Essays On The Value Premium

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I certify that all material in this thesis which is not my own work has been identified and that no material has previously been submitted and approved for the award of a degree by this or any other University.

Signature: ……………………………………………………………..

This piece of work is dedicated to my family.

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Abstract

Value premium, which is the return difference between value and growth stocks, is one of the most important asset pricing anomalies. Value stocks tend to have more returns than growth stocks. And though, researchers agree about the existence of value premium, they tend to disagree about the reasons behind it. There are three main explanations of the value premium. Firstly, value premium is a compensation for risk. This risk is captured systematically by asset pricing models, raised by firm characteristics or measured through business cycle phases. Secondly, value premium is a result of misspricing caused by investors' behaviour. Finally, value premium is not an anomaly at all, it is a result of data bias.

The unsettled debate around value premium shows the need for more research into this problem. This study is different from previous work in several important areas. Firstly, the period of study is divided into two subperiods, the pre-1992 and the post-1992 period. This division will (i) reduce the effect of the missing data: and (ii) test the efficent market hypothesis, where the value premium becomes more known. Secondly, the risk of value and growth stocks is really tested by comparing their risk at the same level of returns. Thirdly, the reaction to earnings surprises around the quarterly returns instead of yearly returns is investigated. Finally, whether optimized value and growth portfolios can produce more returns than equal weighted ones is tested.

I find that: (i) value premium is significant for the pre-1992 and post-1992 periods alike. But after controlling for size, value premium exists only for the smallest size quintile; (ii) the January effect causes the value premium for the smallest size quintile in the post-1992 period but not on the pre-1992 period; (iii) Fama and French's three factor model fails to explain the returns of the small size portfolios in the post-1992 period; (iv) value premium is not an effect of worsening conditions of the business cycle; (v) value stocks are riskier than growth stocks, but this is not the cause of value premium. Growth stocks have more returns than value stocks at the same levels of risk;

(vi) analysts are more optimistic about value stocks but this is not the cause of value premium. Growth stocks are more affected by negative earnings surprise than value stocks; finally, (vii) the optimised value and growth portfolios can produce more out of sample returns than the equally weighted ones regardless of the length of the estimation period.

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Chapter 1

Introduction

1.1 Motivation

Based on the portfolio selection introduced by Markowitz (1959), Sharp (1964), Lintner (1965), and Black (1972) derived the capital asset pricing model CAPM. The CAPM states that, only the market beta can explain the difference in the cross section of the expected returns of assets and portfolios. The CAPM promotes the efficient market hypothesis where the market beta is capable of capturing any regular changes in the stock's price.

Empirical evidence shows that most of the variation in expected returns cannot be explained by market beta. There are some patterns of average returns that the CAPM cannot explain. Basu (1977) shows that the CAPM cannot explain the returns of stocks sorted according to their earnings to price ratio. The CAPM cannot predict the high returns of high earnings to price portfolios. Banz (1981) shows that, for stocks sorted according to their market capitalisation, the average returns for small stocks are higher than predicted by the CAPM. Bhandari (1988) shows that stocks with a high debt-equity ratio have too high returns compared to that of their market betas. Statman (1980) and Rosenberg, Rrid, and Lanstien (1985) report that stocks with high book to market equity, B/M, have high average returns that are not explained by their betas. Fama and French (1992, 1996) confirm that market capitalisation, earning to price, debt-equity, and book to market ratios, add to the explanation of expected stock returns provided by the market beta. These patterns are called asset pricing anomalies because of the failure of the CAPM to explain them.

One of the most important asset-pricing anomalies, which has recently attracted more attention by academics and researchers, is the value premium. The value premium is the difference between the returns of the value and growth stocks. Value stocks are the stocks that have a low price relative to their fundamentals such as book equity, earnings, and cash flow. Value stocks are considered to be cheap or underpriced stocks. The value investors invest in these stocks because they expect their prices to rise in the future. In contrast, growth (or glamour) stocks are the stocks that have high prices relative to their fundamentals. Growth stocks are characterised by a high growth rate of earnings. These stocks did well in the past and the investors expect them to continue doing well in the future. The value premium states that portfolios with high book to market, high earnings to price, high cash flow to price, and / or low sales growth have higher returns than portfolios with low book to market, low earnings to price, low cash flow to price and / or high sales growth.

The foundation of value investing dates back to Graham and Dodd (1934) who argue that securities should be purchased if their market prices are less than their intrinsic values. Since then, this trading strategy has received much attention from investors and academics alike. They prove the existence of the value premium over time not only for the US stock markets but also for most international stock markets. For more details see, for example, Basu (1977), Rosenberg et el (1985), Fama and French (1992, 1993, 1996), Capaul et el (1993), Davis et al (2000), and Lettau and Wachter (2007).

Dividing the value and growth stocks according to their sizes (small or big) raises questions about the existence of value premium among the big and small stocks. There is common agreement about the existence of value premium for small stocks. Their is still debate however about the existence of the value premium between big stocks.

Although academics agree about the existence and the importance of the value premium, they disagree about the reasons behind it. Their explanations can be divided into three main categories, the data bias explanation, the risk based explanation, and the behavioral explanation.

The first explanation is that the value premium is not an anomaly at all, it happens because of data bias with the data being specific to certain dates. Black (1993) and McKinlay (1995) argue that the value premium is a chance result and it is unlikely to be observed out of sample. This claim is refuted by many studies. Davis (1994) observes that the value premiums in U.S. recent returns extended back to 1941. Davis et al. (2000) find the pre-1963 returns close to that observed for the subsequent period in earlier work. Also, many papers documented strong value premiums in markets outside the U.S. (Chan et al (1991), Capaul et al (1993), Fama and French (1998) and Das and Rao (2012). Another source of data bias is the finding of Agarwall and Wang (2006). They find that on average value stocks have higher transaction costs than growth stocks. The value premium disappears as the implementation of value strategies involves substantial transaction costs. Other reasons suggest that the value premium is due to a seasonal effect. Loughran (1997), and Chou et al (2011) show that U.S. firms exhibit value premium mainly in January. Das and Roa (2012) provide evidence of the January effect on the global stock market data from 21 countries.

The second explanation of the value premium is that the it is a compensation for risk. The value stocks tend to have more returns than growth stocks because they are systematically riskier. Based on the multi-factor version of Ross's (1976) arbitrage pricing model (APT), Fama and French (1993, 1996) propose a three-factor model that uses the market portfolio, mimicking portfolios for factors related to size and book to market equity to explain the average returns. They find that their model largely captures the average returns on U.S. portfolios formed on the size and book to market and other asset pricing anomalies. Also Fama and French (1998) show that their model can explain the average returns on portfolios in 13 major international markets.

Researchers cast doubt on the idea that value stocks have higher returns because they have higher loadings on the various factors. They refer the value premium to the risk associated with firm specific characteristics. They suggest that the value firms have higher returns because they have higher financial distress risk (Fama and French (1992), Dichev (1998), Griffin and Lemmon (2002), and Campel et al (2008)), lower profitability (Zhang (2005) and Cooper (2006)), higher operating leverage (Carlson et al (2004), Zhang (2005), and Gulen et al (2008), higher cash flow risk (Campbell and Vuolteenaho (2004), Bansal et al (2005), Hansen et al (2008) and Da (2009)), and high liquidity risk (Kang and Li (2010)).

Another risk story is that the value stocks are riskier than growth stocks because they are more affected by changes in economic conditions. Zhang and Xing (2004) document that the value firms are more affected by negative business cycle shocks than growth firms. Zhang (2005) concludes that the fundamentals of value firms are more affected by worsening economic conditions because disinvesting is restricted by costly reversibility. Gulen et al (2008) argue that expected returns of growth stocks co-vary more with recession than the returns of growth stocks, as value stocks are less flexible in adjusting to recessionary shocks. On the other hand, Du (2011) found only a very small correlation of the returns of value and growth stocks with the state of the economy.

The third explanation for the value premium is that it is a result of investors' behaviour. Lakonishok, Shleifer, and Vishny (1994) argue that value stocks outperform growth stocks because the investors make systematic errors in expecting the future earnings growth of these stocks. Growth stocks are the stocks that did well in the past and expect to do well in the future hence they have high prices. On the other hand, investors are excessively pessimistic about the growth rate of value stocks. La Porta (1995) goes further and suggests buying stocks with low forecasted earnings growth and selling those with high forecasted earnings growth to get good excess returns. La Porta et al (1997) show that up to 30% of the return differences between value and growth stocks happens within a three-day window around quarterly earnings announcements. On the other hand, Douckas (2002) fails to support the extrapolation hypothesis. He shows that investors are more optimistic about the value stocks than growth stocks.

The unsettled question about the explanations of the reasons behind the value premium encouraged me to carry out more investigations about the value premium and the reasons behind it.

A large body of research about the value premium has been undertaken recently following articles by Fama and French in 1992 and 1993. When researchers analyse the value premium they use data before this period going back to 1963 or even 1926. The data for the pre-1972 period is characterised by the existence of only a small number of stocks available for analysis. This data is also biased towards successful companies. The COMPUSTAT databases include few stocks from the NASDAQ stock exchange, and deals primarily with small stocks. The CRSP database began to include stocks from the NASDAQ exchange only from 1972. Any fair analysis about the value premium should starts from this year. The efficient market hypothesis predicts that the value premium will disappear after knowledge about the value premium becomes public. The period of study is vivided into two parts: the old period, the period before Fama and French's articles, from 1972 to 1992: and the recent period, the period after Fama and French's articles, from 1993 to 2011. This thesis compares the results of the two periods.

1.2 Research questions

1. Are there any differences in the value premium of the recent period and that of the past period? Given the well-known information about the value premium, should we expect it to have less value in the recent

period?

2. Is the value premium a result of the January effect? This question tests the importance of the returns of the month of January in explaining the total value premium and the value premium for small and big stocks.

3. Is the value premium affected by incomplete data? The information about the returns is taken from the CRSP database while the information about the fundamentals is taken from COMPUSTAT. Not all the stocks in CRSP are included in COMPUSTAT and vise versa. When matching the two databases, we thus lose a great deal of stocks throught this matching. This loss of information can affect the breakpoints used to distinguish between the value and growth stocks. This thesis tests whether these missing stocks could have directly affected the size premium and, indirectly, the value premium.

4. Are value stocks riskier than growth stocks in bad times? With this question, the thesis studies the effect of business cycle periods on the value and growth stocks and whether this effect drives the value premium.

5. Does Fama and French's three-factor model explain the value premium? In order for the model to explain the value premium, the intercepts on the value and growth portfolios should be zeros and the model be sensitive to the changes of the returns in the two periods. the thesis tests the ability of the model to explain the value premiums for small and big stocks.

6. Do value stocks have more returns than growth stocks because they are riskier? Her the thesis attempts to reinvestigate the trade off between the risk and return for value and growth stocks and compare them. The traditional way to answer this question is to compare the risk and return of these portfolios over one value using the equal and value weighting methods. This thesis compares the risk and return for value and growth

portfolios over many points that constitute their efficient frontiers. Comparing the efficient frontiers of value and growth stocks will enable us to know which portfolio is riskier and which portfolio is more efficient.

7. Do optimised value and growth portfolios produce higher out of sample returns than the equal weighted portfolio? The thesis compares the out of sample returns of the equal weighted value and growth portfolios with that of the portfolios that have the minimum variances and maximum number of stocks on the efficient frontier. The comparisons between the returns of these portfolios will be achieved in terms of t test, Sharp ratio, and certainty equivalence. Also, the wealth gained from investing 1 dollar in these portfolios at the end of the test period will be compared.

8. Does value premium result from errors made by investors and analysts in forecasting earnings? This question tests whether the ideas of extrapolations, over-optimism, and overreaction drive the value premium. If the investor is over-optimistic about future earnings per share of growth stocks, the returns after the analyst's announcement should be higher for them than value stocks. This is the proper way to know the optimism about growth stocks because no-one knows the actual earnings yet. The reverse should happen after the announcement of the actual earnings. The growth stocks should have low returns. To test the reactions to actual earnings, the reactions will be separated into good and bad surprises.

1.3 Thesis structure

This thesis consists of nine chapters. Chapter 1 introduces the thesis. It includes the motivation of the thesis, the research questions, and the thesis structure.

Chapter 2, The Literature Review, presents the literature on the value premium. To begin, some of the asset pricing theories that try to model the relationship between the stock returns and the factors that might explain the returns' behavior are introduced. Next, some of the challenges -asset pricing anomalies- which make these theories ineffective in explaining the returns' behaviour are presented. Finally, different explainations for the value premium anomaly are introduced.

Chapter 3, Data and Methodology, mainly collects the data used in the analysis and introduces the ways the data is analyzed this. This chapter is divided into three sections. The first section is devoted to collecting the data from different sources. In the second section the ways the different sources of data are matched and merged is discussed reaching the final variables will be used in the analysis. In addition, summary statistics of the important variables before and after matching and merging the data is given. In the last section, the methods that will be used in analysing the data reaching to achieve the goals of the thesis are presented.

Chapter 4, Revisiting Fama and French, firstly examines the existence of the value and size premiums in the most recent period from, July 1992 to June 2011, compared to the whole period from July 1927 to June 2011 and the sub-period from July 1972 to June 1992. Secondly, it goes on to examine whether there is any seasonal effect on the value and size premiums and whether the book to market and size effect are the results of the January effect in recent years compared to previously. The chapter then examines whether the value (size) premium observed among large and small stocks (growth and value stocks) are different and whether they are related to the January effect. In the third section, the effect of data selection bias caused by choosing only the joint stocks in COMPUSTAT and CRSP in constructing portfolios based on the size and book to market is surveyed. In other words, the effect of unselected CRSP stocks on the size and value premiums is investigated.

Chapter 5, Fama and French Risk-based Explanation, discusses whether the Fama and French three factor model explains the value and size premiums in the years from 1992 to 2011 compared to the past years from 1972 to 1992.

The effect on the results of excluding the month of January is tested as is the effect of the business cycle periods on the three factor model results.

Chapter 6, The Mean Variance-based Explanation, tests whether value and small portfolios are actually riskier than growth and big portfolios. This will be done by comparing the variances of the portfolios with the same expected returns using their frontiers constructed by the mean-variance technique. This chapter analysis whether the mean variance results are affected by the behavior of covariances of the portfolios.

Chapter 7, Out of Sample Results, evaluates the out of sample performance of the sample-based minimum variance model for different portfolio classes. The out of sample performance of the naive portfolio is compared with the minimum variance portfolios that have the largest number of stocks and the portfolios that have the minimum variance. In addition to the out of sample Sharp ratio, the certainty equivalent return, and the turnover used by researchers as performance measures, the wealth gained at the end of the investment period is used as a measure of performance. The chapter tests whether these results are changing in the recent period compared to the earliest one.

Chapter 8, The Earnings Expectation, researches the role of behavioural actions in explaining the value premium. This chapter searches whether investors or analysts make errors in expecting the short and long-term earnings per share and whether analysts are more optimistic about growth and big stocks than value and small stocks. Does this optimism or pessimism derives value and size premiums and whether the asymmetric reactions to earnings surprise derives value and size premiums. Whether investors are more shocked about negative surprises on growth stocks than on value stocks is tested.

Chapter 9, Conclusion and Summary, concludes and gives a summary of the thesis.

Chapter 2

Literature review

Nowadays no one asks about whether the value premium exists or not. The questions that arise are, why does such a phenomenon exist? What affects it? How can it be used in the future to achieve a high level of returns? Why has it not disappeared after all the available information on it?

The aim of this chapter is to present the literature which tries to explain the value premium. To achieve this goal, some of the asset pricing theories that try to model the relationship between the stock returns and the factors that might explain the returns' behaviour are introduced. Next, some of the challenges -asset pricing anomalies- which make these theories ineffective in explaining the returns' behaviour are presented. finally, different ideas about explaining the value premium anomaly are discussed.

2.1 Asset pricing models

Markowitz (1952) develops a portfolio selection model, where the investor selects a portfolio at time t that produces an expected return at time t+1. Markowitz's model assumes that the investors are risk averse and they only care about the mean and variance of the stock returns. So the investors have a set of efficient portfolios, efficient frontiers, that they can choose from depending on the mean and variance of the proposed portfolios' return. The investor should select a mean-variance efficient portfolio that minimises the portfolio's variance given a required expected return or minimises the expected return given a specific variance.

Sharp (1964) and Lintner (1965) built a model based on Markowitz's results called the Capital Asset Pricing Model (CAPM). The CAPM is used in many applications such as estimating the cost of capital for companies and evaluating the performance of managed portfolios. They add two key assumptions to the Markowitz model on identifying the mean-variance efficient portfolio. The first assumption makes the investors agree about the distribution of asset returns. So each investor expects the returns to behave in the same way. The second one allows the investors to borrow and lend money at the same risk-free rate. They also use Tobin's conclusion that all the efficient portfolios are a combination of risk free assets and a single risky tangency portfolio. So all the investors will hold the same tangency portfolio of risky assets. Sharp and Lintner assume that the market portfolio, M, must be on the minimum-variance frontier. If there are N risky assets, the minimum-variance condition for M according to Sharp-Lintner is

$E(R_i) = R_f + (E(R_M) - R_f)B_{iM}, i = 1, 2, \ldots, N$

where R_f is the risk-free rate, $E(R_M)$ is the expected return of the portfolio M, and B_{iM} is the market beta of asset i. B_{iM} is the covariance of its return of asset i with the market return divided by the variance of the market return, $B_{iM} = \frac{cov(R_i, R_M)}{\sigma^2_{R_M}}$. The CAPM says that the expected return of a security or a portfolio equals the rate on risk-free assets plus a risk premium. If this expected return does not meet or beat the required return, then the investment should not be undertaken.

Black (1972) develops a version of the CAPM without risk-free borrowing and lending by allowing the unrestricted short sale of risky assets. He concludes that a portfolio made of efficient portfolios is also efficient so the market portfolio is also efficient.

The important implication of the Sharp-Lintner and Black versions of the CAPM is that only the market beta can explain the differences in the expected return of assets and portfolios.

Evidence shows that much of the variation in expected returns cannot be explained by the market beta. Basu (1977) points out that, when stocks are sorted according to their earning to price, E/P, the future returns on high E/P stocks are higher than those predicted by the CAPM. Banz (1981) shows that, for stocks sorted according to their market capitalisation, the average returns for small stocks are higher than those predicted by the CAPM. Bhandari (1988) shows that stocks with a high debt-equity ratio have too high returns compared to that of their market betas. Statman (1980) and Rosenberg, Rrid, and Lanstien (1985) report that stocks with high book to market equity, B/M, have high average returns that are not explained by their betas. Fama and French (1992, 1996) confirm that the market capitalisation, earning to price, debt-equity, and book to market ratios add to the explanation of expected stock returns provided by the market beta.

The failure of the CAPM to explain such patterns of the stock returns makes researchers think about the unrealistic assumptions of the CAPM resulting in alternative asset pricing models. Merton's (1973) Intertemporal Capital Asset Pricing Model, ICAPM, begins with a different assumption about the investors' objectives. In ICAPM the investors are not only concerned with the end of the period expected return, but also consider that their portfolio's return will vary with future state variables such as consumption, investment opportunities, and labor income. The ICAPM implies the need for additional state variables along with market beta for explaining the expected return. Ross's (1976) Arbitrage Pricing Theory (APT) states that under certain assumptions, the expected return on a risky asset is related to its associated factor loading.

Fama and French's (1993) three-factor model, uses an indirect approach of choosing the factors that will help to explain the expected return. They argue that the size and book to market equity reflect unidentified state variables that produce non-diversifiable risks in returns that are not captured by the market return and are priced separately from the market betas. Their model is,

$$E(R_{it}) - R_{ft} = B_{iM}[E(R_{Mt}) - R_{ft}] + B_{is}E(SMB_t) + B_{ih}E(HML_t)$$

Where SMB_t (small minus big), is the difference between the return on diversified portfolios of small and big stocks, HML_t (high minus low), is the difference between the returns on diversified portfolios of high and low B/M stocks, and B_{iM}, B_{is}, and B_{ih} are the slopes in the multiple regression of $R_{it} - R_{ft}$ on $R_{Mt} - R_{ft}$, SMB_t , and HML_t respectively. Fama and French (1993, 1996) find that the model captures most of the variations in average return for portfolios formed on size, book to market equity and other portfolios that cause problems for the CAPM. However, Fama and French's three factor model presents an alternative to the CAPM for estimating the cost of capital equity: its main problem is that it is not formed on an economic basis so it cannot explain why it gives such promising results.

Another problem for the three factor model is the failure to capture the momentum effect presented by Jegadesh and Titman (1993). The momentum effect states that the stocks that do well (poorly) relative to the market over the last three to twelve months tend to continue to do well (poorly) for the next few months. Carhart (1997) suggests adding a momentum factor to the three factor model. But since the momentum factor is short-lived, it is used to manage specific cases rather than estimating the cost of equity capital. Another problem for the three factor model is the failure to capture the cash flow effect. The stocks with high expected cash flow have higher average returns.

The impirical finance literature documents another source of risk factors of concern to investors such as liquidity risk. Studies by Chordia, Roll, and Subrahmanyam (2000), Hasbrouck and Seppi (2001), and Huberman and Halka (2001) provide evidence for the existence of commonality across stocks in liquidity fluctuations. Their findings have initiated a new research hypothesis that if liquidity shocks are non-diversifiable and have a varying impact across individual securities, the more sensitive a stock's return to such shocks, the greater its expected return should be.

Another version of asset pricing models takes place with violations of the assumption that the returns are normally distributed. The CAPM claims that only the information about the first two moments (i.e. mean and variance) are sufficient to explain the return's distribution. However, the evidence did not prove this was the case (Rubinstein 1973). This implies that the higher moments of the returns are important and carry important information about the returns. Harvey and Siddique (2000) extend the CAPM including systematic co-skewness to the model. They conclude that conditional skewness is significant in explaining the cross-section variations of stock return, even when factors based on size and book to market are included in the model. Chung, Johnson, and Schill (2006) use a set of systematic co-moments added to the three factor model. They conclude that the SMB and HML factors are simply proxies for higher systematic co-moments.

The CAPM is based on the assumption that all the market participants share identical subjective expectations of the mean and variance of the return distribution. Engle (1982) and Bollerslev (1986) give evidence suggesting that the return distribution varies over time. So the investors' expectations of moments behave like random variables rather than a constant as assumed by the traditional CAPM. Taking into consideration that the investors will have the same moments but their moments are conditional on the information at time t means new versions of asset pricing models known as the conditional CAPM will be produced.

The differences in expected returns across assets using the CAPM are determined by differences in the assets' exposure to systematic risk. This key insight into financial economics is used to reflect another way of pricing models: the Consumption-based Asset Pricing Model (CCAPM) (see Rubinstein (1976), Lucas (1978), and Breeden (1979)). The CCAPM predicts that an asset's consumption beta - a measure of co-movement between asset return and aggregate consumption determines its expected return. Asset pricing literature has largely concluded that differences in expected returns are not due to differences in risk to consumption. Others point out that systematic consumption risk, if measured over long horizons, is able to explain the cross-sectional variation in expected return.

2.2 Asset pricing anomalies

Financial market anomalies are empirical results that seem to be inconsistent with the well-known theories of asset pricing behaviour. They indicate either market inefficiency or inadequacies in the asset pricing models. The persistence of the anomalies for decades, however the researchers shed light upon them, suggests that they are not evidence of market efficiencies. The inadequacies of the pricing models of capturing these anomalies lead to reformulating these models so they can test whether the anomalies are important factors in the pricing models. This section will focus on presenting some of the common financial market anomalies in the literature that will interact directly or indirectly with the value premium (the anomaly of interest).

2.2.1 The size effect

The size anomaly refers to the negative relation between the security returns and the market value of the common equity of a company. It refers to high average returns for small size companies compared to the big size companies. The small (big) size companies are companies which have small (big) market capitalisation. It is measured by multiplying the price and the number of shares outstanding owned by the company. This phenomenon was first addressed by Banz (1981) and Reinganum (1981). They show that small capitalised firms on the New York Stock Exchange (NYSE) earned higher average returns than was predicted by the CAPM from 1936 to 1975. They find that the coefficient on size has more explanatory power than the coefficient on beta in describing the cross-section returns. Fama and French (1992) group all stocks traded in the NYSE, AMEX, and NASDQ stock exchanges every year, from 1963 to 1990, into 10 deciles based on their market value. They find the average return of the smallest decile is significantly higher than the average return of the largest decile. The stocks in the smallest decile have higher betas that that of the largest one. This risk difference is not enough to explain the difference in average returns. Fama and French (1993) suggest including an additional factor to the CAPM to capture this effect, called the size factor.

2.2.2 The value premium

Value premium is the difference of the average returns between the value and growth stocks. Value stocks are stocks that are believed to have lower price relative to their fundamentals (book value, dividends, cash flow, earnings, etc.). The common characteristics of value stocks include a high book to market ratio, high dividends yield, high earnings to price, low sales growth rate, and/or high cash flow to price. The investors consider value stocks as cheap or undervalued stocks. On the other hand, growth stocks , also known as glamour stocks, have higher prices relative to their fundamentals. They can be characterised by having a low book to market ratio, low earnings to price ratio, high sales growth, and /or low cash flow to price. They are consided by investors as high prospective growth companies because they retain most of their earnings for reinvestment, therefore pay less dividends.

The foundation for value investing dates back to Graham and Dodd (1934) who argue that securities should be purchased if their market price is less than their intrinsic value. Since then, this trading strategy has received much attention from investors and academics alike.

Basu (1977) shows that stocks with low price to earning ratio tend to have higher subsequent average returns than stocks with a high price to earning ratio. Rosenberg, Reid, and Lanstein (1985) show that stocks with a high book to market ratio generate greater returns than stocks with a high book to market ratio. Fama and French (1992), in searching for the factors affecting asset returns, find that the book to market ratio plays a very important role in explaining stock returns. They find a significant positive relationship between stock returns and the book to market ratios. They also group the stocks into ten portfolios according to the book to market ratios. They find that stocks within the high book to market ratios have more returns than those of the lowest book to market ratios. Depending on these results, Fama and French (1993) produce a risk factor, HML (high minus low) to help in explaining stock returns.

Capaul, Rowley, and Sharpe (1993) investigate the value effect in six developed equity markets and find evidence of superior performance of value stocks compared to growth stocks in all six countries in their sample. Fama and French (1998) support the existence of the value premium by testing a broad sample of countries using the book to market ratio, the earning to price ratio, the cash flow to price ratio, and the dividend to price ratio. The value portfolios they use consistently generate superior returns to the growth portfolios in almost every country.

Davis, Fama, and French (2000) provide evidence for the existence of value premium in post-1963 and pre-1963 US data, respectively. Lettau and Wachter (2007) analysed monthly data from 1952 to 2002. They find an excess return of value over growth portfolios of about 4.01% p.a. when value is defined by the dividend- price-ratio. Even higher excess returns are found for other value criteria: for the earnings-price ratio the excess return is 9.31% p.a.; for the cash flow-price ratio 8.04% p.a., and for the book to market-ratio 5.63% p.a. For all four value criteria the CAPM betas of value portfolios are not higher and often even smaller than those of growth portfolios.

2.2.3 The momentum effect

The momentum is the tendency of a security's price to continue its movements in a single direction. For example, if the price of a security begins to increase, the momentum is its likelihood to continue to increase. Jegadeesh and Titman (1993) show that a strategy that simultaneously buys past winners and sells past losers has high abnormal returns over a holding period of 3 to 12 months. These results are independent of the size and the value effect. The short term momentum described by Jegadeesh and Titman that could not be captured by Fama and French's three factor model, leads Carhart (1995) to introduce a fourth factor called the momentum factor. It is based on the the difference of the return between the portfolios of the winners and the portfolios of the losers. Jegadeesh and Titman (2001) provide evidence that substantial momentum profits could be made during the 1990's even after the publication of their study.

2.2.4 Event studies effect

Event studies are the attempt to determine if particular events, realizing information about the stock, produce abnormal returns from stock investments. Some of the common event studies used in explaining the value premium effect are introduced in this section.

The January effect is the tendency of stocks to perform better in January than at any other time of the year. Keim (1983) and Rienganum (1983) show that most of the abnormal returns to small companies happen during the first two weeks in January. Roll (1983) speculates that the stock markets tend to become oversold in December when the investors sell to establish losses for tax purposes. This selling pressure might reduce the prices of the stocks in December, leading to an increase in the prices in January when the investors repurchase these stocks.

A post-earnings announcement drift is a phenomenon presented by Bernard and Tomas (1989). They group all stocks traded on NYSE and AMEX, every quarter from 1974 to 1986, into deciles based on the size of surprise in their post-earnings announcement. They find that on average, over the 60 days after the earnings announcement, the deciles of stocks with surprisingly good news outperform the decile with surprisingly bad news. Chen, Jedadeesh, and Lakonishok (1996) measure the surprise by the stock reaction to the news and get similar results. These results can not be explained by the difference in the beta for the two portfolios.

Michaely, Thaler and Womack (1995) study firms which announced initiation or omission of dividend payments. They find that on average, the shares of firms initiating (omitting) dividends outperform (underperform) the market portfolio over the year after the announcement. Loughran and Ritter (1995) study firms which undertook primary or secondary equity offering. They find that on average, the return of shares of these firms over the period of five years after the issuance is below that of non issuing firms. Michell and Stafford (2001) look at the firms which announced a share repurchase. They find that on average, the shares of these firms outperform portfolios performed on size and book to market over four years after the event.

2.3 Explaining Value Premium

The value premium has attracted both academic and professional attention for many years. Despite it being well established in the empirical asset pricing literature that there is debate over the interpretation of why stocks with higher book to market ratio earn higher returns.

There are three common explanations for the book to market anomaly. One says that value stocks earn more returns because they are riskier than growth stocks. They also divide the risk based explanations into three groups: one group referring it to the factor loading, the second group referring it to the risk accompanied by the firm characteristics, and the last group linking it to the macroeconomic risk.

The second explanation refers to the high return for the value premium to the irrational behavior of market participants.

The final story for explaining the value premium suggests that the value premium is due to data snooping.

This section will discuss in detail these three common explanations for the value premium.

2.3.1 Risk based explanations

2.3.1.1 Systematic risk

Several studies suggest that the value premium reflects compensation for systematic risk. One of the reasons for the failure of the CAPM is the incapability of explaining the value premium. It is supposed that if the CAPM explains the value premium, the betas for higher book to market ratios should be bigger than that of the lower book to market ratios. This is not the case. The betas for low book to market ratios are bigger than that of the high book to market ratios. Fama and French (2006) examine whether and when the CAPM market beta explains the observed value premium. They show that the overall value premium in the US is similar before and after 1963. They find that the market beta for the value stocks for the post 1963 sample is lower than that of growth stocks. As a result the CAPM fails the tests, whether allowing for the time varying beta or not. On the other hand, the value stocks have higher beta than growth stocks during 1926-1963. They find that the CAPM perfectly captures the value premium for this period.

Since the appearance of the APT and ICAPM theories, researchers have been searching for different systematic risk factors beyond the market factor that explain the value premium. Fama and French's three-factor model (1993) proposes another two factors in addition to the market factor to explain the cross section of stock returns.

Campell and Vuolteenaho (2004) explain the value premium using a two beta model. The beta of a stock with the market portfolio is broken into two components: one reflecting news about the market's future cash flows and the other reflecting news about the market discount rates. Value stocks have considerably higher cash flow betas than growth stocks which may explain the higher average returns for value stocks.

2.3.1.2 Risk related to firm characteristics

Researchers cast doubt on the idea that the value stocks have higher returns because they have higher loading on the different factors. They refer the value premium to the risk associated with the specific firm characteristics. In this section, Some characteristic-related risk-based explanations for the value premium are introduced.

One explanation is related to the distress risk. Fama and French (1992) postulate that the book to market ratio proxy for the state-dependent risk is related to relative financial distress. They present evidence that the industry specific variation in the value premium corresponds with periods of industry strength or distress.

In fact, some researchers disagree with the financial distress explanation for the book to market effect. Dichev (1998), Griffin and Lemmon (2002) and Compel, Hilscher and Szilagyi (2008) employ accounting models using a set of accounting and equity market variables to measure distress risk and find contradictory results. They find that the value stocks are negatively related to the distress risk and the stocks with a high risk of default declare low abnormal returns.

On the other hand, Vassalou and Xing (2004) use Merton's (1974) option pricing model to employ a structure approach to measure distress risk. Obtaining the individual firms' default probabilities, they conclude that default risk is positively priced in the stock market and a large position of the book to market effect can be attributed to default risk. Chava and Purnanam (2010) argue that the prior studies use a noisy ex-post realized returns to estimate the returns.Using ex-ante estimates based on the implied cost of capital, they find a positive relationship between expected stock returns and default probability. They also conclude that the previous results are specific to the 1980s. When excluded from their sample, the under-performing high risk stocks disappear.

However, when Groot and Huij (2011) use the credit spreads and credit ratings to measure the distress risk, they observe a weak positive relation between value and distress risk, irrespective of the measure of distress risk.

Another explanation relies on the operating leverage as one of the determinants of systematic risk of common stocks. Several structural models predicts that value firms have higher operating leverage so they should earn higher subsequent returns. Carlson et al. (2004) model the optimal investment behaviour of monopolistic firms facing stochastic market demand conditions. They find that the book to market effect emerges and relates to operating leverage. Novy-Marx (2007) finds support for the hypothesis that operating leverage is related to the value premium. He reports a positive relation between operating leverage and loadings on Fama and French's HML factor. Novy-Marx (2007) also develops an equilibrium model which states that if the operating leverage hypothesis holds, there should be a strong correlation between stock returns and book to market within industries and a weak association across industries. He finds support for this prediction.

Aguerrevere (2009) extends the model of Carlson et al. (2004) to consider the effect of competitive instruction on the firm's investment decisions. He finds that the model is consistent with the negative association between operating leverage and book to market. Alternatively Feio'o and Jorgenson (2010) find evidence of a positive association between operating leverage and book to market.

A third explanation is based on the cash flow risk. Bansal and Yaron (2004) model the consumption cash flow risk and find it can explain many time series properties of the asset market. Cambell and Voulteenaho (2004), Bansal, Dittmar, and Lundblad (2005), Kiku (2007), Hansen, Heaton, and Li (2008) and Da (2009) measure the cash flow risk as the covariance with the aggregate consumption or by the covariance return markets and cash flow news. They show that value firms could have a higher cash flow risk than growth firms, and hence higher expected return. The cash flow risk can explain a significant amount of the cross section variation of expected returns. Cen and Chao (2009) show that the positive relation between the cash flow risk and book to market is sensitive to instrument variables in estimating the cash flow news.Cash flow duration is used also to explain the value premium. Lettau and Wachter (2007, 2011), Groce, Lettau and Ludvigson (2007) and Da (2005) show that growth stocks have a higher cash flow duration and hence are less risky.

Liquidity risk is also checked as a risk factor in identifying the difference between value and growth returns. Kang and Li (2010) explore the relationship between liquidity of assets and the value premium. They find that value firms are less liquid than growth firms. They find also the liquidity difference between value and growth stocks are much more prominent when the aggregate market is less liquid.

Zhang (2005) and Cooper (2006) predict that the more profitable firms are less risky. Zhang (2005) shows that firms with low profitability are less flexible than firms with high profitability and hence the value firms are riskier and have higher expected returns. Cooper (2006) reveals that if the firms are hit by adverse profitability shocks, their market value will fall. Their book to market ratio will be high because their book value remains fairly constant due to irreversibility.

2.3.1.3 Macroeconomic risk

The central point of this explanation is that firms should differ in their response to the change in economic conditions. So the main questions are: How and why are value and growth affected by the business cycle? Are the value companies riskier than growth companies because they are more affected by the changes in the aggregate market conditions? This section to deals with these sorts of questions.

Zhang and Xing (2004) test whether the value firms are indeed more affected by negative aggregate shocks than growth firms. They documented that value firms are more affected by negative business cycle shocks than growth firms. They also shed some light on the question why value stocks have higher cash flow betas than growth stocks by linking firm level fundamentals to the business cycle. They also ask whether there exists a differential response to business cycle shocks between value and growth firms. They conclude that the fundamentals of value firms respond negatively and rapidly to negative shocks, but those of growth firms respond mildly.

Zhang (2005) demonstrates that value stocks are riskier than growth stocks, especially in bad times when the price of risk is high. He demonstrates that the value premium can be explained by costly reversibility and the counter-cyclical price of risk. The value firms are less flexible than growth firms in scaling down to mitigate the impact of negative shocks. Value firms disinvest more in recession because the assets of value firms are less profitable than those of growth firms. The fundamentals of value firms are more affected by worsening economic conditions than those of growth firms because disinvesting is restricted by costly reversibility. The time varying price of risk reinforces the effect of costly reversibility. When the aggregate price of risk is counter-cyclical, the discount rates of firms will in general be higher in recessions than in expansions.

Cooper (2006) measures the sensitivity of the return of the firms to aggregate market conditions. If capital investment is irreversible, the book value of assets of a distressed firm remain constant, but its market value falls, increasing to its book to market. A high book to market is sensitive as its extra installed capacity allows it to expand production easily without net investment providing a high payoff to equity holders. Therefore, high book to market stocks have a greater risk; in contrast, low book to market firms would need to undertake investment providing the lower payoff.

Gulen et al. (2008) find evidence that the value premium displays countercyclical time variation. They argue that the expected returns of value firms covary more with recession than the returns of growth firms as value stocks are less flexible than growth stocks in adjusting to recessionary shocks. They find a positive association between book to market and measures of real flexibility including operating leverage, the ratio of fixed assets to total assets, and the frequency of disinvestment. Gulen et al. (2008) also find strong evidence of countercyclical movements in the expected value minus growth returns using the two state Markov switching model. They find that under worsening aggregate economic conditions, as measured by higher short term interest rates and a higher default spread, the expected excess returns of value stocks are more strongly affected than the growth stocks. In contrast, in expansion the expected excess returns of both value and growth stocks have insignificant loadings on the short term interest rate and default spread. Because of this, the value premium tends to spike rapidly upward during recession only to decline more gradually during expansion. They also examined the sources of the time varying expected value premium using a variety of proxies for real flexibility. They documented that the value firms have higher ratios of fixed assets to total assets, higher frequency of disinvestment, higher financial leverage, and higher operating leverage than growth firms.

Du (2011) finds that the economic variables that Gulen et al. (2008) use to proxy aggregate economic conditions do not have a reliable association with the state of the economy, which makes it even more difficult to interpret their results. He extends their work using more informative measures of the aggregate economic condition, the Chicago Fed. national activity, which is the first principal component of 85 macro economic indicators. The results show very little correlation with the state of the economy.

2.3.2 Behavioral considerations

Traditional finance theory seeks to understand financial markets using models in which investors are rational. Rationality means that when investors receive more information, they update their decisions correctly and these decisions are normatively acceptable. Rational approaches cannot be confirmed using the data in real life. Behavioural finance is a way for financial markets to be used in response to the difficulties faced by the traditional ones. It argues that some features of asset prices are most plausibly interpreted as deviations from their fundamental value. These deviations are brought about by the presence of investors who are not fully rational.

There is a set of behavioral models which try to explain the value premium phenomenon. In this section some of these behavioural explanations for the value premium will be presented.

Lakonishok, Shleifer and Vishny (1994) argue that value strategies produce superior returns because investors overestimate the future growth rates of growth stocks relative to the value stocks. Investors are excessively pessimistic about value stocks because they tie their expectations of future growth in earnings to past bad earnings. On the other hand, investors are excessively optimistic about the growth stocks because they extend their past high growth rate to the future. Alternatively, the value strategies outperform growth strategies because the actual future growth rate of earnings of growth stocks relative to value stocks turns out to be considerably lower than it was in the past or than what the multiples of those stocks suggest the market expected them to be. This implies that investors make systematic errors in predicting future growth in earnings for value stocks. Namely, investors' excessive pessimism about future earnings of value stocks relative to growth stocks.

La Porta (1995) also acknowledges that the superior performance of value stocks can be attributed to investors' errors about future growth in earnings and errors about risk. He uses the earning growth forecasts to classify stocks into value and growth portfolios rather than using the book to market ratio. He shows that, by selling stocks with high forecasted earnings growth and buying stocks with low forecasted earnings growth, one produces excess returns.

La Porta et al. (1997) examine stock price reactions around earnings announcements and show that size adjusted announced returns are significantly more positive for value and growth stocks. A difference of the returns between value and growth stocks over a three-day window around quarterly earnings announcements can explain up to 30 percent of the annual value premium. It is consistent with the interpretation that the investors are too optimistic about stocks that have had good performance in the recent past and too pessimistic about the stocks that have performed poorly.

Doukas et al. (2002) claim that past studies do not directly test the error in expectation hypotheses. They fail to support the extrapolation hypothesis. They show that the investors are overoptimistic about both value and growth stocks. Also they show that the high book to market firms display higher forecast error and higher downward forecast revisions than low book to market portfolios.

Some other studies focus on the impact of institutional trading on the value premium. Ali, Hwang and Trombley (2003) and Nagel (2005) investigate the relation between the level of institutional holding and the book to market effect. They find evidence of higher value premium among stocks with lower levels of institutional ownership; this supports the notion that the book to market effect is because of mispricing. Daniel and Titman (2006) argue that the book to market effect is driven by the reversal of intangible returns. They find that the intangible returns strongly and negatively forecast future returns, suggesting overreaction to intangible information. Tiang (2010) asks whether sophisticated players in the stock markets trade against intangible information, thereby mitigating the extent of overreaction. He shows that the institutions tend to herd in the direction of intangible information and that this tendency produces the price overreactions, contributing to the book to market effect. On the other hand, Phalippou (2008) argues that 93 percent of the market capitalisation held mostly by institutional investors is value premium free.

Another group of studies shed light on the importance of divergent opinions in explaining the value premium. Doukas et al. (2004) use analysts' forecast dispersion as a proxy for the divergent opinions. They document that value firms have higher forecast dispersion than growth firms. They suggest that the value companies are more exposed to the risk of divergent opinions. The future prospects of value firms are highly uncertain so the investors will demand a high rate of return on their investments. On the other hand, Chen et al. (2002) argue that firms with higher divergent opinions should earn low returns. Diether et al. (2002) find a negative relation between divergent opinions and future stock returns. Hong and Stien (2003) produce a model that predicts no relation between divergent opinions and future stock returns. Zhang (2006) also finds a statistically insignificant association between divergent opinions and future stock returns. Shon and Zhou (2010) replicate Doukas et al. (2004) using an extended sample (1983-2004). They find that value stocks have higher divergent opinions. They find no evidence that the value stock with higher divergent opinions earns higher returns than those with lower divergent opinions. The result suggests that value stocks have higher divergent opinions but does not explain why they earn higher returns.

2.3.3 Data snooping biases

Conard, Cooper, and Kaul (2003) examine the potential effects of data snooping biases in numerous recent studies that sort firms according to firm characteristics in an attempt to explain the behaviour of asset returns. Specifically, they attempt to study the propensity of cross-sectional sorting strategies to generate spurious profits because of data snooping biases induced by their collective familiarity with the data. Using sixteen cross-sectional and four time-series firm characteristics that have been previously analyzed in the literature, they first estimate in-sample profits of simple linear portfolio strategies allowing for a specific form of data snooping. They find evidence of in-sample profits that are consistent with the findings of several recent studies. However, when they generate data that is designed to have no relation with returns, they find that in-sample profits of one-way (two-way) sorts of firm characteristics can easily be generated that represent between 30% and 97% of the in-sample profits observed in real data. Moreover, they show that while the average out-of-sample profits in the real data remain statistically significant at about 3.0%-4.5% per annum, any prior knowledge of the performance of a firm's characteristic over long horizons, or correlation with predictor variables whose performance is known, can dramatically affect even the "real" out-of-sample profits. Consistent with this, they find that if investors are constrained to select from the best strategies from prior periods, out-of-sample profits decline dramatically.

Chan, Karceski, and Lakonishok (2000) argue that the "agency factor" may play a role in inflating the price of glamour stocks. In order to get commissions, analysts need to convince customers to buy stocks. One way to do this is to show them past data and historical performances. Additionally, Bhushan (1989) and Jegadeesh, Kim, Krische and Lee (2002) argue that growth stocks tend to come from exciting industries which give people the prospect of high growth of earnings in the future and are thus easier to tout in analyst reports and media coverage. Thus, in an effort to benefit their careers, many professional money managers will gravitate towards growth-oriented stocks, making glamour stocks over-priced and value stocks under-priced. According to Shleifer and Vishny (1997), this mispricing pattern can persist over long periods of time.

Agarwal and Wang (2006) empirically examine whether the value strategy of buying value stocks and selling growth stocks is profitable after controlling for transaction costs. They find that on average value stocks have higher transaction costs than growth stocks and the value premium disappears as the implementation of a value strategy involves substantial transaction costs. After controlling for size and liquidity as well, they reach the same conclusion.

Several studies report evidence of the January seasonal effect related to value premium. Fama and French (1993) examine risk-adjusted excess stock returns of U.S. stocks and find evidence of the January seasonal effect related to size and value effect. However, they attribute the seasonal variation in size and value premiums to corresponding seasonal variation in the size and book-to-market risk factors. Daniel and Titman (1997) argue that book-to-market is not a proxy of risk. In support of their characteristic model, they study the seasonal patterns of returns generated by different U.S. portfolios sorted on book-to-market. They show that the value premium of large firms exists mainly in January. Loughran (1997) and Chou, Das, and Rao (2011) analyse the January effect on value premium and find that large U.S. firms exhibit value premium mainly in January. These studies document a seasonal pattern in the value premium in U.S. stock markets. Arshanapalli, Coggin, and Nelson (2002, 2003) find that value stocks outperform growth stocks mainly in January. However, their risk-based regression models do not find evidence of a January effect outside of the U.S. Meanwhile Das and Rao (2011) provide evidence of seasonality in the Japanese, U.K. and French equity markets.

Das and Rao (2012) analyse comprehensive global stock market data from 21 countries to study the interaction of value premium and the January effect. Using major international indices, they find that the January seasonal effect in value premium is more prevalent than once thought. Their results provide evidence of the January effect in the value premium phenomenon. The consistent result across all major indices ensures that the seasonal pattern in value premium is not the result of data mining. Using stock market indices for Asia Pacific, EAFE (Europe, Australasia, and Far East), Europe (with and without the U.K.), Scandinavian countries, the U.K., U.S., and Japan across the time period from 1975 through 2007, their study provides out-of-sample evidence from twenty-one countries that comprise different index portfolios. As robustness measures, they use regression analysis, paired means t-tests, and non-parametric tests to examine whether the persistence of the anomalous January value premium is real and significant. Their empirical analysis shows that the annualised excess January value premium ranges from 42.96 percent for Scandinavian countries to 9.24 percent for EAFE markets and 20.28 percent for the U.S.

Lo and MacKinlay (1990) argue that the findings of value premium were the result of data-mining; that is, attempting to find a pattern that lacks prediction power. Chan, Hamao, and Lakonishok (1991) address this concern by studying the Japanese stock market. Sorting using book-to-market, they find that the value portfolio has an average monthly return of 2.43%, compared to 1.13% of the glamour portfolio. Sorting by CF/P, the value portfolio has an average monthly return of 2.22%, whereas the glamour portfolio is 1.43%. Noting that the standard deviation of the value and growth portfolios is very close in both cases, this indicates that the value portfolio does not have a higher total risk. Therefore, given that the same method has led to similar findings in two totally different markets, they conclude that data mining is not driving the results.

Banz and Breen (1986) and Kothari, Shanken, and Sloan (1992) suggest that "survivorship bias" may contribute to value premium. Authors sometimes exclude bankrupted companies in their year-to-year calculations and, as a result, fail to take into account the risk of financial distress in value stocks. Lakonishok, Shleifer, and Vishny (1994) addressed this concern by changing the sample selection methodology. First, they required five years of past data to classify firms before measuring their returns, and dismissed the data when survivorship bias was found. Also, they only reported results for the largest 50% of the firms on the NYSE and AMEX, which have less serious selection bias. That the value premium persists under this methodology provides support that survivorship bias is not the main factor for the value premium. However, the argument of survivorship bias still cannot be laid to rest.

Chapter 3

Data and Methodology

The main purposes of this chapter are to describe the data used in the thesis analysis and introduce the ways the data is analysed. This chapter is divided into three sections, the first is devoted to describing the different sources of data used. In the second section how to match and merge the different sources of data, reaching the final variables that will be used in the analysis are discussed. In addition, summary statistics of the important variables before and after matching and merging the data are provided. In the last section, the methods that will be used in analysing the data are presented.

3.1 Data collection

This study concerns only the companies listed in the three main exchanges in the United States of America -the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the NASDAQ stock exchange. The period of study will vary depending on the availability of the data and the purpose of the analysis. In general, all the available data will be used starting from 1926 to 2011. In the next subsections, the collected data, according to the sources from which it was collected are presented.

3.1.1 COMPUSTAT North America

The COMPUSTAT database is mainly concerned with presenting information about the fundamental variables collected from companies' financial statements. The main variables that will be collected from the COMPUSTAT database are the book equity and the earnings. Collecting data began using the COMPUSTAT North America file for the fundamental annual dataset starting from the first available date in Jan. 1950 to Dec. 2011.[1] The CUSIP codes were used to identify the companies[2] in the entire database. The firm's parent and subsidiary accounts to be consolidated,[3] the financial and non financial companies, the active and nonactive companies, the USD currency, and the international and domestic companies were chosen. The following identifiers and variables have been collected:

CUSIP: The CUSIP is a firm identifier code maintained by the CUSIP agency. This code may change from period to period according to the companies' situations. The CUSIP announced at the COMPUSTAT is the latest CUSIP a company acquires. The CUSIP is important in matching COMPUSTAT and CRSP.

DATADATE: The data date is the date for the last calendar day of the financial year. Most of the companies (about 70%) report their annual data on Dec. 31. Not all the companies publish their data directly at the end of financial year. For some, it may takes up to 6 months after the end of the financial year.

FYE: The Fiscal Year End: The fiscal year end indicates the last month of the financial year of a company.

[1] However some subjects of the study will start from 1925, the missing data will be completed from the data collected by hand by Kenneth French's data library.

Fama and French (1992) conclude that the data before 1962 are biased towards the big historically successful firms.

[2] It is of no significance which of the company's codes will be used in collecting the data as any of them will give the same results.

[3] Choosing consolidated and non consolidated companies (domestic and international) give the same results.

COSTAT: The company state identifies whether the company is active or inactive.

EXCHG: The exchange code is a number which represents the inclusion of a stock to an exchange. It takes for example, 11,12, and 14 for the NYSE, AMEX, and Nasdaq exchange.

BKVLPS: The book value per share is the book value of common equity over the number of shares outstanding.

CEQ: The total of common/ ordinary equity or the book value of common equity.[4]

CSHO: The common shares outstanding is the number of publicly held shares recorded in millions.

TXDBC: The balance sheet deferred tax and investment tax credit.

IB: The earnings before extraordinary items. It will be used here to represent earnings.

The main aim of collecting the data from COMPUSTAT is to get the book equity (be), and the earnings (e) variables. This can be achieved after filtering the data by the following steps.

1. The number of cases captured by COMPUSTAT are 422057 firm-year observations.

2. Choosing only the companies traded in the NYSE, AMEX, or NASDAQ stock exchanges. These companies are the companies that have exchange codes equal to 11, 12, or 14. The remaining observations are 256813 firm year observations.

[4]Some authors use the CEQ alone to represent the book equity (such as Fama and French (1992,1993) and Bulkley and Harris (1997)) while others add the balance sheet deferred tax to the CEQ (such as La Porta 1996 and Fama and French 1996) .

3. Multiplying the BKVLPS and the CSHO and then deleting the observations which have no CEQ or BKVLPS times CSHO.[5] There are 223266 firm year observations left.

4. Using the 7976 cases resulting from multiplying BKVLPS and CSHO as a book value of common equity (CEQ).

5. Deleting the duplicate cases (23516) where some companies are defined as a financial and industrial company at the same time. The duplicate cases also happen because a record is repeated for different months in the same year.

6. Adding TXDBC to the CEQ to get the book equity variable.

The remaining observations are 199750 firm year observations which have complete book equity variables.[6]

3.1.2 CRSP database

The CRSP (the Center for Research in Security Prices) database basically provides information about stock prices and returns. This database is a research source which will provide market equity and information about prices and returns for selected stocks.

Searching CRSP began using the monthly stock file starting from the first available data-date Jan. 1925[7] to the end of June 2011. The PERMNO[8] will be used for collecting the entire stocks in the database. The following identifying information about prices and returns were selected.

CUSIP:[9]: The CUSIP of the CRSP is the same as that of COMPUSTAT except that it is only eight digits rather than nine digits. The ninth digit of COMPUSTAT will be deleted in order to match them.

[5]Another way of getting the book equity is multiplying BKVLPS and CSHO. This will save 7976 firm year observations from deleting.

[6]This include 7962 non positive CEQ cases

[7]The records of CRSP actually start at Dec. 1925

[8]The reason for using PERMNO instead of CUSIP for searching this database is to be capable of matching the Kenneth French and the COMPUSTAT databases.

NCUSIP: The NCUSIP is the historical CUSIP which is given to a company over its entire life. The CUSIP agency often changes the issues of CUSIP to reflect a change of the name or the capital structure of a company.[10] If the NCUSIP does not exist for a company, the CUSIP will be used in order not to lose part of the data.

Shrcd: The share code is a two digit code which describes the type of traded shares. The first digit takes the value of 1, 2, 3, 4, or 7 for ordinary shares, certificates, ADRs, SBIs, or Units respectively. The second digit gives more information about the type of traded security. It takes 0, 1, 2, 3, 4, 5, or 8 for non defined securities, defined securities, companies outside the US, trust companies, closed end funds, outside the US closed fund companies, or REIT's respectively.

Exchcd: The Exchange code identifies on which exchange a security is listed. Only the codes -2, -1, 1, 2, 3, 31, 32, and 33 which represent the stocks of the NYSE, AMEX, and NASDAQ stock exchanges will be used.

SIC: The Standard Industrial Classification code is used to group companies with similar products or services. It takes integers between 1000 and 9999. The first two digits refer to a major group, the first three digits refer to an industry group, and all four digits indicate an industry.

PRC: The closing price or the negative bid/ask average for the last trading date of a month. If the price is not available on any given trading day, the bid/ask average is provided with a negative sign to differentiate it from the closing price. If neither the closing price nor the bid/ask average is available on a date, the price is set to zero.

[10]NCUSIP is important in matching the IBES database with the other databases where the CUSIP does not exist as a search identifier for IBES.

Ret: The holding period return: it is the simple return. It is the monthly changes in the total value of an investment. It is calculated as $r_t = \frac{p_t - p_{t-1} + d_t}{p_{t-1}}$, where t is the holding period (t is one month in the collected data), p_t is the price at the end of the period, p_{t-1} is the price of the previous period, and d_t is the dividends within the period.

Retx: The holding period return without dividends.

Shrout: The number of shares outstanding. It is the number of publicly held shares in thousands.

SPrtrn: The return on the Standard & Poor's composite index.

Dlprc: The delisting price

Dlret: The delisting return

Dlretx: The delisting return without dividends

The collected firm year monthly observations are 3905535 cases. To make the data suitable for analysis the following preparations were made:

1. Deleting the observations of the stock exchanges other than the NYSE, AMEX, and NASDAQ. The excluded exchanges are the exchanges with 4, 5, 10, 13, 16, 17, 19, 20, and 0 exchange codes. About 116295 cases have been deleted.

2. Sorting the data using the price and the delisted price, then deleting the cases where there is no price or delisted price (23178 cases).

3. Using the dlprc, dlret, and dlretx instead of the prc, ret, and retx respectively if they do not exist (19597 cases).

4. Deleting the cases where the price is set to be zero (12685 cases).

5. Market equity is computed by multiplying the number of shares outstanding and the price.

6. Deleting the zero market equity (3112 cases).

7. There are no duplicate cases in CRSP.

8. Using the CUSIP if the NCUSIP is not known (522411 cases).

The remaining observations after all these operations are 3766081 firm year monthly observations.[11]

3.1.3 IBES database

IBES international Inc. provides both summary and detailed analyst forecasts of companies' earnings, cash flows, and other important financial items, as well as buy-sell-hold recommendations. To obtain information about the analysts' forecasts of the earnings per share of a company, one uses the detailed history file. The database is searched using the announced date starting from the most available date in Jan. 1981 to Dec. 2011,[12] using the CUSIP provided by IBES -which is the same as the historical one provided by CRSP- for the entire database using the US file only. The following variables and identifiers have been collected from the database,

EPS: EPS is just an identifier which shows that the variable that analysts will make estimations for is the earnings per share.

FPI: Forecasted period indicator indicates the periods for which the forecasts are made . The chosen FPI to be 1,2,3,4, and 5 years in addition to the long term growth which has FPI equal to zero. The long term growth rate is the expected long term growth (estimated to be 5 years) in earnings.

CUSIP: The same as the NCUSIP in CRSP.

Forecast period end date: the date for which the estimates are made.

[11] At the beginning of a company's life there is no return, so I am not canceling prices if the returns is not known. In addition the CRSP has data available at year 1925 only for the month of Dec. which will be used for computing the breakpoints for 1926 year.

[12] Although one can start searching the database from 1970, there is no actual data until 1981.

Estimate value: The expected value of the earnings per share identified at different periods, FPI.

Actual value: the actual value of the earnings per share at the end of the forecasted period.

Announce date: The date when the analysts announced their estimates.

Primary/diluted flag: An index which indicates whether the estimates are for the primary or diluted earnings per share. The primary or basic eps is the earnings divided by the actual traded shares; whereas the diluted eps is the eps divided by the common shares outstanding.

The data collected from IBES were about 7430693 observations. A few steps were taken to make the data ready for use as follows:

1. Canceling the cases where there is no CUSIP (47456 observations).

2. Choosing only the data for diluted earnings per share. The remaining observations are about 5344909 observations.

3. Subtracting the announced date from the forecasted period end date. The result is the gap between these two dates in months. Using this gap it will be easy to identify any inappropriate (unreasonable) observations in forecasting eps. This should give a reasonable gap between the announced data and the forecasted period end date. This idea will be discussed in the methodology section.

3.1.4 Other databases

3.1.4.1 Kenneth French web page

The Kenneth French web page data is a web page which presents financial data created by Eugene Fama and Kenneth French. Data from the Kenneth French web page is used in this thesis for the purpose of analysis or to compare results. The utilised data are as follows:

- Data collected from Moody's: The COMPUSTAT presents the data for companies' financial statements starting from 1950. To get information about book equity before this date, data collected by hand from financial statements published at Moody's by Kenneth French will be used. The variable and identifiers of this data are the book equity, the year of publication, and the PERMNO. There are 29643 firm year observations extracted from this database. This data was first used by Davis, Fama and French, (2000).

- Breakpoints and portfolios' returns: This web page presents the breakpoints and returns for all the common portfolio strategies. These breakpoints and portfolio returns are used only for the purpose of comparing our results to check whether the process of matching and merging the data and computations are correct.

3.2 Data matching and statistics

Table (3-1) shows the number of available companies in COMPUSTAT, CRSP, and IBES databases each year. It shows the companies available at the NYSE, AMEX, and NASDAQ stock exchanges in addition to the companies collected by hand from Moody's publications on the Kenneth French web page. The COMPUSTAT data starts from 1950 with few representations from the AMEX and NASDAQ exchanges. The CRSP data starts from 1925 for NYSE, 1962 for AMEX, and 1972 for NASDAQ. Most of Moody's companies are from the NYSE except for 108 companies from NASDAQ.

Comparing the total number of companies in the COMPUSTAT and the CRSP, we find that the CRSP has about 90000 more firm year observations. The total number of companies of the NYSE plus Moody at the COMPUSTAT (123388) is nearly equal to the number of companies of the NYSE at CRSP (127553). But the number of companies is not equal each year for either database. In recent years the COMPUSTAT has had more NYSE companies.

The number of NYSE observations of the CRSP from 1993 to 2011 is 9400 observations more than that of COMPUSTAT. It is about 500 more companies each year. In a later section, the effect of these missing observations on the returns of portfolios formed according to the market equity and book to market equity will be examined.

The number of companies in AMEX and NASDAQ is not balanced and the number of CRSP is about double the number of COMPUSTAT.

The IBES database for forecasting earnings per share starts from the year 1982. Because of the number of companies in the table, only one observation each year for the available stocks was chosen. The number of observations for forecasting the first and second year are about the same, so it is reliable to compare their results. The 3,4, and 5 year forecasts are greatly decreased in number. The long term growth rate has a moderate number of companies and can be used in the analysis.

Matching the COMPUSTAT, CRSP, IBES and Moody's data is done by the following steps,

1. Matching Moody's and CRSP using the PERMNO in order to assign the CUSIP for Moody's. All the PERMNOs in Moody's have corresponding PERMNOs in CRSP except 4.

2. Merging Moody's and the COMPUSTAT observations and checking for duplicate cases using both the CUSIP and the year. About 1512 duplicate cases from Moody's data were removed.

3. Matching the COMPUSTAT with CRSP using the CUSIP and the year[13] together. To do so, only the data on Dec. of CRSP was chosen so as to compare the yearly data of COMPUSTAT and the monthly data of CRSP. The matching results revealed 187756 firm year observations which exist in both databases. Then the NCUSIP, EXCHCD, CSHO, market equity and other important variables from CRSP to COMPU-

[13]If the researcher had chosen to match the data only by the CUSIP, there would have been too many missing data in the databases.

STAT were merged. Table (3-2) shows the number of joint COMPUSTAT/CRSP observations for different stock exchanges.

4. Matching the COMPUSTAT and IBES using NCUSIP and the announced year. Merging the matched data gives the joint COMPUSTAT/CRSP/IBES observations of Table (3-2).[14]

Comparing the results from Table (3-1) and Table (3-2) we find big differences in the data after matching the databases. Where there are 228860 observations in the COMPUSTAT before matching the databases, only 187756 observations are available for analysis because the rest do not exist in CRSP.[15] The number of observations used to get the breakpoints of market equity on the Kenneth French web page, indicate that they use the joint COMPUSTAT/CRSP in getting their breakpoints. Although the total number of firm year observations for NYSE is nearly the same at the COMPUSTAT before and after matching the databases, there are great differences in the number of joint companies each year. The same situation happens on the NYSE of CRSP before and after data matching. The changes and reductions of observations will affect the results extracted from these data. Table (3-2) also shows the changes to the number of companies of IBES after matching the COMPUSTAT, CRSP, and IBES. There is a reduction of the number of joint companies of the three databases.

Panels A and B of Table (3-3) show the effect of the data reduction on the statistics taken from the COMPUSTAT and CRSP before and after matching the data. This table shows that all the variables are positively skewed because of the existence of positive extreme values in the data. These extreme values will not affect the results too much except maybe for the returns[16] which will be taken into consideration later. The table shows that all the variables

[14]Of course there are many records each year, but only one was chosen to indicate the existence of the company at IBES.

[15]The reason for using only the joint information in CRSP and COMPUSTAT is the lack of data about the market equity, in addition we have to use the return from CRSP.

[16]All the variables other than the returns will be used in determining the inclusion of a stock into a specific portfolio. No other analysis will be done on them, so it does not make too much difference how extreme they are.

are positively affected by the reduction of the data, especially the monthly returns. The mean of monthly returns has increased from 0.013 to 0.0221 (almost doubled). The median of monthly returns has changed from 0.004 to 0.012.

Market equity was highly affected by data reduction. The effect of information reduction on the portfolios formed according to market equity will be discussed later. The effect of these changes on the portfolios formed according to book to market cannot be directly measured because of the lack of information about market equity in the COMPUSTAT.

Table (3-3), panels C,D, E and F show the effect of data reduction on the forecasted and actual earnings per share before and after matching the databases. These panels show significant changes of the forecasted and actual EPS. They also emphasise the importance of using the median on the computations using these variables.

After completing matching and merging the databases, a summary of the most important computed variables follows:

- Market equity: Market equity is the value of a company valued at the current prices in the market. It is computed by multiplying the number of shares outstanding and the price. Market equity indicates how big a company is.

- Book to market equity ratio: This is computed by dividing the book equity by the market equity. Book equity is the book value of a company extracted from the company's records at the end of the company's financial year. The book to market ratio indicates how valuable or how cheap a company is. If this ratio is relatively high (low) the company is called value (growth or glamour) company.

- Earnings to price ratio: This is another measure of the value of a company. It is also a measure of expected growth. It is calculated by dividing the earnings before extraordinary items over the market equity. The higher the ratio, the better the position of the company. The companies are called value or growth companies according to how high or low their ratios are.

3.3 Methodology

The aim of this section is to present the methods and the models that will be used in analysing the data to meet the objectives of the research of this thesis. Section 3.3.1 describes how to perform portfolios based on various indicators. Section 3.3.2 describes the construction of the Fama and French three factor model. Section 3.3.3 describes how to get the minimum variance portfolios condition on specific returns, how to get the out of sample returns, and the techniques used to measure the performance of the out of sample returns of any two portfolios. Section 3.3.4 describes how to compute the 1, 2, 3-year, and long-term portfolios' actual earnings per share (EPS) growth rate, forecasted EPS growth rate, and forecast error.

3.3.1 Construction of portfolios

At the end of June of year (t), the researcher created five portfolios based on market equity, book to market ratio and earnings to price ratio. [17] The inclusion of a stock into any of the 5 portfolios depends on computed predetermined breakpoints for each measure. The breakpoints should be known before the portfolios selections using the information on the previous financial year (t-1). The breakpoints for the market equity in June of year (t) use the market equity information at the end of Dec. of year (t-1). The breakpoints of the book to market equity and the earnings to price will use the available information on the book equity and the earnings to price at the end of the financial year (t-1) and the information on the market equity at the end of Dec. of year (t-1). The breakpoints will be used to construct portfolios for one year

[17] This follows the method of Fama and French (1992, 1993, and 1996) in order to compare the results and to be sure that all the computations are correct.

from July of year (t) till June of year (t+1).[18] Only NYSE stocks are used in determining the breakpoints for the market equity as in Fama and French (1992 and 1993). All the stocks are used in determining the breakpoints for the book to market and the earnings to price ratios.[19]

To form the portfolios, book to market and earnings to price with values less than or equal to zero are excluded from the sample. NYSE, AMEX, and NASDAQ stocks are ranked on their book to market and earnings to price ratios, as well as all NYSE stocks on their size. Based on these rankings, 20%, 40%, 60%, and 80% breakpoints are calculated for book to market, earnings to price, and size. Then all the NYSE, AMEX, and NASDAQ stocks are placed into the five groups based on these breakpoints. The stocks less than 20%, 40%, 60%, and 80% and above the 80% book to market and earnings to price (size) breakpoints are designated Low, 2, 3, 4, and High (Small, 2, 3, 4, and Big) respectively.[20]

Table (3-4) shows 10 breakpoints (rather than 5) based on the book to market equity each year from 1926 to 2011. Comparing this table with the breakpoints of Fama and French on the Kenneth French web page we find a great agreement between the numbers in both tables. Any difference happens because of the number of companies available to me, as they use the merged COMPUSTAT/CRSP database, while I use the COMPUSTAT and CRSP separately. These tables show that my computations are in agreement with theirs.[21] The first (last) decile portfolios using the market equity are called small (big) size portfolios while the first (last) decile portfolios using book to market ratio or earnings to price ratio are called growth (value) portfolios.

[18] To evaluate the long term value strategies the breakpoints at year (t) may be used for more than one year .

[19] Using all the stocks in determining the breakpoints for the book to market equity and the earnings to price ratios will give almost the same portfolios' returns. On the other hand it will achieve the balance in the number of stocks in the portfolios. Also these ratios are not affected by the big number of small stocks as that of the market equity.

[20] Since the market equity breakpoints are based only on NYSE firms, there is considerable variation in the number of firms in each of the five portfolios formed in this way.

[21] This data was collected in Sep. 2012. The previous data collection was in April 2011. It does not show these big numbers of collected stocks. They are nearly the same as that of Fama and French. May be the COMPUSTAT has filled the data of the missing stocks on the previous years.

The previous set of rankings allowsthe formation 25 portfolios using the book to market or the size and the earnings to price ratio. All the stocks are placed into the 25 portfolios based on the intersection between the two measures. They show the effect of the size of the stocks on the portfolios based on the book to market or earnings to price.

3.3.2 Minimum variance portfolios

3.3.2.1 Minimum variance frontier

Many researchers claim that the reason why value (small) stocks have more returns than growth (big) stocks is because they are riskier. Conversely, because the value (small) stocks are riskier than growth (big) stocks, they have more returns. One of the goals of this thesis is to test this claim by identifying which portfolio is superior. The idea is to compare the returns of these portfolios at the same levels of variances or vice versa. Doing these comparisons, we can determine whether the value (small) portfolios are superior to the growth (big) portfolios. This can easily be done by getting the relation between the returns and variances of all possible portfolios for each class of stocks (the so called frontier). The conditional minimum variance model is used in order to create the frontiers for the value, growth, and the other stock classes. Conditioned on a specific portfolio's return and no short sale constraint, the model gives the weights that minimise the portfolio's variance. Any frontier of 100 points of portfolio's returns and variances is constructed. The monthly returns are predetermined to range from -.02 to .06. Their corresponding variances are extracted by the model. Next, a detailed explaination of how to get the frontier for each class of stocks.

- Suppose there are N available stocks that belongs to a particular class of stocks (value, small, ...) in month t where $1 \leq t \leq T$ and T is the length of the study period in months. Let r_{it} be the returns of stock i in month t where $1 \leq i \leq N$. The vector of returns at any t that includes all the individual returns is called R_t.

- Starting from time $t = w + 1$ where w is the length of the estimation period and takes the values of 12, 24, 36, 48, 60, or 72, all the available stocks that exist over the period from $t = 1$ till $t = w+1$ are selected. [22] Any stocks that have any missing returns during this period are deleted.

- From the available stocks, a random sample of $n = 100$ stocks are selected.[23] The result is a matrix of returns of 100 stocks (columns) over $w + 1$ months (rows).

- Using the first w rows the stocks' vector of mean returns μ and the variance covariance matrix Σ are estimated. The ith item of μ ,μ_i represents the average returns of stock i over the w months and computed $\mu_i = 1/w \sum_{t=1}^{w} r_{it}$. The ijth item of the Σ, Σ_{ij}, is the covariance between stock i and stock j and computed as $\Sigma_{ij} = 1/(w-1)\sum_{t=1}^{w}(r_{it} - \mu_i)(r_{jt} - \mu_j)$ where $1 \leq i, j \leq n$.

- The next step is to use the minimum variance model to get the stocks weights that minimise the variance of any portfolio at a predetermined portfolio return. The model can be written as,

$$Min\ W_{tk}\Sigma W_{tk}'$$

$$Sub.to \quad \begin{array}{c} W_{tk}\mu' = r_{p_k} \\ W_{tk}1_n = 1 \\ W_{tk} \geq 0 \end{array}$$

  Where W_{tk} is a weight vector constituting of n items resulting from solving the previous system, t is the month of calculation, k is a number index where $1 \leq k \leq 100$, r_{p_k} is the kth value of an arbitrary portfolio return r_p , 1_n is the unit vector of n items, and 0 is the zero vector of n items.

- The previous step is repeated for every arbitrary portfolio return. It is

[22] The data in the month $w + 1$ will be used to get the out of sample returns.
[23] In some cases all the available N stocks are used where there are not enough stocks.

assumed that there are $k = 100$ portfolio returns ranging from -.02 to .06[24]. So the $r_{p_1} = -.02$ and the $r_{p_{100}} = .06$ etc. The result after finishing this step is 100 portfolios' returns, their corresponding minimum variances, and their corresponding weights that solve the model.

- The previous steps are repeated for every following month until the end of the period T. The outcomes of these steps are a matrix of $T - w$ rows and 100 columns of portfolio returns, their corresponding minimum variances, and their corresponding weights that achieve them.

- Averaging each of the previous columns over all months for the matrices of portfolio returns and variances, I got 100 values of in-sample averages of monthly portfolios' returns and their corresponding 100 values of averages of monthly variances.

- Plotting these points to constitute the desired minimum variance frontier.

- All the previous steps for all the desired estimation windows w are repeated.

- All of the previous steps for all types of the portfolios are repeated.

3.3.2.2 Out of sample portfolios returns

Another goal of this study is to determine whether it is valuable to rely on the optimised techniques in selecting the stocks into our portfolios or simply to use the naive portfolios in doing so. The equal weighted out of sample portfolio returns will be compared with that of the minimum variance portfolios. The monthly out of sample optimised portfolios returns were as follows:

- At time $t = w + 1$ with $k = 1$ (the first in sample return), the weights extracted at this time $W_{w+1,1}$ were used with the corresponding vector

[24]If any of the proposed portfolio's returns is not realistic or impossible to be achieved from the data, the nearest possible one will be chosen. So it may be more convenient to write r_{p_k} as $r_{p_{tk}}$ because for example, for each t the first arbitrary portfolio return may not equal to -.02 each time.

of returns R_{w+1} for the selected sample size $n = 100$ to get the out of sample portfolio return $r_{o_{w+1,1}}$ at the point $k = 1$ as follows, $r_{o_{w+1,1}} = W_{w+1,1}R'_{w+1}$.

- The previous step is repeated for all $k = 100$ points and for all months t , $T - w$ months. Finally I will get 100 columns with $T - w$ rows of the out of sample returns.

- Averaging each of the previous columns over the whole period, 100 values of averages of monthly out of sample returns are obtained.

- The in-sample returns with the out of sample returns are ploted.

- All the previous steps are done for all classes of stocks and for all the estimation periods w.

To make the study more precise, the performance of the out of sample returns of the equal weighted portfolios are compared with some selected points on the frontiers. A further comparison is made with the minimum variance portfolios and the portfolios that have a maximum number of stocks. The minimum variance portfolio is selected each month by selecting the portfolio that has the minimum variance of the 100 available portfolios. The returns for these portfolios each month are called r_{min_t}. The maximum number of stocks portfolio is selected each month by selecting the portfolio that has the maximum number of stocks of the 100 available portfolios. The returns for these portfolios are called r_{max_t} .

The monthly out of sample equal weighted portfolio returns at time t is easily obtained by multiplying a constant vector of 100 items of $1/n$ values with the R_t. The resulting portfolio returns are called r_{eq_t}.

3.3.2.3 The out of sample performance measures

To compare the out of sample performance of the equal weighted portfolios with that of the minimum variance portfolios and with that of the maximum number of stocks portfolios, the out of sample Sharp ratio and the certainty equivalent return are used.

- The out of sample Sharp ratio for any strategy s, SR_s ($s = eq,\ min,\ and\, max$) is the mean of the out of sample returns divided by their sample standard deviation:

  $$SR_s = \frac{\mu_s}{\sigma_s} = \frac{mean\, r_{s_t}}{std\, r_{s_t}}.$$

  To test whether the Sharp ratios of any two strategies are statistically distinguishable, the p-value for the difference is computed using the approach used in DeMiguel et al. (2009) assuming that the portfolios' returns are independently and normally distributed over time. Given any two portfolios s and g with $\mu_s,\ \mu_g,\ \sigma_s,\ \sigma_g,\ and\, \sigma_{s,g}$ as their estimated means, variances, and covariance over a period of $T - w$ months, the test statistic for testing the null hypothesis $H_0 : \mu_s/\sigma_s - \mu_g/\sigma_g = 0$ is obtained via the statistic:

  $$Z_{s,g} = \frac{\sigma_g \mu_s - \sigma_s \mu_g}{\sqrt{\vartheta}}.$$

  where

  $$\vartheta = \frac{1}{T-w}\left(2\sigma_s^2\sigma_g^2 - 2\sigma_s\sigma_g\sigma_{s,g} + \frac{1}{2}\mu_s^2\sigma_g^2 + \frac{1}{2}\mu_g^2\sigma_s^2 - \frac{\mu_s\mu_g}{\sigma_s\sigma_g}\sigma_{s,g}^2\right).$$

In addition to the previous measures used to compare the out of sample strategies, the end of the period wealth gained is computed by investing one pound in any strategy.

3.3.3 Earnings per share's forecast error

The purpose of this section is to determine how to compute the 1, 2, 3-year, and long-term portfolios' actual earnings per share (EPS) growth rate, forecasted EPS growth rate, and forecast error.

The supposition here is that the analysts will know the actual EPS three months after the end of the financial year, i. e. after March. Table (3.5) shows the monthly number of forecasts (in thousands) the analysts made for all stocks in this month. The numbers clearly indicate repetitive patterns occur every three months. From these patterns the conclusion is drawn that not all the analysts made their forecasts at the same time and nearly all the analysts present them over a three month period. The numbers also indicate that they revise their previous forecasts every three months. For these remarks, the supposition is that the analysts will do their forecasts within a three month period starting from April, and that they revise their forecasts within the next three month period.

The following are some expressions used in the computations. Suppose that t is the year in which the analysts intend to make their forecasts, d is the gap in months between the actual and forecast times. For example, t = 8 means that there are 8 months between the actual and forecasted EPS.[25] Also, y is the number of counted years.

Act_t, means the actual EPS at year t. The analysts provide this variable.

$AG_{t,y}$, means the y years actual EPS growth rate computed at year t .

$For_{t,d,y}$, means the y years forecasted EPS computed at year t and these forecasts made d months away from t. The analysts provide this variable.

$FG_{t,d,y}$, means the y years forecasted EPS growth rate at year t and made d months away from t.

$FE_{t,d,y}$, means the y years forecasted error of EPS growth rate at year t and made d months away from t.

$FE_{d,y}$, means the average forecasted error of a portfolio.

FG_0, means the average long term forecasted growth per year. The analysts give this variable.

AG_0, means the average long term (5 years) actual growth per year. $AG_0 = (Act_t - Act_{t-5})/abs(Act_{t-5}) * 100/5$.

[25]If d = 8, it means that the analysts make their forecasts 7, 8, and 9 months before the actual earnings announcement date. 8 is used for simplicity.

If d= 8, 5, or 2, it means the analysts make their forecasts for 1 year ahead but on different gaps or revisions. If d= 20, 17, or 14, it means the analysts make their forecasts for 2 years ahead. etc.

FE_0, means the long term forecasted error.

To get the average forecasted errors of a portfolio, the following steps are taken:

- Compute the $AG_{t,y} = (Act_t - Act_{t-y})/abs(Act_{t-y}) * 100$.
- Compute the $FG_{t,d,y} = (For_{t,d,y} - Act_{t-y})/abs(Act_{t-y}) * 100$.
- Compute the $FE_{t,d,y} = FG_{t,d,y} - AG_{t,y}$.
- The portfolio average forecasted errors $FE_{d,y}$ is the average of the forecasted errors of the stocks included in the portfolio.

The long term forecasted error is computed as, $FE_0 = FG_0 - AG_0$.

If the forecasting error is positive, it means the analysts have made a bad error. This situation is called negative surprise. If the forecasting error is negative, we call it positive surprise. The investors will be happy if this happens. To get the reaction of the prices to certain positive or negative surprises of a portfolio, the average returns of the stocks that have this certain surprise are found. For example, to compute the reactions of the stocks that have more than 10% positive surprise, the average of the returns on all stocks that have more than 10% positive surprise should be calculated.

3.4 Conclusion

This chapter considers the analysis of data collection and the used sample. It also offers a comprehensive look into overall methodology that forms the basis of the current programme of research. It explores the use of different research techniques, like the construction of the portfolios, the three factor model, the construction of minimum variance portfolios and the computation of earnings per share forecast error. The detailed results with discussion of the link between the theory and hypothesis are presented in the following chapters.

Table (3-1) Yearly number of stocks before matching COMPUSTAT, CRSP, and IBES databases

Each year I report the number of stocks exsist in COMPUSTAT and CRSP databases for the NYSE, AMEX, and Nsdaq exchanges. Moody, is the number of stocks each year collected by hand from Moody's financial statements by Kenneth French web page. The Total colum, is the sum over all exchanges. The Total row, is the sum over all the years. The numbers of CRSP are the stocks existed at December. The FPI = 1, 2, 3, 4, 5, and 0 are the stocks of whom the analysts made thier forecasts, for the comming 1, 2, 3, 4, 5, and long term years respectively.

Year	COMPUSTAT					CRSP				IBES					
	NYSE	AMEX	Nasdaq	Moody	Total	NYSE	AMEX	Nasdaq	Total	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
1925	0	0	0	464	464	503	0	0	503	0	0	0	0	0	0
1926	0	0	0	492	492	542	0	0	542	0	0	0	0	0	0
1927	0	0	0	513	513	588	0	0	588	0	0	0	0	0	0
1928	0	0	0	578	578	631	0	0	631	0	0	0	0	0	0
1929	0	0	0	632	632	721	0	0	721	0	0	0	0	0	0
1930	0	0	0	647	647	736	0	0	736	0	0	0	0	0	0
1931	0	0	0	619	619	726	0	0	726	0	0	0	0	0	0
1932	0	0	0	620	620	708	0	0	708	0	0	0	0	0	0
1933	0	0	0	623	623	708	0	0	708	0	0	0	0	0	0
1934	0	0	0	628	628	710	0	0	710	0	0	0	0	0	0
1935	0	0	0	647	647	720	0	0	720	0	0	0	0	0	0
1936	0	0	0	694	694	744	0	0	744	0	0	0	0	0	0
1937	0	0	0	718	718	777	0	0	777	0	0	0	0	0	0
1938	0	0	0	710	710	781	0	0	781	0	0	0	0	0	0
1939	0	0	0	710	710	780	0	0	780	0	0	0	0	0	0
1940	0	0	0	731	731	795	0	0	795	0	0	0	0	0	0
1941	0	0	0	739	739	800	0	0	800	0	0	0	0	0	0
1942	0	0	0	737	737	802	0	0	802	0	0	0	0	0	0
1943	0	0	0	745	745	816	0	0	816	0	0	0	0	0	0
1944	0	0	0	785	785	830	0	0	830	0	0	0	0	0	0
1945	0	0	0	801	801	852	0	0	852	0	0	0	0	0	0
1946	0	0	0	851	851	908	0	0	908	0	0	0	0	0	0
1947	0	0	0	894	894	941	0	0	941	0	0	0	0	0	0
1948	0	0	0	920	920	964	0	0	964	0	0	0	0	0	0
1949	0	0	0	928	928	991	0	0	991	0	0	0	0	0	0
1950	423	18	13	954	1408	1015	0	0	1015	0	0	0	0	0	0
1951	464	19	13	962	1458	1031	0	0	1031	0	0	0	0	0	0
1952	469	20	13	981	1483	1046	0	0	1046	0	0	0	0	0	0
1953	474	22	14	702	1212	1046	0	0	1046	0	0	0	0	0	0
1954	487	22	14	700	1223	1052	0	0	1052	0	0	0	0	0	0
1955	498	23	15	698	1234	1057	0	0	1057	0	0	0	0	0	0
1956	512	25	15	683	1235	1056	0	0	1056	0	0	0	0	0	0
1957	529	27	16	679	1251	1078	0	0	1078	0	0	0	0	0	0
1958	566	30	21	660	1277	1068	0	0	1068	0	0	0	0	0	0
1959	581	29	23	669	1302	1088	0	0	1088	0	0	0	0	0	0
1960	776	238	54	596	1664	1117	0	0	1117	0	0	0	0	0	0
1961	971	314	72	485	1842	1146	0	0	1146	0	0	0	0	0	0
1962	1047	367	95	443	1952	1167	889	0	2056	0	0	0	0	0	0
1963	721	164	90	397	1372	1190	880	0	2070	0	0	0	0	0	0
1964	727	156	101	369	1353	1227	904	0	2131	0	0	0	0	0	0
1965	824	214	119	347	1504	1251	905	0	2156	0	0	0	0	0	0
1966	1122	340	145	291	1898	1270	930	0	2200	0	0	0	0	0	0
1967	1257	420	159	221	2057	1259	950	0	2209	0	0	0	0	0	0
1968	1323	487	213	182	2205	1256	962	0	2218	0	0	0	0	0	0
1969	1407	559	239	154	2359	1296	1032	0	2328	0	0	0	0	0	0
1970	1478	663	252	117	2510	1337	1092	0	2429	0	0	0	0	0	0
1971	1530	676	282	110	2598	1402	1151	0	2553	0	0	0	0	0	0

Continuo of table (3-1)

Year	COMPUSTAT					CRSP				IBES					
	NYSE	AMEX	Nasdaq	Moody	Total	NYSE	AMEX	Nasdaq	Total	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
1972	1594	704	320	102	2720	1480	1217	2998	5695	0	0	0	0	0	0
1973	1627	685	341	94	2747	1538	1191	2563	5292	0	0	0	0	0	0
1974	1694	697	558	66	3015	1547	1130	2248	4925	0	0	0	0	0	0
1975	1693	669	581	62	3005	1535	1092	2335	4962	0	0	0	0	0	0
1976	1687	638	602	54	2981	1557	1031	2445	5033	0	0	0	0	0	0
1977	1681	593	621	50	2945	1555	989	2403	4947	0	0	0	0	0	0
1978	1656	547	643	47	2893	1559	912	2402	4873	0	0	0	0	0	0
1979	1631	517	671	41	2860	1542	870	2429	4841	0	0	0	0	0	0
1980	1626	496	751	37	2910	1546	841	2646	5033	0	0	0	0	0	40
1981	1608	479	828	31	2946	1539	832	3044	5415	3	0	0	0	0	354
1982	1623	463	966	27	3079	1505	808	3241	5554	951	441	0	0	0	920
1983	1656	461	1128	24	3269	1523	802	3895	6220	1574	1476	172	1	1	1360
1984	1642	436	1220	24	3322	1519	776	4061	6356	1670	1588	300	139	39	1325
1985	1646	443	1373	37	3499	1523	772	4090	6385	1784	1691	579	340	190	1365
1986	1684	449	1507	19	3659	1554	787	4423	6764	1795	1685	357	13	8	1412
1987	1716	458	1542	10	3726	1617	903	4696	7216	1875	1775	243	20	8	1505
1988	1730	423	1565	7	3725	1650	934	4460	7044	1848	1764	516	281	209	1415
1989	1737	403	1557	8	3705	1681	895	4283	6859	1725	1647	535	255	226	1058
1990	1765	394	1683	3	3845	1729	893	4114	6736	1815	1733	421	82	38	1036
1991	1838	396	1863	4	4101	1851	901	4102	6854	1777	1751	349	50	30	1051
1992	1943	405	2080	3	4431	2056	828	4112	6996	1830	1784	458	173	154	1273
1993	2105	432	2747	3	5287	2315	864	4615	7794	2216	2098	1028	761	762	1819
1994	2175	416	2977	6	5574	2508	828	4919	8255	2566	2603	1149	780	746	2075
1995	2318	418	3341	15	6092	2589	784	5146	8519	3251	3007	1011	405	335	2502
1996	2367	423	3425	28	6243	2780	761	5574	9115	3625	3200	1026	207	54	3281
1997	2301	401	3343	15	6060	2884	772	5556	9212	3816	3783	1426	241	87	4043
1998	2244	394	3615	0	6253	2914	773	5136	8823	6198	6040	3216	462	184	4138
1999	2162	397	3549	0	6108	2809	770	4863	8442	6016	5836	3096	461	194	3516
2000	2059	361	3296	0	5716	2640	823	4767	8230	5561	5383	2741	395	112	2836
2001	1987	335	3118	0	5440	2560	810	4120	7490	4644	4604	2601	365	144	3154
2002	2012	327	3140	0	5479	2558	826	3695	7079	4471	4448	2829	677	183	3150
2003	2063	324	3182	0	5569	2545	834	3351	6730	4345	4391	3307	1225	817	3016
2004	2072	309	3132	0	5513	2613	872	3281	6766	4719	4697	3680	1457	1025	3298
2005	2070	312	3127	0	5509	2680	897	3219	6796	4861	4842	3905	1542	984	3376
2006	2030	336	2995	0	5361	2705	947	3208	6860	5039	4996	4105	1723	1141	3034
2007	1968	353	2837	0	5158	2532	1110	3146	6788	5142	5091	4205	2011	1184	3059
2008	2012	339	2805	0	5156	2451	629	3038	6118	4745	4721	4017	2030	1507	2720
2009	2075	307	2818	0	5200	2413	526	2875	5814	4510	4491	3894	2383	1637	2523
2010	2075	291	2740	0	5106	2450	488	2807	5745	4580	4589	4105	2607	1646	2634
2011	1987	277	2566	0	4830	2472	466	2689	5627	4530	4571	4090	2176	1399	2636
Total	93745	22341	83131	29643	228860	127553	43879	146995	318427	103482	100726	59361	23262	15044	70924

Table (3-2) Yearly number of stocks After matching COMPUSTAT, CRSP, and IBES databases

Each year I report the number of joint stocks that exsist at the same time in both of COMPUSTAT and CRSP databases for the NYSE, AMEX, and Nsdaq exchanges. The Total colum, is the sum over all exchanges. The Total row, is the sum over all the years. The numbers of crsp are the stocks existed at December. The FPI = 1, 2, 3, 4, 5, and 0 are the joint stocksthat exist at the same time in COMPUSTAT, CRSP, and IBES of whom the analysts made thier forecasts, for the comming 1, 2, 3, 4, 5, and long term years respectively.

Year	COMPUSTAT/CRSP				COMPUSTAT/CRSP/IBES					
	NYSE	AMEX	Nasdaq	Total	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
1925	436	0	0	436	0	0	0	0	0	0
1926	470	0	0	470	0	0	0	0	0	0
1927	497	0	0	497	0	0	0	0	0	0
1928	530	0	0	530	0	0	0	0	0	0
1929	602	0	0	602	0	0	0	0	0	0
1930	632	0	0	632	0	0	0	0	0	0
1931	606	0	0	606	0	0	0	0	0	0
1932	610	0	0	610	0	0	0	0	0	0
1933	617	0	0	617	0	0	0	0	0	0
1934	618	0	0	618	0	0	0	0	0	0
1935	630	0	0	630	0	0	0	0	0	0
1936	667	0	0	667	0	0	0	0	0	0
1937	706	0	0	706	0	0	0	0	0	0
1938	705	0	0	705	0	0	0	0	0	0
1939	703	0	0	703	0	0	0	0	0	0
1940	727	0	0	727	0	0	0	0	0	0
1941	733	0	0	733	0	0	0	0	0	0
1942	733	0	0	733	0	0	0	0	0	0
1943	736	0	0	736	0	0	0	0	0	0
1944	769	0	0	769	0	0	0	0	0	0
1945	774	0	0	774	0	0	0	0	0	0
1946	841	0	0	841	0	0	0	0	0	0
1947	882	0	0	882	0	0	0	0	0	0
1948	908	0	0	908	0	0	0	0	0	0
1949	924	0	0	924	0	0	0	0	0	0
1950	956	0	0	956	0	0	0	0	0	0
1951	964	0	0	964	0	0	0	0	0	0
1952	982	0	0	982	0	0	0	0	0	0
1953	917	0	0	917	0	0	0	0	0	0
1954	912	0	0	912	0	0	0	0	0	0
1955	918	0	0	918	0	0	0	0	0	0
1956	903	0	0	903	0	0	0	0	0	0
1957	930	0	0	930	0	0	0	0	0	0
1958	918	0	0	918	0	0	0	0	0	0
1959	944	0	0	944	0	0	0	0	0	0
1960	936	0	0	936	0	0	0	0	0	0
1961	941	0	0	941	0	0	0	0	0	0
1962	932	342	0	1274	0	0	0	0	0	0
1963	678	144	0	822	0	0	0	0	0	0
1964	665	126	0	791	0	0	0	0	0	0
1965	701	169	0	870	0	0	0	0	0	0
1966	858	284	0	1142	0	0	0	0	0	0
1967	862	383	0	1245	0	0	0	0	0	0
1968	889	438	0	1327	0	0	0	0	0	0
1969	940	535	0	1475	0	0	0	0	0	0
1970	980	663	0	1643	0	0	0	0	0	0
1971	1031	700	0	1731	0	0	0	0	0	0

Continuo of table (3-2)

Year	COMPUSTAT/CRSP				COMPUSTAT/CRSP/IBES					
	NYSE	AMEX	Nasdaq	Total	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
1972	1084	750	551	2385	0	0	0	0	0	0
1973	1109	731	563	2403	0	0	0	0	0	0
1974	1104	701	631	2436	0	0	0	0	0	0
1975	1097	680	666	2443	0	0	0	0	0	0
1976	1111	651	695	2457	0	0	0	0	0	0
1977	1101	610	705	2416	0	0	0	0	0	0
1978	1098	563	746	2407	0	0	0	0	0	0
1979	1080	529	765	2374	0	0	0	0	0	0
1980	1081	502	801	2384	0	0	0	0	0	27
1981	1071	486	903	2460	2	0	0	0	0	271
1982	1047	463	979	2489	689	328	0	0	0	673
1983	1052	451	1217	2720	1082	1020	121	1	1	953
1984	1047	417	1339	2803	1070	1037	215	108	25	890
1985	1038	409	1398	2845	1166	1123	409	248	141	918
1986	1040	411	1554	3005	1179	1138	257	6	4	958
1987	1074	432	1614	3120	1226	1175	169	14	4	1029
1988	1085	433	1614	3132	1193	1161	376	209	153	978
1989	1094	412	1579	3085	1149	1119	384	190	169	773
1990	1131	425	1616	3172	1288	1235	321	64	33	781
1991	1199	448	1738	3385	1320	1308	272	38	21	841
1992	1307	453	1894	3654	1403	1374	369	141	126	985
1993	1444	457	2581	4482	1659	1598	809	602	603	1379
1994	1558	428	2784	4770	1804	1833	852	588	572	1520
1995	1610	409	2866	4885	2103	1960	705	317	265	1799
1996	1757	392	3032	5181	2432	2226	737	167	42	2391
1997	1855	395	2962	5212	2526	2516	1016	186	64	2813
1998	1848	390	2816	5054	3866	3794	2140	302	126	2867
1999	1778	385	2839	5002	3727	3665	2027	266	116	2392
2000	1679	362	2849	4890	3546	3469	1834	242	69	2046
2001	1658	338	2658	4654	3253	3231	1888	237	103	2375
2002	1708	333	2564	4605	3313	3291	2157	485	141	2513
2003	1723	336	2469	4528	3294	3310	2541	943	650	2498
2004	1763	338	2479	4580	3536	3521	2850	1150	827	2727
2005	1753	338	2498	4589	3648	3641	3014	1198	763	2755
2006	1740	331	2499	4570	3651	3628	3078	1293	859	2529
2007	1737	345	2492	4574	3710	3692	3182	1514	915	2529
2008	1739	294	2462	4495	3633	3621	3185	1650	1249	2368
2009	1757	264	2447	4468	3691	3681	3274	2002	1393	2278
2010	1818	265	2437	4520	3753	3747	3425	2203	1394	2349
2011	1854	262	2409	4525	3732	3748	3420	1809	1160	2355
total	92642	21403	73711	187756	73644	72190	45027	18173	11988	54560

Table (3-3) Data summary for COMPUSTAT, CRSP, and IBES' variables before and after matching databases.

This table shows the summary statistics for the variables on COMPUSTAT at the end of financial year and for the CRSP at the end of December. CEQ, CSHO, and E of COMPUSTAT mean the common equity (book value), the common shares outstanding, and the earnings before extraordinary items respectively. PRC, RET, ME, and SHROUT of CRSP means the price, the monthly returns, the market equity, and the common shares outstanding respectively. FPI is the forecasted period indicator per years.

Panel A: Before matching

	COMPUSTAT			CRSP			
	CEQ	CSHO	E	PRC	RET	ME	SHROUT
Minimum	-85591	0	-99689	0	-0.938	0	0
1st Qu.	15.22	3.174	0.36	5	-0.056	14.4	2.118
Median	58.58	9.887	4.76	12.88	0.004	61.1	6.382
Mean	771.81	60.851	88.33	23.96	0.013	987.7	33.23
3rd Qu.	256.13	31.651	28.01	25.31	0.07	291.6	20.24
Maximum	224541.6	29058.361	104525	141600	12.5	602432.9	29049.6

Panel B: After matching

	COMPUSTAT			CRSP			
	CEQ	CSHO	E	PRC	RET	ME	SHROUT
Minimum	-15276	0	-99689	0	-0.8542	0	0.006
1st Qu.	20.16	4.031	0.67	7.875	-0.0455	26.4	2.475
Median	70.63	11.629	6.17	16.95	0.012	106.9	8.196
Mean	849.74	67.168	102.79	23.485	0.0221	1437.6	44.198
3rd Qu.	292.5	35.85	34.14	30.25	0.0771	499.9	26.669
Maximum	224541.6	29058.361	45220	4736	6.8788	602432	29049.6

Panel C: IBES: Forecasted EPS: Before matching.

	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
Minimum	-28840000	-6000000	-5000000	-831412	-929225	-797
1st Qu.	0	1	1	1	1	10
Median	1	1	2	2	2	15
Mean	-84	-46	8	212	273	17
3rd Qu.	2	3	3	4	4	20
Maximum	185000	1680000	5960000	4880000	3720000	35049

Panel D: IBES: Forecasted EPS: After matching.

	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5	FPI = 0
Minimum	-111300	-80100	-20250	-511.2	-93.6	-510
1st Qu.	0.07	0.69	0.92	0.83	1.08	10
Median	1.17	1.44	1.88	1.97	2.24	15
Mean	5.32	8.7	7.05	2.72	3.1	16.67
3rd Qu.	2.17	2.51	3.3	3.56	3.94	20
Maximum	46875	53250	56250	12150	1240.8	6884

Cont. table 3-3

Panel E: IBES: Actual EPS: Before matching.

	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5
Minimum	-29320000	-6280000	-5760000	-2275000	-2275000
1st Qu.	0	0	0	0.1	0.1
Median	1	1	1	1.4	1.4
Mean	-102	-86	-157	-292.3	-1089.5
3rd Qu.	2	2	3	3.1	3
Maximum	178000	39300	39300	6000	6280

Panel F: IBES: Actual EPS: After matching.

	FPI = 1	FPI = 2	FPI = 3	FPI = 4	FPI = 5
Minimum	-73350	-73350	-73350	-734	-748.8
1st Qu.	0.4	0.42	0.46	0.17	0.1
Median	1.11	1.17	1.41	1.42	1.42
Mean	2.51	1.32	-1.03	1.41	1.45
3rd Qu.	2.11	2.19	2.66	2.87	2.88
Maximum	39300	39300	39300	98.5	56

Table (3-4) Breakpoints based on book to market equity

I compute The book to market breakpoints at the end of each June. The book equity used in June of year t is the book equity for the last fiscal year end in t-1. Market equity is the price times number of shares outstanding at the end of December of t-1. The breakpoints for year t use all NYSE stocks for which I have market equity for December of t-1 and (positive) book equity for the last fiscal year end in t-1. The table contains every tenth percentile of book to market equity, from 10% to 100%. The n is the number of observations avaailable at year t.

Year	n	10th	20th	30th	40th	50th	60th	70th	80th	90th	100th
1926	436	0.42	0.60	0.70	0.86	1.01	1.21	1.53	2.00	3.13	31.32
1927	470	0.44	0.62	0.78	0.93	1.06	1.23	1.54	2.16	3.48	53.10
1928	497	0.34	0.47	0.63	0.75	0.91	1.11	1.35	1.75	2.72	25.29
1929	530	0.24	0.38	0.51	0.60	0.73	0.89	1.13	1.44	2.36	38.58
1930	602	0.38	0.56	0.74	0.88	1.07	1.37	1.78	2.52	4.74	127.19
1931	632	0.56	0.82	1.09	1.37	1.75	2.40	3.17	4.42	8.21	129.41
1932	606	0.84	1.32	1.86	2.52	3.40	4.82	6.44	9.63	17.18	251.73
1933	610	0.88	1.36	1.93	2.69	3.63	4.83	6.66	9.54	18.24	204.06
1934	617	0.52	0.78	0.99	1.30	1.75	2.23	3.12	4.47	7.68	160.27
1935	618	0.47	0.69	0.91	1.13	1.52	1.96	2.74	4.30	8.34	204.73
1936	630	0.34	0.47	0.63	0.79	1.00	1.29	1.82	2.70	5.70	103.77
1937	667	0.27	0.38	0.50	0.62	0.74	0.90	1.11	1.57	3.23	58.17
1938	706	0.48	0.77	0.98	1.19	1.45	1.85	2.29	3.34	7.05	191.60
1939	705	0.36	0.55	0.72	0.93	1.13	1.40	1.77	2.48	5.50	186.62
1940	703	0.39	0.60	0.77	0.96	1.22	1.53	1.94	2.75	5.24	173.43
1941	727	0.45	0.70	0.89	1.08	1.38	1.73	2.19	3.02	5.91	759.19
1942	733	0.61	0.93	1.13	1.43	1.80	2.25	2.85	3.92	7.98	1250.09
1943	733	0.59	0.90	1.11	1.33	1.66	2.01	2.57	3.47	6.52	345.65
1944	736	0.53	0.71	0.90	1.06	1.26	1.50	1.77	2.33	3.66	117.60
1945	769	0.47	0.59	0.73	0.88	1.01	1.17	1.38	1.75	2.46	55.72
1946	774	0.33	0.44	0.53	0.62	0.70	0.79	0.93	1.19	1.80	19.01
1947	841	0.40	0.53	0.64	0.73	0.85	0.96	1.11	1.37	1.89	22.56
1948	882	0.48	0.65	0.77	0.87	1.02	1.15	1.34	1.57	2.16	28.06
1949	908	0.57	0.78	0.93	1.10	1.25	1.44	1.68	2.05	2.70	60.97
1950	924	0.55	0.72	0.87	1.02	1.18	1.39	1.60	1.93	2.57	66.66
1951	956	0.54	0.70	0.81	0.94	1.06	1.20	1.37	1.59	2.09	29.00
1952	964	0.52	0.67	0.79	0.91	1.05	1.20	1.38	1.63	2.17	22.69
1953	982	0.52	0.66	0.79	0.92	1.07	1.23	1.43	1.75	2.23	28.09
1954	917	0.57	0.74	0.88	1.04	1.22	1.47	1.78	2.14	2.80	36.24
1955	912	0.44	0.56	0.66	0.74	0.89	1.03	1.22	1.47	1.85	15.35
1956	918	0.39	0.53	0.62	0.72	0.82	0.97	1.15	1.38	1.74	62.17
1957	903	0.41	0.53	0.63	0.75	0.88	1.03	1.21	1.48	2.03	52.97
1958	930	0.47	0.63	0.77	0.92	1.11	1.34	1.60	1.99	2.72	89.73
1959	918	0.34	0.46	0.56	0.65	0.77	0.93	1.11	1.33	1.74	14.76
1960	944	0.31	0.44	0.54	0.64	0.74	0.85	1.02	1.26	1.64	21.23
1961	936	0.32	0.43	0.55	0.66	0.77	0.91	1.11	1.45	1.98	34.39
1962	941	0.24	0.36	0.44	0.53	0.64	0.76	0.93	1.21	1.65	41.54
1963	932	0.34	0.44	0.56	0.67	0.78	0.94	1.15	1.42	1.92	417.54
1964	678	0.32	0.43	0.52	0.62	0.72	0.87	1.07	1.33	1.75	366.36
1965	665	0.32	0.40	0.49	0.58	0.67	0.81	0.96	1.21	1.55	417.22
1966	700	0.28	0.37	0.43	0.50	0.59	0.67	0.81	0.96	1.31	489.24
1967	858	0.30	0.43	0.52	0.63	0.72	0.83	0.98	1.21	1.66	493.31
1968	862	0.22	0.32	0.40	0.48	0.54	0.62	0.73	0.86	1.16	362.57
1969	889	0.20	0.28	0.35	0.42	0.47	0.54	0.61	0.70	0.88	240.51
1970	939	0.23	0.37	0.48	0.59	0.66	0.77	0.89	1.10	1.40	261.78
1971	979	0.29	0.44	0.55	0.66	0.76	0.85	1.00	1.19	1.58	389.43

Continuo of table (3-4)

Year	n	10th	20th	30th	40th	50th	60th	70th	80th	90th	100th
1972	1031	0.24	0.36	0.49	0.60	0.71	0.81	0.92	1.11	1.49	289.23
1973	1082	0.22	0.36	0.49	0.61	0.73	0.83	0.96	1.13	1.47	252.71
1974	1108	0.36	0.59	0.81	1.01	1.18	1.36	1.57	1.94	2.64	352.41
1975	1102	0.59	1.02	1.30	1.57	1.80	2.03	2.40	2.97	4.12	662.05
1976	1091	0.47	0.73	0.94	1.13	1.28	1.47	1.71	2.08	2.75	305.95
1977	1104	0.44	0.62	0.77	0.88	1.00	1.10	1.27	1.48	1.93	387.09
1978	1092	0.48	0.66	0.80	0.92	1.01	1.12	1.28	1.51	1.85	181.18
1979	1089	0.48	0.67	0.81	0.97	1.09	1.21	1.37	1.60	1.95	428.67
1980	1073	0.41	0.56	0.71	0.85	0.99	1.14	1.29	1.46	1.83	579.05
1981	1078	0.32	0.48	0.61	0.77	0.93	1.09	1.31	1.48	1.81	591.12
1982	1069	0.40	0.54	0.69	0.81	0.97	1.16	1.31	1.50	1.86	531.82
1983	1040	0.35	0.47	0.61	0.75	0.90	1.03	1.15	1.33	1.60	485.81
1984	1047	0.31	0.41	0.52	0.63	0.74	0.85	0.96	1.08	1.29	469.42
1985	1038	0.37	0.48	0.59	0.70	0.81	0.91	1.01	1.15	1.38	556.99
1986	1025	0.29	0.40	0.49	0.58	0.68	0.76	0.86	0.98	1.21	561.05
1987	1026	0.28	0.40	0.48	0.56	0.63	0.71	0.81	0.94	1.21	208.03
1988	1054	0.29	0.43	0.54	0.65	0.75	0.83	0.95	1.14	1.44	2128.21
1989	1058	0.29	0.40	0.51	0.61	0.69	0.77	0.87	0.99	1.27	3334.66
1990	1069	0.24	0.35	0.44	0.54	0.63	0.71	0.81	0.99	1.27	188.06
1991	1110	0.30	0.43	0.56	0.68	0.78	0.91	1.12	1.45	2.15	701.51
1992	1180	0.21	0.34	0.45	0.54	0.61	0.72	0.83	1.06	1.61	833.77
1993	1281	0.21	0.31	0.41	0.49	0.56	0.63	0.74	0.90	1.31	937.32
1994	1413	0.21	0.31	0.38	0.46	0.54	0.61	0.70	0.83	1.09	390.67
1995	1524	0.25	0.34	0.43	0.51	0.60	0.70	0.79	0.94	1.32	10574.84
1996	1577	0.21	0.30	0.37	0.45	0.53	0.61	0.72	0.84	1.22	1050.07
1997	1725	0.19	0.28	0.36	0.43	0.50	0.57	0.68	0.82	1.25	610.74
1998	1818	0.18	0.25	0.32	0.38	0.45	0.53	0.62	0.77	1.28	545.37
1999	1808	0.17	0.27	0.36	0.45	0.54	0.65	0.81	1.05	1.73	293.34
2000	1743	0.17	0.29	0.39	0.50	0.62	0.75	0.92	1.25	2.09	2638.55
2001	1649	0.17	0.30	0.39	0.48	0.60	0.74	0.98	1.40	3.22	222.14
2002	1622	0.20	0.32	0.41	0.50	0.59	0.71	0.87	1.23	2.86	2432.87
2003	1660	0.24	0.37	0.47	0.57	0.66	0.79	0.97	1.35	3.28	7293.43
2004	1686	0.21	0.31	0.38	0.46	0.53	0.61	0.72	0.91	1.93	604.63
2005	1733	0.20	0.28	0.35	0.42	0.49	0.56	0.65	0.81	1.80	829.92
2006	1718	0.20	0.28	0.35	0.42	0.49	0.58	0.69	0.86	1.55	544.90
2007	1704	0.19	0.27	0.32	0.40	0.48	0.55	0.64	0.79	1.40	366.65
2008	1699	0.18	0.27	0.35	0.44	0.53	0.63	0.76	1.00	1.77	201.62
2009	1672	0.28	0.44	0.56	0.70	0.88	1.05	1.36	1.91	4.33	732.03
2010	1695	0.22	0.36	0.44	0.55	0.65	0.79	0.95	1.24	2.51	1039.07
2011	1755	0.21	0.32	0.40	0.49	0.60	0.71	0.85	1.11	2.07	728.99

Chapter 4

Revisiting Fama and French

This chapter firstly examines the existence of the value and size premiums in the most recent period, from July 1992 to June 2011, with comparison of the whole period from July 1927 to June 2011 and the sub-period from July 1972 to June 1992. The period after 1992 witnessed the producion of many articles about the value and size premiums following the famous Fama and French articles (1992 and 1993). Secondly, the question of whether there is any seasonal effect on the value and size premiums is examined alongside of whether the book to market and size effect are results of the January effect in recent years compared to previous years. Attention is also paid to whether the value (size) premium observed among large and small stocks (growth and value stocks) are different and whether they are related to the January effect. In the third section, the effect of data selection bias caused by choosing only the joint stocks in the COMPUSTAT and CRSP in constructing portfolios based on the size and book to market is researched. In other words, is there an effect of unselected CRSP stocks on the size and value premiums?

4.1 The value and size premiums in the post-1992 period

In this section, the value and size premiums at different periods of time will be compared. What happens to the value and size premiums in recent times, i.e. from July 1992 to June 2011 compared to the past period from 1972 to 1992 is an interesting questions. The choice of 1992 as a starting point makes sense for many reasons. This period witnessed a growing number of publications about value and size premiums after the famous articles by Fama and French (1992 and 1993). This period will indicate whether the growing information about the value and size premiums will eliminate them according to the efficient market hypothesis or whether they will not be affected by being of interest for a long period of time. The other reason for choosing this period is the increasing number of stocks published by databases in recent years compared to previous years - as shown in Tables (3-1) and (3-2)- which may affect the results. For example, the COMPUSTAT added about 700 stocks more in 1993, than in 1992. Another reason to choose 1972 rather than 1963, like Fama and French (1992 and 1993), is that there were no Nasdaq stocks before 1972 which were characterised by the inclusion of small stocks. This confirms the conclusion that stocks before 1963 were biased towards the most successful stocks as reported by Fama and French (1996). The entire period is used to get a whole figure for the size and value premiums.

Table (4-1) reports the average monthly equal weight returns for 25 portfolios formed independently on the size and book to market equity for three periods of time. The whole period, which starts from July 1927 to June 2011 (hereafter 1927 to 2011), The sub period from July 1972 to June 1992 (hereafter 1972 to 1992), and the sub period from July 1992 to June 2011 (hereafter 1992 to 2011). The table also shows the average monthly equal weight returns of 5 portfolios formed on the book to market (the All row) and the 5 portfolios formed on the size (the All column). It also shows the value (size) premium which is the difference between the 5th and 1st (1st and 5th) quintile portfolios based on book to market (market equity) indicator irrespective of the size (book to market). The table shows as well the t statistic for testing the significance of the portfolio returns and the value and size premiums.

Table (4-1) panel A shows that over the period from 1927 to 2011 and regardless of the size of the companies (the All row), there is a monotonic significant increase of the average monthly returns from growth portfolio (1st quintile, low book to market portfolio) towards the value portfolio (5th quintile, high book to market portfolio). This behaviour led to a significant monthly value premium of 0.59%. The same behaviour happened in reverse for the portfolios sorted on the market equity regardless of the effect of the book to market indicator (the All column). The portfolios that include small companies have more returns than the portfolios of big companies. This leads to a significant monthly size premium of 0.59%. The value and the size premium are equal in amount.

Table (4-1) panel A also shows the average monthly returns of the 25 portfolios formed on the intersection between the size and book to market for the whole period. It shows the average returns of the book to market within the size quintiles and the average returns of the size within the book to market quintiles. There is a realized pattern of the returns of these 25 portfolios that the returns increase when moving from growth to value stocks at any size. Also the returns decrease when moving from the small portfolios towards the big size portfolios. The (H-L) column is the value premium for a size quintile, which is the difference between the average returns on the highest book to market portfolio (high column) and the average returns on the lowest book to market portfolio (low column) of a size quintile. Similarly, the size premium (S-B row) for a book to market quintile is the difference between the average returns of the small and big portfolios for any of the book to market quintiles. The monthly value premium is declining monotonically from small size portfolios to the large size one. For large size quintiles (4 and 5), the value premium is just 0.19 and 0.23 percent per month which is insignificant. But the value premium for the small size quintiles (1 and 2) is economically and statistically significant. It ranges from 0.76% to 0.37% per month. There is also a monotonically increasing size premium over the book to market indicator where the value stocks have a significant 0.67% monthly size premium and the growth stocks have a 0.10% insignificant monthly size premium.

Over the whole period there are significant value and size premiums. There is a significant value premium for small companies while there is no evidence for a significant value premium for the big companies. There is also a significant size premium through the value companies while there is no evidence of the size premium for growth companies. So, it is better for the investor to choose from the small value stocks rather than any other type of stocks.

The previous results are well known in the literature over different periods of time (see for example, Fama and French (1992, 1993, 2006), Lakonishok, Shleifer, and Vishny (1994), Loughran(1997), Daniel and Titman (1997), and Chou, Das, and Roa (2011)).

Loughran (1997) concludes that value premium is related only to small stocks. Fama and French (2006) conclude that the results that the value premium is particular to small stocks is just a result of a specific period from 1963 to 1995 and a result of choosing the book to market indicator as a measure for value. But when they use the earning to price as another indicator for value they find that big stocks also have a significant value premium.

Table (4-1) panel B shows the average monthly equal weight returns for the 25 portfolios for the sub period from 1972 to 1992. The table shows higher returns than that of the whole period indicating that the whole period may be affected by the small number of companies in the years before 1972. The total monthly value premium (row 1 and H-L column) has increased by 0.15% (from 0.59% to 0.74%). The total size premium is still the same at 0.59%. The value premium across the size quintiles (H-L column) has changed its pattern to be significantly increasing from the smallest to the biggest size except for the mega stocks (big portfolio) which have an insignificant value premium. Although the size premium through book to market portfolios (S-B row) increased in amount, only the value portfolios have a significant size premium.

Panel C of Table (4-1) shows the average monthly returns for the 25 portfolios over the the period from 1992 to 2011. It confirms the existence of a significant total value and size premium (0.71% and 0.63% respectively) in recent times as in the past. What changes is the decline in value and size premium across the big and growth stocks respectively. The value premium is only significant for the smallest size portfolios (quintile 1) while it is no longer significant for the rest of the quintiles. Value premium for the smallest size has increased from 0.43% to 0.63% when comparing the 1972 to 1992 and 1992 to 2011 periods. The size premium is only significant for the value stocks (quintiles 4 and 5). The size premium over the value stocks (quintile 5) also has increased by 0.16% (from 0.73% to 0.89%) in comparing these two periods.

There is no change in the behaviour of the total size and value premiums of the 1992 - 2011 period compared to that of the 1972 - 1992 period. When controlling for the book to market indicator there is no signifiant change in the behaviour of the size premium. But when controlling for size, the value premium is highly changed in the 1992-2011 period compared to that of the 1972-1992 period. Only the smallest size value premium is significant. The other four value premiums over the size are not significant. This result contradicts Fama and French's (1992 and 1993) results and gives more evidence in favour of Loughran's (1997) results.

4.2 The January Effect

Whether the value and size premiums are just results of the January effect in recent years as well as in previous years is assessed. Several previous studies have highlighted the importance of January in explaining the value and size premium. Banz (1981) and Kim (1983) find that the small stocks have higher returns than large stocks and the size premium occurs mainly in January. Danial and Titman (1997) examine the returns patterns of size and book to market sorted portfolios over the period from 1963 to 1993: they show that there is an important interaction between the size and book to market effects and that the returns patterns are different in January and non-January months. They show that the size effect is almost exclusively a January phenomenon and the book to market phenomenon occurs mainly in January for the large stocks. Loughran (1997) reports that the size and book to market explain none of the cross-sectional variations in returns for the three largest size quintiles during 1963 to 1995 once January is excluded from the sample. Chou, Das, and Rao (2011) found that large stocks have a significant value premium only in January and this high January value premium among large stocks is mainly driven by loser stocks at the turn of the year. In contrast with large stocks, the value premium for small stocks occurs only in non-January months.

Next, the effect of January and non January months on the returns of the book to market and the size comparing their behaviour in different periods of time is discussed.

4.2.1 Book to market effects in January and non January months

Table (4-2) shows the average returns each month for 5 portfolios formed based on the book to market equity. It also shows the average monthly returns of portfolios for 11 months (non-January months, all months excluding January) and the average monthly returns for all months. Panel A of Table (4-2) shows the returns for the whole period from 1927 to 2011. It is interesting to realize the great impact of January on the book to market portfolios during this period. The January returns monotonically increase from growth stocks to value stocks, the same as non-January and total returns. The January returns explain 26, 27, 27, 31, and 38 percent of the total book to market returns of the five book to market portfolios respectively. The returns of October, November, and December change the book to market behaviour. They decrease monotonically from growth stocks towards value stocks. The higher returns of value stocks than that of growth stocks in January looks like a recovery from the long reversed process. It is also interesting to note that only September and October have negative book to market portfolio returns through all the deciles and all the other months have positive returns. Overall the non-January months play a significant role in explaining the returns of the book to market portfolios. The January value premium explains 57% of the yearly value premium and the non-January months explain 43%. Only February, April, and July have significant value premiums within the non-January months. The three consecutive months - October, November, and December- have a negative value premium.

Panel B shows the average returns each month for the period from 1972 to 1992. The January returns for the 5 quintiles increased by about 2% more than the whole period which plays a more important role in explaining the returns of the book to market during this period (39, 39, 35, 37, 42 percent for the 5 quintiles respectively). For the growth stocks (quintile 1) the total non-January returns, despite being positive in most cases, are not significant. The January value premium explains 45% of the yearly value premium, which reduces by 12% from the whole period. Only March has a significant value premium. In total, the non-January months explain 55% of the yearly value premium.

Panel C of Table (4-2) shows significant changes of the monthly returns of the book to market quintiles during the period from 1992 to 2011. The January returns for the 5 book to market quintiles becomes very low and even insignificant for the first three quintiles. The January returns only explain 13% and 16% of the total yearly returns of value portfolios (quintiles 4 and 5 respectively), which is very low compared to 37% and 42% in the previous period. The returns of April and December become more important in explaining the returns of the book to market portfolios than the returns of January. The January value premium is no longer significant in explaining the yearly value premium. It is only July that shows a significant value premium as a result of negative returns on the growth portfolio. September and October no longer have negative returns but have negative value premiums.

The conclusion is that during the 1972-1992 period, the returns of January play the biggest role in explaining the returns of the book to market portfolios and the total value premium. This role becomes very small in the recent period. The value premium for January in the recent period is insignificant and no longer explains a great portion of the total value premium.

4.2.2 Size effect in January and non January months

Table (4-3) shows the average returns every month for 5 quintile portfolios formed on the market equity. Panel A shows the returns for the period from 1927 to 2011. The January returns are significant for the the 5 quintiles but monotonically decrease from the small portfolios towards the big portfolios. Although the total monthly returns (the All row) have the same behaviour as the January returns, the total non-January does not have a specific pattern and is almost fixed over the quintiles. Mainly, the January returns are responsible for the monotone behaviour of the size quintiles. The January returns for small companies explain 42% of the yearly small companies' returns. There are significant non-January returns distributed through many months especially in November and December for big stocks. The size premium is highly concentrated in January. The January size premium explains 85% of the yearly size premium. It is only January and February that cause the size premium phenomenon while all the other months have insignificant or negative size premium. The last three consecutive months (October, November and December) have a negative size premium. The size premium for the total non-January months is very low and insignificant.

The same pattern occures in panel B for the sub period from 1972 to 1992 except that the January portfolios have about 1% more returns over the 5 quintile portfolios and the most significant returns are concentrated in January and December. The January returns explain 88% of the yearly returns.

Again, as in the book to market portfolios, the situation changes in panel C for the recent period from 1992 to 2011. The returns of January become very low if compared to the 1972-1992 period. It only becomes significant for the small portfolios (quintile 1) and only explains 20% of the total yearly returns compared to 46% of the 1972-1992 period. The non-January returns play an important role in explaining the yearly returns of small stocks. The significant non-January months are concentrated only in April and December. The January returns no longer explain any of the returns of the neutral and big portfolios. The size premium for January, although becoming very low (3.49%), explains 46% of the yearly size premium. The remaining size premiums are caused by non-January months. July and September have significant size premiums.

One can conclude that in the recent period (1992-2011) the January returns no longer have an important effect on the total returns over the size quintiles except for the smallest size quintile. Although the January size premium explains 46% of the total size premium, it is reduced by half compared to the value of the 1972-1992 period.

4.2.3 The interaction between the size and book to market and January effect

In general, the previous sections demonestrate that the portfolios of small companies have more returns than the big companies during January and this difference makes a significant size premium. Also that value companies have more returns than growth companies in January and lead to a significant value premium for the whole period and the 1972 to 1992 period. In this section the interaction between the size and book to market indicators on the returns of January and non-January months are explored. In other words, what will happen to the returns of the book to market (size) portfolios after controlling for the size (book to market) in January and non-January months;

also, whether there are value premiums for the small and big stocks in January and non-January months and whether there are size premiums for the growth and value portfolios in January and non-January months.

Table (4-4) shows the average returns of the portfolios made on the interaction between the size and book to market effect in January. In general for all periods, the smallest size portfolios have very significant high returns over all the 5 book to market quintiles if compared to the other size portfolios. There is also no value premium in January for the smallest size or for the three sample periods. This means that the investor will get high returns from investing in any of the small size book to market portfolios and is indifferent about choosing any of them. There are also significant size premiums over all the book to market quintiles over the three periods. These size premiums have their biggest value on the growth stocks (except for the recent period which has nearly similar premiums).

Panels A and B of Table (4-4) show that the returns monotonically decreased from the small size towards the big size portfolios for all the book to market portfolios, generating a very rapid decreasing behaviour which differs from that shown in Table (4-1). The situation of panel C is different where there is no behaviour for the returns and only the smallest size portfolios have significant returns whereas all other sizes have insignificant returns. The behaviour of value premium over the size has changed. It increases rather than decreases as in Table (4-1). The significant value premiums exist only for the big stocks as reported in the literature by Daniel and Titman (1997), Loughran (1997), and Chou, Das, and Roa (2011). In the recent period, panel C of Table (4-4), the January value premium no longer exists for all the five size quintiles. Also, it is not significant for the total value premium (H-L row 1). There is no evidence for the existence of the January value premium during the recent period from 1992 to 2011.

Table (4-5) shows the average monthly returns of 11 months (non -January) for portfolios formed on the intersection between the size and book to market equity. The table shows different figures to that of Table (4-4). The returns of the book to market deciles across the size deciles no longer have a powerful decreasing pattern resulting in insignificant size premiums over the book to market deciles for all periods (except for the value portfolio in the period from 1992 to 2011). The value premium decreases from the smallest size to the biggest. The value premium is only significant for the smallest size portfolios for the non-January months.

Although the size premium is a phenomena caused largely by January returns for all periods, in the recent period the non-January returns have also had a great impact on the size premium. The size premium of growth stocks in January is higher than or at least equal to that of value stocks which contradict the all months results. There are no value premiums for January across any of the size quintiles in the recent period. This makes the value premium for the small size quintile a result of non-January months.

4.3 Robustness check

Fama and French (2006) use the earnings to price indicator as a robustness check for the evidence of the existence of the value premium for big stocks. They found that the big stocks have significant value premium in the case of using the earnings to price as an indicator for value. Chou, Das, and Roa (2011) use the earnings to price to confirm that the value premium for the small size portfolios is a result of the non-January effect. In this section the earnings to price ratio is used as a measure of value to confirm the changes of behaviour of the value premium on January and non-January months during the recent period from 1992 to 2011 compared to that of the 1972-1992 period.

Table (4-6) panels A and B show the returns of the 5 earnings to price portfolios every month. They show that the returns of January for the 5 portfolios play an important role in explaining the total returns during the period from 1972 to 1992. This role becomes very weak in the recent period from 1992 to 2011. For the two periods, the January value premium is not significant. It has only a value of 0.46 per month in the recent period compared to 1.57 in the past period. The table gives more evidence that the January value premium is no longer important in explaining the total value premium.

Panels C and D of Table (4-6) show the average monthly returns of the 25 portfolios based on the intersection between the earnings to price and size for the two periods. They confirm that the value premium for the big stocks is not significant. Panel D gives more evidence of the decreasing value premium for small stocks during the recent period. The value premium is no longer significant even for the smallest size portfolio.

Panels E and F of the table show the interaction between the size and earnings to price indicators during January for the two periods. They show that the January value premium for small stocks in both periods has negative values rather than positive ones. They show that the value premium for small size portfolios is not due to the January effect. They also give further evidence that there is no value premium on big stocks during January, contradicting the previous literature.

Panels G and H give the returns for all months except January. They confirm that value premium for small stocks is a cause of non-January months. Combining panel F and H of the table shows that the negative value premium for the small stocks of panel F led to the insignificant value premium of the small stocks in panel D.

These results, using the earnings to price as a measure of value, confirm the declining importance of the value premium on the 1992-2011 period compared to the 1972-1992 period.

4.4 Monthly distribution of the size and value premium

Chou, Das, and Roa (2011) argue that, “If the value premium of large stocks is due to underlying risk, then the value premium should be evenly distributed among all months, not only January". So the risk premium should be time invariant. They also argue that the absence of value premium in non-January months for large stocks will support the behavioral explanation for the value premium. Table (4-7) panel A shows the distribution of the monthly value premium on the small and big portfolios. It confirms the findings of Chou et al (2011) that the January effect on value premium for small and big portfolios is different and the value premium for large stocks only occurs in January. Chou et al (2011) conclude that because of that, the risk compensation story is not suitable for explaining the value premium. Panels B and C in Table (4-7) for the sub periods contradict the whole period findings. In panel B not only does January have a significant value premium for large stocks but also August is also significant. In panel C, January no longer plays a role in explaining value premium for big companies. For small companies the January effect is not significant in any period.

The table, explains why Table (4-5) shows that the non-January months have no significant value premium for big stocks because the negative and positive value premiums during the 11 months cancel each other out, resulting in no value premium.

In the same way, the question arises, is the size premium is time invariant? Tables (4-3) and (4-4) show that the size premium is mainly a January effect, and the average of the non-January months have little effect on the size premium except for the large stocks in recent years. Table (4-8) shows something different; it shows the distribution of monthly size premiums across the book to market deciles in detail for non-January months as well as for the month of January. The table shows that February has a great impact in explaining the size premium for value stocks.

The table confirms the findings regarding the positive and negative size premium canceling each other out during the non-January months, resulting in no size premium for these months. Because there is no significant negative size premium for value stocks during the period from 1992 to 2011, the size premium is economically significant.

4.5 The COMPUSTAT selection bias

In this section, the question whether the COMPUSTAT selection bias affects the returns of the value and size premium arises. Tables (3-1) and (3-2) show that there are differences in the number of observations collected by the CRSP and the COMPUSTAT. There is a reduction of the data after matching both of them. The effect of this reduction on the characteristics of basic variables is presented in Table (3-3). Our concern lies with measuring the effect of this data reduction on the returns of portfolios based on the size and book to market indicators.

Kothari, Shanken, and Sloan (1995) claim that the book to market effect is due to selection bias on the COMPUSTAT data files. They argue that there are two types of survivorship related to how the COMPUSTAT includes its firms over the years. The first type is back filling the companies that are discovered to do well for at least 5 years when expanding the database. The second type arises when delisting the companies that have financial difficulties for a period of time and including them again when they are doing well. They argue that the companies that are not included in the COMPUSTAT are the firms that have low market value relative to book value and are likely to perform poorly. They find that - although the standard deviations of the market equity deciles for the COMPUSTAT companies and the non-COMPUSTAT companies (not on the COMPUSTAT but on the CRSP) are the same and despite the low market equity for the non-COMPUSTAT deciles - the non-COMPUSTAT companies have lower significant returns than that of COMPUSTAT. This results do not appear to be limited to the extremely small companies. Despite these results, they find no significant difference between the market equity deciles using the COMPUSTAT and the CRSP (including the companies not in the COMPUSTAT) databases.

Wang (2000) claims that the size effect is not an asset pricing anomaly and can be largely explained by the data truncation caused by survival bias. It partly affects the book to market effect. He argues that the small stocks are more likely to drop out from the sample because they have more volatile returns, they are likely to go bankrupt, and they are less likely to meet the stock exchanges' minimum capitalization requirements for listing. He argues that for the NYSE and AMEX of the period from 1926 to 1995, 3%, 10%, 17%, and 30% of the companies drop out within 1, 2, 3, and 5 years respectively. Excluding the small stock that does poorly (about 3% of the companies each year) returns reach 19.9% to 21.3% for the small size portfolio.

The effect of the data reduction (survivorship bias) on the market equity portfolios can be directly measured by using all the data on the CRSP not only the joint the COMPUSTAT and the CRSP data. It is a real test for the data selection bias of the COMPUSTAT. If the returns on the CRSP's market equity portfolios do not change compared to that of the Joint COMPUSTAT/CRSP, there is no chance to support the belief that the size effect is due to survival bias. Also there will be no evidence that the unselected CRSP stocks are poor performance stocks. The results of Wang (2000) are very weak and, if one statistically compares these results, there will be no statistical difference. Only 1.4% change of the returns of small stocks and no change in the returns of big stocks will not highly affect the significance of the difference.

Unfortunately, one can not directly measure the effect of the data reduction for the book to market indicator because there is no book to market information on the dropped COMPUSTAT data. Instead, new breakpoints based on the market equity using all the available NYSE companies on CRSP will be calculated. The new breakpoints will be used to measure the effect on the interaction between the size and book to market indicators. Changing the breakpoints for market equity will change the inclusion of the stocks of the portfolios and this will change the portfolio returns. If the returns of the portfolios do not change significantly, will be a good evidence against the survival bias effect.

In this section, only the results for the 1972 to 1992 and the 1992 to 2011 periods are computed where the period before the mid 1970s is biased towards the bigger and more mature firms as discussed by Fama and French (1996), Chan et al. (1995), and Kothari et al. (1994). This period also has comparatively fewer joint companies and may affect the results by just including them in the analysis.

Table (4-9) panel A shows the average monthly number of stocks for the size quintiles based on the joint COMPUSTAT/CRSP stocks and the stocks of CRSP for the two periods. Panel B of the table shows the number of missing stocks on the joint COMPUSTAT/CRSP data. The table shows that there is large number of missing stocks by COMPUSTAT. The small portfolios have a much higher number of missing stocks than the big stocks. But still there are high percentages of missing stocks on big portfolios. this confirms the finding that there is a high survival bias between the small stocks on the COMPUSTAT database. The next analysis will investigate the effect of these missing stocks on the returns of the size portfolios.

Panels C and D in Table (4-9) show the monthly distribution of the average returns of the 5 market equity portfolios using all the CRSP stocks and using the COMPUSTAT/CRSP breakpoints. The panels show the same results as panels B and C in Table (4-3). The January returns of the 5 portfolios for the period from 1972 to 1992 explain good portions of the total returns. In the period from 1992 to 2011, the January returns are very weak compared to the previous period and not important in explaining the total returns (except for the smallest quintile). The low returns of big stocks lead to a highly significant size premium in January, especially for the 1972-1992 period, which explains 87% percent of the total size premium. The size premium for the recent period in January explains only 46% of the total size premium.

To make the picture clearer about the changes of the returns resulting from adding the missing CRSP stocks, Panels E and F from Table (4-9) show the average monthly difference of the returns and size premiums, of portfolios based on the joint COMPUSTAT/CRSP stocks and portfolios based on all CRSP stocks for the two periods. The positive changes mean that the returns of all CRSP stocks are higher than that of joint COMPUSTAT/CRSP stocks. So there is no selection bias on COMPUSTAT data. If the excluded stocks from COMPUSTAT are the small and poor performance stocks, one expects to find significant negative differences on small stocks rather than big stocks.

Panel E for the period from 1972 to 1992 shows negative differences for all the quintiles for all non-January and all months (the last two rows). These negative differences are highly significant for the second and fourth size quintiles. Also, most of the returns of the table are negative and there are no significant positive values. This indicates that the COMPUSTAT database for this period is biased towards the good performance stocks and has a survival bias on its data.

Panel F for the period from 1992 to 2011 shows something different. The differences of the smallest and biggest portfolios for non-January and all months (the last two rows) are positive but insignificant. Also, most of the changes for these portfolios are positive (however insignificant). The other quintiles (2, 3, and 4) show more negative differences than positive differences, but the total changes for these portfolios are insignificant. So, there is no evidence of the effect of the survival bias on the returns for the recent period compared to the previous period. This may be a result of the lower percentage of the missing stocks for the recent period (36.3%) than that of the previous period (51.4%) as shown in panel B. These results show that the survival bias is a period specific effect and does not affect the COMPUSTAT data in the recent period.

It is hard to measure the effect of COMPUSTAT data reduction on the book to market portfolios. There is no data of the book equity for the missing COMPUSTAT data. This effect can be indirectly measured on the interaction between the book to market and the size by assigning new breakpoints for the market equity using all NYSE stocks of CRSP. The portfolio returns of the interaction between the size (based on the new breakpoints) and the book to market will differ from that of the size (based on the COMPUSTAT/CRSP breakpoints) and the book to market. The number of stocks will not change for this experiment. What will change is the distribution of the stocks on the deciles because of the new breakpoints.

The new breakpoints using only the NYSE stocks will achieve the balance between the small and big stocks. Panel A in Table (4-9) shows that there are more small stocks than big stocks on CRSP. So when making new breakpoints based on all NYSE/CRSP stocks we expect the changes on panel A, Table (4-10). This panel shows the 5 quintile breakpoints using COMPUSTAT/CRSP stocks and all CRSP stocks for the 1972/1992 and 1992/2011 periods. Because of the bigger number of small stocks of NYSE/CRSP than that of NYSE/CRSP/COMPUSTAT, the breakpoints for the CRSP stocks become less than that of the CRSP/COMPUSTAT. This will affect the distribution of the stocks on the portfolios as shown in panels B and C. The panels show the average monthly number of stocks included in the portfolios, based on the intersection between the size and book to market using COMPUSTAT/CRSP and CRSP breakpoints for the periods from 1972 to 1992 and from 1992 to 2011. They show that the number of stocks on the smallest portfolios on CRSP become less than that of CRSP/COMPUSTAT. The rest has been distributed to the other size quintiles. The changes in the recent period are more sound than those of the 1972/1992 period. The number of stocks of the smallest size portfolios has decreased by about 100 stocks for every book to market quintile.

The effect of these changes on the returns of the size and book to market portfolios is shown on Table (4-11), panels A to F. They show the returns using the CRSP breakpoints of all months, January, and non-January months, for the two periods. We can get the same conclusions on the returns and premiums from these panels as the correspond panels of Tables (4-1), (4-4), and (4-5), except for a few changes. To make these changes clear, panels from G to L show the difference of the returns on these panels and the corresponding panels of Tables (4-1), (4-4), and (4-5). These panels give the difference between the returns using COMPUSTAT/CRSP and the CRSP based portfolios.

The reduced number of stocks on the smallest portfolios lead to an increase in the returns of the book to market portfolios. This increasing of the returns is very clear for the period from 1992 to 2011. There is a significant increase of the returns on all the small book to market portfolios. The increasing returns of growth small stocks is bigger than the value small stocks which leads to a reduction of value premium for small stocks.

There is also an increase in the January returns for small stocks across the book to market portfolios. This increase is highly significant for the 1992/2011 period. In contrast, most of the changes (however insignificant) are negative for the big book to market portfolios. It is reflected in the significance of the size premiums across the book to market quintiles. The non-January changes are insignificant (but negative) for the smallest size book to market portfolios.

The previous results show that most of the stocks excluded from the COMPUSTAT database are small stocks which have a negative influence on the portfolio returns. The effect of excluded COMPUSTAT stocks is strongly limited to the 1972 to 1992 period. They show an insignificant effect on the portfolios of the 1992 to 2011 period.

New breakpoints based on the NYSE/CRSP stocks give a positive increase in the book to market portfolios through small stocks. This effect is highly realized in the month of January.

4.6 Conclusion

One of the main aims of this chapter is to evaluate the performance of the value premium on the post-1992 period compared to the pre-1992 period. Using only book to market in constructing the portfolios, no changes of the value premium over the two periods are found. After controlling for size, the value premium exists only for the smallest size quintile on the recent period. There is no signignificant value premium for the remaining four quintiles. This finding is also supported by using earnings to price as another measure of value instead of the book to market. This contradicts the famous work of Fama and French (1992 and 1993) and supports the work of Loughran (1997). It shows that the value premium changes over time.

The second aim of this chapter is to investigate whether the value premium is a result of January returns. Significant changes on the value premium of January on the recent and old period are discovered. The January value premium on the post-1992 period is about three times less than that of the pre-1992 period. Excluding January from the monthly returns does not show any significant changes on the total value premium. But, after controlling for size, it appears that the value premium of the smallest size quintile is caused by January returns on the pre-1992 period. There is no effect of January returns on the post-1992 period for the smallest size quintile.

Table (4-1) Average monthly returns for 25 portfolios formed on size and book to market

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average monthly returns for book to market (size) portfolios irrespective of the size (book to market). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of monthly differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. T statistic for H-L (S-B) is the average monthly difference divided by the standard error. T statistic for the rest is the average monthly divided by the standard error.

Panel A: July 1927 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.95	1.08	1.24	1.31	1.54	0.59		4.62	5.46	6.2	6.26	6.31	4.46
	Small	1.51	0.97	1.17	1.39	1.47	1.73	0.76	6.11	3.35	3.98	5.66	6.33	6.88	3.6
	2	1.17	0.91	1.08	1.27	1.3	1.28	0.37	5.22	3.6	4.95	5.86	6.09	5.12	2.64
Size	3	1.12	0.95	1.14	1.14	1.19	1.29	0.34	5.36	4.27	5.51	5.76	5.65	5.25	2.34
	4	1.03	0.87	0.99	1.15	1.15	1.1	0.23	5.18	4.31	5.19	5.77	5.33	4.19	1.38
	Big	0.92	0.87	0.95	1.01	0.97	1.07	0.19	5.15	4.8	5.32	5.37	4.72	4.27	1.2
	S-B	0.59	0.1	0.22	0.37	0.5	0.67		4.14	0.88	1.07	2.46	3.39	4.26	

Panel B: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.03	1.2	1.4	1.49	1.77	0.74		2.37	3.04	3.88	4.34	4.54	3.35
	Small	1.59	1.43	1.41	1.57	1.57	1.86	0.43	3.78	2.93	3.17	3.88	4.1	4.52	2.05
	2	1.25	0.97	1.14	1.38	1.43	1.48	0.51	3.21	1.95	2.77	3.65	4.16	3.9	2.02
Size	3	1.15	0.79	1.09	1.23	1.32	1.57	0.79	3.15	1.77	2.8	3.59	4.08	4.1	3.09
	4	1.15	0.86	1.1	1.18	1.35	1.67	0.81	3.25	2.1	2.94	3.39	4.2	4.54	3.52
	Big	1	0.9	1.01	1.06	1.3	1.12	0.22	3.11	2.45	2.93	3.33	4.36	3.21	0.75
	S-B	0.59	0.53	0.39	0.51	0.27	0.73		2.19	1.63	1.5	1.95	1.03	2.32	

Panel C: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.04	1.21	1.25	1.39	1.75	0.71		2.46	3.5	4.09	4.68	5.4	3.04
	Small	1.57	1.28	1.39	1.38	1.52	1.91	0.63	4.63	2.77	3.55	4.3	5.01	5.76	2.51
	2	1.18	0.97	1.16	1.25	1.31	1.41	0.44	3.24	2.09	3.09	3.66	3.95	3.87	1.46
Size	3	1.12	1.05	1.13	1.16	1.16	1.24	0.19	3.12	2.28	3.06	3.55	3.49	3.57	0.63
	4	1.06	0.96	1.15	1.15	1.11	1	0.04	3.08	2.19	3.42	3.5	3.43	2.86	0.14
	Big	0.94	0.87	1	1.1	0.99	1.02	0.15	2.9	2.42	3.18	3.46	2.85	3.14	0.56
	S-B	0.63	0.41	0.39	0.27	0.53	0.89		2.85	1.36	1.35	1.11	1.98	3.48	

Table (4-2) Average returns each month for 5 portfolios formed on book to market

At the end of June of year t, I form 5 equal weight portfolios as sorts of NYSE, AMEX, and Nasdaq stocks into five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row is average monthly returns (over all months) for book to market portfolios . The Non January row is average non January months returns (over all months except January) for book to market portfolios . H-L is the value premium for a month estimated from the time series differences each month between the average of the returns for the highest book to market quintile and the average of the returns for the lowest book to market quintile. T statistic for H-L is the average monthly difference divided by the standard error. T statistic for the rest is the average each month divided by the standard error.

Panel A: July 1927 to June 2011

Month	Book to market						t statistic					
	Low	2	3	4	High	H-L	Low	2	3	4	High	H-L
January	2.96	3.45	4.03	4.92	6.97	4.01	4.63	5.45	5.82	7.04	7.89	7.01
February	0.57	0.92	1.12	1.19	1.79	1.23	0.97	1.75	2.24	2.3	2.93	2.82
March	0.7	0.92	1.07	1.04	1.28	0.58	1.1	1.5	1.64	1.57	1.63	1.54
April	1.04	1.12	1.54	1.43	1.89	0.85	1.28	1.44	1.94	1.71	2.12	2.25
May	0.43	0.54	0.59	0.59	0.69	0.25	0.58	0.72	0.74	0.69	0.73	0.56
June	0.52	0.73	0.67	0.99	1.04	0.51	0.74	1.07	1.02	1.38	1.29	1.37
July	1	1.27	1.51	1.91	2.44	1.43	1.37	1.76	2.09	2.55	2.86	3.27
August	1.05	1.22	1.41	1.2	1.23	0.18	1.51	1.74	2.01	1.69	1.52	0.44
September	-0.42	-0.38	-0.33	-0.22	-0.38	0.04	-0.54	-0.49	-0.43	-0.27	-0.4	0.08
October	-0.14	-0.19	-0.29	-0.36	-0.77	-0.63	-0.16	-0.24	-0.39	-0.49	-0.95	-1.61
November	1.87	1.62	1.64	1.51	0.98	-0.88	2.52	2.44	2.54	2.2	1.24	-1.86
December	1.81	1.76	1.92	1.5	1.27	-0.55	3.81	3.74	3.81	2.8	1.83	-1.25
Non January	0.77	0.87	0.99	0.98	1.04	0.27	3.55	4.19	4.76	4.54	4.21	2.13
All	0.95	1.08	1.24	1.31	1.54	0.59	4.62	5.46	6.2	6.26	6.31	4.46
Non Jan. * 11	8.47	9.57	10.89	10.78	11.44	2.97						
All * 12	11.4	12.96	14.88	15.72	18.48	7.08						
Jan. / All * 12	0.26	0.266	0.271	0.313	0.377	0.566						

Panel B: July 1972 to June 1992

Month	Book to market						t statistic					
	Low	2	3	4	High	H-L	Low	2	3	4	High	H-L
January	4.86	5.59	5.94	6.53	8.83	3.98	2.78	3.4	3.58	4.03	4.61	3.42
February	1.53	1.85	2.16	2.16	3.22	1.69	1.18	1.55	2.2	2.2	2.79	1.88
March	1.34	1.74	2.02	2.39	3.11	1.76	1.01	1.42	1.73	2.21	2.47	3.25
April	0.93	1.19	1.6	1.29	1.72	0.79	0.82	1.22	1.81	1.5	2.1	1.46
May	1.45	1.59	1.58	1.48	1.62	0.17	1.19	1.41	1.53	1.54	1.57	0.36
June	0.67	1.16	1.16	1.43	1.62	0.95	0.71	1.35	1.47	1.89	2.2	1.74
July	0.24	0.45	0.69	0.94	1	0.76	0.16	0.36	0.69	1.15	0.98	1.06
August	0.27	0.28	0.63	0.63	0.86	0.59	0.17	0.2	0.48	0.51	0.68	1.06
September	-1.47	-1.17	-0.86	-0.58	-0.59	0.88	-1.09	-1.03	-0.88	-0.68	-0.67	1.4
October	-0.92	-1.24	-1.21	-1.37	-2.07	-1.15	-0.36	-0.55	-0.61	-0.74	-1.04	-1.2
November	2.02	1.6	1.5	1.72	0.99	-1.03	1.17	1.06	1.08	1.35	0.74	-1.38
December	1.52	1.35	1.6	1.21	0.99	-0.53	1.53	1.39	1.75	1.41	0.97	-0.92
Non January	0.69	0.8	0.99	1.03	1.14	0.45	1.56	2.04	2.81	3.14	3.14	2.16
All	1.03	1.2	1.4	1.49	1.77	0.74	2.37	3.04	3.88	4.34	4.54	3.35
Non Jan. * 11	7.59	8.8	10.89	11.33	12.54	4.95						
All * 12	12.36	14.4	16.8	17.88	21.24	8.88						
Jan. / All * 12	0.393	0.388	0.354	0.365	0.416	0.448						

Continuo of table (4-2)

Panel C: July 1992 to June 2011

Month	Book to market						t statistic					
	Low	2	3	4	High	H-L	Low	2	3	4	High	H-L
January	1.83	1.33	1.46	2.1	3.31	1.48	1.49	1.35	1.62	2.36	3.12	1.89
February	-0.77	0.18	0.42	0.38	1.14	1.91	-0.52	0.18	0.46	0.42	1.26	1.68
March	0.92	1.85	2.06	1.73	2.09	1.17	0.76	1.92	2.29	2.13	2.15	1.78
April	2.33	2.8	2.78	2.63	3.55	1.22	1.44	2.09	2.37	2.17	2.85	1.3
May	2.04	1.88	1.92	2.03	2.07	0.03	1.38	1.6	1.89	2	1.87	0.04
June	0.09	0.08	0.09	0.4	0.7	0.61	0.07	0.08	0.1	0.44	0.68	0.89
July	-0.59	0.19	0.55	0.99	1.47	2.06	-0.4	0.14	0.46	0.87	1.31	2.99
August	0.18	0.23	0.26	0.45	0.64	0.46	0.12	0.17	0.22	0.41	0.53	0.63
September	1.08	0.74	0.79	1.14	1.02	-0.07	0.66	0.52	0.64	1.04	0.79	-0.09
October	0.92	0.62	0.06	0.16	0.29	-0.62	0.52	0.41	0.05	0.13	0.21	-0.79
November	2.06	1.92	1.71	1.74	1.76	-0.3	1.13	1.37	1.4	1.39	1.38	-0.32
December	2.36	2.69	2.94	2.92	2.95	0.59	2.39	3.61	4.69	5.23	4.42	0.76
Non January	0.97	1.2	1.23	1.33	1.61	0.64	2.16	3.27	3.8	4.22	4.74	2.62
All	1.04	1.21	1.25	1.39	1.75	0.71	2.46	3.5	4.09	4.68	5.4	3.04
Non Jan. * 11	10.67	13.2	13.53	14.63	17.71	7.04						
All * 12	12.48	14.52	15	16.68	21	8.52						
Jan. / All * 12	0.147	0.092	0.097	0.126	0.158	0.174						

Table (4-3) Average returns each month for 5 portfolios formed on size

At the end of June of year t, I form 5 equal weight portfolios as sorts of NYSE, AMEX, and Nasdaq stocks into five market equity groups (using the NYSE quintile breakpoints). The market equity (number of shares outstanding times the price) is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row is average monthly returns (over all months) for book to market portfolios . The Non January row is average non January months returns (over all months except January) for size portfolios . S-B is the size premium for a month estimated from the time series differences each month between the average of the returns for the smallest size quintile and the average of the returns for the biggest size quintile. T statistic for S-B is the average monthly difference divided by the standard error. T statistic for the rest is the average each month divided by the standard error.

Panel A: July 1927 to June 2011

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	7.62	4.49	3.12	2.48	1.64	5.99	8.29	5.64	4.66	4.04	3.12	10.04
February	1.74	0.93	0.79	0.68	0.29	1.45	2.75	1.67	1.51	1.38	0.61	3.42
March	1.15	0.86	0.92	0.74	0.74	0.41	1.54	1.21	1.39	1.15	1.31	1.03
April	1.61	1.37	1.4	1.2	1.38	0.23	1.74	1.58	1.68	1.49	1.88	0.56
May	0.82	0.42	0.44	0.4	0.53	0.29	0.84	0.47	0.53	0.53	0.8	0.51
June	0.86	0.68	0.67	0.7	0.74	0.13	1.05	0.93	0.95	1	1.18	0.31
July	2.01	1.42	1.48	1.53	1.46	0.55	2.48	1.72	1.88	2.06	2.13	1.4
August	1.06	1.41	1.38	1.49	1.3	-0.24	1.29	1.82	1.85	2.12	1.9	-0.61
September	-0.2	-0.5	-0.39	-0.59	-0.86	0.66	-0.22	-0.59	-0.49	-0.78	-1.27	1.56
October	-0.51	-0.52	-0.22	-0.12	0.4	-0.91	-0.61	-0.64	-0.27	-0.16	0.57	-2.27
November	1.05	1.8	1.84	1.79	1.66	-0.61	1.27	2.42	2.65	2.72	2.78	-1.31
December	0.91	1.72	2	2.02	1.83	-0.92	1.33	2.83	3.91	4.23	4.38	-1.93
Non January	0.95	0.87	0.94	0.9	0.86	0.09	3.84	3.76	4.29	4.3	4.53	0.71
All	1.51	1.17	1.12	1.03	0.92	0.59	6.11	5.22	5.36	5.18	5.15	4.14
Non Jan. * 11	10.45	9.57	10.34	9.9	9.46	0.99						
All * 12	18.12	14.04	13.44	12.36	11.04	7.08						
Jan. / All * 12	0.421	0.32	0.232	0.201	0.149	0.846						

Panel B: July 1972 to June 1992

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	8.76	5.63	4.19	3.61	2.54	6.22	4.43	3.04	2.5	2.16	1.84	4.9
February	3	1.91	1.39	1.23	0.64	2.36	2.33	1.67	1.35	1.25	0.71	2.48
March	2.77	1.69	1.53	1.18	1.08	1.69	2	1.38	1.35	1.17	1.39	1.9
April	1.49	1.23	0.98	0.89	0.99	0.51	1.57	1.29	1.04	0.97	1.14	0.91
May	1.68	1.15	1.26	1.49	1.52	0.17	1.42	1.05	1.21	1.43	1.68	0.2
June	1.26	1.08	1.23	1.17	1.09	0.17	1.55	1.3	1.5	1.41	1.45	0.44
July	1.01	0.6	0.53	0.32	0.22	0.79	0.88	0.5	0.47	0.28	0.22	1.15
August	0.16	0.62	0.86	1.43	1.13	-0.98	0.11	0.44	0.6	1.03	0.83	-1.07
September	-0.84	-0.95	-0.94	-0.9	-1.37	0.53	-0.84	-0.88	-0.89	-0.88	-1.36	1.21
October	-2.14	-1.61	-1.06	-0.47	0.62	-2.76	-0.99	-0.76	-0.52	-0.24	0.33	-2.7
November	1.17	1.98	1.97	1.97	1.65	-0.49	0.77	1.32	1.39	1.42	1.38	-0.63
December	0.75	1.71	1.87	1.89	1.83	-1.08	0.71	1.75	2.17	2.13	2.37	-1.4
Non January	0.94	0.86	0.87	0.93	0.86	0.08	2.37	2.24	2.4	2.63	2.63	0.34
All	1.59	1.25	1.15	1.15	1	0.59	3.78	3.21	3.15	3.25	3.11	2.19
Non Jan. * 11	10.34	9.46	9.57	10.23	9.46	0.88						
All * 12	19.08	15	13.8	13.8	12	7.08						
Jan. / All * 12	0.459	0.375	0.304	0.262	0.212	0.879						

Continuo of table (4-3)

Panel C: July 1992 to June 2011

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	3.83	0.44	-0.01	0.3	0.34	3.49	3.36	0.4	-0.02	0.31	0.41	4.64
February	0.66	-0.27	-0.38	0.01	-0.57	1.24	0.68	-0.25	-0.34	0.01	-0.56	1.46
March	1.54	1.8	1.84	1.94	1.79	-0.24	1.56	1.81	1.9	1.61	1.66	-0.28
April	2.59	2.9	3.19	3.09	3.01	-0.42	1.98	2.07	2.19	2.32	2.52	-0.48
May	2.25	1.88	1.92	1.97	1.69	0.56	1.83	1.42	1.56	1.88	1.69	0.82
June	0.66	0.63	-0.1	-0.62	-1.07	1.72	0.61	0.6	-0.11	-0.71	-1.31	2.18
July	0.89	-0.13	-0.17	0.3	0.44	0.46	0.74	-0.09	-0.12	0.24	0.39	0.73
August	0.51	0.45	0.48	0.21	0.11	0.4	0.39	0.33	0.36	0.16	0.09	0.64
September	1.46	1.01	0.76	0.18	0.06	1.4	1.18	0.71	0.51	0.12	0.04	2.41
October	0.33	0.02	0.53	0.38	1.35	-1.03	0.23	0.01	0.36	0.24	0.92	-1.42
November	1.59	2	2.15	2.07	2.17	-0.58	1.14	1.37	1.48	1.58	1.7	-0.76
December	2.51	3.46	3.23	2.89	1.91	0.6	3.51	4.4	4.12	3.95	2.92	0.89
Non January	1.36	1.25	1.22	1.13	0.99	0.37	3.87	3.24	3.21	3.09	2.88	1.66
All	1.57	1.18	1.12	1.06	0.94	0.63	4.63	3.24	3.12	3.08	2.9	2.85
Non Jan. * 11	14.96	13.75	13.42	12.43	10.89	4.07						
All * 12	18.84	14.16	13.44	12.72	11.28	7.56						
Jan. / All * 12	0.203	0.031	-0	0.024	0.03	0.462						

Table (4-4) Average January returns for 25 portfolios formed on size and book to market

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average January returns for book to market (size) portfolios irrespective of the size (book to market). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of January differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. T statistic is the average January difference divided by the standard error.

Panel A: January: July 1927 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		2.96	3.45	4.03	4.92	6.97	4.01		4.63	5.45	5.82	7.04	7.89	7.01
	Small	7.62	8.3	7.5	6.1	6.75	8.46	0.16	8.29	6.59	6.29	6.92	8.15	8.86	0.26
	2	4.49	4.47	3.85	4.05	4.61	5.62	1.16	5.64	4.96	5.19	5.13	6.08	6.33	2.35
Size	3	3.12	2.34	2.82	2.85	3.63	4.39	2.05	4.66	3.39	4.22	4.4	5.44	5.45	4.37
	4	2.48	1.59	2.19	2.59	3.23	4.13	2.54	4.04	2.54	3.66	4.02	5.11	5.06	4.53
	Big	1.64	1.1	1.51	1.89	2.19	3.24	2.14	3.12	2.06	2.9	3.26	3.52	3.83	3.23
	S-B	5.99	7.2	5.98	4.21	4.56	5.23		10.04	6.82	5.9	7.53	7.96	9.15	

Panel B: January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		4.86	5.59	5.94	6.53	8.83	3.98		2.78	3.4	3.58	4.03	4.61	3.42
	Small	8.76	8.31	7.88	7.86	7.94	9.88	1.57	4.43	4.02	4.35	4.46	4.5	4.93	1.63
	2	5.63	5.38	5.1	5.66	5.78	6.64	1.27	3.04	2.4	2.83	3.14	3.38	3.78	1.23
Size	3	4.19	2.57	4.5	4.3	4.68	5.86	3.29	2.5	1.47	2.71	2.7	2.9	3.57	3.51
	4	3.61	1.94	3.48	3.93	4.77	5.64	3.71	2.16	1.17	2.16	2.3	3.19	3.05	4.7
	Big	2.54	1.52	2.7	2.82	3.6	4.56	3.04	1.84	1.04	1.88	2.19	3.03	3.05	3.27
	S-B	6.22	6.8	5.18	5.04	4.34	5.32		4.9	4.76	4.81	4.85	3.86	4.06	

Panel C: January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.83	1.33	1.46	2.1	3.31	1.48		1.49	1.35	1.62	2.36	3.12	1.89
	Small	3.83	4.57	3.6	3.22	3.34	4.32	-0.26	3.36	2.77	2.72	2.97	3.13	3.89	-0.24
	2	0.44	0.51	0.62	-0.09	0.74	1.06	0.55	0.4	0.36	0.54	-0.08	0.74	0.94	0.56
Size	3	-0.01	0.13	-0.3	-0.06	-0.1	0.41	0.28	-0.02	0.11	-0.3	-0.07	-0.13	0.39	0.34
	4	0.3	0.86	-0.1	0.16	0.18	0.23	-0.64	0.31	0.67	-0.12	0.19	0.23	0.2	-0.62
	Big	0.34	0.69	0.06	0.17	-0.3	0.14	-0.55	0.41	0.76	0.08	0.2	-0.29	0.13	-0.57
	S-B	3.49	3.89	3.53	3.06	3.65	4.18		4.64	3.58	2.93	3.57	3.06	4.35	

Table (4-5) Average non January returns for 25 portfolios formed on size and book to market

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average non January returns for book to market (size) portfolios irrespective of the size (book to market). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of non January differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. T statistic is the average non January difference divided by the standard error.

Panel A: Non January: July 1927 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.77	0.87	0.99	0.98	1.04	0.27		3.55	4.19	4.76	4.54	4.21	2.13
	Small	0.95	0.31	0.59	0.96	0.99	1.12	0.81	3.84	1.08	2.02	3.82	4.2	4.46	3.77
	2	0.87	0.58	0.83	1.02	1	0.88	0.3	3.76	2.24	3.65	4.56	4.55	3.44	2.04
Size	3	0.94	0.82	0.99	0.98	0.97	1	0.18	4.29	3.52	4.55	4.75	4.4	3.93	1.2
	4	0.9	0.81	0.88	1.01	0.96	0.82	0.02	4.3	3.78	4.4	4.88	4.23	3	0.09
	Big	0.86	0.85	0.9	0.93	0.85	0.87	0.02	4.53	4.43	4.76	4.7	3.96	3.34	0.1
	S-B	0.09	-0.54	-0.3	0.03	0.14	0.25		0.71	-2.19	-1.52	0.17	0.92	1.61	

Panel B: Non January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.69	0.8	0.99	1.03	1.14	0.45		1.56	2.04	2.81	3.14	3.14	2.16
	Small	0.94	0.81	0.82	1	0.99	1.13	0.32	2.37	1.68	1.89	2.55	2.73	3.01	1.55
	2	0.86	0.58	0.78	1	1.04	1.01	0.44	2.24	1.16	1.9	2.69	3.14	2.75	1.7
Size	3	0.87	0.63	0.79	0.95	1.02	1.19	0.56	2.4	1.36	2	2.8	3.22	3.1	2.15
	4	0.93	0.77	0.89	0.94	1.04	1.31	0.55	2.63	1.81	2.33	2.72	3.29	3.68	2.35
	Big	0.86	0.85	0.86	0.9	1.09	0.81	-0.03	2.63	2.22	2.44	2.76	3.59	2.32	-0.11
	S-B	0.08	-0.04	-0.04	0.1	-0.1	0.32		0.34	-0.13	-0.15	0.39	-0.41	1.03	

Panel C: Non January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.97	1.2	1.23	1.33	1.61	0.64		2.16	3.27	3.8	4.22	4.74	2.62
	Small	1.36	0.98	1.19	1.21	1.35	1.69	0.71	3.87	2.06	2.92	3.62	4.3	4.91	2.77
	2	1.25	1.01	1.21	1.37	1.36	1.44	0.43	3.24	2.06	3.04	3.81	3.89	3.75	1.35
Size	3	1.22	1.14	1.26	1.27	1.28	1.32	0.18	3.21	2.32	3.21	3.65	3.59	3.59	0.56
	4	1.13	0.97	1.26	1.24	1.19	1.07	0.1	3.09	2.09	3.54	3.54	3.46	2.91	0.34
	Big	0.99	0.89	1.08	1.19	1.1	1.1	0.21	2.88	2.3	3.24	3.51	3.02	3.23	0.78
	S-B	0.37	0.09	0.11	0.02	0.25	0.59		1.66	0.3	0.37	0.09	0.94	2.31	

Table (4-6) Average monthly returns for 25 portfolios formed on size and earnings to price

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five earnings to price groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The earnings (Earnings is the income before extraordinary items minus dvidends on preferred stocks if available, plus deffered tax from income statements), is for the end of calendar year t-1. The market equity (= price) is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive earnings. The All row (column) is average monthly returns for book to market (size) portfolios irrespective of the size (earnings to price). H-L (S-B) is the value premium (size premium) for a size (earnings to price) group estimated from the time series of monthly differences between the average of the returns for the highest earnings to price (lowest size) quintile within a size (earnings to price) quintile and the average of the returns for the lowest earnings to price (biggest size) quintile. T statistic for H-L (S-B) is the average monthly difference divided by the standard error. T statistic for the rest is the average monthly divided by the standard error.

Panel A: July 1972 to June 1992

Month	Earnings to price						t statistic					
	Low	2	3	4	High	H-L	Low	2	3	4	High	H-L
January	5.59	5.12	5.69	6.02	7.16	1.57	3.15	3.23	3.32	3.63	3.99	1.84
February	1.69	1.91	2.37	2.41	2.75	1.06	1.35	1.75	2.37	2.57	2.57	1.42
March	1.39	1.67	2.06	2.28	2.59	1.2	1.02	1.4	1.87	2.06	2.27	2.38
April	0.98	1.36	1.43	1.65	1.65	0.67	0.92	1.41	1.65	1.92	1.93	1.37
May	1.62	1.6	1.7	1.47	1.62	-0.01	1.36	1.47	1.65	1.57	1.64	-0.02
June	0.84	1.21	1.36	1.6	1.44	0.6	0.91	1.49	1.73	2.12	1.85	1.18
July	0.34	0.8	0.89	0.92	1.15	0.8	0.23	0.6	0.81	1.12	1.39	1
August	0.5	0.8	0.55	0.66	1.27	0.76	0.33	0.59	0.42	0.52	0.97	1.39
September	-1.6	-0.97	-0.48	-0.36	-0.63	0.96	-1.25	-0.87	-0.48	-0.38	-0.65	1.55
October	-1.38	-0.67	-0.95	-0.9	-1.36	0.02	-0.55	-0.3	-0.48	-0.5	-0.72	0.02
November	1.69	1.86	1.66	1.75	1.72	0.03	1.03	1.28	1.15	1.32	1.32	0.05
December	1.11	1.8	1.53	1.65	1.41	0.31	1.13	1.83	1.56	1.83	1.55	0.78
Non January	0.66	1.04	1.1	1.19	1.24	0.58	1.52	2.69	3.11	3.62	3.6	3.18
All	1.07	1.37	1.48	1.6	1.73	0.66	2.48	3.59	4.09	4.66	4.77	3.64
Non Jan. * 11	7.26	11.44	12.1	13.09	13.64	6.38						
All * 12	12.84	16.44	17.76	19.2	20.76	7.92						
Jan. / All * 12	0.435	0.311	0.32	0.314	0.345	0.198						

Panel B: July 1992 to June 2011

Month	Earnings to price						t statistic					
	Low	2	3	4	High	H-L	Low	2	3	4	High	H-L
January	1.47	1.13	0.81	1.06	1.93	0.46	1.3	1.24	1.02	1.21	2.06	0.86
February	-0.41	0.35	0.46	0.31	0.94	1.35	-0.32	0.4	0.55	0.34	1.05	1.44
March	1.49	1.99	2.01	1.92	2	0.51	1.38	2.3	2.47	2.37	2.11	0.97
April	2.68	2.99	2.95	2.93	3.55	0.87	1.83	2.61	2.69	2.75	3.01	1.19
May	2.39	1.93	1.91	1.95	1.85	-0.54	1.83	1.94	2.22	2.3	1.69	-0.94
June	0.25	0.27	0.29	0.66	0.48	0.23	0.23	0.29	0.34	0.78	0.55	0.41
July	-0.3	0.82	0.97	1.16	1.47	1.77	-0.22	0.74	0.94	1.14	1.26	3.58
August	0.6	0.46	0.56	0.47	0.59	-0.01	0.41	0.38	0.53	0.48	0.48	-0.02
September	1.15	0.84	0.84	1.15	1.28	0.13	0.81	0.71	0.79	1.14	1	0.26
October	0.75	0.42	0.34	0.36	0.39	-0.37	0.49	0.32	0.28	0.32	0.28	-0.7
November	1.9	1.61	1.58	1.78	1.85	-0.05	1.21	1.35	1.52	1.72	1.53	-0.07
December	2.6	2.83	2.65	2.7	3.18	0.58	3.47	5.15	5.48	5.27	5.55	0.96
Non January	1.19	1.32	1.32	1.4	1.6	0.41	3.01	4.16	4.57	4.96	4.84	2.16
All	1.21	1.3	1.28	1.37	1.62	0.41	3.24	4.34	4.69	5.11	5.21	2.31
Non Jan. * 11	13.09	14.52	14.52	15.4	17.6	4.51						
All * 12	14.52	15.6	15.36	16.44	19.44	4.92						
Jan. / All * 12	0.101	0.072	0.053	0.064	0.099	0.093						

Continuo of table (4-6)

Panel C: All months: July 1972 to June 1992

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.07	1.37	1.48	1.6	1.73	0.66		2.48	3.59	4.09	4.66	4.77	3.64
	Small	1.61	1.36	1.7	1.7	1.75	1.85	0.48	3.96	2.95	3.96	4.19	4.52	4.75	3.24
	2	1.37	1.05	1.4	1.51	1.52	1.61	0.56	3.58	2.13	3.24	3.96	4.45	4.45	2.24
Size	3	1.26	0.83	1.2	1.3	1.44	1.58	0.75	3.48	1.77	3.15	3.53	4.39	4.43	2.77
	4	1.2	0.87	1.16	1.25	1.46	1.41	0.54	3.4	1.96	3.17	3.55	4.41	3.9	1.94
	Big	1.02	0.92	1.07	1.18	1.25	1.34	0.42	3.2	2.4	3.09	3.63	3.95	4.07	1.49
	S-B	0.59	0.45	0.63	0.51	0.5	0.5		2.29	1.38	2.25	1.96	2.05	1.8	

Panel D: All months: July 1992 to June 2011

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.21	1.3	1.28	1.37	1.62	0.41		3.24	4.34	4.69	5.11	5.21	2.31
	Small	1.53	1.45	1.48	1.4	1.48	1.74	0.29	5.26	4.16	4.72	5.18	5.57	5.56	1.93
	2	1.35	1.29	1.33	1.27	1.38	1.57	0.28	4.06	3.12	3.91	3.94	4.48	4.66	1.18
Size	3	1.27	1.28	1.35	1.23	1.15	1.36	0.08	3.83	2.93	4.03	4.03	3.68	4.03	0.31
	4	1.15	1.04	1.2	1.21	1.22	1.24	0.2	3.59	2.52	3.69	4.01	4.14	3.54	0.86
	Big	0.99	0.91	0.99	1.05	1.17	1.18	0.27	3.22	2.37	3.41	3.64	3.85	3.45	1.27
	S-B	0.54	0.54	0.49	0.35	0.31	0.56		2.8	2.26	2.13	1.59	1.46	2.71	

Panel E: January: July 1972 to June 1992

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		5.59	5.12	5.69	6.02	7.16	1.57		3.15	3.23	3.32	3.63	3.99	1.84
	Small	8.19	8.86	7.9	7.7	7.53	8.47	-0.4	4.2	4.3	4.06	3.87	4	4.56	-0.74
	2	5.59	5.17	5.29	5.6	5.61	5.72	0.54	3.07	2.24	3.25	3.12	3.47	3.16	0.48
Size	3	4.21	3.18	3.51	4.45	4.41	5.51	2.33	2.51	1.64	2.29	2.62	2.82	3.54	2.12
	4	3.54	2.45	2.69	3.61	4.29	4.56	2.11	2.11	1.35	1.89	2.34	2.86	2.42	1.71
	Big	2.51	2.1	2.16	2.71	4.04	4.3	2.2	1.81	1.42	1.54	2.04	2.82	3.14	1.93
	S-B	5.68	6.76	5.75	4.99	3.5	4.16		4.61	4.01	4.57	4.22	3.37	3.98	

Panel F: January: July 1992 to June 2011

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.47	1.13	0.81	1.06	1.93	0.46		1.3	1.24	1.02	1.21	2.06	0.86
	Small	2.65	3.6	2.91	2.15	2.24	2.8	-0.81	2.62	2.84	2.53	2.25	2.24	2.78	-1.54
	2	0.14	0.3	0.22	-0.07	-0.05	0.68	0.38	0.14	0.26	0.2	-0.07	-0.05	0.7	0.59
Size	3	-0.05	-0.03	0.06	-0.17	-0.22	0.41	0.44	-0.06	-0.03	0.06	-0.21	-0.26	0.49	0.54
	4	0.14	0.32	0.45	-0.09	-0.02	0.06	-0.26	0.15	0.24	0.46	-0.12	-0.02	0.06	-0.27
	Big	0.29	0.56	0.24	-0.01	0.03	0.63	0.07	0.35	0.51	0.33	-0.02	0.04	0.57	0.11
	S-B	2.36	3.05	2.67	2.16	2.21	2.17		3.87	3.88	2.83	2.74	3.05	2.83	

Continuo of table (4-6)

Panel G: Non January: July 1972 to June 1992

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.66	1.04	1.1	1.19	1.24	0.58		1.52	2.69	3.11	3.62	3.6	3.18
	Small	1.02	0.68	1.14	1.15	1.23	1.25	0.56	2.65	1.55	2.75	3	3.34	3.42	3.64
	2	0.99	0.67	1.04	1.14	1.15	1.24	0.57	2.64	1.38	2.37	3.04	3.45	3.53	2.21
Size	3	0.99	0.62	0.99	1.01	1.17	1.23	0.61	2.75	1.29	2.54	2.77	3.61	3.46	2.19
	4	0.99	0.73	1.02	1.04	1.21	1.12	0.4	2.81	1.6	2.71	2.92	3.65	3.21	1.41
	Big	0.89	0.81	0.97	1.04	1	1.07	0.26	2.73	2.05	2.73	3.13	3.16	3.22	0.91
	S-B	0.13	-0.13	0.16	0.11	0.23	0.17		0.55	-0.44	0.63	0.44	0.96	0.62	

Panel H: Non January: July 1992 to June 2011

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.19	1.32	1.32	1.4	1.6	0.41		3.01	4.16	4.57	4.96	4.84	2.16
	Small	1.43	1.26	1.35	1.34	1.41	1.65	0.39	4.7	3.48	4.15	4.72	5.12	5	2.5
	2	1.46	1.38	1.43	1.39	1.51	1.65	0.27	4.16	3.15	3.99	4.11	4.72	4.63	1.07
Size	3	1.38	1.4	1.47	1.35	1.28	1.45	0.05	3.95	3.02	4.14	4.18	3.84	4.02	0.17
	4	1.25	1.1	1.26	1.33	1.33	1.34	0.24	3.66	2.54	3.69	4.13	4.27	3.63	1.01
	Big	1.06	0.94	1.05	1.15	1.28	1.23	0.29	3.22	2.31	3.42	3.73	3.94	3.42	1.29
	S-B	0.37	0.31	0.29	0.19	0.13	0.42		1.87	1.27	1.26	0.83	0.62	1.96	

Table (4-7) Monthly distribution of the value premium on 5 size portfolios

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The value premium for small stocks on January, for example, estimated from the time series of January differences between the average of the returns for the highest book to market quintile within the smallest size quintile and the average of the returns for the lowest book to market quintile. T statistic is the average monthly difference divided by the standard error.

Panel A: January: July 1927 to June 2011

Month	Value premium					t statistic				
	Small	2	3	4	Big	Small	2	3	4	Big
January	0.19	1.16	2.05	2.54	2.14	0.26	2.35	4.37	4.53	3.23
February	1.88	0.67	0.43	0.06	0.13	3.27	1.33	0.83	0.1	0.25
March	0.18	1.28	0.23	-0.49	-0.12	0.26	2.57	0.5	-0.91	-0.23
April	1.6	1.03	0.7	0.44	0.15	3.11	2.15	1.51	0.86	0.31
May	0.84	-0.53	-0.03	0.04	-0.55	1.87	-1.26	-0.06	0.07	-1.2
June	0.66	1.06	0.03	0.48	0.34	1.14	2.12	0.08	0.92	0.63
July	0.64	1.08	1.92	1.44	0.75	1.38	2.12	3.16	2.33	1.14
August	0.48	0.34	0.43	0.01	0.12	0.94	0.94	0.88	0.02	0.22
September	0.33	-0.13	-0.45	-0.08	0.55	0.67	-0.3	-1.01	-0.12	0.9
October	0.36	-0.85	-1.05	-1.18	-0.86	0.75	-1.78	-2.12	-2.31	-1.6
November	-0.31	-0.75	-0.9	-0.77	-0.91	-0.53	-1.31	-1.59	-1.22	-1.53
December	0.3	0.06	0.64	0.22	0.6	0.43	0.13	1.43	0.35	1.08

Panel B: January: July 1972 to June 1992

Month	Value premium					t statistic				
	Small	2	3	4	Big	Small	2	3	4	Big
January	1.57	1.27	3.29	3.71	3.04	1.63	1.23	3.51	4.7	3.27
February	1.23	0.93	1.32	0.43	0.03	1.59	1.15	1.39	0.53	0.03
March	1.26	1.12	1.71	1.63	-0.23	1.83	1.27	2.24	2.3	-0.25
April	0.39	1.29	0.78	0.95	-0.92	0.58	1.81	0.9	1.09	-0.86
May	0.31	-0.52	-0.33	-0.2	-1.04	0.46	-0.87	-0.66	-0.38	-1.43
June	0.86	0.97	1.01	0.86	-0.51	1.51	1.4	1.15	1.28	-0.59
July	0.48	0.43	0.46	0.26	0.26	0.73	0.44	0.47	0.44	0.21
August	0.31	1.2	1.42	1.06	1.48	0.44	1.5	1.84	1.41	1.96
September	0.48	1.01	0.37	1.58	1.49	0.64	1.4	0.39	1.88	1.43
October	-0.33	-0.66	-0.76	-0.71	-1.22	-0.45	-0.63	-0.69	-0.69	-1.03
November	-1.19	-0.28	-0.22	0.47	-0.44	-1.54	-0.24	-0.23	0.61	-0.39
December	-0.27	-0.68	0.38	-0.28	0.75	-0.45	-0.78	0.64	-0.32	0.82

Panel C: January: July 1992 to June 2011

Month	Value premium					t statistic				
	Small	2	3	4	Big	Small	2	3	4	Big
January	-0.26	0.55	0.28	-0.64	-0.55	-0.24	0.56	0.34	-0.62	-0.57
February	1.95	1.09	0.77	-0.11	-0.13	1.73	0.71	0.49	-0.08	-0.1
March	1.52	1.99	1.35	0.31	0.24	2.18	2.35	1.4	0.37	0.36
April	1.44	1.92	1.14	0.83	0.56	1.51	1.67	1.36	0.79	0.61
May	0.09	-1.19	-0.9	-0.47	0.67	0.11	-1.16	-0.92	-0.54	1.15
June	0.33	-0.25	-0.41	-0.17	-0.24	0.43	-0.25	-0.5	-0.19	-0.29
July	1.93	2.32	1.84	1.18	0.56	2.78	2.49	1.74	1.43	0.67
August	0.63	0.33	-0.03	-0.39	0.18	0.9	0.38	-0.03	-0.51	0.21
September	-0.8	-0.95	-0.8	-0.35	0.8	-1.15	-1.53	-0.92	-0.42	0.91
October	0	-0.51	-1.09	-0.73	-1.57	0	-0.54	-1.28	-0.75	-1.87
November	0.45	-0.85	-1.06	0.11	-0.8	0.44	-0.71	-0.8	0.09	-0.72
December	0.23	0.84	1.15	0.92	2.06	0.26	0.78	1.23	0.87	2.42

Table (4-8) Monthly distribution of the value premium on 5 size portfolios

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The size premium for Low book to market stocks on January, for example, estimated from the time series of January differences between the average of the returns for the smallest size quintile within the lowest book to market quintile and the average of the returns for the biggest size quintile. T statistic is the average monthly difference divided by the standard error.

Panel A: January: July 1927 to June 2011

Month	Size premium					t statistic				
	Low	2	3	4	High	Low	2	3	4	High
January	7.19	5.98	4.21	4.56	5.23	6.82	5.9	7.53	7.96	9.15
February	-0.05	-0.07	1.06	1.99	1.91	-0.08	-0.11	2.26	4.15	3.58
March	0.4	-0.1	0.43	0.36	0.76	0.51	-0.15	0.79	0.8	1.6
April	-1.04	-1.03	0.57	-0.12	0.59	-1.59	-1.41	1.28	-0.3	1.06
May	-1.14	0.17	0.29	0.36	0.78	-1.78	0.25	0.49	0.56	1.44
June	-0.28	0	-0.19	0.28	0.07	-0.38	0	-0.33	0.55	0.14
July	0.45	0.46	-0.16	0.03	0.54	0.7	0.85	-0.27	0.05	0.98
August	-0.55	-0.43	-0.17	-0.65	-0.06	-1.01	-0.83	-0.47	-1.46	-0.11
September	0.54	-0.42	0.63	0.79	0.16	1.04	-0.58	1.4	2.15	0.37
October	-1.5	-0.83	-0.74	-0.62	-0.22	-2.55	-1.38	-1.67	-1.31	-0.5
November	-0.69	-0.64	-0.55	-0.29	-0.21	-0.97	-0.84	-1.05	-0.51	-0.37
December	-1.01	-0.42	-0.87	-0.63	-1.55	-1.22	-0.76	-1.66	-1.48	-3.34

Panel B: January: July 1972 to June 1992

Month	Size premium					t statistic				
	Low	2	3	4	High	Low	2	3	4	High
January	6.8	5.18	5.04	4.34	5.32	4.76	4.81	4.85	3.86	4.06
February	2.11	1.68	1.86	2.17	3.31	2.1	2.09	2.56	2.52	2.77
March	1.15	1.22	1.74	1.21	2.64	0.94	1.34	1.83	1.31	2.77
April	0.53	0.51	0.11	-0.12	1.84	0.7	0.79	0.15	-0.15	2.08
May	-0.46	0.4	0.54	0.4	0.88	-0.48	0.37	0.55	0.5	1.12
June	-0.27	-0.12	-0.21	0.6	1.1	-0.43	-0.2	-0.4	1.3	1.45
July	0.33	1.07	0.79	0.6	0.56	0.33	1.68	1.08	0.82	0.51
August	-0.36	-1.13	-0.78	-1.63	-1.53	-0.34	-1.21	-0.81	-1.55	-1.39
September	0.94	-0.04	0.28	0.13	-0.06	1.15	-0.07	0.59	0.28	-0.1
October	-3.3	-2.19	-1.81	-2.63	-2.41	-2.44	-2.22	-1.78	-2.94	-2.82
November	0.14	-0.73	-0.57	-0.87	-0.61	0.16	-0.82	-0.68	-1.11	-0.48
December	-1.22	-1.1	-0.84	-1.02	-2.25	-1.38	-1.44	-0.94	-1.3	-2.42

Panel C: January: July 1992 to June 2011

Month	Size premium					t statistic				
	Low	2	3	4	High	Low	2	3	4	High
January	3.89	3.53	3.06	3.65	4.18	3.58	2.93	3.57	3.06	4.35
February	0.74	-0.08	0.38	1.03	2.82	0.62	-0.06	0.37	0.93	3
March	-1.1	-0.6	-0.75	-0.47	0.18	-1.04	-0.63	-0.77	-0.53	0.23
April	-0.7	-0.6	-1.28	-1.06	0.18	-0.61	-0.68	-1.61	-1.19	0.17
May	0.68	0.64	0.27	-0.1	0.11	0.64	0.78	0.36	-0.12	0.18
June	1.33	1.92	1.83	2.49	1.9	1.2	1.74	1.94	2.47	2.08
July	-0.27	-0.3	-0.06	0.31	1.11	-0.31	-0.36	-0.09	0.41	1.47
August	0.05	0.77	0.12	-0.16	0.51	0.06	1.57	0.22	-0.22	0.62
September	1.85	1.46	1.2	1.04	0.25	2.8	2.25	1.95	1.27	0.27
October	-1.62	-1.13	-0.71	-0.45	-0.05	-2.25	-1.08	-0.83	-0.52	-0.06
November	-1.27	-1.07	-0.67	-0.08	-0.01	-1.14	-0.97	-0.78	-0.08	-0.02
December	1.33	0.15	-0.07	0.19	-0.5	1.28	0.15	-0.08	0.26	-0.76

Table (4-9) Average returns each month for 5 portfolios formed on size of CRSP stocks using breakpoints based on COMPUSTAT/CRSP stocks

At the end of June of year t, I form 5 equal weight portfolios as sorts of NYSE, AMEX, and Nasdaq stocks of CRSP into five market equity groups (using the NYSE of CRSP quintile breakpoints). The market equity (number of shares outstanding times the price) is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row is average monthly returns (over all months) for book to market portfolios . The Non January row is average non January months returns (over all months except January) for size portfolios .Panels E and F show the average of the monthly differences in the returns and premiums of the panels A and B and the correspondant ones of table (4-3). S-B is the size premium for a month estimated from the time series differences each month between the average of the returns for the smallest size quintile and the average of the returns for the biggest size quintile. T statistic for S-B is the average monthly difference divided by the standard error. T statistic for the rest is the average each month divided by the standard error.

Panel A: Average number of stocks

Period	CRSP/COMPUSTAT						CRSP					
	Size											
	All	Small	2	3	4	Big	All	Small	2	3	4	Big
1972/1992	2487	1252	418	321	258	238	5121	3278	686	472	364	321
1992/2011	4267	2120	761	541	446	399	6700	3952	1067	689	532	460

Panel B: Percent of missing CRSP/COMPUSTAT stocks

	Missing stocks						Missing stocks %					
	All	Small	2	3	4	Big	All	Small	2	3	4	Big
1972/1992	2634	2026	268	151	106	83	51.44	61.81	39.07	31.99	29.12	25.86
1992/2011	2433	1832	306	148	86	61	36.31	46.36	28.68	21.48	16.17	13.26

Panel C: July 1972 to June 1992

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	8.7	5.61	4.18	3.58	2.54	6.16	4.46	3.04	2.5	2.14	1.84	4.97
February	3	1.86	1.38	1.22	0.64	2.36	2.34	1.63	1.35	1.24	0.71	2.48
March	2.76	1.63	1.51	1.18	1.07	1.68	2	1.34	1.34	1.17	1.38	1.91
April	1.5	1.21	0.97	0.87	0.98	0.51	1.58	1.27	1.04	0.95	1.14	0.92
May	1.67	1.14	1.27	1.47	1.51	0.16	1.43	1.04	1.21	1.41	1.68	0.19
June	1.27	1.07	1.22	1.16	1.09	0.18	1.57	1.29	1.49	1.39	1.45	0.46
July	1.02	0.61	0.53	0.31	0.21	0.81	0.89	0.52	0.47	0.27	0.2	1.19
August	0.17	0.61	0.84	1.43	1.15	-0.98	0.12	0.43	0.59	1.03	0.84	-1.08
September	-0.83	-0.95	-0.93	-0.9	-1.36	0.53	-0.83	-0.88	-0.89	-0.88	-1.36	1.21
October	-2.15	-1.61	-1.07	-0.48	0.62	-2.77	-1	-0.77	-0.52	-0.25	0.33	-2.7
November	1.17	1.99	1.97	1.97	1.65	-0.48	0.78	1.32	1.39	1.42	1.38	-0.63
December	0.72	1.68	1.87	1.89	1.82	-1.11	0.68	1.72	2.17	2.13	2.37	-1.42
Non January	0.94	0.84	0.87	0.92	0.86	0.08	2.37	2.2	2.39	2.61	2.63	0.33
All	1.58	1.24	1.15	1.14	1	0.59	3.78	3.17	3.14	3.23	3.11	2.19
Non Jan. * 11	10.34	9.24	9.57	10.12	9.46	0.88						
All * 12	18.96	14.88	13.8	13.68	12	7.08						
Jan. / All * 12	0.46	0.38	0.30	0.26	0.21	0.87						

Continuo table (4-9)

Panel D: July 1992 to June 2011

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	3.85	0.45	-0.01	0.29	0.34	3.51	3.37	0.41	-0.01	0.31	0.4	4.67
February	0.68	-0.27	-0.4	0	-0.57	1.25	0.7	-0.25	-0.35	0	-0.56	1.51
March	1.58	1.79	1.83	1.93	1.79	-0.21	1.6	1.81	1.89	1.61	1.66	-0.24
April	2.62	2.9	3.19	3.08	3.01	-0.39	2.03	2.06	2.18	2.32	2.52	-0.44
May	2.22	1.87	1.94	1.97	1.69	0.53	1.82	1.42	1.57	1.88	1.7	0.78
June	0.67	0.62	-0.12	-0.63	-1.07	1.74	0.63	0.59	-0.13	-0.72	-1.31	2.23
July	0.93	-0.12	-0.17	0.29	0.43	0.51	0.77	-0.08	-0.12	0.24	0.38	0.8
August	0.53	0.44	0.48	0.22	0.1	0.43	0.41	0.32	0.36	0.17	0.09	0.68
September	1.47	1.01	0.77	0.19	0.06	1.41	1.19	0.71	0.52	0.13	0.04	2.4
October	0.32	0.02	0.54	0.37	1.36	-1.05	0.23	0.01	0.36	0.24	0.93	-1.44
November	1.56	1.99	2.14	2.06	2.17	-0.61	1.11	1.37	1.46	1.57	1.7	-0.81
December	2.5	3.46	3.22	2.89	1.91	0.58	3.5	4.4	4.12	3.94	2.95	0.88
Non January	1.37	1.25	1.22	1.13	0.99	0.38	3.91	3.22	3.2	3.08	2.88	1.71
All	1.58	1.18	1.12	1.06	0.94	0.64	4.67	3.23	3.12	3.07	2.9	2.9
Non Jan. * 11	15.07	13.75	13.42	12.43	10.89	4.18						
All * 12	18.96	14.16	13.44	12.72	11.28	7.68						
Jan. / All * 12	0.20	0.03	0.00	0.02	0.03	0.46						

Panel E: The difference: July 1972 to June 1992

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	-0.06	-0.02	-0.01	-0.02	0	-0.06	-1.29	-1.17	-0.97	-2.24	0.18	-1.28
February	0	-0.06	-0.01	-0.01	0	0.01	0.13	-2.18	-0.52	-0.77	-0.45	0.23
March	-0.02	-0.06	-0.01	0	-0.01	-0.01	-0.78	-2.97	-1	-0.06	-1.37	-0.29
April	0	-0.02	-0.01	-0.01	0	0.01	0.3	-1.51	-0.38	-1.41	-0.03	0.3
May	-0.01	-0.01	0.01	-0.02	0	-0.01	-0.33	-0.73	0.45	-1.85	-0.35	-0.2
June	0.01	-0.01	-0.01	-0.01	0	0.01	0.8	-0.52	-0.88	-0.98	0.06	0.62
July	0.01	0.02	0	-0.01	-0.01	0.02	0.67	0.88	0.31	-1.33	-1.23	1.88
August	0.01	-0.01	-0.01	0	0.01	0	0.89	-0.66	-1.62	0.16	1.07	-0.2
September	0.01	0	0	0	0.01	0	0.67	-0.11	0.42	0.3	1.21	-0.23
October	-0.01	-0.01	-0.01	-0.01	0	-0.01	-0.64	-0.58	-0.7	-1.14	0	-0.63
November	0	0.01	0.01	0	0	0.01	0.25	0.84	0.57	-0.16	-0.23	0.38
December	-0.03	-0.03	0	0	0	-0.03	-2.36	-2.09	-0.01	-0.48	-0.48	-2.14
Non January	0	-0.02	0	-0.01	0	0	-0.34	-2.97	-0.88	-2.53	-0.31	-0.17
All	-0.01	-0.02	0	-0.01	0	-0.01	-1.05	-3.2	-1.13	-3.08	-0.26	-0.89

Panel F: The difference: July 1992 to June 2011

Month	Size						t statistic					
	Small	2	3	4	Big	S-B	Small	2	3	4	Big	S-B
January	0.02	0.01	0.01	0	0	0.02	0.38	0.82	0.71	-0.7	-0.53	0.41
February	0.01	0	-0.01	-0.01	0	0.01	0.39	-0.34	-2.13	-0.61	0.73	0.26
March	0.04	0	-0.01	0	0	0.04	1.19	-0.48	-1.22	-0.5	0.68	1.12
April	0.03	-0.01	0	0	0	0.04	1.24	-0.91	-0.34	-0.3	-0.54	1.55
May	-0.03	-0.01	0.02	0	0.01	-0.03	-0.44	-1.61	2.8	-0.04	1.09	-0.5
June	0.02	-0.01	-0.02	-0.01	0	0.02	0.27	-1.46	-2.34	-2.1	0.16	0.26
July	0.04	0.01	0	0	-0.01	0.05	1.01	0.7	-0.87	-0.51	-1.94	1.3
August	0.02	-0.01	0	0	-0.01	0.03	1.43	-1.61	-0.58	1.1	-0.8	1.7
September	0.01	0.01	0.01	0.01	0	0.01	0.85	0.96	0.94	2.22	0.3	0.63
October	-0.01	0	0	-0.01	0.01	-0.02	-1.76	0.29	0.17	-1.31	1.07	-2.31
November	-0.03	-0.01	-0.01	-0.01	0	-0.03	-2.32	-0.94	-1.37	-1.79	-0.18	-1.77
December	-0.01	0	-0.01	0	0	-0.01	-0.77	-0.96	-1.09	0.42	0.52	-1.07
Non January	0.01	0	0	0	0	0.01	0.84	-1.83	-1.61	-0.93	0.15	0.79
All	0.01	0	0	0	0	0.01	0.92	-1.26	-1.24	-1.07	0.06	0.9

Table (4-10) Average monthly number of stocks for 25 portfolios formed on size and book to market for size breakpoints based on CRSP/COMPUSTAT and CRSP stocks

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The breakpoints of the size is made two times, once using the intersections of the CRSP and COMPUSTAT stocks and the other using only CRSP stocks. The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average monthly number of stocks for book to market (size) portfolios irrespective of the size (book to market).

Panel A: Upper NYSE breakpoints' values

Period	CRSP/COMPUSTAT					CRSP				
	Size									
	Small	2	3	4	Big	Small	2	3	4	Big
1971/1991	71	179	423	1156	53789	59	142	346	974	53789
1992/2011	308	763	1656	4556	296588	156	432	1058	3094	296588

Panel B: July 1972 to June 1992

		CRSP/COMPUSTAT						CRSP					
		Book to market											
		All	Low	2	3	4	High	All	Low	2	3	4	High
	All		520.9	470.1	447.4	459.2	503.6		520.9	470.1	447.4	459.2	503.6
	Small	1200	208.1	196.9	202.8	234.5	357.6	1126	193.8	181.5	186	220.3	344.6
Size	2	403.5	92.54	85.49	84.84	78.49	62.15	409.7	90.13	86.13	87.05	79.49	66.85
	3	310.2	78.87	69.81	66.75	59.55	35.18	332	84.3	75.27	71.7	62.59	38.13
	4	252.2	69.2	59.78	47.96	46.46	28.84	274	75.21	63.07	52.98	50.72	31.98
	Big	235.3	72.12	58.13	44.98	40.23	19.81	259.2	77.38	64.12	49.59	46.08	22.05

Panel C: July 1992 to June 2011

		CRSP/COMPUSTAT						CRSP					
		Book to market											
		All	Low	2	3	4	High	All	Low	2	3	4	High
	All		876.9	822.8	774	739	836.6		876.9	822.8	774	739	836.6
	Small	1987	297.6	299.7	350.3	432.2	606.9	1489	197.7	194.6	247	336.2	513.8
Size	2	722.9	173.1	167.6	159.9	125.3	96.92	800.5	171.3	174.2	171.3	150.7	133.2
	3	518.4	136.2	135.9	113.3	74.44	58.45	663.2	163.9	162.1	146.5	106.8	83.87
	4	430.8	122.8	116.4	84.58	61.84	45.16	572	156.4	153.6	117.6	82	62.34
	Big	390.5	147.2	103.2	65.89	45.13	29.16	524.5	187.7	138.3	91.63	63.36	43.5

Table (4-11) Average monthly returns for 25 portfolios formed on size and book to market using NYSE market cap quintile breakpoints of CRSP stocks

At the end of June of year t, I form 25 equal weight portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints of all CRSP stocks) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average monthly returns for book to market (size) portfolios irrespective of the size (book to market). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of monthly differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. Panels from G to K show the average of the monthly differences in the returns and premiums of the panels from A to F and the correspondant ones of tables (4-1), (4-4), and (4-5). T statistic for H-L (S-B) is the average monthly difference divided by the standard error. T statistic for the rest is the average monthly difference of returns on this table and that of tables (4-1), (4-4), (4-5) for the correspondent periods divided by the standard error.

Panel A: All months: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.03	1.2	1.4	1.49	1.77	0.74		2.37	3.04	3.88	4.34	4.54	3.35
	Small	1.6	1.46	1.43	1.6	1.58	1.87	0.4	3.82	3	3.2	3.92	4.12	4.53	1.93
	2	1.21	0.9	1.14	1.36	1.39	1.52	0.62	3.1	1.8	2.77	3.58	4.04	4.02	2.56
Size	3	1.17	0.84	1.1	1.28	1.35	1.52	0.67	3.17	1.84	2.82	3.7	4.06	3.91	2.63
	4	1.12	0.8	1.11	1.15	1.31	1.66	0.87	3.19	1.94	2.95	3.37	4.16	4.49	3.77
	Big	1.01	0.93	1.02	1.06	1.3	1.24	0.3	3.16	2.52	2.95	3.32	4.34	3.68	1.09
	S-B	0.59	0.53	0.41	0.53	0.28	0.63		2.21	1.63	1.53	2.03	1.08	2.04	

Panel B: All months: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.04	1.21	1.25	1.39	1.75	0.71		2.46	3.5	4.09	4.68	5.4	3.04
	Small	1.66	1.41	1.47	1.43	1.55	1.94	0.54	5.01	3.1	3.66	4.48	5.26	5.92	2.22
	2	1.23	1.02	1.19	1.16	1.37	1.58	0.56	3.3	2.08	3.04	3.49	3.96	4.27	1.75
Size	3	1.15	0.97	1.17	1.25	1.21	1.28	0.31	3.16	2.09	3.2	3.65	3.63	3.53	1.07
	4	1.09	1	1.11	1.16	1.21	1.13	0.13	3.16	2.27	3.22	3.71	3.75	3.27	0.45
	Big	0.95	0.87	1.05	1.08	0.95	1.02	0.15	2.89	2.31	3.28	3.3	2.8	3.11	0.6
	S-B	0.71	0.54	0.42	0.35	0.6	0.92		3.11	1.83	1.35	1.36	2.19	3.58	

Continuo of table (4-11)

Panel C: January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		4.86	5.59	5.94	6.53	8.83	3.98		2.78	3.4	3.58	4.03	4.61	3.42
	Small	8.83	8.36	8.17	8.02	8.1	9.92	1.56	4.52	4.04	4.46	4.56	4.59	4.94	1.62
	2	5.81	5.83	5.06	5.92	5.65	7.09	1.27	3.16	2.66	2.83	3.29	3.28	4.11	1.35
Size	3	4.3	2.77	4.45	4.23	5.16	5.88	3.11	2.57	1.55	2.71	2.64	3.25	3.56	3.16
	4	3.6	2.02	3.51	4	4.53	5.55	3.53	2.17	1.22	2.15	2.4	3.08	3.01	4.45
	B	2.62	1.61	2.76	2.82	3.77	4.67	3.07	1.87	1.1	1.92	2.16	3.06	3.1	3.44
	Big	6.21	6.75	5.4	5.2	4.33	5.24		5.07	4.82	4.85	4.97	3.96	4.01	

Panel D: January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.83	1.33	1.46	2.1	3.31	1.48		1.49	1.35	1.62	2.36	3.12	1.89
	Small	4.62	5.67	4.94	3.99	3.78	4.85	-0.82	4.33	3.62	3.82	3.69	3.71	4.54	-0.81
	2	1.25	1.78	0.85	0.85	1.71	1.46	-0.32	1.01	1.07	0.66	0.83	1.48	1.14	-0.27
Size	3	0.09	0.19	0.47	-0.27	0.01	0.56	0.36	0.08	0.14	0.46	-0.27	0.01	0.48	0.43
	4	0.17	0.53	-0.39	0.02	0.15	0.39	-0.14	0.18	0.43	-0.42	0.03	0.18	0.4	-0.16
	Big	0.23	0.63	-0.02	0.18	-0.41	-0.27	-0.89	0.27	0.64	-0.03	0.21	-0.43	-0.25	-0.9
	S-B	4.39	5.04	4.96	3.8	4.19	5.12		5.74	4.76	3.99	4.27	3.22	4.94	

Panel E: Non January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.69	0.8	0.99	1.03	1.14	0.45		1.56	2.04	2.81	3.14	3.14	2.16
	Small	0.95	0.84	0.82	1.02	0.99	1.14	0.3	2.4	1.75	1.87	2.58	2.74	3.02	1.42
	2	0.8	0.45	0.79	0.95	1.01	1.02	0.56	2.08	0.91	1.91	2.56	3.04	2.79	2.25
Size	3	0.89	0.67	0.8	1.01	1.01	1.12	0.45	2.41	1.42	2.02	2.94	3.1	2.91	1.74
	4	0.9	0.69	0.89	0.9	1.02	1.31	0.62	2.56	1.62	2.34	2.65	3.28	3.64	2.67
	Big	0.87	0.87	0.86	0.9	1.08	0.93	0.05	2.67	2.28	2.44	2.76	3.55	2.78	0.19
	S-B	0.08	-0.03	-0.04	0.11	-0.09	0.21		0.34	-0.11	-0.18	0.44	-0.36	0.7	

Panel F: Non January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.97	1.2	1.23	1.33	1.61	0.64		2.16	3.27	3.8	4.22	4.74	2.62
	Small	1.39	1.02	1.15	1.2	1.34	1.68	0.66	4.06	2.18	2.77	3.63	4.42	4.94	2.68
	2	1.22	0.95	1.22	1.19	1.33	1.59	0.64	3.14	1.85	2.97	3.38	3.69	4.1	1.92
Size	3	1.25	1.04	1.23	1.39	1.32	1.35	0.3	3.24	2.12	3.17	3.84	3.73	3.53	0.99
	4	1.18	1.04	1.25	1.26	1.31	1.2	0.15	3.2	2.22	3.4	3.79	3.8	3.27	0.5
	Big	1.02	0.89	1.14	1.16	1.07	1.14	0.25	2.9	2.22	3.37	3.33	3	3.31	0.94
	S-B	0.37	0.13	0	0.04	0.27	0.54		1.66	0.45	0.02	0.14	1.03	2.17	

Continuo of table (4-11)

Panel G: Difference of returns: All months: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.01	0.03	0.02	0.03	0.01	0.01	-0.03	1.46	1.91	1.07	2.17	1.35	1.04	-1.48
	2	-0.04	-0.07	0	-0.02	-0.04	0.04	0.11	-2.14	-1.34	0.14	-0.74	-1.06	0.9	1.61
Size	3	0.02	0.05	0.01	0.05	0.03	-0.05	-0.12	0.99	1.02	0.2	1.34	0.74	-0.95	-1.42
	4	-0.03	-0.06	0.01	-0.03	-0.04	-0.01	0.06	-1.5	-1.69	0.13	-0.77	-1.01	-0.27	0.98
	Big	0.01	0.03	0.01	0	0	0.12	0.08	1.45	1.44	0.3	0.21	0.18	1.39	0.96
	S-B	0	0	0.02	0.02	0.01	-0.1		-0.02	0.03	0.49	1.13	0.37	-1.29	

Panel H: Difference of returns: All months: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.09	0.13	0.08	0.05	0.03	0.03	-0.09	2.11	1.79	1.13	1.09	0.61	1.01	-1.45
	2	0.05	0.05	0.03	-0.09	0.06	0.17	0.12	0.7	0.4	0.31	-0.92	0.57	1.85	0.96
Size	3	0.03	-0.08	0.04	0.09	0.05	0.04	0.12	0.64	-0.89	0.4	1.26	0.58	0.4	0.96
	4	0.03	0.04	-0.04	0.01	0.1	0.13	0.09	0.76	0.47	-0.52	0.1	1.55	1.25	0.77
	Big	0.01	0	0.05	-0.02	-0.04	0	0	0.67	-0.11	1.58	-0.45	-0.77	0.04	0.09
	S-B	0.08	0.13	0.03	0.08	0.07	0.03		1.37	1.46	0.35	1.1	1.03	0.36	

Panel I: Difference of returns: January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.07	0.05	0.29	0.16	0.16	0.04	-0.01	0.98	0.92	2.44	3.1	2.27	0.95	-0.18
	2	0.18	0.45	-0.04	0.26	-0.13	0.45	0	2.41	2.37	-0.29	1.66	-1.18	3.31	0.01
Size	3	0.11	0.2	-0.05	-0.07	0.48	0.02	-0.18	0.9	0.72	-0.41	-0.51	2.94	0.08	-0.47
	4	-0.01	0.08	0.03	0.07	-0.24	-0.09	-0.18	-0.05	0.53	0.18	0.36	-1.53	-0.57	-0.83
	B	0.08	0.09	0.06	0	0.17	0.11	0.03	1.63	0.83	0.61	-0.02	1.35	0.93	0.14
	Big	-0.01	-0.05	0.22	0.16	-0.01	-0.08		-0.06	-0.39	1.64	1.52	-0.11	-0.67	

Panel J: Difference of returns: January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.79	1.1	1.34	0.77	0.44	0.53	-0.56	3.86	3.88	5.88	4.14	1.84	2.87	-3.22
	2	0.81	1.27	0.23	0.94	0.97	0.4	-0.87	3.11	3.02	0.62	2.89	2.25	1.11	-1.93
Size	3	0.1	0.06	0.77	-0.21	0.11	0.15	0.08	0.54	0.19	2.09	-0.72	0.38	0.49	0.27
	4	-0.13	-0.33	-0.29	-0.14	-0.03	0.16	0.5	-0.86	-1.37	-1.33	-0.68	-0.12	0.4	1.14
	Big	-0.11	-0.06	-0.08	0.01	-0.11	-0.41	-0.34	-1.54	-0.44	-0.9	0.12	-0.47	-1.95	-1.26
	S-B	0.9	1.15	1.43	0.74	0.54	0.94		4.23	3.4	5.2	3.51	2.02	3.88	

Continuo of table (4-11)

Panel K: Difference of returns: Non January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.01	0.03	0	0.02	0	0.01	-0.02	1.1	1.74	-0.29	1.3	0.4	0.72	-1.49
	2	-0.06	-0.13	0.01	-0.05	-0.03	0.01	0.12	-3.16	-2.12	0.23	-1.49	-0.78	0.03	1.66
Size	3	0.02	0.04	0.01	0.06	-0.01	-0.07	-0.11	0.64	0.78	0.33	1.54	-0.26	-1.05	-1.34
	4	-0.03	-0.08	0	-0.04	-0.02	0	0.07	-1.59	-1.96	0.08	-1	-0.58	-0.08	1.31
	Big	0.01	0.02	0	0	-0.01	0.12	0.08	0.95	1.21	0.08	0.24	-0.33	1.28	0.95
	S-B	0	0.01	0	0.01	0.01	-0.11		0.02	0.15	-0.25	0.6	0.45	-1.22	

Panel L: Difference of returns: Non January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0	0	0	0	0	0							
	Small	0.03	0.04	-0.04	-0.01	-0.01	-0.01	-0.05	0.67	0.55	-0.58	-0.14	-0.24	-0.35	-0.74
	2	-0.03	-0.06	0.01	-0.18	-0.03	0.15	0.21	-0.43	-0.57	0.1	-1.92	-0.32	1.56	1.63
Size	3	0.03	-0.1	-0.03	0.12	0.04	0.03	0.12	0.49	-0.99	-0.32	1.59	0.48	0.29	0.93
	4	0.05	0.07	-0.01	0.02	0.12	0.13	0.05	1.07	0.87	-0.13	0.28	1.65	1.18	0.43
	Big	0.03	0	0.06	-0.03	-0.03	0.04	0.04	1.1	0.01	1.86	-0.49	-0.63	0.48	0.44
	S-B	0	0.04	-0.11	0.02	0.02	-0.05		-0.02	0.42	-1.35	0.22	0.34	-0.57	

Chapter 5

Fama and French risk based explanations

In this chapter the question of whether the Fama and French three factor model explains the value and size premiums in the recent years from 1992 to 2011 compared to the past years from 1972 to 1992 is posed . The effect of excluding the month of January on the results is tested as is the effect of the business cycle periods on the three factor model results.

5.1 Introduction

Although academics and investment professionals agree that the value (small) stocks outperform growth (big) stocks, they disagree on the reasons behind this phenomenon. One of the explanations they argue about is that value (small) portfolios have more returns than growth (big) portfolios because they are systematically riskier. The leading article which supports this explanation is by Fama and French (1993). Fama and French (1993), based on the results of Fama and French (1992), find that the size and book to market equity do a good job in explaining the cross section of average returns on NYSE, AMEX, and NASDAQ stocks for the 1963 - 1990 period. They claim that if the assets are priced rationally, the variables that relate to average returns, such as size and book to market equity, must proxy for the sensitivity to common risk factors in stock returns. Based on this conclusion, they introduce two new risk factors in addition to the market factor; the market excess return RM - RF. The SMB (small minus big), which mimics the risk factor in returns related to size. The HML (high minus low), which mimics the risk factor in returns related to the book to market equity. The SMB is the difference between the returns on small and big portfolios and is free of the influence of the book to market equity. The HML is the difference between the returns on the high and low book to market portfolios and is free of the influence of the size.

Fama and French (1993) test whether the mimicking factors, SMB and HML, capture the common variations of the 25 portfolios formed on the size and book to market equity. They use the time series regression approach of Black, Jensen, and Scholes (1972). They use the regression's slopes and R square values to show whether mimicking portfolios for risk factors explains the variations in stock returns. A well specified asset pricing model of regressing excess returns on the dependent variables is determined by getting an intercept that is indistinguishable from zero. They conclude that the three factor model does a good job in explaining the common variations in the stock returns. It can explain the cross section variations in 22 portfolios out of the 25 size and book to market portfolios for the period from July 1963 to December 1991. The three factor model unfortunately can not explain the cross section average returns for small growth and big growth portfolios.

Also Fama and French (1995) use six size and book to market portfolios to confirm the results of Fama and French (1993) that the regression slopes and the average premiums for the three risk factors capture most of the strong spread of the size and book to market portfolios. Fama and French (1996) find that, in addition to the size and book to market anomalies, the three factor model can explain most of the other asset pricing anomalies. It can explain the strong pattern in returns for portfolios formed in earnings to price, cash flow to price, and the sales growth documented by LSV (1994). The three factor model cannot explain the momentum returns documented by Jegadesh and Titman (1993) and Asness (1994).

The three factor model is used here to test some points different from that of Fama and French. Fama and French judge the size and value premiums according to the significance of the portfolios on the first and fifth quintiles. The value and size premiums directly test the significance of the difference between the first and fifth quintiles. The test is whether the model is capable of explaining why small stocks have higher value premium than big stocks and also looks at the results of one-way portfolios as well as two way portfolios. Also following the previous chapter, a further step tests whether there are changes in the performance of the model in the recent period (1992-2011) as compared to the previous period (1972-1992) where the model proved to do well. Testing the effect of January by excluding the returns in the month of January from the sample and evaluating whether the results of Fama and French's three factor model will be affected by the business cycle conditions during the periods of expansions and contractions is a further measure. Finally, the previous tests are repeated using the earnings to price to check the robustness of the results.

5.2 One and two way size and book to market portfolios

In Table (4-1), I showed that there are specific relationships between the average returns and the size and book to market equity. The returns increase by increasing the book to market equity and they decrease by increasing the size. These relationships are maintained over different periods of time. Also the table shows that the value and size premiums have the same relationship as the size and book to market quintiles. The value premium decreases with increasing the size of the portfolios and the size premium increases with increasing the book to market portfolios' value. If the Fama and French model is a good risk model, it has to preserve the trade off between the risk and the return. The Fama and French loadings should increase with increasing the returns and vice versa. Also, the loadings should be affected by the changes of the returns due to changing the period of study. It also has to explain the changes of the size and value premiums.

Table (5-1) shows the time series regression results of regressing the portfolios excess returns on the market excess returns, SMB, and HML factors for the whole period from July 1972 to June 1992 and for the two sub periods from July 1972 to June 1992 and from July 1992 to June 2011. The table shows the factors' loadings and their t statistics in addition to R squares and the standard errors for the residuals. Panel A of Table (5-1) shows that the Fama and French three factors, the market, SMB, and HML, capture substantial time series variations in stock returns for the whole period as indicated by R squares. For the 25 size and book to market portfolios, most of the R square values are 0.9 or higher. Other than that, the R squares are higher than 0.79. Most of the R square values under 0.9 are for the big high portfolios. The R square values for the one way portfolios for the size and book to market portfolios (the all column and row) are 0.9 or higher. The R squares for the size and value premiums (S-B row and H-L column) are lower than that of the 25 portfolios. They are about 0.7 for the size premiums and 0.6 for the value premiums. This indicates that the time series variations for the value and size premiums are not fully explained by the three factor model and this opens the door for more variables to explain them.

In order for the models to explain the cross section of the stock returns, the regressions' intercepts should not be different from zero as stated by Fama and French (1993). Only 6 of the 25 size and book to market portfolios have intercepts significantly higher than zero. Five of them are for the small value portfolios. The 6th is for the big growth portfolio. These results differ from those of Fama and French (1996), where nearly only the smallest growth and biggest growth are higher than zero for the period from 1963 to 1993.

These results affected the intercepts of the one way size and book to market portfolios. The three factor model can not explain the cross section of either the smallest size portfolio or the lowest book to market portfolio.

The slopes for the market equity on the 25 two way portfolios and the 5 size and book to market portfolios are all more than a standard error of 39 from zero. These slopes did not have specific patterns and did not show the expected risk-return relationship. They are all close to one. There are no risk-return differences captured by the market factor between small, big, value, and growth portfolios. The case is very clear in terms of the size and value premiums. The market betas of the value premium on the small quintiles are significantly negative. The market betas of the value premium are insignificant. This totally contradicts the Fama and French risk-based explanations. If the market factor for the value premium is a proxy for the risk, the betas for the value premium should be significantly positive for the small quintiles and higher than that of the big quintiles. The loadngs of the size premiums over the book to market quintiles have the same problem. The market betas for the size premium are significantly positive for the smallest book to market quintile but significantly negative for the high book to market quintiles which contradict the returns in Table (4-1). If the market factor is a good proxy for risk, the market betas of the size premium should be higher on high book to market portfolios than low book to market portfolios.

The slopes of the SMB clearly capture the changes of the portfolios' returns with the changes of the size after controlling for the book to market. The SMB betas monotonically decrease with size. After controlling for the book to market, equal or monotonic increasing betas over the book to market quintiles at any of the size quintiles would not be unexpected. The case is totally different for most of the size quintiles. The betas of the growth portfolios are higher than that of the value portfolios. This leads to a significant negative betas for most of the value premiums across size. This again contradicts the risk based explanation. However, the loadings for the size premiums across book to market quintiles are significantly positive; they again contradict the risk based explanation. The betas for the growth portfolios should be less than that of the value portfolios, which is not the case. This means that the SMB factor captures the sensitivity of the size quintiles; however, it cannot explain the higher size premium for the value stocks than that of the growth stocks.

Similarly, panel A of Table (5-1) shows that the slopes of the HML, the mimicking risk for the book to market equity, are systematically related to book to market quintiles. In every size quintile, the HML slopes increase monotonically from strong negative values for the lowest book to market quintiles to strong positive values for the highest book to market quintiles. The value premiums across all the size quintiles are all positive and clearly significant. This indicates that the HML clearly captures shared variations in stock returns missed by the market and SMB factors. Although the HML loadings explain the higher returns for the value portfolios than that of the growth portfolios, they cannot explain why the small stocks have a higher value premium than that the big stocks.

Adding all the previous results together, it appears that the three factors model gives a good explanation for the one and two ways size and book to market classifications but it cannot explain the value and size premiums properly. The three factor model does not give a clue as to why the value premiums for the small size quintiles are higher than those of the big size quintiles. It also does not explain why the size premiums for the value portfolios are higher than those of the growth portfolios.

Testing the ability of the three factor model to capture the changes of the returns for different periods by comparing the models' coefficients for these periods is next. Panels B and C of Table (5-1) show the three factor model's regression results for the sub-periods from July 1972 to June 1992 and from July 1992 to June 2011. Comparing the two panels, it appears that the model for 1972 to 1992 captures more variations in the stock returns than that of the

1992 to 2011 period which appear from R squares. The model, also for the 1972 to 1992 period, substantially explains the cross section of stock returns by having more intercepts significantly equal to zero. In this period only one intercept of the 25 book to market portfolios has a t value greater than 2 compared to 4 coefficients in the 1992 to 2011 period. The previous results on the slopes for the whole period hold for the the two sub-periods.

Comparing the coefficients of the two sub periods, lower slopes for on the market and SMB factors in the 1992 to 2011 period than the 1972 to 1992 period are found, especially for the small value portfolios. This does not match the risk-based explanation that the value portfolios have more returns than the growth portfolios. The reduction of the market and SMB betas are substituted by the increase of the betas on the HML factor especially for the growth portfolios. This again does not favor the risk based explanation. The two panels still show the changes of betas over time.

5.3 The January effect

Table (4-5) shows that the portfolio returns are highly affected by excluding the January returns from the samples. It shows that excluding the January returns makes no size premiums over the book to market quintiles. It mainly returns the size premium to the returns of the January months. This also appears using the returns on January using Table (4-4). Can the Fama and French three factor model capture the changes in the returns by excluding January from the sample?

Table (5-2) shows the results of the three factor model excluding the January returns for the whole period and the sub-periods. Comparing Table (5-1) panel A and Table (5-2) panel A, there are no significant changes in the R squares of the two models. But excluding the January returns makes the three factor model more capable of explaining the cross section of stock returns as appears from the significance of the intercepts. Only 2 out of the 25 size and book to market portfolios differ from zero compared to 6 portfolios of the model containing January. The results also show the capability of the model to explain all the one way size portfolios.

Despite the better performance of the three factor model in explaining the cross section of stock returns by excluding January returns, the slopes of the market, SMB, and HML show almost no change in their values. The results do not show any changes of the risk captured by the three factors, despite the great effect on the mean return after excluding the January returns. These results contradict the risk-return trade-off.

To confirm the effect of January as indicated by Table (4-4), the January excess returns are regressed on the three factors from 1972 to 2011 as shown in Table (5-3). Although the models cannot explain the cross section returns of the small size portfolios over the book to market quintiles, they show significant slopes for the three factors. They also show very high R squares. This indicates that the January returns can be explained by the risk factors. To show whether the higher returns in January are a cause of higher risk, the three factors' slopes of Table (5-3) and of Table (5-2) panel A can be compared. The market coefficients in January are less than that of the non-January months. The SMB coefficients are less than that of non-January months except for the smallest size portfolios over the book to market quintiles and for the value portfolios over the size quintiles. Most of these differences in the slopes are not so high. All the slopes on the HML for January are less than that of non-January months. Adding all these results together, it is clear that the three factor model is not sensitive to the changes on the returns. When the returns are greatly changed, the slopes show less response to these changes.

To test whether the three factor model is capable of capturing the changes in the returns after excluding January from the two sub periods, compare the slopes of the period from 1972 to 1992 with those from the period from 1992 to 2011 as shown in Table (5-2), panels B and C respectively. Panel C in Table (4-5) shows higher returns in the 1992 to 2011 period than the 1972 to 2011 period. Can the model reflect these changes? Although the slopes of the three factors of the period 1992 to 2011 are likely to be more than that of 1972 to 1992 to reflect higher riskiness due to higher returns, the slopes on the market and SMB actually became lower in the 1992 to 2011 period than the 1972 to 1992 period. The lowness of the market and SMB slopes has been replaced by the highness of the HML slopes. Summing up all the effects, it is clear that the increase of the returns on the 1992 to 2011 period is not due to risk captured by the three factors model.

Therefore, although January greatly affected the returns, the three factor model can not effectively capture this effect.

5.4 Business cycle effect

One of the potential explanations of the value premium is the time varying risk, the risk of value minus growth strategies in bad and good times. During the recession, value stocks are seen as riskier than growth stocks. This implies that in bad times investors shift their preferences away from value firms. Instead they use growth stocks as hedges against deterioration in their wealth during those times. Lakonishok et. al. (1994) report that value betas are higher than growth betas in good times but are lower in bad times, a result that directly contradicts the risk hypothesis. Lattau and Ladvigson (2001) and Petkova and Zhang (2005) argue that the time variation in the conditional betas of value and growth stocks in bad and good times of the economy drives the value premium. Using conditional CAPM (CCAPM) they find that the value stocks have lower market (consumption) betas during bad times relative to growth stocks, thus they conclude that value is riskier than growth. Zhang (2005) demonstrates that "contrary to conventional wisdom, assets in place are much riskier than growth options, especially in bad times when the price of risk is high"

Perez-Quiros and Timmermann (2000) argue that small firms display the highest degree of asymmetry in their risk across recession and expansion states. This translates into a higher sensitivity of their expected returns with respect to variables that measure credit market conditions. They state that the small firms with little collateral should be more strongly affected by the tighter credit market conditions in the recession states than the large, better collaterised ones.

In this section, the effect of the changes in economic conditions on the risk captured by the three factor model are examined. Before doing so, the behaviour of the returns during expansion and recession periods, as defined by the NBER, from 1972 to 2011 as shown in Table (5-4) will be looked at. Panel A of Table (5-4) shows the returns of the expansion periods. By comparing these returns with that of Table (4-1) panel A, it clearly indicates the negative effect of the contraction periods on the returns. Panel C of the table for the contraction periods shows that the returns are not significant for all quintiles. Even so, the return patterns for the size and book to market are still the same. This contradicts ideas supporting the change in the risk according to the economic conditions.

Panels A and B Table (5-5) show the three factor model results for the expansion and contraction periods respectively. Comparing panel A of this table with panel A of Table (5-1), the exclusion of recession periods from the sample has little effect on the slopes of the three factor model. This is not expected according to the increase of the returns for the expansion periods. This indicates that economic risk is not the cause of the value premium. The behaviour of the slopes in the contraction periods is still the same as shown in panel B, despite the reduction in the slopes. This indicates again that there are no changes in the risk behaviour of the portfolios according to the changes in the economic conditions.

5.5 Conclusion

In this chapter the ability of Fama and French's (1993, 1995) three factor model to explain the value premium is discussed. Using the significance of the model's intercept and the bigger R square, their model explains the value premium in the 1972-1992 period. This is not the same for the 1992-2011 period. The three factor model cannot explain the returns of the most important portfolios in this period, the small value portfolios. These portfolios have significant intercepts. A close look at the loadings of the value premiums across the size quintiles, shows increasing patterns of the value premiums' loadings. The value premiums' loadings on the market, SMB, and HML are higher for big portfolios than the small portfolios. This contradicts the risk explanation where the reverse should happen. Another source of the limitation of the ability of the three factor model in explaining the returns are significant intercepts of the small companies when explaining the January and expansion periods' returns.

It is likely that growth stocks outperform value stocks during bad times of the business cycle (Lakonishock et al. (1994)). The results of this study show a different story. The returns of value stocks are higher than those of growth stocks during recession periods, but both are insignificant. This result lessens the role of the business cycle as an explanation of the value premium.

Table 5.1 Three-factors regressions for monthly excess returns on 25 portfolios formed on size and book to market.

R(t) - RF(t) = a + b [RM(t) - RF(t)] + s SMB(t) + h HML(t) + e(t)

RM is the value weighted monthly percent return on the stocks in the size-BE/ME portfolios, plus the negative BE stocks excluded from the portfolios. RF is the one-month Treasury bill rate, observed at the biggining of the month. SMB (small minus big) is the difference between the returns on small stocks big stock portfolios with about the same weighted average book to market equity. HML (hogh minus low) id the difference between the returns on high and low book to market equity portfolios with about the same weighted average size. The 25 size-BE/ME stocks portfolios are formed as in table 4.1. The retuns of the portfolios are the value weighted monthly percent returns.

Panel A: July 1972 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.13	0.01	-0.03	0.05	0	-0.14		2.45	0.17	-0.4	0.81	-0.07	-1.56
	Small	0.22	0.14	0.28	0.17	0.31	0.28	0.14	3.13	1.15	2.7	2.08	3.83	3.15	1.15
	2	0.07	0.01	0.04	0.05	0.12	0.18	0.17	1.39	0.12	0.5	0.77	1.7	2.2	1.29
Size	3	0.03	0.08	0.02	0.01	-0.05	0.03	-0.05	0.46	0.75	0.29	0.08	-0.65	0.25	-0.39
	4	0.04	0.1	0.02	-0.05	0.02	0.09	-0.01	0.71	1.18	0.3	-0.7	0.3	0.93	-0.11
	Big	0.04	0.16	0.03	-0.03	0.03	-0.17	-0.33	1.83	2.44	0.36	-0.41	0.36	-1.54	-2.46
	S-B	0.19	-0.02	0.25	0.21	0.28	0.45		2.44	-0.14	1.98	1.79	2.4	3.28	
					b							t(b)			
	All		0.99	1.02	0.99	0.94	1.05	0.06		81.96	69.98	63.96	63.99	69.72	3
	Small	0.95	1.07	0.95	0.9	0.83	0.94	-0.13	58.3	39.44	40.69	47.23	44.85	46.46	-4.74
	2	1.01	1.15	1.01	0.94	0.92	1.03	-0.12	93.28	49.37	55.09	61.19	58.49	55.84	-4.1
Size	3	1.01	1.09	0.99	0.96	0.94	1.1	0.02	78.55	45.53	55.7	57.16	52.52	48.5	0.61
	4	1.02	1.07	1.04	0.99	0.96	1.08	0.01	86.87	56.41	58.33	56.16	51.69	51.72	0.5
	Big	0.99	0.97	1.02	1	0.95	1.02	0.05	219.19	66.12	63.26	52.79	49.73	40.73	1.73
	S-B	-0.04	0.1	-0.07	-0.11	-0.12	-0.08		-2.32	3.12	-2.28	-4.01	-4.61	-2.7	
					s							t(s)			
	All		-0.14	-0.06	-0.09	0.07	0.18	0.33		-8.4	-3.07	-3.91	3.38	8.61	11.79
	Small	0.97	1.08	1.11	0.91	0.91	0.9	-0.18	42.08	28.01	33.18	33.8	34.76	31.43	-4.49
	2	0.8	0.95	0.78	0.77	0.74	0.65	-0.3	51.74	28.56	29.73	35.29	33.01	24.83	-7.08
Size	3	0.63	0.73	0.65	0.54	0.51	0.49	-0.24	34.25	21.57	25.76	22.69	20.2	15.24	-5.41
	4	0.34	0.44	0.27	0.24	0.26	0.25	-0.19	20.08	16.24	10.68	9.46	9.86	8.41	-5.07
	Big	-0.21	-0.25	-0.2	-0.28	-0.14	-0.1	0.16	-33.61	-12.22	-8.6	-10.23	-5	-2.79	3.61
	S-B	1.18	1.34	1.3	1.19	1.05	1		47.93	28.98	31.6	31.65	27.69	22.6	
					h							t(h)			
	All		-0.37	0.09	0.29	0.5	0.67	1.04		-20.3	4.19	12.58	22.43	29.28	34.99
	Small	0.23	-0.26	-0.12	0.18	0.34	0.58	0.84	9.34	-6.32	-3.39	6.29	12.29	19.18	19.94
	2	0.2	-0.37	0.03	0.34	0.5	0.63	1	12.2	-10.43	0.93	14.63	21.09	22.71	22.61
Size	3	0.17	-0.47	0.07	0.4	0.58	0.64	1.11	8.8	-13.05	2.48	15.88	21.7	18.64	23.81
	4	0.12	-0.47	0.13	0.4	0.52	0.55	1.02	6.94	-16.39	4.69	15.04	18.74	17.55	26.08
	Big	-0.04	-0.36	0.09	0.27	0.51	0.68	1.04	-5.31	-16.42	3.62	9.44	17.68	18.02	22.91
	S-B	0.26	0.1	-0.21	-0.09	-0.17	-0.1		10.08	2.14	-4.75	-2.27	-4.17	-2.08	
					R sq.							s(e)			
	All		0.95	0.92	0.9	0.9	0.92	0.74		1.13	1.36	1.43	1.37	1.4	1.83
	Small	0.94	0.89	0.9	0.91	0.9	0.89	0.58	1.51	2.52	2.18	1.76	1.71	1.88	2.61
	2	0.97	0.92	0.92	0.93	0.92	0.91	0.65	1.01	2.17	1.71	1.43	1.47	1.72	2.72
Size	3	0.95	0.9	0.92	0.91	0.89	0.87	0.62	1.2	2.22	1.65	1.56	1.66	2.12	2.87
	4	0.96	0.93	0.9	0.89	0.87	0.87	0.65	1.1	1.76	1.67	1.64	1.72	1.94	2.41
	Big	0.99	0.93	0.9	0.86	0.84	0.79	0.54	0.42	1.36	1.5	1.76	1.78	2.33	2.81
	S-B	0.84	0.67	0.72	0.7	0.65	0.55		1.62	3.02	2.7	2.45	2.47	2.9	

Cont. Table 5-1

Panel B: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.19	0	0.02	0.09	-0.03	-0.22		2.28	0.02	0.21	1.16	-0.29	-1.66
	Small	0.14	0.26	0.29	0.16	0.11	0.1	-0.15	2.14	1.93	2.62	1.84	1.44	1.05	-0.93
	2	0.1	0.06	0.1	0.12	0.08	0.16	0.1	1.88	0.47	1.05	1.46	0.93	1.67	0.63
Size	3	0.08	0.17	0.07	0.07	-0.06	-0.01	-0.18	1.31	1.21	0.71	0.82	-0.6	-0.08	-1.01
	4	0.02	0.07	0.05	-0.06	-0.02	0.2	0.13	0.39	0.69	0.47	-0.63	-0.16	1.62	0.84
	Big	0.02	0.21	0	0	0.1	-0.31	-0.52	0.87	1.95	0.02	-0.01	0.97	-1.77	-2.36
	S-B	0.12	0.05	0.29	0.16	0.01	0.42		1.63	0.25	1.94	1.18	0.09	2.08	
					b							t(b)			
	All		0.97	1.04	0.98	0.96	1.09	0.12		50.26	58.12	46.24	52.03	50.73	3.97
	Small	0.98	1.08	1	0.95	0.87	0.98	-0.1	65.32	35	38.75	48.39	48.48	43.11	-2.64
	2	1.01	1.16	1	0.98	0.94	0.99	-0.16	82.23	38.89	46.56	52.87	49.24	44.78	-4.42
Size	3	1.01	1.05	1.03	0.97	0.97	1.1	0.05	71.98	33.35	46.98	47.35	42.12	34.14	1.22
	4	1.05	1.06	1.08	1.02	1.01	1.14	0.08	74.74	43.22	48.17	49.63	41.51	40.31	2.34
	Big	0.98	0.95	1.04	0.98	0.95	1.05	0.11	152.81	37.99	47.47	36.45	39.48	25.82	2.09
	S-B	0.01	0.13	-0.04	-0.03	-0.08	-0.08		0.54	3.03	-1.27	-0.94	-2.82	-1.67	
					s							t(s)			
	All		-0.09	0.03	-0.14	-0.01	0.23	0.32		-3.06	1.01	-4.4	-0.26	6.93	6.88
	Small	1.12	1.21	1.15	1.02	1.05	1.07	-0.14	48.17	25.61	28.99	33.8	37.66	30.72	-2.42
	2	0.82	0.97	0.82	0.82	0.69	0.77	-0.2	43.13	21.14	24.68	28.88	23.48	22.42	-3.57
Size	3	0.58	0.63	0.61	0.51	0.47	0.62	-0.01	26.91	12.95	18.05	16.09	13.39	12.44	-0.18
	4	0.27	0.3	0.27	0.27	0.16	0.27	-0.02	12.44	7.89	7.73	8.7	4.41	6.32	-0.43
	Big	-0.26	-0.24	-0.14	-0.37	-0.19	-0.13	0.11	-26.5	-6.29	-4.14	-8.85	-5.18	-2.03	1.45
	S-B	1.38	1.45	1.29	1.39	1.24	1.2		54.89	21.91	24.16	29.2	28.62	16.83	
					h							t(h)			
	All		-0.5	-0.11	0.13	0.46	0.7	1.19		-15.3	-3.55	3.54	14.75	19.32	23.49
	Small	0.16	-0.31	-0.14	0.14	0.32	0.55	0.86	6.39	-6.04	-3.16	4.35	10.68	14.36	13.36
	2	0.09	-0.43	-0.1	0.22	0.4	0.49	0.92	4.23	-8.6	-2.65	7.08	12.35	13.08	14.9
Size	3	0.03	-0.67	-0.12	0.22	0.48	0.6	1.27	1.07	-12.58	-3.16	6.3	12.51	11.14	18.73
	4	0.07	-0.48	-0.08	0.2	0.51	0.56	1.04	3.12	-11.72	-2.07	5.68	12.45	11.84	18.13
	Big	-0.05	-0.46	-0.1	0.11	0.44	0.76	1.21	-4.91	-10.87	-2.66	2.44	10.85	11.03	14.09
	S-B	0.21	0.14	-0.04	0.03	-0.12	-0.21		7.83	1.97	-0.66	0.64	-2.48	-2.7	
					R sq.							s(e)			
	All		0.95	0.95	0.92	0.93	0.93	0.73		1.24	1.16	1.36	1.19	1.38	1.94
	Small	0.98	0.93	0.94	0.96	0.96	0.95	0.55	0.97	1.98	1.65	1.27	1.16	1.46	2.46
	2	0.98	0.94	0.95	0.96	0.95	0.94	0.63	0.79	1.91	1.38	1.19	1.22	1.43	2.36
Size	3	0.98	0.92	0.95	0.94	0.92	0.88	0.63	0.91	2.03	1.41	1.32	1.48	2.07	2.59
	4	0.97	0.94	0.94	0.94	0.9	0.9	0.61	0.91	1.57	1.44	1.32	1.56	1.81	2.2
	Big	0.99	0.91	0.93	0.87	0.88	0.75	0.48	0.41	1.6	1.41	1.73	1.56	2.63	3.29
	S-B	0.94	0.71	0.73	0.8	0.79	0.57		1.05	2.78	2.23	1.99	1.81	2.98	

Cont. Table 5-1

Panel C: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.13	0.13	-0.02	0.01	0.02	-0.1		2.11	1.57	-0.24	0.11	0.25	-0.95
	Small	0.38	0.07	0.29	0.25	0.57	0.53	0.46	3.26	0.35	1.66	1.78	4.21	3.79	2.51
	2	0.08	-0.01	0.04	0.05	0.2	0.28	0.28	1.08	-0.03	0.29	0.53	1.82	2.17	1.37
Size	3	0.02	0.04	0.05	0.01	0	0.11	0.07	0.24	0.25	0.46	0.08	-0.03	0.75	0.34
	4	0.06	0.1	0.09	0.05	0.06	-0.02	-0.11	0.77	0.77	0.84	0.42	0.51	-0.14	-0.7
	Big	0.04	0.14	0.15	-0.03	-0.03	-0.05	-0.19	1.75	2.04	1.62	-0.25	-0.22	-0.39	-1.33
	S-B	0.34	-0.07	0.14	0.27	0.6	0.58		2.8	-0.33	0.7	1.54	3.08	3.21	
					b							t(b)			
	All		0.99	0.94	0.97	0.92	1.01	0.02		70.46	49.14	45.9	39.31	46.28	0.74
	Small	0.86	1.03	0.89	0.8	0.74	0.86	-0.18	31.72	22.41	21.95	25.14	23.74	26.55	-4.12
	2	0.99	1.13	1	0.86	0.89	1.03	-0.1	56.37	30.04	32.56	36.99	35.46	34.8	-2.09
Size	3	0.98	1.1	0.91	0.9	0.88	1.08	-0.02	47.88	31.28	35.07	36.21	32.22	32.76	-0.4
	4	0.99	1.1	0.96	0.9	0.9	1.01	-0.09	52.47	37.95	37.91	34.61	31.74	31.98	-2.35
	Big	1	0.98	0.95	1.01	0.94	1	0.03	176.6	61.55	45.24	38.86	30.66	32.58	0.8
	S-B	-0.14	0.05	-0.05	-0.21	-0.2	-0.15		-5.06	1.09	-1.13	-5	-4.36	-3.51	
					s							t(s)			
	All		-0.15	-0.08	0.01	0.14	0.14	0.29		-8.16	-3.06	0.18	4.6	4.97	8.8
	Small	0.88	1	1.08	0.84	0.81	0.78	-0.21	24.47	16.36	20.13	19.88	19.67	18.37	-3.78
	2	0.82	0.95	0.78	0.76	0.81	0.6	-0.35	35.26	19.11	19.32	24.99	24.46	15.42	-5.5
Size	3	0.7	0.86	0.74	0.62	0.57	0.41	-0.46	25.88	18.59	21.48	18.72	15.78	9.33	-7.54
	4	0.4	0.55	0.33	0.27	0.34	0.23	-0.32	16.21	14.33	10.02	7.72	8.97	5.52	-6.32
	Big	-0.18	-0.24	-0.19	-0.16	-0.07	-0.1	0.14	-23.41	-11.44	-6.82	-4.72	-1.8	-2.44	3.18
	S-B	1.05	1.24	1.27	1	0.89	0.88		28.42	18.64	20.02	18.34	14.93	15.96	
					h							t(h)			
	All		-0.3	0.22	0.43	0.55	0.63	0.93		-15.38	8.2	14.87	17.14	21.14	26.71
	Small	0.24	-0.26	-0.11	0.18	0.32	0.57	0.83	6.43	-4.1	-2.05	4.1	7.52	12.8	14.17
	2	0.28	-0.33	0.1	0.41	0.6	0.7	1.03	11.49	-6.29	2.43	12.99	17.35	17.22	15.64
Size	3	0.29	-0.29	0.22	0.55	0.67	0.63	0.92	10.35	-6.09	6.16	15.96	17.88	13.82	14.63
	4	0.18	-0.41	0.28	0.54	0.57	0.54	0.95	7.13	-10.41	8.19	15.17	14.5	12.47	18.23
	Big	-0.01	-0.3	0.21	0.41	0.57	0.64	0.94	-1.35	-13.79	7.41	11.61	13.65	15.08	20.46
	S-B	0.25	0.04	-0.33	-0.23	-0.25	-0.07		6.5	0.6	-4.96	-4.14	-4.06	-1.23	
					R sq.							s(e)			
	All		0.96	0.92	0.91	0.88	0.91	0.77		0.9	1.23	1.35	1.49	1.39	1.62
	Small	0.9	0.84	0.85	0.85	0.84	0.84	0.62	1.73	2.94	2.59	2.03	1.99	2.06	2.71
	2	0.96	0.9	0.89	0.91	0.91	0.88	0.66	1.12	2.4	1.95	1.48	1.6	1.89	3.04
Size	3	0.94	0.9	0.9	0.9	0.87	0.85	0.65	1.31	2.24	1.65	1.59	1.74	2.11	2.92
	4	0.94	0.92	0.88	0.86	0.84	0.84	0.72	1.2	1.84	1.61	1.66	1.82	2.01	2.42
	Big	0.99	0.95	0.9	0.87	0.82	0.84	0.67	0.36	1.01	1.33	1.65	1.95	1.96	2.13
	S-B	0.78	0.65	0.72	0.67	0.58	0.57		1.78	3.2	3.06	2.62	2.86	2.67	

Table 5.2 Three-factors regressions for monthly excess returns on 25 portfolios formed on size and book to market: Non January months

R(t) - RF(t) = a + b [RM(t) - RF(t)] + s SMB(t) + h HML(t) + e(t)

RM is the value weighted monthly percent return on the stocks in the size-BE/ME portfolios, plus the negative BE stocks excluded from the portfolios. RF is the one-month Treasury bill rate, observed at the biggining of the month. SMB (small minus big) is the difference between the returns on small stocks big stock portfolios with about the same weighted average book to market equity. HML (hogh minus low) id the difference between the returns on high and low book to market equity portfolios with about the same weighted average size. The 25 size-BE/ME stocks portfolios are formed as in table 4.1. The retuns of the portfolios are the value weighted monthly percent returns.

Panel A: Non January: July 1972 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.13	0.03	-0.02	0.05	0	-0.13		2.35	0.46	-0.31	0.81	0.04	-1.42
	Small	0.11	0	0.13	0.09	0.24	0.15	0.16	1.58	-0.03	1.27	1.01	2.9	1.71	1.21
	2	0.08	0	0.1	0.08	0.13	0.15	0.15	1.68	-0.03	1.16	1.08	1.77	1.76	1.14
Size	3	0.1	0.18	0.06	0.1	-0.02	0.02	-0.16	1.75	1.77	0.72	1.34	-0.19	0.21	-1.16
	4	0.08	0.16	0.07	-0.02	0.03	0.11	-0.05	1.68	1.89	0.93	-0.25	0.37	1.15	-0.41
	Big	0.03	0.16	0.05	-0.04	0.04	-0.16	-0.31	1.66	2.31	0.62	-0.51	0.42	-1.37	-2.27
	S-B	0.08	-0.16	0.09	0.13	0.21	0.31		1.02	-1.07	0.66	1.08	1.71	2.23	
					b							t(b)			
	All		1	1.03	1.01	0.95	1.05	0.06		76.65	66.1	62.96	61.85	65.15	2.7
	Small	0.94	1.07	0.97	0.89	0.83	0.94	-0.13	55.73	37.03	39.88	44.34	42.15	44.5	-4.38
	2	1.01	1.15	1.01	0.94	0.93	1.05	-0.1	89.51	46.65	52.42	57.94	56.17	52.8	-3.09
Size	3	1.02	1.11	1.01	0.97	0.95	1.13	0.02	78.82	46	54.39	57.21	50.63	46.93	0.69
	4	1.04	1.08	1.06	1.01	0.98	1.09	0.01	87.58	55.15	57.66	56.42	51.03	48.75	0.19
	Big	0.99	0.97	1.03	1.03	0.96	1.02	0.05	204.92	61.61	59.46	52.09	47.83	37.97	1.61
	S-B	-0.05	0.1	-0.06	-0.13	-0.13	-0.08		-2.51	2.98	-1.96	-4.68	-4.77	-2.5	
					s							t(s)			
	All		-0.15	-0.06	-0.06	0.09	0.19	0.34		-7.98	-2.57	-2.57	4.07	8.33	11.29
	Small	0.94	1.05	1.08	0.89	0.9	0.86	-0.19	38.92	25.24	30.91	30.91	31.96	28.5	-4.26
	2	0.8	0.95	0.8	0.76	0.74	0.65	-0.3	49.5	26.81	28.82	32.73	31.13	22.65	-6.68
Size	3	0.65	0.79	0.68	0.56	0.53	0.49	-0.3	35.17	22.86	25.73	22.78	19.8	14.32	-6.33
	4	0.36	0.46	0.3	0.26	0.27	0.26	-0.21	21.19	16.44	11.23	10.29	9.92	7.97	-5.16
	Big	-0.21	-0.26	-0.19	-0.25	-0.11	-0.08	0.19	-30.65	-11.69	-7.69	-8.78	-3.83	-1.99	4.05
	S-B	1.15	1.31	1.27	1.14	1.01	0.94		44.11	26.26	28.89	28.21	24.97	20	
					h							t(h)			
	All		-0.38	0.12	0.36	0.52	0.67	1.05		-18.32	4.84	14.1	21.21	26.36	31.47
	Small	0.22	-0.27	-0.12	0.18	0.33	0.56	0.83	8.15	-5.95	-3.01	5.68	10.75	16.81	17.29
	2	0.21	-0.37	0.05	0.34	0.52	0.65	1.03	11.93	-9.58	1.49	13.19	19.85	20.83	20.81
Size	3	0.21	-0.41	0.11	0.44	0.62	0.68	1.09	10.29	-10.78	3.92	16.33	20.79	17.91	21.26
	4	0.16	-0.44	0.18	0.46	0.56	0.58	1.02	8.31	-14.31	6.13	16.26	18.45	16.37	23.06
	Big	-0.03	-0.38	0.11	0.34	0.53	0.69	1.07	-4.53	-15.22	4.16	11.01	16.65	16.34	21.07
	S-B	0.25	0.11	-0.23	-0.16	-0.2	-0.13		8.74	1.92	-4.74	-3.63	-4.39	-2.58	
					R sq.							s(e)			
	All		0.95	0.92	0.91	0.9	0.92	0.71		1.13	1.36	1.39	1.34	1.4	1.83
	Small	0.94	0.89	0.9	0.9	0.89	0.89	0.57	1.46	2.51	2.1	1.75	1.7	1.83	2.64
	2	0.97	0.92	0.92	0.93	0.92	0.9	0.65	0.98	2.13	1.68	1.41	1.44	1.72	2.71
Size	3	0.96	0.92	0.92	0.91	0.89	0.86	0.62	1.13	2.09	1.6	1.48	1.63	2.09	2.82
	4	0.96	0.93	0.91	0.9	0.87	0.86	0.65	1.02	1.7	1.6	1.55	1.66	1.93	2.43
	Big	0.99	0.93	0.9	0.87	0.84	0.78	0.53	0.42	1.36	1.5	1.71	1.74	2.33	2.79
	S-B	0.82	0.66	0.71	0.69	0.64	0.53		1.58	3.02	2.65	2.45	2.44	2.84	

Cont. Table 5-2

Panel B: Non January: July 1972 to June 1992

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.19	0	0.02	0.05	-0.04	-0.23		2.24	-0.01	0.18	0.68	-0.42	-1.75
	Small	0.06	0.18	0.17	0.1	0.07	0	-0.18	1.03	1.36	1.56	1.12	0.89	0.03	-1.06
	2	0.09	0.02	0.1	0.13	0.1	0.13	0.1	1.72	0.17	1.02	1.56	1.18	1.29	0.64
Size	3	0.11	0.2	0.04	0.13	-0.04	-0.03	-0.23	1.84	1.56	0.43	1.44	-0.43	-0.2	-1.29
	4	0.05	0.1	0.05	-0.04	-0.02	0.21	0.11	0.85	0.95	0.54	-0.42	-0.23	1.71	0.7
	Big	0.01	0.21	0.01	-0.02	0.05	-0.35	-0.56	0.46	1.97	0.08	-0.14	0.52	-1.94	-2.54
	S-B	0.05	-0.03	0.16	0.12	0.01	0.35		0.72	-0.15	1.07	0.82	0.11	1.76	
					b							t(b)			
	All		0.96	1.06	1.01	0.99	1.11	0.15		45.72	54.61	43	48.94	47.3	4.63
	Small	0.97	1.06	1.02	0.97	0.88	0.97	-0.09	62.55	31.22	38.08	44.45	45.44	40.27	-2.17
	2	1.01	1.14	1.02	0.99	0.95	1.02	-0.12	74.59	34.44	42.5	47.99	44.84	41.55	-2.83
Size	3	1.04	1.09	1.06	1	0.99	1.16	0.07	69.81	33.8	44.85	44.96	39.13	33.14	1.61
	4	1.07	1.09	1.11	1.05	1.03	1.17	0.08	70.79	39.92	46.44	47.51	39.21	37.39	2.06
	Big	0.97	0.93	1.05	1.01	0.97	1.08	0.15	138.33	34.12	43.97	33.69	36.58	23.77	2.72
	S-B	0	0.14	-0.04	-0.04	-0.1	-0.11		0.01	2.83	-0.96	-1.23	-3.02	-2.15	
					s							t(s)			
	All		-0.11	0.02	-0.12	0	0.26	0.37		-3.48	0.7	-3.3	-0.1	7.18	7.43
	Small	1.09	1.2	1.11	1.02	1.05	1.02	-0.18	45.51	22.91	26.79	30.25	35.25	27.47	-2.75
	2	0.81	0.96	0.83	0.8	0.68	0.77	-0.19	38.81	18.87	22.55	25.01	20.74	20.23	-3.07
Size	3	0.6	0.69	0.62	0.51	0.48	0.64	-0.05	26.16	13.79	17.01	14.88	12.16	11.75	-0.75
	4	0.28	0.31	0.27	0.28	0.15	0.28	-0.02	12.02	7.34	7.4	8.19	3.78	5.88	-0.41
	Big	-0.27	-0.28	-0.15	-0.34	-0.18	-0.08	0.2	-24.52	-6.6	-4.05	-7.34	-4.48	-1.14	2.29
	S-B	1.36	1.48	1.26	1.36	1.23	1.1		49.7	19.95	21.91	25	25.15	14.13	
					h							t(h)			
	All		-0.55	-0.07	0.2	0.5	0.75	1.31		-14.79	-2.06	4.71	13.74	17.98	22.53
	Small	0.12	-0.36	-0.14	0.17	0.31	0.48	0.84	4.46	-5.89	-2.82	4.34	8.91	11.2	10.92
	2	0.1	-0.46	-0.06	0.21	0.42	0.51	0.97	3.93	-7.85	-1.35	5.72	11.03	11.5	13.27
Size	3	0.09	-0.57	-0.05	0.27	0.54	0.71	1.28	3.29	-9.83	-1.08	6.82	11.86	11.37	16.15
	4	0.13	-0.42	-0.01	0.28	0.55	0.64	1.06	4.84	-8.59	-0.16	6.96	11.54	11.48	15.08
	Big	-0.07	-0.55	-0.07	0.19	0.48	0.84	1.39	-5.82	-11.28	-1.7	3.5	10.05	10.37	13.94
	S-B	0.2	0.19	-0.06	-0.02	-0.17	-0.36		6.23	2.2	-0.94	-0.3	-3	-3.97	
					R sq.							s(e)			
	All		0.95	0.95	0.92	0.93	0.93	0.73		1.2	1.12	1.35	1.16	1.34	1.86
	Small	0.98	0.93	0.95	0.96	0.96	0.94	0.52	0.89	1.95	1.54	1.25	1.11	1.38	2.47
	2	0.98	0.94	0.95	0.95	0.94	0.93	0.62	0.78	1.89	1.38	1.19	1.22	1.41	2.34
Size	3	0.98	0.93	0.95	0.94	0.91	0.88	0.61	0.85	1.85	1.36	1.28	1.46	2.01	2.54
	4	0.97	0.94	0.94	0.94	0.9	0.89	0.56	0.87	1.56	1.38	1.27	1.51	1.79	2.25
	Big	0.99	0.91	0.93	0.86	0.87	0.73	0.5	0.4	1.56	1.38	1.73	1.53	2.6	3.2
	S-B	0.92	0.69	0.71	0.76	0.76	0.53		1.02	2.76	2.13	2.03	1.82	2.9	

Cont. Table 5-2

Panel C: Non January: July 1992 to June 2011

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.12	0.16	-0.03	0.04	0.06	-0.06		1.95	1.76	-0.37	0.35	0.64	-0.52
	Small	0.26	-0.13	0.13	0.15	0.51	0.4	0.53	2.13	-0.62	0.71	1.04	3.57	2.78	2.71
	2	0.11	0	0.14	0.08	0.17	0.25	0.25	1.39	0	1.03	0.82	1.51	1.86	1.17
Size	3	0.11	0.17	0.12	0.11	0.03	0.12	-0.05	1.19	1.06	1.02	1.01	0.26	0.83	-0.22
	4	0.11	0.16	0.16	0.08	0.07	0.02	-0.14	1.43	1.27	1.44	0.68	0.56	0.11	-0.82
	Big	0.04	0.13	0.17	-0.06	0.01	0.02	-0.11	1.73	1.76	1.7	-0.53	0.07	0.15	-0.71
	S-B	0.21	-0.26	-0.04	0.21	0.5	0.38		1.7	-1.12	-0.17	1.1	2.48	2.06	
					b							t(b)			
	All		0.99	0.95	0.98	0.93	1	0.01		67.91	46.11	45.44	38.81	44.12	0.4
	Small	0.87	1.05	0.9	0.79	0.74	0.87	-0.18	31.32	22.07	21.91	24.47	22.97	26.13	-4.06
	2	0.99	1.14	0.98	0.86	0.89	1.03	-0.1	56.07	29.81	31.72	36.73	34.81	33.39	-2.08
Size	3	0.98	1.1	0.91	0.91	0.89	1.09	-0.02	47.91	30.2	34.43	37.1	31.8	31.91	-0.34
	4	1	1.1	0.97	0.92	0.92	1.01	-0.09	55.05	38.63	37.9	35.93	32.72	31	-2.23
	Big	1	0.98	0.95	1.02	0.95	0.99	0.01	168.15	58.95	42.31	38.98	30.21	31.1	0.36
	S-B	-0.13	0.07	-0.04	-0.22	-0.2	-0.12		-4.7	1.35	-0.89	-5.19	-4.41	-2.93	
					s							t(s)			
	All		-0.15	-0.07	0	0.15	0.14	0.29		-7.59	-2.76	0.09	4.88	4.83	8.28
	Small	0.87	0.97	1.07	0.83	0.81	0.78	-0.19	23.83	15.53	19.65	19.42	19.01	17.8	-3.29
	2	0.82	0.95	0.8	0.77	0.8	0.59	-0.36	35.26	18.92	19.5	25.07	23.53	14.51	-5.53
Size	3	0.71	0.88	0.75	0.61	0.58	0.41	-0.47	26.16	18.19	21.43	18.96	15.79	9.05	-7.5
	4	0.41	0.55	0.34	0.29	0.35	0.24	-0.31	17.35	14.67	10.23	8.51	9.44	5.55	-5.99
	Big	-0.17	-0.23	-0.19	-0.17	-0.06	-0.1	0.14	-22.33	-10.67	-6.3	-4.93	-1.38	-2.31	3
	S-B	1.04	1.21	1.25	1	0.87	0.87		27.59	17.51	19.1	17.59	14.43	15.59	
					h							t(h)			
	All		-0.28	0.23	0.46	0.55	0.63	0.91		-13.75	7.77	15.07	16.3	19.48	24.13
	Small	0.26	-0.24	-0.1	0.18	0.33	0.59	0.83	6.53	-3.65	-1.66	4.03	7.27	12.5	13.08
	2	0.28	-0.32	0.1	0.42	0.59	0.72	1.04	11.3	-5.98	2.32	12.74	16.34	16.36	14.95
Size	3	0.29	-0.31	0.23	0.55	0.68	0.65	0.95	10.13	-5.92	6.1	15.86	17.14	13.44	14.18
	4	0.19	-0.43	0.3	0.57	0.59	0.55	0.99	7.38	-10.78	8.34	15.92	14.9	11.95	17.62
	Big	-0.01	-0.28	0.22	0.44	0.57	0.62	0.9	-0.83	-12.14	7.01	12.08	12.9	13.69	18.52
	S-B	0.26	0.04	-0.32	-0.26	-0.24	-0.03		6.46	0.54	-4.53	-4.28	-3.69	-0.51	
					R sq.							s(e)			
	All		0.96	0.91	0.91	0.89	0.91	0.75		0.9	1.26	1.33	1.47	1.4	1.64
	Small	0.9	0.85	0.86	0.86	0.84	0.85	0.61	1.7	2.92	2.53	1.99	1.99	2.04	2.76
	2	0.96	0.91	0.9	0.92	0.91	0.88	0.67	1.08	2.34	1.9	1.43	1.58	1.9	3.02
Size	3	0.95	0.91	0.91	0.91	0.88	0.86	0.67	1.26	2.24	1.63	1.51	1.72	2.09	2.92
	4	0.95	0.93	0.89	0.88	0.86	0.84	0.73	1.11	1.75	1.57	1.57	1.73	2.01	2.44
	Big	0.99	0.95	0.9	0.88	0.82	0.83	0.65	0.37	1.02	1.37	1.6	1.92	1.96	2.12
	S-B	0.79	0.65	0.72	0.68	0.59	0.58		1.76	3.21	3.06	2.64	2.81	2.62	

Table 5.3 Three-factors regressions for monthly excess returns on 25 portfolios formed on size and book to market: January month

R(t) - RF(t) = a + b [RM(t) - RF(t)] + s SMB(t) + h HML(t) + e(t)

RM is the value weighted monthly percent return on the stocks in the size-BE/ME portfolios, plus the negative BE stocks excluded from the portfolios. RF is the one-month Treasury bill rate, observed at the biggining of the month. SMB (small minus big) is the difference between the returns on small stocks big stock portfolios with about the same weighted average book to market equity. HML (hogh minus low) id the difference between the returns on high and low book to market equity portfolios with about the same weighted average size. The 25 size-BE/ME stocks portfolios are formed as in table 4.1. The retuns of the portfolios are the value weighted monthly percent returns.

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.12	-0.28	-0.09	0.15	-0.05	-0.17		0.55	-1.19	-0.35	0.51	-0.2	-0.5
	Small	1.5	1.81	2	1.2	1.17	1.72	-0.09	6.39	4.82	4.82	4.15	3.7	5.62	-0.23
	2	-0.13	0.23	-0.57	-0.32	-0.02	0.47	0.24	-0.55	0.49	-1.62	-1.1	-0.06	1.77	0.45
Size	3	-0.82	-0.99	-0.3	-1.21	-0.45	-0.04	0.94	-3.21	-1.99	-0.88	-3.71	-1.4	-0.11	1.78
	4	-0.51	-0.55	-0.6	-0.49	-0.05	-0.28	0.28	-1.86	-1.5	-1.66	-1.33	-0.11	-0.77	0.77
	Big	0.09	0.17	-0.27	0.08	0.1	-0.19	-0.36	1.11	0.66	-1.05	0.23	0.28	-0.43	-0.64
	S-B	1.42	1.65	2.27	1.13	1.07	1.91		5.91	3.61	5.06	3.43	2.29	3.62	
					b							t(b)			
	All		0.97	0.99	0.9	0.87	1.07	0.1		25.6	23.58	20.11	17.18	22.34	1.61
	Small	0.96	1.03	0.83	0.9	0.82	0.89	-0.14	23.04	15.44	11.37	17.48	14.62	16.4	-1.95
	2	1.03	1.18	1.04	0.92	0.86	0.9	-0.28	25.17	13.92	16.74	17.63	15.7	19.3	-2.99
Size	3	0.98	1	0.93	0.88	0.86	0.95	-0.05	21.81	11.38	15.31	15.28	15.08	13.4	-0.51
	4	0.99	0.97	0.97	0.9	0.84	1.05	0.08	20.45	14.89	15.29	13.75	11.85	16.59	1.25
	Big	0.98	0.96	1	0.9	0.89	1.06	0.1	71.07	21.38	21.67	15.34	13.58	13.77	1.05
	S-B	-0.02	0.07	-0.17	0	-0.08	-0.17		-0.52	0.87	-2.1	-0.06	-0.92	-1.87	
					s							t(s)			
	All		-0.13	0.02	-0.06	-0.05	0.14	0.28		-2.24	0.26	-0.91	-0.62	1.94	2.95
	Small	1.07	1.18	1.24	0.98	0.91	1.05	-0.13	16.59	11.37	10.88	12.22	10.53	12.46	-1.15
	2	0.82	0.91	0.7	0.87	0.81	0.76	-0.16	12.93	6.93	7.23	10.67	9.49	10.39	-1.1
Size	3	0.6	0.49	0.57	0.64	0.47	0.65	0.15	8.58	3.62	6.04	7.2	5.33	5.87	1.05
	4	0.3	0.32	0.3	0.27	0.28	0.33	0.01	4	3.16	3.03	2.63	2.52	3.4	0.14
	Big	-0.24	-0.24	-0.12	-0.24	-0.31	-0.25	-0.01	-11.32	-3.45	-1.71	-2.62	-3	-2.12	-0.09
	S-B	1.31	1.42	1.36	1.21	1.22	1.3		19.93	11.31	11.05	13.42	9.54	8.98	
					h							t(h)			
	All		-0.34	-0.03	0.05	0.5	0.65	1		-6.77	-0.49	0.85	7.46	10.2	12.34
	Small	0.11	-0.36	-0.29	0.06	0.31	0.51	0.87	1.97	-4.08	-2.97	0.8	4.17	7.09	9.1
	2	0.14	-0.35	0.02	0.32	0.42	0.51	0.87	2.48	-3.13	0.23	4.6	5.75	8.24	7.07
Size	3	0.1	-0.46	-0.05	0.31	0.52	0.46	0.92	1.6	-3.94	-0.56	4.08	6.77	4.81	7.33
	4	0.07	-0.4	-0.02	0.2	0.42	0.44	0.84	1.01	-4.65	-0.28	2.25	4.39	5.19	9.98
	Big	-0.03	-0.3	-0.03	-0.02	0.53	0.69	0.99	-1.57	-5	-0.45	-0.29	6.1	6.72	7.55
	S-B	0.14	-0.06	-0.26	0.08	-0.22	-0.18		2.44	-0.59	-2.49	1	-2.04	-1.44	
					R sq.							s(e)			
	All		0.95	0.94	0.92	0.91	0.95	0.85		1.15	1.27	1.35	1.52	1.44	1.82
	Small	0.97	0.93	0.9	0.95	0.93	0.95	0.72	1.25	2	2.21	1.55	1.68	1.63	2.17
	2	0.97	0.9	0.92	0.95	0.94	0.96	0.64	1.23	2.55	1.87	1.58	1.65	1.41	2.78
Size	3	0.95	0.84	0.91	0.92	0.92	0.9	0.65	1.35	2.64	1.84	1.73	1.73	2.13	2.82
	4	0.94	0.89	0.89	0.87	0.85	0.92	0.76	1.46	1.97	1.91	1.97	2.15	1.91	1.91
	Big	0.99	0.93	0.93	0.87	0.86	0.87	0.64	0.42	1.35	1.39	1.77	1.98	2.32	2.96
	S-B	0.93	0.81	0.78	0.86	0.73	0.7		1.28	2.43	2.39	1.75	2.48	2.81	

Table 5.4 Average monthly returns for 25 portfolios formed on size and book to market: Business cycle periods

At the end of June of year t, I form 25 value weighted portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average monthly returns for book to market (size) portfolios irrespective of the size (book to market). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of monthly differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. T statistic for H-L (S-B) is the average monthly difference divided by the standard error. T statistic for the rest is the average monthly divided by the standard error. The expansion and contraction periods are taken from the National Berou of Economic Research web page.

Panel A: July 1972 to June 2011 : Expansion periods

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.33	1.5	1.61	1.71	2.11	0.78		4.35	5.88	7.17	7.95	8.65	4.55
	Small	1.97	1.77	1.79	1.86	1.89	2.29	0.52	7.42	5.17	5.93	7.32	7.85	8.92	2.88
	2	1.47	1.24	1.42	1.49	1.58	1.84	0.6	5.6	3.46	5.07	6.2	6.91	7.25	2.68
Size	3	1.42	1.18	1.37	1.5	1.5	1.65	0.47	5.67	3.53	5.33	6.68	6.77	6.49	2.2
	4	1.35	1.14	1.39	1.37	1.49	1.64	0.51	5.7	3.77	5.6	6.17	7.08	6.64	2.49
	Big	1.26	1.19	1.34	1.37	1.4	1.38	0.19	5.8	4.69	5.83	6.14	6.69	6	0.94
	S-B	0.71	0.58	0.45	0.49	0.49	0.91		3.77	2.44	1.96	2.4	2.39	4.27	

Panel B: July 1972 to June 2011 : Cntraction periods

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.15	0.02	0.21	0.35	0.37	0.52		-0.16	0.03	0.26	0.46	0.45	1.22
	Small	0.25	0.08	0.07	0.14	0.27	0.34	0.26	0.29	0.08	0.08	0.16	0.36	0.4	0.77
	2	0.23	-0.18	0.13	0.36	0.56	0.37	0.55	0.27	-0.18	0.14	0.43	0.68	0.42	1.27
Size	3	0.16	-0.24	0.16	0.31	0.45	0.42	0.67	0.19	-0.26	0.19	0.37	0.57	0.48	1.47
	4	0.16	-0.04	0	0.28	0.34	0.5	0.54	0.2	-0.05	0	0.36	0.44	0.61	1.24
	Big	-0.14	-0.29	-0.23	-0.12	0.04	0.2	0.49	-0.18	-0.34	-0.31	-0.16	0.06	0.26	0.91
	S-B	0.39	0.37	0.3	0.26	0.22	0.14		0.82	0.67	0.72	0.58	0.48	0.27	

Table 5.5 Three-factors regressions for monthly excess returns on 25 portfolios formed on size and book to market: Business cycle periods

R(t) - RF(t) = a + b [RM(t) - RF(t)] + s SMB(t) + h HML(t) + e(t)

RM is the value weighted monthly percent return on the stocks in the size-BE/ME portfolios, plus the negative BE stocks excluded from the portfolios. RF is the one-month Treasury bill rate, observed at the biggining of the month. SMB (small minus big) is the difference between the returns on small stocks big stock portfolios with about the same weighted average book to market equity. HML (hogh minus low) id the difference between the returns on high and low book to market equity portfolios with about the same weighted average size. The 25 size-BE/ME stocks portfolios are formed as in table 5.2. The retuns of the portfolios are the value weighted monthly percent returns.

Panel A: July 1972 to June 2011 : Expansion periods

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.16	0.01	-0.06	0.03	-0.04	-0.2		2.71	0.17	-0.81	0.38	-0.55	-2.13
	Small	0.29	0.16	0.4	0.29	0.36	0.38	0.22	3.87	1.22	3.53	3.14	4.06	4	1.58
	2	0.05	0.05	-0.01	0.05	0.09	0.16	0.11	0.82	0.41	-0.1	0.62	1.16	1.63	0.72
Size	3	-0.01	0.03	0	0	-0.13	-0.08	-0.1	-0.18	0.23	0.03	-0.05	-1.54	-0.7	-0.68
	4	-0.04	0.02	-0.03	-0.17	-0.04	-0.05	-0.07	-0.71	0.26	-0.3	-2	-0.45	-0.47	-0.56
	Big	0.05	0.21	0.04	-0.06	0.01	-0.19	-0.4	2.31	2.93	0.48	-0.65	0.12	-1.53	-2.73
	S-B	0.24	-0.05	0.36	0.35	0.35	0.57		3.04	-0.29	2.51	2.72	2.68	3.86	
					b							t(b)			
	All		0.97	1.04	1.01	0.95	1.08	0.1		65.47	53.6	51.21	52.44	57.13	4.42
	Small	0.96	1.08	0.93	0.88	0.85	0.96	-0.12	49.25	31.81	32.16	37.52	37.84	39.04	-3.44
	2	1.03	1.15	1.04	0.93	0.93	1.07	-0.08	73.11	37.33	43.12	49.54	46.15	43.13	-2.11
Size	3	1.02	1.1	0.97	0.93	0.94	1.15	0.05	60.11	36.73	43.17	43.6	41.97	39.94	1.16
	4	1.04	1.05	1.05	1.02	0.96	1.13	0.08	70.24	43.18	45.73	45.73	43.02	44.14	2.47
	Big	0.98	0.94	1.03	1.02	0.96	1.03	0.08	181.75	52.02	48.48	42.48	40.2	32.25	2.25
	S-B	-0.02	0.14	-0.11	-0.14	-0.11	-0.07		-0.88	3.36	-2.98	-4.24	-3.24	-1.89	
					s							t(s)			
	All		-0.15	-0.05	-0.06	0.11	0.21	0.36		-8.15	-2.23	-2.27	4.78	9.2	12.42
	Small	0.99	1.13	1.15	0.93	0.96	0.92	-0.21	41.27	26.85	32.34	31.92	34.23	30.35	-4.69
	2	0.8	0.97	0.79	0.77	0.76	0.67	-0.3	45.99	25.41	26.56	32.89	30.51	21.81	-6.23
Size	3	0.65	0.81	0.68	0.56	0.53	0.51	-0.3	31.06	21.71	24.53	20.99	19.13	14.27	-6.16
	4	0.36	0.47	0.29	0.26	0.29	0.26	-0.21	19.54	15.72	10.28	9.25	10.41	8.33	-5.18
	Big	-0.21	-0.27	-0.19	-0.25	-0.1	-0.07	0.2	-32.13	-11.98	-7.09	-8.3	-3.47	-1.69	4.37
	S-B	1.21	1.4	1.34	1.18	1.06	0.99		47.14	27.95	29.7	28.92	25.84	21	
					h							t(h)			
	All		-0.36	0.14	0.34	0.57	0.69	1.06		-17.25	5.19	12.32	22.09	26.01	31.51
	Small	0.23	-0.25	-0.12	0.15	0.37	0.62	0.87	8.32	-5.18	-3.04	4.39	11.68	17.85	17.13
	2	0.21	-0.39	0.08	0.39	0.55	0.69	1.08	10.61	-9	2.22	14.53	19.22	19.66	19.62
Size	3	0.21	-0.4	0.14	0.44	0.65	0.74	1.13	8.92	-9.34	4.27	14.5	20.6	18.12	20.46
	4	0.17	-0.43	0.19	0.5	0.59	0.65	1.08	8.32	-12.36	5.95	15.82	18.82	17.89	23.29
	Big	-0.03	-0.36	0.13	0.31	0.58	0.66	1.02	-4.23	-14.03	4.46	9.15	17.14	14.62	19.28
	S-B	0.26	0.11	-0.26	-0.17	-0.21	-0.04		8.92	1.95	-5.02	-3.56	-4.42	-0.76	
					R sq.							s(e)			
	All		0.95	0.9	0.88	0.88	0.9	0.74		1.07	1.39	1.41	1.31	1.35	1.7
	Small	0.93	0.88	0.89	0.9	0.89	0.88	0.6	1.4	2.44	2.07	1.69	1.62	1.76	2.57
	2	0.96	0.91	0.9	0.92	0.9	0.87	0.65	1.01	2.21	1.73	1.36	1.45	1.78	2.79
Size	3	0.94	0.9	0.9	0.88	0.86	0.84	0.64	1.22	2.16	1.61	1.54	1.6	2.07	2.81
	4	0.95	0.91	0.88	0.86	0.85	0.85	0.68	1.06	1.75	1.65	1.6	1.61	1.85	2.35
	Big	0.99	0.92	0.87	0.83	0.81	0.74	0.52	0.39	1.3	1.53	1.73	1.72	2.29	2.68
	S-B	0.86	0.71	0.75	0.73	0.69	0.57		1.49	2.9	2.62	2.36	2.38	2.73	

Cont. Table 5.5

Panel B: July 1972 to June 2011 : Contraction periods

		Book to market							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.12	-0.11	-0.01	0.04	0.01	-0.11		0.89	-0.94	-0.08	0.29	0.06	-0.49
	Small	-0.14	-0.01	-0.08	-0.23	-0.05	-0.28	-0.27	-0.69	-0.02	-0.31	-1.11	-0.23	-1.16	-0.94
	2	0.05	-0.1	0.08	0.06	0.17	0.06	0.16	0.5	-0.48	0.45	0.36	1.06	0.38	0.64
Size	3	0.12	0.16	0.15	0.13	0.24	0.16	0.01	1.11	0.64	0.88	0.84	1.31	0.72	0.03
	4	0.25	0.45	0.14	0.22	0.22	0.3	-0.15	2.09	2.55	0.84	1.43	1	1.33	-0.58
	Big	0.03	0.08	-0.15	-0.07	-0.01	-0.09	-0.17	0.56	0.47	-1.13	-0.34	-0.06	-0.36	-0.51
	S-B	-0.17	-0.08	0.07	-0.16	-0.04	-0.18		-0.78	-0.24	0.23	-0.55	-0.12	-0.5	
					b							t(b)			
	All		1.02	1	0.98	0.95	1.04	0.02		41.93	48.31	35.57	35.02	35.58	0.4
	Small	0.93	1.09	1.03	0.92	0.81	0.9	-0.2	27.08	20.75	22.16	25.54	22.37	21.55	-3.91
	2	0.99	1.17	0.98	0.94	0.93	0.98	-0.2	53.79	32.43	33.61	32.47	32.98	38.95	-4.63
Size	3	1.02	1.12	1.05	1.01	0.95	1.04	-0.08	52.81	26.48	36.44	36.13	30.27	26.2	-1.46
	4	1.02	1.13	1.05	0.96	0.98	1.01	-0.13	48.53	36.73	35.55	35.08	25.86	25.64	-2.78
	Big	1	1	0.99	0.99	0.95	1.05	0.05	104.62	34.73	42.35	28.09	26.97	23.09	0.91
	S-B	-0.07	0.1	0.03	-0.07	-0.15	-0.15		-1.87	1.57	0.63	-1.32	-2.83	-2.37	
					s							t(s)			
	All		-0.11	-0.03	-0.15	0.01	0.08	0.19		-2.22	-0.63	-2.85	0.1	1.45	2.35
	Small	0.86	0.87	0.87	0.77	0.75	0.89	0.03	12.76	8.35	9.54	10.82	10.55	10.87	0.27
	2	0.79	0.8	0.78	0.86	0.72	0.67	-0.13	21.99	11.26	13.54	15.13	12.92	13.61	-1.55
Size	3	0.57	0.46	0.6	0.52	0.53	0.58	0.12	15.04	5.56	10.57	9.36	8.5	7.42	1.09
	4	0.31	0.29	0.27	0.3	0.23	0.34	0.04	7.36	4.85	4.73	5.66	3.12	4.35	0.45
	Big	-0.21	-0.18	-0.16	-0.34	-0.18	-0.3	-0.13	-11.4	-3.16	-3.45	-4.96	-2.56	-3.4	-1.1
	S-B	1.08	1.04	1.03	1.11	0.93	1.2		14.68	8.52	9.76	11.12	9.17	9.55	
					h							t(h)			
	All		-0.44	-0.05	0.2	0.33	0.66	1.1		-10.6	-1.28	4.24	7.1	13.13	15.67
	Small	0.28	-0.2	-0.07	0.31	0.35	0.51	0.71	4.76	-2.18	-0.85	4.98	5.63	7.11	8.24
	2	0.19	-0.25	-0.08	0.15	0.38	0.51	0.76	6.2	-3.98	-1.56	3.03	7.93	11.91	10.5
Size	3	0.07	-0.55	-0.15	0.26	0.38	0.39	0.94	2.22	-7.6	-2.99	5.37	7.01	5.71	10.06
	4	0.01	-0.55	-0.06	0.13	0.33	0.32	0.87	0.3	-10.4	-1.17	2.79	5.05	4.72	10.94
	Big	-0.06	-0.44	-0.04	0.2	0.33	0.83	1.27	-3.84	-8.95	-1.02	3.39	5.48	10.59	12.69
	S-B	0.34	0.24	-0.03	0.1	0.02	-0.32		5.37	2.28	-0.29	1.19	0.19	-2.9	
					R sq.							s(e)			
	All		0.97	0.97	0.95	0.95	0.95	0.76		1.29	1.09	1.45	1.43	1.54	2.16
	Small	0.95	0.91	0.92	0.94	0.92	0.92	0.54	1.81	2.78	2.44	1.89	1.9	2.2	2.63
	2	0.98	0.96	0.96	0.96	0.96	0.97	0.66	0.96	1.91	1.54	1.53	1.48	1.32	2.22
Size	3	0.98	0.93	0.96	0.96	0.95	0.93	0.57	1.02	2.23	1.51	1.47	1.66	2.1	2.88
	4	0.98	0.96	0.96	0.95	0.92	0.92	0.63	1.11	1.63	1.56	1.44	1.99	2.06	2.43
	Big	0.99	0.95	0.96	0.91	0.91	0.88	0.66	0.5	1.51	1.23	1.85	1.86	2.39	3.06
	S-B	0.77	0.58	0.6	0.63	0.51	0.53		1.97	3.28	2.82	2.67	2.7	3.35	

Table 5.6 Returns on 25 portfolios formed on size and earnings to price and the three-factor regressions for thier monthly excess returns : Business cycle periods

At the end of June of year t, I form 25 value weighted portfolios as the intersections of independent sorts of NYSE, AMEX, and Nasdaq stocks into five size groups (using the NYSE market cap, Size, quintile breakpoints) and five book to market equity groups (using the all NYSE, AMEX, and Nasdaq quintile breakpoints). The book equity (common equity , CEQ, plus the deffered tax from balance sheet ,TXDB), is for the end of calendar year t-1. The market equity is for is for the end of December of calendar year t-1. The portfolios only include the firms with positive book equity. The All row (column) is average monthly returns for book to market (size) portfolios irrespective of the size (earnings to price). H-L (S-B) is the value premium (size premium) for a size (book to market) group estimated from the time series of monthly differences between the average of the returns for the highest book to market (lowest size) quintile within a size (book to market) quintile and the average of the returns for the lowest book to market (biggest size) quintile. T statistic for H-L (S-B) is the average monthly difference divided by the standard error. T statistic for the rest is the average monthly divided by the standard error. The expansion and contraction periods are taken from the National Berou of Economic Research web page.

$$R(t) - RF(t) = a + b\,[RM(t) - RF(t)] + s\,SMB(t) + h\,HML(t) + e(t)$$

RM is the value weighted monthly percent return on the stocks in the size-BE/ME portfolios, plus the negative BE stocks excluded from the portfolios. RF is the one-month Treasury bill rate, observed at the biggining of the month. SMB (small minus big) is the difference between the returns on small stocks big stock portfolios with about the same weighted average book to market equity. HML (hogh minus low) id the difference between the returns on high and low book to market equity portfolios with about the same weighted average size.

Panel A: 3 factors model: July 1972 to June 2011

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
		a							t(a)						
	All		0	0.09	0.09	0.09	0.11	0.11		-0.03	1.36	1.34	1.32	1.39	0.93
	Small	0.15	0.06	0.31	0.15	0.26	0.29	0.23	2.74	0.68	3.41	1.77	3.1	3.54	2.2
	2	0.07	-0.01	0.12	0.1	0.13	0.25	0.26	1.22	-0.06	1.19	1.2	1.62	2.65	2.06
Size	3	0.01	-0.1	0.14	-0.01	-0.02	0.09	0.19	0.25	-0.91	1.65	-0.1	-0.2	0.93	1.29
	4	0.06	0.07	0.1	0.04	0.12	0.02	-0.05	1.2	0.77	1.15	0.45	1.32	0.15	-0.41
	Big	0.04	0.04	0.1	0.12	0.07	0.14	0.1	1.75	0.46	1.38	1.47	0.8	1.18	0.63
	S-B	0.12	0.02	0.21	0.04	0.19	0.15		1.9	0.15	1.9	0.38	1.7	1.1	
		b							t(b)						
	All		1.08	0.97	0.97	0.95	1.03	-0.05		65.73	63.86	61.63	59.68	57.81	-1.68
	Small	0.97	1.09	0.95	0.87	0.88	0.95	-0.14	76.96	55.38	45.97	43.94	46.06	52.04	-5.84
	2	1.02	1.15	1.03	0.91	0.91	1.03	-0.12	83.56	56.6	46.11	45.94	50.4	47.39	-4.04
Size	3	1.01	1.15	0.95	0.95	0.93	1.04	-0.12	83.64	47.63	50.71	47.42	46.82	47.58	-3.54
	4	1.04	1.16	1.02	1	0.96	1.07	-0.09	89.78	56.95	50.91	51.5	46.68	47.77	-3.03
	Big	0.98	1.05	0.97	0.97	0.95	1	-0.06	211.42	53.56	57.91	54.78	48.27	37.45	-1.59
	S-B	-0.01	0.04	-0.02	-0.1	-0.07	-0.04		-0.78	1.29	-0.8	-4.38	-2.78	-1.46	
		s							t(s)						
	All		0.01	-0.13	-0.16	-0.1	0.11	0.1		0.42	-5.92	-6.98	-4.41	4.42	2.67
	Small	0.97	1.17	0.87	0.85	0.75	0.75	-0.42	53.88	41.76	29.63	30.37	27.79	28.91	-12.47
	2	0.72	0.9	0.7	0.62	0.59	0.53	-0.37	41.63	31.3	21.98	21.83	23.16	17.14	-9.13
Size	3	0.56	0.7	0.57	0.46	0.36	0.33	-0.37	32.91	20.37	21.62	16.08	12.85	10.54	-8.06
	4	0.29	0.4	0.21	0.14	0.1	0.19	-0.21	17.39	13.67	7.36	5.18	3.33	5.95	-4.9
	Big	-0.23	-0.2	-0.25	-0.32	-0.26	-0.06	0.14	-35.46	-7.11	-10.41	-12.67	-9.33	-1.48	2.8
	S-B	1.2	1.37	1.11	1.17	1.01	0.81		60.48	34.93	31.62	34.55	27.98	18.68	
		h							t(h)						
	All		-0.32	0	0.22	0.42	0.46	0.78		-12.88	0.06	9.22	17.43	17.31	19.28
	Small	0.24	0.04	0.01	0.3	0.45	0.54	0.49	12.5	1.51	0.45	10.18	15.8	19.44	13.92
	2	0.22	-0.16	0.16	0.33	0.5	0.59	0.75	11.84	-5.24	4.61	11.13	18.54	18.17	17.53
Size	3	0.14	-0.27	-0.04	0.32	0.54	0.53	0.8	7.73	-7.48	-1.25	10.5	18.09	16.21	16.35
	4	0.12	-0.29	0.04	0.33	0.46	0.53	0.83	6.96	-9.53	1.29	11.25	14.84	15.78	18.47
	Big	-0.04	-0.34	-0.02	0.19	0.38	0.4	0.74	-5.91	-11.49	-0.66	7.14	12.99	10.06	13.79
	S-B	0.28	0.38	0.03	0.11	0.07	0.13		13.26	9.29	0.82	3.11	1.8	2.89	
		R sq.							s(e)						
	All		0.93	0.91	0.89	0.89	0.89	0.48		1.52	1.42	1.47	1.48	1.66	2.51
	Small	0.96	0.94	0.9	0.89	0.89	0.9	0.58	1.17	1.83	1.91	1.84	1.77	1.7	2.18
	2	0.96	0.93	0.88	0.87	0.89	0.87	0.58	1.13	1.88	2.08	1.84	1.67	2.02	2.66
Size	3	0.96	0.9	0.9	0.87	0.85	0.85	0.53	1.12	2.25	1.73	1.86	1.84	2.03	3.04
	4	0.96	0.92	0.88	0.86	0.84	0.85	0.53	1.08	1.9	1.85	1.81	1.92	2.09	2.76
	Big	0.99	0.89	0.89	0.87	0.83	0.76	0.33	0.43	1.83	1.55	1.65	1.83	2.47	3.33
	S-B	0.89	0.74	0.7	0.72	0.64	0.43		1.3	2.56	2.3	2.22	2.37	2.83	

Cont. Table 5-6

Panel B: 3 factors model: July 1972 to June 1992

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.07	0.13	0.11	0.16	-0.02	-0.09		0.69	1.64	1.26	1.7	-0.22	-0.55
	Small	0.12	-0.04	0.42	0.25	0.32	0.18	0.22	2.03	-0.36	3.79	2.74	3.69	2.2	1.82
	2	0.13	0.14	0.24	0.28	0.16	0.22	0.08	2.42	1.19	2.02	2.8	1.73	2.18	0.46
Size	3	0.05	-0.08	0.14	0.03	0.09	0.08	0.16	0.9	-0.56	1.22	0.31	0.89	0.61	0.77
	4	0.03	0.09	0.14	-0.01	0.14	-0.02	-0.11	0.42	0.71	1.29	-0.07	1.24	-0.15	-0.57
	Big	0.02	0.12	0.14	0.12	0.14	0	-0.13	0.77	0.98	1.55	1.17	1.15	-0.02	-0.53
	S-B	0.1	-0.17	0.28	0.13	0.18	0.19		1.5	-1	2.06	1	1.24	0.95	
					b							t(b)			
	All		1	1.01	1	0.96	1.05	0.05		41.83	54.92	50.82	45.27	43.55	1.35
	Small	0.99	1.09	0.94	0.96	0.92	0.96	-0.13	70.16	42.14	36.88	45.55	45.37	49.71	-4.73
	2	1.02	1.12	1.05	0.94	0.95	0.99	-0.13	79.19	41.03	38.74	41.15	45.09	43.4	-3.48
Size	3	1.01	1.11	0.98	0.98	0.97	1.04	-0.07	73.25	32.71	37.4	40.03	42.02	36.24	-1.41
	4	1.06	1.14	1.03	1.07	1.01	1.09	-0.06	72.76	38.99	39.69	48.52	39.57	33.93	-1.32
	Big	0.97	0.98	1.01	1	0.93	1.02	0.04	145.69	33.38	47.5	42.26	33.38	24.97	0.75
	S-B	0.01	0.11	-0.06	-0.05	-0.01	-0.07		0.82	2.85	-1.98	-1.55	-0.33	-1.5	
					s							t(s)			
	All		-0.02	-0.07	-0.06	-0.08	0.12	0.13		-0.46	-2.52	-1.85	-2.37	3.14	2.18
	Small	1.1	1.26	1.05	1.06	0.99	0.95	-0.32	50.61	31.71	26.59	32.62	31.98	32	-7.22
	2	0.78	0.91	0.86	0.75	0.65	0.71	-0.2	39.69	21.5	20.64	21.5	20.23	20.04	-3.47
Size	3	0.55	0.64	0.52	0.54	0.45	0.4	-0.25	25.69	12.28	12.79	14.27	12.72	8.92	-3.37
	4	0.24	0.26	0.21	0.22	0.16	0.22	-0.04	10.55	5.79	5.34	6.43	4.01	4.55	-0.54
	Big	-0.27	-0.22	-0.23	-0.26	-0.25	-0.13	0.09	-26.19	-4.87	-7.03	-7.09	-5.82	-2.01	1.08
	S-B	1.36	1.48	1.28	1.32	1.24	1.07		56.71	25.14	26.64	28.66	23.53	15.43	
					h							t(h)			
	All		-0.49	-0.17	0.11	0.32	0.5	0.99		-12.14	-5.53	3.3	9.13	12.33	14.8
	Small	0.16	0.05	-0.16	0.18	0.26	0.44	0.38	6.66	1.25	-3.81	5.18	7.69	13.58	8.05
	2	0.08	-0.31	-0.14	0.07	0.34	0.49	0.8	3.62	-6.66	-3.02	1.75	9.52	12.78	12.71
Size	3	0.05	-0.43	-0.15	0.07	0.39	0.45	0.88	2	-7.58	-3.43	1.77	10.1	9.22	11.01
	4	0.08	-0.37	-0.19	0.18	0.35	0.54	0.91	3.29	-7.44	-4.36	4.95	8.01	10.04	11.92
	Big	-0.06	-0.46	-0.16	0.11	0.29	0.48	0.94	-5	-9.32	-4.41	2.87	6.21	6.91	9.88
	S-B	0.21	0.52	-0.01	0.07	-0.03	-0.04		8.13	7.99	-0.13	1.37	-0.51	-0.49	
					R sq.							s(e)			
	All		0.93	0.95	0.93	0.91	0.91	0.52		1.54	1.18	1.27	1.36	1.55	2.56
	Small	0.98	0.95	0.94	0.95	0.95	0.96	0.51	0.9	1.66	1.65	1.35	1.3	1.24	1.83
	2	0.98	0.94	0.93	0.94	0.94	0.93	0.55	0.83	1.76	1.74	1.46	1.35	1.47	2.41
Size	3	0.98	0.91	0.92	0.92	0.92	0.89	0.45	0.89	2.18	1.69	1.58	1.49	1.85	3.06
	4	0.97	0.92	0.92	0.93	0.89	0.86	0.45	0.94	1.89	1.66	1.42	1.65	2.06	2.91
	Big	0.99	0.89	0.93	0.9	0.84	0.74	0.32	0.43	1.89	1.36	1.53	1.79	2.64	3.63
	S-B	0.94	0.77	0.76	0.79	0.72	0.52		1.01	2.47	2.01	1.92	2.21	2.91	

Cont. Table 5-6

Panel C: 3 factors model: July 1992 to June 2011

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		-0.03	0.14	0.15	0.07	0.24	0.27		-0.33	1.53	1.54	0.69	2.01	1.71
	Small	0.25	0.18	0.31	0.17	0.34	0.48	0.3	2.96	1.37	2.39	1.45	3.02	3.75	1.81
	2	0.06	-0.1	0.16	0.07	0.19	0.37	0.47	0.75	-0.77	1.18	0.62	1.62	2.31	2.48
Size	3	0.01	-0.07	0.18	0.08	-0.04	0.16	0.23	0.09	-0.46	1.55	0.64	-0.28	1.07	1.13
	4	0.11	0.04	0.15	0.18	0.18	0.06	0.02	1.36	0.34	1.25	1.39	1.28	0.42	0.11
	Big	0.05	-0.02	0.13	0.16	0.03	0.25	0.27	1.72	-0.17	1.25	1.41	0.27	1.6	1.35
	S-B	0.2	0.2	0.18	0.01	0.31	0.23		2.25	1.17	1.06	0.06	2.07	1.38	
					b							t(b)			
	All		1.14	0.89	0.89	0.92	1.01	-0.13		53.95	40.8	38.67	37.8	36.86	-3.56
	Small	0.92	1.08	0.88	0.7	0.75	0.9	-0.18	47.07	35.2	29.22	25.63	28.82	30.35	-4.67
	2	0.99	1.14	0.92	0.8	0.81	1.03	-0.11	49.54	37.53	30.06	28.95	29.81	27.59	-2.59
Size	3	0.98	1.18	0.89	0.84	0.83	1	-0.18	49.66	33.82	33.92	30.32	26.96	29.66	-3.91
	4	1.01	1.19	0.95	0.88	0.87	1.05	-0.14	55.44	42.19	33.53	29.51	27.33	31.77	-3.51
	Big	1	1.12	0.88	0.91	0.95	0.99	-0.13	161.19	42.69	36.26	34.33	32.93	27.81	-2.89
	S-B	-0.08	-0.05	0	-0.21	-0.2	-0.09		-3.79	-1.17	-0.02	-5.68	-5.86	-2.36	
					s							t(s)			
	All		0.08	-0.12	-0.2	-0.09	0.1	0.02		2.71	-4.27	-6.61	-2.83	2.72	0.48
	Small	0.89	1.09	0.78	0.74	0.62	0.63	-0.46	34.63	27.01	19.5	20.34	18.07	16.09	-9.17
	2	0.71	0.94	0.66	0.59	0.59	0.42	-0.52	27.18	23.34	16.24	16.01	16.51	8.56	-8.87
Size	3	0.6	0.79	0.65	0.46	0.34	0.3	-0.49	23.07	17.12	18.85	12.66	8.27	6.68	-8.08
	4	0.34	0.52	0.27	0.13	0.09	0.16	-0.36	13.97	13.99	7.2	3.3	2.04	3.7	-7.02
	Big	-0.2	-0.15	-0.22	-0.34	-0.24	-0.02	0.13	-24.91	-4.34	-6.82	-9.83	-6.37	-0.46	2.14
	S-B	1.1	1.24	0.99	1.08	0.87	0.65		39.63	23.77	19.13	22.25	19.09	12.56	
					h							t(h)			
	All		-0.19	0.12	0.27	0.48	0.44	0.63		-6.64	3.87	8.63	14.39	11.71	12.73
	Small	0.26	0.01	0.09	0.34	0.53	0.55	0.54	9.77	0.26	2.16	9.05	14.72	13.57	10.32
	2	0.3	-0.06	0.32	0.49	0.61	0.61	0.67	11.02	-1.37	7.72	12.83	16.4	12.01	11.08
Size	3	0.21	-0.14	0.07	0.48	0.62	0.58	0.72	7.92	-2.92	2.04	12.51	14.82	12.42	11.3
	4	0.17	-0.2	0.21	0.43	0.54	0.52	0.72	6.79	-5.13	5.34	10.39	12.28	11.41	13.49
	Big	-0.02	-0.25	0.09	0.23	0.45	0.38	0.63	-2.42	-7.04	2.63	6.41	11.23	7.68	10.05
	S-B	0.28	0.27	0	0.11	0.08	0.18		9.82	4.88	0.03	2.11	1.71	3.26	
					R sq.							s(e)			
	All		0.94	0.88	0.87	0.87	0.86	0.5		1.35	1.39	1.47	1.54	1.75	2.31
	Small	0.95	0.92	0.88	0.85	0.86	0.86	0.63	1.24	1.95	1.92	1.74	1.66	1.89	2.43
	2	0.94	0.92	0.86	0.85	0.86	0.81	0.62	1.27	1.94	1.95	1.77	1.72	2.37	2.81
Size	3	0.94	0.9	0.9	0.85	0.8	0.82	0.62	1.26	2.23	1.67	1.77	1.95	2.15	2.94
	4	0.94	0.92	0.85	0.81	0.78	0.83	0.65	1.16	1.8	1.81	1.91	2.02	2.11	2.47
	Big	0.99	0.9	0.86	0.84	0.83	0.78	0.37	0.39	1.68	1.55	1.69	1.85	2.27	2.91
	S-B	0.88	0.72	0.66	0.7	0.64	0.41		1.34	2.52	2.51	2.34	2.19	2.5	

Cont. Table 5-6

Panel D: July 1972 to June 2011 : Expansion periods

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		1.64	1.54	1.58	1.64	1.9	0.25		5.32	6.46	7.38	8.14	8.36	1.68
	Small	1.9	2.02	1.84	1.75	1.79	2.03	0.01	7.14	6.21	6.9	7.38	7.95	8.39	0.06
	2	1.46	1.31	1.48	1.61	1.56	1.77	0.46	5.59	3.88	5.44	6.78	7.11	7.49	2.28
Size	3	1.39	1.21	1.42	1.41	1.44	1.62	0.41	5.68	3.66	5.68	6.45	6.97	6.94	1.93
	4	1.35	1.2	1.36	1.41	1.51	1.57	0.37	5.68	3.93	5.69	6.45	7.01	6.38	1.9
	Big	1.25	1.15	1.28	1.42	1.42	1.55	0.39	5.79	4.39	5.9	6.74	6.85	6.74	2.05
	S-B	0.66	0.86	0.55	0.32	0.37	0.48		3.49	3.75	2.82	1.72	2.04	2.45	

Panel E: July 1972 to June 2011 : Contraction periods

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.06	0.13	0.15	0.42	0.45	0.5		-0.06	0.16	0.18	0.55	0.55	1.63
	Small	0.27	0.12	0.19	0.21	0.49	0.48	0.36	0.32	0.13	0.22	0.26	0.61	0.58	1.28
	2	0.25	-0.02	0.3	0.04	0.58	0.51	0.53	0.29	-0.02	0.33	0.04	0.73	0.61	1.54
Size	3	0.1	-0.33	0.17	0.21	0.22	0.56	0.89	0.12	-0.32	0.22	0.25	0.27	0.68	2.13
	4	0.12	-0.11	0.11	0.24	0.49	0.09	0.21	0.15	-0.12	0.14	0.3	0.67	0.11	0.44
	Big	-0.17	-0.36	-0.13	-0.26	0.09	0	0.36	-0.23	-0.4	-0.17	-0.37	0.13	0.01	0.79
	S-B	0.44	0.48	0.31	0.48	0.4	0.47		0.96	0.79	0.64	1.07	1	1.15	

Cont. Table 5-6

Panel F: July 1972 to June 2011 : Expansion periods

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		-0.01	0.07	0.1	0.05	0.1	0.11		-0.17	0.87	1.27	0.67	1.13	0.86
	Small	0.18	0.1	0.34	0.22	0.29	0.27	0.17	2.99	1.04	3.43	2.3	3.1	2.94	1.4
	2	0.02	-0.01	0.09	0.12	0.07	0.2	0.22	0.39	-0.14	0.8	1.14	0.76	1.86	1.52
Size	3	-0.03	-0.17	0.11	-0.01	-0.03	-0.03	0.14	-0.48	-1.43	1.2	-0.12	-0.33	-0.33	0.86
	4	0.01	0.04	0.03	-0.03	-0.02	-0.07	-0.11	0.11	0.39	0.34	-0.28	-0.18	-0.62	-0.74
	Big	0.05	0.06	0.09	0.13	0.04	0.19	0.14	2.29	0.6	1.08	1.48	0.36	1.39	0.76
	S-B	0.13	0.05	0.25	0.09	0.26	0.07		1.99	0.34	2.03	0.75	2.03	0.46	
					b							t(b)			
	All		1.05	0.97	0.97	0.97	1.06	0.01		54.58	48.64	48.11	47.67	47.67	0.23
	Small	0.99	1.12	0.95	0.86	0.88	0.96	-0.16	62.95	44.89	36.8	34.79	36.25	41.25	-5.2
	2	1.04	1.15	1.03	0.93	0.91	1.07	-0.08	63.76	42.89	35.06	35.89	39.71	38.81	-2.18
Size	3	1.01	1.15	0.96	0.92	0.91	1.07	-0.08	65.24	36.69	42.44	37.94	36.09	39.98	-1.92
	4	1.06	1.15	1.02	1	1	1.11	-0.04	74.14	44.17	41.19	40.9	39.62	40.39	-1.08
	Big	0.97	1.02	0.96	0.98	0.98	1.01	-0.01	173.75	43.5	44.04	42.44	38.39	28.29	-0.26
	S-B	0.01	0.1	-0.01	-0.11	-0.1	-0.05		0.78	2.82	-0.32	-3.75	-3.05	-1.19	
					s							t(s)			
	All		0.04	-0.1	-0.17	-0.08	0.11	0.07		1.75	-3.9	-6.6	-3.19	4.09	1.73
	Small	0.98	1.19	0.9	0.86	0.74	0.76	-0.43	50.46	38.65	28.02	27.89	24.75	26.31	-11.55
	2	0.72	0.92	0.73	0.63	0.59	0.52	-0.4	35.63	27.56	19.9	19.52	20.85	15.16	-8.83
Size	3	0.59	0.8	0.66	0.46	0.34	0.33	-0.47	30.71	20.55	23.48	15.43	10.91	9.84	-9.11
	4	0.31	0.46	0.25	0.13	0.12	0.2	-0.26	17.28	14.16	8.31	4.23	3.92	5.81	-5.67
	Big	-0.24	-0.19	-0.22	-0.33	-0.25	-0.06	0.13	-33.94	-6.41	-8.05	-11.54	-7.81	-1.25	2.27
	S-B	1.22	1.38	1.11	1.19	0.99	0.81		57.36	32.54	28.17	31.39	24.49	16.06	
					h							t(h)			
	All		-0.29	0.05	0.27	0.47	0.52	0.8		-10.47	1.94	9.57	16.25	16.37	17.07
	Small	0.24	0.06	0.02	0.31	0.45	0.58	0.52	10.78	1.75	0.66	8.72	13.15	17.58	12.07
	2	0.25	-0.17	0.22	0.4	0.58	0.69	0.86	10.63	-4.47	5.17	11.01	17.83	17.64	16.69
Size	3	0.18	-0.19	0.04	0.38	0.59	0.62	0.81	8.36	-4.31	1.35	11.01	16.43	16.39	13.72
	4	0.16	-0.24	0.11	0.39	0.58	0.62	0.86	7.91	-6.54	3.19	11.18	16.2	15.88	16.44
	Big	-0.04	-0.32	0.03	0.24	0.42	0.42	0.74	-4.92	-9.52	1	7.46	11.7	8.42	11.22
	S-B	0.28	0.38	-0.01	0.06	0.03	0.15		11.49	7.81	-0.15	1.46	0.63	2.66	
					R sq.							s(e)			
	All		0.92	0.88	0.87	0.86	0.86	0.49		1.39	1.44	1.46	1.47	1.6	2.38
	Small	0.96	0.93	0.89	0.87	0.86	0.88	0.61	1.13	1.78	1.86	1.78	1.74	1.67	2.17
	2	0.95	0.92	0.85	0.84	0.85	0.83	0.63	1.18	1.93	2.12	1.87	1.64	1.99	2.62
Size	3	0.95	0.88	0.9	0.84	0.8	0.83	0.56	1.11	2.25	1.62	1.74	1.81	1.92	3
	4	0.95	0.9	0.85	0.83	0.81	0.82	0.57	1.02	1.87	1.77	1.76	1.81	1.98	2.66
	Big	0.99	0.88	0.86	0.84	0.8	0.68	0.29	0.4	1.68	1.57	1.65	1.83	2.56	3.35
	S-B	0.9	0.75	0.71	0.74	0.63	0.41		1.23	2.45	2.29	2.19	2.34	2.93	

Cont. Table 5-6

Panel G: July 1972 to June 2011 : Contraction periods

		Earnings to price							t statistic						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
					a							t(a)			
	All		0.14	0.16	0	0.09	-0.03	-0.17		0.68	1.23	-0.03	0.58	-0.15	-0.54
	Small	-0.05	-0.27	0.12	-0.1	0.13	0.31	0.57	-0.31	-1.28	0.54	-0.45	0.63	1.59	2.57
	2	0.09	0.01	0.16	-0.11	0.32	0.19	0.18	0.97	0.06	0.82	-0.65	1.99	0.96	0.69
Size	3	0.14	0.2	0.14	0.1	0.1	0.4	0.2	1.21	0.98	0.69	0.45	0.52	1.66	0.67
	4	0.19	0.21	0.33	0.29	0.45	0.1	-0.11	1.45	1.07	1.52	1.5	2.05	0.4	-0.34
	Big	0.02	0.13	0.12	-0.02	0.04	-0.16	-0.29	0.45	0.52	0.84	-0.11	0.23	-0.73	-0.84
	S-B	-0.07	-0.39	0	-0.08	0.09	0.47		-0.43	-1.31	0	-0.33	0.32	1.87	
					b							t(b)			
	All		1.15	1	0.95	0.92	0.97	-0.17		31.97	44.57	40.19	33.66	28.53	-3.2
	Small	0.95	1.05	0.96	0.87	0.87	0.94	-0.11	38.07	28.81	24.2	22.34	23.89	28.09	-2.76
	2	0.98	1.15	1.05	0.87	0.9	0.94	-0.21	59.3	37.66	30.85	29.67	32.61	27.67	-4.79
Size	3	1.02	1.25	0.99	1	0.94	0.99	-0.26	51.81	36.15	28.71	26.12	29.51	23.77	-4.9
	4	1.04	1.24	1.06	1	0.94	1.01	-0.22	44.26	36.22	27.92	29.84	24.63	22.81	-3.95
	Big	1	1.12	0.99	0.95	0.91	0.97	-0.16	102.77	26.31	38.65	34.7	26.79	24.76	-2.58
	S-B	-0.05	-0.07	-0.04	-0.08	-0.05	-0.02		-1.63	-1.34	-0.91	-1.87	-1.05	-0.5	
					s							t(s)			
	All		-0.11	-0.2	-0.01	-0.1	0.2	0.31		-1.49	-4.53	-0.26	-1.93	3.01	2.89
	Small	0.92	1.1	0.73	0.86	0.81	0.8	-0.3	18.69	15.28	9.47	11.16	11.35	12.08	-3.9
	2	0.77	0.8	0.66	0.69	0.72	0.75	-0.05	23.58	13.23	9.81	11.87	13.18	11.22	-0.54
Size	3	0.5	0.35	0.28	0.52	0.54	0.47	0.12	12.83	5.1	4.18	6.96	8.68	5.74	1.18
	4	0.26	0.17	0.09	0.31	0.16	0.29	0.12	5.54	2.57	1.26	4.68	2.13	3.35	1.08
	Big	-0.23	-0.23	-0.31	-0.18	-0.27	-0.01	0.21	-11.8	-2.71	-6.2	-3.4	-4.03	-0.17	1.8
	S-B	1.15	1.32	1.05	1.04	1.08	0.81		20.58	12.84	12.49	12.36	11.7	9.38	
					h							t(h)			
	All		-0.41	-0.13	0.01	0.3	0.33	0.74		-6.62	-3.41	0.22	6.48	5.63	7.96
	Small	0.27	0.06	0.04	0.28	0.44	0.4	0.34	6.35	0.96	0.58	4.21	7.11	7.01	5.15
	2	0.16	-0.08	0	0.13	0.24	0.3	0.38	5.52	-1.54	-0.03	2.51	5.07	5.21	5.03
Size	3	0.04	-0.39	-0.14	0.07	0.31	0.27	0.67	1.31	-6.58	-2.36	1.01	5.7	3.83	7.31
	4	0.05	-0.38	-0.13	0.1	0.16	0.31	0.69	1.14	-6.48	-2.01	1.73	2.4	4.06	7.11
	Big	-0.07	-0.46	-0.14	-0.01	0.32	0.34	0.8	-4.1	-6.25	-3.13	-0.14	5.54	5.08	7.7
	S-B	0.34	0.52	0.18	0.29	0.12	0.06		7.02	5.75	2.42	3.93	1.46	0.85	
					R sq.							s(e)			
	All		0.94	0.97	0.96	0.94	0.93	0.52		1.89	1.19	1.24	1.44	1.8	2.84
	Small	0.97	0.96	0.93	0.93	0.93	0.95	0.44	1.32	1.92	2.08	2.06	1.91	1.77	2.05
	2	0.99	0.97	0.95	0.95	0.96	0.94	0.43	0.87	1.61	1.79	1.55	1.46	1.79	2.34
Size	3	0.98	0.96	0.93	0.93	0.94	0.91	0.52	1.04	1.82	1.82	2.01	1.67	2.2	2.79
	4	0.97	0.96	0.92	0.94	0.91	0.9	0.48	1.23	1.8	2	1.77	2	2.34	2.97
	Big	0.99	0.91	0.95	0.94	0.9	0.9	0.48	0.51	2.24	1.35	1.44	1.8	2.05	3.18
	S-B	0.87	0.74	0.7	0.7	0.66	0.56		1.49	2.76	2.25	2.25	2.47	2.31	

Chapter 6

Mean-variance based explanations

In this chapter, the question whether the value and small portfolios are actually riskier than the growth and big portfolios will be posed. This will be done by comparing the variances of the portfolios with the same expected returns using their frontiers constructed by the mean-variance technique. Whether the mean variance results are affected by the behavior of covariances of the portfolios will be examined.

6.1 Efficient portfolios

In the previous analysis, an attempt was made to confirm the claim that the value (small) portfolios outperform the growth (big) portfolios because they are systematically riskier. Although the Fama and French three factor model partially supports this claim, it fails to explain why the value premium for small stocks is higher than that of big stocks. The model also cannot explain why the size premium for value stocks is higher than that of growth stocks. Nor can it explain the changes of the returns from period to period. In my opinion, the claim that value stocks outperform growth stocks because they are riskier has not really been tested. One of the reasons is the low sensitivity of the slopes to the changes of the returns using the Fama and French model. The other reasons depend on the technical ways of constructing the portfolios or the reality itself. All the previous studies depend on using the value or equal weighted strategy in constructing these portfolios. The equal or value weighted strategy gives equal or value weighted opportunity of the stocks that appear in the portfolio. They treat all the stocks in the same way and choose all the available stocks to be included in the portfolios. Including a large number of stocks in a portfolio is irrational. The investors will face some difficulties related to the budget constraints, transaction costs, and time management which may reduce the benefit of diversification. So, rational investors will not necessarily include all the stocks that have certain characteristics (value, small, ...) in one portfolio even if this theoretically brings more returns than the portfolios that have other characteristics. It is not just the return that governs their stocks included in the portfolios. They will choose their portfolios according to many conditions. At the very least, apart from what class of stocks and the desired rate of returns, they will decide the risks they might face in gaining these returns or any other factors.

Despite using equal and value weighted portfolios, I will use the mean-variance portfolio technique (specifically its minimum variance version) introduced by Markowitz (1952) in the comparisons between the size and book to market portfolios. The mean variance portfolio gives the investor an opportunity to choose not only between the available portfolios but also between the most efficient ones. This way gives all the possible efficient portfolios that can be constructed from the set of all available stocks (known as the efficient frontier). The efficient frontier shows the trade off between the portfolios' returns and the risks they will face in acquiring these returns. So, if the investor decides the required rate of return of his investment, he can choose the portfolio that gives him the minimum risk and vice versa.

This way will enable us to compare the portfolios not only using their returns but also using their variances. Now the question turns to whether the value (small) portfolios are more efficient than the growth (big) portfolios. In other words, whether the value (small) portfolios have more returns than growth (big) portfolios at the same variance levels and vice versa. These questions are easily answered by just comparing the mean-variance frontiers of these classes.

To construct the minimum variance frontier[1], a sample of 100 stocks each month during the months of the period under study were used. The expected returns and the standard deviations for these stocks each month using the previous 12, 36, 48, 60, or 72 months was estimated. Each month, using the estimated means and standard deviations a frontier which consists of 100 portfolios was constructed. To get the 100 portfolios each month using the minimum variance procedure, the expected means of the 100 portfolios was assumed take an arithmetic sequence from -0.02 (or the minimum estimated return if it does not exist) to 0.06 (or the maximum estimated return if it does not exist). Conditional on these returns, I solve for the weights that minimise the portfolios' variances for each of the 100 returns. Each month, 100 points of the portfolios' means and their minimum variances that can achieve these returns are obtained. Finally, the average of each point on the frontier of all months over the period of study will be calculated.

6.1.1 One way classifications

Figure (6-1) panel A shows the mean of monthly frontiers for the small, big, value and growth stocks of the period from July 1972 to June 2011 using different estimation windows. It is remarkable that increasing the length of the estimation period increases the volatility of the portfolios and reduces the portfolio returns. Comparing the efficient part of the frontiers for the value and growth stocks, interesting results were found. It is true that the value stocks are riskier than growth stocks but the growth stocks are more efficient than the value stocks. For the same returns of the growth and value portfolios, the growth portfolios are less risky than the value portfolios. This contradicts the finding that the value portfolios have more returns than the growth portfolios because they are riskier. Also, for the same portfolios' stan-

[1]For more information see Section 3.3.

dard deviations of value and growth stocks, the growth stocks have more returns. The figure clearly indicates that the growth stocks are more efficient than the value stocks. The only portfolios where the value stocks are more efficient are the portfolios that lie on the non-efficient part of the frontiers where the investor is not interested in them. It is better for the investor to choose the growth portfolios, not the value portfolios, as he can get the same returns with less risk.

The same contradiction to the risk based explanation appears when comparing the frontiers of the small and big portfolios. The frontiers show that the small portfolios can have higher standard deviations than the big portfolios. For the same portfolios' returns the big portfolios have less standard deviation than the small ones. Also for the same standard deviations, the big portfolios have more returns than the small portfolios. So it is better for the investor to form his portfolios using the big stocks than the small stocks. He can get the same returns with less risk.

the same results were found using the sub samples from July 1972 to June 1992 and from July 1992 to June 2011 as indicated by Figure (6-1), panels B and C respectively. The difference between these two periods is that the portfolios of the period from 1992 to 2011 are more volatile than those of the 1972 to 1992 period. To get the same returns in the 1992 to 2011 period as in the 1972 to 1992 one will have more risk.

6.1.2 Two way classifications

Figure (6-2) presents the frontiers of the joint size and book to market portfolios for the different estimation windows. Panel A of the figure shows the frontiers for the whole period from July 1972 to June 2011. The figure shows in general that, increasing the estimation windows of estimating the expected returns and standard deviations increases the portfolios' volatility and reduces the portfolios' returns. The maximum returns for big value portfolios are remarkably less than that of the other portfolios.

To evaluate the performance of the joint size and book to market portfolios, after controlling for size, value and growth portfolios were compared. Comparing small value and small growth efficient frontiers, a contradiction to the previous results was found in so far as small value portfolios outperform small growth portfolios. From an efficiency point of view, the small growth stocks outperform the small value stocks. With the same level of portfolio returns the small growth portfolios have a lower standard deviation. Also for the same standard deviations, the small growth portfolios have higher returns than the small value portfolios. The situation is the same when comparing the big value and the big growth portfolios. For the same returns, the big growth are more efficient than the big value portfolios. The only difference is that the big growth portfolios can earn higher returns than those of the big value portfolios. This again contradicts the value and equal weighted portfolio returns.

Comparing the portfolios after controlling for the book to market is also interesting. The big growth portfolios are more efficient than the small growth ones. Also the big value portfolios can earn the same returns as the small value portfolios with less risk.

The same results can be seen by comparing the frontiers at different periods of time as shown in Figure (6-2), panels B and C for the 1972 to 1992 period and the 1992 to 2011 period respectively. The only difference between these two periods is that the portfolios for the 1992 to 2011 period are more volatile and can earn more returns than that of the 1972 to 1992 period.

6.1.3 Business cycle effect

Figure (6-3), panels A and B show the frontiers for one way classification of the size and book to market portfolios for the expansion and contraction months respectively for the period from 1972 to 2011. There are no differences in the results when comparing the expansion period of panel A and that of the whole period of Figure (6-1) panel A. Also there are no significant changes on the frontiers when comparing panels A and B of Figure 6-3. The growth (big) portfolios are more efficient than the value (small) portfolios.

Figure (6-4), panels A and B show the frontiers for the joint size and book to market portfolios, for the expansion and contraction months respectively for the period from 1972 to 2011. There are no differences in the results comparing the panel A of Figure (6-4) and panel A of Figure (6-2). Also there are no differences in the conclusions when comparing panels A and B of Figure (6-4). The small growth (big growth) portfolios outperform the small value (big value). Also the big growth (big value) portfolios outperform the small growth (small value).

6.2 Discussion of results

Why do the lesser portfolios using the equal and value weighted strategy produce more efficient portfolios using the mean-variance technique? In other words, why do the growth and big portfolios have lower risk using the mean variance technique than the value and small portfolios? It may be because the selected stocks of these portfolios have less stock variances or less stock covariances than the others. The portfolio variances on the frontiers are divided into two parts, the sum of mean-variance weighted variances and the sum of mean-variance weighted covariances. Comparing the two parts of the portfolios will show which part has more effect on the portfolios' variances.

Figure (6-5), panels A and B show the one way size and book to market portfolios' covariances and variances parts using 36 and 60 month estimation periods respectively and for the whole and sub-periods. The first remark using the two panels is that increasing the estimation period reduces the portfolios covariances and increases the portfolios' variances. The figure for the whole period from 1972 to 2011 shows that, for the efficient part of the frontiers, both the covariances and variance parts for the big portfolios are less than that of the small portfolios. This makes the big portfolios more efficient than the growth ones. There are different results for the value and growth portfolios at the efficient parts of the frontiers. The covariances part of the value portfolios are less than that of the growth portfolios. But, the variances part of the value portfolios are higher than that of the growth portfolios. Adding them together leads to higher variances for the value portfolios than the growth portfolios. This makes the growth portfolios more efficient than the value ones.

These results are robust when using the two sub periods from 1972 to 1992 and from 1992 to 2011. What distinguishes these two periods is the increase in the portfolios' variances and covariances in the recent period compared to the past period.

Figure (6-6), panels A and B show the joint size and book to market portfolios' covariances and variances using 36 and 60 month estimation periods respectively and for the whole and sub-periods. Controlling for size, it is clear that the small growth portfolios have higher covariances than the small value portfolios. But, because the variance part of the small value portfolios is bigger than that of the small growth ones, the sum of the covariances and variances makes the small growth portfolios more efficient than the small value ones. The same scenario applies to the big growth and big value portfolios. Controlling for book to market, one sees that the superior mean-variance performance for the big growth portfolios over the small growth portfolios is because of the two parties of the portfolios' variances. The small growth portfolios have higher covariances and variances than the big growth portfolios. In contrast, the small value and big value portfolios have almost the same variance parts when they have the same returns. Because the big value portfolios have lower covariances than that of the small value portfolios, the sum makes the big value portfolios more efficient. The results are robust using the 36 and 60 month estimation periods. and over the two sub-periods. The difference between the two periods is the higher covariances and variances parts for the recent period than those of the past period.

The efficiency of the portfolios was also related to the number of selected stocks in the portfolios. It is well known that there is a negative relationship between the number of selected stocks, the stocks that have weights more than zero, in a portfolio and its variance. Increasing the number of stocks in a portfolio will reduce its variance. The question here is, whether the portfolios variances at the same return are affected by the number of selected stocks in the portfolios. Figure (6-7), panel A shows the number of selected stocks in the portfolios and their returns using the different estimation windows from 1972 to 2011. On the efficient part of the frontiers (starting nearly at 0.01 returns), there are negative relationships between the returns and the number of selected stocks. Reducing the number of stocks increases the returns.

To get the same returns on the value and growth portfolios, more stocks are needed on the growth than the value portfolios. So the reason for the greater efficiency of the growth portfolios than the value portfolios is the greater number of stocks needed to get the same returns. The increasing number of stocks on growth portfolios will lead to reducing their variances. This explanation cannot be generalised where the number of selected stocks in big companies is more than that of small companies with the same portfolio returns.

Figure (6-7), panel B shows the relation between the joint size and book to market portfolio returns and the number of stocks selected on these portfolios for different estimation windows. On the efficient part, the number of selected stocks on the small growth portfolios is more than that of the small value portfolios. This relationship may affect the variances in both portfolios. The large number of selected stocks in the small growth portfolios may make their variances lower than that of the small value portfolios where they have a smaller number of selected stocks. The big value portfolios cannot be compared with other portfolios where the number of stocks in this class is already small. There is no opportunity with the mean-variance way to choose more stocks.

6.3 Earnings to price results

The aim of this section is to repeat the previous analysis using another measure for value, the earnings to price. Are there any contradictory results like that presented by the book to market equity? Figure (6.8) shows the results of the mean-variance portfolios using 36 and 72 estimation windows and for the whole and sub-periods. Panel A of the figure shows the one way mean-variances portfolios. There are different results using the earnings to price rather than the book to market. The value portfolios are more efficient than the growth portfolios. This efficiency becomes more questionable by increasing the months of the estimation window. Also the behaviour of the small and growth portfolios are highly similar to each other. It is also remarkable that the earnings to price portfolios have less portfolio variance than those of the book to market portfolios.

Figure (6.8) panel B shows the joint size and book to market portfolios' frontiers. The results for the small value and small growth portfolios are different. The small value portfolios are more efficient than the small growth portfolios. This happens over all the windows for the whole and sub periods. The big growth portfolios still show more efficient portfolios than the small growth portfolios.

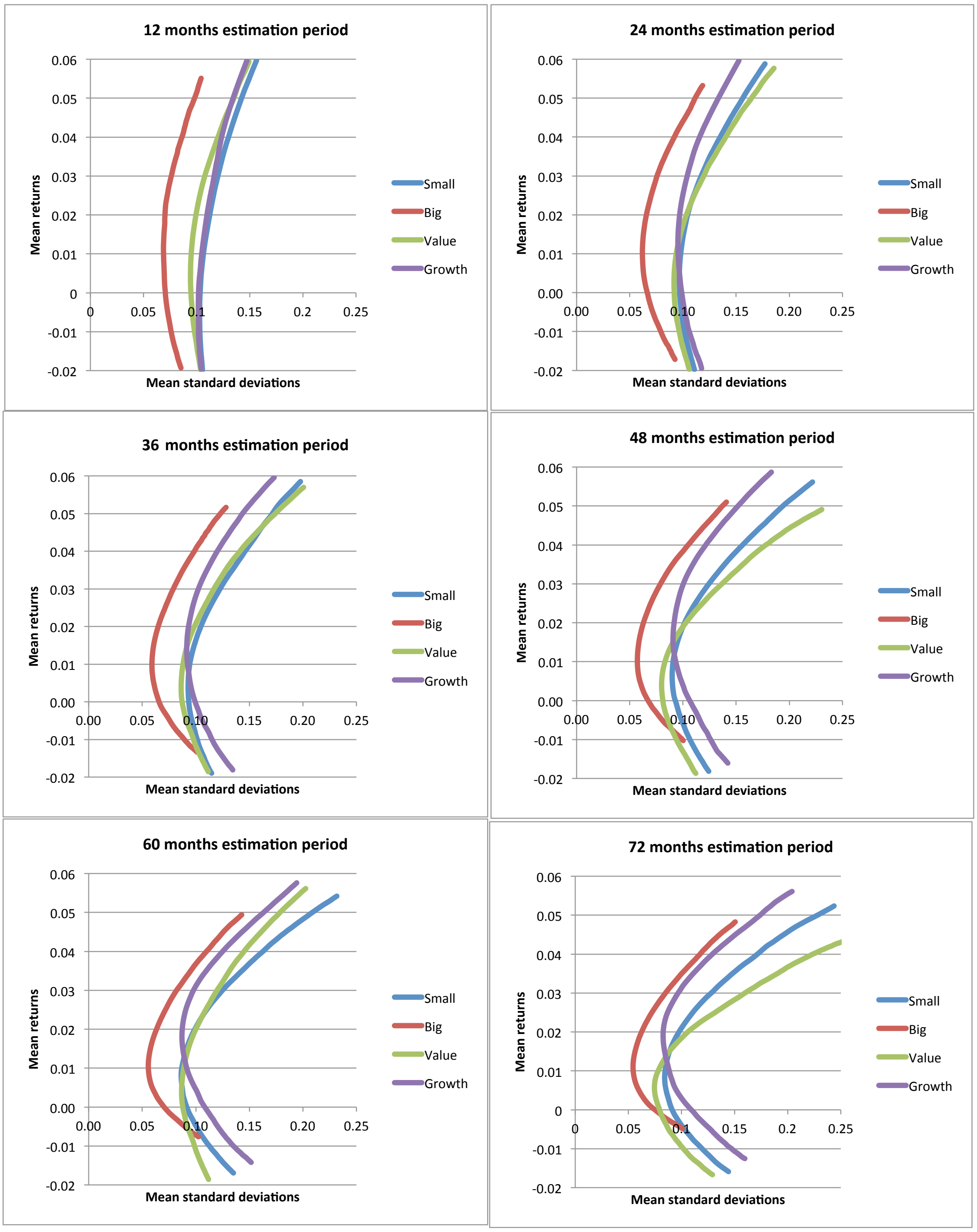
The same previous conclusions apply to the results over the expansion and contraction periods as presented in panel C of Figure (6.8). There is no difference in the behaviour of the expansion and contraction periods from that of the whole period, which contradicts the business cycle risk effect.

6.4 Conclusion

This chapter introduces a real test of determining which of value or growth stocks are riskier and whether the risk causes the high returns for value stocks by comparing the efficient frontiers of value and growth stocks based on the minimum variance technique. The efficient frontiers indicate that the value stocks are riskier than growth stocks. They also indicate that the height of the risk of value stocks does not make them have higher returns than growth stocks. With the same levels of risk, the growth stocks have higher returns. This indicates that the growth stocks are more efficient than the value stocks. With the same levels of returns the growth stocks have less variance. Analysing the variance components (the sum of covariances and the sum of variances) of value and growth stocks, one can see that, with the same levels of return, the growth stocks have higher covariances and lower variances than that of value stocks. Comparing the efficient frontiers for the small growth and small value portfolios, the same contradiction is found. The small growth portfolios are more efficient than the small value portfolios. These results cast doubt on the risk explanation for the value premium and invite us to search for other explanations.

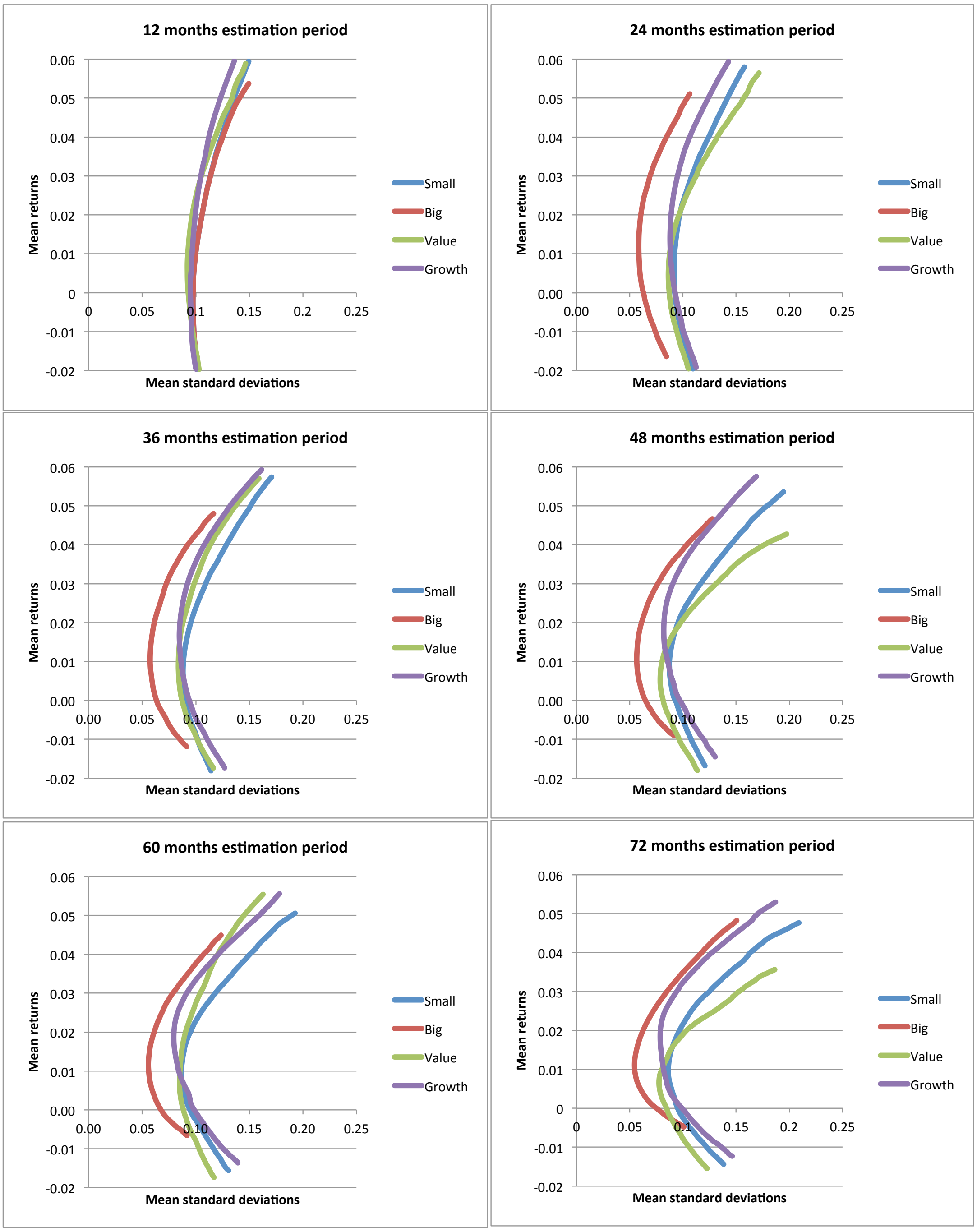
Figure 6-1 The mean of the monthly efficient frontiers, single size and book to market .
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the mean of the monthly efficient frontier points over the whole period. The graph constitute another efficient frontier each of its points is the mean of a monthly efficient frontier point over all months. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity.

Panel A: Period from July 1972 to June 2011



Cont. Figure 6-1

Panel B: Period from July 1972 to June 1992



Cont. Figure 6-1

Panel C: Period from July 1992 to June 2011

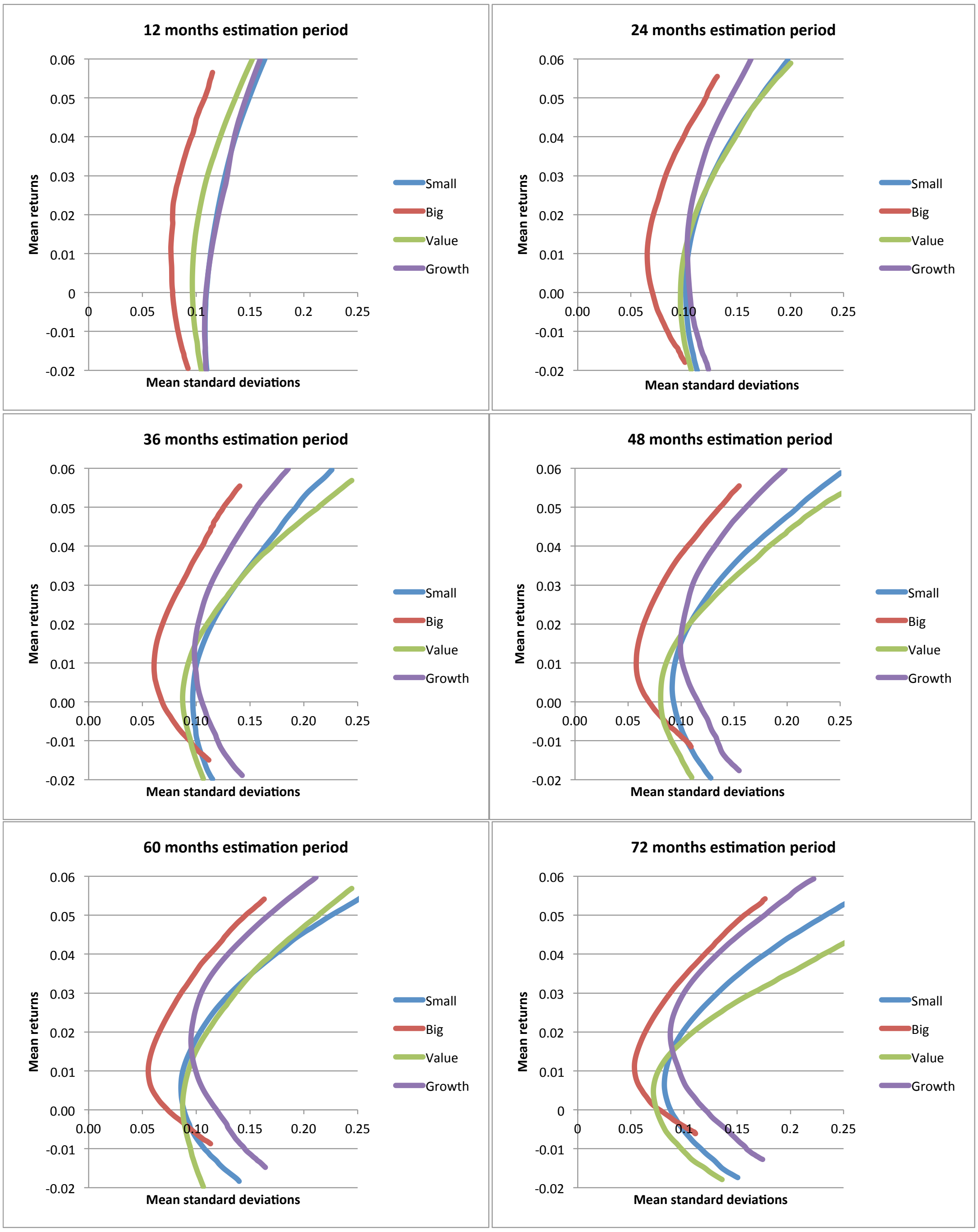
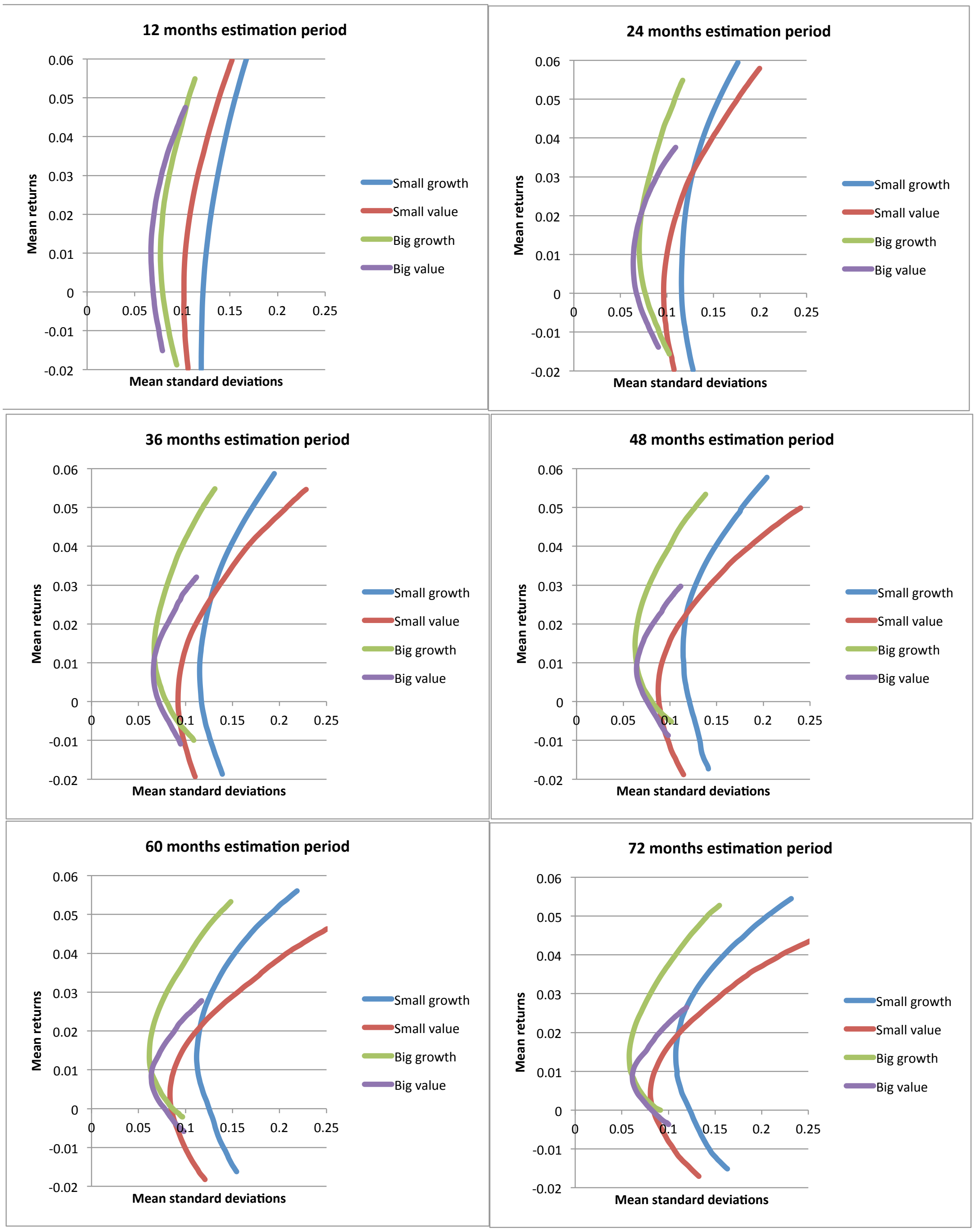


Figure 6-2 The mean of the monthly efficient frontiers, joint size and book to market.

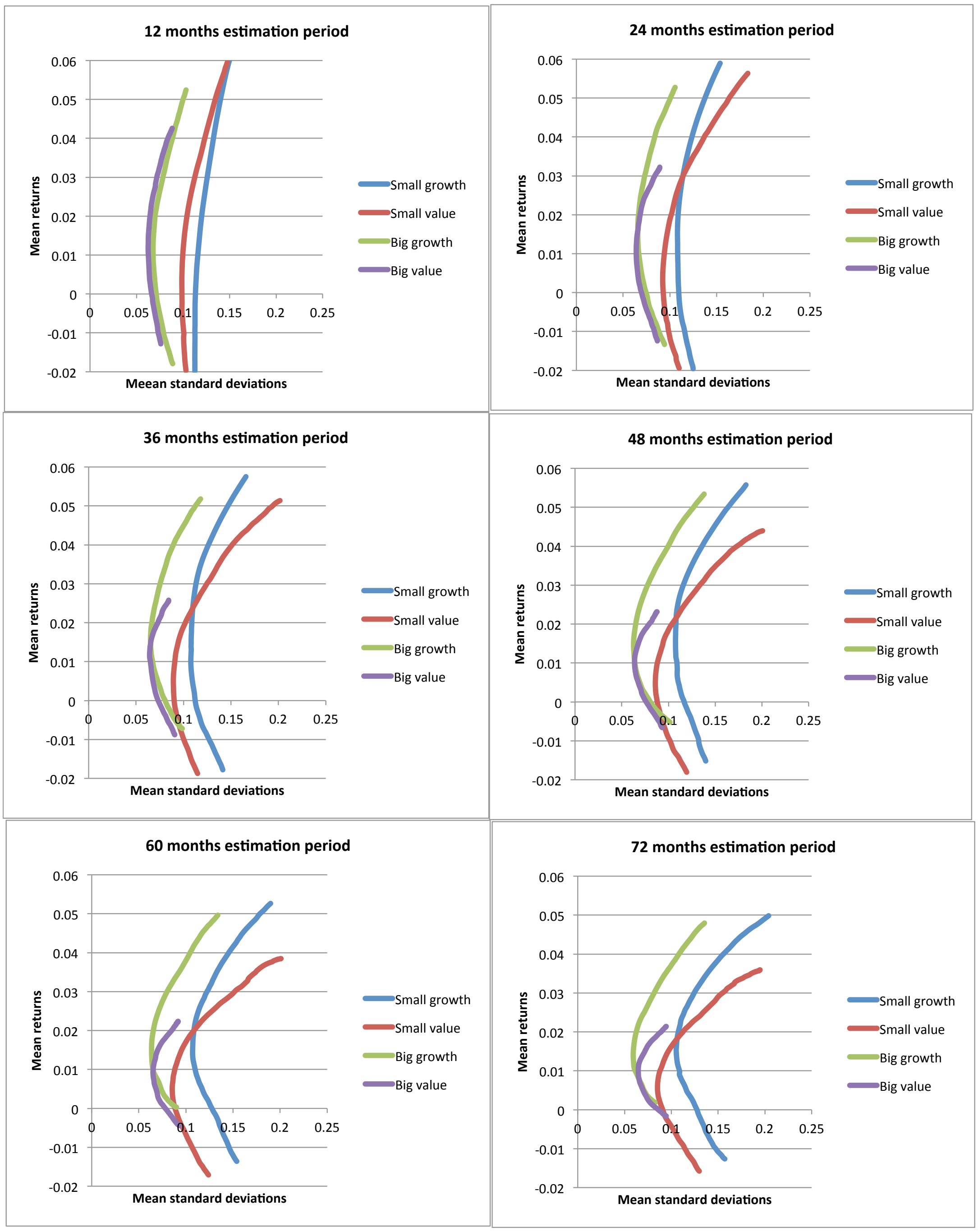
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small growth, ...) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the mean of the monthly efficient frontier points over the whole period. The graph constitute another efficient frontier each of its points is the mean of a monthly efficient frontier point over all months. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity. Small growth is the joint stocks of the small and growth stocks. etc.

Panel A: Period from July 1972 to June 2011



Con. Figure 6-2

Panel B: Period from July 1972 to June 1992



Con. Figure 6-2

Panel C: Period from July 1992 to June 2011

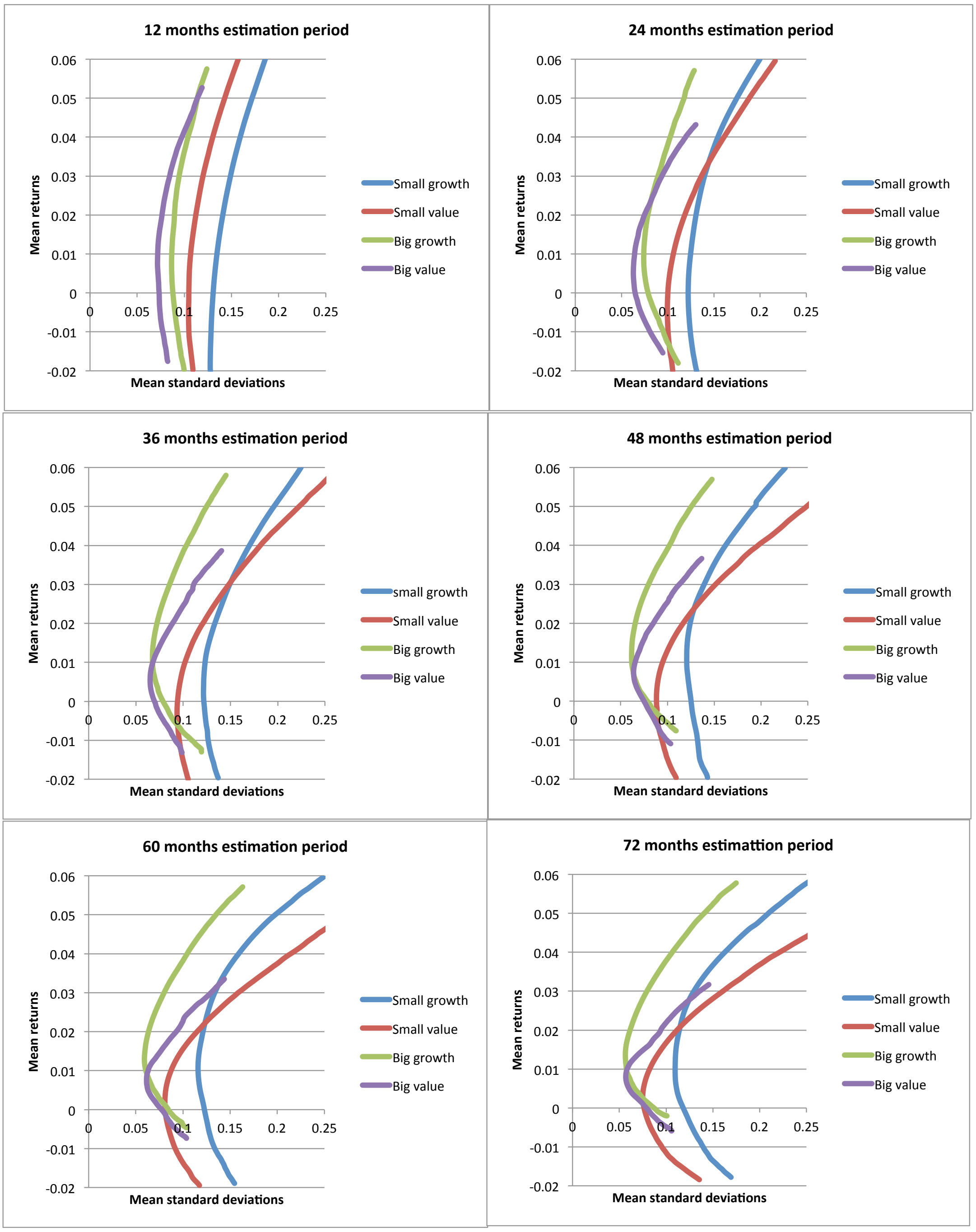
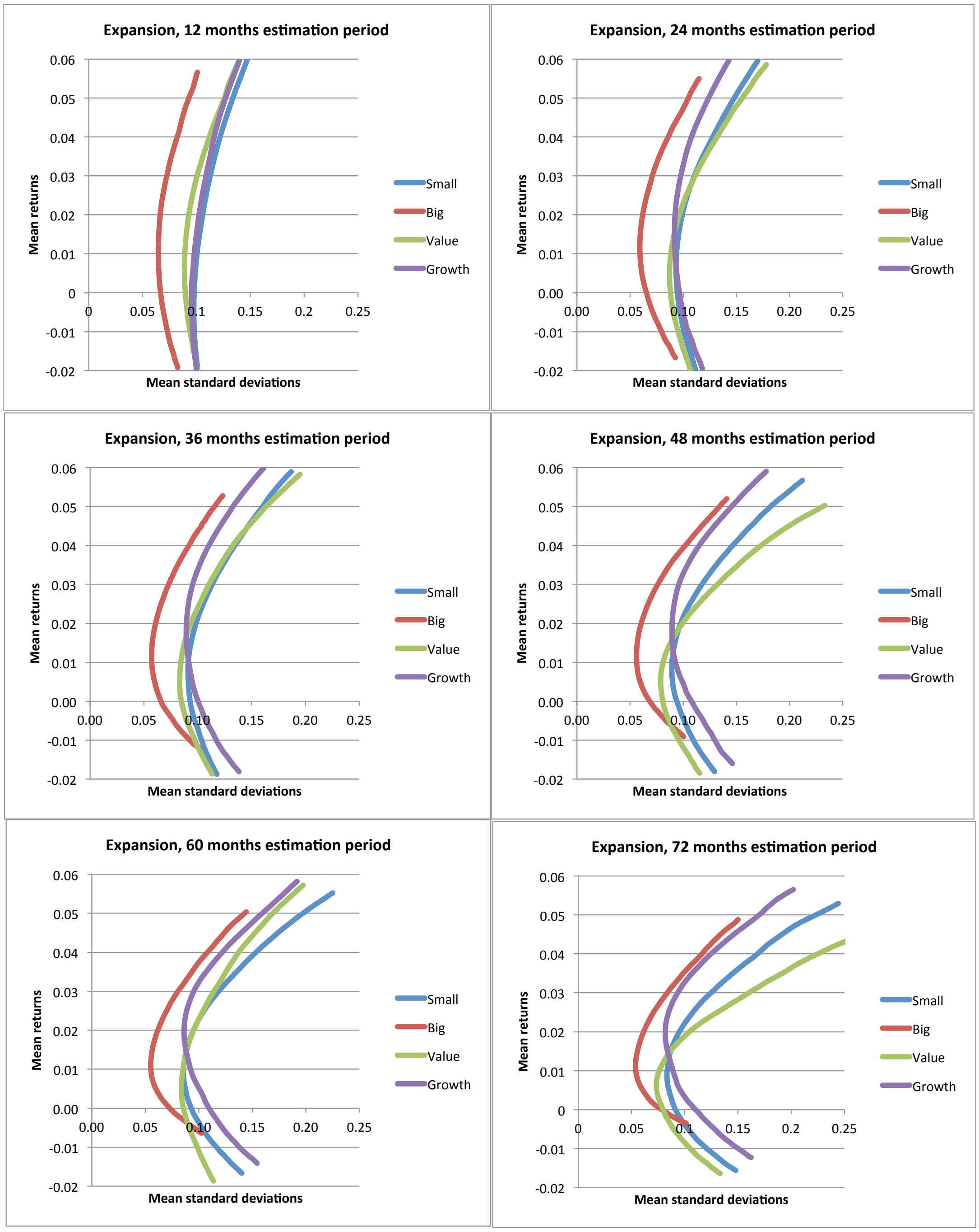


Figure 6-3 The mean of the monthly efficient frontiers, cycle periods, single size and book to market . Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the mean of the monthly efficient frontier points over the business cycle periods (expansion and contraction periods). The months constitute each period are determined using the Beurau of Economic Reserch web site. The graph constitute another efficient frontier each of its points is the mean of a monthly efficient frontier point over all months of the cycle. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity.

Panel A: Average over expansion periods



Cont. Figure 6-3

Panel B: Average over contraction periods

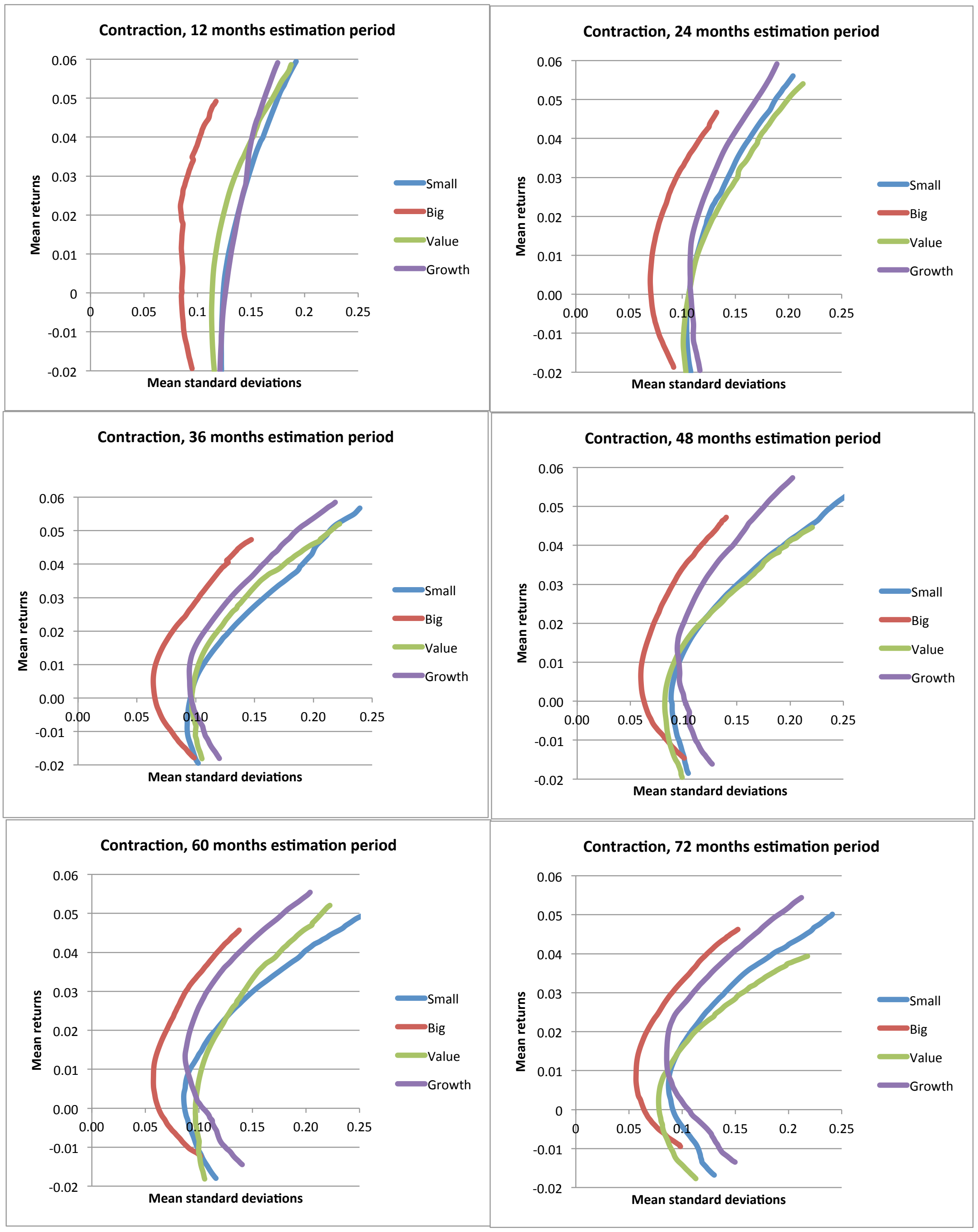
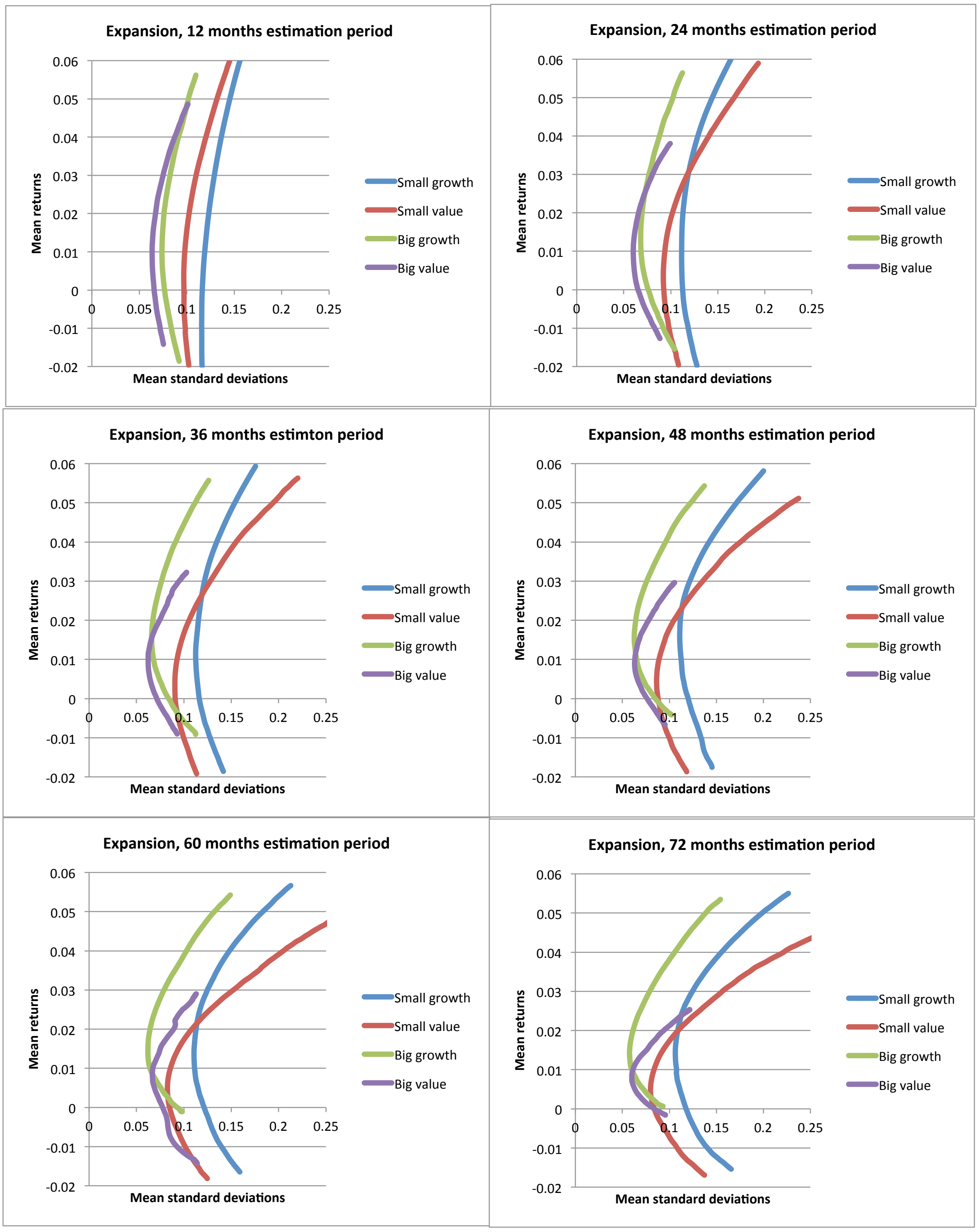


Figure 6-4 The mean of the monthly efficient frontiers, cycle periods, joint size and book to market.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small growth, ...) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the mean of the monthly efficient frontier points over the business cycle periods (expansion and contraction periods). The months constitute each period are determined using the Beurau of Economic Reserch web site. The graph constitute another efficient frontier each of its points is the mean of a monthly efficient frontier point over all months of the cycle. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity. Small growth is the joint stocks of the small and growth stocks. etc.

Panel A: Average over expansion periods



Cont. Figure 6-4

Panel B: Average over contraction periods

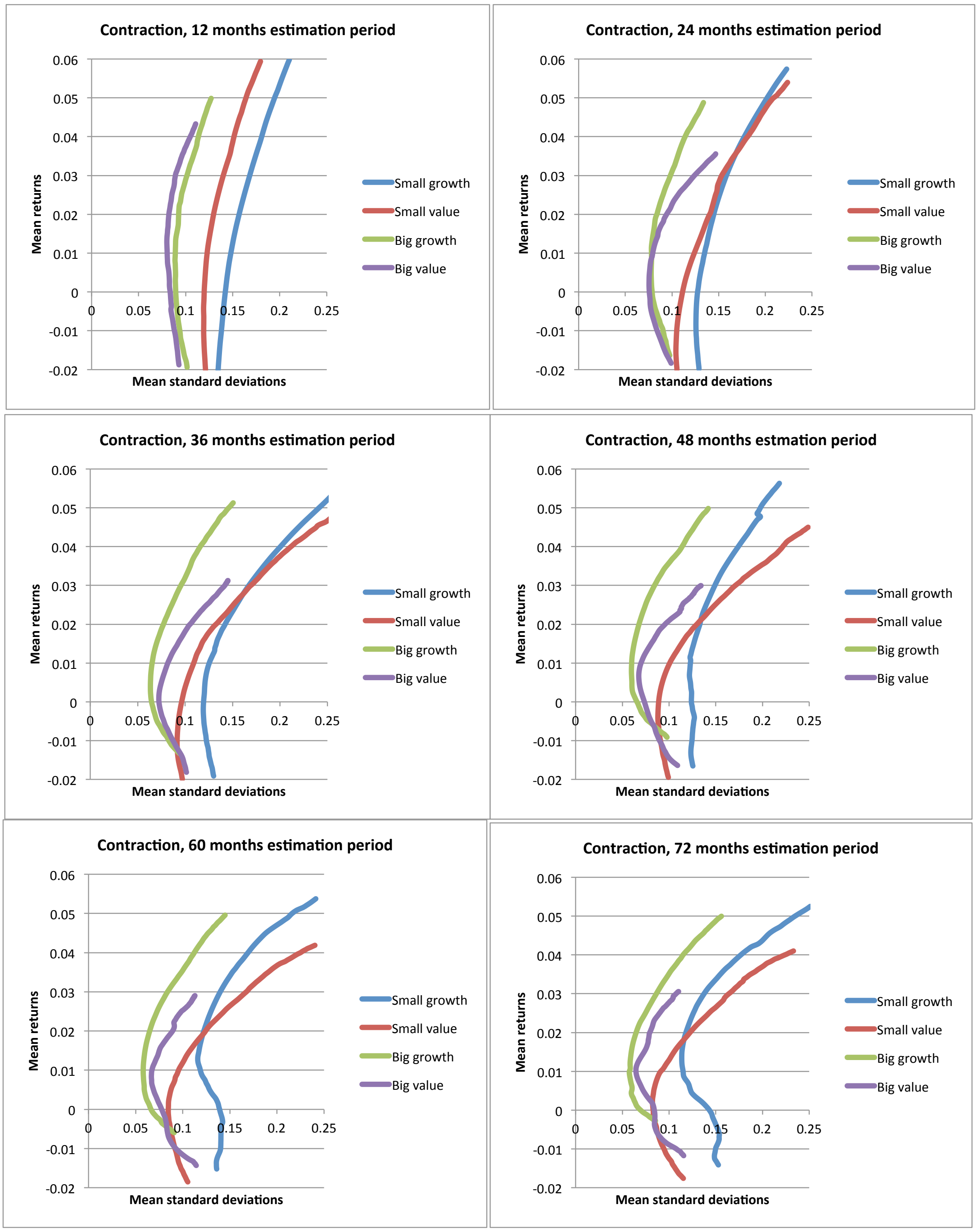
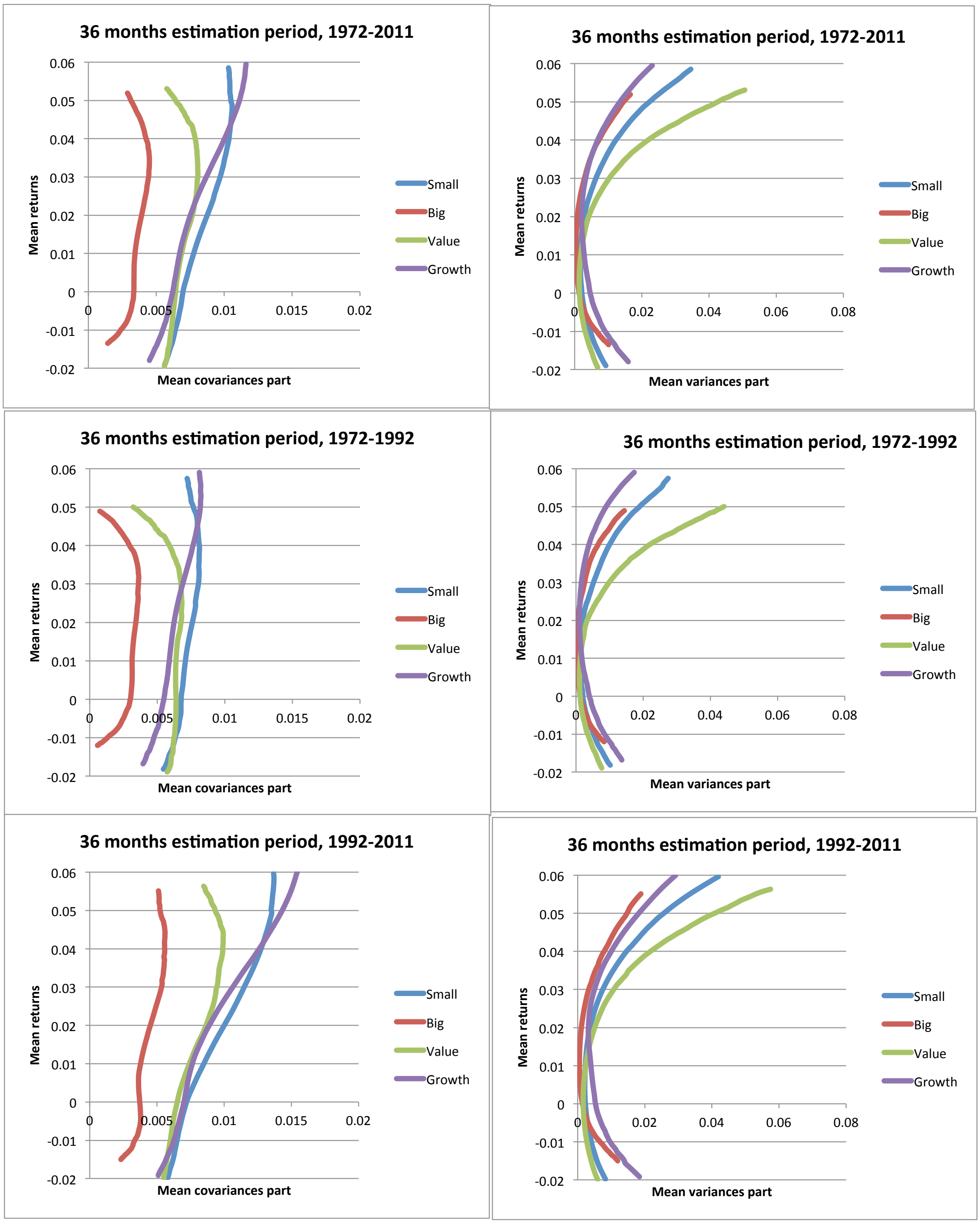


Figure 6-5 Partioning the mean-variance portfolios' variances into their covariances and variances parts: One way size and book to market portfolios.

Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small, growth, ...) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. I divide the mean-variance portfolios' variances into two parts. The sum of mean-variance stocks' variances and the sum of mean-variance stocks' covariances. The graph gives the mean of the monthly sum of mean-variance stocks' variances (covariances) and their corresponding mean of the portfolios' returns.

Panel A: 36 months estimation peeriod



Cont. Figure 6-5

Panel B: 60 months estimation peeriod

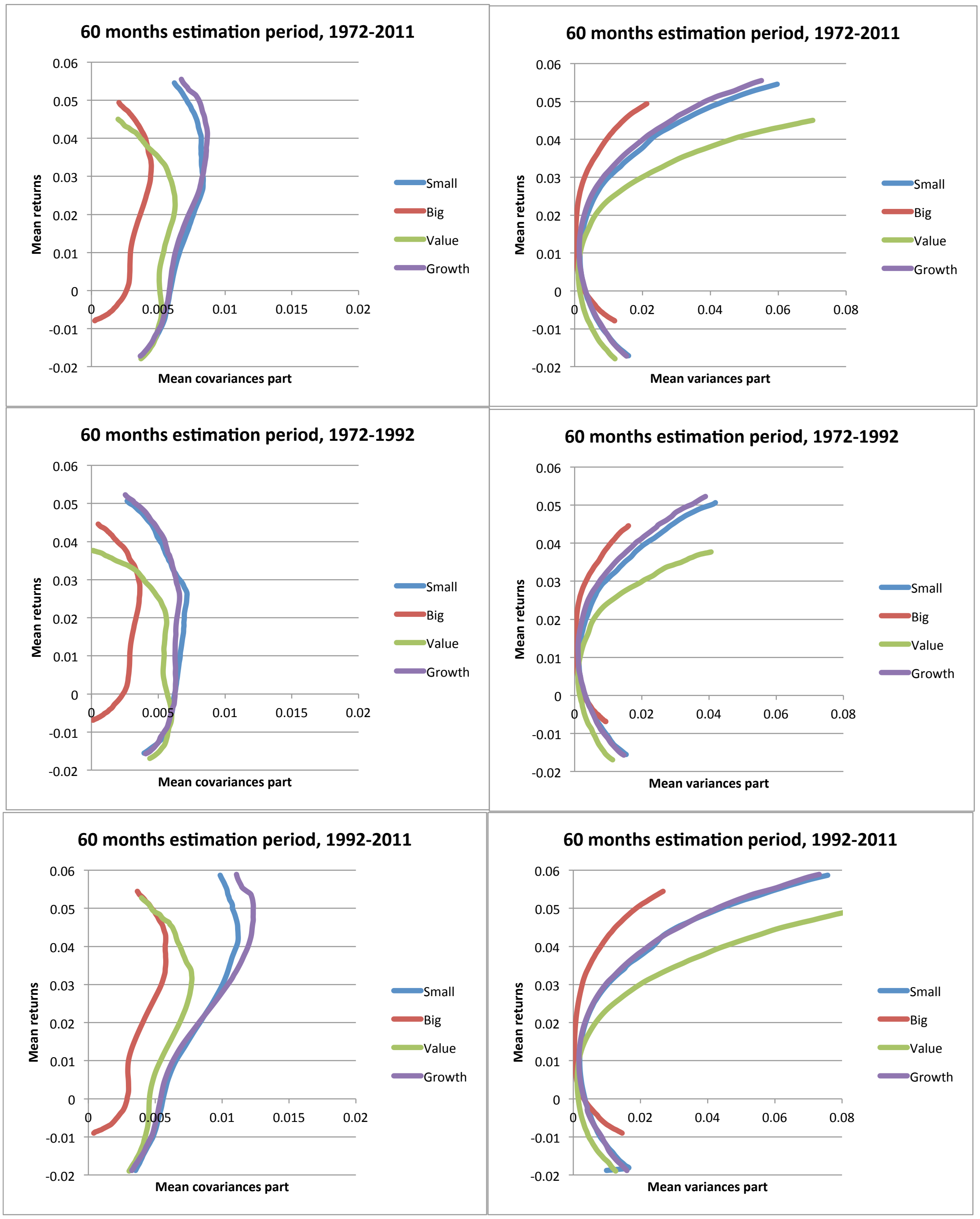
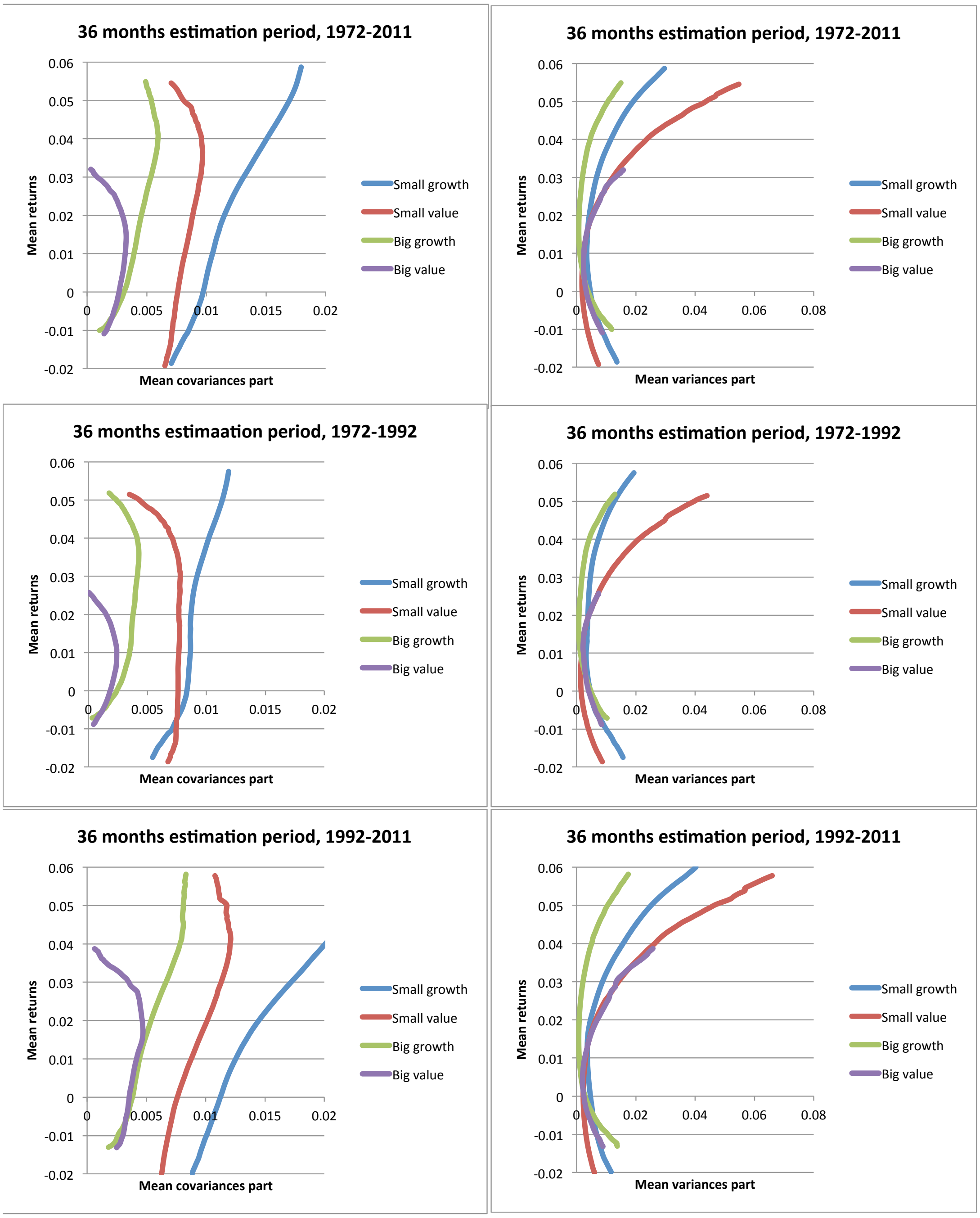


Figure 6-6 Partioning the mean-variance portfolios' variances into their covariances and variances parts: Joint size and book to market portfolios.

Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small growth, ...) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. I divide the mean-variance portfolios' variances into two parts. The sum of mean-variance stocks' variances and the sum of mean-variance stocks' covariances. The graph gives the mean of the monthly sum of mean-variance stocks' variances (covariances) and their corresponding mean of the portfolios' returns.

Panel A: 36 months estimation peeriod



Cont. Figure 6-6

Panel B: 60 months estimation peeriod

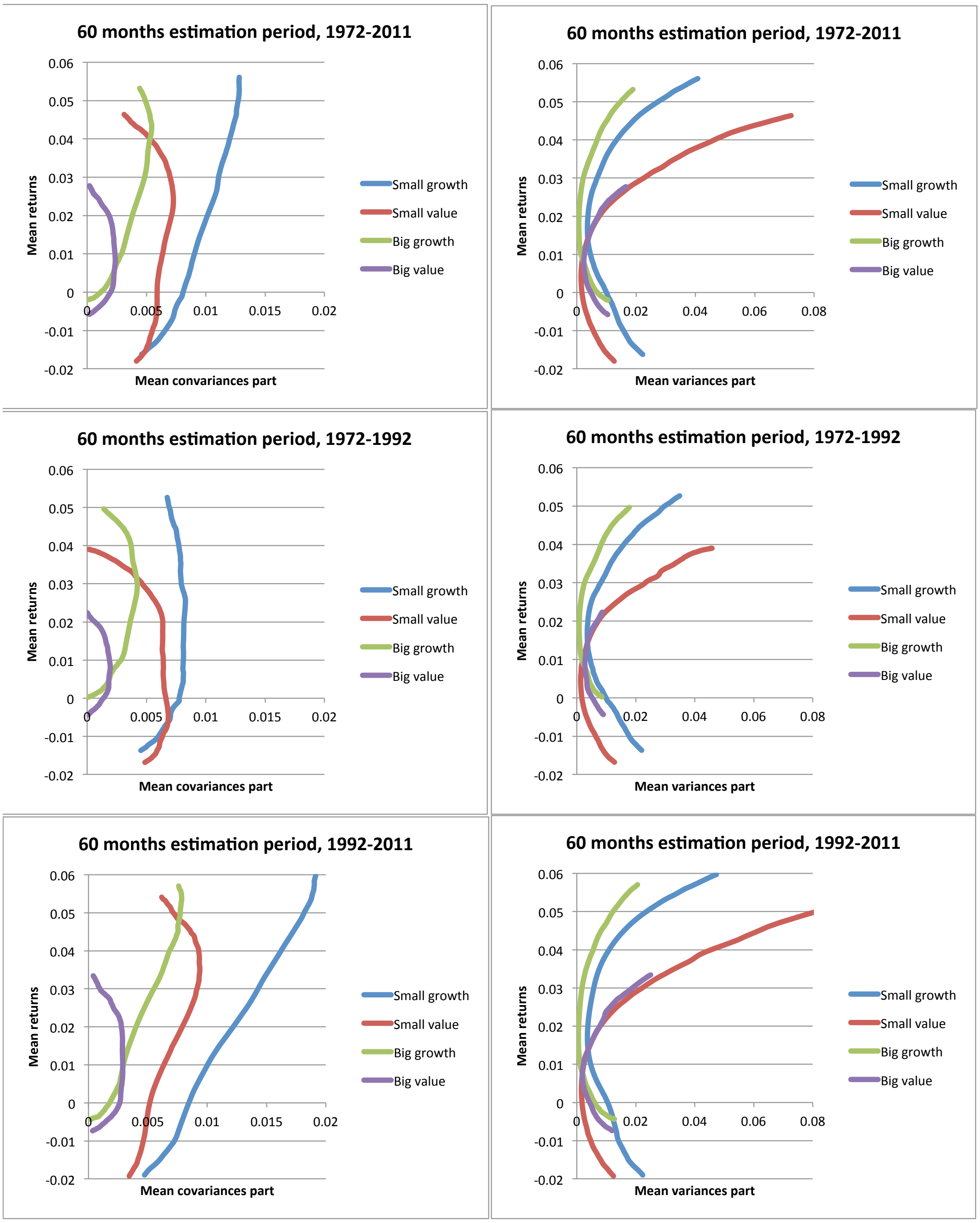
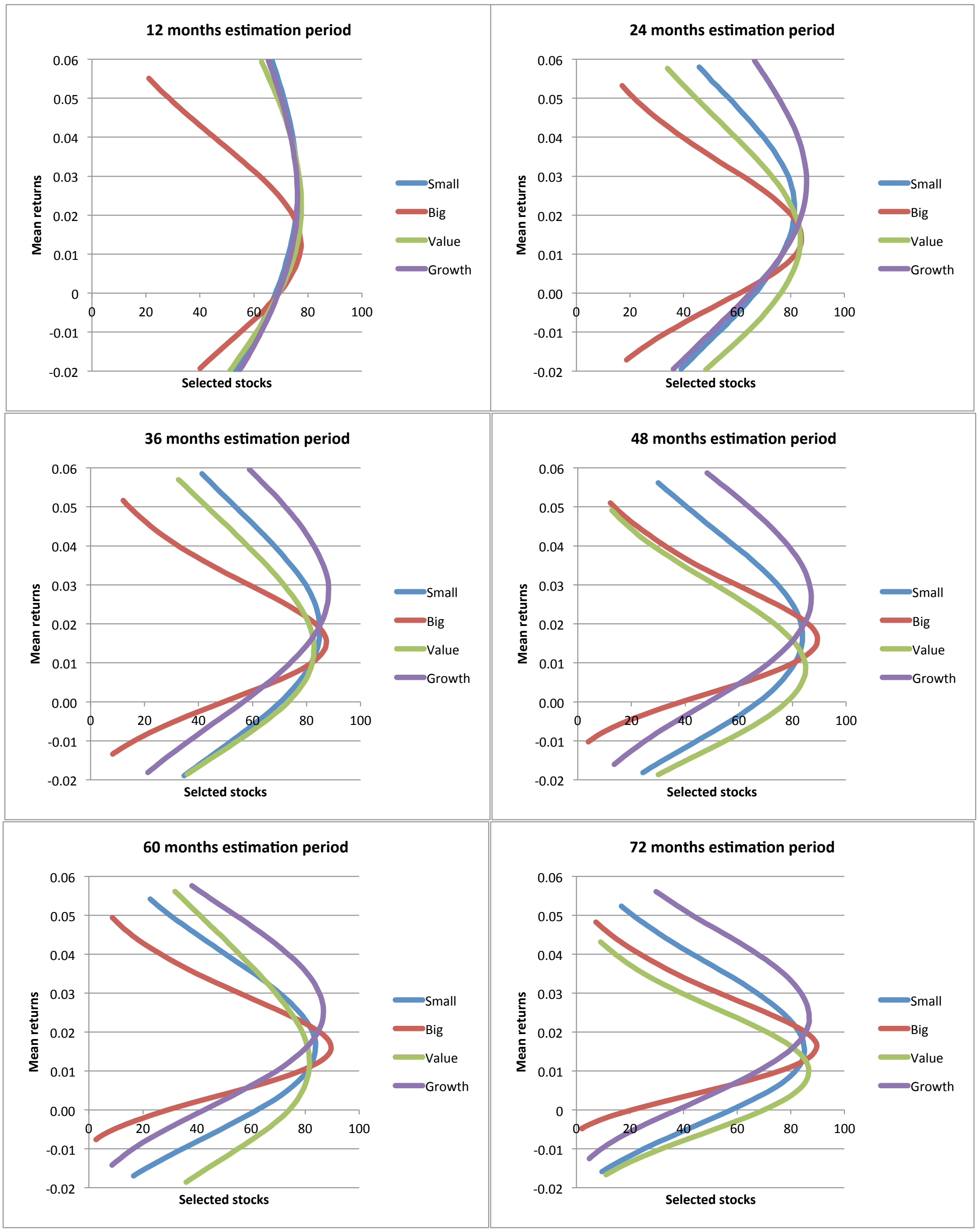


Figure 6-7 Average number of stocks selected in the portfolios .

Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the average number of stocks selected in the portfolios, such that the estimated wieghts are greater than zero, over the whole period at each of the 100 returns points . The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity . Small growth is the joint stocks of the small and growth stocks. etc.

Panel A: One way classification from 1972 to 2011



Cont. Figure 6-7

Panel B: Two way classification from 1972 to 2011

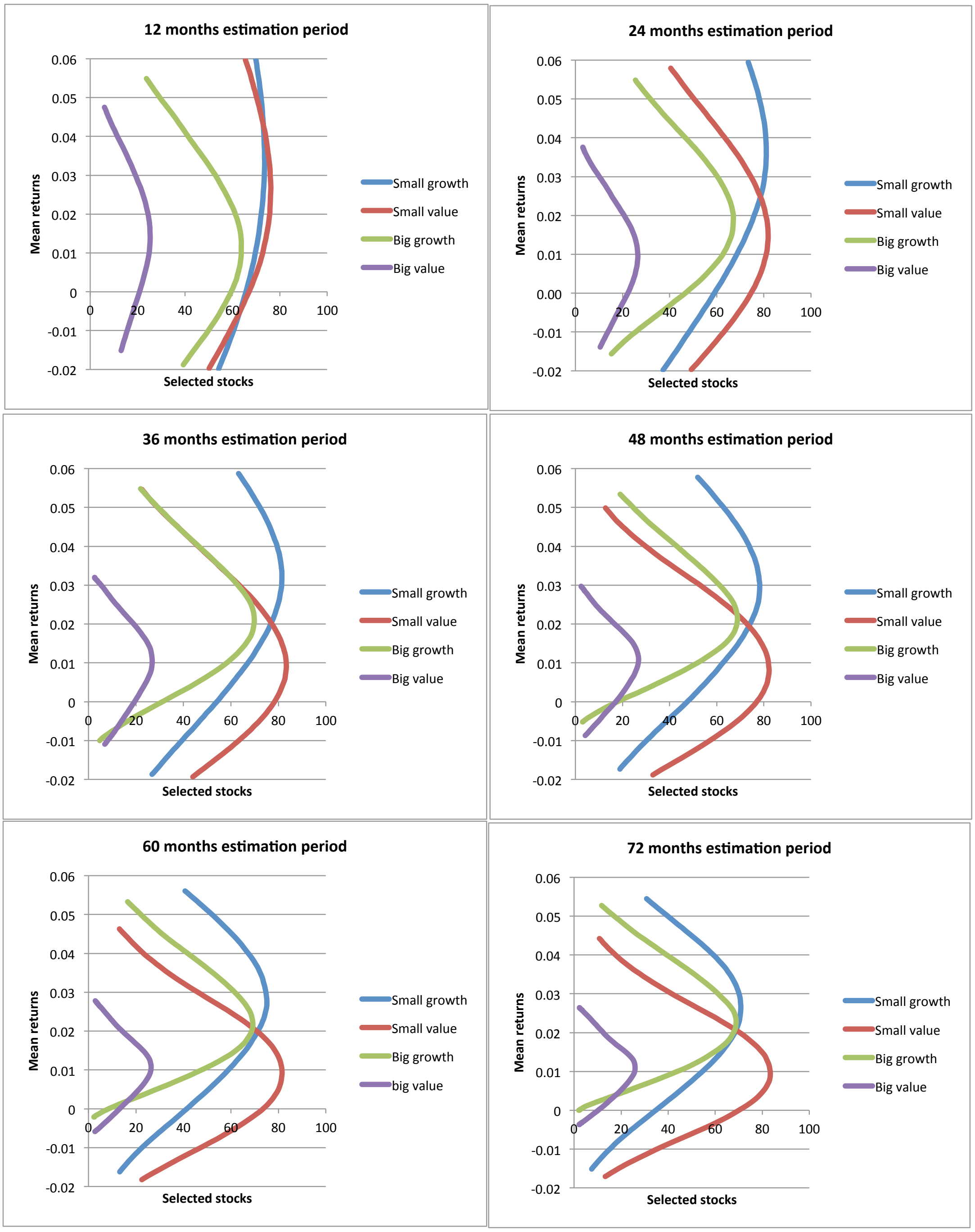
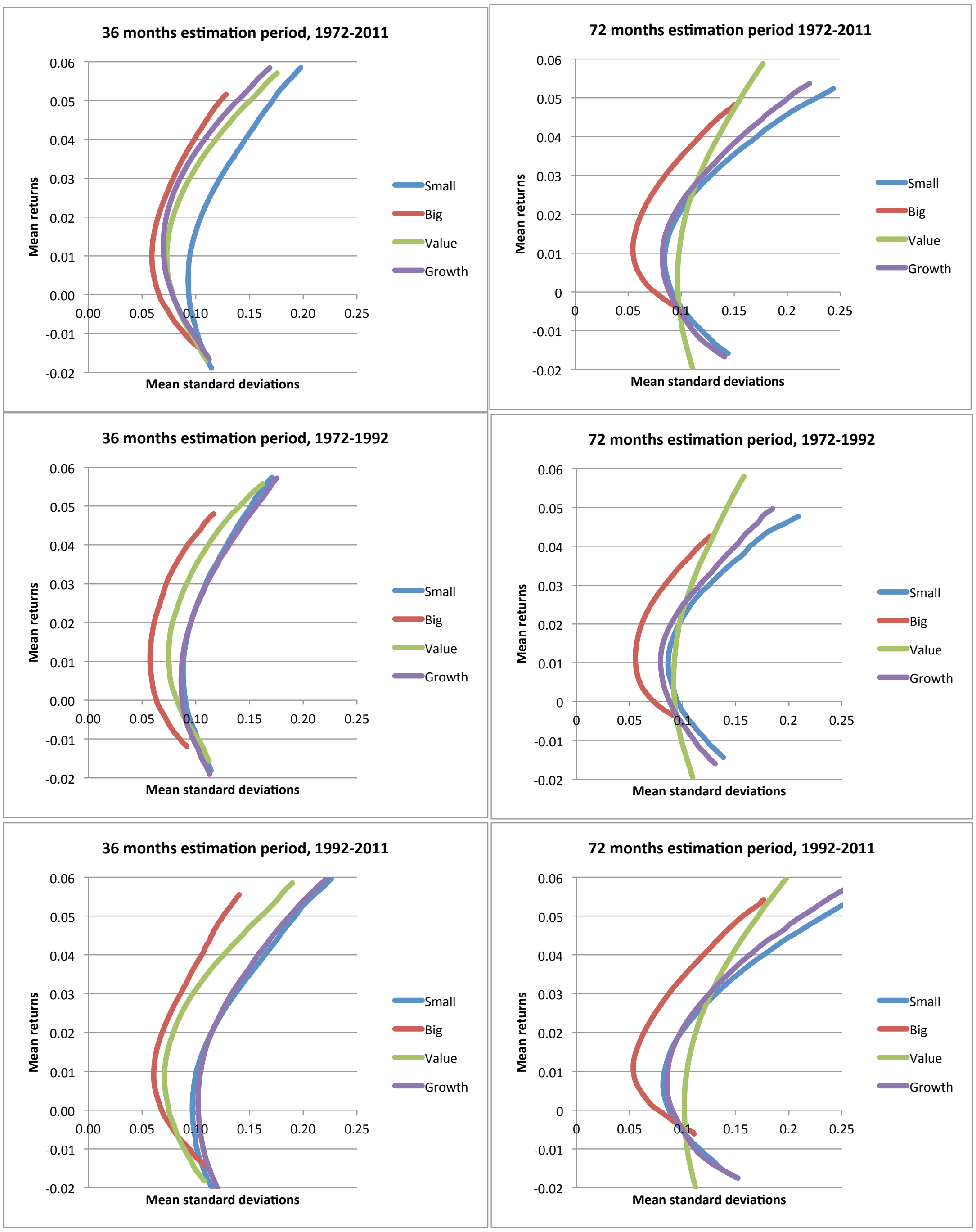


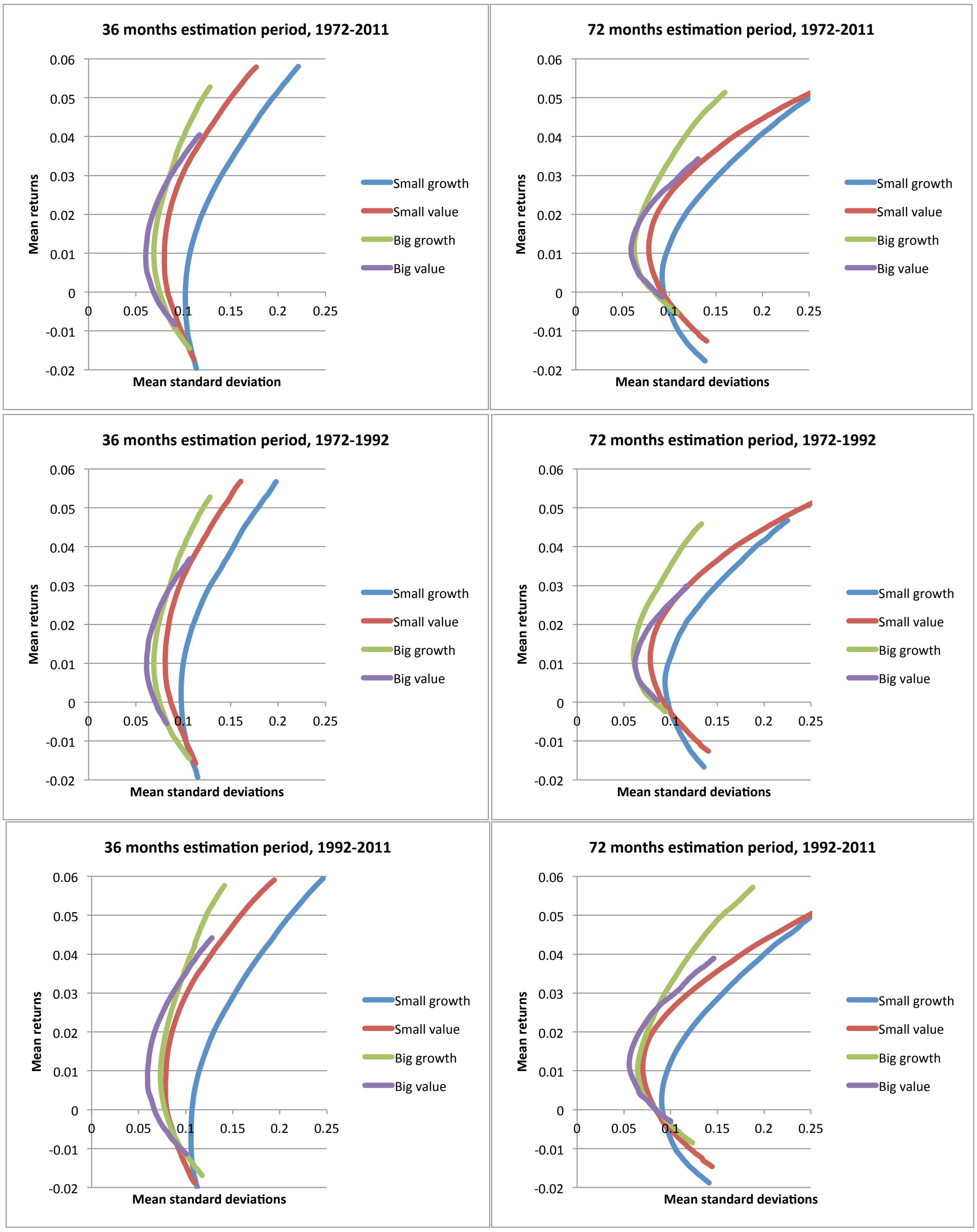
Figure 6-8 The mean of the monthly efficient frontiers, Earnings to price results.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, ... etc.) . I form a mean variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods of 36 and 72 months. The graph gives the mean of the monthly efficient frontier points over the stated months. The graph constitute another efficient frontier each of its points is the mean of a monthly efficient frontier point over all indicated months. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the earnings to price.

Panel A: One way classification : whole period



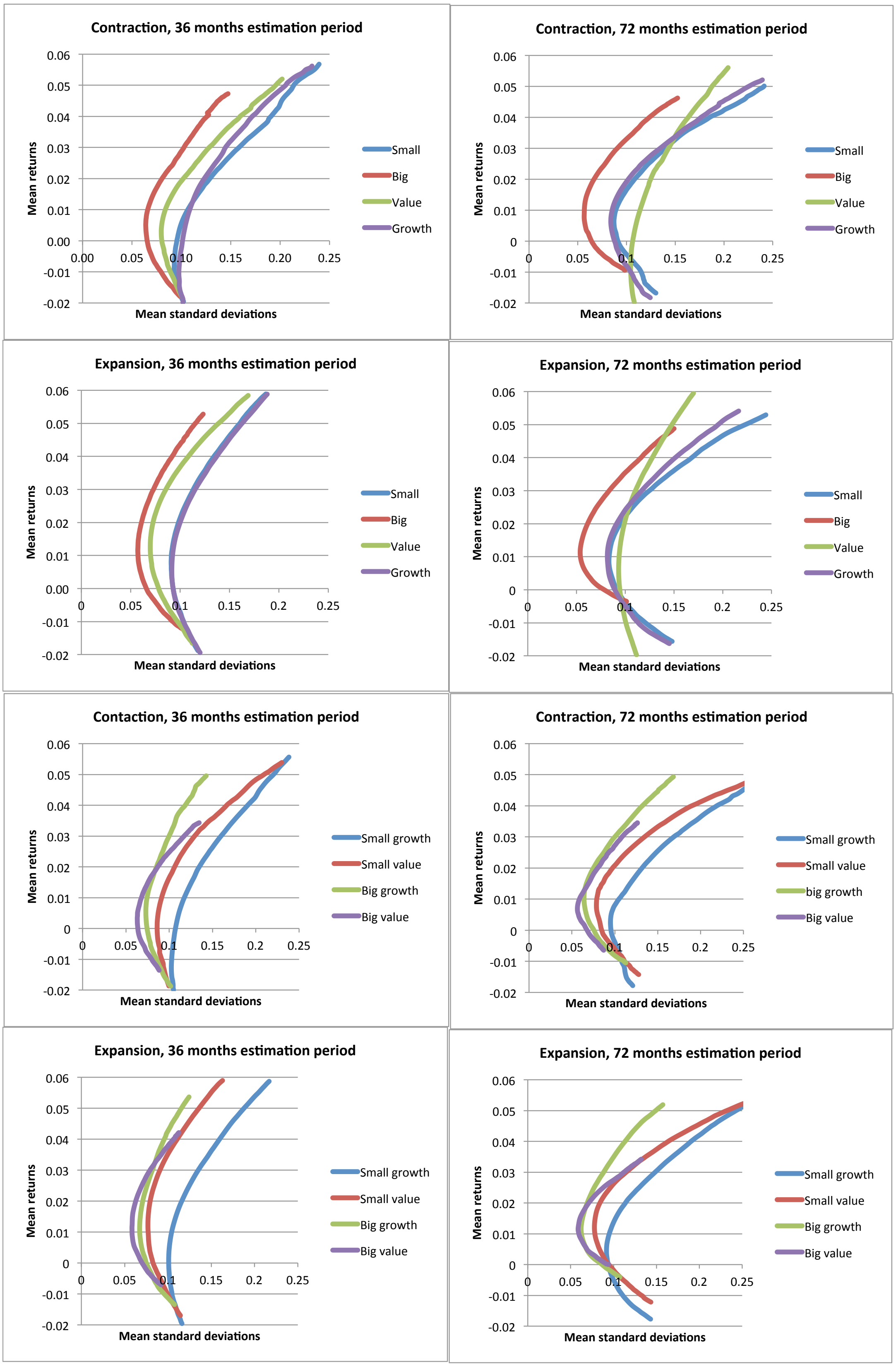
Cont. Figure 6-8

Panel B: Two way classification : whole period



Cont. Figure 6-8

Panel C: One and two way classifications : cycle periods



Chapter 7

Out of sample results

In this chapter, the out of sample performance of the sample based minimum variance model for different portfolio classes is evaluated. A comperison is then made between the out of sample performance of the naive portfolio with the minimum variance portfolios that have the largest number of stocks and the portfolios that have the minimum variance. In addition to the out of sample sharp ratio, the certainty equivalent return, and the turnover used by the researchers as performance measures, the wealth gained at the end of the investment period is an added measure of performance. Then whether these results change from the most recent period compared to the earliest one is tested.

7.1 Introduction

Many authors discuss the question of whether the naive portfolio (equal weighted portfolio) outperforms portfolios based on the optimised techniques. Their results are disputable and they do not agree on this matter. Some claim that the naive portfolio outperforms the optimised portfolios. They think that the optimisation techniques add no value in the absence of informed inputs. Others have no evidence that the 1/N portfolio is superior to the optimised portfolios.

DeMiguel et al. (2009) investigate whether the optimised portfolios outperform the 1/N portfolio using 14 optimised models across seven empirical data sets. Their models include advances in Bayesian estimation and moment restrictions designed to reduce the estimation error. They find that, out of the 14 models, none of them are consistently better than the 1/N rule using the Sharp ratio, certainty equivalent return, or turnover. Concerning to the minimum variance model constrained on short sale, Jagannathan and Ma (2003) find that only one of the seven data sets performs well in terms of Sharp ratio but not in terms of certainty equivalent return or turnover. They find that the minimum variance strategy based on no restrictions on the moments of return leads to better performance in 6 of the data sets relative to that of the mean variance strategy.

In contrast to DeMiguel (2009), Fraham et al. (2010) claim that the use of simple testing procedures leads to the results of DeMiguel (2009). They conduct several hypothesis tests based on multiple testing. They test whether it is possible to beat the naive strategy by at least one of the optimised strategies, whether the naive strategy is better than any optimised strategy, and which of the optimised strategies is significantly outperformed by naive diversification. Their empirical study shows that average certainty equivalent is higher than that of the naive strategy in almost all models. Especially for a medium-sized risk aversion, the minimum variance strategies outperform the naive strategy.

Kritman et al. (2010) claim that the superiority of the naive approach arises not from limitations in optimisation but from the reliance on the short term estimation sample that ranges from 30 months up to 120 months. Relying on longer term samples, they find that the optimised portfolios outperform the out of sample equally weighted portfolios. DeMiguel (2009), using simulation results, shows that the optimised portfolios can outperform the 1/N portfolio if they have long estimation windows (more than 3000 months) for a small number of assets (25 assets).

This study is different to previous research in many ways. First, the study compares the out of sample performance of specific portfolio classes constructed based on the size and book to market equity to determine which one we can rely on as a good portfolio strategy. These results are also compared with the equal weighted strategy. Second, individual stocks in these particular portfolios are used rather than the constructed portfolios or indices used by many researchers.

7.2 Out of sample performance

Table (4-1) showed the average of monthly returns that could be gained by constructing equal weighted portfolios based on the book to market and size. These returns represent the out of sample results gained by the equal weighted strategy because the equal weighted strategy simply uses all the stocks included in a portfolio and gives them equal weights without the need for any further information. The table indicated that the small, big, growth, and value portfolios have 1.57, 0.94, 1.04 1.75 average monthly returns respectively for the period from July 1992 to June 2011. Also, the small growth, small value, big growth, big value portfolios have 1.28, 1.91, 0.87, and 1.02 average monthly returns respectively for the same period. Is it valuable to rely on optimised portfolios in getting out of sample average returns that outperform these returns? Specifically, can the corresponding portfolios based on the minimum variance technique produce out of sample returns that outperform the returns of the equal weighted portfolios?

The purpose here is to compare the out of sample average monthly returns of the size and book to market portfolios constructed based on the minimum variance method to determine which one is more valuable for the investor. A comparison between the portfolios minimum variance returns with those of the equal weighted portfolios will also be made. The out of sample average monthly returns of the minimum variance portfolios are simply explained in the following paragraph. [1]

[1] For more details, see the methodology section of chapter 3.

The desired outcomes are 100 values of the out of sample average monthly returns corresponding to the 100 in-sample portfolio returns on the frontier (the returns that range from -0.02 to 0.06). Each of the out of sample average monthly returns is the average of the monthly out of sample returns over the period from t = w +1[2] to the end of the period of study. The monthly out of sample return is the sum of the weights, extracted by the minimum variance model of the previous month, times the returns of their corresponding stocks in these months.

7.2.1 One way classification

Figure (7-1) shows the plot of the 100 in-sample average returns against their corresponding 100 out of sample average returns for one way size and book to market equity. The figure shows the plots for the different estimation windows and for the whole and sub periods. Table (7-1) (column 1) shows the average equal weighted returns for the same samples used to construct Figure (7-1)[3]. The table shows the returns for different estimation windows at different periods of time. For example, the equal weighted returns for the small, big, value, and growth portflios using w = 24 months for the 1992/2011 period are .0201, .0112, .0229, and .0164 respectively. Figure (7-1) panel A for the period from 1972 to 2011 shows some interesting results.

Firstly, the graph shows a slight negative relation between the in-sample mean returns and the out of sample returns. These negative relations become stronger by increasing the length of the estimation window. Bearing in mind that the efficient frontiers (as anticipated from the graphs of chapter 6) lie on the part of the graph where the in-sample returns are above 0.01. There is also a positive relation between the portfolios' returns on the efficient frontier and their variances. Also there are negative relations between the portfolios' returns and the sample sizes. It is better for the investor to invest in portfolios

[2]The starting date of the out of sample results is one month after the end of the first rolling window.

[3]All the stocks will be used to calculate the equal weighted returns. Only the stocks selected by the minimum variance method are used to calculate the returns on Figure (7-1).

where the in-sample returns are close to 0.01 on the efficient frontiers for large w. These portfolios are characterised by high out of sample returns. But for low estimation windows, it is better for the investor to choose the portfolios that have high in-sample returns. They will give high out of sample returns with fewer stocks in the portfolios which will be easy to manage.

Secondly, on the inefficient part of the frontier (the part where the in-sample portfolios returns are lower than 0.01), although this part is not of interest to researchers, it produces very high out of sample returns. It is better for the investor to invest in portfolios that have high losses in the previous period. The high losses portfolios are characterised by a low number of stocks and high variability in sample returns.

Thirdly, the small and value portfolios have the best out of sample returns especially on the efficient part of the frontiers. The small portfolios can produce more out of sample returns than those of the value portfolios for some estimation periods. The big portfolios have the lowest performance among the other portfolios. This is true for any estimation period. The growth portfolios produce high out of sample returns on the inefficient part of the graph compared to other portfolios.

Finally, the optimised portfolios can produce higher out of sample returns than those of the equal weighted portfolios for different estimation windows. For example, when w = 24, the equal weighted returns for the small, big, value, and growth portfolios are 0.0188, 0.0106, 0.0207, and, 0.0142 respectively. Comparing these returns with those of the minimum variance portfolios, it is easy to realize that the small, value, and growth minimum variance portfolios outpeform the corresponding equal weighted portfolios. This is true for most of the estimation windows. This result will be discussed more in the next section.

The previous results are robust using the sub-periods from 1972 to 1992 and from 1992 to 2011, introduced by panels B and C of Figure (7-1). The recent period is distinguished by very high out of sample returns compared to the returns in the previous period over all estimation windows. It is easy to realize that the optimised portfolios in the 1992/2011 period can outperform the equal weighted portfolios for different estimation periods. For example when w = 36, the equal weighted small, big, value, and growth portfolios' returns are 0.021, 0.011, 0.022, and 0.017 respectively. Comparing these portfolios' returns with that of the minimum variance portfolios, the optimised portfolios clearly outperform these returns.

7.2.2 Two way classification

Figure (7-2) panel A shows the plots of the in sample and the out of sample portfolios returns for the joint size and book to market equity over the 1972/2011 period. The graph indicates that the small growth and the small value portfolios can produce high out of sample returns compared to other portfolios. For the small growth and small value portfolios, there are slight negative relations between the in-sample and the out of sample portfolio returns. These negative relations are increased by increasing the estimation windows. On the efficient part of the frontiers, the out of sample returns of the small value portfolios outperform those of the small growth portfolios. But for the inefficient part of the frontiers, the out of sample returns of the small growth portfolios outperform those of the small value portfolios.

The optimised small value and small growth portfolios can outperform the equal weighted portfolios for different estimation windows. For example, Table (7-1) panel 3 shows that for w = 36 the small value and small growth portfolios have 0.023, and 0.018 equal weighted returns respectively. Comparing these returns with those in the graph for w = 36, it is clear that the optimised portfolios outperform the equal weighted ones. This result will be discussed in detail in the next section.

The previous results are robust using the sub-periods from 1972 to 1992 and from 1992 to 2011 introduced by panels B and C of Figure (7-2). The recent period is distinguished by very high out of sample returns compared to the returns on the previous period over all estimation windows. It is obvious that the optimised portfolios in the 1992/2011 and 1972/1992 periods can outperform the equal weighted portfolios for different estimation periods. For example when w = 36 for the 1992/2011 period, the equal weighted small value and small growth portfolios' returns are 0.026 and 0.024 respectively. Comparing these portfolio returns with those of the minimum variance portfolios, the optimised portfolios easily beat these returns.

7.3 Naive portfolio versus minimum variance portfolios

This section is devoted to comparing the out of sample performance of the equal weighted portfolios and the out of sample performance of some specific optimised portfolios on the efficient frontiers. Two portfolios on the efficient frontiers were chosen: the portfolio with the minimum variance and the portfolio with the maximum number of stocks. It is interesting to determine whether the optimised portfolios outperform the naive portfolio (the equal weighted portfolios). This comparison will determine whether it is valuable to use the optimised portfolios as a strategy when constructing our portfolios. These portfolios will be compared with the equal weighted portfolios using t test for testing the equality of their average returns. The investment balances at the end of the periods for these portfolios using their monthly portfolio returns will also be compared. Comparing these balances will indicate how big the effect of the difference of the average returns is of these portfolios. Other common comparison procedures such as the Sharp ratio and certainty equivalence will also be employed.

The average minimum variance portfolio is the average of the monthly returns of the portfolios that have the lowest variance each month among all the variances extracted by the conditional minimum variance procedure.[45] I

[4]For more information about constructing this portfolios see chapter 3.

[5]Theoretically This portfolio will be equal to the portfolio that was extracted by the

chose this portfolio because it has the lowest variance and the lowest return on the efficient frontier. Using the previous graphs, this portfolio is expected to have good out of sample returns. Many other researchers also use the minimum variance portfolio as it is proven to have good results among other optimisation procedures, (see for example DeMiguelet al. (2009)).

The average maximum number of stocks portfolio is the average of the monthly minimum variance portfolios that have the maximum number of stocks in them. This study is the first to compare this portfolio with the equal weighted portfolio. This portfolio is valuable because it has the same diversification level as the equal weighted portfolio. If this portfolio outperforms the equal weighted portfolio it will be better to use it instead of the equal weighted portfolio as a benchmark in evaluating the stocks' performance.

Table (7.1) shows the out of sample average monthly returns for the equal weighted portfolios, the minimum variance portfolios, and the maximum number of stocks portfolios. The table also shows the p-value of the t test for testing the equality between the average returns of these portfolios, the end of the period investment balance when investing 1 dollar in these portfolios monthly using the monthly portfolios returns, and the average sample size used in constructing these portfolios. These results are extracted for different classes of stocks for the size and book to market equity and for different estimation periods w =12, 24, 36, 48, 60, and 72. The table also presents the results for the whole period from 7/1972 to 6/2011 and for the two sub periods from 7/1972 to 6/1992 and from 7/1992 to 6/2011.

The first interesting thing to remark about Table (7.1) is the results of the portfolios for the 1972 to 1992 period presented by the p-value for comparing the equality of the average returns between the portfolios. The p-value columns compare the equal weighted portfolio with the minimum variance portfolio, the equal weighted portfolio with the maximum n portfolio, and the minimum variance portfolio with the maximum n portfolio respectively. In almost all the cases, there is no significant difference (p-value $>$ .05) between

unconditional minimum variance model.

the average returns of these portfolios. This remark is true for all the size and book to market portfolios and for many of the used estimation periods. This remark is also robust using a sample size of 100 stocks or when using all the stocks in the class of stocks to construct the portfolios as shown in Table (7.1) panel 5 for $w = 60$. When $w = 60$ none of the portfolios shows superiority over the others in the 1972/1992 period.

In contrast to the 1992/2011 period, the results show significant differences between the average returns of the equal weighted portfolios and that of the optimised portfolios in favour of the optimised portfolios. When comparing the equal weighted portfolio with the minimum variance portfolio, it is clear that the minimum variance portfolios outperform (p-value < 0.05) the equal weighted portfolios for the most profitable size and book to market classes (small, value, small value, and small growth). These results are true for all estimation periods when $w > 12$. These results are also true when using all stocks included in the size and book to market classes as shown when $w = 60$ in Table (7.1), panel 5. Even for the other portfolios, the results show that the minimum variance portfolios can outperform the equal weighted portfolios for many estimation periods.

Similar results are extracted when comparing the average returns of the equal weighted portfolios and the maximum n portfolios for the 1992/ 2011 period. The maximum n portfolios outperform the most important two portfolios, the value and the small value portfolio, for every $w > 12$. These results are also clear when using all stocks for $w = 60$. The maximum n portfolios can also outperform the equal weighted portfolios of different size and book to market classes for many w's. Table (7.1) also shows that the minimum variance portfolios can outperform the maximum n portals in many cases but not for the most profitable portfolio, the small value portfolio.

The previous results indicate the ability of the optimised portfolios to produce higher returns than the equal weighted portfolios by selecting proper stocks' weights in constructing the portfolios. This appears from the performance of the maximum n portfolios; however, they almost have the same number of stocks as the equal weighted portfolios. The optimised portfolios also ignore the stocks that may not be useful in constructing the portfolios. This clearly appears from the sample size extracted using the minimum variance portfolios as shown in Table (7.1). Although the minimum variance portfolios have smaller sample sizes than the equal weighted portfolios, they outperform the equal weighted portfolios. These results shed some light on the importance of the optimised portfolios and refute the claims about their useless economic returns.

To make the subject more interesting, one can compare the investment balances of investing 1 dollar in any of the equal weighted, the minimum variance, and the maximum number of stocks portfolios. The invested money is compounded monthly using the monthly portfolio returns. The end of the period balances are shown in Table (7.1). The table reveals that there are huge differences between the balances of the portfolios that show significant differences between the equal weighted portfolio and the optimised portfolios. For example when $w = 60$, using all the available stocks in the portfolios, the equal weighted small value portfolio with monthly average return of 0.0227 has a balance of 15593 dollars while the maximum n small value portfolio with a monthly return of 0.0246 has a balance of 28675 dollars. The maximum n portfolio has about double the balance of the equal weighted portfolio; however, the difference of their average returns is just 0.0019. Also the balance of the minimum variance portfolio (56240) is about 4 times the balance of the equal weighted portfolio; however, the difference of their average returns is just 0.0033. There is even a huge difference between the small value minimum variance portfolio and the small value maximum n portfolio; however, there is no significance different between their average returns.

Another way of knowing whether the out of sample performance of equal weighted portfolio outperforms that of the optimised portfolios is to compare their Sharp ratios. The previous studies, for example DeMigual et al.

(2009), show that the 1/n portfolio outperforms most of the optimised portfolios because its Sharp ratio is significantly higher than most of the optimised portfolios. This study also tests the equality of the Sharp ratios of the equal weighted portfolios and the minimum variance portfolios or the maximum n portfolios. Rejecting the equality means that the equal weighted portfolios can outperform the optimised portfolios. Table (7.2) shows the Sharp ratios and the value of the z test for testing the equality of the portfolios' Sharp ratios using different estimation periods for different study periods.

It is easy to conclude that there is no significant difference between the Sharp ratios of the equal weighted portfolios and the minimum variance portfolios when $w > 12$ for the whole and the sub-periods of the study. This means that the equal weighted portfolios do not outperform the minimum variance portfolios in terms of Sharp ratio. The only portfolio that has significant differences is the big value portfolio, which is not valuable for the investor. The results when comparing the Sharp ratios of the equal weighted portfolios and that of the maximum n portfolios are not exact. They change over the estimation periods and over the periods of study. But in most of the cases of the value and small value portfolios of the 1992/2011 period there is no significant difference in Sharp ratios between the equal and maximum n portfolios.

7.4 Earnings to price results

Panels A and B of Figure (7-3) show the plot of the in-sample portfolio returns against the out of sample portfolio returns for the one and two ways size and earnings to price characteristics for the 36 and 72 estimation windows and for the whole and sub-periods. The same conclusions can be extracted from the one way earnings to price portfolios as that of the book to market portfolios except that the returns of the growth earnings to price portfolios are highly comptitive with those of the small portfolios. The growth earnings to price portfolios can produce returns higher than the returns of the small portfolios on the efficient part of the graph for high estimation windows. This result significantly affected the two way size and earnings to price portfolios as shown in Figure (7-3) panel B. The small growth portfolios out of sample portfolio returns outperform those of the small value portfolios for the whole period from 1972 to 2011. This is more greatly observed in the recent period (1992/2011) than the past period (1972/1992).

The figures of the earnings to price portfolios show that, it is possible to get higher returns on the optimised portfolios than on the equal weighted ones for single or double classified portfolios. For example, Table (7-3) panel B with w = 72 shows that the equal weighted small value and small growth portfolios produce 0.0197 and 0.0252 average returns respectively for the 1992/2011 period. Comparing these returns with those of the corresponding optimised portfolios of Figure (7-3), it is clear that the optimised small growth portfolios highly outperform the equal weighted portfolios.

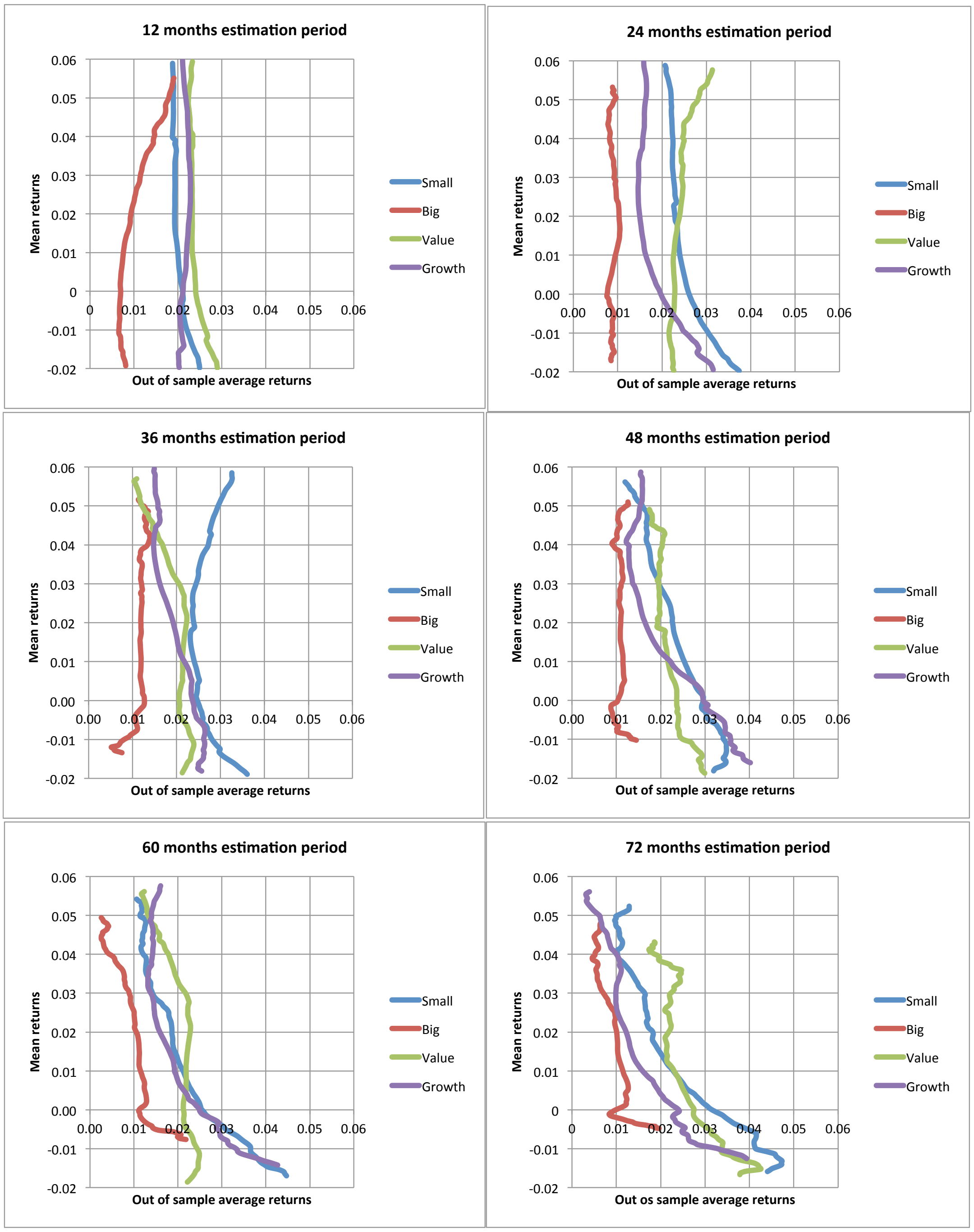
Tables (7-3) and (7-4) are used to compare the out of sample performance of the equal weighted portfolios with the minimum variance portfolios or the maximum n portfolios using the earnings to price as a measure of value. The conclusions are extracted as for book to market portfolios except that the small growth portfolios outperform the small value portfolios.

7.5 Conclusion

In this chapter, the question whether the out of sample returns of optimised portfolios produce higher returns than that of equal weighted portfolios is investigated. None of these articles discuss whether optimised value and growth portfolios outperform the 1/N portfolio. I find that the out of sample returns of the optimised value and growth portfolios, such as the minimum variance and the maximum sample size portfolios, produce higher returns than the equal weighted value and growth portfolios irrespective of the length estimation windows. There is no need for long estimation windows for the optimised portfolios to outperform the equal weighted portfolios contrary to the findings of many researchers (DeMiguel et al (2009)). Investing 1 dollar in the small value portfolio using equal weighted, maximum sample size, and minimum variance portfolios produce 2.6%, 3.3%, and 3.6% average monthly returns and wealth of $228, $822, and $1536 respectively over the 1992-2002 period using a 36 month estimation window.

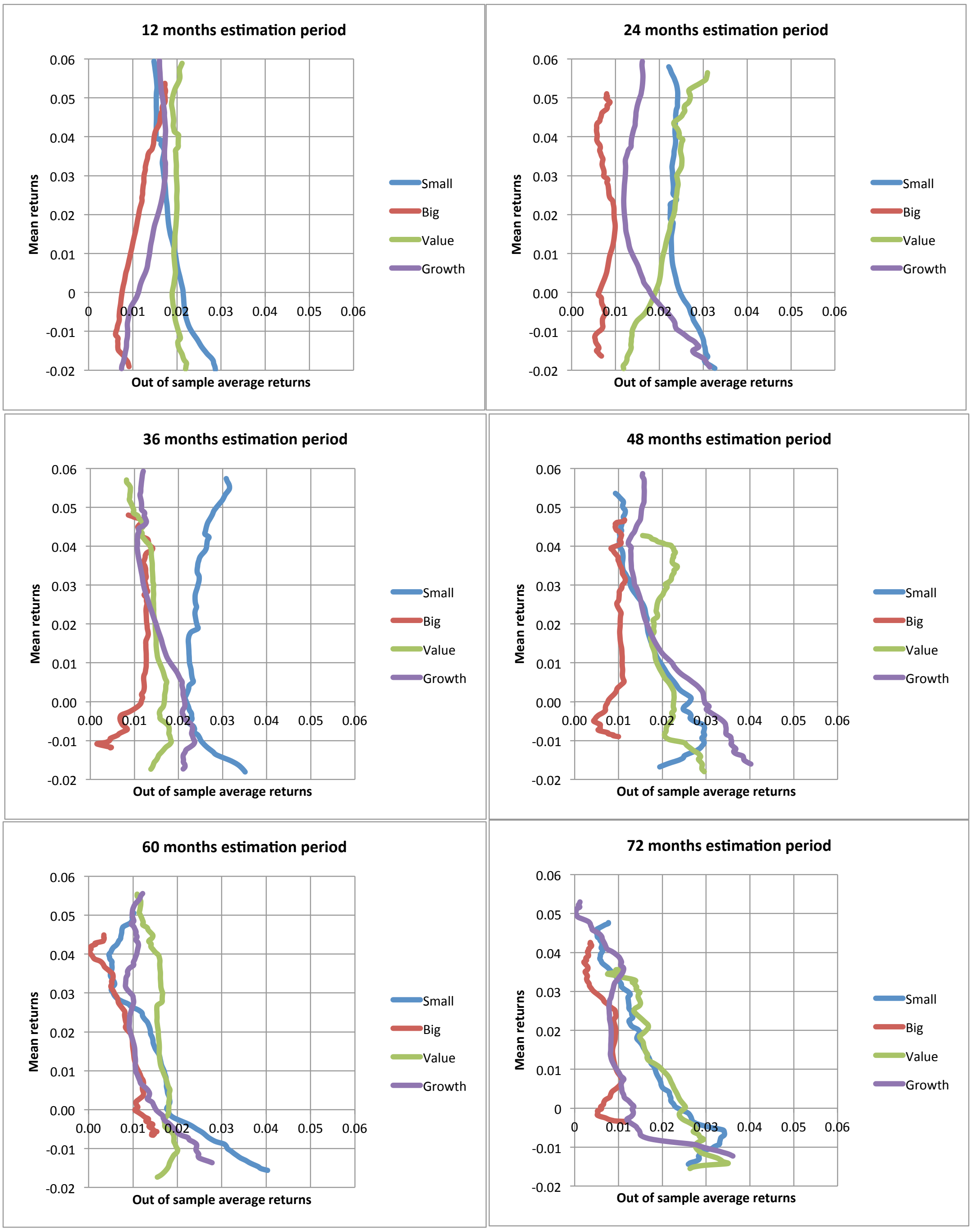
Figure 7-1 In sample versus out of sample average portfolios' returns: Single size and book to market . Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the weights of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the out of sample average retuns using the estimated wieghts over the study period at each of the 100 returns points. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity.

Panel A: Period from July 1972 to June 2011



Con. Figure 7-1

Panel B: Period from July 1972 to June 1992



Cont. Figure 7-1

Panel C: Period from July 1992 to June 2011

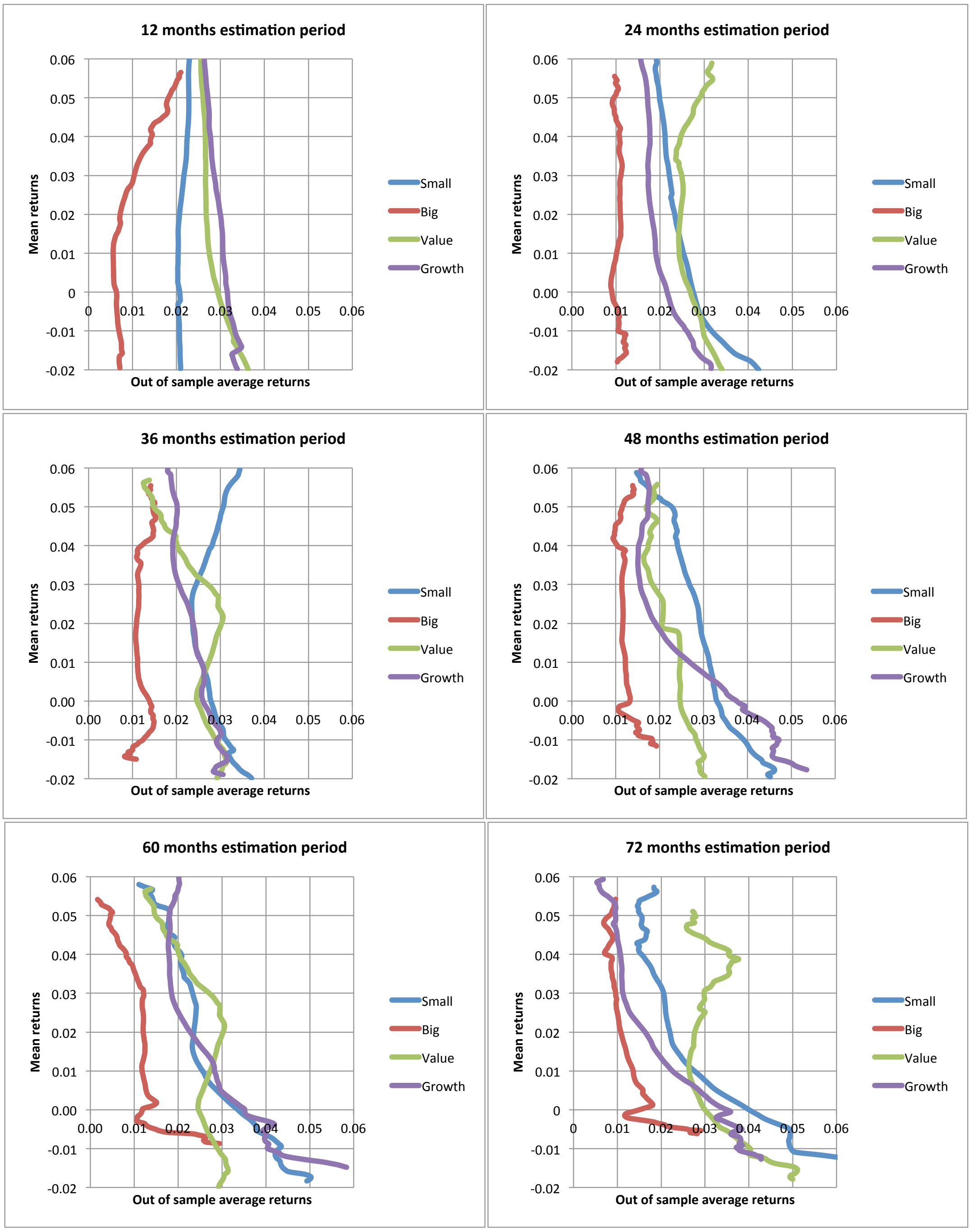
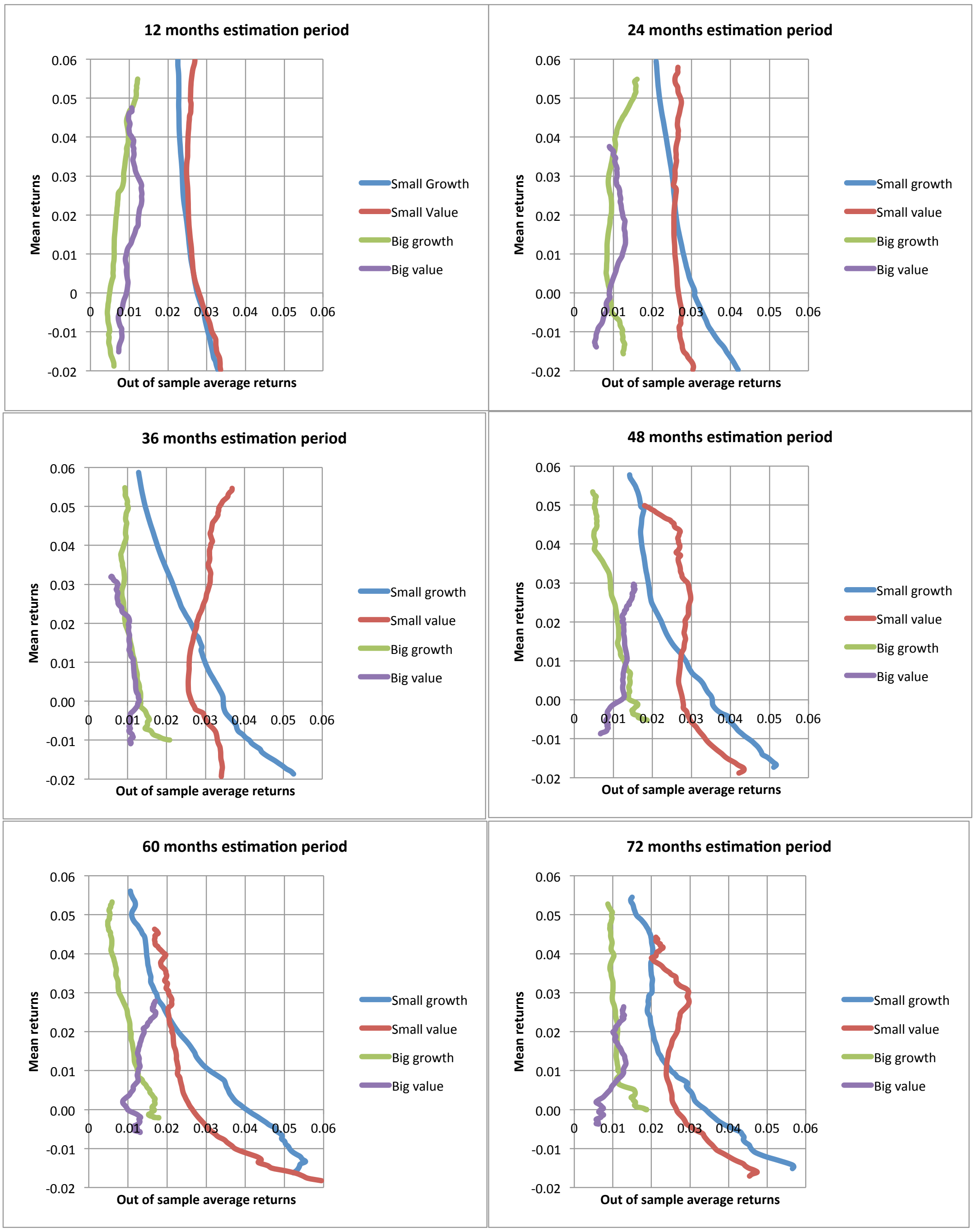


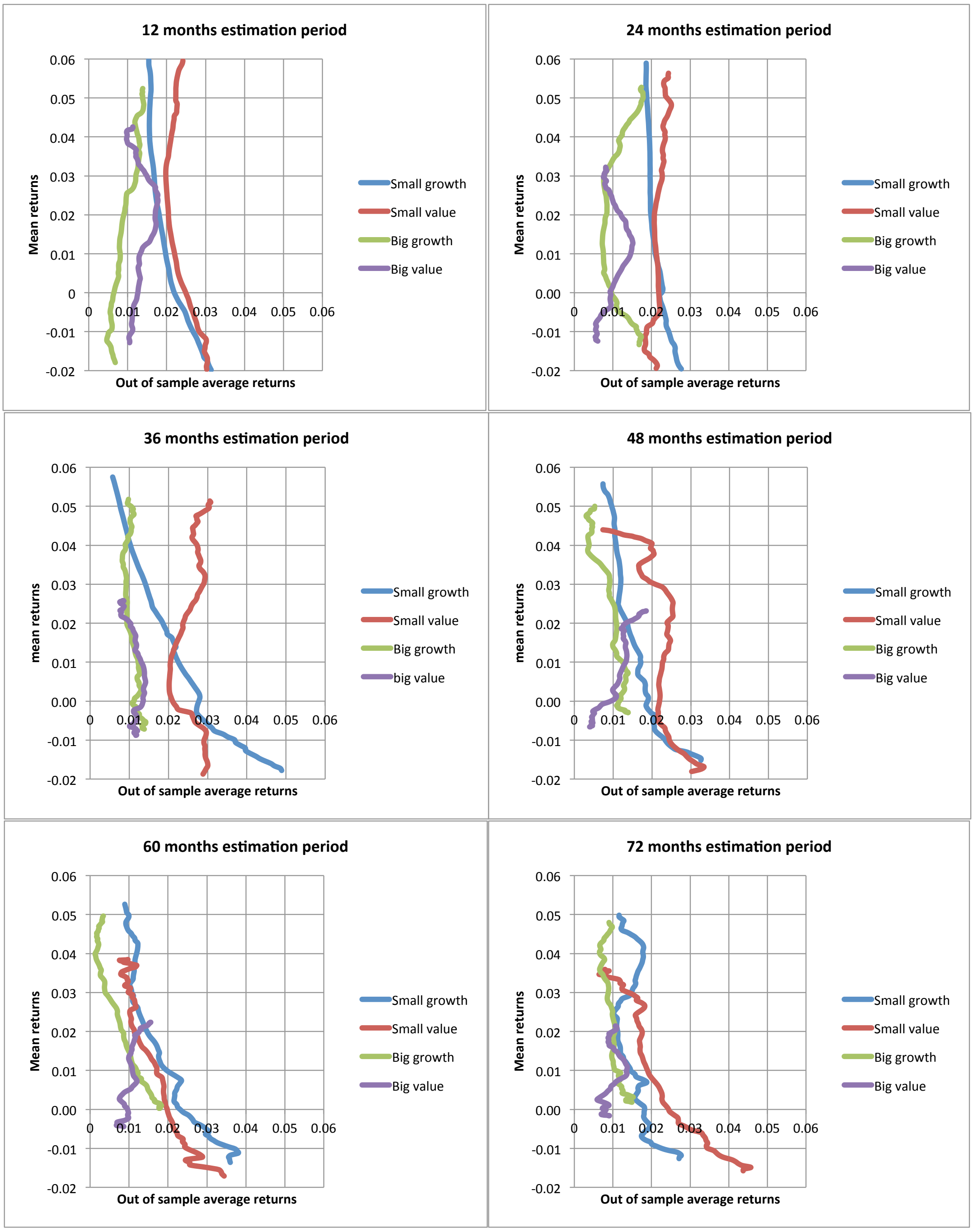
Figure 7-2 In sample versus out of sample average portfolios' returns: Joint size and book to market.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small growth, ...) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods ranges from 12 months to 72 months. The graph gives the out of sample average retuns using the estimated wieghts over the study period at each of the 100 returns points. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to the book to market equity. Small growth is the joint stocks of the small and growth stocks. etc.

Panel A: Period from July 1972 to June 2011



Cont. Figure 7-2

Panel B: Period from July 1972 to June 1992



Cont. Figure 7-2

Panel C: Period from July 1992 to June 2011

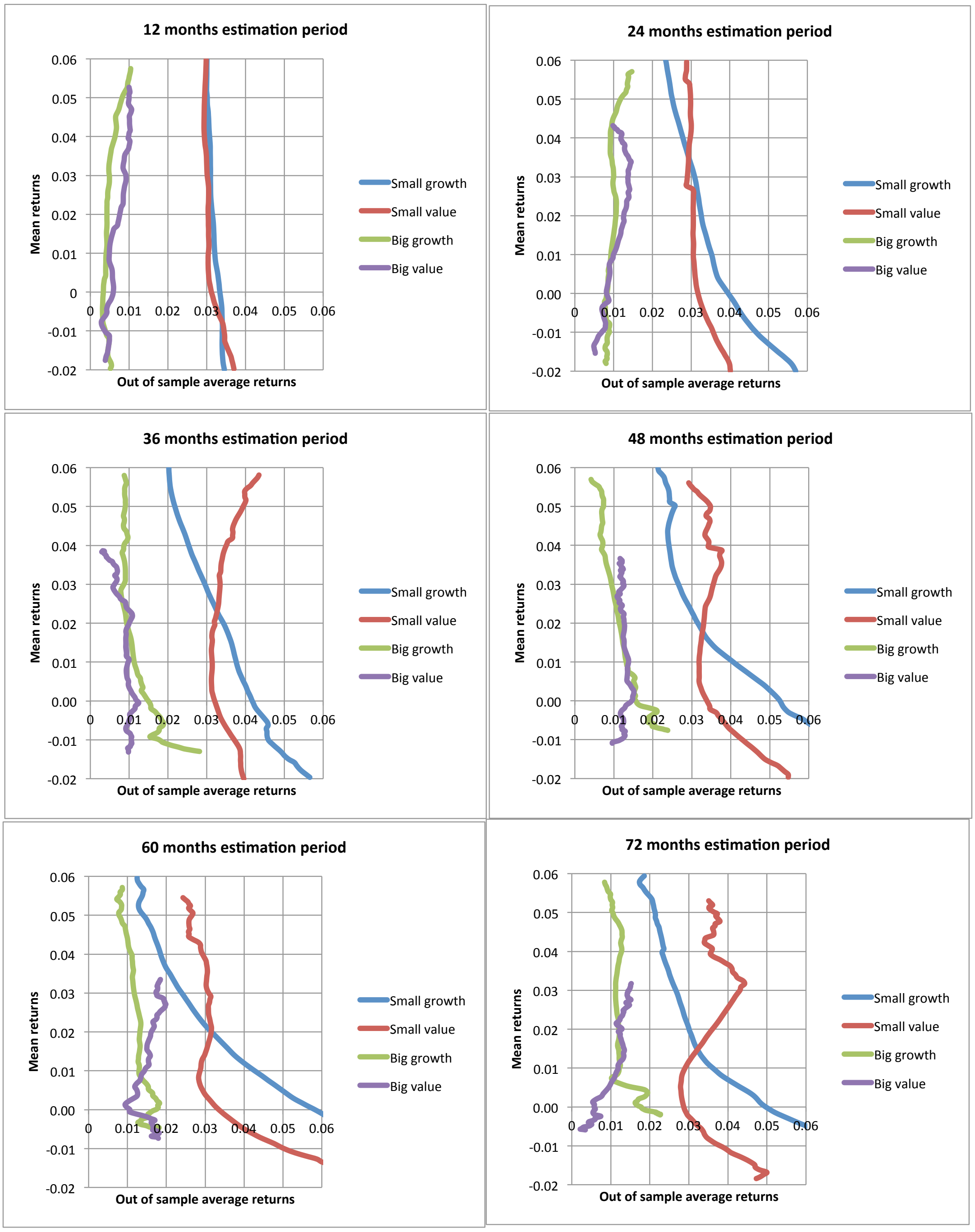


Table 7-1 Naive versus optimized out of ample portfolios' returns: Size and book to market equity.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. The equal w., the equal weighted portfolio, is the portfolio that uses all available stocks to for the portfolio. The max n, the maximum number of stocks portfolio, is the portfolio that has the maximum number of stocks among the portfolios produced by the minimum variance model. The min var., the minimum variance portfolio, is the portfolio that has mimimum variance among all the portfolios produced bt the model. The out of sample average returns of a portfolio is the average of the monthly returnes of this portfolio over the study period. The out of sample wealth is the end of period balance of investing 1 pound in a portfolio compounded using monthly returns.

Panel 1: Estimation period w = 12: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0203	0.0200	0.0205	0.844	0.916	0.771	4870	2276	2790	100	86	66
	72/92	0.0186	0.0171	0.0201	0.331	0.541	0.221	48	28	53	100	90	65
	92/11	0.0221	0.0231	0.0210	0.746	0.728	0.454	101	82	53	100	82	66
Big	72/11	0.0100	0.0087	0.0105	0.175	0.748	0.243	58	22	61	100	94	65
	72/92	0.0102	0.0089	0.0116	0.078	0.379	0.131	8	6	12	100	97	61
	92/11	0.0099	0.0084	0.0092	0.438	0.751	0.749	7	4	5	100	91	69
Value	72/11	0.0207	0.0224	0.0242	0.301	0.084	0.318	6588	8522	16524	100	88	70
	72/92	0.0189	0.0187	0.0220	0.945	0.296	0.203	56	40	82	100	91	69
	92/11	0.0226	0.0263	0.0265	0.080	0.155	0.919	117	211	203	100	84	71
Growth	72/11	0.0179	0.0213	0.0235	0.043	0.008	0.251	1599	4215	10532	100	86	67
	72/92	0.0142	0.0139	0.0141	0.874	0.977	0.943	17	14	14	100	90	68
	92/11	0.0218	0.0290	0.0335	0.020	0.001	0.175	96	298	749	100	82	65
Small value	72/11	0.0222	0.0249	0.0281	0.059	0.005	0.127	12337	26611	97074	100	86	66
	72/92	0.0206	0.0196	0.0255	0.519	0.098	0.040	79	54	185	100	90	65
	92/11	0.0238	0.0305	0.0308	0.009	0.020	0.914	155	495	525	100	82	67
Small growth	72/11	0.0208	0.0233	0.0265	0.260	0.027	0.153	3259	4801	18219	97	82	64
	72/92	0.0172	0.0160	0.0208	0.468	0.230	0.095	27	18	49	94	83	61
	92/11	0.0247	0.0309	0.0325	0.128	0.062	0.656	122	267	370	100	82	67
Big value	72/11	0.0122	0.0105	0.0081	0.095	0.008	0.157	161	58	20	33	31	22
	72/92	0.0134	0.0122	0.0121	0.440	0.489	0.943	18	12	12	23	22	14
	92/11	0.0110	0.0087	0.0039	0.108	0.005	0.076	9	5	2	45	41	30
Big growth	72/11	0.0092	0.0066	0.0088	0.016	0.791	0.107	32	7	19	84	78	58
	72/92	0.0095	0.0071	0.0115	0.015	0.243	0.026	6	4	10	70	68	46
	92/11	0.0088	0.0062	0.0060	0.158	0.183	0.893	5	2	2	97	88	71

Panel 2: Estimation period w = 24: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0188	0.0232	0.0262	0.007	0.006	0.260	2476	9953	30134	100	93	72
	72/92	0.0176	0.0198	0.0222	0.175	0.050	0.326	38	51	89	100	96	71
	92/11	0.0201	0.0267	0.0306	0.020	0.038	0.446	66	194	340	100	90	73
Big	72/11	0.0106	0.0103	0.0117	0.726	0.223	0.211	77	53	118	100	98	75
	72/92	0.0100	0.0095	0.0115	0.477	0.246	0.207	8	7	11	100	99	73
	92/11	0.0112	0.0111	0.0120	0.955	0.562	0.596	9	8	11	100	97	77
Value	72/11	0.0207	0.0225	0.0245	0.133	0.026	0.168	6285	9332	21402	100	95	76
	72/92	0.0185	0.0176	0.0197	0.423	0.509	0.221	51	36	57	100	97	75
	92/11	0.0229	0.0276	0.0296	0.035	0.027	0.413	124	260	379	100	92	78
Growth	72/11	0.0142	0.0138	0.0180	0.694	0.055	0.033	241	120	734	100	96	73
	72/92	0.0122	0.0104	0.0159	0.073	0.130	0.029	10	6	20	100	98	75
	92/11	0.0164	0.0174	0.0202	0.633	0.217	0.360	24	20	36	100	93	72
Small value	72/11	0.0235	0.0266	0.0286	0.058	0.008	0.255	22019	56281	145508	100	94	75
	72/92	0.0209	0.0215	0.0223	0.804	0.521	0.757	84	76	109	99	96	74
	92/11	0.0261	0.0320	0.0352	0.014	0.005	0.152	263	738	1339	100	92	75
Small growth	72/11	0.0201	0.0229	0.0297	0.117	0.001	0.005	2441	4458	69506	95	88	63
	72/92	0.0151	0.0153	0.0207	0.856	0.047	0.058	17	16	47	91	87	61
	92/11	0.0253	0.0309	0.0391	0.113	0.008	0.041	145	281	1486	99	89	65
Big value	72/11	0.0123	0.0130	0.0102	0.468	0.066	0.058	167	193	56	32	32	26
	72/92	0.0131	0.0138	0.0099	0.692	0.055	0.099	17	18	7	22	22	15
	92/11	0.0115	0.0123	0.0105	0.497	0.536	0.336	10	11	8	43	42	38
Big growth	72/11	0.0095	0.0086	0.0107	0.343	0.335	0.131	40	18	56	83	81	62
	72/92	0.0095	0.0078	0.0107	0.046	0.424	0.108	7	4	9	70	69	50
	92/11	0.0096	0.0095	0.0107	0.933	0.566	0.565	6	4	7	97	94	75

Cont. table 7-1

Panel 3: Estimation period w = 36: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0202	0.0223	0.0269	0.120	0.002	0.029	4695	7676	50655	100	96	77
	72/92	0.0196	0.0202	0.0226	0.720	0.186	0.358	58	54	89	100	98	77
	92/11	0.0209	0.0245	0.0315	0.061	0.003	0.040	81	143	571	100	94	77
Big	72/11	0.0112	0.0108	0.0106	0.585	0.602	0.912	102	67	73	100	99	80
	72/92	0.0113	0.0108	0.0113	0.461	0.931	0.653	11	9	11	100	100	80
	92/11	0.0111	0.0107	0.0099	0.787	0.506	0.732	9	7	7	100	98	80
Value	72/11	0.0213	0.0232	0.0240	0.077	0.073	0.626	8663	13808	19912	100	97	81
	72/92	0.0208	0.0221	0.0193	0.227	0.397	0.148	86	99	55	100	99	79
	92/11	0.0219	0.0244	0.0289	0.184	0.004	0.050	100	140	359	100	96	82
Growth	72/11	0.0131	0.0136	0.0182	0.688	0.002	0.010	152	104	1065	100	98	76
	72/92	0.0098	0.0094	0.0107	0.768	0.611	0.491	6	5	6	100	99	75
	92/11	0.0165	0.0180	0.0261	0.540	0.001	0.009	25	23	164	100	96	76
Small value	72/11	0.0233	0.0266	0.0301	0.005	0.000	0.034	20050	56236	260742	100	97	79
	72/92	0.0211	0.0207	0.0246	0.710	0.133	0.111	88	68	170	99	98	76
	92/11	0.0257	0.0327	0.0358	0.001	0.000	0.162	228	822	1536	100	95	82
Small growth	72/11	0.0184	0.0212	0.0278	0.061	0.000	0.011	1128	2139	29353	93	89	65
	72/92	0.0132	0.0129	0.0194	0.841	0.040	0.040	10	8	31	87	85	65
	92/11	0.0239	0.0300	0.0366	0.021	0.002	0.113	108	264	943	99	93	66
Big value	72/11	0.0120	0.0153	0.0088	0.017	0.004	0.001	147	461	28	31	31	27
	72/92	0.0130	0.0148	0.0119	0.274	0.407	0.204	16	22	12	22	22	17
	92/11	0.0110	0.0159	0.0055	0.030	0.003	0.001	9	21	2	42	41	38
Big growth	72/11	0.0097	0.0091	0.0111	0.514	0.292	0.200	43	22	70	82	81	60
	72/92	0.0098	0.0085	0.0085	0.081	0.486	0.991	7	5	5	68	68	51
	92/11	0.0097	0.0097	0.0138	0.978	0.034	0.104	6	4	14	97	95	69

Panel 4: Estimation period w = 48: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0202	0.0247	0.0253	0.003	0.005	0.762	4634	20064	27731	100	97	79
	72/92	0.0187	0.0199	0.0234	0.464	0.053	0.216	48	51	122	100	99	81
	92/11	0.0218	0.0298	0.0273	0.002	0.041	0.390	97	396	228	100	95	77
Big	72/11	0.0103	0.0108	0.0108	0.418	0.624	0.990	69	72	78	100	100	77
	72/92	0.0106	0.0103	0.0097	0.422	0.383	0.611	10	8	7	100	100	79
	92/11	0.0100	0.0114	0.0119	0.204	0.204	0.750	7	9	11	100	99	76
Value	72/11	0.0201	0.0229	0.0249	0.007	0.001	0.164	4733	11450	31051	100	98	80
	72/92	0.0201	0.0213	0.0226	0.343	0.203	0.541	72	78	115	100	100	80
	92/11	0.0200	0.0245	0.0274	0.007	0.002	0.174	66	147	271	100	97	80
Growth	72/11	0.0132	0.0157	0.0193	0.058	0.011	0.147	176	305	1555	100	98	75
	72/92	0.0121	0.0127	0.0139	0.486	0.437	0.653	11	11	15	100	100	76
	92/11	0.0145	0.0187	0.0250	0.078	0.012	0.155	17	28	104	100	97	75
Small value	72/11	0.0227	0.0269	0.0264	0.003	0.031	0.789	15781	64241	60229	99	97	78
	72/92	0.0218	0.0220	0.0241	0.842	0.309	0.405	105	95	169	98	98	78
	92/11	0.0237	0.0321	0.0288	0.002	0.046	0.310	150	673	356	100	96	79
Small growth	72/11	0.0200	0.0229	0.0288	0.051	0.000	0.013	2269	4156	49872	90	88	66
	72/92	0.0153	0.0172	0.0157	0.216	0.874	0.548	17	21	15	82	81	67
	92/11	0.0249	0.0289	0.0426	0.127	0.000	0.001	136	201	3277	98	94	64
Big value	72/11	0.0120	0.0141	0.0115	0.152	0.724	0.089	143	254	72	31	31	27
	72/92	0.0127	0.0123	0.0116	0.819	0.467	0.737	15	13	11	21	21	18
	92/11	0.0114	0.0160	0.0113	0.066	0.986	0.034	10	20	7	41	41	37
Big growth	72/11	0.0096	0.0094	0.0122	0.754	0.051	0.064	43	29	125	82	81	55
	72/92	0.0096	0.0085	0.0121	0.042	0.146	0.038	7	5	12	67	67	50
	92/11	0.0097	0.0103	0.0122	0.672	0.190	0.442	6	6	11	97	96	61

Cont. table 7-1

Panel 5: Estimation period w = 60: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0210	0.0215	0.0270	0.729	0.002	0.007	6976	5112	58642	100	98	79
	72/92	0.0202	0.0192	0.0222	0.480	0.431	0.281	68	46	88	100	100	82
	92/11	0.0220	0.0239	0.0320	0.396	0.001	0.006	103	111	667	100	97	75
Big	72/11	0.0108	0.0110	0.0126	0.710	0.033	0.092	87	80	175	100	100	81
	72/92	0.0108	0.0104	0.0118	0.413	0.335	0.193	10	9	12	100	100	82
	92/11	0.0109	0.0117	0.0134	0.447	0.043	0.261	9	9	14	100	99	79
Value	72/11	0.0204	0.0236	0.0256	0.001	0.004	0.259	5758	17115	40206	100	99	82
	72/92	0.0193	0.0204	0.0221	0.222	0.196	0.475	61	70	109	100	99	81
	92/11	0.0216	0.0269	0.0294	0.001	0.009	0.383	95	246	368	100	98	83
Growth	72/11	0.0195	0.0213	0.0248	0.151	0.007	0.077	3433	4769	20290	100	98	79
	72/92	0.0181	0.0184	0.0194	0.767	0.568	0.659	43	39	47	100	100	82
	92/11	0.0209	0.0243	0.0306	0.151	0.004	0.066	80	122	431	100	97	76
Small value	72/11	0.0224	0.0244	0.0247	0.049	0.113	0.853	13302	23077	27804	98	97	80
	72/92	0.0206	0.0208	0.0194	0.834	0.533	0.516	77	71	53	96	96	79
	92/11	0.0243	0.0283	0.0304	0.036	0.005	0.396	172	326	524	100	97	81
Small growth	72/11	0.0200	0.0230	0.0318	0.034	0.000	0.004	2399	4678	142096	86	84	64
	72/92	0.0157	0.0171	0.0155	0.335	0.932	0.639	19	21	13	75	74	66
	92/11	0.0246	0.0292	0.0489	0.058	0.000	0.000	129	225	11174	98	95	63
Big value	72/11	0.0126	0.0152	0.0109	0.292	0.111	0.145	187	323	72	30	30	27
	72/92	0.0130	0.0119	0.0112	0.457	0.218	0.730	16	12	10	21	21	18
	92/11	0.0122	0.0186	0.0106	0.184	0.305	0.153	12	28	7	39	39	36
Big growth	72/11	0.0098	0.0092	0.0119	0.369	0.069	0.054	47	28	122	81	81	54
	72/92	0.0098	0.0088	0.0110	0.059	0.433	0.172	7	5	9	66	66	49
	92/11	0.0098	0.0096	0.0128	0.862	0.074	0.166	7	5	13	97	96	60

Panel 6: Estimation period w = 60: All available stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Value	72/11	0.0204	0.0220	0.0231	0.005	0.008	0.236	6003	9722	16675	520	514	424
	72/92	0.0195	0.0194	0.0188	0.870	0.471	0.614	66	58	56	392	391	331
	92/11	0.0213	0.0246	0.0275	0.000	0.000	0.042	91	169	300	655	643	522
Growth	72/11	0.0128	0.0130	0.0160	0.785	0.006	0.023	153	123	618	478	472	356
	72/92	0.0108	0.0104	0.0101	0.552	0.699	0.862	8	7	7	323	323	238
	92/11	0.0149	0.0157	0.0223	0.541	0.000	0.000	19	18	92	641	629	481
Small value	72/11	0.0227	0.0246	0.0260	0.004	0.006	0.244	15593	28675	56240	321	316	248
	72/92	0.0210	0.0208	0.0198	0.750	0.472	0.593	87	73	63	247	247	205
	92/11	0.0244	0.0286	0.0325	0.000	0.000	0.017	180	393	899	399	389	292
Small growth	72/11	0.0204	0.0228	0.0297	0.044	0.001	0.018	2883	4783	62555	110	108	81
	72/92	0.0160	0.0180	0.0150	0.129	0.749	0.392	20	26	11	86	85	73
	92/11	0.0250	0.0278	0.0451	0.162	0.000	0.000	145	183	5573	136	132	89
Big value	72/11	0.0099	0.0095	0.0118	0.442	0.103	0.102	51	35	124	122	121	83
	72/92	0.0098	0.0088	0.0107	0.068	0.574	0.255	7	5	9	71	71	55
	92/11	0.0101	0.0102	0.0129	0.872	0.083	0.234	7	6	14	175	174	111
S&P 500	72/11	0.0118	0.0121	0.0121	0.375	0.723	0.936	131	136	137	410	408	359
	72/92	0.0128	0.0125	0.0124	0.489	0.658	0.880	15	13	13	384	384	328
	92/11	0.0108	0.0117	0.0117	0.106	0.302	0.943	9	10	10	437	435	392
NYSE	72/11	0.0118	0.0125	0.0110	0.178	0.277	0.038	132	146	83	1613	1605	1380
	72/92	0.0128	0.0127	0.0117	0.809	0.268	0.394	14	13	11	1325	1324	1066
	92/11	0.0108	0.0122	0.0104	0.094	0.668	0.009	9	11	7	1917	1901	1711

Cont. table 7-1

Panel 7: Estimation period w = 72: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Small	72/11	0.0200	0.0223	0.0225	0.092	0.160	0.885	4352	7293	7919	100	99	81
	72/92	0.0184	0.0179	0.0169	0.553	0.416	0.579	44	36	28	100	100	83
	92/11	0.0218	0.0268	0.0284	0.053	0.035	0.629	98	204	284	100	97	78
Big	72/11	0.0103	0.0104	0.0123	0.849	0.037	0.042	70	62	150	100	100	79
	72/92	0.0101	0.0095	0.0106	0.215	0.654	0.316	8	7	9	100	100	83
	92/11	0.0105	0.0114	0.0142	0.421	0.023	0.075	8	9	17	100	100	75
Value	72/11	0.0205	0.0232	0.0240	0.002	0.023	0.613	6225	15370	23698	99	98	83
	72/92	0.0197	0.0200	0.0203	0.792	0.817	0.909	70	64	73	98	98	81
	92/11	0.0213	0.0266	0.0280	0.000	0.001	0.484	89	240	323	100	98	84
Growth	72/11	0.0121	0.0120	0.0128	0.938	0.644	0.640	111	71	115	100	99	80
	72/92	0.0100	0.0110	0.0095	0.328	0.752	0.391	7	7	5	100	100	81
	92/11	0.0142	0.0131	0.0162	0.509	0.430	0.268	16	10	21	100	98	78
Small value	72/11	0.0225	0.0261	0.0252	0.000	0.030	0.540	13423	51025	34422	97	96	81
	72/92	0.0211	0.0219	0.0227	0.401	0.273	0.542	89	93	116	94	94	79
	92/11	0.0239	0.0305	0.0279	0.000	0.060	0.274	151	547	296	100	98	83
Small growth	72/11	0.0194	0.0229	0.0250	0.009	0.030	0.477	1903	5076	13126	80	79	61
	72/92	0.0145	0.0166	0.0142	0.162	0.932	0.499	14	18	11	64	64	57
	92/11	0.0247	0.0296	0.0363	0.027	0.006	0.145	140	285	1178	96	94	66
Big value	72/11	0.0120	0.0133	0.0108	0.148	0.230	0.041	145	224	73	29	29	26
	72/92	0.0130	0.0135	0.0118	0.703	0.380	0.405	16	17	12	20	20	19
	92/11	0.0109	0.0131	0.0098	0.081	0.416	0.008	9	13	6	38	38	35
Big growth	72/11	0.0098	0.0095	0.0118	0.622	0.099	0.127	48	33	122	80	80	52
	72/92	0.0100	0.0088	0.0118	0.025	0.191	0.041	7	5	11	65	65	48
	92/11	0.0097	0.0102	0.0119	0.665	0.271	0.537	7	6	11	96	96	56

Table 7-2 Naive versus optimized out of sample portfolios' Sharp ratios: Size and book to market.

Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. The equal w., the equal weighted portfolio, is the portfolio that uses all available stocks to for the portfolio. The max n, the maximum number of stocks portfolio, is the portfolio that has the maximum number of stocks among the portfolios produced by the minimum variance model. The min var., the minimum variance portfolio, is the portfolio that has mimimum variance among all the portfolios produced bt the model. Sharp ratio, the out of sample Sharp ratio, is the average of the monthly returns of a portfolio divided by their variance.

Panel 1: Estimation period w = 12: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Small	72/11	0.317	0.238	0.241	3.97	3.10	-0.12
	72/92	0.269	0.213	0.239	2.74	1.00	-0.84
	92/11	0.380	0.264	0.243	3.45	3.50	0.63
Big	72/11	0.195	0.136	0.183	3.98	0.48	-1.88
	72/92	0.203	0.166	0.227	2.59	-0.70	-1.73
	92/11	0.186	0.115	0.146	3.08	1.12	-0.86
Value	72/11	0.352	0.286	0.294	3.05	2.25	-0.36
	72/92	0.300	0.223	0.254	2.48	1.26	-1.00
	92/11	0.420	0.367	0.341	1.71	2.06	0.72
Growth	72/11	0.286	0.261	0.275	1.18	0.42	-0.59
	72/92	0.208	0.189	0.183	0.94	0.80	0.19
	92/11	0.389	0.328	0.360	1.76	0.72	-0.81
Small value	72/11	0.363	0.321	0.340	2.14	0.83	-0.72
	72/92	0.307	0.255	0.295	2.59	0.33	-1.11
	92/11	0.438	0.391	0.391	1.40	1.12	-0.01
Small growth	72/11	0.250	0.224	0.247	1.19	0.12	-1.08
	72/92	0.209	0.181	0.219	1.39	-0.29	-1.16
	92/11	0.293	0.263	0.274	0.81	0.51	-0.35
Big value	72/11	0.239	0.176	0.139	3.47	3.46	1.26
	72/92	0.259	0.207	0.210	2.00	1.44	-0.08
	92/11	0.216	0.143	0.067	2.85	3.22	1.68
Big growth	72/11	0.156	0.096	0.127	4.15	1.41	-1.65
	72/92	0.163	0.119	0.190	2.49	-0.90	-2.10
	92/11	0.149	0.079	0.077	3.40	2.60	0.05

Panel 2: Estimation period w = 24: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Small	72/11	0.297	0.281	0.277	0.84	0.65	0.12
	72/92	0.253	0.243	0.270	0.50	-0.59	-0.88
	92/11	0.358	0.319	0.286	1.15	1.41	0.62
Big	72/11	0.213	0.175	0.215	3.38	-0.09	-2.05
	72/92	0.202	0.178	0.215	1.89	-0.51	-1.23
	92/11	0.225	0.172	0.215	2.89	0.37	-1.50
Value	72/11	0.343	0.301	0.314	2.66	1.23	-0.76
	72/92	0.290	0.243	0.263	3.02	1.06	-0.81
	92/11	0.409	0.359	0.366	1.76	1.07	-0.21
Growth	72/11	0.204	0.164	0.205	3.14	-0.03	-1.79
	72/92	0.173	0.136	0.197	2.56	-0.75	-1.85
	92/11	0.237	0.190	0.212	2.40	0.76	-0.67
Small value	72/11	0.381	0.331	0.367	2.28	0.52	-1.71
	72/92	0.305	0.252	0.307	1.89	-0.04	-1.65
	92/11	0.489	0.430	0.425	1.72	1.54	0.17
Small growth	72/11	0.246	0.225	0.263	1.20	-0.61	-1.74
	72/92	0.188	0.177	0.213	0.76	-0.85	-1.16
	92/11	0.307	0.268	0.308	1.32	-0.01	-1.18
Big value	72/11	0.239	0.221	0.183	1.02	2.55	1.49
	72/92	0.254	0.231	0.171	0.84	2.69	1.49
	92/11	0.223	0.211	0.197	0.56	0.82	0.40
Big growth	72/11	0.168	0.123	0.167	3.53	0.06	-2.15
	72/92	0.165	0.127	0.180	2.60	-0.52	-1.71
	92/11	0.170	0.122	0.155	2.74	0.55	-1.20

Cont. table 7-2

Panel 3: Estimation period w = 36: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Small	72/11	0.320	0.280	0.312	2.35	0.29	-1.30
	72/92	0.274	0.234	0.255	1.79	0.69	-0.71
	92/11	0.392	0.342	0.376	1.89	0.34	-0.75
Big	72/11	0.225	0.181	0.200	4.10	1.21	-0.87
	72/92	0.228	0.202	0.217	2.24	0.52	-0.65
	92/11	0.222	0.164	0.183	3.41	1.09	-0.50
Value	72/11	0.356	0.315	0.326	2.89	1.37	-0.60
	72/92	0.322	0.291	0.271	2.21	1.90	0.72
	92/11	0.398	0.341	0.382	2.17	0.51	-1.23
Growth	72/11	0.194	0.158	0.225	2.57	-1.45	-3.17
	72/92	0.145	0.120	0.141	1.63	0.14	-0.86
	92/11	0.247	0.193	0.306	2.35	-1.69	-3.16
Small value	72/11	0.372	0.343	0.375	2.05	-0.12	-1.63
	72/92	0.310	0.268	0.310	3.06	0.02	-1.26
	92/11	0.454	0.424	0.444	1.18	0.34	-0.64
Small growth	72/11	0.227	0.215	0.254	0.81	-1.16	-1.64
	72/92	0.162	0.142	0.190	1.17	-0.91	-1.46
	92/11	0.296	0.283	0.317	0.55	-0.56	-0.88
Big value	72/11	0.233	0.230	0.153	0.16	3.87	2.60
	72/92	0.252	0.243	0.215	0.34	1.47	0.72
	92/11	0.213	0.220	0.093	-0.23	3.63	2.73
Big growth	72/11	0.169	0.130	0.176	3.38	-0.30	-2.02
	72/92	0.170	0.141	0.140	2.26	1.00	0.05
	92/11	0.168	0.123	0.212	2.80	-1.38	-2.64

Panel 4: Estimation period w = 48: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Small	72/11	0.317	0.295	0.310	1.26	0.29	-0.63
	72/92	0.266	0.233	0.287	1.72	-0.63	-1.50
	92/11	0.387	0.363	0.334	0.79	1.59	0.78
Big	72/11	0.209	0.190	0.201	1.98	0.43	-0.61
	72/92	0.216	0.196	0.186	1.86	1.31	0.43
	92/11	0.202	0.186	0.216	1.04	-0.48	-0.97
Value	72/11	0.331	0.305	0.340	2.05	-0.36	-1.84
	72/92	0.303	0.270	0.307	2.27	-0.14	-1.31
	92/11	0.373	0.348	0.374	1.10	-0.03	-0.81
Growth	72/11	0.204	0.190	0.225	0.97	-0.71	-1.16
	72/92	0.182	0.173	0.192	0.67	-0.28	-0.53
	92/11	0.227	0.207	0.255	0.90	-0.62	-1.01
Small value	72/11	0.371	0.337	0.359	2.00	0.46	-0.84
	72/92	0.325	0.289	0.335	2.81	-0.31	-1.29
	92/11	0.434	0.384	0.382	1.66	1.41	0.05
Small growth	72/11	0.243	0.225	0.268	1.25	-1.08	-1.93
	72/92	0.182	0.178	0.168	0.23	0.52	0.38
	92/11	0.310	0.271	0.357	1.71	-1.33	-2.35
Big value	72/11	0.230	0.206	0.165	1.09	2.55	1.82
	72/92	0.245	0.207	0.200	1.44	1.62	0.16
	92/11	0.213	0.209	0.142	0.14	1.81	2.27
Big growth	72/11	0.173	0.142	0.201	2.75	-1.24	-2.52
	72/92	0.168	0.142	0.199	2.35	-1.06	-1.92
	92/11	0.179	0.143	0.202	2.11	-0.68	-1.63

Cont. table 7-2

Panel 5: Estimation period w = 60: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Small	72/11	0.334	0.268	0.329	4.13	0.20	-2.48
	72/92	0.288	0.238	0.267	2.90	0.66	-0.82
	92/11	0.404	0.300	0.396	3.89	0.19	-2.46
Big	72/11	0.219	0.194	0.230	2.65	-0.66	-2.19
	72/92	0.218	0.199	0.218	1.84	-0.02	-0.87
	92/11	0.222	0.192	0.240	2.03	-0.76	-1.80
Value	72/11	0.346	0.330	0.338	1.29	0.29	-0.33
	72/92	0.302	0.284	0.318	1.40	-0.46	-0.95
	92/11	0.403	0.379	0.360	1.22	1.17	0.49
Growth	72/11	0.315	0.272	0.295	2.81	0.78	-0.98
	72/92	0.265	0.236	0.239	2.28	0.89	-0.10
	92/11	0.384	0.308	0.354	2.65	0.75	-1.06
Small value	72/11	0.359	0.324	0.333	2.61	1.17	-0.46
	72/92	0.297	0.269	0.258	2.33	1.36	0.34
	92/11	0.447	0.387	0.418	2.38	0.92	-0.82
Small growth	72/11	0.245	0.231	0.279	1.13	-1.20	-1.74
	72/92	0.188	0.181	0.163	0.45	0.73	0.49
	92/11	0.310	0.279	0.379	1.52	-1.66	-2.33
Big value	72/11	0.241	0.183	0.185	1.88	2.98	-0.05
	72/92	0.250	0.203	0.197	1.85	2.03	0.19
	92/11	0.230	0.181	0.173	1.04	2.11	0.13
Big growth	72/11	0.179	0.145	0.214	3.32	-1.68	-3.06
	72/92	0.171	0.148	0.192	2.17	-0.73	-1.52
	92/11	0.187	0.141	0.238	2.94	-1.57	-2.68

Panel 6: Estimation period w = 60: All available stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Value	72/11	0.357	0.333	0.354	3.30	0.17	-1.96
	72/92	0.311	0.278	0.301	3.74	0.58	-1.24
	92/11	0.419	0.396	0.405	1.70	0.55	-0.35
Growth	72/11	0.204	0.179	0.240	2.97	-1.95	-3.29
	72/92	0.168	0.152	0.155	1.58	0.46	-0.1
	92/11	0.244	0.205	0.331	3.11	-3.62	-4.78
Small value	72/11	0.373	0.350	0.375	2.70	-0.06	-1.67
	72/92	0.308	0.276	0.281	3.23	1.07	-0.21
	92/11	0.468	0.444	0.479	1.55	-0.38	-1.27
Small growth	72/11	0.252	0.235	0.269	1.52	-0.62	-1.23
	72/92	0.192	0.191	0.157	0.04	1.00	0.90
	92/11	0.320	0.278	0.367	2.36	-1.24	-2.14
Big value	72/11	0.180	0.154	0.220	3.00	-1.92	-2.86
	72/92	0.171	0.148	0.187	2.16	-0.55	-1.36
	92/11	0.191	0.159	0.261	2.47	-2.13	-2.69
S&P 500	72/11	0.229	0.217	0.223	1.91	0.43	-0.52
	72/92	0.233	0.217	0.225	1.79	0.41	-0.38
	92/11	0.225	0.217	0.219	0.84	0.36	-0.10
NYSE	72/11	0.230	0.211	0.199	2.86	2.32	1.19
	72/92	0.226	0.206	0.215	2.36	0.59	-0.44
	92/11	0.238	0.216	0.182	2.11	3.57	2.33

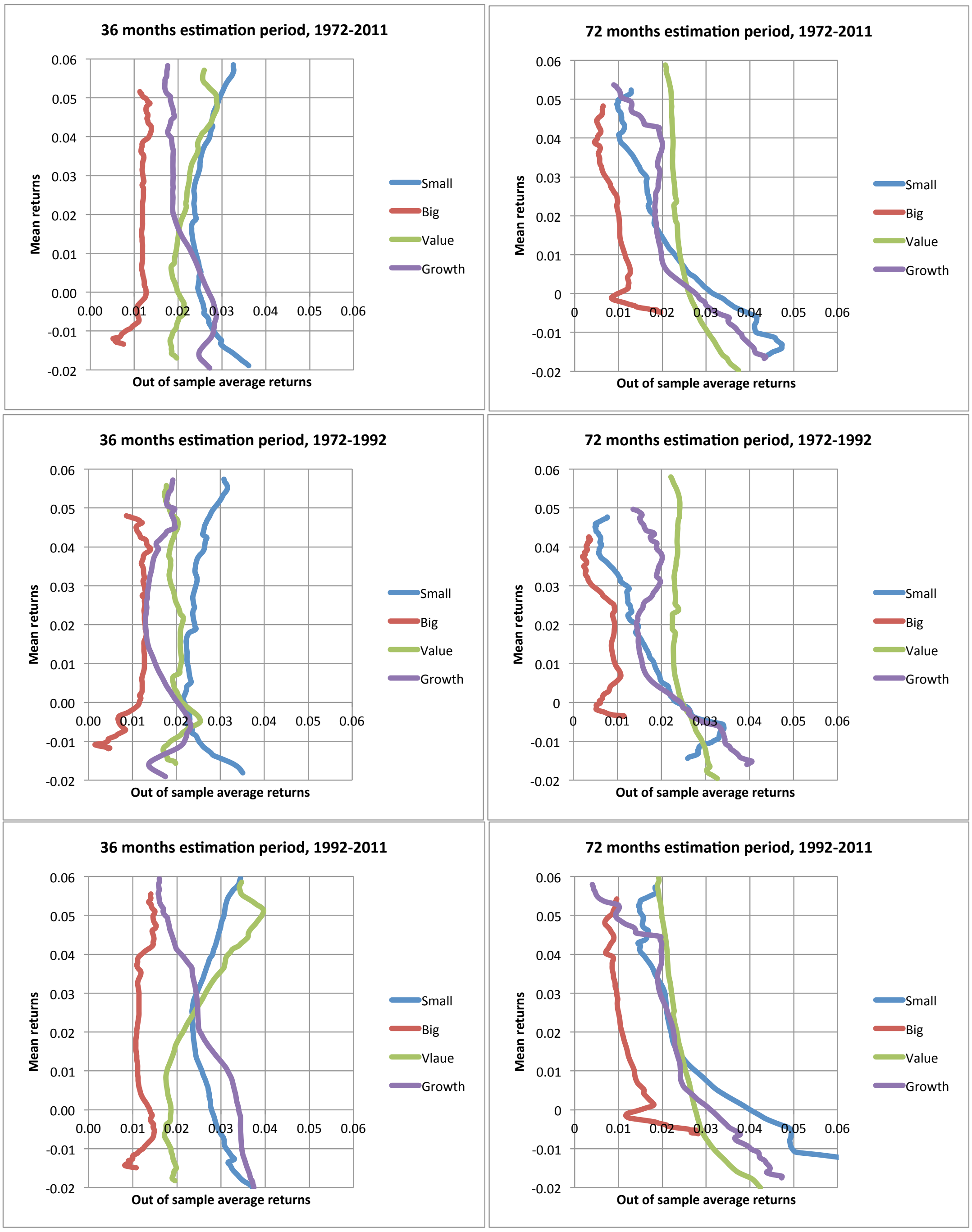
Cont. table 7-2

Panel 7: Estimation period w = 72: Sample size n = 100 stocks

Portfolio	Period	Sharp ratio Equal w.	Max n	Min var.	Test Sharp ratio Equal/Max	Equal/Min	Max/Min
Small	72/11	0.318	0.279	0.278	2.43	1.75	0.06
	72/92	0.263	0.234	0.219	2.76	1.80	0.61
	92/11	0.396	0.323	0.335	2.50	1.59	-0.29
Big	72/11	0.211	0.187	0.217	2.66	-0.35	-1.89
	72/92	0.205	0.183	0.197	2.08	0.35	-0.65
	92/11	0.217	0.190	0.236	1.84	-0.72	-1.68
Value	72/11	0.353	0.331	0.352	1.91	0.05	-0.95
	72/92	0.318	0.279	0.303	2.85	0.38	-0.63
	92/11	0.398	0.388	0.402	0.45	-0.16	-0.44
Growth	72/11	0.193	0.159	0.178	2.87	0.71	-0.86
	72/92	0.157	0.153	0.136	0.33	0.83	0.66
	92/11	0.233	0.165	0.219	3.43	0.36	-1.45
Small value	72/11	0.357	0.355	0.341	0.17	0.88	0.88
	72/92	0.311	0.291	0.308	1.65	0.17	-0.81
	92/11	0.417	0.427	0.376	-0.45	1.35	1.43
Small growth	72/11	0.243	0.236	0.263	0.55	-0.71	-0.92
	72/92	0.173	0.172	0.160	0.06	0.38	0.31
	92/11	0.323	0.301	0.363	1.03	-0.85	-1.26
Big value	72/11	0.237	0.228	0.190	0.58	2.77	1.88
	72/92	0.250	0.230	0.211	0.82	1.50	0.51
	92/11	0.222	0.225	0.167	-0.10	2.43	2.53
Big growth	72/11	0.179	0.151	0.213	2.64	-1.53	-2.44
	72/92	0.174	0.150	0.209	2.21	-1.40	-2.26
	92/11	0.184	0.152	0.218	1.99	-0.86	-1.47

Figure 7-3 OIn sample versus out of sample average portfolios' returns: Earnings to price results.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (Small, growth, ...) . I form a minmum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. This technique depends on choosing the wieghts of the stocks of a portfolio that minimize the portfolio's variance under a predetermined portfolio's return. The variances of the stocks are estimated over different periods of 36 and 72 months. The graph gives the out of sample average retuns using the estimated wieghts over the study period at each of the 100 returns points. The small (big) is the first (last) quintile stocks of the stocks arranged according to the market equity. The growth (value) is the first (last) quintile stocks of the stocks arranged according to earnings to price. Small growth is the joint stocks of the small and growth stocks. etc.

Panel A: One way classification



Cont. Figure 7-3

Panel B: Two way classification

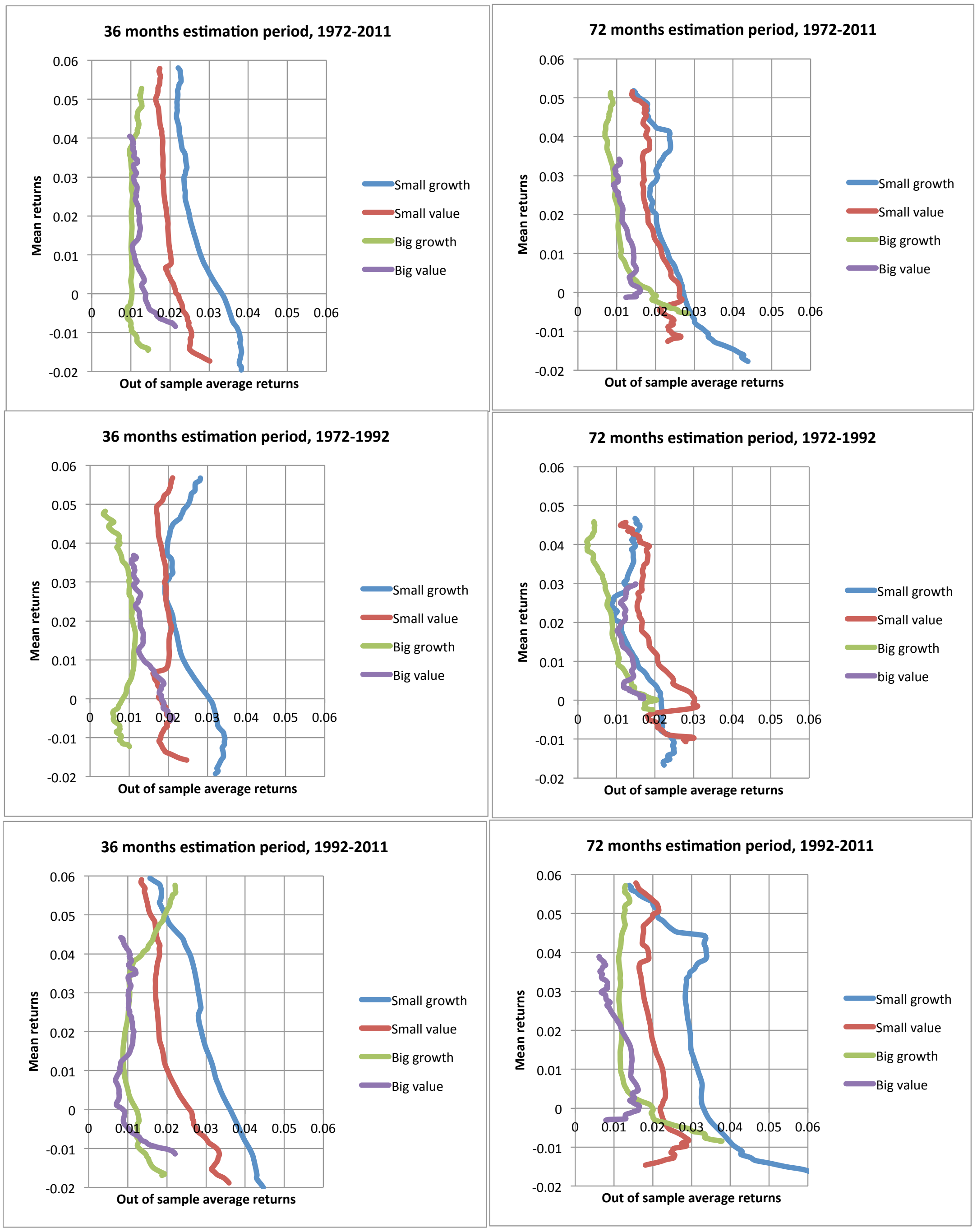


Table 7-1 Naive versus optimized out of ample portfolios' returns: Earnings to price.
Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. The equal w., the equal weighted portfolio, is the portfolio that uses all available stocks to for the portfolio. The max n, the maximum number of stocks portfolio, is the portfolio that has the maximum number of stocks among the portfolios produced by the minimum variance model. The min var., the minimum variance portfolio, is the portfolio that has mimimum variance among all the portfolios produced bt the model. The out of sample average returns of a portfolio is the average of the monthly retunes of this portfolio over the study period. The out of sample wealth is the end of period balance of investing 1 pound in a portfolio compounded using monthly returns.

Panel A: Estimation period w = 36: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Value	72/11	0.0179	0.0195	0.0175	0.062	0.699	0.081	2091	3237	1319	100	98	78
	72/92	0.0177	0.0181	0.0161	0.642	0.313	0.223	46	45	28	99	98	76
	92/11	0.0182	0.0210	0.0190	0.058	0.593	0.214	45	72	47	100	97	81
Growth	72/11	0.0176	0.0209	0.0241	0.053	0.006	0.171	1073	2315	8950	100	97	74
	72/92	0.0148	0.0152	0.0169	0.705	0.376	0.501	18	17	25	100	99	74
	92/11	0.0205	0.0268	0.0317	0.052	0.008	0.234	59	135	358	100	96	74
Small value	72/11	0.0192	0.0199	0.0230	0.469	0.014	0.042	3567	3575	12826	95	92	70
	72/92	0.0193	0.0192	0.0212	0.881	0.339	0.307	62	52	80	92	91	67
	92/11	0.0191	0.0207	0.0248	0.322	0.014	0.069	57	69	160	98	93	74
Small growth	72/11	0.0235	0.0264	0.0297	0.024	0.002	0.132	13153	28717	130542	100	97	72
	72/92	0.0195	0.0226	0.0233	0.053	0.163	0.810	49	80	91	100	98	72
	92/11	0.0276	0.0305	0.0365	0.176	0.002	0.075	270	359	1442	100	95	71
Big value	72/11	0.0123	0.0140	0.0111	0.090	0.323	0.059	169	292	85	45	45	34
	72/92	0.0129	0.0146	0.0124	0.193	0.808	0.276	16	22	14	35	35	27
	92/11	0.0118	0.0135	0.0098	0.271	0.235	0.121	11	13	6	56	56	42
Big growth	72/11	0.0093	0.0096	0.0108	0.771	0.305	0.477	33	26	53	74	73	55
	72/92	0.0100	0.0089	0.0087	0.187	0.365	0.872	7	5	5	57	57	45
	92/11	0.0086	0.0103	0.0130	0.304	0.068	0.358	4	5	11	92	90	65

Panel B: Estimation period w = 72: Sample size n = 100 stocks

		Out of sample average returns			P-value of test equal averages			Out of sample wealth			Sample size		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min	Equal w.	Max n	Min var.	Equal w.	Max n	Min var.
Value	72/11	0.0164	0.0173	0.0178	0.125	0.208	0.669	1076	1336	1652	98	98	81
	72/92	0.0173	0.0175	0.0181	0.694	0.615	0.742	42	40	45	97	97	80
	92/11	0.0156	0.0171	0.0175	0.104	0.184	0.785	26	33	36	100	99	81
Growth	72/11	0.0167	0.0189	0.0219	0.046	0.006	0.135	802	1340	5484	100	99	75
	72/92	0.0148	0.0153	0.0164	0.646	0.467	0.655	19	18	25	100	100	79
	92/11	0.0187	0.0226	0.0277	0.044	0.004	0.116	42	73	218	100	98	71
Small value	72/11	0.0199	0.0208	0.0234	0.252	0.017	0.072	4745	5558	17700	90	89	71
	72/92	0.0201	0.0202	0.0207	0.878	0.650	0.715	71	65	78	83	83	69
	92/11	0.0197	0.0214	0.0262	0.210	0.013	0.064	67	85	228	97	94	73
Small growth	72/11	0.0214	0.0231	0.0288	0.131	0.001	0.016	5631	7817	86009	99	98	74
	72/92	0.0178	0.0180	0.0262	0.808	0.001	0.001	32	29	179	98	98	78
	92/11	0.0252	0.0284	0.0315	0.120	0.094	0.451	177	267	480	100	98	70
Big value	72/11	0.0121	0.0140	0.0140	0.026	0.053	0.942	154	315	334	43	43	33
	72/92	0.0127	0.0136	0.0151	0.481	0.031	0.213	15	18	27	33	33	28
	92/11	0.0115	0.0144	0.0129	0.009	0.400	0.370	10	17	12	53	53	39
Big growth	72/11	0.0101	0.0102	0.0125	0.906	0.040	0.088	49	40	134	70	70	54
	72/92	0.0105	0.0097	0.0119	0.139	0.321	0.083	8	7	11	53	53	45
	92/11	0.0096	0.0106	0.0130	0.385	0.067	0.322	6	6	12	89	88	62

Table 7-4 Naive versus optimized out of sample portfolios' Sharp ratios: Earnings to price.

Each month from July 1972 to June 2011, I choose 100 stocks based on different characteristics (growth, value, small and big) . I form a minimum variance effecient frontier based on 100 pairs of 100 portfolios' expected means and variances. The 100 expected portfolios' means are selected arbitrary to range from -.02 to .06. The corresponding 100 portfolios' variances are the minimum portfolios' variances that achieve these returns computed by the quadratic programming technique. The equal w., the equal weighted portfolio, is the portfolio that uses all available stocks to for the portfolio. The max n, the maximum number of stocks portfolio, is the portfolio that has the maximum number of stocks among the portfolios produced by the minimum variance model. The min var., the minimum variance portfolio, is the portfolio that has mimimum variance among all the portfolios produced bt the model. Sharp ratio, the out of sample Sharp ratio, is the average of the monthly returns of a portfolio divided by their variance.

Panel A: Estimation period w = 36: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Value	72/11	0.330	0.299	0.272	2.52	3.29	1.71
	72/92	0.305	0.274	0.243	2.38	2.42	1.18
	92/11	0.361	0.325	0.303	1.65	2.37	0.80
Growth	72/11	0.245	0.224	0.243	1.26	0.09	-0.82
	72/92	0.206	0.186	0.204	1.32	0.06	-0.58
	92/11	0.287	0.258	0.280	0.99	0.22	-0.55
Small value	72/11	0.338	0.293	0.317	3.31	0.96	-1.20
	72/92	0.305	0.264	0.278	2.81	0.97	-0.52
	92/11	0.387	0.329	0.362	2.29	0.70	-0.92
Small growth	72/11	0.300	0.280	0.313	1.51	-0.59	-1.50
	72/92	0.242	0.242	0.243	-0.03	-0.04	-0.02
	92/11	0.366	0.318	0.389	2.25	-0.68	-1.87
Big value	72/11	0.240	0.232	0.199	0.46	1.80	1.32
	72/92	0.251	0.264	0.228	-0.51	0.68	0.98
	92/11	0.228	0.205	0.169	1.04	1.87	0.94
Big growth	72/11	0.155	0.133	0.160	1.88	-0.25	-1.16
	72/92	0.174	0.144	0.138	2.01	1.38	0.21
	92/11	0.136	0.126	0.181	0.62	-1.25	-1.43

Panel B: Estimation period w = 72: Sample size n = 100 stocks

		Sharp ratio			Test Sharp ratio		
Portfolio	Period	Equal w.	Max n	Min var.	Equal/Max	Equal/Min	Max/Min
Value	72/11	0.309	0.286	0.292	2.52	0.87	-0.40
	72/92	0.302	0.276	0.282	2.26	0.76	-0.21
	92/11	0.319	0.297	0.305	1.36	0.50	-0.29
Growth	72/11	0.245	0.227	0.265	1.51	-0.82	-1.56
	72/92	0.213	0.194	0.217	1.49	-0.13	-0.68
	92/11	0.280	0.259	0.310	1.05	-0.82	-1.34
Small value	72/11	0.349	0.315	0.341	2.90	0.36	-1.26
	72/92	0.306	0.278	0.297	2.38	0.42	-0.91
	92/11	0.424	0.367	0.388	2.42	0.84	-0.48
Small growth	72/11	0.283	0.260	0.301	1.84	-0.72	-1.62
	72/92	0.216	0.201	0.270	1.31	-2.03	-2.52
	92/11	0.372	0.324	0.334	2.06	0.85	-0.21
Big value	72/11	0.236	0.247	0.255	-0.72	-0.96	-0.42
	72/92	0.248	0.254	0.300	-0.24	-2.19	-1.81
	92/11	0.223	0.241	0.216	-0.95	0.26	0.88
Big growth	72/11	0.172	0.155	0.205	1.86	-1.64	-2.37
	72/92	0.181	0.163	0.201	1.59	-0.79	-1.66
	92/11	0.162	0.148	0.208	1.02	-1.46	-1.66

Chapter 8

Earnings expectations

8.1 Introduction

In Chapter 5, the question of whether the value and small portfolios are riskier than growth and big portfolios was discussed. According to the risk model proposed by Fama and French (1993), there are many instances in which the model is incapable of fully explaining the value and size premiums. The model fails to explain the cross section returns for the most important portfolios, the small value portfolios, especially in the period from 1992 to 2011. The model fails to explain why the value premium for the small stocks is higher than that of the big stocks. It also fails to explain why the size premium for the value stocks are higher than that of growth stocks. Finally, the changes of the model loadings do not reflect the changes of the returns when comparing different models.

In Chapter 6, a real experiment to test whether the value and small stocks have more returns than the growth and value stocks because of higher risk was set up. I compare the risk of these portfolios with the same returns using their efficient frontiers. One of the findings is that the growth and small portfolios can produce better returns than the value and small portfolios at the same level of risk. This result suggests re-assessing risk as an explanation for the value and size premiums. Also, it will make us re-think the nature of the relationship between risk and return when comparing different portfolios.

In other words, whether the risk is a cause or an effect when comparing the returns for different portfolios. Is it because the value or small stocks are riskier than the growth or big stocks that they have more returns or are some other factors affecting prices and making the value and small stocks fluctuate more?

In this chapter, the role of behavioral considerations in explaining the value premium is investigated. Do investors or analysts make errors in expecting the short and long term earnings per share? In addition, (i) are analysts more optimistic about the growth and big stocks than the value and small stocks? (ii) does this optimism or pessimism drive the value and size premiums? (iii) whether the asymmetric reactions to earnings surprise drives the value and size premiums; and (iv) whether investors are more influenced by negative surprises on growth stocks than value stocks.

Many authors have investigated the role of earnings expectations in explaining the value premium. Lakonishok, Shleifer and Vishny (1994) argue that value strategies yield higher returns not because they are fundamentally riskier but because they exploit the suboptimal behaviour of typical investors. They test whether the return difference between value and glamour stocks result from mistakes made by investors when they extend the past performance of glamour stocks to the future. Their evidence suggests that the forecasts extend the past growth rates and are more optimistic for the growth stocks than value stocks. La Porta (1996) justifies the superior returns for the value stocks on the extreme errors of the analysts' forecasts on the future growth rate in earnings.

Dreman and Berry (1995) examine the stock price response to earnings surprises on low and high price to earnings of the stocks. They find that the analysts' errors have an asymmetric impact on the prices of value and growth stocks. Positive surprises for value stocks result in higher returns than glamour stocks. Negative surprises result in only a minor impact on value stocks but low returns on glamour stocks. La Porta et al. (1997) show whether the superior returns to value stocks are the result of expectation errors made by investors. They study the stock price reactions around earnings announcements over a 5-year period after portfolio formation. They conclude that a significant portion of the return difference between value and growth stocks is attributable to earnings surprise that is systematically more positive for value stocks.

Doukas, Rim, and Pantzalis (2002) claim that they are the first to make a real investigation into the error in the expectation hypothesis, as other authors do not sort their portfolios in the same way as Fama and French. They examine whether investors systematically overestimate the expected earnings of growth stocks and underestimate expected earnings of value stocks. Their results suggest that the superior returns for value stocks result from over optimism in predicting the future growth rate of value stocks.

Magnuson (2011) reports that the superior returns for value stocks are not a result of systematically higher earnings surprises of value stocks. He claims that the overall theme is disappointment where the earnings surprises for the value stocks are negative. He highlights that asymmetric price reactions to earnings beats/misses for value and growth stocks. Prices of value stocks increased regardless of the expectations are beats or misses, whereas the prices of growth stocks rose and fell after beats and misses respectively. He suggests that the superior returns for value stocks are more likely due to a gradual corrective reversal of earlier overreaction and mispricing.

This study is different from the above mentioned studies in different aspects. Firstly, the study looks at the effect of earnings' forecasts on prices in the most recent period (from 1992 to 2011) while most of the previous studies use earlier data which may not have contained sufficient data and which may have been subject to data selection bias. while the previous studies were interested only in explaining one dimension book to market or earnings to price portfolios this study investigates whether the companies' size affects the earnings expectations of the value and growth companies. This study also interested in testing the effect of the long term expected growth rate on prices whereas previous studies were interested in the short term growth rate. In addition to this, this study further investigates the reaction of prices to different earnings surprises and tries to determine whether the asymmetric responses to earnings surprises cause the value and size premiums.

8.2 Actual earnings growth rates

To study the effect of earnings expectations on the prices of the value, growth, small, and big portfolios, it is important to know first what invsertors and analysts really know about the actual earnings growth rates of these portfolios. Do value and small portfolios have more returns than the growth and big portfolios because they are more profitable or because they grow faster? Table (8-1) shows the average of one, two, three, and five-year actual growth rate of earnings per share for portfolios based on size and book to market equity for the period from 1992 to 2011. The table shows some important remarks. The growth stocks have very high growth rates compared to value stocks. The one-year growth rates of growth stocks are 20% more than the growth rates of value stocks. This is true for the total book to market equity or for the book to market after controlling for size. The highest growth rate differences between the value and growth stocks are for the small portfolios. This behaviour of the growth rates of the value and growth stocks contradicts their returns behaviour. The behaviour of the actual earnings growth rates of the small and big portfolios contradicts the returns on these portfolios. The total smallest portfolio has less growth rate than the biggest portfolios. Also after controlling for book to market, the small portfolios' growth rates are less or equal to that of the big portfolios. The greatest differences are for the value portfolios.

The same behaviour is found for two, three, and five year actual growth rates. For two year growth rates, it is remarkable that the growth rates are about double the one-year growth rate, however this is not true for the three and five year growth rates.

So, why do the slow growing stocks (value and small stocks) have more returns than the stocks that grow fast (growth and big stocks)? Are there any behaviour considerations affecting these returns? Do analysts extrapolate the past performance of earnings growth of these portfolios to the future or do they expect different growth rates?

8.3 Expected earnings growth rates

Table (8-2) shows the one, two, three and long term average of yearly median growth forecast rates of the earnings per share for portfolios based on the joint size and book to market equity for the period from 1992 to 2011. The table also shows the average yearly number of stocks included in these portfolios. Comparing the number of stocks of panel A of Table (8-1) with that of Table (4-10) panel C of Chapter 4, the analysts are more interested in producing forecasts for the big companies than the small companies. This is also clear if one compares panels A and B of Table (8-2) where only a few companies are missing from the 2 year forecasts. This shows that the analysts are more interested in producing analysis for the big companies than the small ones. Also the analysts are more interested in analysing the small value companies than the small growth ones. The average number of stocks for the long term growth rates shows a very high reduction in the number of stocks existing on the small portfolios compared to the number of one year forecasts.

When we look at one-year analysts' forecasts of the earnings per share growth rates, we find large differences in the actual growth rates. The analysts expect growth stocks to have higher growth rates than the value stocks but the differences in their growth rates are less than those of the actual growth rates. This is mainly because analysts expect value stocks to have higher expected growth rates than actual ones. The situation is different for the small and big stocks. The small stocks are expected to have higher growth rates than the big stocks, which is not confirmed by the actual growth rates. The expected long-term growth rates have the same pattern with less forecast values on the growth stocks and higher values for value stocks.

The two and three year forecasts are dramatically changed. The analysts expect the earnings growth rates for value stocks to be more than that of growth stocks. Also the small stocks are expected to have higher growth rates than the big stocks with very large differences.

As time passes the analysts get more information about the quarterly performances of the companies, so they revise their previous forecasts about the companies' growth rates of the earnings per share. Table (8-3) shows the analysts' revisions of the expected earnings per share growth rates of the one, two and three year forecasts. Panel A of the table shows the one year forecasts' revision after 3 and 6 months respectively of the initial forecasts. The same for panels B and C for the two and three years' forecasts.

The first year revisions show changes in the forecasts in the right direction towards the actual values as they become closer to the end of the financial year. The changes in the second and the third year revisions do not show large changes in the value related to actual ones.

From the previous comments, it appears that analysts have abnormally high prospects about the earnings' growth rates of the value and small stocks. The results are errors made by the analysts. The next sections measure how far away the analysts' expectations are from the actual ones and whether these errors cause value and size premiums.

8.4 Eps forecasting errors

Table (8-4) shows one year, two years, three years, and long-term differences between the forecasted and actual earnings growth rates. The negative values mean that the actual growth rates are higher than the forecasted ones. The positive values mean that the forecasted growth rates are higher than the actual ones. The positive (negative) values mean that the analysts are optimistic (pessimistic) about the eanrnings growth rates. Also, the negative (positive) values mean that the companies on average have results better (worse) than expected.

Investigating Table (8-4), we can draw a number of important remarks. The analysts are more optimistic about the performance of value (small) stocks than growth (big) stocks. This is true for all estimated years. It is noticeable that as the estimation period becomes longer, the deviations from the actual earnings growth are greater. This means that the ability of the analysts to perform good forecasts becomes weaker. It is remarkable also that the big growth companies do better than expected by the analysts. Also, the analysts are more optimistic about the small value stocks than the small growth stocks.

8.5 Errors in expectations explanation

It is remarkable that the analysts are so optimistic about the value and small stocks. Does this optimism cause the value and size premiums? The quick answer to this question is yes. There is a very strong relationship between the returns of the portfolios based on the size and/or book to market equity and the forecasting errors made by the analysts. Actually this is true if we look at the returns over a one year period (see Table (8-5) panel A) as all the previous authors did. But, if we think deeply we will find that, if there is error in expectations and the value and size premiums are affected by the optimism about them, the returns of value and growth stocks will be the highest in the months after the analysts' forecast announcements not after the actual earnings announcements.

Panels B and C of Table (8-5) show the average returns from 1 to 3 months and from 4 to 6 months after the analysts' forecast announcements. If we relate the three months returns of after the forecast announcements (panel B of Table (8-5)) and the forecast errors (Table (8-4), panel A) using only one way size and book to market portfolios, we find a strong relation between the forecast errors and the returns. The situation is different when taking into consideration the joint relation between the size and book to market equity.

The small value has less returns than the small growth. The size premiums for growth stocks are more than that of the value stocks. These returns contradict the error in expectations explanation. Also investigating the returns from 4 to 6 months after the forecast announcements (panel C of Table (8-5)), we find another contradiction in the error in expectations explanation. There are no significant differences between the returns of value and growth portfolios and small and big portfolios.

The previous remarks prove that the superior returns for small and value stocks are not because of optimism about these stocks. Another explanation may not be related to the optimism of the value and small stocks but about what the investors believe about the growth and big stocks. Investors and analysts believe that the growth and big portfolios will have high growth rates from the experience of their actual and forecast growth rates. What if the stocks in these portfolios do not meet these expectations? What is the reaction of these portfolios if they miss these expectations? This is what the study discuss in the next section.

8.6 Earnings surprises

Panels D and E of Table (8-5) show that most of the return differences between value and growth portfolios or the small and big portfolios concentrate on the 6 months after the end of the companies' financial year. This indicates that the actual earnings announcements may affect directly or indirectly the stock returns. The investors will be surprised whether they missed or passed expected earnings. Because small and value portfolios have more returns than big and growth portfolios, the test is whether prices of big and growth stocks are more affected by missing earnings expectations. In other words, the value and size premiums are results of the asymmetric response to earnings surprises.

Table (8-6) shows the average of returns when investors miss and beat expectations based on the first year forecast errors. Panels A, B, C, and D show the returns when stocks miss expectations by more than 0%, 10%, 20% and 30% respectively. The first remark on these panels is that stocks lose more money by increasing expectation errors. Also the growth and big companies always lose money when missing the expectation target. The panels show that growth and big stocks are more affected by missing the earnings' expectations target. This is very clear when realizing increasing the value premiums as increasing the missed expectations by higher percentages. This behaviour of value premiums comes basically from more losses in growth stocks than value stocks. For example, total returns on value stocks changes by a small percentage from 0.89%, 0.76%, 0.79%, to 0.89% by increasing the missed expectation target while the losses are from -0.38%, -0.83%, -1.02%, to -1.11%.

Panels E, F, G, and H show the returns when the stocks beat the expectations by more than 0%, 10%, 20% and 30% respectively. These panels show a different story. In general, the returns of growth and big stocks increase more rapidly than the returns of value and small stocks by increasing the expected beat percentages. This is clear when we realize that the total value premium is decreasing.

The same general remarks extracted from Table (8-3) are true when analyzing the returns of the next three months (4, 5, and 6) when missing and beating the first year expectations as shown in Table (8-7).

8.7 Conclusion

This chapter tests whether optimism about the future growth rate of earnings per share or the overreaction to the earnings per share drives the value premium, One sees the returns around the announcement of predictions and the announcement of actual earnings per share. Previous studies use the yearly returns to analysis the optimism and overreaction hypothesis. This study uses the average of three months returns. It is more realistic to study the relation between the investors' behaviour and the returns. If investors are overly optimistic about actual growth rate of earnings per share for growth companies, their returns should be higher than the value stocks after the announcement of the forecasts. Also, growth stocks should be more affected by negative shocks. The returns after releasing the forecasts are negative for growth stocks and positive for value stocks. This reaction indicates that investors are not optimistic about growth stocks. There are also lower returns for growth stocks than for value stocks after the actual earnings are disclosed. Growth stocks are more affected by negative shocks than value stocks, whereas, for positive shocks the big growth stocks have better returns than the big stocks.

Table 8-1 Average actual EPS growth rate.

Panel A: 1 year actual growth

		Average growth rates							Average number of stocks					
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High
	All		21.6	14.5	10.1	4.6	-4	-25.6		488	479	423	372	356
	Small	5	16.8	13.6	8.4	1.5	-11.5	-28.3	683	97	98	126	152	211
	2	12.9	22.4	18.1	10.1	6	-0.6	-23.0	429	90	102	102	80	54
Size	3	13.9	25.6	16.1	10.1	4	4.5	-21.1	349	86	96	76	55	37
	4	14.1	24.3	12.8	12.3	6.4	1.9	-22.4	331	95	94	64	46	32
	Big	13.6	17.9	12.7	10.5	6.3	3.4	-14.5	326	121	89	56	39	22
	S-B	-8.6	-1.1	0.9	-2.1	-4.8	-14.9							

Panel B: 2 years actual growth

		Average growth rates							Average number of stocks					
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High
	All		41.8	26.1	18.5	7	-1.5	-43.3		426	424	371	326	308
	Small	11	40.9	24.8	17	4.1	-8.6	-49.5	557	78	77	100	126	176
	2	21.5	40.3	30.9	19	8.5	-0.8	-41.1	365	74	86	87	70	49
Size	3	23.2	46.6	27.1	17.3	4.4	8.9	-37.7	311	72	87	70	50	33
	4	24.6	47.1	26.1	18.8	7	0.7	-46.4	309	86	89	61	44	29
	Big	25.4	35.4	23.6	18.4	9.1	14.3	-21.1	313	115	86	53	38	21
	S-B	-14.4	5.5	1.2	-1.4	-5	-22.9							

Panel C: 3 years actual growth

		Average growth rates							Average number of stocks					
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High
	All		53.2	35.4	23.6	12	10.4	-42.8		156	126	100	86	86
	Small	20.9	50.9	31.7	25	10.6	6.3	-44.6	101	25	13	14	17	32
	2	29.4	53.7	43.1	23.5	15.7	4.1	-49.6	90	23	18	19	16	14
Size	3	29.7	59.9	35.0	22.2	8.4	20.1	-39.8	90	22	22	18	15	13
	4	31.9	58.4	36.7	26.2	4.9	6.3	-52.1	113	29	31	21	17	15
	Big	34.5	46.9	32.8	24.7	16.6	29.5	-17.4	159	57	42	27	21	12
	S-B	-13.6	4.0	-1.1	0.3	-6.0	-23.2							

Panel D: Long term (5 years) actual growth

		Average growth rates							Average number of stocks					
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High
	All		76.5	55.5	42.5	29.9	41.2	-35.3		237	261	223	187	160
	Small	49.7	77.7	58.8	44	43.5	53	-24.7	232	26	29	43	54	81
	2	50.6	72.5	66.7	45.1	41.9	38	-34.5	191	30	44	49	41	27
Size	3	52.1	80.6	60.4	42	30.8	38.9	-41.7	185	36	54	45	32	17
	4	50	83.5	55.4	48	18.3	14.8	-68.7	210	53	64	44	30	20
	Big	55.2	72.2	54.1	39	21.3	51.9	-20.3	250	92	72	42	29	16
	S-B	-5.5	5.5	4.7	5	22.2	1.1							

Table 8-2 Average forecasted EPS growth rates.

Panel A: 1 year forecasted growth: d = 8

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		20.4	15.2	12.8	11.3	10.7	-9.7
	Small	18.3	30.4	21.3	17.1	14.6	18.6	-11.8
	2	16.3	24.4	18.3	13.7	13.6	9.2	-15.2
Size	3	14.8	22.0	16.0	12.1	9.4	8.1	-13.9
	4	14.1	20.7	13.2	12.6	8.5	5.5	-15.2
	Big	13.3	16.5	12.3	10.8	8.7	10.5	-6.0
	S-B	5.0	13.9	9.0	6.3	5.9	8.1	

Panel B: 2 years forecasted growth: d = 20

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		19.4	18.9	21	26.2	40.1	20.7
	Small	49.9	80.5	42.5	37.2	49.6	71.8	-8.7
	2	26.4	30.5	24.4	28	26.3	34.4	3.9
Size	3	18.7	21.8	18.0	18.7	21.3	22.4	0.6
	4	16.2	16.5	16.3	15.9	16.5	21.9	5.4
	Big	14	13.7	14.9	14.8	14	18.9	5.2
	S-B	35.9	66.8	27.6	22.4	35.6	52.9	

Panel C: 3 years forecasted growth: d = 32

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		31.1	30.4	40.5	44.9	42.9	11.8
	Small	108.4	109.8	139.1	194.3	211.3	119.3	9.5
	2	68	75.1	118.2	95.4	97	98.9	23.8
Size	3	55.9	62.5	75.1	67.7	72.6	35.7	-26.8
	4	31.7	38.6	33.3	45.2	34.8	52.2	13.6
	Big	19.6	15.2	23	88.9	27.6	35.8	20.6
	S-B	88.8	94.6	116.1	105.4	183.7	83.5	

Panel D: long term forecasted growth

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		16.7	14.5	13.4	12.7	12.9	-3.8
	Small	16.9	22.5	20.2	17.4	15.9	16	-6.5
	2	15.9	19	17.7	15.4	13.9	13.3	-5.7
Size	3	14.2	18.1	15.4	13.5	11.9	10.3	-7.8
	4	13.1	17	13.7	12.4	10.4	10.1	-6.9
	Big	12.7	15.1	12.7	11.5	9.9	9.3	-5.8
	S-B	4.2	7.4	7.5	5.9	6.0	6.7	

Table 8-3 Revesion of average forecasted EPS growth rate.

Panel A: 1 year forecasted growth: d = 5

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		21.1	14.3	11.7	8	5.7	-15.4
	Small	12.3	26.6	17.9	12.4	8.1	6.9	-19.7
	2	14.6	25.7	17.5	12.2	10	4	-21.7
Size	3	14	22.9	15.8	12	6.8	8	-14.9
	4	14.1	21.8	12.7	12.5	8	3.9	-17.9
	Big	13.2	17.3	12.5	10.5	7.4	8.1	-9.2
	S-B	-0.9	9.3	5.4	1.9	0.7	-1.2	

Panel B: 1 year forecasted growth: d = 2

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		20.9	13.6	10.3	4.7	-1.6	-22.5
	Small	7.3	21.3	14.1	8.9	2.6	-5.1	-26.4
	2	12.4	23.2	16.7	10.4	6.7	0.3	-22.9
Size	3	13.2	23.7	15.8	10.1	4.2	2.9	-20.8
	4	13.7	23.7	12.3	11.8	6.9	2.2	-21.5
	Big	13	17.3	12.2	9.8	6.2	6.9	-10.4
	S-B	-5.7	4	1.9	-0.9	-3.6	-12	

Panel C: 2 years forecasted growth: d = 17

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		20.5	18.7	19	23.1	35.7	15.2
	Small	44.2	62.1	38.8	34.2	40.8	61.5	-0.6
	2	23.9	31.3	23.4	22.9	26.3	27.9	-3.4
Size	3	18.1	21.5	17.9	17.3	19	20.1	-1.4
	4	16.4	18.4	16.5	15.5	15.1	23.8	5.4
	Big	14.3	14.8	14.9	14	13.9	17	2.2
	S-B	29.9	47.3	23.9	20.2	26.9	44.5	

Panel D: 2 years forecasted growth: d = 14

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		20.3	17.2	17	19.4	27	6.7
	Small	33.8	57.8	31.3	27.1	32.1	48.2	-9.6
	2	21.5	27.3	22.3	19.7	21.1	23.7	-3.6
Size	3	17	21.9	17.1	15.8	16.1	16.1	-5.8
	4	15.5	18.3	15.1	14.6	13.8	14.5	-3.8
	Big	13.9	15.3	13.9	12.9	12.1	13.6	-1.7
	S-B	19.9	42.5	17.4	14.2	20	34.6	

Panel E: 3 years forecasted growth: d = 29

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		22.9	29.5	41.6	44.3	64.7	41.8
	Small	288.1	60.7	602.8	468.3	110.6	123.3	62.6
	2	80.6	112.9	122.7	84.5	78.1	70.3	-42.6
Size	3	40.4	116.4	35.4	45.5	51.4	61	-55.4
	4	27.9	22.3	33.5	38.6	38.6	161.9	139.6
	Big	18.8	13.6	21.8	36.9	35.9	40	26.4
	S-B	269.3	47.1	581.0	431.4	74.7	83.3	

Panel F: 3 years forecasted growth: d = 26

		Average growth rates						
		All	Low	2	3	4	High	H-L
	All		20.9	23.6	31	35.6	52	31.1
	Small	80.4	103.3	82.2	78.4	99.4	93.3	-10
	2	45.3	61.8	44.3	54.6	56.3	84.6	22.8
Size	3	26.5	48.4	23.1	42.8	47.3	37.6	-10.8
	4	22.4	20.2	25.7	29.4	26.5	138	117.8
	Big	15.7	13.9	18.9	17.4	31.5	19.1	5.2
	S-B	64.7	89.4	63.3	61	67.9	74.2	

Table 8-4 Average forecast errors for EPS growth rate.

Panel A: 1 year forecast errors: d = 8 | Panel B: 1 year forecast errors: d = 5

		Forecast errors (Panel A)							Forecast errors (Panel B)						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All	NA	-2.3	-0.2	1.2	5.9	14.4	16.7		-1.7	-0.7	0.4	2.5	7.8	9.5
	Small	12.8	15.6	4.1	9.9	14.2	32.8	17.2	6	6.7	3	3.1	6.8	17.4	10.7
	2	2.5	-1.5	0.4	3.5	7.4	10.4	11.9	0.6	-1.1	-0.3	0.7	3.1	6	7.1
Size	3	-0.4	-4.3	-0.8	0.3	4.7	3.9	8.2	-0.7	-3.2	-1.2	0.5	1.6	1.1	4.3
	4	-0.7	-4	-0.6	-0.4	2.5	8.2	12.2	-0.6	-2.8	-0.6	-0.4	1.9	5.6	8.4
	Big	-1.1	-2.3	-0.9	-0.6	1	9.6	11.9	-0.9	-1.6	-0.8	-0.4	0.6	7.3	8.9
	S-B	13.9	17.9	5.0	10.5	13.2	23.2		6.9	8.3	3.8	3.5	6.2	10.1	

Panel C: 2 years forecast errors: d = 20 | Panel D: 2 years forecast errors: d = 17

		Forecast errors (Panel C)							Forecast errors (Panel D)						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-16.1	-4.4	6.1	21.6	47.4	63.5		-17.3	-4.8	4	18.4	38.3	55.6
	Small	45.3	43.8	24.5	21.3	53.4	95.1	51.3	37.5	25.4	19.3	18	45.3	71.8	46.4
	2	12.8	-2.8	-1.8	17	27.5	48.7	51.5	8.5	-9.4	-4	9.6	27.4	40.5	49.9
Size	3	0.5	-14.8	-4.0	2.3	17.7	25.3	40.1	-1.3	-16.9	-5.5	1	14.1	16.6	33.5
	4	-5.7	-26.9	-8.1	-2	9	23.6	50.5	-6	-26.8	-8.5	-1.7	7.4	24.1	50.9
	Big	-8.9	-18.8	-7.5	-0.3	5.4	9.9	28.7	-9.2	-19.5	-7.8	-1.8	5.1	9.7	29.2
	S-B	54.2	62.6	32.0	21.6	48.0	85.2		46.7	44.9	27.1	19.8	40.2	62.1	

Panel E: 3 years forecast errors: d = 32 | Panel F: 3 years forecast errors: d = 29

		Forecast errors (Panel E)							Forecast errors (Panel F)						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-9.9	-0.5	27.6	52.3	49.9	59.8		-20.5	-5.2	15.1	29.9	108.2	128.7
	Small	98	67.4	124.9	147.7	166.7	125.8	58.4	-62.8	45.4	-124	73.7	81.3	140	94.6
	2	55.6	48.7	19.9	30.9	106.1	112	63.3	53.1	7.7	72	87	69.6	82.9	75.2
Size	3	26.4	30.9	34.5	-3.9	126.5	26.4	-4.5	15.5	23.3	32.2	4.8	49.4	73.8	50.5
	4	9.6	-12.3	-0.6	10.5	36.8	80.6	92.9	2.5	-25.4	34	18.6	29.1	150	175.4
	Big	-8.6	-23	-7.2	-35.4	20.1	11.3	34.3	-12.6	-30.1	-18.5	-3.7	6.5	72.1	102.2
	S-B	106.6	90.4	132.1	183.1	146.6	114.5		-50.2	75.5	-106	77.4	74.8	67.9	

Panel G: Long term (5 years) forecast errors

		Forecast errors						
		All	Low	2	3	4	High	H-L
	All		-1.7	1.6	3.1	8.3	19.2	20.9
	Small	17.4	13.8	1.1	4.8	16.5	32.2	18.4
	2	5.2	8.6	2.8	3.3	7.6	17.4	8.8
Size	3	2.7	-4.1	1.1	3.4	9.6	9.9	14.0
	4	1.2	-2.6	2.1	1	6.9	15.5	18.1
	Big	0.5	-1	0.6	3.1	3.5	7.7	8.7
	S-B	16.9	14.8	0.5	1.7	13.0	24.5	

Table 8-5 Average 3 months returns.

Panel A: Average returns: all months

		Average returns						
		All	Low	2	3	4	High	H-L
	All		1.02	1.15	1.23	1.3	1.5	0.5
	Small	1.59	1.4	1.54	1.59	1.53	1.77	0.4
	2	1.17	0.9	1.17	1.23	1.4	1.28	0.4
Size	3	1.12	1.1	1.1	1.12	1.12	1.2	0.1
	4	0.94	0.84	0.99	1.1	1.05	0.89	0.1
	Big	0.83	0.78	0.9	1.01	0.86	1.02	0.2
	S-B	0.8	0.6	0.6	0.6	0.7	0.8	

Panel B: Average returns: months 7, 8, 9

		Average returns						
		All	Low	2	3	4	High	H-L
	All		-0.12	-0.18	-0.02	0.35	0.2	0.3
	Small	0.51	0.59	0.2	0.21	0.64	0.45	-0.1
	2	-0.04	-0.23	-0.16	-0.17	0.5	-0.27	0.0
Size	3	-0.12	-0.2	-0.4	0.04	0.14	-0.04	0.2
	4	-0.28	-0.64	-0.34	0.07	0.11	-0.49	0.2
	Big	-0.22	-0.38	-0.31	-0.09	0.17	0.26	0.6
	S-B	0.7	1.0	0.5	0.3	0.5	0.2	

Panel C: Average returns: months 10, 11, 12

		Average returns						
		All	Low	2	3	4	High	H-L
	All		2.22	2.24	2.08	2.01	2.15	-0.07
	Small	2.08	1.73	2.35	2.39	1.85	2.05	0.32
	2	2.26	2.25	2.34	2.17	2.28	2.13	-0.12
Size	3	2.36	2.93	2.28	1.91	2.34	2.4	-0.53
	4	1.98	1.99	2.17	1.89	1.97	2.37	0.38
	Big	2.02	2.06	2.33	2.2	1.77	1.99	-0.07
	S-B	0.06	-0.33	0.02	0.19	0.08	0.06	

Panel D: Average returns: months 1, 2, 3

		Average returns						
		All	Low	2	3	4	High	H-L
	All		0.62	1.13	1.23	1.25	1.78	1.2
	Small	1.92	1.52	1.59	1.99	1.79	2.5	1.0
	2	0.85	0.28	1.23	1.06	1.03	1.46	1.2
Size	3	0.62	0.3	0.9	0.82	0.84	0.85	0.6
	4	0.78	0.8	0.95	1.04	0.69	0.5	-0.3
	Big	0.45	0.33	0.68	0.91	0.44	0.14	-0.2
	S-B	1.5	1.2	0.9	1.1	1.4	2.4	

Panel E: Average returns: months 4,5,6

		Average returns						
		All	Low	2	3	4	High	H-L
	All		1.67	1.72	1.9	1.96	2.32	0.65
	Small	2.31	2.07	2.28	2.1	2.4	2.54	0.47
	2	1.96	1.75	1.66	2.12	2.15	2.18	0.43
Size	3	1.85	1.84	1.8	1.92	1.44	1.91	0.07
	4	1.56	1.54	1.45	1.56	1.6	1.29	-0.25
	Big	1.29	1.3	1.12	1.23	1.34	2.05	0.75
	S-B	1.02	0.77	1.16	0.87	1.06	0.49	

Table 8-6 Prices reaction to 1 year forecast error. First quarter retuns.

Panel A: Forecast errors > 0 / Panel B: Forecast errors < 0

		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.38	0.29	0.33	0.53	0.89	1.3		1.82	2.1	2.26	2.08	2.8	0.98
	Small	0.89	0.74	0.71	0.59	1.01	1.45	0.7	3.18	2.54	2.98	3.88	2.88	3.78	1.24
	2	-0.07	-1.02	0.44	0.38	0.19	0.46	1.5	1.92	1.89	1.99	1.93	1.98	2.69	0.8
Size	3	-0.33	-1.0	-0.1	-0.12	0.34	0.14	1.1	1.71	1.84	2	1.8	1.34	1.33	-0.51
	4	-0.11	-0.48	0.01	0.3	-0.1	-0.05	0.4	1.77	2.02	2.11	1.94	1.26	1.11	-0.91
	Big	-0.23	-0.32	0.05	0.21	-0.3	-0.88	-0.6	1.16	1.02	1.43	1.54	1.3	0.76	-0.26
	S-B	1.1	1.1	0.7	0.4	1.3	2.3		2.02	1.52	1.55	2.34	1.58	3.02	

Panel C: Forecast errors > 10 / Panel D: Forecast errors < -10

		C: All	C: Low	C: 2	C: 3	C: 4	C: High	C: H-L	D: All	D: Low	D: 2	D: 3	D: 4	D: High	D: H-L
	All		-0.83	-0.06	0.16	0.35	0.76	1.6		2.83	2.91	3.11	2.73	3.35	0.52
	Small	0.61	0.02	0.4	0.48	0.97	1.07	1.1	3.77	2.83	3.56	4.75	3.53	4.3	1.47
	2	-0.29	-1.16	0.07	0.31	-0.14	0.46	1.6	2.62	2.74	2.6	2.57	2.39	3.46	0.72
Size	3	-0.69	-1.6	-0.4	-0.52	0.1	-0.26	1.3	2.44	2.84	2.47	2.7	2.09	1.33	-1.51
	4	-0.49	-0.94	-0.52	0.05	-0.51	0.5	1.4	2.54	2.91	3.45	2.52	1.74	2.63	-0.28
	Big	-0.66	-0.89	-0.31	-0.38	-0.37	-0.91	0.0	1.96	2.18	1.94	2.58	2.19	0.09	-2.09
	S-B	1.3	0.9	0.7	0.9	1.3	2.0		1.81	0.65	1.62	2.17	1.34	4.21	

Panel E: Forecast errors > 20 / Panel F: Forecast errors < -20

		E: All	E: Low	E: 2	E: 3	E: 4	E: High	E: H-L	F: All	F: Low	F: 2	F: 3	F: 4	F: High	F: H-L
	All		-1.02	-0.21	-0.14	0.25	0.79	1.8		3.26	3.32	3.66	3.12	3.71	0.45
	Small	0.41	-0.39	0.36	0.09	0.81	1.18	1.6	4.33	3.93	3.97	5.15	3.88	5.26	1.33
	2	-0.4	-1.16	-0.09	0.1	-0.21	0.39	1.6	2.87	2.64	3.02	2.72	3.15	4.05	1.41
Size	3	-0.78	-1.6	-0.4	-0.86	0.17	-0.21	1.4	3.02	3.63	2.96	3.56	2.5	1.69	-1.94
	4	-0.76	-1	-1.05	-0.2	-0.47	-0.01	1.0	2.44	3.22	4.11	2.51	2	0.39	-2.83
	Big	-0.84	-0.7	-0.2	-0.64	-0.9	-0.98	-0.3	2.16	2.9	1.24	3.26	2.76	1.05	-1.85
	S-B	1.3	0.3	0.6	0.7	1.7	2.2		2.17	1.03	2.73	1.89	1.12	4.21	

Panel G: Forecast errors > 30 / Panel A: Forecast errors < -30

		G: All	G: Low	G: 2	G: 3	G: 4	G: High	G: H-L	A: All	A: Low	A: 2	A: 3	A: 4	A: High	A: H-L
	All		-1.11	-0.55	-0.24	0.15	0.89	2.0		3.62	3.51	3.81	3.36	4.01	0.39
	Small	0.27	-0.51	-0.17	0	0.68	1.17	1.7	4.48	3.8	4.56	5.12	4.08	5.3	1.5
	2	-0.44	-0.99	-0.37	-0.38	-0.14	0.34	1.3	3.1	2.98	2.65	2.92	3.3	4.4	1.42
Size	3	-0.96	-1.9	-1.0	-0.67	-0.23	0.2	2.1	2.8	3.41	2.51	4.1	2.51	1.61	-1.8
	4	-0.9	-1.75	-1.29	-0.22	-0.5	-0.1	1.7	2.97	3.57	3.93	3.18	1.51	1.5	-2.07
	Big	-0.74	-0.35	-0.31	-0.45	-0.79	0.02	0.4	2.72	3.7	1.44	3.5	2.8	1.41	-2.29
	S-B	1.0	-0.2	0.1	0.5	1.5	1.2		1.76	0.1	3.12	1.62	1.28	3.89	

Table 8-7 Prices reaction to 1 year forecast error. Second quarter retuns.

table 8-7

Panel A: Forecast errors > 0 | Panel B: Forecast errors < 0

		Average returns							Average returns						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		0.29	0.56	0.61	0.77	1.01	0.7		3.29	3.16	3.44	3.32	3.84	0.55
	Small	0.66	0.37	0.81	0.39	0.78	1.04	0.7	4.35	4.11	4.81	4.42	4.3	4.26	0.15
	2	0.46	0.32	0.04	0.52	0.97	0.77	0.5	3.72	3.63	3.52	3.93	3.56	3.81	0.18
Size	3	0.69	0.4	0.6	0.95	0.46	0.93	0.5	3.28	3.53	3.53	3.21	2.44	2.97	-0.56
	4	0.61	0.08	0.64	0.88	1.09	0.57	0.5	2.71	3.08	2.43	2.41	2.37	2.42	-0.66
	Big	0.34	0.2	0.37	0.26	0.98	0.87	0.7	2.3	2.36	2.01	2.33	2.01	3.01	0.65
	S-B	0.3	0.2	0.4	0.1	-0.2	0.2		2.05	1.75	2.8	2.09	2.29	1.25	

Panel C: Forecast errors > 20 | Panel D: Forecast errors < -10

		Average returns							Average returns						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.36	0.12	0.16	0.48	0.66	1.0		4.18	4.39	4.38	4.15	4.63	0.45
	Small	0.26	-0.28	0.32	-0.06	0.55	0.57	0.9	5.2	5.06	5.98	5.49	5.12	4.67	-0.39
	2	-0.05	-0.23	-0.82	0.11	1.04	0.57	0.8	4.38	4.03	4.11	4.74	4.15	4.91	0.88
Size	3	0.33	-0.3	0.6	0.53	0.11	0.67	1.0	4.1	4.51	4.57	3.93	3.29	4.1	-0.41
	4	0.16	-0.61	0.28	0.34	0.73	0.66	1.3	3.47	4.05	3.52	3.06	2.7	3.1	-0.95
	Big	-0.22	-0.78	-0.05	-0.14	0.23	0.78	1.6	3.2	3.37	2.91	2.83	2.67	3.81	0.44
	S-B	0.5	0.5	0.4	0.1	0.3	-0.2		2	1.69	3.07	2.66	2.45	0.86	

Panel E: Forecast errors > 20 | Panel F: Forecast errors < -20

		Average returns							Average returns						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.53	-0.16	-0.08	0.26	0.61	1.1		5.05	4.92	4.63	4.57	5.3	0.25
	Small	0.04	-0.54	0.09	-0.39	0.26	0.61	1.2	5.79	7.17	6.5	5.47	5.5	5.43	-1.74
	2	-0.36	-0.53	-1.23	-0.31	0.62	0.52	1.1	4.87	4.07	5.14	4.93	4.92	5.89	1.82
Size	3	0.24	-0.4	0.4	0.93	-0.3	0.96	1.4	4.7	5.41	4.67	4.03	3.72	4.68	-0.73
	4	0.02	-0.81	0.22	0.26	0.87	-0.04	0.8	3.7	4.71	3.79	3.08	2.59	3.21	-1.5
	Big	-0.58	-1.11	-0.6	-0.45	0.26	0.49	1.6	3.79	4.88	3.14	3.63	2.95	4.79	-0.09
	S-B	0.6	0.6	0.7	0.1	0.0	0.1		2	2.29	3.36	1.84	2.55	0.64	

Panel G: Forecast errors > 30 | Panel H: Forecast errors < -30

		Average returns							Average returns						
		All	Low	2	3	4	High	H-L	All	Low	2	3	4	High	H-L
	All		-0.74	-0.3	-0.29	0.02	0.56	1.3		5.72	5.57	4.71	4.9	5.89	0.17
	Small	-0.22	-0.49	-0.05	-0.76	-0.18	0.64	1.1	6.27	7.9	7.75	5.34	5.81	6.14	-1.76
	2	-0.54	-0.7	-1.5	-0.48	0.61	0.42	1.1	5.41	3.62	6.48	5.33	5.11	7.17	3.55
Size	3	-0.06	-0.8	0.6	0.25	-0.6	0.69	1.5	5.06	6.31	4.36	4.66	3.36	4.85	-1.46
	4	-0.01	-0.69	0.08	0.4	0.66	0.1	0.8	3.63	4.71	4.84	2.8	2.51	3.14	-1.57
	Big	-0.69	-1.05	-0.52	-0.93	-0.34	0.04	1.1	4.69	5.72	4.13	3.97	4.04	4.67	-1.05
	S-B	0.5	0.6	0.5	0.2	0.2	0.6		1.58	2.18	3.62	1.37	1.77	1.47	

Chapter 9

Summary and conclusion

9.1 Introduction

Financial market anomalies are empirical results that seem to be inconsistent with the well-known theories of asset pricing behaviour. They indicate either market inefficiency or inadequacies in the asset pricing models. The persistence of the anomalies for decades, however the researchers shed light upon them, suggests that they are not evidence of market efficiencies. The inadequacies of the pricing models of capturing these anomalies lead to reformulating these models so they can test whether the anomalies are important factors in the pricing models.

Value premium is one of the most important asset pricing anomalies. Value premium is the difference of the average returns between the value and growth stocks. Value stocks are stocks that are believed to have lower price relative to their fundamentals (book value, dividends, cash flow, earnings, etc.). The common characteristics of value stocks include a high book to market ratio, high dividends yield, high earnings to price, low sales growth rate, and/or high cash flow to price. The investors consider value stocks as cheap or undervalued stocks. On the other hand, growth stocks , also known as glamour stocks, contrary to the value one, have higher prices relative to their fundamentals. They can be characterised by having low book to market ratio, low earnings to price ratio, high sales growth, and /or low cash flow to price. They are consided by investors as high prospective growth companies because they retain most of their earnings for reinvestment, therefore pay fewer dividends.

The value premium has attracted both academic and professional attention for many years. Despite it being well established in the empirical asset pricing literature that there is a debate over the interpretation of why stocks with higher book to market ratio earn higher returns.

There are three common explanations for the book to market anomaly. Firstly, value stocks earn more returns because they are riskier than growth stocks. They also divide the risk based explanations into three groups: one group referring it to the factor loading, the second group referring it to the risk accompanied by the firm characteristics, and the last group linking it to the macroeconomic risk. Secondly, value premium exists due to irrational behaviour of market participants. Finally, value premium is due to data snooping.

The unsetteled question about the reasons behind the value premium encouraged the direction of this study. Do value stocks have more returns than growth stocks? This research is a continuation of the large body of research about the value premium. This study differs from others in many aspects, such as:

Firstly, the intensive look at the information available about stocks in different databases made the study begin in the year 1972. This will greatly reduce any source of bias of the available data. The period of study is further divided into two parts; (i) the recent period from 1992 to 2011 where intensive research about the value premium started as a result of the work of Fama and French (1992, 1993); and (ii) the past period from 1972 to 1993. There are about 1000 shares more in the years following 1992 than in the years before it. According to the efficient market hypothesis, we can expect the value premium to change from the past period to the recent one, as it becomes widely known and accepted.

Secondly, despite using the equal and value weighted portfolios, the mean-variance portfolio technique (specifically its minimum variance version) introduced by Markowitz (1952) is used in the comparisons between size and book to market portfolios. The mean variance portfolio gives the investor an opportunity to choose not only between the available portfolios but also between the most efficient ones. This will enable us to compare the portfolios not only using their returns but also using their variances. Now the question turns to whether the value (small) portfolios are more efficient than the growth (big) portfolios. In other words, whether the value (small) portfolios have more returns than growth (big) portfolios at the same variance levels and vice versa. These questions are easily answered by just comparing the mean-variance frontiers of these classes.

Thirdly, the effect of earnings' forecasts on prices in the most recent period from 1992 to 2011 comprises part of this study. Most of the previous studies use earlier data which may not have been sufficient data and may have been subject to data selection bias. One of the questions of this study is whether the companies' size affects the earnings expectations of the value and growth companies. The previous studies were interested only in explaining one dimension book to market or earnings to price portfolios. This study also investigates the effect of the long term expected growth rate on prices where the previous studies were interested in the short term growth rate. In addition to this, the reaction of the prices to different earnings surprises is investigated and whether the asymmetric responses to earnings surprises causes the value and size premiums. The previous studies use one year returns while this study uses quartarly returns to examine the reaction to earnings surprises.

Finally, many authors discuss the question of whether the naive portfolio (equal weighted portfolio) outperforms portfolios based on optimised techniques. Their results are disputable and they do not agree on this matter. Some claim that the naive portfolio outperforms optimised portfolios. They think that optimisation techniques add no value in the absence of informed inputs. Others have no evidence that the 1/N portfolio is superior to the optimised portfolios. This study is different to previous research in many ways. (i) the out of sample performance of specific portfolio classes constructed based on the size and book to market equity are compared to determine which can be relied upon as a good portfolio strategy. These results are also compared with the equal weighted strategy. (ii) Individual stocks in these particular portfolios are used rather than the constructed portfolios or indices used by many researchers.

9.2 Findings

This study finds that there is no significant change in the total value premium (sorting only using the book to market) of the 1972-1992 period and value premium of the 1992-2011 period. However, differences emerge if we sort the value and growth stocks according to their sizes. In the recent period, the value premiums are significant only for the smallest size quintile. This is a significant change if compared with the previous period where the value premiums of 4 out of 5 size quintiles are significant. This result supports the work of Loughran (1997) that the value premium appear only for the small stocks. However, it contradicts the Fama and French (2006) conclusion that the value premium exists for the big stocks and the results of Loughran are period and book to market specific. There is no sign of a value premium on the big stocks even after using the earnings to price as a measure of value.

The January returns play a very important role in explaining the total value premium in the old period compared to that of the recent period. The January returns explain only 17% of the total value premium in the period from 1992 to 2011; in contrast it explains 45% of the total value premium in the 1972-1992 period. Excluding January returns from the total returns of the 1972-1992 period leads to the disappear all of value premiums of the small quintiles. This, however, does not affect the value premiums in the 1992-2011 period, which indicates that the value premium on the small stocks of the 1972-1992 period is a result of the January effect. Using the returns for

January only, there are no value premiums across the small and big stocks in the recent period, which contradicts the finding of Chou et al. (2011) of the existence of the value premium for big stocks in January.

After matching the companies on CRSP and COMPUSTAT databases about 51% and 36% unmatched companies of CRSP in the 1972-1992 and 1992-2011 periods respectively were found. These stocks are not taken into consideration when making the breakpoints that determine the value and growth stocks. Because these stocks exist only in CRSP and they have no data on fundamentals, the effect of these stocks is tested directly on the size premium and indirectly on the value premium by making the size breakpoint according to CRSP before matching the data. Fortunately, there is no significant effect on the size premium after including the lost information. Also there is no significance on the value premiums across the size quintile after using the new size breakpoints and the book to market breakpoints.

It is likely that the growth stocks outperform the value stocks during bad times of the business cycle (Lakonishock et al. (1994)). The results of this study show a different story. The returns of value stocks are higher than those of growth stocks during the recession periods, but both of them are insignificant. This result lessens the role of the business cycle as an explanation of the value premium.

Fama and French (1993, 1995) claim the ability of their three factor model to explain the value premium and most of the asset pricing anomalies. Using the significance of the model's intercept and the bigger R square, their model explains the value premium in the 1972-1992 period. This is not the same for the 1992-2011 period. The three factor model cannot explain the returns of the most important portfolios in this period, the small value portfolios. These portfolios have significant intercepts. A close look at the loadings of the value premiums across the size quintiles, shows increasing patterns of the value premiums' loadings. The value premiums' loadings on the market, SMB, and HML are higher for big portfolios than for small ones. This contradicts the risk explanation where the reverse should happen. Another source of the limitation of the ability of the three factor model in explaining the returns are significant intercepts of the small companies when explaining the January and expansion periods' returns.

To determine which of value or growth stocks are riskier and whether the risk causes the high returns for value stocks, the efficient frontiers of value and growth stocks are compared. The efficient frontiers indicate that value stocks are riskier than growth stocks. They also indicate that the highness of the risk of the value stocks does not make them have higher returns than the growth stocks. With the same levels of risk, the growth stocks have higher returns. This indicates that the growth stocks are more efficient than the value stocks. With the same levels of returns the growth stocks have less variance. Analysing the variance components (the sum of covariances and the sum of variances) of value and growth stocks, with the same levels of returns, the growth stocks are found to have higher covariances and lower variances than of value stocks. Comparing the efficient frontiers for the small growth and small value portfolios, the same contradiction is seen. The small growth portfolios are more efficient than the small value portfolios. These results cast doubt on the risk explanation for the value premium and invite us to search for other explanations.

There are unsettled questions on whether the out of sample returns of the optimised portfolios produce higher returns than that of the equal weighted portfolio. None of these articles discusses whether the optimised value and growth portfolios outperform the 1/N portfolio. The out of sample returns of the optimised value and growth portfolios, such as the minimum variance and the maximum sample size portfolios, are found to produce higher returns than the equal weighted value and growth portfolios irrespective of the length estimation windows. There is no need for long estimation windows for the optimised portfolios to outperform the equal weighted portfolios contrary to the findings of many researchers (DeMiguel et al (2009)). Investing 1 dollar in the small value portfolio using equal weighted, maximum sample size, and minimum variance portfolios produces 2.6%, 3.3%, and 3.6% average monthly returns and wealth of \$228, \$822, and \$1536 respectively over the 1992-2002 period using a 36 month estimation window.

To test whether optimism about the future growth rate of earnings per share or the overreaction to the earnings per share drives the value premium, the returns around the announcement of predictions and the announcement of actual earnings per share were studed. The previous studies use the yearly returns to analyse the optimism and overreaction hypothesis. The average of three months returns is used. It is more realistic to study the relation between the investors' behavior and the returns. If investors are overly optimistic about the actual growth rate of earnings per share for growth companies, their returns should be higher than the value stocks after the announcement of the forecasts. Also, growth stocks should be more affected by negative shocks. The returns after releasing the forecasts are negative for growth stocks and positive for value stocks. This reaction indicates that investors are not optimistic about growth stocks. There are also lower returns for growth stocks than for value stocks after the actual earnings are disclosed. Growth stocks are more affected by negative shocks than value stocks, whereas, for positive shocks the big growth stocks have better returns than the big stocks.

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