%	7.2%	0.4%	0.34	4.14	0.076														
jun11mv	-0.065															-10.8%	-12.2%	-2.8%	-8.7%	-6.0%	-12.6%	-8.2%	-7.1%	-7.4%	-1.7%	0.005	0.20	2.05	0.19
dec11mv	0.070	31.0%	7.8%	8.2%	7.5%	10.5%	5.1%	3.8%	3.3%	3.4%	8.0%	-1.7%	0.40	5.26	0.051														
jun12mv	0.080	14.8%	12.0%	7.7%	10.3%	8.3%	9.8%	8.6%	5.6%	7.5%	-0.5%	-1.1%	0.69	17.96	0.003														
	Average	19.9%	13.0%	12.3%	11.1%	10.0%	11.0%	10.6%	11.0%	10.9%	11.2%	-0.6%	0.41	5.55	0.046	3.7%	0.8%	-1.4%	-2.2%	-0.7%	-4.4%	-3.7%	-4.6%	-6.0%	-5.7%	-0.010	0.87	51.74	0.00

Figure 7: Momentum-Portfolios



6-month returns based on portfolios sorted by momentum over the preceeding 6 months, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.

	1	2	3	4	5	6	7	8	9	10						
MOM											slope	Rsquare	F-stat	Pvalue	S&P	No of success
dec91mv	33.5%	9.5%	12.0%	3.1%	12.1%	9.6%	4.7%	4.1%	2.6%	3.1%	-0.022	0.31	8.19	0.021	-0.006373339	1
jun92mv	21.1%	21.4%	15.1%	14.3%	16.2%	17.6%	12.5%	13.0%	13.4%	13.5%	-0.003	0.10	0.90	0.371	0.089074546	1
dec92mv	37.6%	13.0%	11.3%	11.1%	11.3%	13.2%	8.3%	10.0%	15.6%	15.0%	-0.012	0.20	1.96	0.193	0.052826087	1
jun93mv	13.8%	9.6%	17.3%	10.1%	11.3%	8.3%	9.7%	12.3%	15.2%	12.5%	0.000	0.00	0.01	0.924	0.051823723	1
dec93mv	-1.6%	0.1%	-4.4%	-1.0%	-2.3%	-3.0%	0.0%	1.4%	-6.0%	-5.6%	-0.003	0.11	1.01	0.345	-0.038606773	1
jun94mv	-2.5%	3.1%	3.6%	0.1%	3.3%	0.4%	-0.5%	0.0%	2.8%	14.1%	0.007	0.23	2.43	0.158	0.039243231	
dec94mv	43.3%	15.5%	28.3%	15.6%	12.3%	10.7%	19.3%	16.3%	17.2%	42.1%	-0.003	0.01	0.04	0.840	0.181239826	1
jun95mv	16.1%	8.4%	9.3%	12.2%	10.4%	10.1%	11.4%	13.8%	21.2%	2.0%	-0.001	0.01	0.05	0.831	0.143234684	1
dec95mv	23.2%	16.5%	14.6%	11.0%	7.5%	8.7%	7.3%	10.8%	10.8%	12.8%	-0.010	0.38	4.36	0.057	0.03861628	1
jun96mv	5.8%	8.8%	12.2%	7.3%	7.8%	12.0%	10.3%	14.0%	11.5%	8.6%	0.004	0.22	2.25	0.172	0.104544532	
dec96mv	16.7%	15.3%	13.7%	10.4%	12.2%	17.4%	17.4%	19.2%	13.0%	19.7%	0.004	0.15	1.40	0.271	0.18515191	
jun97mv	14.3%	17.4%	13.8%	16.4%	16.3%	15.0%	18.1%	15.8%	17.3%	17.6%	0.002	0.11	1.02	0.343	0.116438906	
dec97mv	4.6%	11.0%	3.6%	5.1%	1.5%	5.0%	14.0%	3.8%	13.3%	12.2%	0.009	0.35	4.28	0.072	0.144074806	
jun98mv	-7.0%	-8.7%	-4.6%	-3.6%	-0.7%	-3.6%	0.2%	-5.1%	-5.1%	0.4%	0.006	0.36	4.41	0.063	0.04132145	
dec98mv	30.6%	11.8%	10.5%	4.8%	4.3%	9.3%	6.7%	3.0%	1.0%	13.0%	-0.016	0.32	3.81	0.087	0.094556563	1
jun99mv	10.3%	-4.1%	-3.4%	-10.5%	18.1%	-3.5%	-0.7%	0.3%	15.0%	36.2%	0.024	0.27	2.90	0.127	0.008343123	
dec99mv	2.8%	0.8%	1.2%	4.8%	2.3%	6.1%	1.8%	5.3%	8.7%	34.2%	0.022	0.43	6.11	0.039	0.00413354	
jun00mv	5.1%	5.5%	3.5%	14.2%	18.7%	19.6%	12.6%	14.2%	11.5%	-11.6%	-0.005	0.03	0.28	0.614	0.035393345	1
dec00mv	45.2%	16.8%	15.3%	22.0%	13.3%	12.3%	10.6%	6.3%	6.7%	4.5%	-0.032	0.68	17.24	0.003	-0.046396801	1
jun01mv	0.5%	2.4%	0.2%	-1.7%	3.3%	3.4%	5.3%	9.7%	-2.2%	6.2%	0.005	0.19	1.91	0.205	-0.040216515	
dec01mv	-0.2%	19.0%	7.1%	5.3%	5.3%	5.5%	9.5%	12.6%	11.3%	11.3%	0.006	0.11	1.03	0.340	-0.088883387	
jun02mv	-12.2%	-11.9%	-10.0%	-10.5%	-7.3%	-6.3%	-8.3%	-10.0%	-9.4%	-10.2%	0.003	0.22	2.28	0.163	-0.103206696	
dec02mv	38.5%	22.6%	12.4%	17.3%	11.5%	15.1%	8.3%	15.1%	15.3%	23.1%	-0.012	0.18	1.79	0.218	0.118643908	1
jun03mv	40.8%	23.0%	23.3%	19.2%	21.3%	16.3%	22.0%	23.4%	35.0%	37.9%	0.004	0.02	0.17	0.692	0.15438304	1
dec03mv	4.2%	5.3%	8.8%	5.8%	5.5%	9.5%	8.5%	6.4%	7.2%	16.1%	0.007	0.42	5.79	0.043	0.042647549	
jun04mv	3.0%	25.6%	10.5%	11.7%	12.8%	13.3%	16.0%	16.1%	15.6%	14.3%	0.001	0.01	0.05	0.837	0.039258604	
dec04mv	0.5%	-2.6%	3.8%	0.8%	0.8%	1.0%	3.4%	1.6%	7.0%	3.8%	0.006	0.44	6.19	0.038	0.014483016	
jun05mv	8.3%	7.7%	11.1%	4.8%	7.5%	4.3%	5.3%	6.7%	7.3%	9.5%	-0.001	0.02	0.18	0.684	0.063172863	
dec05mv	1.8%	7.2%	5.3%	6.2%	4.3%	9.5%	6.2%	5.1%	13.6%	11.8%	0.008	0.52	8.60	0.019	0.043196777	
jun06mv	12.5%	14.2%	11.3%	10.4%	13.3%	14.3%	14.1%	9.6%	8.6%	7.7%	-0.005	0.33	3.88	0.084	0.121005533	1
dec06mv	16.6%	3.1%	3.7%	5.8%	9.0%	6.7%	4.0%	9.3%	7.5%	11.5%	-0.004	0.11	1.02	0.343	0.084715823	1
jun07mv	-14.2%	-11.7%	-10.4%	-5.3%	-6.4%	-2.3%	-2.7%	-3.6%	-2.3%	-0.2%	0.014	0.88	60.04	0.000	-0.016737368	
dec07mv	-14.2%	-10.1%	-8.6%	-11.1%	-10.2%	-6.0%	-4.5%	-5.7%	-5.2%	-6.6%	0.009	0.68	16.34	0.003	-0.092765037	
jun08mv	-35.1%	-33.8%	-27.7%	-23.3%	-20.7%	-22.8%	-22.1%	-22.0%	-25.2%	-42.3%	0.002	0.00	0.04	0.848	-0.314674083	1
dec08mv	60.5%	30.7%	23.0%	17.3%	11.6%	5.2%	11.5%	-1.8%	-5.3%	-16.4%	-0.067	0.87	54.02	0.000	0.039518739	1
jun09mv	38.6%	37.2%	21.3%	24.4%	24.7%	24.0%	28.2%	29.8%	25.5%	39.7%	-0.002	0.01	0.05	0.828	0.232610169	1
dec09mv	4.2%	-2.3%	6.1%	2.1%	0.2%	-0.2%	-4.2%	0.6%	-1.4%	-0.3%	-0.005	0.24	2.56	0.148	-0.052025808	1
jun10mv	27.3%	28.3%	27.3%	26.7%	27.7%	26.7%	25.8%	21.7%	19.1%	22.1%	-0.003	0.75	24.00	0.001	0.242343084	1
dec10mv	6.5%	4.8%	8.5%	7.1%	5.5%	5.2%	5.7%	4.1%	4.8%	1.5%	-0.004	0.43	7.61	0.025	0.053695721	1
jun11mv	-18.1%	-10.0%	-9.5%	-5.1%	-3.1%	0.2%	-3.2%	-6.4%	-8.2%	-10.4%	0.006	0.15	1.37	0.275	-0.064341283	
dec11mv	20.7%	9.4%	10.7%	6.7%	8.1%	7.1%	5.4%	6.3%	8.2%	4.0%	-0.011	0.54	9.26	0.016	0.065815277	1
jun12mv	6.8%	5.3%	6.6%	3.3%	3.3%	6.4%	8.1%	6.4%	8.5%	14.5%	0.005	0.32	3.71	0.090	0.078143867	
dec12mv																
average	12.3%	8.2%	7.7%	6.5%	7.5%	7.2%	7.3%	7.3%	7.7%	9.5%	-0.002	0.10	0.91	0.368		53.7%
																55.0%

Figure 8: Momentum-Portfolios in relation to benchmark returns

	MOM	If market up													If market down													
		1	2	3	4	5	6	7	8	9	10				1	2	3	4	5	6	7	8	9	10			
	S&P500											slope	Rsquare	F-stat	Pvalue											slope	Rsquare	F-stat	Pvalue
dec91mv	-0.006														33.6%	9.5%	12.0%	3.1%	12.1%	9.8%	4.7%	4.1%	2.8%	3.1%	-0.022	0.51	8.19	0.02
jun92mv	0.089	21.1%	21.4%	15.1%	14.3%	16.2%	17.8%	12.5%	19.0%	13.4%	19.5%	-0.3%	0.10	0.90	0.371													
dec92mv	0.053	37.8%	13.0%	11.9%	11.1%	11.3%	13.2%	8.3%	10.0%	15.6%	15.0%	-1.2%	0.20	1.96	0.199													
jun93mv	0.052	13.8%	9.6%	17.9%	10.1%	11.9%	8.3%	9.7%	12.3%	15.2%	12.5%	0.0%	0.00	0.01	0.924													
dec93mv	-0.039														-1.8%	0.1%	-4.4%	-1.0%	-2.3%	-3.0%	0.0%	1.4%	-6.0%	-5.6%	-0.003	0.11	1.01	0.34
jun94mv	0.039	-2.5%	3.7%	3.6%	0.1%	3.3%	0.4%	-0.5%	0.0%	2.8%	14.1%	0.7%	0.23	2.43	0.158													
dec94mv	0.181	43.3%	15.5%	28.3%	15.6%	12.9%	10.7%	19.9%	16.3%	17.2%	42.1%	-0.3%	0.01	0.04	0.840													
jun95mv	0.143	16.1%	8.4%	9.9%	12.2%	10.4%	10.1%	11.4%	13.8%	21.2%	2.0%	-0.1%	0.01	0.05	0.831													
dec95mv	0.099	23.2%	16.5%	14.6%	11.0%	7.5%	8.7%	7.9%	10.8%	10.8%	12.8%	-1.0%	0.38	4.96	0.057													
jun96mv	0.105	5.8%	8.8%	12.2%	7.9%	7.8%	12.0%	10.3%	14.0%	11.5%	8.6%	0.4%	0.22	2.25	0.172													
dec96mv	0.185	16.7%	15.3%	13.7%	10.4%	12.2%	17.4%	17.4%	19.2%	13.0%	19.7%	0.4%	0.15	1.40	0.271													
jun97mv	0.116	14.9%	17.4%	13.8%	18.4%	18.3%	15.0%	18.1%	15.8%	17.3%	17.6%	0.2%	0.11	1.02	0.343													
dec97mv	0.144	4.6%	11.0%	3.6%	5.1%	1.5%	5.0%	14.0%	9.8%	13.3%	12.2%	0.9%	0.35	4.28	0.072													
jun98mv	0.041	-7.0%	-8.7%	-4.6%	-3.6%	-0.7%	-3.6%	0.2%	-5.1%	-5.1%	0.4%	0.6%	0.36	4.41	0.069													
dec98mv	0.095	30.6%	11.8%	10.5%	4.8%	4.3%	9.9%	6.7%	3.0%	1.0%	13.0%	-1.6%	0.32	3.81	0.087													
jun99mv	0.008	10.3%	-4.1%	-3.4%	-10.5%	18.1%	-3.5%	-0.7%	0.9%	15.0%	36.2%	2.4%	0.27	2.90	0.127													
dec99mv	0.001	2.8%	0.8%	1.2%	4.8%	2.3%	6.1%	1.8%	5.9%	8.7%	34.2%	2.2%	0.43	6.11	0.039													
jun00mv	0.035	5.1%	5.5%	9.5%	14.2%	18.7%	19.6%	12.6%	14.2%	11.5%	11.6%	-0.5%	0.03	0.28	0.614													
dec00mv	-0.046														45.2%	18.8%	15.3%	22.0%	13.9%	12.3%	10.6%	6.3%	6.7%	4.5%	-0.032	0.68	17.24	0.00
jun01mv	-0.040														0.5%	2.4%	0.2%	-1.7%	3.3%	3.4%	5.3%	9.7%	-2.2%	6.2%	0.005	0.19	1.91	0.20
dec01mv	-0.088														-0.2%	19.0%	7.1%	5.3%	5.3%	5.5%	9.5%	12.6%	11.9%	11.9%	0.006	0.11	1.03	0.34
jun02mv	-0.103														-12.2%	-11.9%	-10.0%	-10.5%	-7.9%	-6.9%	-8.9%	-10.0%	-9.4%	-10.2%	0.003	0.22	2.28	0.17
dec02mv	0.119	38.5%	22.6%	12.4%	17.3%	11.5%	15.1%	8.9%	15.1%	15.3%	23.1%	-1.2%	0.18	1.79	0.218													
jun03mv	0.154	40.8%	23.0%	23.3%	19.2%	21.3%	18.3%	22.0%	23.4%	35.0%	37.9%	0.4%	0.02	0.17	0.692													
dec03mv	0.043	4.2%	5.3%	8.8%	5.8%	5.5%	9.5%	8.5%	6.4%	7.2%	16.1%	0.7%	0.42	5.79	0.043													
jun04mv	0.092	9.0%	25.6%	10.5%	11.7%	12.8%	13.3%	16.0%	16.1%	15.6%	14.3%	0.1%	0.01	0.05	0.837													
dec04mv	0.014	0.5%	-2.6%	3.8%	0.8%	0.8%	1.0%	3.4%	1.6%	7.0%	3.8%	0.6%	0.44	6.19	0.038													
jun05mv	0.069	8.9%	7.7%	11.1%	4.8%	7.5%	4.9%	5.3%	6.7%	7.9%	9.5%	-0.1%	0.02	0.18	0.684													
dec05mv	0.049	1.8%	7.2%	5.3%	6.2%	4.9%	9.5%	6.2%	5.1%	13.6%	11.8%	0.8%	0.52	8.60	0.019													
jun06mv	0.121	12.5%	14.2%	11.3%	10.4%	13.3%	14.9%	14.1%	9.6%	8.6%	7.7%	-0.5%	0.33	3.88	0.084													
dec06mv	0.085	16.6%	9.1%	9.7%	5.8%	9.0%	6.7%	4.0%	9.9%	7.5%	11.5%	-0.4%	0.11	1.02	0.343													
jun07mv	-0.017														-14.2%	-11.7%	-10.4%	-5.3%	-6.4%	-2.9%	-2.7%	-3.6%	-2.3%	-0.2%	0.014	0.88	60.04	0.00
dec07mv	-0.093														-14.2%	-10.1%	-8.8%	-11.1%	-10.2%	-6.0%	-4.5%	-5.7%	-5.2%	-6.8%	0.009	0.68	16.94	0.00
jun08mv	-0.315														-35.7%	-33.8%	-27.7%	-23.9%	-20.7%	-22.8%	-22.1%	-22.0%	-25.2%	-42.9%	0.002	0.00	0.04	0.85
dec08mv	0.040	60.5%	30.7%	23.0%	17.9%	11.6%	5.2%	11.5%	-1.8%	-5.9%	-16.4%	-6.7%	0.87	54.02	0.000													
jun09mv	0.233	39.8%	37.2%	21.3%	24.4%	24.7%	24.0%	28.2%	29.8%	25.5%	39.7%	-0.2%	0.01	0.05	0.828													
dec09mv	-0.052														4.2%	-2.3%	6.1%	2.1%	0.2%	-0.2%	-4.2%	0.6%	-1.4%	-0.3%	-0.005	0.24	2.56	0.15
jun10mv	0.242	27.9%	28.9%	27.9%	26.7%	27.7%	26.7%	25.8%	21.7%	19.1%	22.1%	-0.9%	0.75	24.00	0.001													
dec10mv	0.060	6.5%	4.8%	8.5%	7.1%	5.5%	5.2%	5.7%	4.1%	4.8%	1.5%	-0.4%	0.49	7.61	0.025													
jun11mv	-0.065														-18.1%	-10.0%	-9.5%	-5.1%	-3.1%	0.2%	-3.2%	-6.4%	-8.2%	-10.4%	0.006	0.15	1.37	0.27
dec11mv	0.070	20.7%	9.4%	10.7%	6.7%	8.1%	7.1%	5.4%	6.3%	8.2%	4.0%	-1.1%	0.54	9.26	0.016													
jun12mv	0.080	6.8%	5.9%	6.6%	9.3%	9.9%	6.4%	8.1%	6.4%	8.5%	14.5%	0.5%	0.32	3.71	0.090													
	Average	17.1%	12.1%	11.3%	9.7%	10.6%	10.2%	10.4%	10.3%	11.6%	14.5%	-0.2%	0.06	0.49	0.503	-1.2%	-2.7%	-2.7%	-2.3%	-1.4%	-1.0%	-1.4%	-1.2%	-3.5%	-4.6%	-0.002	0.15	1.40	0.27

Figure 9: Volatility-Portfolios

6-month returns based on portfolios sorted by volatility over the preceeding 6 months, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.																	
	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	S&P	No of success	
Vol																	
dec91mv	7.8%	10.6%	5.7%	10.8%	6.5%	2.8%	11.3%	3.3%	6.3%	28.3%	0.009	0.14	1.27	0.292	-0.006373333		-20.6%
jun92mv	8.8%	7.3%	11.8%	13.1%	14.3%	11.3%	16.0%	30.6%	24.3%	29.4%	0.025	0.82	35.48	0.000	0.089074546		-20.6%
dec92mv	10.0%	3.1%	3.1%	13.5%	11.1%	3.5%	22.3%	20.8%	16.3%	24.6%	0.016	0.67	15.93	0.004	0.052926087		-14.6%
jun93mv	3.1%	6.3%	10.5%	8.8%	12.1%	14.7%	13.3%	14.3%	24.6%	12.3%	0.015	0.65	14.85	0.005	0.051823723		-3.8%
dec93mv	-5.5%	-3.4%	-2.0%	-0.6%	-0.2%	2.0%	-4.6%	-4.1%	-1.3%	-3.2%	0.001	0.02	0.13	0.731	-0.003608779		-2.3%
jun94mv	-0.8%	2.9%	0.2%	2.2%	-2.0%	3.8%	1.3%	3.1%	5.8%	9.1%	0.008	0.52	8.55	0.019	0.039249231		-9.3%
dec94mv	13.3%	14.3%	11.6%	18.0%	17.0%	23.0%	17.0%	17.6%	24.3%	67.7%	0.036	0.44	6.26	0.037	0.181239826		-54.4%
jun95mv	10.7%	14.2%	12.7%	10.4%	9.6%	13.1%	15.6%	12.7%	5.7%	10.4%	-0.003	0.06	0.67	0.438	0.143234684	1	0.3%
dec95mv	5.5%	3.3%	7.0%	12.1%	8.5%	3.7%	13.7%	12.6%	8.9%	3.2%	0.016	0.70	18.56	0.003	0.09861628		-14.6%
jun96mv	15.0%	11.2%	11.3%	10.6%	9.3%	10.8%	12.6%	8.9%	3.2%	5.1%	-0.009	0.64	13.34	0.006	0.104544592	1	9.3%
dec96mv	3.6%	16.2%	15.0%	20.5%	14.7%	14.7%	22.3%	14.5%	16.8%	3.8%	0.001	0.00	0.02	0.888	0.18157191		-0.2%
jun97mv	16.9%	19.0%	16.0%	16.5%	16.5%	14.5%	13.7%	23.0%	15.6%	14.4%	-0.001	0.02	0.17	0.684	0.116438906	1	2.4%
dec97mv	3.3%	5.3%	7.3%	5.8%	7.4%	3.5%	7.6%	12.5%	14.1%	6.2%	0.007	0.42	5.88	0.042	0.144074806		-2.3%
jun98mv	-1.1%	-4.3%	-4.6%	-1.8%	-2.4%	-6.3%	-1.2%	-10.4%	-1.0%	-4.6%	-0.002	0.06	0.47	0.511	0.04132145	1	3.4%
dec98mv	-1.7%	1.3%	7.7%	3.3%	5.4%	4.3%	12.3%	8.7%	22.3%	29.3%	0.028	0.76	24.68	0.001	0.034658583		-31.0%
jun99mv	-6.3%	-4.3%	-6.3%	-9.5%	2.3%	-8.1%	3.7%	5.0%	21.7%	47.2%	0.049	0.66	15.27	0.004	0.008343123		-53.5%
dec99mv	4.8%	0.8%	-1.3%	1.2%	6.7%	-2.2%	6.3%	12.3%	12.8%	27.3%	0.022	0.56	10.27	0.013	0.001413354		-22.6%
jan00mv	9.2%	8.3%	9.5%	21.6%	12.0%	24.2%	16.6%	16.7%	0.2%	-19.3%	-0.017	0.17	1.66	0.231	0.035393345	1	29.1%
dec00mv	12.2%	13.5%	12.4%	14.8%	11.5%	15.0%	13.8%	14.5%	21.0%	24.0%	0.011	0.66	15.44	0.004	-0.046336101		-11.8%
jan01mv	2.4%	0.3%	2.4%	5.3%	4.4%	7.2%	4.7%	3.4%	3.9%	-8.0%	-0.004	0.03	0.74	0.414	-0.040215615	1	10.4%
dec01mv	6.0%	10.8%	11.7%	8.6%	9.6%	2.7%	11.1%	10.2%	14.2%	3.8%	0.000	0.00	0.00	0.967	-0.008169387	1	2.2%
jan02mv	-4.4%	-8.0%	-6.7%	-8.6%	-8.4%	-10.4%	-11.2%	-16.5%	-13.5%	-10.8%	-0.009	0.67	16.45	0.004	-0.103120696	1	6.3%
dec02mv	12.6%	12.0%	9.5%	8.1%	16.0%	14.1%	27.6%	17.6%	24.3%	38.7%	0.025	0.65	14.86	0.005	0.186643908		-26.1%
jan03mv	11.2%	13.6%	20.8%	25.3%	25.1%	24.3%	23.0%	30.6%	37.1%	41.4%	0.028	0.32	34.36	0.000	0.154363004		-30.2%
dec03mv	6.5%	4.6%	5.8%	6.0%	3.6%	7.3%	6.8%	6.3%	11.8%	11.0%	0.006	0.56	10.36	0.012	0.042647543		-4.5%
jan04mv	11.1%	14.7%	15.7%	11.7%	15.1%	10.6%	12.6%	16.3%	14.7%	22.4%	0.006	0.32	3.68	0.091	0.092256604		-11.3%
dec04mv	2.6%	1.3%	1.6%	2.2%	1.4%	1.6%	2.6%	6.8%	2.3%	-3.3%	-0.001	0.02	0.15	0.706	0.014463016	1	5.3%
jan05mv	1.1%	3.7%	6.6%	4.2%	7.5%	6.0%	6.3%	16.0%	8.2%	15.7%	0.013	0.66	15.73	0.004	0.063172863		-14.6%
dec05mv	3.3%	7.7%	8.5%	5.6%	8.2%	7.1%	4.8%	10.3%	11.3%	5.0%	0.003	0.11	1.00	0.347	0.043168777		-1.7%
jan06mv	12.7%	12.7%	10.7%	14.2%	11.4%	13.3%	10.3%	12.2%	10.3%	7.3%	-0.004	0.32	3.85	0.085	0.121005533	1	5.4%
dec06mv	2.8%	2.3%	5.3%	5.0%	7.2%	10.2%	3.7%	11.7%	16.7%	16.7%	0.016	0.34	117.41	0.000	0.084175823		-13.8%
jan07mv	-4.6%	-1.3%	-8.7%	-7.0%	-4.2%	-4.6%	-10.4%	-4.3%	-7.2%	-7.3%	-0.004	0.16	1.55	0.248	-0.016797368	1	3.2%
dec07mv	-4.1%	-3.5%	-3.3%	-3.0%	-5.8%	-11.7%	-11.3%	-8.7%	-4.5%	-13.8%	-0.005	0.16	1.57	0.246	-0.032765037	1	9.7%
jan08mv	-12.4%	-25.3%	-23.2%	-21.1%	-30.8%	-31.3%	-26.3%	-30.4%	-34.9%	-34.8%	-0.018	0.70	13.10	0.002	-0.314674083	1	22.5%
dec08mv	1.2%	1.6%	2.3%	3.0%	4.3%	7.3%	25.6%	23.3%	21.3%	40.0%	0.038	0.76	25.26	0.001	0.039519739		-38.8%
jan09mv	16.2%	18.2%	16.2%	26.2%	19.6%	23.3%	23.2%	34.5%	49.4%	66.6%	0.047	0.75	24.43	0.001	0.232610183		-50.4%
dec09mv	0.8%	-0.8%	-0.3%	0.2%	-0.2%	-1.7%	1.1%	-1.0%	6.3%	0.3%	0.003	0.17	1.66	0.233	-0.052025808		0.0%
jan10mv	13.6%	19.2%	17.4%	22.5%	30.5%	28.1%	25.5%	31.8%	33.8%	31.7%	0.021	0.82	37.47	0.000	0.242543084		-18.2%
dec10mv	6.0%	7.6%	7.0%	10.8%	8.1%	3.0%	7.6%	2.3%	4.3%	-2.4%	-0.008	0.45	6.59	0.033	0.059395721	1	8.5%
jan11mv	1.6%	1.5%	-4.2%	-5.3%	-3.4%	-9.2%	-11.7%	-14.0%	-11.2%	-12.4%	-0.017	0.85	46.13	0.000	-0.064341283	1	14.0%
dec11mv	6.7%	8.6%	8.7%	4.3%	7.6%	8.3%	8.6%	8.4%	18.5%	6.5%	0.005	0.16	1.50	0.255	0.065819277	1	0.1%
jan12mv	3.6%	5.6%	5.5%	5.1%	7.4%	12.8%	12.1%	9.5%	11.1%	9.2%	0.008	0.53	11.64	0.003	0.079743667		-5.6%
dec12mv																	0.0%
average	5.0%	6.1%	5.6%	6.3%	7.0%	6.3%	3.4%	3.4%	11.8%	13.4%	0.009	0.86	60.87	0.000		33.0%	-8.3%
																40.0%	0.0%

Figure 10: Volatility-Portfolios in relation to benchmark returns

	VOL	If market up													If market down													
		1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue
	S&P500															7.8%	10.6%	5.7%	10.8%	6.5%	2.8%	11.9%	3.3%	6.8%	28.3%	0.009	0.14	1.27	0.29
dec91mv	-0.006																												
jun92mv	0.089	8.8%	7.3%	11.8%	13.1%	14.9%	11.9%	18.0%	30.6%	24.5%	29.4%	2.5%	0.82	35.48	0.000														
dec92mv	0.053	10.0%	9.1%	13.5%	13.5%	11.1%	9.5%	22.9%	20.8%	16.9%	24.6%	1.6%	0.67	15.93	0.004														
jun93mv	0.052	3.1%	6.9%	10.5%	8.8%	12.1%	14.7%	13.9%	14.9%	24.6%	12.9%	1.5%	0.65	14.85	0.005														
dec93mv	-0.039															-5.5%	-3.4%	-2.0%	-0.6%	-0.2%	2.0%	-4.6%	-4.1%	-1.3%	-3.2%	0.001	0.02	0.13	0.73
jun94mv	0.039	-0.8%	2.9%	0.2%	2.2%	-2.0%	3.8%	1.3%	3.1%	5.8%	9.1%	0.8%	0.52	8.55	0.019														
dec94mv	0.181	13.3%	14.3%	11.6%	18.0%	17.0%	23.0%	17.0%	17.6%	24.3%	67.7%	3.6%	0.44	6.26	0.037														
jun95mv	0.143	10.7%	14.2%	12.7%	10.4%	9.8%	13.1%	15.8%	12.7%	5.7%	10.4%	-0.3%	0.08	0.67	0.438														
dec95mv	0.099	5.5%	9.9%	7.0%	12.1%	8.5%	9.7%	13.7%	12.8%	24.6%	20.2%	1.6%	0.70	18.56	0.003														
jun96mv	0.105	15.0%	11.2%	11.9%	10.6%	9.3%	10.8%	12.8%	8.9%	3.2%	5.1%	-0.3%	0.64	13.94	0.006														
dec96mv	0.185	9.6%	16.2%	15.0%	20.5%	14.7%	14.7%	22.9%	14.5%	16.8%	9.8%	0.1%	0.00	0.02	0.888														
jun97mv	0.116	16.9%	19.0%	16.0%	16.5%	16.5%	14.5%	13.7%	23.0%	15.6%	14.4%	-0.1%	0.02	0.17	0.694														
dec97mv	0.144	3.3%	5.9%	7.3%	5.8%	7.4%	9.5%	7.6%	12.5%	14.1%	6.2%	0.7%	0.42	5.88	0.042														
jun98mv	0.041	-1.1%	-4.3%	-4.6%	-1.8%	-2.4%	-6.3%	-1.2%	-10.4%	-1.0%	-4.6%	-0.2%	0.06	0.47	0.511														
dec98mv	0.095	-1.7%	1.9%	7.7%	3.3%	5.4%	4.9%	12.9%	8.7%	22.3%	29.3%	2.8%	0.76	24.68	0.001														
jun99mv	0.008	-6.3%	-4.9%	-6.3%	-9.5%	2.9%	-8.1%	9.7%	5.0%	27.7%	47.2%	4.9%	0.66	15.27	0.004														
dec99mv	0.001	4.8%	0.8%	-1.3%	1.2%	6.7%	-2.2%	6.3%	12.3%	12.8%	27.3%	2.2%	0.56	10.27	0.013														
jun00mv	0.035	9.2%	8.3%	9.5%	21.6%	12.0%	24.2%	16.6%	16.7%	0.2%	-19.9%	-1.7%	0.17	1.68	0.231														
dec00mv	-0.046															12.2%	13.5%	12.4%	14.8%	11.5%	15.0%	19.8%	14.5%	21.0%	24.0%	0.011	0.66	15.44	0.00
jun01mv	-0.040															2.4%	0.3%	2.4%	5.3%	4.4%	7.2%	4.7%	3.4%	3.9%	-8.0%	-0.004	0.09	0.74	0.41
dec01mv	-0.088															6.0%	10.8%	11.7%	8.6%	9.6%	2.7%	11.1%	10.2%	14.2%	3.8%	0.000	0.00	0.00	0.97
jun02mv	-0.103															-4.4%	-8.0%	-6.7%	-9.6%	-8.4%	-10.4%	-11.2%	-16.5%	-13.5%	-10.8%	-0.009	0.67	16.45	0.00
dec02mv	0.119	12.6%	12.0%	9.5%	8.1%	16.0%	14.1%	27.6%	17.6%	24.3%	38.7%	2.5%	0.65	14.86	0.005														
jun03mv	0.154	11.2%	19.6%	20.8%	25.3%	25.1%	24.9%	29.0%	30.6%	37.1%	41.4%	2.8%	0.92	94.98	0.000														
dec03mv	0.043	6.5%	4.6%	5.8%	6.0%	9.6%	7.9%	6.8%	6.9%	11.8%	11.0%	0.6%	0.56	10.36	0.012														
jun04mv	0.092	11.1%	14.7%	15.7%	11.7%	15.1%	10.6%	12.8%	16.9%	14.7%	22.4%	0.6%	0.32	3.68	0.091														
dec04mv	0.014	2.6%	1.9%	1.6%	2.2%	1.4%	1.6%	2.6%	6.8%	2.9%	-3.3%	-0.1%	0.02	0.15	0.706														
jun05mv	0.069	1.1%	3.7%	6.8%	4.2%	7.5%	6.0%	6.3%	16.0%	8.2%	15.7%	1.3%	0.66	15.73	0.004														
dec05mv	0.049	3.3%	7.7%	8.5%	5.6%	8.2%	7.1%	4.8%	10.3%	11.3%	5.0%	0.3%	0.11	1.00	0.347														
jun06mv	0.121	12.7%	12.7%	10.7%	14.2%	11.4%	13.9%	10.9%	12.2%	10.9%	7.3%	-0.4%	0.32	3.85	0.085														
dec06mv	0.085	2.8%	2.9%	5.9%	5.0%	7.2%	10.2%	9.7%	11.7%	16.7%	16.7%	1.6%	0.94	117.41	0.000														
jun07mv	-0.017															-4.6%	-1.3%	-8.7%	-7.0%	-4.2%	-4.6%	-10.4%	-4.3%	-7.2%	-7.9%	-0.004	0.16	1.55	0.25
dec07mv	-0.093															-4.1%	-9.5%	-9.3%	-3.0%	-5.8%	-11.7%	-11.3%	-8.7%	-4.5%	-13.8%	-0.005	0.16	1.57	0.25
jun08mv	-0.315															-12.4%	-25.3%	-23.2%	-27.1%	-30.8%	-31.3%	-26.3%	-30.4%	-34.9%	-34.8%	-0.018	0.70	19.10	0.00
dec08mv	0.040	1.2%	7.6%	2.3%	3.0%	4.3%	7.3%	25.6%	23.9%	21.9%	40.0%	3.8%	0.76	25.26	0.001														
jun09mv	0.233	16.2%	18.2%	16.2%	26.2%	19.6%	23.3%	29.2%	34.5%	49.4%	66.6%	4.7%	0.75	24.43	0.001														
dec09mv	-0.052															0.8%	-0.8%	-0.9%	0.2%	-0.2%	-1.7%	1.1%	-1.0%	6.3%	0.9%	0.003	0.17	1.66	0.23
jun10mv	0.242	13.6%	19.2%	17.4%	22.5%	30.5%	28.1%	25.5%	31.8%	33.8%	31.7%	2.1%	0.82	37.47	0.000														
dec10mv	0.060	6.0%	7.8%	7.0%	10.8%	8.1%	3.0%	7.8%	2.3%	4.3%	-2.4%	-0.8%	0.45	6.59	0.033														
jun11mv	-0.065															1.6%	1.5%	-4.2%	-5.3%	-9.4%	-9.2%	-11.7%	-14.0%	-11.2%	-12.4%	-0.017	0.85	46.13	0.00
dec11mv	0.070	6.7%	8.6%	8.7%	4.3%	7.6%	8.9%	8.6%	8.4%	18.5%	6.5%	0.5%	0.16	1.50	0.255														
jun12mv	0.080	3.6%	5.6%	5.5%	5.1%	7.4%	12.8%	12.1%	9.5%	11.1%	9.2%	0.8%	0.59	11.64	0.009														
	Average	6.8%	8.6%	8.4%	9.7%	10.4%	10.6%	13.6%	14.3%	16.6%	19.2%	1.3%	0.93	109.34	0.000	0.0%	-1.0%	-2.1%	-1.1%	-2.5%	-3.6%	-2.4%	-4.3%	-1.8%	-3.1%	-0.003	0.51	8.20	0.02

Figure 11: Beta-Portfolios

6-month returns based on portfolios sorted by beta over the preceeding 6 months, small to large from Dec. 91 to June 2012. Returns are for the following 6 months.																				
	1	2	3	4	5	6	7	8	9	10	slope	Rsquare	F-stat	Pvalue	S&P	No of success				
Beta																				
dec91mv	23.3%	9.6%	9.6%	9.5%	8.3%	11.1%	11.6%	3.6%	3.6%	4.5%	-0.014	0.56	10.05	0.013	-0.0063733333	1	18.8%			
jun92mv	16.1%	6.1%	17.1%	13.1%	20.6%	12.8%	18.3%	15.2%	15.4%	35.6%	0.014	0.33	3.39	0.081	0.083074546		-19.6%			
dec92mv	24.3%	26.8%	18.0%	19.3%	9.6%	6.8%	2.3%	15.3%	6.3%	17.4%	-0.017	0.33	5.11	0.054	0.052836087	1	6.3%			
jun93mv	8.5%	4.6%	12.2%	11.6%	13.5%	13.8%	15.0%	11.4%	17.8%	12.8%	0.008	0.43	7.71	0.024	0.051823723		-4.3%			
dec93mv	3.2%	-0.8%	-4.0%	-4.1%	2.3%	-5.6%	-3.4%	-1.0%	-2.3%	-7.1%	-0.006	0.28	3.12	0.115	-0.038608779	1	10.3%			
jun94mv	0.1%	1.1%	-0.5%	-0.3%	0.8%	4.2%	5.0%	5.5%	2.5%	8.3%	0.008	0.66	15.54	0.004	0.035243231		-8.2%			
dec94mv	45.3%	11.8%	13.6%	13.2%	14.3%	24.7%	16.4%	25.8%	32.2%	26.3%	0.003	0.01	0.06	0.807	0.181293626	1	13.1%			
jun95mv	3.6%	12.8%	10.0%	13.2%	11.8%	13.4%	11.2%	17.4%	10.0%	6.6%	-0.001	0.01	0.06	0.808	0.143234684	1	3.0%			
dec95mv	16.0%	3.1%	10.7%	10.7%	12.0%	8.5%	15.2%	16.0%	13.3%	12.6%	0.002	0.05	0.46	0.515	0.03861628	1	3.5%			
jun96mv	5.1%	10.4%	8.5%	7.7%	16.4%	13.3%	9.8%	8.0%	8.1%	11.4%	0.002	0.05	0.46	0.518	0.104544532		-6.2%			
dec96mv	12.7%	16.5%	16.6%	12.4%	14.5%	16.7%	15.6%	20.6%	16.3%	11.7%	0.001	0.02	0.19	0.677	0.18515191	1	0.3%			
jun97mv	22.4%	18.1%	16.5%	17.1%	16.1%	16.3%	12.8%	13.3%	13.3%	14.1%	-0.006	0.36	4.55	0.066	0.116438306	1	8.4%			
dec97mv	6.3%	2.8%	7.6%	10.8%	8.3%	9.8%	9.3%	9.3%	4.3%	9.0%	0.003	0.12	1.11	0.323	0.144074606		-2.7%			
jun98mv	-9.2%	-8.2%	-6.1%	-2.1%	-3.1%	2.7%	-1.9%	-0.3%	-0.1%	-8.6%	0.006	0.19	1.82	0.214	0.04132145		-0.6%			
dec98mv	2.2%	5.2%	1.7%	3.4%	7.5%	7.3%	8.0%	18.6%	13.2%	27.3%	0.023	0.74	22.26	0.002	0.034658563		-25.2%			
jun99mv	7.8%	-0.6%	3.3%	-4.6%	0.0%	5.3%	13.1%	1.7%	-1.0%	31.6%	0.016	0.21	2.13	0.183	0.008343123		-23.8%			
dec99mv	12.0%	7.3%	7.0%	0.2%	1.6%	2.3%	5.8%	1.9%	12.8%	16.0%	0.005	0.07	0.61	0.456	0.001413354		-6.0%			
jun00mv	-1.4%	8.5%	14.4%	14.5%	15.4%	12.1%	3.8%	12.7%	11.3%	6.1%	0.003	0.02	0.20	0.663	0.035393345		-7.5%			
dec00mv	27.0%	16.7%	13.1%	13.3%	10.0%	13.4%	14.8%	12.7%	11.8%	26.2%	-0.002	0.01	0.10	0.753	-0.046386101	1	0.8%			
jun01mv	6.8%	0.2%	1.3%	1.3%	3.2%	3.5%	5.2%	5.2%	1.5%	-1.2%	-0.002	0.05	0.44	0.527	-0.040215615	1	8.1%			
dec01mv	18.3%	13.3%	5.0%	9.2%	8.2%	9.2%	9.1%	12.7%	4.5%	-0.7%	-0.012	0.45	6.64	0.033	-0.088189387	1	18.3%			
jun02mv	-8.3%	-7.1%	-3.1%	-7.0%	-9.2%	-8.5%	-10.3%	-12.0%	-10.6%	-16.0%	-0.007	0.66	15.87	0.004	-0.103120696	1	7.7%			
dec02mv	16.1%	11.6%	10.7%	19.4%	15.3%	17.4%	15.0%	18.5%	20.1%	36.4%	0.016	0.48	7.40	0.026	0.118643908		-20.2%			
jun03mv	26.5%	22.0%	20.6%	23.0%	25.3%	22.7%	28.2%	23.0%	41.2%	31.6%	0.012	0.38	4.81	0.060	0.15436304		-5.1%			
dec03mv	12.3%	6.8%	5.4%	7.7%	7.0%	7.7%	9.8%	10.5%	7.5%	2.1%	-0.003	0.13	1.19	0.308	0.042647543	1	10.1%			
jun04mv	11.3%	13.4%	12.9%	26.4%	12.9%	21.9%	9.7%	14.7%	9.8%	12.4%	-0.003	0.03	0.21	0.658	0.092258604		-1.1%			
dec04mv	4.7%	3.7%	4.9%	1.4%	4.3%	1.2%	0.3%	-0.2%	-2.1%	2.1%	-0.006	0.56	10.11	0.013	0.014483016	1	2.5%			
jun05mv	6.4%	5.3%	4.7%	8.5%	7.5%	8.3%	7.6%	7.4%	6.5%	12.4%	0.004	0.33	5.21	0.052	0.063172663		-6.0%			
dec05mv	4.6%	8.0%	8.7%	5.3%	6.4%	9.7%	7.0%	9.5%	5.2%	7.0%	0.001	0.02	0.15	0.706	0.043198777		-2.4%			
jun06mv	3.3%	11.3%	13.7%	10.3%	10.6%	11.8%	10.6%	14.2%	9.6%	12.8%	0.001	0.02	0.18	0.682	0.121005539		-2.3%			
dec06mv	3.0%	2.3%	7.7%	10.6%	10.1%	10.5%	12.7%	8.1%	11.6%	10.3%	0.008	0.57	10.42	0.012	0.084715823		-7.8%			
jun07mv	-4.2%	-4.5%	-4.7%	-7.2%	-1.5%	-5.3%	-5.5%	-7.6%	-6.8%	-12.1%	-0.006	0.45	6.42	0.035	-0.016797368	1	8.0%			
dec07mv	-5.3%	-8.3%	-4.7%	-10.4%	-5.5%	-7.3%	-8.2%	-10.5%	-9.4%	-10.3%	-0.005	0.33	5.19	0.052	-0.092765037	1	5.6%			
jun08mv	-24.2%	-20.8%	-18.6%	-23.1%	-30.5%	-24.3%	-31.2%	-31.3%	-31.3%	-40.3%	-0.018	0.73	21.37	0.002	-0.314674083	1	16.0%			
dec08mv	15.9%	11.0%	7.6%	11.8%	10.8%	4.0%	4.7%	15.0%	23.1%	31.5%	0.014	0.26	2.76	0.135	0.035619193		-15.6%			
jun09mv	23.5%	17.6%	20.5%	22.3%	33.8%	35.3%	30.7%	45.3%	31.1%	37.7%	0.023	0.62	12.35	0.007	0.232610193		-14.2%			
dec09mv	0.3%	2.2%	5.8%	-0.4%	-2.4%	1.3%	1.8%	-3.3%	-0.1%	-0.8%	-0.004	0.23	2.34	0.165	-0.052025808	1	1.7%			
jun10mv	26.4%	20.3%	18.6%	25.5%	28.2%	26.8%	25.3%	25.2%	28.3%	28.1%	0.006	0.33	3.30	0.084	0.242343084		-1.8%			
dec10mv	2.1%	4.2%	4.2%	7.0%	6.0%	3.3%	3.4%	5.4%	6.7%	5.5%	0.003	0.16	1.51	0.254	0.059395721		-3.5%			
jun11mv	-9.5%	-3.6%	-4.0%	-4.2%	-7.3%	-6.0%	-7.7%	-6.4%	-3.8%	-15.8%	-0.008	0.44	6.27	0.037	-0.064941283	1	7.4%			
dec11mv	16.0%	3.8%	7.8%	3.5%	6.5%	5.3%	6.6%	7.5%	13.3%	4.4%	-0.006	0.21	2.16	0.160	0.063619277	1	11.6%			
jun12mv	5.1%	11.0%	5.5%	7.4%	7.3%	5.8%	10.8%	13.3%	6.3%	8.3%	0.002	0.07	0.57	0.470	0.075743867		-2.5%			
dec12mv																	0.0%			
average	9.3%	6.9%	7.0%	7.5%	7.8%	8.3%	7.6%	8.3%	8.4%	9.8%	0.001	0.22	2.21	0.175		46.8%	-0.4%			
																40.0%				

Figure 12: Beta-Portfolios in relation to benchmark returns

	BETA	If market up															If market down													
		1	2	3	4	5	6	7	8	9	10						1	2	3	4	5	6	7	8	9	10				
	S&P500											slope	Rsquare	F-stat	Pvalue													slope	Rsquare	F-stat	Pvalue
dec91mv	-0.006																23.3%	9.6%	9.6%	9.5%	8.3%	11.1%	11.6%	3.6%	3.6%	4.5%	-0.014	0.56	10.05	0.01
jun92mv	0.089	16.1%	6.1%	17.1%	13.1%	20.6%	12.8%	18.3%	15.2%	15.4%	35.6%	1.4%	0.33	3.99	0.081															
dec92mv	0.053	24.3%	26.8%	18.0%	19.9%	9.6%	6.8%	2.9%	15.3%	6.3%	17.4%	-1.7%	0.39	5.11	0.054															
jun93mv	0.052	8.5%	4.6%	12.2%	11.6%	13.5%	13.8%	15.0%	11.4%	17.8%	12.8%	0.8%	0.49	7.71	0.024															
dec93mv	-0.039																3.2%	-0.8%	-4.0%	-4.1%	2.3%	-5.6%	-3.4%	-1.0%	-2.3%	-7.1%	-0.006	0.28	3.12	0.12
jun94mv	0.039	0.1%	1.1%	-0.5%	-0.9%	0.8%	4.2%	5.0%	5.5%	2.5%	8.3%	0.8%	0.66	15.54	0.004															
dec94mv	0.181	45.9%	11.8%	13.6%	13.2%	14.3%	24.7%	16.4%	25.8%	32.2%	26.9%	0.3%	0.01	0.06	0.807															
jun95mv	0.143	9.6%	12.8%	10.0%	13.2%	11.8%	13.4%	11.2%	17.4%	10.0%	6.6%	-0.1%	0.01	0.06	0.808															
dec95mv	0.099	16.0%	9.1%	10.7%	10.7%	12.0%	8.5%	15.2%	16.0%	13.3%	12.6%	0.2%	0.05	0.46	0.515															
jun96mv	0.105	5.1%	10.4%	8.5%	7.7%	16.4%	13.3%	9.8%	8.0%	8.1%	11.4%	0.2%	0.05	0.46	0.518															
dec96mv	0.185	12.7%	16.5%	16.8%	12.4%	14.5%	16.7%	15.6%	20.6%	16.3%	11.7%	0.1%	0.02	0.19	0.677															
jun97mv	0.116	22.4%	18.1%	16.5%	17.1%	16.1%	16.3%	12.8%	13.9%	19.3%	14.1%	-0.6%	0.36	4.55	0.066															
dec97mv	0.144	6.3%	2.8%	7.6%	10.8%	8.9%	9.8%	9.9%	9.9%	4.9%	9.0%	0.3%	0.12	1.11	0.323															
jun98mv	0.041	-9.2%	-8.2%	-6.1%	-2.1%	-3.1%	2.7%	-1.9%	-0.9%	-0.1%	-8.6%	0.6%	0.19	1.82	0.214															
dec98mv	0.095	2.2%	5.2%	1.7%	3.4%	7.5%	7.3%	8.0%	18.6%	13.2%	27.3%	2.3%	0.74	22.26	0.002															
jun99mv	0.008	7.8%	-0.6%	3.9%	-4.6%	0.0%	5.9%	13.1%	1.7%	-1.0%	31.6%	1.6%	0.21	2.13	0.183															
dec99mv	0.001	12.0%	7.3%	7.0%	0.2%	1.6%	2.3%	5.8%	1.9%	12.8%	18.0%	0.5%	0.07	0.61	0.456															
jun00mv	0.035	-1.4%	8.5%	14.4%	14.5%	15.4%	12.1%	3.8%	12.7%	11.9%	6.1%	0.3%	0.02	0.20	0.669															
dec00mv	-0.046																27.0%	16.7%	13.1%	13.3%	10.0%	13.4%	14.8%	12.7%	11.8%	26.2%	-0.002	0.01	0.10	0.76
jun01mv	-0.040																6.8%	0.2%	1.3%	1.3%	3.2%	3.5%	5.2%	5.2%	1.5%	-1.2%	-0.002	0.05	0.44	0.53
dec01mv	-0.088																18.3%	13.3%	5.0%	9.2%	8.2%	9.2%	9.1%	12.7%	4.5%	-0.7%	-0.012	0.45	6.64	0.03
jun02mv	-0.103																-8.3%	-7.1%	-9.1%	-7.0%	-9.2%	-8.5%	-10.9%	-12.0%	-10.6%	-16.0%	-0.007	0.66	15.87	0.00
dec02mv	0.119	16.1%	11.6%	10.7%	19.4%	15.3%	17.4%	15.0%	18.5%	20.1%	36.4%	1.6%	0.48	7.40	0.026															
jun03mv	0.154	26.5%	22.0%	20.6%	23.0%	25.3%	22.7%	28.2%	23.0%	41.2%	31.6%	1.2%	0.38	4.81	0.060															
dec03mv	0.043	12.3%	6.9%	5.4%	7.7%	7.0%	7.7%	9.8%	10.5%	7.5%	2.1%	-0.3%	0.13	1.19	0.308															
jun04mv	0.092	11.3%	13.4%	12.9%	26.4%	12.9%	21.9%	9.7%	14.7%	9.8%	12.4%	-0.3%	0.03	0.21	0.658															
dec04mv	0.014	4.7%	3.7%	4.9%	1.4%	4.3%	1.2%	0.3%	-0.2%	-2.1%	2.1%	-0.6%	0.56	10.11	0.013															
jun05mv	0.069	6.4%	5.3%	4.7%	8.5%	7.5%	8.9%	7.6%	7.4%	6.5%	12.4%	0.4%	0.39	5.21	0.052															
dec05mv	0.049	4.6%	8.0%	8.7%	5.9%	6.4%	9.7%	7.0%	9.5%	5.2%	7.0%	0.1%	0.02	0.15	0.706															
jun06mv	0.121	9.9%	11.9%	13.7%	10.9%	10.6%	11.8%	10.6%	14.2%	9.6%	12.8%	0.1%	0.02	0.18	0.682															
dec06mv	0.085	3.0%	2.9%	7.7%	10.6%	10.1%	10.5%	12.7%	8.1%	11.6%	10.9%	0.8%	0.57	10.42	0.012															
jun07mv	-0.017																-4.2%	-4.5%	-4.7%	-7.2%	-1.5%	-5.9%	-5.5%	-7.6%	-6.8%	-12.1%	-0.006	0.45	6.42	0.04
dec07mv	-0.093																-5.3%	-8.9%	-4.7%	-10.4%	-5.5%	-7.9%	-8.2%	-10.5%	-9.4%	-10.9%	-0.005	0.39	5.19	0.05
jun08mv	-0.315																-24.2%	-20.8%	-18.8%	-23.1%	-30.5%	-24.3%	-31.2%	-31.3%	-31.9%	-40.3%	-0.018	0.73	21.37	0.00
dec08mv	0.040	15.9%	11.0%	7.8%	11.8%	10.8%	4.0%	4.7%	15.0%	23.1%	31.5%	1.4%	0.26	2.76	0.135															
jun09mv	0.233	23.5%	17.8%	20.5%	22.9%	33.8%	35.3%	30.7%	45.3%	31.1%	37.7%	2.3%	0.62	12.95	0.007															
dec09mv	-0.052																0.9%	2.2%	5.8%	-0.4%	-2.4%	1.3%	1.8%	-3.9%	-0.1%	-0.8%	-0.004	0.23	2.34	0.16
jun10mv	0.242	26.4%	20.9%	18.6%	25.5%	28.2%	26.8%	25.9%	25.2%	28.3%	28.1%	0.6%	0.33	3.90	0.084															
dec10mv	0.060	2.1%	4.2%	4.2%	7.0%	6.0%	9.9%	3.4%	5.4%	6.7%	5.5%	0.3%	0.16	1.51	0.254															
jun11mv	-0.065																-8.5%	-3.6%	-4.0%	-4.2%	-7.9%	-6.0%	-7.7%	-6.4%	-9.8%	-15.8%	-0.008	0.44	6.27	0.04
dec11mv	0.070	16.0%	9.8%	7.8%	9.5%	6.5%	5.3%	6.6%	7.5%	13.3%	4.4%	-0.6%	0.21	2.16	0.180															
jun12mv	0.080	5.7%	11.0%	5.5%	7.4%	7.3%	5.8%	10.8%	13.3%	6.3%	8.3%	0.2%	0.07	0.57	0.470															
	Average	11.7%	9.4%	9.8%	10.9%	11.4%	11.9%	11.1%	13.2%	12.9%	15.6%	0.5%	0.64	13.93	0.006		2.6%	-0.3%	-0.9%	-2.1%	-2.3%	-1.8%	-2.2%	-3.5%	-4.5%	-6.8%	-0.008	0.86	48.07	0.00

Figure 13: Combined Portfolio A: Size, P/E, P/B

Need to test each year for difference in means and overall average									
	Under 25% size, PE, PB			above 75, Size, PE,PB			Difference		
	No. of stocks	mean	stdev		mean	stdev	T-stat	p-value	No of success
dec91mv	62	0.28184	0.68557	65	-0.0339438	0.2071354	38.32	0.000000	1
jun92mv	57	0.27416	0.70794	54	0.1711033	0.2619427	10.24	0.000000	1
dec92mv	-			-					
jun93mv	28	0.08808	0.26411	36	0.1443587	0.2688718	-12.51	0.000000	
dec93mv	28	0.11677	0.28359	37	-0.0361247	0.1652811	42.35	0.000000	1
jun94mv	30	0.03042	0.29918	36	0.0467933	0.1352364	-4.69	0.000016	
dec94mv	30	0.14155	0.19744	41	0.1584192	0.2722083	-5.43	0.000001	
jun95mv	36	0.20970	0.35186	35	0.09589	0.2053735	24.51	0.000000	1
dec95mv	27	0.33583	0.44027	47	0.0936241	0.2347311	29.00	0.000000	1
jun96mv	23	0.22721	0.30941	49	0.0856086	0.1400585	31.04	0.000000	1
dec96mv	27	0.31820	0.33550	55	0.2035394	0.2309835	22.31	0.000000	1
jun97mv	34	0.31500	0.28745	58	0.1215932	0.2055301	61.23	0.000000	1
dec97mv	34	0.26893	0.52340	72	0.1612262	0.2561175	12.01	0.000000	1
jun98mv	40	-0.11597	0.17776	78	0.1010108	0.2947493	-113.97	0.000000	
dec98mv	47	0.10978	0.41728	78	0.10206	0.3114953	1.56	0.124127	1
jun99mv	47	-0.03648	0.26977	75	0.2065946	0.7318613	-27.97	0.000000	
dec99mv	45	0.07882	0.24883	79	0.0413209	0.3839543	11.57	0.000000	1
jun00mv	43	0.06652	0.49502	79	-0.0833873	0.3324763	21.12	0.000000	1
dec00mv	45	0.33854	0.39157	68	-0.135398	0.2155752	115.86	0.000000	1
jun01mv	46	0.10741	0.30648	62	-0.0357622	0.1777091	56.12	0.000000	1
dec01mv	35	0.54323	0.69089	48	-0.1525217	0.211094	47.76	0.000000	1
jun02mv	33	-0.06807	0.18813	42	-0.1128576	0.1876076	23.44	0.000000	1
dec02mv	23	0.32381	0.37939	39	0.0930663	0.1552888	33.56	0.000000	1
jun03mv	26	0.38464	0.34159	40	0.1495764	0.1573809	46.03	0.000000	1
dec03mv	15	0.11496	0.24548	29	0.0256118	0.1910489	16.93	0.000000	1
jun04mv	22	0.23962	0.45236	28	0.0354055	0.1688673	19.79	0.000000	1
dec04mv	20	-0.01427	0.15577	28	-0.0706936	0.2253787	18.64	0.000000	1
jun05mv	28	0.10303	0.25205	30	0.0945274	0.2050424	2.32	0.023944	1
dec05mv	24	0.15690	0.29001	31	0.0349007	0.213683	24.51	0.000000	1
jun06mv	22	0.20633	0.23694	28	0.0803682	0.1820056	33.73	0.000000	1
dec06mv	25	0.26240	0.58029	32	0.0632231	0.1626396	13.93	0.000000	1
jun07mv	18	-0.11859	0.13595	25	0.0349259	0.1969946	-59.52	0.000000	
dec07mv	21	-0.00392	0.28963	34	-0.0788136	0.2160971	13.95	0.000000	1
jun08mv	20	-0.22111	0.30427	31	-0.3344618	0.2343358	17.71	0.000000	1
dec08mv	14	0.28071	0.37628	21	0.0327694	0.1525715	22.09	0.000000	1
jun09mv	16	0.19172	0.34521	26	0.1644101	0.1193364	3.42	0.001146	1
dec09mv	20	0.20508	0.38564	21	-0.0726623	0.1244332	33.98	0.000000	1
jun10mv	17	0.23860	0.26390	17	0.2728899	0.2006931	-5.30	0.000002	
dec10mv	23	0.06813	0.18042	18	0.0628886	0.1357044	2.15	0.035465	1
jun11mv	29	-0.01137	0.26730	22	-0.03469	0.1708898	6.15	0.000000	1
dec11mv	27	0.46025	1.59421	22	0.1416697	0.1714429	3.34	0.001457	1
jun12mv	24	0.32055	0.57894	26	0.0311687	0.1108913	20.04	0.000000	1
Average	29	16.6%	37.9%	41	4.6%	21.8%	20.00	0.000000	82.9%

Figure 14: Combined Portfolio B: Size, P/E

Need to test each year for difference in means and overall average									
	Under 20, size,pe			Over 80, size, pe			Difference		
		mean	stdev		mean	stdev	T-stat	p-value	No of success
dec91mv	74	0.35158	0.7141121	60	0.0173413	0.2362945	42.731233	1.24859E-46	1
jun92mv	66	0.3736322	0.7882028	53	0.0878163	0.2240316	27.588224	8.69915E-36	1
dec92mv	0			0					
jun93mv	42	0.0959199	0.2156157	47	0.1182848	0.2367226	-9.7272426	6.02546E-14	
dec93mv	43	0.0937341	0.267339	46	0.0148363	0.1865987	32.615406	7.02832E-40	1
jun94mv	39	0.0582492	0.3390646	49	0.034023	0.1075694	7.6088334	2.28162E-10	1
dec94mv	34	0.1508142	0.2183949	43	0.1421396	0.2028067	3.6766632	0.000506501	1
jun95mv	38	0.185229	0.3347569	43	0.0951571	0.1744798	24.630085	4.55638E-33	1
dec95mv	36	0.3225216	0.4414808	48	0.101097	0.1982321	35.526261	5.33662E-42	1
jun96mv	38	0.2285027	0.3510208	45	0.0873496	0.1388848	38.449183	5.65432E-44	1
dec96mv	44	0.2879564	0.3023975	47	0.2285612	0.2263599	18.745709	9.13389E-27	1
jun97mv	48	0.2738761	0.2728539	59	0.0915477	0.2289927	74.730917	6.43559E-61	1
dec97mv	51	0.2196294	0.4571695	70	0.1366523	0.2295209	17.106252	9.44753E-25	1
jun98mv	52	-0.1623031	0.1815351	82	0.0996841	0.3097114	-145.26439	3.88728E-78	
dec98mv	57	0.1309478	0.4728099	71	0.1140515	0.2772224	3.3763372	0.001293655	1
jun99mv	55	-0.0054895	0.273231	69	0.2748241	0.8644858	-22.998547	1.88866E-31	
dec99mv	57	0.1020418	0.2398309	72	0.0548974	0.3706607	16.160374	1.57527E-23	1
jun00mv	54	0.0090189	0.4421549	77	-0.0556357	0.3160801	13.146859	2.54787E-19	1
dec00mv	52	0.3783887	0.4119532	71	-0.1027587	0.2563933	114.84744	4.89929E-72	1
jun01mv	52	0.1379199	0.3636676	70	-0.0677427	0.198426	66.218504	8.3679E-58	1
dec01mv	41	0.4614574	0.6725903	60	-0.103104	0.2300593	47.379533	3.03405E-49	1
jun02mv	43	-0.0382651	0.194606	59	-0.1173433	0.1872444	53.613145	2.16018E-52	1
dec02mv	35	0.370834	0.3883083	53	0.1335371	0.1882276	47.682736	2.08944E-49	1
jun03mv	35	0.4169117	0.3281131	51	0.1987713	0.1784287	58.953656	8.04525E-55	1
dec03mv	24	0.1300022	0.4410966	37	0.043953	0.1848408	9.528904	1.28586E-13	1
jun04mv	29	0.4691966	1.4497872	32	0.0688815	0.1529265	5.4680722	9.30629E-07	1
dec04mv	29	0.0502032	0.4412565	31	-0.0368317	0.1986832	10.896486	7.49486E-16	1
jun05mv	33	0.1649647	0.2670249	28	0.1060249	0.1531479	19.657551	7.82644E-28	1
dec05mv	33	0.113266	0.2604871	30	0.0143206	0.1731788	32.378849	1.06292E-39	1
jun06mv	33	0.1685926	0.2394953	29	0.0560574	0.150558	44.660957	9.54976E-48	1
dec06mv	38	0.2406594	0.4904791	28	0.0650035	0.1470863	24.728289	3.66505E-33	1
jun07mv	30	-0.1088142	0.1837449	27	-0.0270526	0.1678517	-37.697376	1.76528E-43	
dec07mv	28	-0.0566766	0.2169318	29	-0.0750892	0.2801462	4.1971069	9.07457E-05	1
jun08mv	26	-0.2549344	0.2603297	30	-0.3995056	0.2381633	32.146064	1.60116E-39	1
dec08mv	28	0.2455228	0.353807	31	0.0963485	0.4680812	12.928469	5.37779E-19	1
jun09mv	22	0.3600989	0.6016253	46	0.2459833	0.2030381	6.5778045	1.30721E-08	1
dec09mv	34	0.1069994	0.3316566	35	-0.0472918	0.1286513	41.609573	5.85176E-46	1
jun10mv	29	0.2279151	0.264391	27	0.220982	0.1253674	2.3167864	0.023946782	1
dec10mv	35	0.1070973	0.2910237	23	0.0204641	0.1411739	26.361298	1.08637E-34	1
jun11mv	33	-0.0246337	0.2554221	28	-0.1006845	0.1963476	22.67565	4.0475E-31	1
dec11mv	33	0.4236001	1.4870402	23	0.0679012	0.1453036	5.2365104	2.21147E-06	1
jun12mv	36	0.2196936	0.4991955	23	0.0429526	0.1949412	20.612685	6.51914E-29	1
Average	39.024	0.171	0.415	44.810	0.047	0.225	22.376925	8.25644E-31	90.24%

Figure 15: Combined Portfolio C: P/E, P/B

Need to test each year for difference in means and overall average									
	Under 20, PB, PE			Over 80, PB, PE			Difference		
		mean	stdev		mean	stdev	T-stat	p-value	No of success
dec91mv	65	0.2697912	0.6784688	143	0.0238117	0.2488258	32.732622	5.73146E-40	1
jun92mv	61	0.2747515	0.6911658	131	0.0903077	0.2341059	22.35771	8.6461E-31	1
dec92mv	0			0					
jun93mv	43	0.0843549	0.2108349	152	0.1149148	0.2951059	-19.020319	4.31927E-27	
dec93mv	46	0.0630698	0.2371933	144	-0.0570387	0.2248778	76.296253	1.8791E-61	1
jun94mv	48	0.0060756	0.1971633	127	0.0020094	0.2174432	3.4396238	0.001065554	1
dec94mv	56	0.1995583	0.2119063	141	0.1922748	0.4855536	2.9441075	0.004601656	1
jun95mv	60	0.2364371	0.2665846	137	0.0772546	0.2828772	90.00784	1.00968E-65	1
dec95mv	44	0.1809464	0.2775584	144	0.1219559	0.3702342	21.82591	3.13712E-30	1
jun96mv	55	0.1675114	0.2242587	137	0.0363476	0.2054373	107.29485	2.84592E-70	1
dec96mv	62	0.1906772	0.2552353	147	0.0978494	0.2287271	65.99361	1.02349E-57	1
jun97mv	64	0.2927827	0.2689995	141	0.0858563	0.2503511	131.3698	1.58991E-75	1
dec97mv	47	0.1477869	0.2549425	149	0.0656523	0.2304205	47.224978	3.67261E-49	1
jun98mv	62	-0.0959944	0.1863044	152	0.0586362	0.2791323	-144.18774	6.06668E-78	
dec98mv	60	0.1317811	0.3885149	150	0.1194496	0.3982235	3.451365	0.001027665	1
jun99mv	64	-0.0625434	0.2401497	144	0.2011562	0.6762765	-64.677196	3.3726E-57	
dec99mv	64	0.0947399	0.2447824	157	0.1287072	0.6008713	-10.497077	3.29865E-15	
jun00mv	58	0.159841	0.4942393	157	-0.0590647	0.3452565	44.037932	2.16469E-47	1
dec00mv	56	0.3617915	0.3266457	138	-0.0004662	0.2487921	153.90051	1.22675E-79	1
jun01mv	49	0.0471959	0.2500937	142	-0.0192877	0.2035223	42.3958	1.97378E-46	1
dec01mv	44	0.4475619	0.6591789	125	-0.079646	0.3016617	49.720737	1.80276E-50	1
jun02mv	36	-0.0724711	0.1933134	111	-0.0767624	0.1830746	3.2024886	0.00218115	1
dec02mv	33	0.2912256	0.34102	114	0.1814693	0.390308	22.581745	5.06015E-31	1
jun03mv	30	0.3817507	0.3205427	119	0.179216	0.2751996	49.868813	1.51444E-50	1
dec03mv	35	0.135146	0.2616796	126	-0.0086179	0.2792554	55.822374	2.00734E-53	1
jun04mv	43	0.1802063	0.3187613	113	0.1099884	0.1776793	26.573795	6.96644E-35	1
dec04mv	41	0.0416248	0.1459269	114	-0.0158409	0.1912722	68.386945	1.24105E-58	1
jun05mv	45	0.1179222	0.2831539	117	0.0963003	0.2362155	9.5731635	1.08541E-13	1
dec05mv	40	0.099802	0.2553482	111	0.0590452	0.2805096	17.425302	3.74269E-25	1
jun06mv	46	0.1803065	0.1587953	110	0.1214039	0.252504	52.228203	1.0055E-51	1
dec06mv	42	0.122692	0.4682482	107	0.0651479	0.232939	10.046994	1.78949E-14	1
jun07mv	39	-0.1785221	0.1775187	101	-0.0134327	0.2883425	-101.20703	9.29144E-69	
dec07mv	28	-0.1388115	0.2578944	110	-0.0365823	0.3316458	-30.287987	4.64759E-38	
jun08mv	36	-0.2314516	0.3193441	113	-0.3186596	0.2250168	26.580756	6.86613E-35	1
dec08mv	16	0.4268528	0.4014225	102	0.1447814	0.3278308	25.354953	9.28964E-34	1
jun09mv	20	0.2674102	0.322998	113	0.1882197	0.2288767	13.942072	1.7673E-20	1
dec09mv	28	0.1319424	0.3503122	107	-0.0003789	0.2193314	27.382109	1.32051E-35	1
jun10mv	34	0.2497784	0.2328252	102	0.2360941	0.2731486	5.8836418	1.92048E-07	1
dec10mv	40	0.0327228	0.1714397	107	0.042315	0.2036952	-8.5449096	5.79679E-12	
jun11mv	37	-0.0852413	0.1698029	102	-0.0399171	0.1705023	-42.586645	1.52043E-46	
dec11mv	40	0.3180904	1.320462	102	0.0466621	0.1762497	6.183576	6.05199E-08	1
jun12mv	35	0.3024785	0.5114254	100	0.01449	0.1489838	37.425467	2.67841E-43	1
Average	44.095	0.141	0.330	122.833	0.053	0.279	28.225773	2.43253E-36	80.49%

Figure 16: Combined Portfolio D: Size, P/B

Need to test each year for difference in means and overall average									
	Under 20, size, pb			Over 80, size, pb			Difference		
		mean	stdev		mean	stdev	T-stat	p-value	No of success
dec91mv	82	0.2517765	0.6229778	74	0.1245721	1.2974602	4.6287078	2.01817E-05	1
jun92mv	74	0.2812303	0.6325056	79	0.0998747	0.2371419	29.642402	1.5633E-37	1
dec92mv	75			66		0.3406144			
jun93mv	76	0.1658447	0.5158821	48	0.1212199	0.220888	9.8765479	3.41384E-14	1
dec93mv	72	0.058538	0.2288185	52	-0.0488798	0.1478359	93.611086	9.73835E-67	1
jun94mv	76	0.0078152	0.3177085	51	0.101279	0.1955926	-44.971958	6.37275E-48	
dec94mv	80	0.5969988	2.3452566	55	0.2018794	0.268152	5.6397107	4.86667E-07	1
jun95mv	80	0.1173703	0.3251696	52	0.0870907	0.1972081	14.630707	1.8709E-21	1
dec95mv	76	0.2888358	0.3569585	63	0.1036849	0.1930691	81.627292	3.39277E-63	1
jun96mv	70	0.0577412	0.3119356	65	0.1218055	0.1950468	-32.432073	9.6823E-40	
dec96mv	66	0.1872132	0.3282062	71	0.2614947	0.195111	-34.258176	4.27162E-41	
jun97mv	68	0.2811883	0.3608645	72	0.1253257	0.2015322	62.869423	1.80342E-56	1
dec97mv	58	0.1062332	0.2786319	76	0.1629501	0.2329719	-27.630357	7.99037E-36	
jun98mv	68	-0.1227143	0.2105598	79	0.121743	0.3007256	-136.05529	1.95517E-76	
dec98mv	75	0.1054538	0.3978733	84	0.0928448	0.261281	4.3130944	6.09686E-05	1
jun99mv	83	0.0439332	0.5056278	86	0.1575589	0.6854257	-13.300256	1.51318E-19	
dec99mv	72	0.1271641	0.4750085	90	0.0392495	0.3313161	20.194166	1.91623E-28	1
jun00mv	69	0.0083455	0.5357859	83	-0.0185581	0.3257466	4.9465768	6.42676E-06	1
dec00mv	83	0.4176383	0.6210284	90	-0.0900323	0.2365338	96.362353	1.73215E-67	1
jun01mv	84	0.04414	0.3387304	76	-0.0144115	0.1556587	34.754002	1.87859E-41	1
dec01mv	80	0.3612977	0.7882589	73	-0.1102046	0.2060837	56.476218	1.01102E-53	1
jun02mv	81	-0.0739743	0.2483885	75	-0.0705498	0.1835219	-2.8283221	0.006352101	
dec02mv	81	0.3794889	0.8116056	71	0.0814395	0.1380452	35.479766	5.75262E-42	1
jun03mv	78	0.3809012	0.3672678	72	0.1454776	0.1414402	117.2922	1.39206E-72	1
dec03mv	71	0.1766762	0.3819278	65	0.0232892	0.1206652	67.319504	3.15166E-58	1
jun04mv	64	0.1820118	0.4591934	57	0.045866	0.1488528	36.962111	5.48564E-43	1
dec04mv	67	0.0776599	0.3154	56	-0.0207216	0.1700205	49.167931	3.47064E-50	1
jun05mv	71	0.1007415	0.2523047	57	0.0724739	0.1195298	24.639646	4.46069E-33	1
dec05mv	67	0.109003	0.2218608	62	0.0323175	0.1508013	69.62218	4.29573E-59	1
jun06mv	66	0.1257181	0.2553894	60	0.1133699	0.155975	8.8600055	1.69908E-12	1
dec06mv	67	0.1443395	0.3829591	59	0.0832871	0.1444426	24.012352	1.82182E-32	1
jun07mv	68	-0.114921	0.1945823	61	0.0227332	0.1798546	-126.62649	1.43298E-74	
dec07mv	65	-0.0770212	0.2552925	62	-0.0739851	0.1860954	-1.9446177	0.056512839	
jun08mv	57	-0.4343138	0.2813618	69	-0.3107885	0.2106943	-60.783636	1.32401E-55	
dec08mv	75	0.5380661	0.8511934	70	0.0529579	0.1543841	48.506479	7.6704E-50	1
jun09mv	77	0.5084586	0.9272388	67	0.1914984	0.1348065	27.713325	6.76121E-36	1
dec09mv	71	0.1704354	0.4547408	62	-0.0419447	0.1189782	67.618812	2.42338E-58	1
jun10mv	70	0.2152676	0.3587255	63	0.2328242	0.1710191	-7.6247322	2.14325E-10	
dec10mv	78	0.0772263	0.308726	57	0.0830785	0.0850579	-4.3386192	5.58233E-05	
jun11mv	70	-0.1226659	0.2235955	63	-0.021181	0.1429114	-97.732037	7.46628E-68	
dec11mv	73	0.3295724	1.0073313	66	0.084065	0.1382392	17.301716	5.3501E-25	1
jun12mv	63	0.1107316	0.447134	60	0.0638384	0.099596	14.044947	1.2588E-20	1
Average	72.548	0.151	0.476	67.119	0.059	0.227	23.60414	4.62609E-32	68.29%

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