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Fundamental Fundamental Valuation
– A Hunt for Abnormal Returns

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Abstract

We set out to develop a valuation model and two trading strategies with the aim to generate abnormal returns. The data sample consists of the shares currently constituting the S&P100 over the time period 1988 to 2007. The model is specifically designed to avoid problems of endogeneity and circularity hitherto found in previous research. We take a new approach in identifying buy and sell candidates where we wish to find a better theoretically founded way of quantifying discrepancies between fundamental values as calculated from our model and the current share price. After controlling for survivorship and selection biases we find that we are able to generate significant abnormal returns with our trading strategies using both the CAPM (7.5% & 6.0%), the Three-Factor-Model (7.0% & 5.8%) and a 36-Month Market Adjusted Buy and Hold net zero hedge portfolio (26.3% & 40.3%). We find small or no similarities between our sell candidates and traditional "Value-Growth" characteristics while slightly larger for buy candidates. Contrary to previous research, our short portfolios are consistently generating strong returns to our hedge portfolios. Our results indicate that fundamental valuation has not been fundamental enough.

Keywords: Abnormal returns, Fundamental Valuation, Residual Income Valuation, Value premium

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1. INTRODUCTION

1.1. BACKGROUND

If an inference is drawn from a premise that includes the conclusion that the inference aims at establishing, the fallacy of circular reasoning has been conducted. Simple logic is needed to identify and refute such fallacious reasoning, at least in the text-book form. But what happens when greed, psychology, egos, jobs, media, reputation, ignorance and last but certainly not least, enormous amounts of money and theoretical complexity, is added to the equation?

During the past decades the financial markets have experienced large crashes, bull markets and bubbles while simultaneously argued to be efficient. Prominent examples are the stock market crash in 1929, the dot-com frenzy of the late 1990's and the subprime crisis that set off in the summer of 2007.

We have since long been fascinated by the incredibly complex system that the financial markets constitute and we are intrigued by its, in our view, inconsistencies. We set out with the idea that price is ontologically separated from fundamental value and that only economical fundamentals, not current prices or alike, should be the determinants of a valuation model. We desire to develop a model with solely exogenous variables in order to avoid circularity and endogeneity problems found in previous research and a subsequent trading strategy that somewhat side-steps epistemological problems in assessing mispricing.

This leads us to the aim of the thesis, namely, to investigate whether we can develop a valuation model and a trading strategy that generates abnormal returns along common dimensions of risk and return. One could say that the thesis is an investigation whether fundamental valuation have been fundamental enough.

We will focus exclusively on shares currently constituting the S&P100 Index.[1] While we do seek to find abnormal returns, we acknowledge the robustness needed to make a true and fair assessment on market efficiency and, hence, reserve and limit ourselves to discussions on implications for eventual abnormal returns on efficient markets but not tests of market efficiency per se.

We hope to contribute to the field of research by identifying abnormal returns that cannot be characterized along the lines of traditional investment strategies hitherto used in the literature. Furthermore, as our model is based on a clear connection between capital markets and real markets as well as past and future performance, we hope it to be able to quantify economically unsound discrepancies between the fundamental value and the share price in a way we have not found in previous research.

[1] As of May 1st, 2008

1.2. METHODOLOGY

With the aim to generate abnormal returns two trading strategies are derived with the use of a fundamental valuation model and economic theory. More specifically, a variant of the Residual Income Valuation Model is used to unveil the markets implied assumptions of future performance. After an assessment regarding the appropriateness of the implied level, positions are taken on the stock market.

The data sample consists of historical data stretching from 1980 to 2007 on the 100 companies that currently constitute the S&P100 index. Acknowledging potential survivorship bias problems associated with the data, several methods to accommodate such problems are used. Finding that the returns of the current constitutes of the index have outperformed the S&P100 over the sample period and realizing that we are dealing with a choice-biased success-influenced dataset, a new index using the total return on all the shares in the sample is created. This index is, henceforth, referred to as the S&P100 Benchmark Index.

In an attempt to further accommodate the survivorship bias problems, data of listings and de-listings from S&P100 for the years 2000 to 2008 is collected. This extends our dataset to a maximum of 135 companies. The extension of the dataset does not prove to significantly affect our results. By means of consistency and conservatism, the initial sample of 100 firms is used.

Three different metrics are used to evaluate the returns generated by the trading strategies. The main and primary metric is a 36-Month Market Adjusted Buy and Hold hedge portfolio which replicates an implementable trading strategy for investors. The two secondary metrics are the Capital Asset Pricing Model (CAPM) to account for systematic market risk and the Three-Factor Model to incorporate the additional factors Book-to-Market and size, empirically found to have explanatory power of returns in excess of CAPM. The regressions will be run against the excess returns of the S&P 100 Benchmark Index as well as the excess returns on a very broad index composed of AMEX, NYSE and NASDAQ.

In order to further increase the roboustness of our methods and results an investment strategy based on Book-to-Market characteristics is created. This strategy serves as a benchmark for the evaluation of our strategies as well as our methods of evaluation. The benchmark strategy further helps us to accentuate the differences and similarities between our strategies and other investing strategies used in the research literature.

1.3. Outline

The thesis is divided into three parts.

Part I "Set Up" aims to provide information regarding *Previous Research* and the rational for a move *Towards a Proprietary Valuation Model.* It also includes the *Theoretical Foundations* needed for the development of our model and for the subsequent evaluations and conclusions. The part ends with a description of the *Empirical Dataset*, the reason for choosing it and its potential problems.

Part II "Execution" deals with the specification of the *Proprietary Valuation Model* and the operationalization of its inputs. The part also provides information regarding the development of the *Trading Strategy* as well as the basis for the *Portfolio Formation*.

Part III "Results and Conclusions" primarily deals with our results and conclusions. Initially the *Evaluation Metrics* needed for the evaluation of our results are discussed followed by a thorough *Evaluation of the Trading Strategies*. Subsequent to the evaluations we present our *Conclusions*.

PART I –SET UP

2. PREVIOUS RESEARCH

THE PURPOSE OF THE SECTION IS TO GIVE A BRIEF OVERVIEW OF RESEARCH RELEVANT FOR THE THESIS AND FOR THE DEVELOPMENT OF THE PROPRIETARY VALUATION MODEL. PLEASE REFER TO THE ORIGINAL TEXTS FOR MORE ELABORATE INFORMATION.

2.1. INTRODUCTION

The tradition of "Value-Growth" investing and fundamental valuation goes back to the legendary book *Security Analysis*, Dodd and Graham (1934). Their main message and insight was that with the use of fundamental information, such as accounting data, one can make an assessment of the fundamental or "intrinsic" value of a share. In the following sections the concept of "Value-Growth" investing, the predictability of future performance on accounting data and applications of the Residual Income Valuation Model will be described. An understanding of "Value-Growth" investing is important for the evaluation of our strategies while previous studies regarding the predictability of accounting information and applications of the Residual Income Valuation Model is essential for the development of our valuation model.

In the "Value-Growth" framework we will primarily focus on the findings by Fama and French (1993), Chan et al. (1991) and Lakonishok et al. (1994). Research relevant to our study with regard to accounting information comes mainly from two different strands, one deals with the value relevance and predictability of future performance using accounting information, e.g. Ou and Penman (1989) and Skogsvik (2002) and the other one deals with the link between fundamental value and price using the Residual Income Valuation Model, e.g. Lee et al. (1999), Jamin (2005). Skogsvik and Skogsvik (2005) combine the two approaches into an arguably more powerful test of market efficiency.

2.2. "VALUE-GROWTH" - INVESTING

It has empirically been shown that strategies based on traditional so called "Value-Growth" investing have generated abnormal returns where "Value" shares have outperformed "Growth" shares, e.g. Fama and French (1993), Lakonishok et al. (1994) and Haugen (1997). Such strategies are often based on simple accounting and price ratios such as Book-to-Market (B/M), Earnings-to-Price (E/P), Dividend-to-Price (D/P) or similar. In the "Value-Growth" framework, "Value" shares are characterized by high B/M, E/P and D/P ratios while "Growth" shares have low ratios.

Fama and French (1993) form portfolios based on a B/M ranking where the top (bottom) deciles constitute the firms with the highest (lowest) B/M. Positions are taken on the U.S stock market during 1963-1990 and they document an annualized return for "Value" firms of 22% and "Growth" firms of 3.6%. A similar study on the same data but with an E/P ranking generates an annualized return of 20.6% to "Value" firms and 12.5% to "Growth" firms. In a later study Fama and French (1998) rank and sort firms into three portfolios based on B/M, E/P and D/P respectively and take positions on the U.S stock market from 1975 to 1995. The returns for "Value" firms are 14.6%, 14.1%, 11.8% while only 7.8%, 7.4% and 8.0% for "Growth" firms. Lakonishok et al. (1994) use U.S data from 1968 to 1989 ranking firms into deciles based on B/M, E/P and Cash flow-to-Price (C/P) with similar results. Fama and French (1998) find similar results on international equity markets and Chan et al. (1991) document a substantial value premium on Japanese data over 1971 to 1988. Judging from the findings the value premium has been large and consistent but during the late 1990's with the dot-com frenzy, "Growth" stocks were skyrocketing leaving "Value" stocks behind (Chan and Lakonishok (2004)).

The existence of a value premium has been considered quite disturbing as the ratios used to characterize the two types of firms lack good theoretical foundations. Several explanations have been put forth to explain the cross-sectional abnormal returns and will be elaborated on in the theoretical section. Clear is, however, that the debate whether the cross sectional differences in returns are due to market inefficiency or a compensation for risk is by no means settled. The table below gives an overview of some of the findings in "Value-Growth" investing.

Table 2.1: Overview of "Value-Growth" findings

In the Fama and French studies "U.S" represents all shares on AMEX, NYSE and NASDAQ with data on accounting information and returns. Some results are originally reported in monthly returns (to equally weighted portfolios) but have been annualized before presented here by a multiplication of 12. In the Lakonishok et al. (1994) study "U.S" refers to all AMEX and NYSE shares with sufficient accounting and return information. Results for "Value" ("Growth") are the returns for portfolios constituting the top (bottom) "ranking type" sorted on "Sorting". In Chan et al (1991) "Japan" refers to all shares on the first and second section of the Tokyo Stock Exchange. Returns originally reported as monthly returns, annualizes as above. The table is a summary of results presented in Chan and Lakonishok (2004).

Study	Time period	Market	Sorting	Ranking type	"Value"	"Growth"
Fama and French (1993)	1963-1990	U.S.	Book-to-market	Top (bottom) Deciles	22.0%[a]	3.6%[a]
	1963-1990	U.S.	Earnings / Price	Top (bottom) Deciles	20.6%[a]	12.5%[a]
Fama and French (1998)	1975-1995	U.S.	Book-to-market	Top (bottom) 30%	14.6%	7.8%
	1975-1995	U.S.	Earnings / Price	Top (bottom) 30%	14.1%	7.4%
	1975-1995	U.S.	Dividend / Price	Top (bottom) 30%	11.8%	8.0%
Lakonishok et al. (1994)	1968-1989	U.S.	Book-to-market	Top (bottom) Deciles	17.3%	11.0%
	1968-1989	U.S.	Earnings / Price	Top (bottom) Deciles	16.2%	12.3%
	1968-1989	U.S.	Cash flow / Price	Top (bottom) Deciles	18.3%	8.4%
Chan et al. (1991)	1971-1988	Japan	Book-to-market	Top (bottom) Quartiles	28.8%[a]	15.6%[a]
	1971-1988	Japan	Earnings / Price	Top (bottom) Quartiles	22.8 %[a]	18.0 %[a]

[a] Numbers originally reported as monthly returns, annualized by a multiplication of 12

2.3. Predictability of Accounting Information and Subsequent Returns

Ball and Brown (1968) highlight the connection between stock prices and accounting (fundamental) data by showing that significant returns can be earned with perfect foresight of the next years' earnings. Though sounding like a truism, their findings are relevant in the sense that they show that there exists a link between accounting (fundamental) information and stock prices, a link that is needed in order for subsequent research in this area. Ou and Penman (1989) and later Skogsvik (2002) test whether markets are efficient with regards to the predictive power of historical financial statement items on future performance. Ou and Penman (1989) perform this analysis on the U.S. stock market by combining a large set of financial statement items into a summary measure which indicates the direction of one-year-ahead-earnings changes. They use the predictions to take positions in the U.S. stock market and for a two year holding period they document a return to a net zero investment hedge position of 12.5% over the period 1973-1983. Skogsvik (2002) performes a similar test on Swedish data over the time period 1970-1994, trying to predict the direction of the change in the average future three year return on equity. When positions are taken according to the prediction model Skogsvik document a return to a hedge position of 29% for a 36-month holding period. Both Ou and Penman (1989) and Skogsvik (2002) are able to generate abnormal returns from their strategies but it is unclear to what extent they are stable over time or against different benchmarks for risk (Skogsvik and Skogsvik (2005)).

Table 2.2 Summary of findings on predictability of accounting information and returns

In the Ou and Penman (1989) study "U.S" represents all industrial companies whose common stock is traded on the NYSE and Amex during the time period but due to missing data, many gas, electric, banks, financial and real estate firms are excluded. {A_t} denotes a summary measure of a number of undisclosed financial statement items used to predict next years earnings change. The return represents the 24- Month Market Adjusted Buy and Hold Return to a net zero investment hedge portfolio. For Skogsvik (2002) "Sweden Industrials" refers to all industrial firms listed on the Stockholm Stock Exchange during the sample period. ROE and (ROE+{A_t}) denotes strategies predicting Return on Equity (ROE) with only historical ROE and with a combination of ROE and a set of accounting ratios. The returns represents the 36-Month Market Adjusted Buy and Hold Return to a net zero investment hedge portfolio.

Study	Time period	Market	Prediction	Market Adjusted Buy-and-Hold Returns
Ou and Penman (1989)	1973-1983	U.S.	{A_t}	13%[a]
Skogsvik (2002)	1970-1994	Sweden Industrials	ROE	29%[b]
	1970-1994	Sweden Industrials	(ROE+{A_t})	12%[b]

[a]24-Month Buy and Hold Return, [b]36-Month Buy and Hold Return

2.4. Applications of the Residual Income Valuation Model

Fundamental valuation models include household names such as The Discounted Cash Flow Model and The Discounted Dividend Model. However, as previously mentioned, trading strategies based on fundamental valuation have historically been more simplistic employing ratios such as E/P, D/P and B/M. The development of the Residual Income Valuation Model did, however, simplify the use of more advanced valuation models due to its close connection to accounting, economic intuition and linearity in parameters.

Lee et al. (1999) develop a framework in which price and fundamental value is a co-integrated system that converges over time. This means that price is not always equal to fundamental value but is expected to be so in the long run. Lee et al. (1999) introduce the "V/P measure" (fundamental value calculated with a Residual Income Valuation Model in relation to current share price) and use this measure to predict future returns, essentially by saying that if V/P is larger (lower) than a pre-specified number, the share is undervalued (overvalued). Lee et al. (1999) evaluate several inputs to the Residual Income Valuation Model and find the use of analyst estimates and time-varying discount rates important in tracking share prices over time and in predicting subsequent returns. The use of analyst estimates as input is commonly used in research using the Residual Income Valuation framework e.g. Abarbanell and Bernard (2000), Jamin (2005) and Ali et al. (2003).

Lee et al. (1999) find that the V/P measure can explain future stock returns better than the traditional B/P, D/P and E/P measures which is encouraging since the Residual Income Valuation Model is better theoretically founded than "Value Growth" investing ratios. A similar approach as Lee et al. (1999) was conducted on the German Stock Market by Jamin (2005) also using the Residual Income Valuation Model while Abarbanell and Bernard (2000) used the model to relate prices with expected earnings and Gebhardt et al. (2001) to make an assessment of the implied required return on equity from stock market prices.

In another study Frankel and Lee (1998) refine the V/P measure adjusting for potential errors in analyst estimates, resulting in a strategy here referred to as (V/P & PErr). Ali et al. (2003) further show that the abnormal returns found by Frankel and Lee (1998) are not the result of exposure to unobservable risk factors as put forth in Fama and French (1993). For a short summary of the finding in the research discussed above, please see the table below.

Table 2.3: Summary of findings on applications of the Residual Income Valuation Model

In the Frankel and Lee (1998) study "U.S." refers to all domestic non-financial companies on AMEX, NYSE and NASDAQ meeting the requirements on accounting data and I/B/E/S estimates. "V/P" refers to the strategy first developed in Lee et al. (1999) using only fundamental value over price while an adjustment for estimated errors in analyst estimates is made in "V/P & PErr". The Jamin (2005) study is conducted on CDAX a broad German stock index. Banks, Financial Services and Insurance where excluded. All returns are 36-Month Market Adjusted Buy and Hold Returns to a net-zero investment hedge positions.

Study	Time period	Market	Prediction	36-Month Market Adjusted Buy and Hold Returns
Frankel and Lee (1998)	1978-1991	U.S.	V/P	35%
	1978-1991	U.S.	V/P & PErr	46%
	1978-1991	U.S.	B/P	23%
Jamin (2005)	1990-2002	German	V/P	22%
	1990-2002	German	P/E	5%
	1990-2002	German	P/B	8%
	1990-2002	German	D/P	13%

2.5. Combining the Two Approaches

One problem put forth in Skogsvik and Skogsvik (2005) regarding the Ou and Penman (1989) and Skogsvik (2002) research is whether the predicted increase or decrease in the valuation indicator variable (for example earnings per share or return on equity) is already incorporated in the market price. Skogsvik and Skogsvik (2005) therefore develop a trading strategy based on the Residual Income Valuation Model in combination with the forecasting of fundamental value indicators (in this case return on equity). Skogsvik and Skogsvik (2005) attempt to make an assessment on whether the predicted increase or decrease in the next periods' return on equity is already priced by the market by assuming that the discrepancy between the calculated fundamental value and the market price represent the markets expectations of a company's future return on equity. Thus, if their calculated value of the stock is lower than the stock market price, the market is assumed to expect that the future profitability of the company will increase. The general idea is to avoid taking positions in stocks when the implied stock market expectation and the model based prediction coincide. With a 36-Month Market Adjusted Buy-and-Hold zero-investment strategy they achieve returns ranging from 28% to 48% depending on how the strategy is implemented.

3. Towards a Proprietary Valuation Model

The purpose of this section is to provide a background and arguments for our move towards a proprietary valuation model. A questioning and acknowledgement of aspects of previous research enables us to develop the foundations of our own model.

We have some conceptual concerns regarding the methodology used in previous research. The main point which we would like to stress is the use of pricing information and other endogenous information as direct input to fundamental valuation models. Lee et al. (1999) argue that the inclusion of analyst estimates helps to explain both a) current prices and b) future returns. We acknowledge that use of analyst estimates can improve the predictions as it is likely that new information have been recognized by the market after the publishing of the last financial statements. We are, however, concerned that by the inclusion of such information, one might be testing how well analyst views of stock prices are correlated with market prices. If prices are affected by analyst estimates, or (which would be troublesome) if analyst estimates are affected by prices, then analysts' estimates might be as far off as the rest of the market. An example might be useful: at the top of the dot-com bubble in 2000, only 2% of the analysts had sell recommendations (Penman (2007)).

We are further skeptical of the use of consensus analyst estimates due to their problematic ontological nature. As there is generally no consensus in the true meaning of the word between analysts, the term often refers to median or mean values of a sample of estimates. Hence, no analyst is likely to hold the mean view and the median analyst does by no necessity agree with the mean estimate. By including analyst estimates we feel that we might miss the main point with our study. In our framework, we need a model free of market sentiment in order to come to a conclusion whether fundamental valuation have been reasonable.

Skogsvik and Skogsvik (2005) suffer from a somewhat similar problem. They try to back out the market's expectations of future profitability by comparing the current share price with the value they find in their Residual Income Valuation Model. The problem is, however, that the fundamental value generated by their Residual Income Valuation Model already incorporates the markets expectations of future profitability as they use a weighted average of the current Market-to-Book[2] for the industry and a Permanent Measurement Bias[3] in determining the terminal value. This induces a circularity problem. In other words, they sets out to determine if the value (X) incorporates certain data (Y) regarding the future prospects, a function of (Y), by comparing (X) to a historically motivated price which in itself is a function of (X) due to the inclusion of average industry Market-to-Book in the terminal value.

In most previous research the valuation model is truncated after only a few years by applying steady state assumptions. Skogsvik and Skogsvik (2005) use the weighted average of the current average industry Market-to-Book and the Permanent Measurement Bias while Lee et al. (1999) use the industry average return on equity. The problem is, however, that if the industry is not in a sustainable steady state, the terminal value will consist of both real economic spread in terms of future abnormal earnings and a measurement bias from conservative accounting making it difficult to control for implied assumptions.

In addition, the closer the truncation, the larger part of the eventually inflated or deflated terminal value is compounded into the model. Hence, with a short period to truncation and terminal values based on current price information and/or performance, current market conditions will have large impact on the total value while the actual forecasting period only makes up a small fraction of the total value.

We believe that a reasonable estimate is that a generic company in the long run will enter into a steady state where the only source for a positive spread between return on equity and required return is due to accounting biases and that the time period needed is not extremely long. There are of course anomalies ex post such as Coca Cola which have showed no real tendency to have reverted towards a steady state for a long period of time. But it is easy to be fooled by ex post data. Standing today, is it reasonable to assume that the Coca Cola dominance will last for another 20 years? One must realize that this was that question analyst and investors were facing 20 years ago, without having the information we have now. An analogy to trading in efficient markets might serve as a good example: *"If you put a hundred thousand monkeys in a room with typewriters, soon enough, one of them is going to write a perfect copy of the Iliad, I would, however, not [ex. ante] bet my money on that the same monkey is going to write the Odyssey"* [4]. In other words, would a development other than a gradient move towards a steady state return on equity have been considered an unbiased estimate if one acknowledges traditional ideas of market forces and efficient capital markets?

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2 Market-to-Book is the inverse of Book-to-Market.

3 Permanent Measurement Bias refers to the expected spread between required return on equity and book return on equity due to conservative accounting. More on this in section *"The Permanent Measurement Bias"*.

4 Citation borrowed from unknown. Author's additions within brackets to make the statement logically sound.

To summarize our view: our valuation model should not include current market expectations, hence, no analyst estimates or terminal values using any kind of industry average profitability or Book-to-Market multiples should be incorporated. This should help us to avoid the endogeneity and circularity problem. The model should further not be truncated before it is reasonable to assume that the company is in a steady state which should allow us to extensively model future expected performance. In the steady state, the only source of returns in excess of the required return should come from industry specific accounting measurement biases and not positive net present value activities, which will facilitate a more robust assessment of implied future performance.

4. THEORETICAL FOUNDATION

THE THEORETICAL SECTION AIMS AT PROVIDING SUPPORT FOR THE DEVELOPMENT OF OUR VALUATION MODEL AND TRADING STRATEGIES AS WELL AS TO FACILITATE A DISCUSSION REGARDING THE INTERPRETATIONS AND POTENTIAL IMPLICATIONS OF OUR RESULTS.

4.1. THE RESIDUAL INCOME VALUATION MODEL

In accordance to the generally accepted theory of capital value, the value of a capital asset is: [5]

$$\mathrm{V_t} = \sum_{i=1}^{\infty} \left(\frac{\mathrm{E_t[D_{t+i}]}}{(1+\rho_e)^{\mathrm{i}}} \right) \tag{1}$$

Where D_{t+i} denotes the cash flow to the holder of the asset for time t+i and ρ_e corresponds to an applicable discount rate given the risk of the cash flows. In the case of equity valuation (and more specifically the Discounted Dividend Model), the D_{t+i} would represent the net dividend paid while the discount rate would represent the required return on equity estimated from an appropriate pricing model.

Feltham and Ohlson (1995) show that as long as a firm's earnings and book values are predicted using the "clean surplus relationship" [6] the Discounted Dividend Model can be restated as:

$$V_t = B_t + \sum_{i=1}^{\infty} \left(\frac{E_t[NI_{t+i} - (\rho_{e,t} * B_{t+i-1})]}{(1+\rho_{e,t})^i} \right) \tag{2}$$

Or equivalently

[5] See for example Koller et al. (2005), Jamin (2005) or Penman (2007)

[6] $\mathrm{B_{t+1} = B_t + Net\ Income\ (NI)_t - Dividends_t + New\ Issues_t}$

$$V_t = B_t + \sum_{i=1}^{\infty}\left(\frac{E_t[ROE_{t+i} - \rho_e] * B_{t+i-1}}{(1+\rho_{e,t})^i}\right) \quad (3)$$

$E_t[.] = \text{Expectation based on information in period } t$
$B_t = \text{Book Value of Owners Equity in period } t$
$NI_{t+i} = \text{Net Income in period } t+i$
$\rho_{e,t} = \text{required rate of return in period } t$
$ROE_{t+i} = \frac{NI_{t+i}}{B_t} = \text{return on book equity in period } t+i$

It is further possible to separate the forecasting into two periods, the explicit ($t \rightarrow T$) and the Terminal Value ($T \rightarrow \infty$):

$$V_t = B_t + \sum_{i=1}^{T}\left(\frac{E_t[ROE_{t+i} - \rho_{e,t}] * B_{t+i-1}}{(1+\rho_{e,t})^i}\right) + \left(\frac{B_T(V_T/B_T - 1)}{(1+\rho_{e,T})^T}\right) \quad (4)$$

$B_T = \text{Book Value of Owners Equity at time} = T$
$V_T = \text{Capital Value of Owners Equity at time} = T$

Hence, (V_T/B_T -1) is a measure of the relative difference in book value and market value at time T. In line with Skogsvik (2002) the difference is expected to consist of two parts (1) business goodwill that is assumed to be negligible at sufficiently large values of T given reasons presented later and (2) a Permanent Measurement Bias induced by conservative accounting.

4.2. The Permanent Measurement Bias

From equation (3) it is easy to see that a company expected to earn a return on equity equal to the cost of capital should have a market value equal to the book value of equity as the second part of the formula equals zero. Or stated differently, a company engaging in zero Net Present Value (NPV) activities should have no residual earnings. That is, however, only true if the company is using non-conservative accounting (Penman (2007)). Assuming that some assets are not carried at market values in the balance sheet due to conservative measurements, the return on equity will be slightly larger than the required return on equity for a zero NPV engaging company. As accounting should not have any effect on value, or rather, the cash flows expected to flow into the company by the use of its asset does not change in either timing, risk or size just because the accountant chooses to be conservative. Hence, there should be a positive spread between the return on equity and the required return on equity (and, hence, also a positive value in the second term in the equation) for a company engaged in zero NPV activities to compensate for the lower book value.[7]

[7] For a more elaborate discussion on the topics of Permanent Measurement Bias, please refer to Runsten (1998) and Skogsvik (2002)

4.3. Market Forces and the Steady State

At some point in time one has to truncate a valuation model in order to calculate what is commonly referred to as the "Terminal Value". At that point in time a firm's characteristics should be consistent with an application of a constant growth rate in eternity.

It is not a trivial task to determine when and how a particular company should be expected to enter a steady state but using economic intuition one can make reasonable assumptions.

If markets are efficient, capital and effort should be allocated toward activities that generate returns over the required return. Or formulated differently, a company earning returns above its cost of capital should eventually attract competition (Koller et al. (2005)). Perfect competition often serves as a representation of the power of market forces where entry and exits constantly keep the industry from earning above (or below) their marginal costs. In order for investors to be willing to provide the capital needed for such companies, the marginal cost must be calculated including the required return on the capital needed (Perloff (2004)). Even though few industries exhibits perfect competition, it is generally hard to argue that a certain industry will not be in a state that closely resembles to perfect competition at some state in the future, especially if capital markets are efficient in resource allocation.

4.4. Explanations of The Value Premium

The Capital Asset Pricing Model developed by William Sharpe (1964) and John Lintner (1965) has been widely used, with varying success, in tests of market efficiency. As any test of market efficiency is a simultaneous test of the asset pricing model, it has generally been hard to argue either for or against market efficiency. One acknowledged problem with the CAPM is its inability to explain the value premium generated by "Value" over "Growth" firms. Different explanations for such returns and the implications for market efficiency have been put forth.

Fama and French (1993) argue that the returns are compensation to unobservable and undiversifiable risk not captured by CAPM and, hence, not signs of market inefficiency. The higher (lower) returns to companies with higher (lower) B/M ratios is a result of investors discounting the cash flows of those companies with a higher (lower) discount rate due to higher (lower) exposure to risk. Similarly, small (large) companies are discounted with higher (lower) discount rates. A few suggestions for allegedly systematic risk have been put forth by Fama and French (1993) such as distress risk and differences sustainability of earnings for "Value" and "Growth" firms.

Lakonishok et al. (1994) take an opposite view arguing that the return premium is not due to differences in discount rates but instead that investors are systematically naïve in their extrapolation of future performance. As low (high) B/M companies tend to have good (bad) past performance investors assign them irrationally high (low) values. When the overreaction is corrected, the returns of high (low) B/M companies are high (low).

An alternative explanation put forth by Daniel and Titman (1997) is that the return premium is due to certain value characteristics and not exposure to systematic risk. Daniel and Titman (1997) argue that high B/M stocks covary with other high B/M stocks but that this covariation is not due to distressed stocks being exposed to a unique distress factor, but rather because stocks with similar factor sensitivities tend to become distressed at the same time. In general the characteristics model covers anything that generates a premium for "Value" shares that is not due to risk (Davis et al. (2000)). The characteristics idea could, hence, include the behavioral view as a premium could exist if investors simply prefer "Value" over "Growth" characteristics and price shares accordingly.

5. Empirical Data

The purpose of this section is to give an overview of our dataset and the rationale for choosing it. We also discuss the problem of survivorship and selection biases as well as missing observations.

5.1. Introduction

Our sample of companies consists of the 100 companies that currently constitute the S&P100 index (as of May 1st 2008). However, due to survivorship bias problems, which we will discuss later, we also extend our sample of companies with an additional 35 companies that were excluded from the S&P100 index during the time period 2000–2008.[8]

5.2. Description of the S&P100 Index

The S&P100 index is a subset of the S&P500 index and it is comprised of 100 leading U.S. stocks with exchange listed options. Constituents of the S&P100 represent about 59% of the market capitalization of the S&P500 and almost 45% of the market capitalization of the U.S. equity markets. The S&P100 is also balanced between different industry sectors. The stocks in the S&P100 are generally among the largest and most established companies in the S&P500. However, for sector balance and means of diversification, it also includes smaller companies. In past years, turnover among stocks in the S&P100 has been lower than the turnover in the S&P500.

5.3. Motivation for choosing the S&P100 Index

The reasons for choosing companies on the S&P100 index are manifold. The first being that the stocks included in the S&P100 index can arguably be regarded as the most transparent and liquid universe of

[8] All information regarding the S&P100 Index is extracted from the Standard & Poor's website (www.standardandpoors.com) as of May 6th, 2008.

stocks. Characteristics such as these are desirable when evaluating abnormal returns as they are less likely to be the result of market anomalies related to illiquidity. Other factors potentially increasing the validity of our study relate to a belief that the constituents of the S&P100 to a larger degree are covered by sophisticated analysts than many other indexes. Another reason for the choice of S&P100 is that if we find signs of market inefficiencies, it would be interesting to examine how option prices are set on what could be fundamentally mispriced shares. As all companies included in the S&P100 index have exchange listed options, it is suitable for such a study.

5.4. Data and Data Sources

Our primary sources of data are Thomsons' DataStream and The Center for Research in Securities Prices (CRSP). The CRSP files contains daily and monthly excess market returns on AMEX, NYSE and NASDAQ (CRSP market returns) as well as the short term interest rate (U.S Government 1-Month Treasury Bill) and return data on the additional factors (HML & SMB) used in the Three-Factor Model as put forth in Fama and French (1993). Refer to Appendix 6 for a description of the HML and SMB factors. In addition to return data, additional information on book value per share, historical pay-out ratios and historical earnings per share is downloaded. The data covers the period 1980 to 2007.

5.5. Survivorship- and Data Selection Biases

Given that companies are included (excluded) on a regular basis from the S&P100 index depending on if they meet (do not meet) certain requirements[9] our dataset, including only historical data on the present constitutes of S&P100 index, is likely to suffer from survivorship bias in a variety of ways. This survivorship bias problem can be completely mitigated by the use of time-series data on which companies that were included in the index over time. We are, however, not able to gain access to such information prior to the year 2000, due to the significant costs of acquiring the information from Standard and Poor's.

Even if one can presume that we are affected by survivorship biases, it is not easy to have view on how the aggregated effects will affect our results. First of all, the 100 companies that are included in the index can probably be regarded as relatively successful companies, since they would otherwise not have grown large enough to be included in the S&P100 index. Hence, this makes it more difficult for us to identify companies worth shorting. At the same time, it affects our buying opportunities in a positive way, since none of the companies included today have performed adverse enough to be excluded from the index. On the other hand, companies that were previously included in the S&P100 index but have historically performed adversely enough are no longer part of the index. Hence, we will

[9] Please refer to Appendix 1 for the criteria of inclusions and exclusions on the S&P100 Index.

miss out on the opportunity to short these companies. By the same token, we are not exposed to the risk of buying these companies.

In order to mitigate our survivorship bias problem and to get a clearer view on how it affects our results we identify 35 companies that for different reasons have been excluded from the index during the time period of 2000 to 2008. These companies are included in our sample and are evaluated within the "Probabilistic" strategy based on the same criteria as the other companies. As will be shown in greater detail in Appendix 3, our model is robust to the inclusion and the return to our hedge portfolio actually increase for the full time period as well as for both sub periods. Since the inclusion of these companies has a positive effect on our results and as we do not have sufficient data on excluded companies for the entire time period, we choose to proceed and evaluate our trading strategies based on the initial data sample for reasons of consistency and conservatism.

In addition to the above measures, a benchmark index is created to control for problems inherent in our data selection methodology. As our sample is suspected to be choice-biased towards particularly successful companies which on average have outperformed traditional benchmarks, performance evaluations of our strategies are arguably more valid and reliable if performed against the new benchmark index. Please refer to section "*9.2 The S&P100 Benchmark Index"*.

Finally, we believe that our valuation model, in general, and the "Probabilistic" strategy, in particular, are intrinsically robust to data selection problems. As will be evident, the performance of a particular share or the current share price is of secondary nature to our trading strategy. In the "Probabilistic" strategy, positions are only taken if firms are deemed under (over)-valued in absolute terms, not relative. This is supported by the results from our extended sample.

5.6. MISSING OBSERVATIONS

Over time and cross-sectional, missing observations are solely encountered amongst the historical pay-out ratios. This problem is controlled for by an interpolation between the two closest known historical pay-out ratios. In our extended dataset including the additional 35 delisted companies some pricing data came out flawed from Thomsons' DataStream as the database returned the last closing price for several months after delisting. Any such redundant observations were removed after a thorough investigation of the actual date of delisting.

PART II – EXECUTION

6. THE PROPRIETARY VALUATION MODEL

THE AIM OF THE SECTION IS TO PUT FORTH THE MATHEMATICAL SPECIFICATIONS AND GENERAL ASSUMPTIONS OF THE PROPRIETARY VALUATION MODEL.

6.1. INTRODUCTION

As touched upon previously, the underlying idea of the thesis is to evaluate and subsequently trade on the assumption that market prices do not always reflect the fundamental value. We advocate a different approach compared to previous research motivated by a desire of a model free of market sentiment and current market prices as inputs. Instead of a focus on discrepancies between share price and fundamental value we take aim at inconsistencies in implied fundamentals. Put simple, we ask ourselves the following two questions: 1) what assumptions about future performance do one have to make in order to support the current share price and 2) how reasonable are those assumptions?

In order to be able to achieve this we need a model with which we can back-solve for fundamentals and a way to asses the probability or reasonableness of those fundamentals. The following sections will deal with just that.

6.2. SPECIFICATION OF THE MODEL

For computational reasons a model with one or few unknown variables is preferred. To facilitate an assessment of the reasonableness of an unknown variable it should preferably lie either in a period as close as possible to the valuation point in time or as distant as possible. The reason for this dichotomy comes from the idea that most fundamentals are easier to predict and analyze in either the short run or in the very long run. The fundamentals should further have desirable statistical properties with regards to distribution, stability over time and it should facilitate economical intuition. One example could be some kind of measurement of profitability. Such an approach is supported by e.g. Ou and Penman (1989) and Skogsvik (2002) who succed in predicting short term profitability while the profitability in the long term should resemble what is commonly expected to persist in a steady state.

From the Residual Income Valuation Model we specify the model:

$$\varphi_{i,t} = B_{i,t-1} + \sum_{t=1}^{T} \frac{B_{i,t-1} * (\vartheta_{i,t} - \rho_{e,t})}{(1+\rho_{e,i,t})^t} + \frac{B_T \times PMB_i}{(1+\rho_{e,i,t})^T} \tag{5}$$

$B_{i,t} = Book\ Value\ of\ Equity\ for\ company\ i\ in\ period\ t$
$\vartheta_{i,t} = Return\ on\ Book\ Equity\ for\ company\ i\ in\ period\ t$
$ℶ_{i,t} = Payout\ ratio\ for\ company\ i\ in\ period\ t$
$g_{ss} = Growth\ In\ Steady\ State$
$PMB_{i,T} = Permanent\ Measurement\ Bias\ for\ company\ i$
$\rho_{e,i} = Required\ Rate\ of\ Return\ on\ Equity\ for\ company\ i\ in\ period\ t$
$\varphi_{i,t} = Capital\ Value\ of\ company\ i\ at\ valuation\ point\ in\ time$

The return on equity $\vartheta_{i,T}$ in t=T is specified as: $\vartheta_{i,T} = \rho_{e,i,t} + PMB_{i,t}(\rho_{e,i,t} - g_{ss})$ (6)

The development of return on equity from period t=1 to t=T is specified as a function of the return on equity at t=1 and t=T: $\vartheta_{i,t\to T} = f(\vartheta_{i,t=1}, \vartheta_{i,T})$ (7)

The Payout ratio $ℶ_{i,t\to T}$ is specified as a function of the historical payout ratio and the steady state consistent payout ratio at t=T: $ℶ_{i,t\to T} = f(ℶ_{i,t,hist}, ℶ_{i,T})$ (8)

The development of Book Value of Equity ($B_{i,t}$) is given by the clean-surplus-relationship. $B_{i,t} = B_{i,t-1}\left(1 + \vartheta_{i,t}(1 - ℶ_{i,t})\right)$ (9)

The steady state consistent payout ratio $ℶ_{i,T+1}$ is a function of the growth in steady state, the required return on equity and the return on equity in steady state: $ℶ_{i,T} = f(g_{ss}, \rho_{e,i,t}, \vartheta_{i,T})$ (10)

6.3. OPERATIONALISATION

BOOK VALUE PER SHARE

The latest available book value per share from the annual financial statements is used.

RETURN ON EQUITY

The development of return of equity $\vartheta_{t\to T}$ is specified as:

$$\vartheta_t = \vartheta_1 + \left(\frac{(t-1)(\vartheta_T - \vartheta_1)}{(T-1)}\right) \tag{11}$$

Where the return on equity in t=T is specified as:

$$\vartheta_T = \rho_{e,i,t} + PMB(\rho_e - g_{ss}) \tag{12}$$

PAYOUT RATIO

The development of the Payout Ratio $ℶ_{t\to T}$ starts from a known 5-year historical average ratio which is linearly interpolated towards a steady state consistent payout ratio $ℶ_T$.

$$ℶ_t = ℶ_{i,t,hist} + \left(\frac{(t-0)(ℶ_T - ℶ_0)}{(T-0)}\right) \tag{13}$$

Using

$$ℶ_{i,t,hist} = \left[\frac{\left(\frac{DIV_{t-5}}{EPS_{t-5}} + \frac{DIV_{t-4}}{EPS_{t-4}} + \frac{DIV_{t-3}}{EPS_{t-3}} + \frac{DIV_{t-2}}{EPS_{t-2}} + \frac{DIV_{t-1}}{EPS_{t-1}} +\right)}{5}\right] \tag{14}$$

And where a steady state consistent payout ratio is:

$$ב_{i,T+1} = (1 - g_{ss}/\vartheta_{i,T}) \tag{15}$$

Since:

$$B_t = B_{t-1}\big(1 + ROE_t(1 - Payout\ Ratio_t)\big) \Rightarrow \frac{B_t}{B_{t-1}} - 1 = ROE_t(1 - Payout\ Ratio_t)$$

$$\Rightarrow Payout\ Ratio_t = \left(1 - \frac{\frac{B_t}{B_{t-1}} - 1}{ROE_t}\right) \tag{16}$$

$$\left(\frac{B_t}{B_{t-1}} - 1\right) = Growth\ in\ Book\ value\ of\ Equity\ between\ period\ t-1\ and\ t \tag{17}$$

TIME TO STEADY STATE

The time to Steady State (t=T) is set to 20 years to motivate an approximation of perfect competition. By increasing the horizon to the steady state, the mathematically interested reader will see that we give the market the 'benefit of the doubt' as the rate of reversion in fundamentals will decrease ceteris paribus.

GROWTH IN STEADY STATE

The growth in Steady State should not exceed the expected nominal long term growth in the economy as a whole**,** growth in steady state (g_{ss}) is set to 3% percent representing an inflation of 2% and real growth of 1%.

PERMANENT MEASUREMENT BIAS

The Runsten (1998) estimations of the Permanent Measurement Bias are used. The estimations are calculated for Swedish data but as no other data is available and since GAAP is conservative, as argued in Liu and Ohlson (1999), it should not be a huge source of error. IBIND industry codes downloaded from DataStream are used to map the Runsten (1998) industry specifications to our sample. Please refer to Appendix 2 for details.

REQUIRED RETURN ON EQUITY

Required return on equity is estimated with a time-dynamic CAPM, a technique advocated by Lee et al. (1999). Time dynamic refers to the use of beta values and risk free yields that vary over time. The beta is estimated on 48 months of daily historical excess returns for the particular security and the CRSP market returns. The 1-Month U.S Government Treasury Bill is used in the calculation of excess returns. The discount rate for valuation is estimated using the calculated beta, the yield on the 10 year U.S. Government Bond and a risk premium heuristically set to 6%.

The CAPM is estimated as:

$$\rho_{CAPM,i,t} = rf_{t,(10yr\ U.S.\ Govt)} + \beta_{i,t}(rp)R_{i,t} \tag{18}$$

$$\beta_{i,t} = \frac{Cov(R_{i,t}, Rm_t)}{Var(Rm_t)} \tag{19}$$

$\beta_{i,t} =$ *Estimated Beta on* 48 *months previous to valuation*
$rp =$ *Market risk premium*
$rf_{t,10yr\ U.S.\ Govt} =$ *Return on* 10 *year U.S.Govt Bond for period t*
$rf_{t,(T-Bill)} =$ *Return on* 1 *month U.S.Govt Treasury Bill for period t*
$R_{i,t} = r_{i,t} - rf_{t,(T-Bill)}$
$Rm_t = rm_t - rf_{t,(T-Bill)}$
$Rm_t =$ *Return on CPSP index period t*
$r_{i,t} =$ *Return on security i in period t*

7. TRADING STRATEGY

THIS SECTION DESCRIBES HOW THE INFORMATION FROM THE VALUATION MODEL IS USED TO IDENTIFY BUY AND SELL CANDIDATES. TWO PROPRIETARY TRADING STRATEGIES AS WELL AS ONE BENCHMARK STRATEGY ARE DEVELOPED.

7.1. DETERMINING THE VALUE OF THE IMPLIED FUNDAMENTALS

Using the specified model and the operationalizations, it is possible to back-solve for the implied next years' profitability and the subsequent development towards the steady state. The idea behind the trading strategy is that if the implied profitability is unreasonably high (low) the share is fundamentally overvalued (undervalued). Using historical information of previous realized profitability a judgment of the soundness its level is made.

More specifically this is achieved by setting $\varphi_{i,t}$ = Share Price$_{i,t}$ solving for profitability.

$$\varphi_{i,t} = B_{i,t-1} + \sum_{t=1}^{T} \frac{B_{i,t-1} * (\vartheta_{i,t} - \rho_{e,t})}{(1+\rho_{e,i,t})^t} + \frac{B_T \times PMB_i}{(1+\rho_{e,i,t})^T} \tag{20}$$

7.2. THE INDICATOR VARIABLE

For each share eligible for valuation the valuation model will return the profitability that solves the equation. This value is then normalized using its 5-year historical mean and standard deviation. The resulting normalized value is referred to as the "Indicator Variable".

$$\overline{Profitability}_{hist,i,t} = \left(\frac{\sum_{(x=t-5)}^{t-1} Profitability_{i,x}}{5}\right) \tag{21}$$

$$Std_{hist,i,t} = \sqrt{\left(\frac{\sum_{x=t-5)}^{t-1} [Profitability_{i,x} - \overline{Profitability}_{hist,i,t}]^2}{5-1}\right)} \tag{22}$$

$$IND_{i,t} = \frac{Profitability_{i,t} - \overline{Profitability}_{hist,i,t}}{Std_{hist,i,t}} \tag{23}$$

Two proprietary strategies are subsequently specified based on how the indicator variable is used in the assessment of buy and sell candidates. Buy (sell) candidates will at rebalancing be included in the long (short) portfolio of the corresponding strategy.

7.3. The Trading Strategies

Two proprietary trading strategies and a benchmark strategy are specified in the following sections. The "Probabilistic" strategy is based on an assessment of the likelihood of the observed fundamentals while "Relative" have a more naïve approach and less restrictive economical assumptions. In addition to those two strategies the "Benchmark" strategy is specified using a traditional "Value-Growth" investing approach.

7.3.1. Strategy "Probabilistic"

The "Probabilistic" strategy is our main strategy and the name refers to the way which we determine which companies to be considered buy and sell candidates. In this strategy we take a statistical approach where we are interested in the level and sign of the indicator variable and the corresponding probability. As will be evident in the secondary strategy named "Relative" and the benchmark strategy "Benchmark" this is not the case. The methodology used in "Probabilistic" implies that we never consider a company a buy or a sell candidate if the indicator variable does not have the required level or sign. That means that if we do not find any buy or sell candidates during certain periods, no positions will be taken. This strategy has the tightest connection with the theoretical development and intuition behind the valuation model. We expect this strategy to be more robust against bubbles on the market since positions are only taken if companies are considered to be trading on unreasonable fundamentals. If the implied fundamental is more than two standard deviations below (above) its historical mean, the particular company is considered under (over)valued. Hence, if the indicator variable is less than -2 (larger than 2) the company is undervalued (overvalued). This would represent a 95% confidence interval assuming profitability to be approximately normally distributed.

What we find intuitively appealing in this strategy is that we are almost completely detached from market sentiment. There is another alluring yet subtle difference with previous research as for example the V/P measure used in Lee et al. (1999). Instead of trying to determine whether the relative difference between the calculated fundamental value and the share price is too high or low, we take another approach. In the "Probabilistic" strategy we somewhat side-step the epistemologically questionable assessment of a threshold level of the relative mispricing since we focus on statistical characteristics of fundamentals instead of prices. [10]

[10] We find it hard to theoretically motivate where the threshold for a buy or sell candidate should be using the V/P ratio.

Table 7.1: Summary of trading strategy indicators for strategy "Probabilistic"

Indicator value	View	Action
$If: IND_{i,t} > 2$	Sell Candidate	Take short position in next rebalancing
$If: -2 \leq IND_{i,t} \leq 2$	Neutral Candidate	Do nothing
$If: IND_{i,t} < -2$	Buy Candidate	Take long position in next rebalancing

7.3.2. STRATEGY "RELATIVE"

In this strategy we are interested in the relative level of the indicator variable but not its sign or absolute level. Observations are ranked into deciles where the shares with the lowest indicator values are distributed in the lowest deciles and the highest in the top deciles. The buy candidates are defined as the companies included in the two lowest deciles while sell candidates are defined as companies in the two highest deciles.

As only the relative size of the indicator variable is taken into consideration, the connection with economic intuition as developed in connection with our valuation model is less direct. It is in other words possible, however, highly unlikely, that a sell candidate in our "Probabilistic" strategy is considered a buy candidate in this strategy. The reason is that if for example all shares in our universe are considered to trade on unreasonably high fundamentals, this strategy would still end up considering the 20% of the least overvalued shares as buy candidates.

Table 7.2: Summary of trading strategy indicators for strategy "Relative"

Indicator value	View	Action
Deciles 9-10	Sell Candidate	Take short position in next rebalancing
Deciles 3-8	Neutral Candidate	Do nothing
Deciles 1-2	Buy Candidate	Take long position in next rebalancing

7.3.3. STRATEGY "BENCHMARK"

As have been mentioned before, traditional "Value-Growth" investing schemes using different ratios of share price and accounting numbers have historically generated abnormal CAPM returns. Fama and French (1993) show that the majority of those cross-sectional variations in returns can be explained by B/M and size. However, as our sample predominantly consists of large companies, the most relevant metric is the B/M. Some further argue that the size effect have decreased since the 1980's (Chan and Lakonishok (2004)). The choice of B/M as the divisor between "Value" and "Growth" stocks is common in the professional investing community and in academic studies (Chan and Lakonishok (2004)). In line with Fama and French (1993) and other such as Lee et al. (1998) a trading strategy taking long (short) positions in companies with high (low) B/M is specified. We rank the companies in deciles based on observations of current B/M where the two lowest deciles contains the companies with the highest B/M. For comparability with the "Relative" strategy, shares in the two lowest (highest) deciles are considered to be buy (sell) candidates.

Table 7.3: Summary of trading strategy indicators for strategy "Benchmark"

Indicator value	View	Action
Deciles 9-10	Sell Candidate	Take short position in next rebalancing
Deciles 3-8	Neutral Candidate	Do nothing
Deciles 1-2	Buy Candidate	Take long position in next rebalancing

8. PORTFOLIO FORMATION

THIS SECTION PROVIDES THE LINK BETWEEN THE IDENTIFICATION OF THE "BUY" AND "SELL" CANDIDATES AND THE IMPLEMENTATION OF THE TRADING STRATEGIES ON THE MARKET.

8.1. TIME PERIOD

Due to data restrictions on historical accounting information, the trading strategies are implemented over the time period 1986 to 2007. The reason behind the start date is a criterion of minimum five years of historical accounting data to be eligible for consideration. This is to ensure reliable estimates of historical averages and standard deviations for the particular fundamentals. As a result, of the above stated requirements, 73 companies are valued at our first valuation in 1986. Going forward more companies are continuously included as they meet the requirements of five year historical data. In total 1903 trading evaluations are conducted.

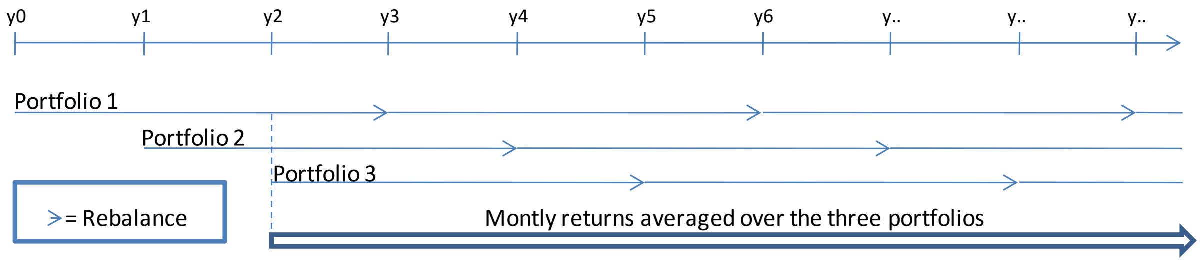
To facilitate comparability with previous studies such as Skogsvik (2002) and Frankel and Lee (1998), portfolios are held for three years before rebalancing. To ensure that the accounting information used is known to the public at the time of valuation, a gap of five months from the fiscal year end is allowed for. Hence, positions are taken in the beginning of June each year.

8.2. PORTFOLIO COMPOSITION AND RETURN CALCULATIONS

Each strategy is based on six simultaneously held portfolios (three long portfolios and three short portfolios) where each portfolio is rebalanced after 36 months. The portfolios are created with a lag so that one of the long portfolios and short portfolios is rebalanced every 12 months. Each share in the portfolio has an equal weight, hence, the return of a portfolio is the average return on all its constituent shares. Later two portfolios are formed that contains the returns for each month averaged over the three long and the three short portfolios respectively. The result is two portfolios, one for the three long portfolios and one for the three short portfolios. These two portfolios are, henceforth, referred to as the long and the short portfolio. A hedge portfolio is then specified as the difference in monthly returns between the long and the short portfolio. Each of the long, short and hedge portfolio contains monthly observations of monthly returns during the period June 1988 to March 2008. These returns are (in excess of the S&P100 Benchmark Index) the basis for the calculations of the 36-Month Market

Adjusted Buy and Hold Returns as well as input (in excess returns over the risk free rate) to the Capital Asset Pricing Model and Three-Factor-Model regressions

Figure 1: Description of portfolio formations



Individual portfolios ($r_{ip,i,t}$)

$$r_{ip,t} = \frac{1}{N_t}\sum_{i=1}^{N}(r_{i,t}) \quad (24)$$

$N = number\ of\ shares\ in\ portfolio, period\ t$

$r_{i,t} = return\ on\ share\ i, period\ t$

$r_{ip,t} = return\ on\ individual\ portfolio\ ip, period\ t$

Aggregated Portfolios ($r_{ap,i,t}$)

$$r_{ap,t} = \frac{1}{3}\sum_{i=1}^{3}(r_{ip,t}) \quad (25)$$

$r_{ip,t} = return\ on\ individual\ portfolio\ ip, period\ t$

$r_{ap,t} = return\ on\ aggregated\ portfolio\ i, period\ t$

PART III – RESULTS AND CONCLUSIONS

9. EVALUATION METRICS

THIS SECTION PROVIDES DESCRIPTIONS OF THE S&P100 BENCHMARK INDEX AS WELL AS THE METHODS USED TO EVALUATE THE PERFORMANCE OF THE TRADING STRATEGIES.

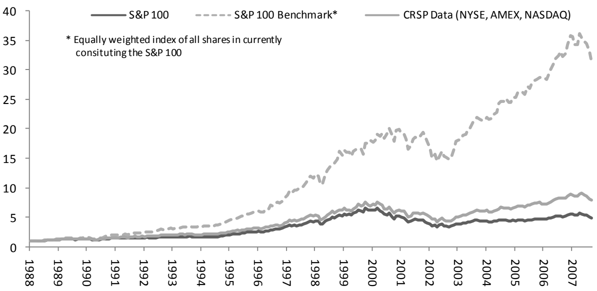
9.1. INTRODUCTION

We focus mainly on two evaluations metrics. The first one, referred to as the “Realistic Return Metric”, replicates the returns an investor would realize by investing in our trading strategies. The second evaluation metric, the “Statistical Return Metric”, includes the Capital Asset Pricing Model (CAPM)[11] and the Fama and French Three-Factor-Model. Initially a description of the S&P 100 Benchmark Index is provided.

9.2. THE S&P100 BENCHMARK INDEX

To control for problems due to having a choice-biased success-influenced sample, we create a new index replicating the return for holding the selected 100 shares over the same period as our trading strategies are implemented. As our portfolios are equally weighted, so will the new index be, in order to facilitate meaningful comparisons. The index is calculated as a total return index where dividends are assumed to be reinvested. The index is created by initially averaging the total return for all 100 shares for each month. Secondly, the geometric buy and hold return for investing one dollar in the first period and subsequently holding it throughout the whole evaluation period is calculated (Equation 25).

Figure 2 Returns of the S&P100 Benchmark vs.S&P100 and (NYSE, AMEX, NASDAQ) CRSP Data



Calculation of Index Returns

$$\prod_{t=1}^{T}\left(1+\frac{1}{N_t}\sum_{i=1}^{Nt} r_{it}\right) \tag{26}$$

$r_{it} = The\ return\ on\ each\ share\ for\ period\ t$

$N_t = Number\ of\ shares\ with\ return\ data\ for\ period\ t$

$T = Number\ of\ months$

[11] The Capital Asset Pricing Model is however an economic model.

The raw returns for the S&P 100 Benchmark Index are substantially higher than the S&P100 and CRSP market returns over the time period. The average monthly difference in returns between the S&P100 Benchmark Index and S&P100 is approximately 0.8% (9.5% annualized). To make the returns risk adjusted we regress the excess returns of our index against the CRSP market excess returns with CAPM and the Three-Factor-Model[12].

Table 9.1: Summary of regression results for S&P100 Benchmark Index using the Capital Asset Pricing Model

Regression model: $r_t - rf_t = \alpha + \beta[r_{mt} - rf_t] + \varepsilon_t$

The regression is estimated for the S&P100 Benchmark Index over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The $r_t - rf_t$ is the excess monthly returns of the S&P100 Benchmark Index over the risk free rate. The rm – rf is the excess CRSP market returns. rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. α represents the monthly abnormal return for the S&P100 Benchmark Index for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α=0 and β=0 respectively.

Period	α	p-value	β	p-value
Full Period	0.006	0.000	0.926	0.000
Period I	0.006	0.000	1.009	0.000
Period II	0.005	0.017	0.818	0.000

Table 9.2: Summary of regression results for S&P100 Benchmark Index using the Three-Factor-Model

Regression model: $r_{pt} - rf_t = \alpha + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt}$

The regression is estimated for the S&P100 Benchmark Index over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007. The $r_t - rf_t$ are the excess monthly returns of the S&P100 Benchmark Index over the risk free rate. The rm – rf is the excess CRSP market returns. Rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. α represents the monthly abnormal return for the S&P100 Benchmark Index for each time period. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. For a description on how the HML and SML are estimated in Fama and French (1993) refer to Appendix 6. α represents the monthly abnormal return for the S&P100 Benchmark Index for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α=0, β_1=0, β_{hml}=0 and β_{smb}=0 respectively.

Period	α	p-value	β_1	p-value	β_{hml}	p-value	β_{smb}	p-value
Full Period	0.005	0.000	1.000	0.000	0.208	0.000	-0.122	0.000
Period I	0.006	0.000	1.006	0.000	-0.023	0.674	-0.044	0.340
Period II	0.005	0.003	0.931	0.000	0.278	0.000	-0.158	0.001

The CAPM results are reported in Table 9.1. The abnormal return (α) is significant and positive for all periods. The beta values are all significant and close to one with slightly higher beta values for the first period. The Three-Factor-Model results, reported in Table 9.2, are indicating that the companies in our sample are relatively larger in Period II than I, in line with expectations as they currently are included in the S&P100. In addition, the companies seem to have higher exposure to HML in Period II indicating that the companies are relatively more similar to "Value" companies in later periods. The conclusion is, however, that the excess returns cannot be fully explained by exposure to systematic market risk or other underlying risk as proxied by Book-to-Market and size.

As any strategy we will create will consist of any or all of these stocks, any such strategy is likely to have significant positive abnormal returns in these two metrics, even if the particular shares are

[12] Fama and French (1993) show that when controlling for B/M and Size, much of the observed abnormal CAPM returns disappear. Please refer to section "*9.4.2 The Three Factor Model*" below for a description of the regression model and to Appendix 6 for the calculation of HML and SMB.

performing worse than the average in our sample. In order to accommodate this and to deflate the returns of the trading strategies, the excess return of the S&P100 Benchmark Index will be used as the explanatory variable for market risk (in addition to the CRSP market returns).

9.3. THE REALISTIC RETURN METRIC

9.3.1. 36-MONTH MARKET ADJUSTED BUY AND HOLD RETURNS

We use a 36-Month Market Adjusted Buy and Hold strategy to make our trading strategy implementable with respect to trading costs and to make our study comparable to more recent studies such as e.g. Holthausen and Larcker (1992), Setiono and Strong (1998) and Skogsvik and Skogsvik (2005). The 36-Month Market Adjusted Buy and Hold Returns are calculated as the cumulative buy and hold return in excess of the S&P100 Benchmark Index on a monthly basis. This method gives us 12 observations per year. We form a net zero investment portfolio (the hedge portfolio) and its returns are defined as the difference between the market adjusted returns to the long position and the market adjusted returns to the short position. For evaluation purposes we divide the time period into two sub-periods and single years. The hedge portfolio returns are tested using one-sided student's t-tests. Buy and hold returns have several acknowledged statistical problems, for example autocorrelation in error terms and skewness. Thus, in the Realistic Metric, the statistical significance is of secondary interest compared to economical interpretations. For tests with more statistical robustness, refer to the Statistical Return Metrics.

36-Month Market Adjusted Buy and Hold ($r_{bh36,t}$)

$$r_{bh36,t} = \prod_{t=1}^{36} (1 + r_{ap,t}) \quad (27)$$

$r_{ap,t} = return\ on\ aggregated\ portfolio\ ap, period\ t$

$r_{bh36,t} = 36 - Month\ Market\ Adjusted\ Buy\ and\ Hold\ Return\ for\ aggregated\ portfolio\ ap, until\ period\ t$

9.4. THE STATISTICAL RETURN METRICS

9.4.1. THE CAPITAL ASSET PRICING MODEL (CAPM)

We use a procedure for estimating Jensen's alpha previously used in e.g. Ball and Kothari (1991) and Greig (1992). The excess monthly returns over the risk free rate for the long, short and the hedge portfolio are regressed against the excess monthly returns of the market portfolio. An advantage with this approach is that the problems associated with time-series variations in beta values for stocks in the portfolios are mitigated since the beta values and abnormal returns are estimated simultaneously. In The Capital Asset Pricing Model framework the average value of a portfolio's excess return should be explained by the exposure to systematic risk and the market risk premium. Hence, the intercept in the time series regression should not be significantly different from zero. We run the regressions against the excess returns generated by our S&P100 Benchmark Index. The strategies are also, for reference and comparability, evaluated against the CRSP excess market returns. The results for those regressions are presented in Appendix 4.

9.4.2. The Three Factor Model

By controlling for B/M and size Fama and French (1993) show that most of the cross-sectional variations can be explained and in line with their study and recommendations the Three-Factor-Model is used to control for those variables. The Three-Factor-Model adds two new variables, β_{hml} and β_{smb}, to regular CAPM regression which should pick up the exposures to characteristics commonly related to abnormal CAPM returns. The new regressions should, hence, represent the unconditional expected returns on our portfolios using the existing knowledge of book-to-market and size effects. This implies that if we find intercepts that are significantly different from zero, our portfolios are generating abnormal returns with regards to the Three-Factor-Model risk and return metric. The market excess return from the S&P100 Benchmark Index is used as well as the CRSP market excess return where the latter will be presented in Appendix 4.

10. Evaluation of Trading Strategies

In this section we evaluate the Trading Strategies "Probabilistic" and "Relative" based on portfolio composition, returns, risk and "Value-Growth" characteristics. In addition each strategy will be evaluated against the "Benchmark" strategy. To demonstrate the robustness of our results we provide a shorter presentation of the results of the "Probabilistic" strategy using the delisted 35 companies in Appendix 3.

10.1. Trading Strategy "Probabilistic"

The "Probabilistic" strategy generates substantial abnormal returns and does so for almost all years. The main metric, the 36-Month Market Adjusted Buy and Hold Returns, is highly significant, even on a year-to-year basis. The buy candidates identified have characteristics similar to traditional "Value-Growth" investing for the first years. The same is, however, not true for the sell candidates which represent a large and consistent source of returns. The strategy generates abnormal returns with respect to both the Capital Asset Pricing Model and the Three-Factor-Model risk and return metric when measured over the Full Period. However, exposure towards risk proxied by Book-to-Market explains a relatively large part of the returns in Period I leaving us with an insignificant intercept. The average 36-Month Market Adjusted Buy and Hold Return to the hedge portfolio is 26.3% and the best portfolios are formed in 1990 with average returns of 74.5%. The annualized abnormal returns to the hedge portfolio for the Full Period are 7.5% CAPM adjusted and 7.0% Three-Factor-Model adjusted.

COMPOSITION OF PORTFOLIO

Figure 3: Distribution of sell, buy and neutral candidates, %

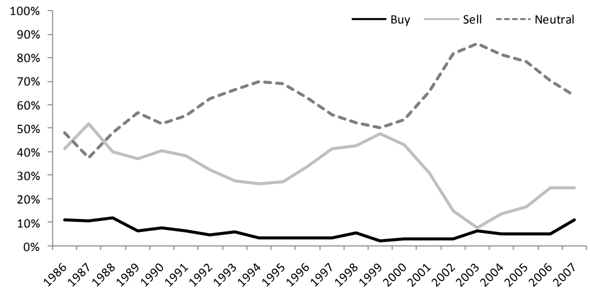
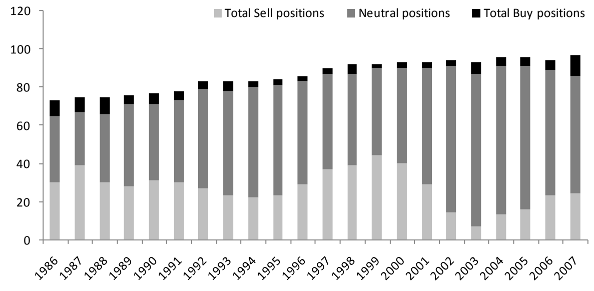


Figure 4: Distribution of sell, buy and neutral candidates



The "Probabilistic" strategy is tilted towards sell candidates meaning that we find more companies to be overvalued than undervalued. While the fraction of buy candidates is stable around 5-10% of the sample the sell candidates vary from around 50% in 1987 and 1999 to 10% in 2003. Since 2003, the fraction of overvalued companies has steadily increased. A complete description of all trading signals over time can be found in Appendix 7.

RETURNS

Figure 5: Buy and hold returns if portfolios held Full Period

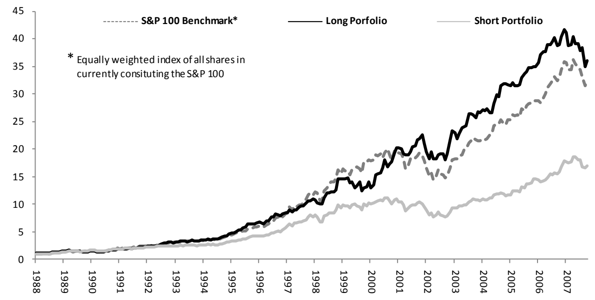
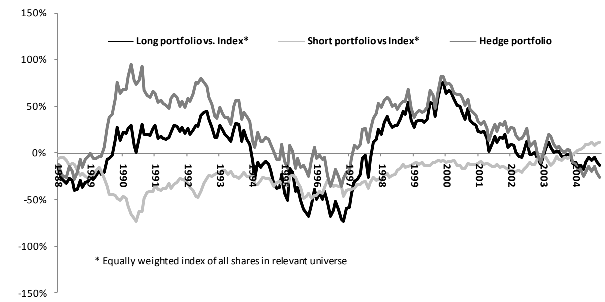


Figure 6: Three year buy and hold returns per vintage year



The most consistent and stable source of returns to the hedge portfolio comes from the short portfolio which is surprising given our success biased sample. Hedge portfolios formed at the early 90's and around the dot-com bubble[13] generate substantial returns in the range of 50-100 % over a 36-month holding period. The performance of the buy portfolio is the largest explanation for the hedge portfolio returns during the dot-com Bubble. Hedge portfolios formed between January 1996 and June 1997 (held to 1999 and 2000) generate negative returns, primarily because the long portfolios are performing worse than short portfolios. Portfolios formed after 2004 (held to 2007) generate negative returns. It is notable that the sell portfolio consistently underperforms the market implying that we are able to consistently find losers in a sample of winners.

[13] The years between late 1990's and the early years of 2000 will henceforth be referred to as the dot-com bubble

"VALUE-GROWTH"- CHARACTERISTICS

Figure 7: Book-to-Market

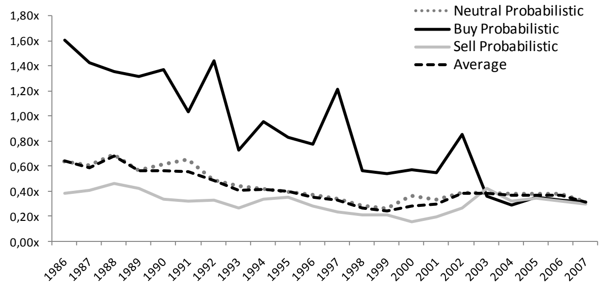


Figure 8: Market Capitalization (Size)

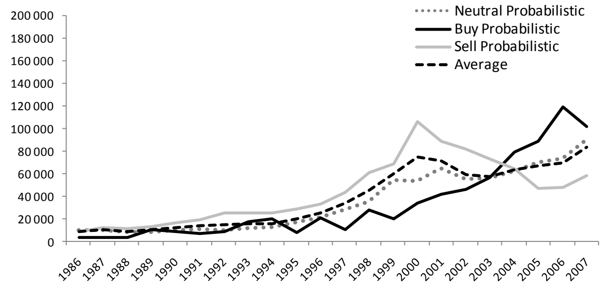


Figure 9: Earnings-to-Price

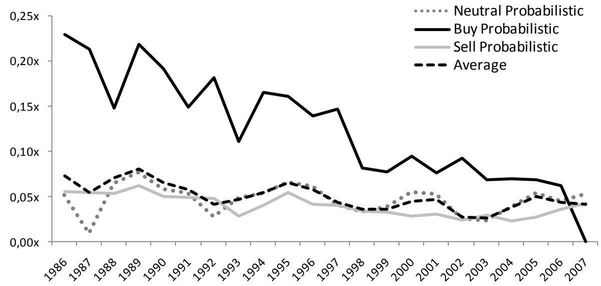
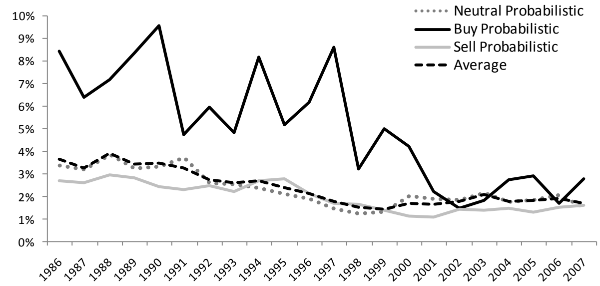


Figure 10: Dividend-to-Price



Buy candidates are initially tilted towards companies with higher B/M than the sell and neutral companies, similar to traditional "Value-Growth" investing. The B/M for the buy candidates decrease over time indicating that there are other characteristics than B/M explaining our positions in the long portfolio. The B/M of the sell candidates do not differ much from the sample average. Thus, there are few similarities between "Value-Growth" investing and our strategy when it comes to identifying sell candidates. This could be due to the fact that our model takes historical fundamentals and their standard deviation into account, making it easier to separate a good company from an overvalued one. This will be more elaborated on in later sections.

The relationship between market capitalization and position is not as clear as for B/M but it is unambiguous that the average market capitalization of sell candidates is higher than for the average of the sample up until 2004. This phenomenon is especially accentuated around the dot-com bubble, where we generate a large part of our returns. These findings suggests that larger companies were on average more overvalued than smaller companies during the bubble while they at the same time had B/M ratios similar to neutral companies.[14]

From an E/P perspective, buy candidates have higher levels than sell and neutral candidates. High E/P ratios for the buy candidates are in line with "Value-Growth" investing. The story of the sell

[14] A priori it is obvious that there is a positive relationship between size and overvaluation. The more overvalued a company is, the larger its size. We do however not think that this is the main driver in this case.

candidates is, however, completely different. Hence, E/P does not seem to explain why a company should be considered overvalued in our model.

In terms of D/P a similar relationship to E/P is observed among the buy candidates which, at least the first years, is similar to traditional "Value-Growth" investing. The sell candidates continue to deviate significantly from the "Value-Growth" characteristics.

Realistic Return Metric

Table 10.1: Summary of results for 36-Month Market Adjusted Buy and Hold Returns, strategy "Probabilistic"

Each month during the period 1988-2004 the difference in monthly returns over the S&P100 Benchmark Index for the long and short portfolio is used to calculate monthly market adjusted returns to the hedge portfolio. For every month a 36-Month Buy and Hold portfolio is created replicating the return an investor would realize by investing in the strategy for that particular month and holding it for 36-months reinvesting all capital distributions. This results in twelve simulated 36-Month portfolios per year, i.e., one for every month. The mean returns for the Full Period (1988-2004), Period I (1988-1995), Period II (1996-2004) and for each vintage year are calculated as the average 36-Month Market Adjusted Buy and Hold returns an investor would realize by holding the hedge portfolios formed over the specific time period. The t- and p-values in the table refers to the null hypothesis that the mean return for the specific time period is less than or equal to zero. The hypothesis is tested with one-sided student's t-tests.

Summary of 36-Month Market Adjusted Buy and Hold Returns													
Period	**Mean**	**t-value**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**
Full	26.3%	11.42	0.000	**1988**	-16.8%	1.000	**1994**	8.9%	0.003	**2000**	59.3%	0.000
Period I	30.2%	8.56	0.000	**1989**	24.5%	0.009	**1995**	-9.2%	0.995	**2001**	27.9%	0.000
Period II	22.7%	7.64	0.000	**1990**	74.5%	0.000	**1996**	-19.2%	1.000	**2002**	13.8%	0.001
				1991	55.4%	0.000	**1997**	18.1%	0.006	**2003**	5.7%	0.017
				1992	61.9%	0.000	**1998**	54.4%	0.000	**2004**	-18.7%	1.000
				1993	42.9%	0.000	**1999**	56.0%	0.000			

The returns of the hedge portfolio are significantly larger than zero for the Full Period and for the two sub periods at the 1% level. When examining the returns for single years, the returns generated during the vast majority of years are significantly larger than zero on the 1% level with one exception significant at the 5% level. Some years' returns are insignificant on all levels. The best returns are from portfolios formed in 1990 with an average return of 74.5% over a 36-month holding period. A large part of the returns come from successful positions in both the long and the short portfolio over the years coinciding with the dot-com bubble. This could be the result of our model not being affected by market sentiment or prices. During the buildup of the dot-com bubble we find only a few companies to be undervalued, and in the subsequent downturn these companies did not loose much value. On the other hand, once the bubble starts to reach its peak, many companies are considered overvalued and short positions are taken which proves to be very profitable. The negative returns for portfolios formed in 2004 (held to 2007) indicate that companies we consider fundamentally overvalued have increased relatively more in value than their undervalued counterparts.

Statistical Return Metric

Table 10.2: Summary of regression results for strategy "Probabilistic" using the Capital Asset Pricing Model

Regression model: $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p over the risk free rate, time t. The $rm_t - rf_t$ is the equally-weighted monthly excess returns on all 100 stocks in the sample (the S&P100 Benchmark Index). rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. . α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α=0 and β=0 respectively. For standard errors of the estimates, R-Square and F-statistics refer to Appendix 4.

Capital Asset Pricing Model: "Probabilistic" vs. S&P100 Benchmark Index												
	Full Period (1988-2007)				Period I (1988-1995)				Period II (1996-2007)			
Portfolio	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**
Long	0.004	0.036	0.680	0.000	0.003	0.188	0.769	0.000	0.004	0.189	0.613	0.000
Short	-0.002	0.052	0.917	0.000	-0.001	0.355	0.860	0.000	-0.002	0.207	0.962	0.000
Hedge	0.006	0.008	-0.237	0.000	0.004	0.133	-0.091	0.183	0.006	0.092	-0.349	0.000

As seen in Table 10.2, the hedge portfolio generates significant positive abnormal returns 0.6% (7.5% annually) for the Full Period at the 1% significance level. The returns are insignificant for Period I but significant at the 10% level for Period II. The beta is slightly larger (smaller) in Period I than in Period II for the long (short) portfolio. The beta is consistently larger (smaller) for the short (long) portfolio leaving the hedge portfolio with a negative beta. Hence, the strategy consistently shorts riskier shares, which all else equal have depressed our hedge portfolio returns. For a net zero beta exposure we could have leveraged up the long portfolio and would then have expected to generate higher returns to the hedge portfolio. The major source of returns, unadjusted for the difference in beta, seems to come from the long position which deviates from the results in the Realistic Return Metric.

Table 10.3: Summary of regression results for strategy "Probabilistic" using the Three-Factor-Model

Regression model: $r_{pt} - rf_t = \alpha + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

The regression is estimated for the long, short and the hedge portfolio. The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p, time t. The rm_t - rf_t is the equally-weighted monthly excess returns on the S&P100 Benchmark Index. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. For a description on how the HML and SML are estimated in Fama and French (1993) refer to Appendix 6. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α=0, β_1=0, β_{hml}=0 and β_{smb}=0 respectively. For standard errors of the estimates, R-Square and F-statistics refer to Appendix 4.

Three-Factor-Model: "Probabilistic" vs. S&P100 Benchmark Index								
Portfolio	**α**	**p-value**	**β_1**	**p-value**	**B_{hml}**	**p-value**	**B_{smb}**	**p-value**
				Full Period (1988-2007)				
Long	0.004	0.039	0.695	0.000	0.273	0.000	-0.113	0.063
Short	-0.002	0.059	0.920	0.000	-0.001	0.973	-0.082	0.007
Hedge	0.006	0.011	-0.225	0.000	0.274	0.000	-0.031	0.660
				Period I (1988-1995)				
Long	0.002	0.483	0.836	0.000	0.280	0.004	-0.076	0.356
Short	-0.001	0.454	0.842	0.000	-0.117	0.035	-0.177	0.000
Hedge	0.002	0.361	-0.006	0.938	0.397	0.001	0.101	0.316
				Period II (1996-2007)				
Long	0.004	0.149	0.587	0.000	0.303	0.000	-0.116	0.182
Short	-0.002	0.239	0.962	0.000	0.016	0.609	-0.042	0.282
Hedge	0.006	0.080	-0.375	0.000	0.287	0.000	-0.074	0.449

As seen in Table 10.3, the Three-Factor-Model risk adjusted returns to the hedge portfolio are similar to those of CAPM but with lower significance. The intercept for the Full Period is significant at the

5% level while the intercept for Period II is significant at the 10% level. The monthly abnormal return for the Full Period to the hedge portfolio is 0.6 % or (7.0% annually). Exposure to risk allegedly proxied by B/M is able to explain the returns to the hedge portfolio in Period I leaving the intercept insignificant. This is in line with the observations regarding "Value-Growth" characteristics for the first years of the evaluation period.

10.2. TRADING STRATEGY "RELATIVE"

The "Relative" strategy generates substantial abnormal returns for almost all years. The strategy generates a mean return for the Full period of 40.3%, in the Realistic Return Metric, which is substantially larger than what generated by the "Probabilistic" strategy. The buy and hold returns are highly significant, even on a year-to-year basis. However, on a risk adjusted basis the "Probabilistic" strategy dominates the "Relative" strategy as the latter have annual abnormal returns of 6.0% CAPM adjusted and 5.8% Three-Factor-Adjusted compared to 7.5% and 7.0%. The "Relative" strategy has fewer similarities in characteristics with "Value-Growth" investing, especially in Period II. We find that Book-to-Market and market capitalization have significant explanatory power in Period I and can together with systematic market risk explain the returns for that period leaving the intercept insignificant.

COMPOSITION OF PORTFOLIO

Figure 11: Distribution of sell, buy and neutral candidates, %

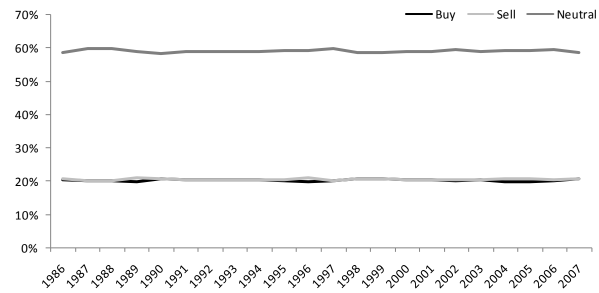
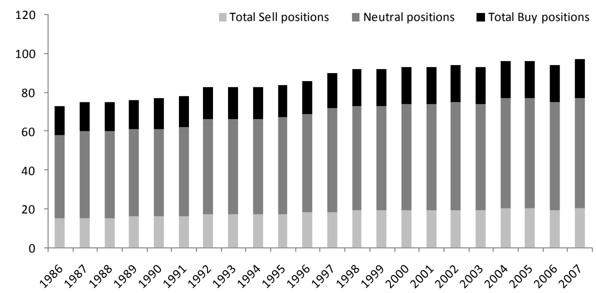


Figure 12: Distribution of sell, buy and neutral candidates



As the "Relative" strategy is based on a deciles ranking where the companies in the first and second (ninth and tenth) deciles constitute the buy (sell) candidates, the percentage of buy, sell and neutral candidates is constant over the Full Period. The number of buy (sell) candidates compared to the "Probabilistic" strategy is much higher (lower) in this strategy. All trading signals can be found in Appendix 7.

Returns

Figure 13: Buy and hold returns if portfolios held Full Period

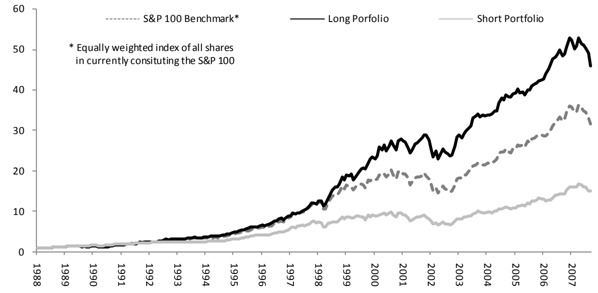
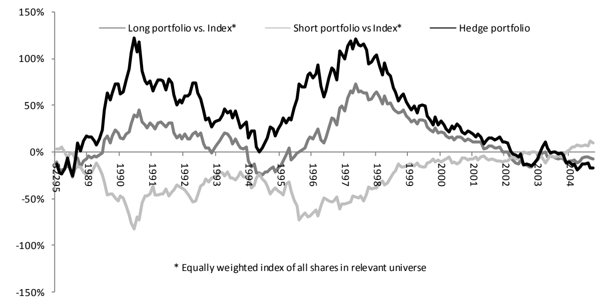


Figure 14: Three year buy and hold returns per vintage year



Similar to the "Probabilistic" strategy, the best portfolios are formed in the early 90's and around the dot-com bubble with returns in excess of 100%. The hedge portfolio formed in November 1990 (held to 1993) generates a return of 122% over a 36-Month holding period. The long and the short portfolio contribute quite equally over the period. The hedge portfolio generates negative returns for portfolios formed in 2003 to 2004 (held to 2006 and 2007).

"Value-Growth"- Characteristics

Figure 15: Book-to-Market

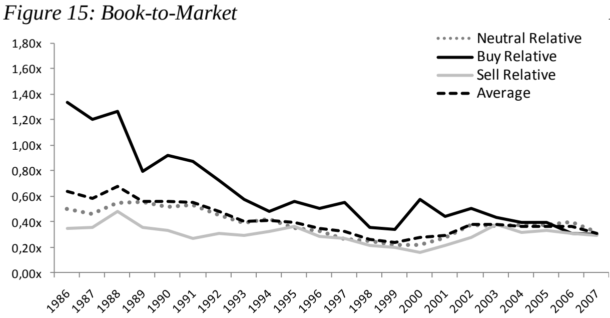


Figure 16: Market Capitalization (Size)

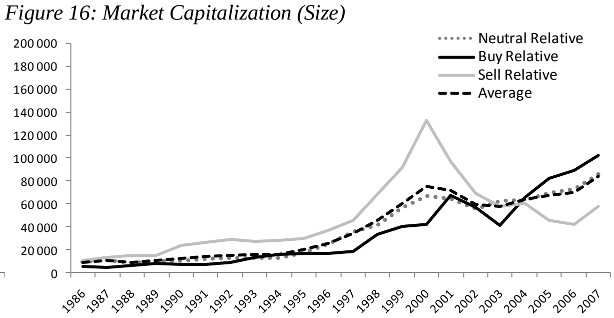


Figure 17: Earnings-to-Price

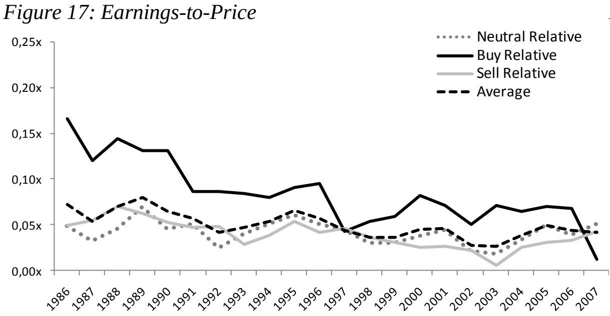
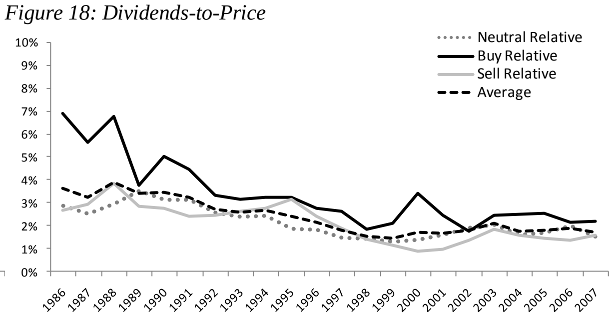


Figure 18: Dividends-to-Price



The average B/M for buy candidates is lower than observed in the "Probabilistic" strategy. Since the "Relative" strategy is based on deciles and have more buy candidates than "Probabilistic", it will contain all buy candidates in "Probabilistic" as well as companies not below the cut-off level of -2 standard deviations. This indicates that B/M is inversely related to number of standard deviations for negative values since the inclusion of more companies which by necessity have indicator variables >-2 lowers the average B/M. Judging from our returns in the buy portfolio, the inclusion of such companies is positive and suggests that the cut-off levels of -2 standard deviations could be moved closer to 0 to maximize returns ex post. As is evident when comparing Figure 11 and Figure 3, the number of sell candidates is substantially fewer in the “Relative” strategy compared to in the “Probabilistic” strategy, while the average B/M is almost the same for the two strategies. Hence, the phenomenon observed for buy candidates is not observed for sell candidates. After the mid 90’s the B/M is similar to that of the neutral and sell candidates when at the same time the portfolios formed in that period and onwards generate substantial returns. Hence, the returns do not seem to be dependent on B/M characteristics.

The difference in average market capitalization is more accentuated in this strategy compared to the “Probabilistic”, particularly around the dot-com bubble where sell candidates have very high market capitalizations. Buy candidates are hard to separate from the neutral candidates.

The E/P ratios for buy candidates is lower than in “Probabilistic” with levels close to those of neutral and sell candidates. In 1997 the E/P is the same for buy, sell and neutral candidates. 1997 was also the formation year of the best portfolios which on average generated 109.1%. There are no apparent differences in D/P between the sell candidates and the sample average.

REALISTIC RETURN METRIC

Table 10.4: Summary of results for 36-Month Market Adjusted Buy and Hold Returns, strategy “Relative”

The mean returns for the Full Period (1988-2004), Period I (1988-1995), Period II (1996-2004) and for each vintage year are calculated as the average 36-Month Market Adjusted Buy and Hold returns an investor would realize by holding the hedge portfolios formed over the specific time period. The t- and "p-val" in the table refers to the null hypothesis that the mean return for the specific time period is less than or equal to zero. The hypothesis is tested with one-sided student's t-tests.

Summary of 36-Month Market Adjusted Buy and Hold Returns													
Period	**Mean**	**t-value**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**
Full Period	40.3%	15.14	0.000	**1988**	-7.6%	0.951	**1994**	15.8%	0.000	**2000**	25.3%	0.000
Period I	43.1%	13.09	0.000	**1989**	38.5%	0.000	**1995**	54.3%	0.000	**2001**	14.7%	0.000
Period II	37.6%	9.19	0.000	**1990**	88.3%	0.000	**1996**	83.2%	0.000	**2002**	-4.8%	0.955
				1991	67.2%	0.000	**1997**	109.1%	0.000	**2003**	-0.5%	0.611
				1992	52.0%	0.000	**1998**	75.4%	0.000	**2004**	-14.4%	1.000
				1993	36.7%	0.000	**1999**	41.9%	0.000			

The returns of the hedge portfolio are significantly larger than zero for the Full Period as well as for Period I and Period II at the 1% level. Examining the returns for single years, most are significantly larger than zero on the 1% level. Returns referring to the years 2002, 2003 and 2004 are not significantly larger than zero. Over all, the returns come from successful positions in both the long and the short portfolios. The average return for the full period is 40.3% compared to 26.3% in “Probabilistic”.

STATISTICAL RETURN METRIC

Table 10.5: Summary of regression results for strategy "Relative" using the Capital Asset Pricing Model

Regression model: $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

Refer to Table 10.2. α represents the monthly abnormal return for the corresponding portfolio for each time period. The "p-val" refer to the probability of the corresponding individual null hypothesis of α=0 and β=0 respectively. For standard errors of the estimates, R-Square and F-statistics refer to Appendix 4.

Capital Asset Pricing Model: "Relative" vs. S&P100 Benchmark Index												
	Full Period (1988-2007)				Period I (1988-1995)				Period II (1996-2007)			
Portfolio	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**
Long	0.003	0.009	0.894	0.000	0.001	0.537	0.948	0.000	0.004	0.007	0.860	0.000
Short	-0.002	0.082	0.906	0.000	0.000	0.843	0.785	0.000	-0.002	0.157	0.997	0.000
Hedge	0.005	0.014	-0.011	0.811	0.001	0.636	0.163	0.023	0.006	0.024	-0.137	0.027

The hedge portfolio generates positive abnormal returns of 0.5% (6.0% annually) for the Full Period, significant on a 5% level. The return to the hedge portfolio is insignificant for Period I but it is rather large, positive and significant on the 5% level for Period II. The beta values are all significant and close to 1 and there are no real differences over the periods.

Table 10.6: Summary of regression results for strategy "Relative" using the Three-Factor-Model

Regression model: $r_{pt} - rf_t = \alpha + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

Refer to Table 10.3 for information regarding the regression. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α=0, β_1=0, β_{hml}=0 and β_{smb}=0 respectively. For standard errors of the estimates, R-Square and F-statistics refer to Appendix 4.

Three-Factor-Model: "Relative" vs. S&P100 Benchmark Index								
Portfolio	**α**	**p-value**	**β_1**	**p-value**	**B_{hml}**	**p-value**	**B_{smb}**	**p-value**
				Full Period (1988-2007)				
Long portfolio	0.003	0.011	0.894	0.000	0.017	0.572	0.041	0.236
Short portfolio	-0.002	0.089	0.910	0.000	0.009	0.789	-0.099	0.009
Hedge portfolio	0.005	0.016	-0.016	0.729	0.008	0.881	0.140	0.027
				Period I (1988-1995)				
Long portfolio	0.000	0.781	0.981	0.000	0.179	0.012	0.170	0.005
Short portfolio	0.000	0.868	0.748	0.000	-0.209	0.004	-0.228	0.000
Hedge portfolio	0.000	0.949	0.233	0.001	0.389	0.001	0.398	0.000
				Period II (1996-2007)				
Long portfolio	0.004	0.006	0.863	0.000	-0.016	0.630	-0.021	0.603
Short portfolio	-0.002	0.179	0.996	0.000	0.035	0.338	-0.050	0.272
Hedge portfolio	0.006	0.026	-0.133	0.034	-0.050	0.415	0.029	0.713

The levels of the intercepts (α) are similar to those of the "Probabilistic" strategy with significant positive abnormal returns to the hedge portfolio of 0.5% (5.8% annualized) for the Full Period. The hedge portfolio intercept is positive and significant on the 5% level for Period II while it is insignificant for Period I. The returns generated in Period I can, hence, be fully explained by market risk, B/M- and size related risk. In other words, the returns are similar to what would have been expected using traditional "Value-Growth" investing. B_{hml} is significant for Period I with a positive factor loading for the long portfolio and a negative for the short portfolio. The resulting HML factor loading for the hedge portfolio is relative large (0.39) and significant on the 1% level. An almost identical relationship is observed for the SMB factor loading. The findings shows that the inclusion of more (fewer) buy (sell) candidates compared to "Probabilistic" decreased the factor loadings of B/M proxied risk from 0.28 to 0.18 and size proxied risk from -0.12 to -0.21. This is in line with our observations with regards to B/M, market capitalization and E/P in Period I. The lower risk-adjusted returns for “Relative” compared to “Probabilistic” provide support for the latter’s arguably closer connection to the intuition of the model and economic theory as a smaller part of the returns in the “Probabilistic” strategy can be explained by exposure to systematic risk. The large difference in the Realistic Return metric of 20% (40.3% - 26.3%) more than disappears after risk adjustments.

10.3. Evaluations Against the “Benchmark” Strategy

The “Benchmark” strategy generates an average negative return of 20.7% for to the Full Period using the Realistic Return Metric. Not surprisingly, as it was the intention, the “Benchmark” strategy finds buy and sell candidates with characteristics in line with traditional “Value-Growth” investing schemes. The risk adjusted returns are not significant in any of the Statistical Metrics. The β_{hml} and β_{smb} are positive (negative) and significant for the long (short) portfolios proving robustness to our methods. In Period I, the hedge portfolio generates a significant negative annualized abnormal return of 10% in the Three-Factor Metric.

Returns and the Realistic Return Metric

Figure 19: Buy and hold returns if portfolios held Full Period

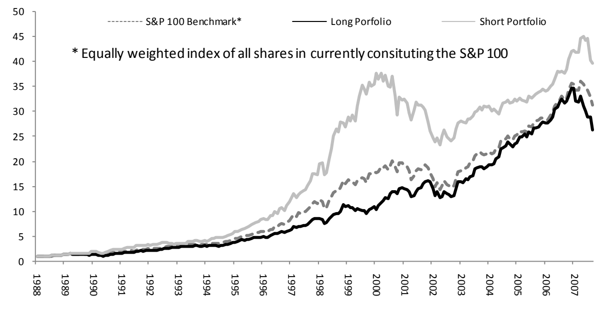


Figure 20: Three year buy and hold returns per vintage year

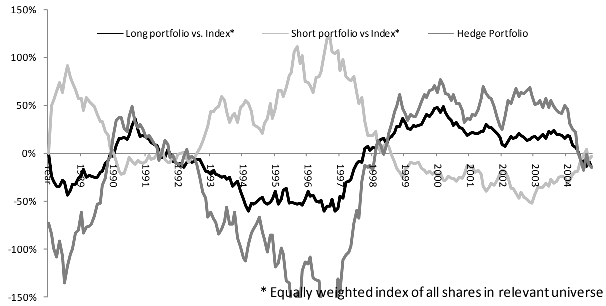


Table 10.7: Summary of results for 36-Month Market Adjusted Buy and Hold Returns, strategy

The mean returns for the Full Period (1988-2004), Period I (1988-1995), Period II (1996-2004) and for each vintage year are calculated as the average 36-Month Market Adjusted Buy and Hold returns an investor would realize by holding the hedge portfolios formed over the specific time period. The t- and “p-val” in the table refers to the null hypothesis that the mean return for the specific time period is less than or equal to zero. The hypothesis is tested with one-sided student’s t-tests.

Summary of 36-Month Market Adjusted Buy and Hold Returns

Period	Mean	t-val	p-val	Vintage	Mean	p-val	Vintage	Mean	p-val	Vintage	Mean	p-val
Full	-20.7%	-4.16	1.000	**1988**	-98.8%	1.000	**1994**	-88.9%	1.000	**2000**	55.9%	0.000
Period I	-53.2%	-9.46	1.000	**1989**	-51.0%	1.000	**1995**	-130.7%	1.000	**2001**	48.8%	0.000
Period II	8.7%	1.26	0.105	**1990**	31.8%	0.000	**1996**	-145.9%	1.000	**2002**	56.8%	0.000
				1991	5.7%	0.036	**1997**	-69.2%	1.000	**2003**	49.9%	0.000
				1992	-19.1%	0.995	**1998**	22.5%	0.004	**2004**	7.7%	0.149
				1993	-74.2%	1.000	**1999**	51.5%	0.000			

In contrary to the “Probabilistic” and “Relative” strategies which realize their best returns to the hedge portfolio over the early and mid 90’s and around the dot-com bubble the “Benchmark” strategy realizes its worst returns from 1994 to 1997 (held to 1997 and 2000), in accordance with Chan and Lakonishok (2004). The hedge portfolio formed in January 1997 (held to 2000) generates a negative return of -176%. The negative returns to the hedge portfolio are deduced from the fact that the short portfolio outperforms the long portfolio over almost all years up until 1998. The returns to the hedge portfolio are, however, in line with "Probabilistic" the years 1999 to 2001 (held to 2002 and 2004) and better than both our strategies thereafter. The average returns from the hedge portfolio are significantly less than zero for the Full Period and for Period I at the 1% level. Examining the returns for single years, returns for eight of the years are significantly less than zero while returns for five of the years are significantly larger than zero. All returns significantly less than zero refers to portfolios formed before 1998. Refer to Appendix 5 for t-tests and a comparison of "Relative" vs. "Benchmark".

STATISTICAL RETURN METRIC

Three-Factor-Model Regressions for "Benchmark"

As seen in Table A 14, Appendix 5, the "Benchmark" strategy does not generate significant abnormal returns for the Full Period. In Period I the hedge portfolio generates a negative return of -0.9% (-10% annualized) significant at the 1% level while insignificant in Period II. The β_{hml} is highly significant and positive (negative) for the long (short) portfolio for all periods on the 1% level. The same relationship is true for the SMB with most being significant at the 1%, 5% or 10% level. For the Full Period, the β_{smb} is significant on the 5% level. The large and significant HML factor loadings provides support to our methodology and results as the "Benchmark" strategy is constructed on a B/M ranking. Compared to our two strategies the β_{hml} and β_{smb} for the hedge portfolio are larger suggesting that by selecting companies based on "Value-Growth" characteristics one have a higher exposure to systematic risk.

COMPARISON OF "VALUE-GROWTH" - CHARACTERISTICS

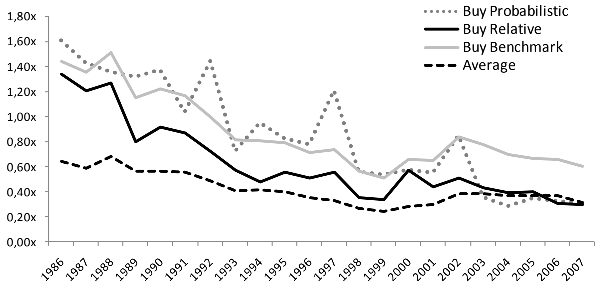


Figure 21: Book-to-market: "Buy" candidates for all strategies

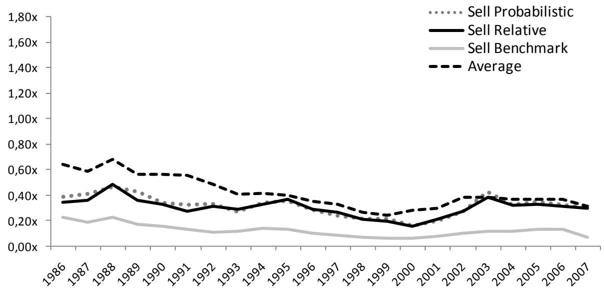


Figure 22: Book-to-market: "Sell" candidates for all strategies

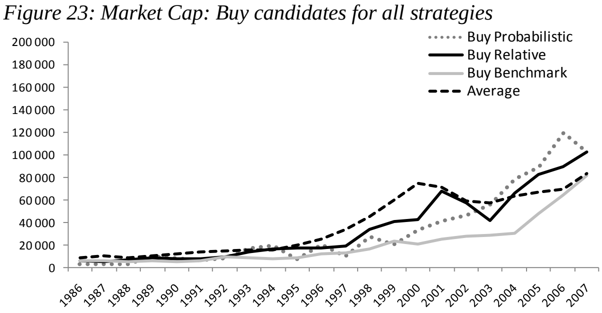


Figure 23: Market Cap: Buy candidates for all strategies

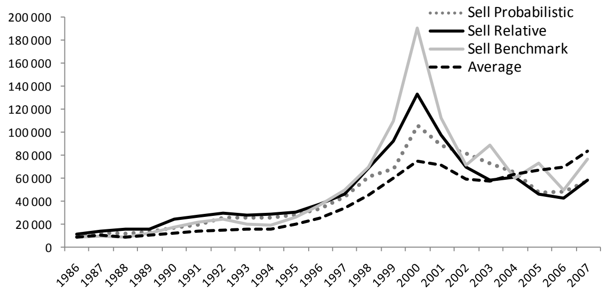


Figure 24: Market Cap: Sell candidates for all strategies

The B/M relationship is, as expected, clear cut for the "Benchmark" strategy. There is a large difference between the "Benchmark" strategy and our two strategies when it comes to indentifying sell candidates. Many of the sell candidates in our two strategies would have been considered as neutral candidates in the "Benchmark" strategy. Ex post, our strategies are correct in restraining from taking short positions in such shares as the shares identified and shorted by the "Benchmark" strategy outperform the market over the holding period while the companies we take short positions in underperform the market. From a buy candidate perspective, the relationship is relatively unclear. The buy candidates in our two strategies have on average the same B/M as a traditional "Value-Growth" investing scheme would have selected. In general, all strategies seem to find buy (sell) candidates with B/M higher (lower) than the sample average. This does, however, not imply that the different trading strategies select the same companies. Our return findings suggests that high B/M has not been a sufficient characteristic in finding companies that on average generate above market returns. However, companies that in general have generated above market returns tend to have higher than sample average B/M. Companies that generated below market returns were not identifiable by low B/M and the lowest B/M firms actually generated above market returns. The findings suggests that our model is better at identifying companies generating above (below) market returns because of an ability to separate a genuinely good (bad) company from an overvalued (undervalued) by quantifying implied deviations from historical data instead of using ratios involving share prices and accounting ratios. The use of the industry specific PMB could also explain why we avoid some of the problems encountered for the "Benchmark" strategy in selecting sell candidates. Cross sectional differences between industries in asset recognition and capitalization of intangible assets should affect B/M and be hard for "Benchmark" to handle, resulting in a systematical selection of companies in certain industries rather than companies expected to generate abnormal returns. Assuming that dot-com companies have less tangible or capitalized assets, the "Benchmark" strategy would be tilted towards such companies. A company with few capitalized assets would all else equal have a low B/M and would look relatively more overvalued in the "Benchmark" strategy while this is not true in our strategies. Assuming that the company in question would, for example, have had very high profitability in the past years, we could identify it as a buy candidate if the implied future profitability is comparably low. With the help of the PMB our model would also have recognized that the company in question is expected to have a high profitability and B/M due to accounting biases in a steady state.

The "Benchmark" strategy has the same tendency as our strategies towards finding sell candidates with higher than average market capitalization. During the dot-com bubble the "Benchmark" strategy finds sell candidates of almost twice the market capitalization compared to "Probabilistic" strategy and 43% larger than "Relative". The same type of relationship, yet inverted, is observed for the buy candidates. As size, all else equal, is inherently connected to B/M, the "Benchmark" strategy is expected to find buy (sell) candidates among small (large) companies while our valuation model should have no such tendency. Judging from the returns on portfolios formed up until 1998, we are right in our assessment of buy and sell candidates but the opposite is true after formation year 2004 where we are outperformed by "Benchmark".

RETURN ON EQUITY

Figure 25: Historical Return on Equity: Buy Candidates

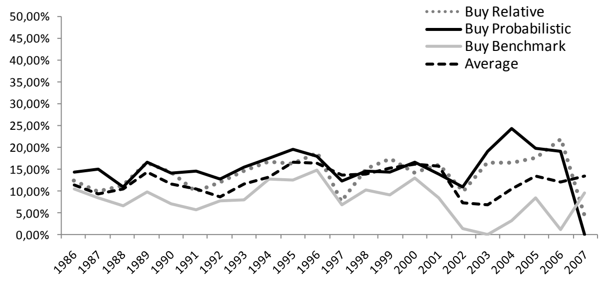
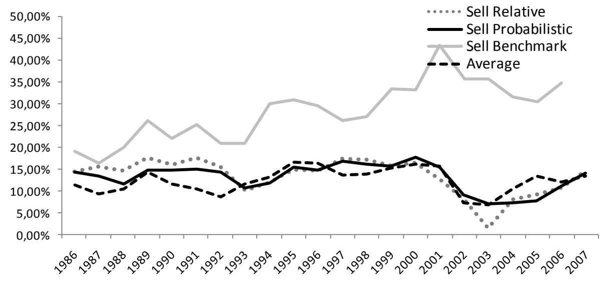


Figure 26: Historical Return on Equity: Sell Candidates



In order to further be able to characterize differences between the strategies, we use the relationship that E/P divided by B/M[15] is equal to E/B, the expression for previous years return on equity. It now becomes easy to show the main divergence between the "Benchmark" strategy and our strategies. There are no apparent differences between our buy and sell candidates with respect to the last realized return on equity. This underlines the fact that we do not take positions based on historical performance, but on a judgment on the assessment of the reasonableness of future implied profitability in the light of past performance. The "Benchmark" strategy on other hand implicitly systematically finds sell (buy) candidates among companies with high (low) return on equity, irrespective if it is

[15] As a reminder, M = Market Price = P

reasonable or not. The reason for this is a high correlation between B/M and E/P, due to the fact that both ratios use the market value in the denominator, generating an endogeneity problem. This also shows the large inherent problem with differences in accounting standards as described above. The fewer capitalized assets, the higher the return on equity, solely due to conservative accounting. Altogether, this could very well be the explanation for the poor performance of “Value-Growth” strategies during the late 90’s. The findings further explain why our strategies on several occasions take the direct opposite trading positions to that of the “Benchmark” strategy. This means that we find some companies to be among the 20% most undervalued companies in the “Relative” strategy, while at the same time they are among the 20% most overvalued in the “Benchmark” strategy. In addition to this, the findings yet again show how hard it is to separate our buy and, especially, our sell candidates from the average sample company.

11. SUMMARY AND CONCLUSIONS

We develop a trading model that aims at avoiding a circularity and endogeneity problem found in previous research. These problems primarily come from the use of market sentiment and current market prices in estimating a fundamental value, a value later used to make assessments of current market prices. As any test of abnormal returns is a simultaneous test of the asset pricing model, we use both the Capital Asset Pricing Model and the Three-Factor-Model. In order to overcome problems with regards to implementability and transaction costs we develop a realistic trading strategy that can be implemented by investors. For comparability and robustness we also develop a strategy replicating traditional "Value-Growth" investing, historically found to generate abnormal CAPM returns. We create a benchmark index to control for problems related to survivorship and selection biases in the data sample.

To summarize our findings, we show that we are able to generate statistically significant positive abnormal returns in both the Realistic and the Statistical Return Metrics using our trading strategies. Our returns are comparable to those of e.g. Lee et al. (1998) and Jamin (2005) but higher than those of Skogsvik (2002) and Ou and Penman (1989). One could, however, question the comparability of these returns due to the use of different datasets and time periods.

Table 11.1: Summary of return findings

	Realistic Return Metric	**Statistical Return Metrics**	
Strategy	36-Month Market Adjusted Buy and Hold Returns	CAPM	Three Factor
Probabilistic	26.3%	7.5%	7.0%
Relative	40.3%	6.0%	5.8%
(Benchmark)	(-20.7%)	(-)	(-)

In general our results indicate that by avoiding market sentiment, in combination with a reliance on historical financial data, notions of accounting measurement biases and traditional ideas of market forces, it would historically have been possible to generate abnormal returns in our sample. The results for the "Benchmark" strategy are in line with other findings on data from the late 90's where "Growth" firms significantly outperformed "Value" firms.

We are able to generate above expected returns in both "normal" markets and around major market dislocations. This was not the case with the "Benchmark" strategy which struggled in the buildup of the dot-com bubble. We further find that our proprietary strategies are generating better returns when the differences in "Value-Growth" characteristics between buy and sell candidates are smaller. Hence, by not compounding current market sentiment into the valuation we seem to be able to avoid falling for the temptations of a rising bubble as well as distance ourselves from B/M and other related characteristics in finding buy and sell candidates. The use of the Permanent Measurement Bias also seems to have helped us in controlling for cross-sectional differences in accounting, avoiding a subsequent bias towards certain industries. A major difference that further underlines the dissimilarity between our trading strategies and the "Benchmark" is the latter's systematic selection of companies with high (low) return on equity as sell (buy) candidates.

We consider the most important finding to be that our primary strategy, "Probabilistic", consistently find more sell than buy candidates for all years except in 2003 while at the same time the short portfolio consistently generates lower returns than the S&P100 Benchmark Index. This suggests that, historically, the market has systematically overvalued certain types of firms identifiable by our valuation model and trading strategy. What is surprising is that our sell candidates do not exhibit characteristics similar to those used to identify sell candidates in the "Value-Growth" framework. The finding that the short portfolio is a large and consistent source of returns to the hedge portfolio is the opposite of what previous research, e.g. Skogsvik and Skogsvik (2005), have found.

Important is, however, that the returns do not have to imply that the market is inefficient in incorporating value-relevant information. The observed above expected returns could be compensation for risk. That means that the companies we identify as buy (sell) candidates generate on average higher (lower) returns as they may have been discounted more (less) than the average company due to having higher (lower) risk. This line of reasoning is similar to that of Fama and French (1993) who argue that the higher (lower) returns observed for companies with higher (lower) B/M is a result of such companies having higher (lower) exposure to systematic risk. Nevertheless, according to our findings, high B/M has not on average been a sufficient characteristic for generating higher than expected returns but on average a necessary one. Yet, lower than average B/M has not on average been neither a sufficient nor a necessary characteristic for generating below expected returns, rather the opposite.

We have an intricate situation when it comes to interpret the implications of our findings with regards to market efficiency. From a buy candidate perspective, some connection with B/M characteristics exists, hence, the returns could be argued to be compensation for risk proxied by B/M and Size. We do, however, not see that the HML and SMB factor loadings can explain much of our returns. This would rather indicate something in line with the characteristics explanation, e.g. Daniel and Titman (1997), or investor being naïve in performance extrapolation, e.g. Lakonishok et al. (1994) and Haugen (1997). Sell candidates do, however, lack a clear connection with B/M characteristics while consistently generating below expected returns. Our valuation model is designed not to systematically choose firms with certain characteristics making it more challenging to motivate an explanation along the lines of the characteristics theory or systematic risk. Given the lack of clear characteristics for the sell candidates, it is hard to argue how investors should identify such risk or prefer those firms over other firms. An area for future research would be to identify other characteristics correlated with our returns, especially for the short portfolio.

To elaborate further, by studying “Value” and “Growth” characteristics in our sample in combination with the Three-Factor-Model regression results one would be inclined to believe that B/M and Size were initially good proxies for systematic risk but, as “Value-Growth” strategies became widely used in the investment community, companies with different B/M and Size characteristics have become more similar with regards to returns as investors have bid away the value premium. Hence, it may be that B/M and Size are no longer correlated with the underlying risk that they initially were assumed to proxy. In any case, the return dichotomy between high and low B/M firms does not seem to hold in our sample.

The results highlight some problems with the metaphysical approach to risk inherent in the Fama and French (1993) framework. As the ontological nature of the unobservable risk is relatively unclear it is challenging to explain abnormal returns in the Three-Factor risk and return metric. On the other hand, the lack of clear characteristics, especially among sell candidates, makes it difficult to argue for a characteristics or behavioral approach.

So far, the only consistent characteristic we find among our sell candidates is the fact that they generate below expected returns. Hence, even though we cannot rule out the risk explanation completely, our results make us inclined to believe that over our sample period and among our sample companies, fundamental analysis has not been fundamental enough.

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APPENDIX 1: S&P100 REGULATIONS

CRITERIAS FOR INDEX ADDITIONS

Only companies included in the S&P 500 are eligible for inclusion in the S&P 100. The index is subjected to the published criteria for additions and deletions for the S&P 500, as follows.

• Options. All stocks added to the S&P 100 must maintain exchange-listed options.

• U.S. Company. Determining factors include location of the company's operations, its corporate structure, its accounting standards, and its exchange listings.

• Market Capitalization. Companies with market cap in excess of US$ 5 billion. This minimum is reviewed from time to time to ensure consistency with the market conditions.

• Public Float. There must be public fl oat of at least 50%.

• Financial Viability. Companies should have four consecutive quarters of positive as-reported earnings, where as-reported earnings are defined as GAAP Net Income excluding discontinued operations and extraordinary items.

• Adequate Liquidity and Reasonable Price. The ratio of annual dollar value traded to market capitalization for the company should be 0.30 or greater. Greater liquidity, however, signals market importance and increases likelihood of selection for the S&P 100.

• Sector Representation. Companies' industry classifications contribute to the maintenance of a sector balance that is in line with the sector composition of the S&P 500. Continued index membership is not necessarily subject to these guidelines. The Index Committee strives to minimize unnecessary turnover in index membership and each removal is determined on a case-by-case basis.

CRITERIA FOR INDEX REMOVALS

• Companies that substantially violate one or more of the criteria for index inclusion.

• Companies involved in merger, acquisition, or significant restructuring such that they no longer meet the inclusion criteria.

Information extracted from the Standard and Poor's Website (www.standardandpoors.com) as of May 6^{th} 2008.

APPENDIX 2: PERMANENT MEASUREMENT BIAS MAPPING

Table A.1: Mapping of the Permanent Measurement Bias

Each company is assigned a Permanent Measurement Bias (PMB) by linking each company's IBIND industry code to the Industry codes used in Runsten (1998). The IBIND industry codes are downloaded from Thompsons DataStream.

Ticker	Company	IBIND	Ticker	Company	IBIND
U:MMM(P)	3M Company	XCONSSVC	U:HAL(P)	Halliburton Co.	OIL
U:ABT(P)	Abbott Labs	DRUGS	U:HIG(P)	Hartford Financial Svc.Gp.	INSURE
U:AES(P)	AES Corp.	ELECUTIL	U:HNZ(P)	Heinz (H.J.)	FOOD
U:AA(P)	Alcoa Inc	METALS	U:HPQ(P)	Hewlett-Packard	COMPUTER
U:ALL(P)	Allstate Corp.	INSURE	U:HD(P)	Home Depot	RETGOODS
U:MO(P)	Altria Group, Inc.	TOBACCO	U:HON(P)	Honeywell Int'l Inc.	MULTCAP
U:AEP(P)	American Electric Power	ELECUTIL	@INTC(P)	Intel Corp.	SEMICOND
U:AXP(P)	American Express	FINSVC	U:IBM(P)	International Bus. Machines	COMPUTER
U:AIG(P)	American Int'l. Group	INSURE	U:IP(P)	International Paper	FOREST
@AMGN(P)	Amgen	BIOTECH	U:JNJ(P)	Johnson & Johnson	DRUGS
U:BUD(P)	Anheuser-Busch	BEVERAGE	U:JPM(P)	JPMorgan Chase & Co.	BANKING
@AAPL(P)	Apple Inc.	COMPUTER	U:KFT(P)	Kraft Foods Inc-A	FOOD
U:T(P)	AT&T Inc.	TELUTIL	U:LEH(P)	Lehman Bros.	INVEST
U:AVP(P)	Avon Products	COSMETIC	U:MCD(P)	McDonald's Corp.	RETFOODS
U:BHI(P)	Baker Hughes	OIL	U:MDT(P)	Medtronic Inc.	MEDSUP
U:BAC(P)	Bank of America Corp.	BANKING	U:MRK(P)	Merck & Co.	DRUGS
U:BK(P)	Bank of New York Mellon Corp.	BANKING	U:MER(P)	Merrill Lynch	INVEST
U:BAX(P)	Baxter International Inc.	MEDSUP	@MSFT(P)	Microsoft Corp.	SOFTWARE
U:BA(P)	Boeing Company	DEFENSE	U:MS(P)	Morgan Stanley	INVEST
U:BMY(P)	Bristol-Myers Squibb	DRUGS	U:NSC(P)	Norfolk Southern Corp.	RAILROAD
U:BNI(P)	Burlington Northern Santa Fe C	RAILROAD	U:NYX(P)	NYSE Euronext	FINSVC
U:CPB(P)	Campbell Soup	FOOD	@ORCL(P)	Oracle Corp.	SOFTWARE
U:COF(P)	Capital One Financial	FINSVC	U:PEP(P)	PepsiCo Inc.	BEVERAGE
U:CAT(P)	Caterpillar Inc.	MACHINE	U:PFE(P)	Pfizer, Inc.	DRUGS
U:CBS(P)	CBS Corp.	COMMUN	U:PM(P)	Philip Morris Intl.	TOBACCO
U:CVX(P)	Chevron Corp.	OIL	U:PG(P)	Procter & Gamble	HOMEPROD
U:CI(P)	CIGNA Corp.	INSURE	U:RTN(P)	Raytheon Co. (New)	DEFENSE
@CSCO(P)	Cisco Systems	O/C EQPT	U:RF(P)	Regions Financial Corp.	FINANCE
U:C(P)	Citigroup Inc.	FINANCE	U:ROK(P)	Rockwell Automation, Inc.	MACHINE
U:CCU(P)	Clear Channel Communications	COMMUN	U:SLE(P)	Sara Lee Corp.	FOOD
U:KO(P)	Coca Cola Co.	BEVERAGE	U:SLB(P)	Schlumberger Ltd.	OIL
U:CL(P)	Colgate-Palmolive	HOMEPROD	U:SO(P)	Southern Co.	ELECUTIL
@CMCSA(P)	Comcast Corp.	COMMUN	U:S(P)	Sprint Nextel Corp.	TELUTIL
U:COP(P)	ConocoPhillips	OIL	U:TGT(P)	Target Corp.	RETGOODS
U:COV(P)	Covidien Ltd.	MEDSUP	U:TXN(P)	Texas Instruments	SEMICOND
U:CVS(P)	CVS Caremark Corp.	RETGOODS	U:TWX(P)	Time Warner Inc.	COMMUN
@DELL(P)	Dell Inc.	COMPUTER	U:TYC(P)	Tyco International (New)	MULTCAP
U:DOW(P)	Dow Chemical	CHEMICAL	U:UPS(P)	U.S. Bancorp	MULTTRAN
U:DD(P)	Du Pont (E.I.)	CHEMICAL	U:UTX(P)	United Parcel Service	MULTCAP
U:EP(P)	El Paso Corp.	GASUTIL	U:UNH(P)	United Technologies	SRVCSMED
U:EMC(P)	EMC Corp.	OTHERCOM	U:USB(P)	UnitedHealth Group Inc.	BANKING
U:ETR(P)	Entergy Corp.	ELECUTIL	U:WB(P)	Wachovia Corp. (New)	BANKING
U:EXC(P)	Exelon Corp.	ELECUTIL	U:WMT(P)	Wal-Mart Stores	RETGOODS
U:XOM(P)	Exxon Mobil Corp.	OIL	U:DIS(P)	Walt Disney Co.	LEISURE
U:FDX(P)	FedEx Corporation	MULTTRAN	U:WFC(P)	Wells Fargo	BANKING
U:F(P)	Ford Motor	AUTO	U:VZ(P)	Verizon Communications	TELUTIL
U:GD(P)	General Dynamics	DEFENSE	U:WY(P)	Weyerhaeuser Corp.	FOREST
U:GE(P)	General Electric	MULTCAP	U:WMB(P)	Williams Cos.	GASUTIL
U:GS(P)	Goldman Sachs Group	INVEST	U:XRX(P)	Xerox Corp.	ELECT
@GOOG(P)	Google Inc.	SOFTWARE			

Mapping of Permanent Measurement Bias Between Runsten(1998) specifications and IBIND-Codes

IBIND Code	Runsten (1998)	PMB	IBIND Code	Runsten (1998)	PMB
BIOTECH	Pharmaceutical	1.75	SOFTWARE	Consultants and computer	0.59
DRUGS	Pharmaceutical	1.75	COMPUTER	Consultants and computer	0.59
COMMUN	Capital intensive service	0.76	HOMEPROD	Mixed building and real estate	0.55
RETFOODS	Consumer goods	0.72	MEDSUP	Trading and retail	0.47
COSMETIC	Consumer goods	0.72	RETGOODS	Trading and retail	0.47
TOBACCO	Consumer goods	0.72	SRVCSMED	Trading and retail	0.47
BEVERAGE	Consumer goods	0.72	FOOD	Trading and retail	0.47
BANKING	Investment companies	0.68	CHEMICAL	Chemical Industry	0.44
INVEST	Investment companies	0.68	SEMICOND	Engineering	0.33
FINSVC	Investment companies	0.68	DEFENSE	Engineering	0.33
INSURE	Investment companies	0.68	MACHINE	Engineering	0.33
FINANCE	Investment companies	0.68	AUTO	Engineering	0.33
FOREST	Pulp and paper	0.67	GASUTIL	Other	0.31
RAILROAD	Shipping	0.65	TELEUTIL	Other	0.31
LEISURE	Other service	0.62	ELECUTIL	Other production	0.31
MULTTRAN	Other service	0.62	OIL	Other production	0.31
ELECT	Consultants and computer	0.59	METALS	Other production	0.31
OTHERCOM	Consultants and computer	0.59	MULTICAP	Conglomerates	0.28
O/C EQPT	Consultants and computer	0.59	XCONSSVC	Conglomerates	0.28

APPENDIX 3: STRATEGY "PROBABILISTIC" (USING ALL 135 COMPANIES)

We identify 35 companies that have been excluded from the S&P100 index during the time period 2000 to 2008 and rerun the "Probabilistic" strategy using the extended data sample of 135 companies. The average 36-Month Buy-and-Hold Return amounts to 30% compared to 26.3% when 100 companies are included. More specific differences are that the extended sample generates slightly better returns during 1993 to 1998 while it generates worse returns over the years 2000-2002. The main reason to the negative impact on the performance in the early 00's appear to be that 7 of the 35 "new" companies are engaged in merger activities during a time when companies in general are seen as overvalued by our model. Thus, we are more likely have a short position in these companies. This ultimately means that our returns are negatively affected by any potential bid premiums. One should note that we have not made any

adjustments to these returns even though it would be reasonable to assume that one would have closed the short position as soon as the bid was announced. A strategy like this would probably imply that the negative effect of such bid premiums would not be slightly lower. Despite the negative effect of mergers, as explained above, the average returns over the Full period as well as over both sub periods are higher compared to the returns generated by the "Probabilistic" strategy including 100 companies. This is mainly due to that we are very well positioned i.e. have short positions in many of the stocks that eventually are excluded from the sample for reasons referring to poor performance. Hence, we see this as further evidence on the robustness of our model. Please refer to Table A.2 for 36-Month Market Adjusted Buy and Hold Returns.

The returns to the hedge portfolio are positive and significant at the 5% level for CAPM of 0.5% (6.5% annualized) (Table A.3) and the Three Factor Model at the 5% level of 0.5% (6.1% annualized) (Table A.4). The returns to the hedge portfolio are insignificant for Period I in both models while significant in Period II. β_{hml} significant at the 5% level for the hedge portfolio during the Full Period as well as the Period I & II. The returns are slightly lower to the hedge portfolio compared to when using the 100 companies and the results indicate that the explanation is a higher exposure to risk proxied by Book-to-Market.

In conclusion, there are no major differences from the sample consisting of 100 companies where the Realistic Return Metric showed higher returns while the Statistical Return Metrics gave slightly lower returns if the additional 35 companies are included. Note however that the corrections discussed above regarding closing short positions right after merger announcement should affect our results negatively.

Table A.2: Summary of results for 36-Month Market Adjusted Buy and Hold Returns

Each month during the period 1988-2004 the difference in monthly returns over the S&P100 Benchmark Index for the long and short portfolio is used to calculate monthly market adjusted returns to the hedge portfolio. For every month a 36-Month Buy and Hold portfolio is created replicating the return an investor would realize by investing in the strategy for that particular month and holding it for 36-months reinvesting all capital distributions. This results in twelve simulated 36-Month portfolios per year, i.e., one for every month. The mean returns for the Full Period (1988-2004), Period I (1988-1995), Period II (1996-2004) and for each vintage year are calculated as the average 36-Month Market Adjusted Buy and Hold returns an investor would realize by holding the hedge portfolios formed over the specific time period. The t- and p-values in the table refers to the null hypothesis that the mean return for the specific time period is less than or equal to zero. The hypothesis is tested with a student's t-test.

Summary of 36-Month Market Adjusted Buy and Hold Returns

Period	**Mean**	**t-val**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**	**Vintage**	**Mean**	**p-val**
Full Period	30.0%	4.36	0.000	**1988**	-16.2%	1.000	**1994**	36.4%	0.000	**2000**	52,1%	0,000
Period I	34.1%	3.31	0.007	**1989**	9.0%	0.106	**1995**	14.6%	0.000	**2001**	18,1%	0,000
Period II	26.3%	2.74	0.013	**1990**	59.8%	0.000	**1996**	-4.8%	0.876	**2002**	6,0%	0,019
				1991	47.0%	0.000	**1997**	34.5%	0.000	**2003**	8.7%	0.000
				1992	68.6%	0.000	**1998**	67.4%	0.000	**2004**	-7,7%	0,999
				1993	53.8%	0.000	**1999**	62.6%	0.000			

Table A.3: Summary of regression results using the Capital Asset Pricing Model

Regression model: $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The rpt – rft is the excess monthly returns of portfolio p over the risk free rate, time t. The rmt – rft is the equally-weighted monthly excess returns on all 135 stocks in the sample (the S&P100 Benchmark Index). rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. . α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α =0 and β=0 respectively.

CAPM For "Probabilistic w. 135 Companies" Against S&P 100 Benchmark Index

	Full Period (1988-2007)				**Period I (1988-1995)**				**Period II (1996-2007)**			
Portfolio	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**	**α**	**p-val**	**β**	**p-val**
Long	0.005	0.004	0.635	0.000	0.003	0.129	0.811	0.000	0.006	0.066	0.519	0.000
Short	-0.001	0.319	0.868	0.000	-0.001	0.412	0.847	0.000	-0.001	0.671	0.883	0.000
Hedge	0.006	0.002	-0.233	0.000	0.004	0.104	-0.036	0.570	0.006	0.055	-0.365	0.000

Table A.4: Summary of regression results for strategy "Probabilistic" using the Three-Factor-Model

Regression model: $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt}$.

The regression is estimated for the long, short and the hedge portfolio. The rpt – rft is the excess monthly returns of portfolio p, time t. The rmt - rft is the equally-weighted monthly excess returns on the S&P100 Benchmark Index. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α =0, β1=0, βhml=0 and βsmb=0 respectively.

Three-Factor-Model For "Probabilistic w. 135 Companies" Against S&P 100 Benchmark Index								
Portfolio	**α**	**p-value**	**β**	**p-value**	β_{HML}	**p-value**	β_{SMB}	**p-value**
Full Period (1988-2007)								
Long	0.005	0.004	0.656	0.000	0.213	0.000	-0.145	0.012
Short	-0.001	0.351	0.879	0.000	-0.028	0.255	-0.132	0.000
Hedge	0.006	0.003	-0.223	0.000	0.241	0.000	-0.014	0.833
Period I (1988-1995)								
Long	0.002	0.364	0.881	0.000	0.262	0.004	-0.102	0.181
Short	-0.001	0.461	0.835	0.000	-0.117	0.018	-0.174	0.000
Hedge	0.003	0.283	0.046	0.485	0.380	0.001	0.072	0.437
Period II (1996-2007)								
Long	0.006	0.043	0.509	0.000	0.253	0.000	-0.137	0.090
Short	0.000	0.854	0.897	0.000	-0.013	0.669	-0.116	0.004
Hedge	0.006	0.053	-0.388	0.000	0.267	0.000	-0.021	0.812

APPENDIX 4: REGRESSION RESULTS

4.1 STRATEGY "PROBABILISTIC"

Table A.5: Summary of regressions "Probabilistic"

(top)

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(upper left) *Summary of regressions using the Capital Asset Pricing Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.* ***(upper right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

(bottom)

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(bottom left) *Summary of regressions using Three-Factor-Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.* ***(bottom right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Summary Regression Models: "Probabilistic" vs. CRSP

Capital Asset Pricing Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0351	0.2497	78.55	0.00
Short Portfolio	238	2	0.0231	0.6604	458.90	0.00
Hedge Portfolio	238	2	0.0330	0.1165	31.112	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0236	0.5724	157.94	0.00
Short Portfolio	120	2	0.0150	0.8078	496.01	0.00
Hedge Portfolio	120	2	0.0274	0.0161	1.94	0.17
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0421	0.1068	13.88	0.00
Short Portfolio	118	2	0.0289	0.5717	154.82	0.00
Hedge Portfolio	118	2	0.0370	0.2069	30.27	0.00
Three-Factor-Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0305	0.44	61.28	0.00
Short Portfolio	238	4	0.0205	0.7359	217.34	0.00
Hedge Portfolio	238	4	0.0323	0.1614	15.01	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0223	0.6259	64.71	0.00
Short Portfolio	120	4	0.0145	0.8252	182.51	0.00
Hedge Portfolio	120	4	0.0264	0.1015	4.37	0.01
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0352	0.3863	23.92	0.00
Short Portfolio	118	4	0.0245	0.6979	87.80	0.00
Hedge Portfolio	118	4	0.0364	0.2458	12.39	0.00

Summary Regression Models: "Probabilistic" vs. S&P100 Benchmark Index

Capital Asset Pricing Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0297	0.4619	202.58	0.00
Short Portfolio	238	2	0.0138	0.8786	1 708.30	0.00
Hedge Portfolio	238	2	0.0337	0.0752	19.201	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0223	0.6193	191.92	0.00
Short Portfolio	120	2	0.0129	0.8593	720.53	0.00
Hedge Portfolio	120	2	0.0274	0.015	1.79	0.18
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0357	0.3573	64.48	0.00
Short Portfolio	118	2	0.0145	0.892	958.57	0.00
Hedge Portfolio	118	2	0.0387	0.1333	17.84	0.00
Three-Factor-Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0275	0.5433	92.80	0.00
Short Portfolio	238	4	0.0136	0.8828	587.27	0.00
Hedge Portfolio	238	4	0.0322	0.162	15.08	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0215	0.6531	72.79	0.00
Short Portfolio	120	4	0.0122	0.8764	274.24	0.00
Hedge Portfolio	120	4	0.0264	0.1014	4.36	0.01
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0321	0.4882	36.24	0.00
Short Portfolio	118	4	0.0145	0.894	320.46	0.00
Hedge Portfolio	118	4	0.0361	0.2559	13.07	0.00

Table A.6: Summary of regressions "Probabilistic", contd

Capital Asset Pricing Model: **Regression:** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(left) *The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p over the risk free rate, time t. The $rm_t - rf_t$ is the monthly excess CRSP market returns. rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. .α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α=0 and β=0 respectively.* ***(right)*** *Same as above but where the $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Three Factor Model: **Regression:** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt}$

(top) *The regression is estimated for the long, short and the hedge portfolio. The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p, time t. The $rm_t - rf_t$ is the equally- monthly CRSP market excess returns. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of $\alpha=0$, $\beta_1=0$, $\beta_{hml}=0$ and $\beta_{smb}=0$ respectively.* ***(bottom)*** *Same as above but where the $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Capital Asset Pricing Model: "Probabilistic" vs. CRSP								
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0094	0.002	4.08	0.000	0.503	0.057	8.86	0.000
Short Portfolio	0.0044	0.002	2.89	0.004	0.801	0.037	21.42	0.000
Hedge Portfolio	0.0050	0.002	2.31	0.022	-0.297	0.053	-5.58	0.000
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0083	0.002	3.68	0.000	0.786	0.063	12.57	0.000
Short Portfolio	0.0047	0.001	3.25	0.002	0.887	0.040	22.27	0.000
Hedge Portfolio	0.0036	0.003	1.39	0.167	-0.101	0.073	-1.39	0.167
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0078	0.004	2.01	0.047	0.324	0.087	3.73	0.000
Short Portfolio	0.0033	0.003	1.23	0.220	0.743	0.060	12.44	0.000
Hedge Portfolio	0.0045	0.003	1.32	0.188	-0.420	0.076	-5.50	0.000

Capital Asset Pricing Model: "Probabilistic" Vs. S&P100 Benchmark Index								
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0042	0.002	2.11	0.036	0.680	0.048	14.23	0.000
Short Portfolio	-0.0018	0.001	-1.95	0.052	0.917	0.022	41.33	0.000
Hedge Portfolio	0.0061	0.002	2.66	0.008	-0.237	0.054	-4.38	0.000
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0030	0.002	1.32	0.188	0.769	0.055	13.85	0.000
Short Portfolio	-0.0012	0.001	-0.93	0.355	0.860	0.032	26.84	0.000
Hedge Portfolio	0.0042	0.003	1.51	0.133	-0.091	0.068	-1.34	0.183
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0044	0.003	1.32	0.189	0.613	0.076	8.03	0.000
Short Portfolio	-0.0017	0.001	-1.27	0.207	0.962	0.031	30.96	0.000
Hedge Portfolio	0.0061	0.004	1.7	0.092	-0.349	0.083	-4.22	0.000

Three-Factor-Model: "Probabilistic" vs. CRSP																
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.008	0.002	4.08	0.000	0.656	0.052	12.56	0.000	0.435	0.059	7.34	0.000	-0.192	0.067	-2.86	0.005
Short Portfolio	0.004	0.001	2.82	0.005	0.894	0.035	25.51	0.000	0.222	0.040	5.57	0.000	-0.192	0.045	-4.24	0.000
Hedge Portfolio	0.004	0.002	2.06	0.040	-0.239	0.055	-4.32	0.000	0.213	0.063	3.4	0.001	-0.001	0.071	-0.01	0.992
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.007	0.002	3.17	0.002	0.898	0.066	13.69	0.000	0.371	0.103	3.6	0.000	-0.084	0.085	-1.00	0.322
Short Portfolio	0.005	0.001	3.23	0.002	0.890	0.043	20.89	0.000	-0.034	0.067	-0.51	0.611	-0.186	0.055	-3.38	0.001
Hedge Portfolio	0.002	0.003	0.91	0.367	0.008	0.078	0.10	0.918	0.405	0.122	3.31	0.001	0.101	0.100	1.01	0.314
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.007	0.003	2.25	0.027	0.494	0.077	6.40	0.000	0.457	0.076	6.03	0.000	-0.194	0.097	-2.00	0.048
Short Portfolio	0.003	0.002	1.41	0.161	0.863	0.054	16.04	0.000	0.278	0.053	5.26	0.000	-0.185	0.068	-2.73	0.007
Hedge Portfolio	0.004	0.003	1.22	0.224	-0.369	0.080	-4.62	0.000	0.179	0.078	2.29	0.024	-0.009	0.100	-0.09	0.928

Three-Factor-Model: "Probabilistic" vs. S&P100 Benchmark																
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.004	0.002	2.07	0.039	0.695	0.044	15.70	0.000	0.273	0.052	5.26	0.000	-0.113	0.060	-1.87	0.063
Short Portfolio	-0.002	0.001	-1.9	0.059	0.920	0.022	41.94	0.000	-0.001	0.026	-0.03	0.973	-0.082	0.030	-2.73	0.007
Hedge Portfolio	0.006	0.002	2.57	0.011	-0.225	0.052	-4.34	0.000	0.274	0.061	4.51	0.000	-0.031	0.071	-0.44	0.660
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.002	0.002	0.7	0.483	0.836	0.058	14.53	0.000	0.280	0.097	2.9	0.004	-0.076	0.081	-0.93	0.356
Short Portfolio	-0.001	0.001	-0.75	0.454	0.842	0.033	25.80	0.000	-0.117	0.055	-2.13	0.035	-0.177	0.046	-3.82	0.000
Hedge Portfolio	0.002	0.003	0.92	0.361	-0.006	0.071	-0.08	0.938	0.397	0.119	3.34	0.001	0.101	0.100	1.01	0.316
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.004	0.003	1.45	0.149	0.587	0.069	8.47	0.000	0.303	0.069	4.41	0.000	-0.116	0.087	-1.34	0.182
Short Portfolio	-0.002	0.001	-1.18	0.239	0.962	0.031	30.72	0.000	0.016	0.031	0.51	0.609	-0.042	0.039	-1.08	0.282
Hedge Portfolio	0.006	0.003	1.77	0.080	-0.375	0.078	-4.82	0.000	0.287	0.077	3.72	0.000	-0.074	0.097	-0.76	0.449

4.2 STRATEGY "RELATIVE"

Table A.7: Summary of regressions "Relative"

(top)

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(upper left) *Summary of regressions using the Capital Asset Pricing Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.* ***(upper right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

(bottom

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(bottom left) *Summary of regressions using Three-Factor-Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.****(bottom right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Summary Regression Models: "Relative" vs. CRSP							**Summary Regression Models: "Relative" vs. S&P100 Benchmark Index**						
			Capital Asset Pricing Model							**Capital Asset Pricing Model**			
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Full Period**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0229	0.6653	469.10	0.00	Long Portfolio	238	2	0.0157	0.8412	1 250.52	0.00
Short Portfolio	238	2	0.0251	0.6171	380.42	0.00	Short Portfolio	238	2	0.0174	0.8159	1 046.12	0.00
Hedge Portfolio	238	2	0.0290	0.0001	0.028	0.87	Hedge Portfolio	238	2	0.0290	0.0002	0.057	0.81
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period I**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0207	0.7122	292.04	0.00	Long Portfolio	120	2	0.0163	0.8229	548.27	0.00
Short Portfolio	120	2	0.0180	0.7152	296.35	0.00	Short Portfolio	120	2	0.0171	0.7431	341.29	0.00
Hedge Portfolio	120	2	0.0287	0.0204	2.46	0.12	Hedge Portfolio	120	2	0.0284	0.0433	5.34	0.02
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period II**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0242	0.638	204.43	0.00	Long Portfolio	118	2	0.0151	0.8598	711.41	0.00
Short Portfolio	118	2	0.0309	0.5589	147.00	0.00	Short Portfolio	118	2	0.0169	0.8679	762.33	0.00
Hedge Portfolio	118	2	0.0291	0.0078	0.91	0.34	Hedge Portfolio	118	2	0.0286	0.0414	5.01	0.03
			Three-Factor-Model							**Three-Factor-Model**			
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Full Period**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0211	0.7169	197.50	0.00	Long Portfolio	238	4	0.0158	0.8422	416.36	0.00
Short Portfolio	238	4	0.0224	0.6984	180.59	0.00	Short Portfolio	238	4	0.0172	0.8223	360.82	0.00
Hedge Portfolio	238	4	0.0288	0.0223	1.78	0.15	Hedge Portfolio	238	4	0.0288	0.0224	1.79	0.15
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period I**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0201	0.7337	106.54	0.00	Long Portfolio	120	4	0.0156	0.8393	201.93	0.00
Short Portfolio	120	4	0.0171	0.7455	113.24	0.00	Short Portfolio	120	4	0.0160	0.778	135.47	0.00
Hedge Portfolio	120	4	0.0268	0.1642	7.60	0.00	Hedge Portfolio	120	4	0.0263	0.1931	9.25	0.00
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period II**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0206	0.7428	109.75	0.00	Long Portfolio	118	4	0.0152	0.8603	233.94	0.00
Short Portfolio	118	4	0.0258	0.6975	87.62	0.00	Short Portfolio	118	4	0.0168	0.8717	258.10	0.00
Hedge Portfolio	118	4	0.0291	0.0292	1.14	0.34	Hedge Portfolio	118	4	0.0287	0.0511	2.05	0.11

Table A.8: Summary of regressions "Relative", contd

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(left) *The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The* $r_{pt} - rf_t$ *is the excess monthly returns of portfolio p over the risk free rate, time t. The* $rm_t - rf_t$ *is the monthly excess CRSP market returns. rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. . α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α=0 and β=0 respectively.* ***(right)*** *Same as above but where the* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt}$.

(top) *The regression is estimated for the long, short and the hedge portfolio. The* $r_{pt} - rf_t$ *is the excess monthly returns of portfolio p, time t. The* $rm_t - rf_t$ *is the equally- monthly CRSP market excess returns. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α=0,* $\beta_1=0$, $\beta_{hml}=0$ *and* $\beta_{smb}=0$ *respectively.* ***(bottom)*** *Same as above but where the* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Capital Asset Pricing Model: "Relative" vs. CRSP								
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0087	0.001	5.83	0.000	0.801	0.037	21.66	0.000
Short Portfolio	0.0041	0.002	2.46	0.014	0.793	0.041	19.50	0.000
Hedge Portfolio	0.0047	0.002	2.46	0.015	0.008	0.047	0.17	0.867
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0079	0.002	3.99	0.000	0.938	0.055	17.09	0.000
Short Portfolio	0.0049	0.002	2.87	0.005	0.819	0.048	17.21	0.000
Hedge Portfolio	0.0030	0.003	1.09	0.278	0.119	0.076	1.57	0.120
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0083	0.002	3.71	0.000	0.715	0.050	14.30	0.000
Short Portfolio	0.0029	0.003	1.04	0.302	0.772	0.064	12.12	0.000
Hedge Portfolio	0.0053	0.003	1.98	0.050	-0.057	0.060	-0.95	0.343

Capital Asset Pricing Model: "Relative" vs. S&P100 Benchmark Index								
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0028	0.001	2.63	0.009	0.894	0.025	35.36	0.000
Short Portfolio	-0.0021	0.001	-1.75	0.082	0.906	0.028	32.34	0.000
Hedge Portfolio	0.0049	0.002	2.48	0.014	-0.011	0.047	-0.24	0.811
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0010	0.002	0.62	0.537	0.948	0.040	23.42	0.000
Short Portfolio	-0.0003	0.002	-0.2	0.843	0.785	0.042	18.47	0.000
Hedge Portfolio	0.0014	0.003	0.47	0.636	0.163	0.071	2.31	0.023
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0039	0.001	2.76	0.007	0.860	0.032	26.67	0.000
Short Portfolio	-0.0022	0.002	-1.42	0.157	0.997	0.036	27.61	0.000
Hedge Portfolio	0.0061	0.003	2.29	0.024	-0.137	0.061	-2.24	0.027

Three-Factor-Model: "Relative" vs. CRSP																
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.008	0.001	5.81	0.000	0.877	0.036	24.25	0.000	0.235	0.041	5.73	0.000	-0.067	0.047	-1.45	0.150
Short Portfolio	0.003	0.001	2.34	0.020	0.892	0.038	23.25	0.000	0.231	0.044	5.3	0.000	-0.209	0.049	-4.24	0.000
Hedge Portfolio	0.005	0.002	2.44	0.016	-0.015	0.049	-0.31	0.759	0.004	0.056	0.08	0.938	0.142	0.064	2.23	0.026
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.007	0.002	3.71	0.000	0.998	0.059	16.86	0.000	0.250	0.093	2.68	0.008	0.159	0.076	2.08	0.040
Short Portfolio	0.005	0.002	3.05	0.003	0.797	0.050	15.81	0.000	-0.131	0.079	-1.65	0.101	-0.236	0.065	-3.62	0.000
Hedge Portfolio	0.002	0.003	0.84	0.404	0.201	0.079	2.55	0.012	0.381	0.124	3.07	0.003	0.395	0.102	3.89	0.000
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.008	0.002	4.31	0.000	0.815	0.045	18.02	0.000	0.226	0.044	5.09	0.000	-0.161	0.057	-2.83	0.005
Short Portfolio	0.003	0.002	1.19	0.236	0.904	0.057	15.97	0.000	0.307	0.056	5.53	0.000	-0.201	0.071	-2.82	0.006
Hedge Portfolio	0.005	0.003	2	0.048	-0.089	0.064	-1.39	0.167	-0.081	0.063	-1.3	0.197	0.040	0.080	0.49	0.623

Three-Factor-Model: "Relative" vs. S&P100 Benchmark Index																
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.003	0.001	2.56	0.011	0.894	0.025	35.23	0.000	0.017	0.030	0.57	0.572	0.041	0.034	1.19	0.236
Short Portfolio	-0.002	0.001	-1.71	0.089	0.910	0.028	32.87	0.000	0.009	0.032	0.27	0.789	-0.099	0.038	-2.64	0.009
Hedge Portfolio	0.005	0.002	2.42	0.016	-0.016	0.046	-0.35	0.729	0.008	0.054	0.15	0.881	0.140	0.063	2.22	0.027
Period I	**α**	**std err**	**t**	**p-val**	**Β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.000	0.002	0.28	0.781	0.981	0.042	23.39	0.000	0.179	0.070	2.55	0.012	0.170	0.059	2.87	0.005
Short Portfolio	0.000	0.002	0.17	0.868	0.748	0.043	17.42	0.000	-0.209	0.072	-2.91	0.004	-0.228	0.061	-3.75	0.000
Hedge Portfolio	0.000	0.003	0.06	0.949	0.233	0.071	3.30	0.001	0.389	0.118	3.29	0.001	0.398	0.100	3.99	0.000
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.004	0.001	2.79	0.006	0.863	0.033	26.34	0.000	-0.016	0.032	-0.48	0.630	-0.021	0.041	-0.52	0.603
Short Portfolio	-0.002	0.002	-1.35	0.179	0.996	0.036	27.49	0.000	0.035	0.036	0.96	0.338	-0.050	0.045	-1.10	0.272
Hedge Portfolio	0.006	0.003	2.26	0.026	-0.133	0.062	-2.15	0.034	-0.050	0.061	-0.82	0.415	0.029	0.078	0.37	0.713

4.3 STRATEGY "BENCHMARK"

Table A 9: Summary of regressions "Benchmark"

(top)

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(upper left) *Summary of regressions using the Capital Asset Pricing Model where $rm_t - rf_t$ is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.*

(upper right) *Same as above but where $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

(bottom)

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(bottom left) *Summary of regressions using Three-Factor-Model where $rm_t - rf_t$ is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.*

(bottom right) *Same as above but where $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Summary Regression Models: "Benchmark" vs. CRSP

Capital Asset Pricing Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0279	0.5348	271.34	0.00
Short Portfolio	238	2	0.0270	0.6525	443.17	0.00
Hedge Portfolio	238	2	0.0389	0.0323	7.879	0.01
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0200	0.7069	284.61	0.00
Short Portfolio	120	2	0.0254	0.6526	221.66	0.00
Hedge Portfolio	120	2	0.0335	0.0127	1.51	0.22
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0337	0.4318	88.16	0.00
Short Portfolio	118	2	0.0280	0.6536	218.87	0.00
Hedge Portfolio	118	2	0.0436	0.0413	4.99	0.03
Three-Factor-Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0206	0.7499	233.87	0.00
Short Portfolio	238	4	0.0256	0.6919	175.20	0.00
Hedge Portfolio	238	4	0.0301	0.4272	58.18	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0166	0.8019	156.56	0.00
Short Portfolio	120	4	0.0229	0.7231	100.96	0.00
Hedge Portfolio	120	4	0.0248	0.4693	34.20	0.00
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0231	0.7387	107.43	0.00
Short Portfolio	118	4	0.0260	0.705	90.80	0.00
Hedge Portfolio	118	4	0.0332	0.4543	31.63	0.00

Summary Regression Models: "Benchmark" vs. S&P100 Benchmark Index

Capital Asset Pricing Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0187	0.7917	897.01	0.00
Short Portfolio	238	2	0.0249	0.7059	566.41	0.00
Hedge Portfolio	238	2	0.0395	0.0028	0.672	0.41
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0169	0.791	446.63	0.00
Short Portfolio	120	2	0.0207	0.7692	393.24	0.00
Hedge Portfolio	120	2	0.0334	0.0218	2.64	0.11
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0204	0.7926	443.29	0.00
Short Portfolio	118	2	0.0281	0.6495	215.00	0.00
Hedge Portfolio	118	2	0.0445	0.0011	0.13	0.72
Three-Factor-Model						
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0153	0.8619	486.64	0.00
Short Portfolio	238	4	0.0199	0.8125	338.01	0.00
Hedge Portfolio	238	4	0.0300	0.4281	58.39	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0139	0.8597	236.98	0.00
Short Portfolio	120	4	0.0169	0.8499	218.87	0.00
Hedge Portfolio	120	4	0.0254	0.4438	30.85	0.00
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0161	0.8719	258.58	0.00
Short Portfolio	118	4	0.0224	0.7826	136.78	0.00
Hedge Portfolio	118	4	0.0333	0.4506	31.16	0.00

Table A.10: Summary of regressions "Benchmark", contd

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(left) *The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p over the risk free rate, time t. The $rm_t - rf_t$ is the monthly excess CRSP market returns. rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. . α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α =0 and β=0 respectively.* ***(right)*** *Same as above but where the $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(top) *The regression is estimated for the long, short and the hedge portfolio. The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p, time t. The $rm_t - rf_t$ is the equally- monthly CRSP market excess returns. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of □ =0, β=0, β_{hml}=0 and β_{smb}=0 respectively.* ***(bottom)*** *Same as above but where the $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Capital Asset Pricing Model: "Benchmark" vs. CRSP

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0068	0.002	3.7	0.000	0.744	0.045	16.47	0.000
Short Portfolio	0.0078	0.002	4.38	0.000	0.920	0.044	21.05	0.000
Hedge Portfolio	-0.0010	0.003	-0.39	0.699	-0.177	0.063	-2.81	0.005
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0054	0.002	2.83	0.006	0.892	0.053	16.87	0.000
Short Portfolio	0.0107	0.002	4.44	0.000	1.001	0.067	14.89	0.000
Hedge Portfolio	-0.0054	0.003	-1.68	0.096	-0.109	0.089	-1.23	0.221
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0068	0.003	2.18	0.031	0.653	0.070	9.39	0.000
Short Portfolio	0.0040	0.003	1.54	0.126	0.854	0.058	14.79	0.000
Hedge Portfolio	0.0028	0.004	0.69	0.489	-0.201	0.090	-2.23	0.027

Capital Asset Pricing Model: "Benchmark" vs. S&P100 Benchmark Index

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0004	0.001	0.36	0.723	0.899	0.030	29.95	0.000
Short Portfolio	0.0019	0.002	1.1	0.271	0.951	0.040	23.80	0.000
Hedge Portfolio	-0.0014	0.003	-0.53	0.599	-0.052	0.063	-0.82	0.413
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	-0.0009	0.002	-0.53	0.595	0.888	0.042	21.13	0.000
Short Portfolio	0.0032	0.002	1.54	0.127	1.022	0.052	19.83	0.000
Hedge Portfolio	-0.0041	0.003	-1.22	0.223	-0.135	0.083	-1.62	0.107
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0019	0.002	1.01	0.314	0.917	0.044	21.05	0.000
Short Portfolio	-0.0004	0.003	-0.14	0.889	0.882	0.060	14.66	0.000
Hedge Portfolio	0.0023	0.004	0.55	0.582	0.035	0.095	0.36	0.717

Three-Factor-Model: "Benchmark" vs. CRSP

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.005	0.001	3.87	0.000	0.897	0.035	25.49	0.000	0.535	0.040	13.38	0.000	-0.040	0.045	-0.88	0.381
Short Portfolio	0.008	0.002	5.01	0.000	0.907	0.044	20.72	0.000	-0.207	0.050	-4.17	0.000	-0.256	0.056	-4.55	0.000
Hedge Portfolio	-0.003	0.002	-1.62	0.107	-0.010	0.051	-0.19	0.849	0.742	0.058	12.7	0.000	0.217	0.066	3.27	0.001
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.003	0.002	2.15	0.034	1.050	0.049	21.53	0.000	0.572	0.077	7.45	0.000	0.086	0.063	1.37	0.172
Short Portfolio	0.013	0.002	5.72	0.000	0.845	0.067	12.55	0.000	-0.576	0.106	-5.43	0.000	-0.125	0.087	-1.44	0.154
Hedge Portfolio	-0.009	0.002	-3.84	0.000	0.205	0.073	2.80	0.006	1.148	0.115	9.99	0.000	0.211	0.094	2.24	0.027
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.006	0.002	2.71	0.008	0.815	0.051	16.10	0.000	0.528	0.050	10.63	0.000	-0.079	0.064	-1.24	0.218
Short Portfolio	0.005	0.002	2.16	0.033	0.893	0.057	15.61	0.000	-0.135	0.056	-2.42	0.017	-0.308	0.072	-4.29	0.000
Hedge Portfolio	0.001	0.003	0.19	0.849	-0.078	0.073	-1.07	0.286	0.663	0.071	9.29	0.000	0.229	0.092	2.50	0.014

Three-Factor-Model: "Benchmark" vs. S&P100 Benchmark Index

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.000	0.001	-0.15	0.878	0.909	0.025	36.96	0.000	0.311	0.029	10.81	0.000	0.071	0.033	2.13	0.034
Short Portfolio	0.003	0.001	2.03	0.044	0.939	0.032	29.26	0.000	-0.433	0.038	-11.53	0.000	-0.145	0.044	-3.32	0.001
Hedge Portfolio	-0.003	0.002	-1.43	0.155	-0.030	0.048	-0.63	0.532	0.744	0.057	13.16	0.000	0.216	0.066	3.29	0.001
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	-0.003	0.001	-2.06	0.041	0.991	0.037	26.50	0.000	0.473	0.063	7.54	0.000	0.097	0.053	1.83	0.069
Short Portfolio	0.006	0.002	3.36	0.001	0.891	0.045	19.71	0.000	-0.598	0.076	-7.89	0.000	-0.113	0.064	-1.76	0.081
Hedge Portfolio	-0.009	0.003	-3.36	0.001	0.100	0.068	1.47	0.143	1.071	0.114	9.38	0.000	0.210	0.096	2.18	0.032
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.001	0.002	0.92	0.362	0.885	0.035	25.43	0.000	0.284	0.034	8.23	0.000	0.058	0.044	1.34	0.184
Short Portfolio	0.001	0.002	0.29	0.773	0.929	0.048	19.28	0.000	-0.398	0.048	-8.34	0.000	-0.153	0.060	-2.55	0.012
Hedge Portfolio	0.001	0.003	0.25	0.803	-0.044	0.072	-0.61	0.543	0.682	0.071	9.59	0.000	0.212	0.090	2.36	0.020

4.4 STRATEGY "PROBABILISTIC" (USING ALL 135 COMPANIES)

Table A.11: Summary of regressions "Probabilistic w. 135 Companies"

(top)

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(upper left) *Summary of regressions using the Capital Asset Pricing Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.* ***(upper right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

(bottom)

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(bottom left) *Summary of regressions using Three-Factor-Model where* $rm_t - rf_t$ *is the monthly excess CRSP market returns. Reported for Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). RMSE refers to Root Mean Square Error while P refers to the p-value for the F statistic. Please refer to Table A. for more information.* ***(bottom right)*** *Same as above but where* $rm_t - rf_t$ *is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Summary Regression Models: "Probabilistic w. 135 Companies" vs. CRSP							**Summary Regression Models: "Probabilistic w. 135 Companies" vs. S&P100 Benchmark Index**						
			Capital Asset Pricing Model							**Capital Asset Pricing Model**			
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Full Period**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	2	0.0323	0.295	98.73	0.00	Long Portfolio	238	2	0.0278	0.4776	215.77	0.00
Short Portfolio	238	2	0.0216	0.6883	521.24	0.00	Short Portfolio	238	2	0.0134	0.8799	1 729.80	0.00
Hedge Portfolio	238	2	0.0303	0.121	32.502	0.00	Hedge Portfolio	238	2	0.0308	0.091	23.612	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period I**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	2	0.0220	0.6368	206.92	0.00	Long Portfolio	120	2	0.0209	0.6723	242.09	0.00
Short Portfolio	120	2	0.0135	0.8363	602.73	0.00	Short Portfolio	120	2	0.0117	0.8775	844.93	0.00
Hedge Portfolio	120	2	0.0254	0.003	0.35	0.55	Hedge Portfolio	120	2	0.0254	0.0027	0.33	0.57
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period II**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	2	0.0377	0.1271	16.89	0.00	Long Portfolio	118	2	0.0325	0.3514	62.83	0.00
Short Portfolio	118	2	0.0274	0.6012	174.84	0.00	Short Portfolio	118	2	0.0150	0.8802	851.89	0.00
Hedge Portfolio	118	2	0.0331	0.2539	39.48	0.00	Hedge Portfolio	118	2	0.0344	0.1931	27.76	0.00
			Three-Factor-Model							**Three-Factor-Model**			
Full Period	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Full Period**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	238	4	0.0283	0.4641	67.55	0.00	Long Portfolio	238	4	0.0260	0.5475	94.39	0.00
Short Portfolio	238	4	0.0193	0.7537	238.68	0.00	Short Portfolio	238	4	0.0129	0.8901	631.82	0.00
Hedge Portfolio	238	4	0.0298	0.158	14.64	0.00	Hedge Portfolio	238	4	0.0296	0.1675	15.69	0.00
Period I	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period I**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	120	4	0.0207	0.6845	83.89	0.00	Long Portfolio	120	4	0.0200	0.705	92.41	0.00
Short Portfolio	120	4	0.0133	0.843	207.54	0.00	Short Portfolio	120	4	0.0109	0.8955	331.32	0.00
Hedge Portfolio	120	4	0.0243	0.1005	4.32	0.01	Hedge Portfolio	120	4	0.0243	0.0971	4.16	0.01
Period II	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**	**Period II**	**Obs**	**Parms**	**RMSE**	**R-sq**	**F**	**P**
Long Portfolio	118	4	0.0317	0.3947	24.78	0.00	Long Portfolio	118	4	0.0294	0.4786	34.89	0.00
Short Portfolio	118	4	0.0232	0.7189	97.16	0.00	Short Portfolio	118	4	0.0146	0.8889	304.12	0.00
Hedge Portfolio	118	4	0.0327	0.2806	14.82	0.00	Hedge Portfolio	118	4	0.0322	0.3034	16.55	0.00

Table A.12: Summary of regressions "Probabilistic w. 135 Companies", contd

Capital Asset Pricing Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_p[r_{mt} - rf_t] + \varepsilon_{pt}$

(left) *The regression is estimated for the long short and the hedge portfolio over the Full Period (1988-2007), Period I (1988-1995) and Period II (1996-2007). The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p over the risk free rate, time t. The $rm_t - rf_t$ is the monthly excess CRSP market returns. rf is the 1-Month U.S Treasury Bill rate observed at the beginning of the month. . α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of the corresponding individual null hypothesis of α =0 and β=0 respectively.* ***(right)*** *Same as above but where the rm_t - rf_t is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Three Factor Model: ***Regression:*** $r_{pt} - rf_t = \alpha_p + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

(top) *The regression is estimated for the long, short and the hedge portfolio. The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p, time t. The rm_t - rf_t is the equally- monthly CRSP market excess returns. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of α=0, β_1=0, β_{hml}=0 and β_{smb}=0 respectively.* ***(bottom)*** *Same as above but where the rm_t - rf_t is the equally-weighted monthly excess returns on the S&P100 Benchmark Index.*

Capital Asset Pricing Model: "Probabilistic w. 135 Companies" vs. CRSP / **Capital Asset Pricing Model: "Probabilistic w. 135 Companies" vs. S&P100 Benchmark Index**

Capital Asset Pricing Model (CRSP)									Capital Asset Pricing Model (S&P100)								
Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**Full Period**	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0090	0.002	4.23	0.000	0.519	0.052	9.94	0.000	Long Portfolio	0.0054	0.002	2.91	0.004	0.635	0.043	14.69	0.000
Short Portfolio	0.0034	0.001	2.42	0.016	0.798	0.035	22.83	0.000	Short Portfolio	-0.0009	0.001	-1.00	0.319	0.868	0.021	41.59	0.000
Hedge Portfolio	0.0055	0.002	2.79	0.006	-0.279	0.049	-5.70	0.000	Hedge Portfolio	0.0063	0.002	3.07	0.002	-0.233	0.048	-4.86	0.000
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**Period I**	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0070	0.002	3.35	0.001	0.837	0.058	14.38	0.000	Long Portfolio	0.0032	0.002	1.53	0.129	0.811	0.052	15.56	0.000
Short Portfolio	0.0030	0.001	2.37	0.019	0.877	0.036	24.55	0.000	Short Portfolio	-0.0010	0.001	-0.82	0.412	0.847	0.029	29.07	0.000
Hedge Portfolio	0.0040	0.002	1.64	0.103	-0.040	0.067	-0.60	0.553	Hedge Portfolio	0.0041	0.003	1.64	0.104	-0.036	0.063	-0.57	0.570
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**Period II**	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**
Long Portfolio	0.0079	0.003	2.28	0.025	0.320	0.078	4.11	0.000	Long Portfolio	0.0056	0.003	1.85	0.066	0.519	0.065	7.93	0.000
Short Portfolio	0.0031	0.003	1.21	0.227	0.749	0.057	13.22	0.000	Short Portfolio	-0.0006	0.001	-0.43	0.671	0.883	0.030	29.19	0.000
Hedge Portfolio	0.0048	0.003	1.59	0.115	-0.429	0.068	-6.28	0.000	Hedge Portfolio	0.0062	0.003	1.94	0.055	-0.365	0.069	-5.27	0.000

Three-Factor-Model: "Probabilistic w. 135 Companies" vs. CRSP

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.008	0.002	4.22	0.000	0.655	0.048	13.52	0.000	0.399	0.055	7.26	0.000	-0.152	0.062	-2.44	0.015
Short Portfolio	0.003	0.001	2.22	0.027	0.884	0.033	26.74	0.000	0.223	0.038	5.95	0.000	-0.142	0.043	-3.34	0.001
Hedge Portfolio	0.005	0.002	2.57	0.011	-0.229	0.051	-4.50	0.000	0.176	0.058	3.04	0.003	-0.010	0.066	-0.16	0.876
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.006	0.002	2.8	0.006	0.947	0.061	15.57	0.000	0.376	0.096	3.93	0.000	-0.036	0.078	-0.46	0.647
Short Portfolio	0.003	0.001	2.3	0.023	0.878	0.039	22.38	0.000	-0.023	0.062	-0.37	0.711	-0.112	0.051	-2.21	0.029
Hedge Portfolio	0.003	0.002	1.12	0.264	0.069	0.072	0.97	0.336	0.399	0.113	3.55	0.001	0.076	0.092	0.82	0.411
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.007	0.003	2.52	0.013	0.469	0.070	6.74	0.000	0.414	0.068	6.07	0.000	-0.152	0.087	-1.74	0.085
Short Portfolio	0.003	0.002	1.34	0.182	0.860	0.051	16.86	0.000	0.275	0.050	5.51	0.000	-0.152	0.064	-2.37	0.020
Hedge Portfolio	0.005	0.003	1.49	0.139	-0.391	0.072	-5.44	0.000	0.139	0.070	1.97	0.052	0.000	0.090	0.00	0.999

Three-Factor-Model: "Probabilistic w. 135 Companies" vs. S&P100 Benchmark Index

Full Period	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.005	0.002	2.94	0.004	0.656	0.041	16.11	0.000	0.213	0.049	4.36	0.000	-0.145	0.057	-2.54	0.012
Short Portfolio	-0.001	0.001	-0.93	0.351	0.879	0.020	43.51	0.000	-0.028	0.024	-1.14	0.255	-0.132	0.028	-4.64	0.000
Hedge Portfolio	0.006	0.002	2.99	0.003	-0.223	0.046	-4.81	0.000	0.241	0.056	4.33	0.000	-0.014	0.065	-0.21	0.833
Period I	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.002	0.002	0.91	0.364	0.881	0.054	16.35	0.000	0.262	0.090	2.93	0.004	-0.102	0.076	-1.35	0.181
Short Portfolio	-0.001	0.001	-0.74	0.461	0.835	0.029	28.47	0.000	-0.117	0.049	-2.41	0.018	-0.174	0.041	-4.22	0.000
Hedge Portfolio	0.003	0.002	1.08	0.283	0.046	0.066	0.70	0.485	0.380	0.109	3.48	0.001	0.072	0.092	0.78	0.437
Period II	**α**	**std err**	**t**	**p-val**	**β**	**std err**	**t**	**p-val**	**βhml**	**std err**	**t**	**p-val**	**βsmb**	**std err**	**t**	**p-val**
Long Portfolio	0.006	0.003	2.05	0.043	0.509	0.060	8.43	0.000	0.253	0.063	4.02	0.000	-0.137	0.080	-1.71	0.090
Short Portfolio	0.000	0.001	-0.18	0.854	0.897	0.030	29.90	0.000	-0.013	0.031	-0.43	0.669	-0.116	0.040	-2.92	0.004
Hedge Portfolio	0.006	0.003	1.96	0.053	-0.388	0.066	-5.86	0.000	0.267	0.069	3.86	0.000	-0.021	0.088	-0.24	0.812

APPENDIX 5: REALISTIC AND STATISTICAL RETURN METRIC RESULTS FOR"BENCHMARK"

Table A.13: Yearly comparison of "Relative" and "Benchmark"

Each month during the period 1988-2004 the difference in monthly returns over the S&P100 Benchmark Index for the long and short portfolio is used to calculate monthly market adjusted returns to the hedge portfolio. For every month a 36-Month Buy and Hold portfolio is created replicating the return an investor would realize by investing in the strategy for that particular month and holding it for 36-months reinvesting all capital distributions. This results in twelve simulated 36-Month portfolios per year, i.e., one for every month. The mean returns for each vintage year are calculated as the average 36-Month Market Adjusted Buy and Hold returns an investor would realize by holding the hedge portfolios formed over the specific time period. The t- and p-values in the table refers to the null hypothesis that the mean return for the specific time period is less than or equal to zero. The hypotheses are tested with one and two-sided student's t-tests.

Summary Table: Comparison of "Relative" and "Benchmark" strategy per year

	"Relative" strategy based on deciles (1-2, 9-10)				**"Benchmark" strategy: Book-to-market strategy based on deciles (1-**			
Vintage year	Return to hedge	p-value t != 0	p-value t < 0	p-value t > 0	Return to hedge	p-value t != 0	p-value t < 0	p-value t > 0
1988	-7.6%	0.098	0.049	0.951	-98.8%	0.000	0.000	1.000
1989	38.5%	0.000	1.000	0.000	-51.0%	0.000	0.000	1.000
1990	88.3%	0.000	1.000	0.000	31.8%	0.000	1.000	0.000
1991	67.2%	0.000	1.000	0.000	5.7%	0.073	0.964	0.036
1992	52.0%	0.000	1.000	0.000	-19.1%	0.011	0.005	0.995
1993	36.7%	0.000	1.000	0.000	-74.2%	0.000	0.000	1.000
1994	15.8%	0.000	1.000	0.000	-88.9%	0.000	0.000	1.000
1995	54.3%	0.000	1.000	0.000	-130.7%	0.000	0.000	1.000
1996	83.2%	0.000	1.000	0.000	-145.9%	0.000	0.000	1.000
1997	109.1%	0.000	1.000	0.000	-69.2%	0.000	0.000	1.000
1998	75.4%	0.000	1.000	0.000	22.5%	0.008	0.996	0.004
1999	41.9%	0.000	1.000	0.000	51.5%	0.000	1.000	0.000
2000	25.3%	0.000	1.000	0.000	55.9%	0.000	1.000	0.000
2001	14.7%	0.000	1.000	0.000	48.8%	0.000	1.000	0.000
2002	-4.8%	0.090	0.045	0.955	56.8%	0.000	1.000	0.000
2003	-0.5%	0.778	0.389	0.611	49.9%	0.000	1.000	0.000
2004	-14.4%	0.000	0.000	1.000	7.7%	0.298	0.851	0.149
Average:	**40.3%**			**Average:**	**-20.7%**			

Table A.14: Summary of reg. results for "Benchmark" using Three-Factor-Model

Regression model: $r_{pt} - rf_t = \alpha + \beta_1[r_{mt} - rf_t] + \beta_{hml}HML_t + \beta_{smb}SMB_t + \varepsilon_{pt.}$

The regression is estimated for the long, short and the hedge portfolio. The $r_{pt} - rf_t$ is the excess monthly returns of portfolio p, time t. The $rm_t - rf_t$ is the equally-weighted monthly excess returns on the S&P100 Benchmark Index. rf is the one month U.S Treasury Bill rate observed at the beginning of the month. Small-minus-Big (SMB) is the difference for each month between the average of the returns on the three small stock portfolios and the three big stock portfolios as provided from the CRSP files. High-minus-Low is the difference for each month between the average of the returns on the two high B/M portfolios and the average of the returns on the two low B/M portfolios from the CRSP-files. For a description on how the HML and SML are estimated in Fama and French (1993) refer to Appendix 6. α represents the monthly abnormal return for the corresponding portfolio for each time period. The p-values refer to the probability of that the corresponding individual null hypothesis of $\alpha=0$, $\beta_1=0$, $\beta_{hml}=0$ and $\beta_{smb}=0$ respectively. For standard errors of the estimates, R-Square and F-statistics refer to Appendix 4

Three-Factor-Model: "Benchmark" vs. S&P100 Benchmark Index

Portfolio	**α**	**p-val**	**β_1**	**p-val**	**B_{hml}**	**p-val**	**B_{smb}**	**p-val**
Full Period (1988-2007)								
Long portfolio	0.000	0.878	0.909	0.000	0.311	0.000	0.071	0.034
Short portfolio	0.003	0.044	0.939	0.000	-0.433	0.000	-0.145	0.001
Hedge portfolio	-0.003	0.155	-0.030	0.532	0.744	0.000	0.216	0.001
Period I (1988-1995)								
Long portfolio	-0.003	0.041	0.991	0.000	0.473	0.000	0.097	0.069
Short portfolio	0.006	0.001	0.891	0.000	-0.598	0.000	-0.113	0.081
Hedge portfolio	-0.009	0.001	0.100	0.143	1.071	0.000	0.210	0.032
Period II (1996-2007)								
Long portfolio	0.001	0.362	0.885	0.000	0.284	0.000	0.058	0.184
Short portfolio	0.001	0.773	0.929	0.000	-0.398	0.000	-0.153	0.012
Hedge portfolio	0.001	0.803	-0.044	0.543	0.682	0.000	0.212	0.020

APPENDIX 6: REGRESSION MODELS FOR CAPM AND THREE-FACTOR-MODEL

6.1 THE CAPITAL ASSET PRICING MODEL

$$\overline{R}_{t\,(H)} = \alpha_{(H)} + \beta_{(H)} \cdot \left(R_{m,t} - R_{f,t}\right) + \varepsilon_{t\,(H)}$$

$$\overline{R}_{t(H)} = \overline{R}_{t\,(L)} - \overline{R}_{t\,(S)}$$

Return of the hedge position for month t

$$\overline{R}_{t\,(L)} = \alpha_{(L)} + \beta_{(L)} \cdot \left(R_{m,t} - R_{f,t}\right) + \varepsilon_{t\,(L)}$$

$$\overline{R}_{t(L)} = \frac{1}{N_{t(L)}} \sum_{i=1}^{N_{t(L)}} R_{i,t}$$

Return for the long position for month

$$\overline{R}_{t\,(S)} = \alpha_{(S)} + \beta_{(S)} \cdot \left(R_{m,t} - R_{f,t}\right) + \varepsilon_{t\,(S)}$$

$$\overline{R}_{t(S)} = \frac{1}{N_{t(S)}} \sum_{i=1}^{N_{t(S)}} R_{i,t}$$

Return for the short position for month t

$R_{i,t}$ *= the return on stock i for month t*

$R_{f,t}$ *= the 1-month risk-free rate at the beginning of month t*

$R_{m,t}$ *= the return of the market index for month t*

$N_{t(.)}$ *= number of stocks in the position (L = Long position and S = Short position)*

$\alpha_{(.)}$ *= abnormal return for the position (H = Hedge position, L = Long position and S = Short position)*

$R_{i(.)}$ *= beta value of the position (H = Hedge position, L = Long position*

6.2 THE THREE-FACTOR-MODEL

$$\overline{R}_{t\,(H)} = \alpha_{(H)} + \beta_{(H)} \cdot \left(R_{m,t} - R_{f,t}\right) + \beta_{(H)hml} \cdot (HML_t) + \beta_{(H)smb} \cdot (SMB_t) + \varepsilon_{t\,(H)}$$

Return of the hedge position for month t

$$\overline{R}_{t\,(L)} = \alpha_{(L)} + \beta_{(L)} \cdot \left(R_{m,t} - R_{f,t}\right) + \beta_{(L)hml} \cdot (HML_t) + \beta_{(L)smb} \cdot (SMB_t) + \varepsilon_{t\,(L)}$$

Return for the long position for month

$$\overline{R}_{t\,(S)} = \alpha_{(S)} + \beta_{(S)} \cdot \left(R_{m,t} - R_{f,t}\right) + \beta_{(S)hml} \cdot (HML_t) + \beta_{(S)smb} \cdot (SMB_t) + \varepsilon_{t\,(S)}$$

Return for the short position for month t

$$\overline{R}_{t(H)} = \overline{R}_{t\,(L)} - \overline{R}_{t\,(S)}$$

$$\overline{R}_{t(L)} = \frac{1}{N_{t(L)}} \sum_{i=1}^{N_{t(L)}} R_{i,t}$$

$$\overline{R}_{t(S)} = \frac{1}{N_{t(S)}} \sum_{i=1}^{N_{t(S)}} R_{i,t}$$

$R_{i,t}$ *= the return on stock i for month t*

$N_{t(.)}$ *= number of stocks in the position (L = Long position and S = Short position)*

$R_{f,t}$ *= the 1-Month risk-free rate at the beginning of month t*

$\alpha_{(.)}$ *= abnormal return for the position (H = Hedge position, L = Long position and S = Short position)*

$R_{m,t}$ *= the return of the market index for month t*

$R_{i(.)}$ *= beta value of the position (H = Hedge position, L = Long position*

6.3 High-minus-Low (HML) and Small-minus-Big (SMB)

The HML and SML factors are estimated in the following way in Fama French (1993). The one month Treasury bill rate (from Ibbotson Associates) is used as the risk free rate. The return of the market is calculated as the value weighted return on all AMEX, NYSE and NASDAQ stocks with book equity data from the previous calendar year. At the end of June of each year (1926 to 1996) they allocate the stocks into two groups (Small or Big) based on whether their June market capitalization, ME (stock price times shares outstanding), is below the median for AMEX, NYSE and NASDAQ stocks in the CRSP. Stocks are allocated in an independent sort to three Book-to-Market (B/M) groups (Large, Medium or High) based on breakpoints for the bottom 30%, middle 40% and top 30% of the values of B/M for the NYSE stocks in their sample. Six portfolios (S/L, S/M, S/H, B/L, B/M and B/H) are then formed as the intersections of the two size and the three B/M groups. Value weighted monthly returns on the portfolios are then calculated from July year t to June year t+1. SMB is subsequently calculated as (S/L+S/M+S/M)/3 – (B/L+B/M+B/H)/3 while HML is calculated as (S/H+B/H)/2 – (S/L+B/L)/2)

Appendix 7: Trading Indicators over Time

Table A.15: Trading signals over time for "Probabilistic"

Arrows pointing up (down) [right] indicate buy (sell) [neutral] candidates.

Probabilistic	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
3M	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→
ABBOTT LABS.	→	↓	→	→	→	→	↓	↑	→	→	↑	→	→	→	↑	↑	→	→	→	→	→	→
AES								→	→	→	→	→	→	→	→	→	↑		→	→	→	→
ALCOA	→	↓	↓	→	→	→	→	→	→	↓	↓	→	→	↓	↓	→	→	→	→	→	↓	↓
ALLSTATE												→	→	→	↑	→	→	→	→	→	→	→
ALTRIA GROUP	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑
AMER.ELEC.PWR.	↓	↓	↓	→	→	→	→	→	→	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→
AMERICAN EXPRESS	↓	↓	↓	↓	→	→	→	→	→	↓	→	→	↓	↓	↓	↓	→	→	→	→	↓	→
AMERICAN INTL.GP.	→	→	→	→	→	↑	↑	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→
AMGEN						↓	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→
ANHEUSER-BUSCH COS.	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	→	↓	↓	→	→	→	→	→	→	↑
APPLE	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→
AT&T	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	→
AVON PRODUCTS	↓	↓	→	↓	↓	→	→	→	→	→	→	→	→	→			→		→	→	→	→
BAKER HUGHES		→	↓	→	↓	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→
BANK OF AMERICA	→	↑	↑	↓	→	→	→	→	→	→	→	↓	↓	→	→	→	→	→	→	→	→	↑
BANK OF NEW YORK MELLON	↑	↑	↑	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	→	→	→	→	→	→
BAXTER INTL.	→	→	→	↓	↓	↓	↓	→	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→
BOEING	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	↓	↓	↓	↓	→	→	→	→	↓	↓
BRISTOL MYERS SQUIBB	↓	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	↓
BURL.NTHN.SANTA FE C	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	→	→	↓	↓
CAMPBELL SOUP	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	↓	↓	↓	→		→	→	→	→	→
CAPITAL ONE FINL.													→	→	↓	↓	→	↑	↑	↑	↑	↑
CATERPILLAR	→	↓	↓	→	→	→	→	↓	→	→	→	→	↑	↑	→	→	→	→	↓	→	→	→
CBS 'B'										→	→	→	→	↓	↓	↓	↓	↓	→	→	→	→
CHEVRON	→	↓	→	↓	↓	↓	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→
CIGNA	→	→	→	→	→	→	↑	↑	→	→	↓	→	→	→	→	→	→	→	→	→	→	→
CISCO SYSTEMS							→	→	→	↑	→	→	→	→	↓	→	→	→	→	→	→	→
CITIGROUP													↑	↓	↓	→	→	→	→	→	→	→
CLEAR CHL.COMMS.						↓	→	→	→	→	→	↓	→	→	→	→	→	↓	→	↓	→	↓
COCA COLA	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	→	→	→	→	→	→	→		→
COLGATE-PALM.	↓	↓	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→
COMCAST 'A'	→	→	→	↓	→		→					→	→	→	→	→	→	→	→	→	↓	↓
CONOCOPHILLIPS	→	↓	↓	→	→	→	→	→	↓	→	↓	→	→	→	→	→	→	→	→	→	→	→
CVS CAREMARK	↓	↓	→	↓	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓
DELL					→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
DOW CHEMICALS	↓	↓	↓	→	→	→	→	→	→	↓	↓	→	→	→	→	→	→	→	→	→	→	→
E I DU PONT DE NEMOURS	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→	↓	↓
EL PASO											→	→	→	↓	↓	→	→	→	→	→	↓	↓
EMC							→	↓	→	→	→	→	→	→	↓	↓	→	→	→	→	↓	↓
ENTERGY	↑	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓
EXELON	↑	→	→	→	↑	→	→	→	→	→	→	↑	↓	↓	↓	→	→	↑	→	→	↓	↓
EXXON MOBIL	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→
FEDEX	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→
FORD MOTOR	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→	→	→	→	→	↑
GENERAL DYNAMICS	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	↑	→	→	→	→
GENERAL ELECTRIC	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→
GENERAL MOTORS	→	→	→	↑	↑	→	→	↓	→	→	→	→	→	→	→	↑	→	→	→	→	→	↑
GOLDMAN SACHS GP.																			→	→	→	→
GOOGLE 'A'																						→
HALLIBURTON	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	↓	↓	→	→
HARTFORD FINL.SVS.GP.															→	→	→	→	→	→	→	→
HEINZ HJ	↓	↓	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→
HEWLETT-PACKARD	→	↓	→	→	→	→	→	→	→	↓	↓	↓	→	↓	↓	↓	→	→	→	→	↓	↓
HOME DEPOT	→	→	→	→	↓	↓	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	↓	→	→	↓	→	→
HONEYWELL INTL.	→	→	→	→	→	→	→	↓	→	→	→	→	↓	↓	→	→	→	→	→	→	↓	↓
INTEL	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	↓
INTERNATIONAL BUS.MACH.	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→
INTL.PAPER	→	↓	↓	→	→	→	→	→	→	↓	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓
JOHNSON & JOHNSON	→	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑
JP MORGAN CHASE & CO.	↑	↑	→	→	→	→	→	→	→	→	→	↓	↓	↓	→	→	→	→	→	→	→	→
KRAFT FOODS																	↓	→	→	→		→
LEHMAN BROS.HDG.												→	→	→	→	→	→	→	→	→	→	→
MCDONALDS	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	↓
MEDTRONIC	↓	↓	→	→	↓	↓	↓	↓	→	→	→	→	→	→	↓	→	→	→	→	→	→	→
MERCK & CO.	↓	↓	↓	→	→	→	→	↑	↑	→	→	→	↓	↓	→	→	↑	↑	↑	↑	→	→
MERRILL LYNCH & CO.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
MICROSOFT		→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	↓	↓	↓
MORGAN STANLEY												→	→	↓	→	→	→	→	→	→	→	→
NORFOLK SOUTHERN	→	→	→	→	→	→	↓	→	→	→	→	↓	↓	→	→	→	→	→	→	→	→	→
NYSE EURONEXT																						
ORACLE				→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→
PEPSICO	↓	↓	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→
PFIZER	↓	→	↑	↑	→	↓	↓	↓	↓	↓	→	→	↓	↓	↓	↓	→	→	→	→	→	→
PROCTER & GAMBLE	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	→	→	→	↑	→
RAYTHEON 'B'	↓	↓	→	→	→	↑	↑	↑	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓
REGIONS FINL.NEW	→	→	↑	→	↑	↑	→	→	→	→	→	↓	↓	↓	→	→	→	→	↑	↑	→	↑
ROCKWELL AUTOMATION	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	↓	↓	↓	→
SARA LEE	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	→	→	→	→	→	→	→	→	→
SCHLUMBERGER	→	→	→	→	↓	↓	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	→
SOUTHERN	↑	↑	↑	↑	↑	→	→	→	↑	→	↑	↑	↑	↑	↑	→	↓	→	→	→	↓	↓
SPRINT NEXTEL	→	→	→	→	→	→	→	→	↓	→	→	→	→	↓	↓	→	→	→	→	↓	→	→
TARGET	↓	↓	→	↓	↓	↓	→	→	→	→	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	→	↓
TEXAS INSTS.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	→	→	→	→	↓	→
TIME WARNER											↓	↓	→	→	→	→	→	→	→	→	→	→
TYCO INTERNATIONAL							→	→	→	→	↓	↓	↓	→	→	→	→	→	→	→	→	→
UNITED PARCEL SER.															↓	↓	→	→	→	→	→	→
UNITED TECHNOLOGIES	↓	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓
UNITEDHEALTH GP.							→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	→
US BANCORP	↑	↑	↑	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→
VERIZON COMMS.	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→
WACHOVIA	→	↑	↑	↑	↑	↑	→	→	→	→	→	↓	↓	↓	→	→	→	→	→	→	→	↑
WAL MART STORES	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	↓	↓	↓	↓	→	↓	→	→	↑
WALT DISNEY	↓	↓	↓	→	↓	→	→	→	→	↓	↓	→	→	→	→	↓	→	↓	↓	↓	↓	→
WELLS FARGO & CO	→	→	→	→	→	→	→	↓	↓	→	→	↓	↓	→	→	→	→	→	→	→	→	↑
WEYERHAEUSER	↓	↓	↓	↓	↓	↓	→	↓	↓	→	→	→	→	↓	→	→	→	→	→	→	→	↓
WILLIAMS COS.	→	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	→	→	↓	↓	↓	↓
XEROX	→	↓	→	↓	→	→	↓	→	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	→

Table A.16: Trading signals over time for "Relative"

Arrows pointing up (down) [right] indicate buy (sell) [neutral] candidates.

Relative	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
3M	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓	↓	→	→	→
ABBOTT LABS.	→	↓	→	↑	→	→	→	↑	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	↑	→	→	→
AES								↑	↑	↑	↑	→	↑	→	→	→	↑		→	→	→	→
ALCOA	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→	→	→	↓	↓
ALLSTATE												→	→	↑	↑	↑	↑	↑	↑	→	→	↑
ALTRIA GROUP	→	→	→	→	→	→	→	↑	↑	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	↑
AMER.ELEC.PWR.	→	→	↓	→	→	→	→	→	→	↓	↓	→	→	→	↑	→	→	→	→	→	→	→
AMERICAN EXPRESS	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	↓	→
AMERICAN INTL.GP.	→	→	→	↑	↑	↑	↑	↑	↑	↑	↓	↓	↓	↓	↓	↓	→	→	→	↑	→	→
AMGEN						↓	→	→	↑	↑	↑	↑	↑	↑	→	↑	↑	→	→	→	→	→
ANHEUSER-BUSCH COS.	→	→	→	↓	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑
APPLE	→	→	→	→	→	↑	↑	↑	↑	→	↑	↑	→	→	→	→	→	→	→	↓	→	→
AT&T	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	↑	↑	↑	→	→
AVON PRODUCTS	↓	↓	→	↓	↓	→	→	→	→	→	→	↑	↑	↑			→		→	→	→	→
BAKER HUGHES		→	→	→	→	→	→	↓	→	→	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	↓	→
BANK OF AMERICA	↑	↑	↑	→	↑	↑	→	→	→	→	→	↓	↓	→	→	→	→	→	→	↑	↑	↑
BANK OF NEW YORK MELLON	↑	↑	↑	↑	→	↑	→	→	→	→	→	→	↓	↓	→	→	→	→	→	→	→	↑
BAXTER INTL.	→	→	→	→	↓	→	→	→	→	→	→	→	→	↓	→	↓	↓	→	→	→	→	→
BOEING	→	→	→	↓	↓	→	→	→	↑	→	→	→	→	↓	→	→	→	→	↓	↓	↓	↓
BRISTOL MYERS SQUIBB	→	↓	↓	↓	↓	↓	→	→	→	↓	↓	↓	↓	→	→	→	↑	→	↑	→	→	↓
BURL.NTHN.SANTA FE C	↑	↑	↑	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	→	↓	→
CAMPBELL SOUP	↓	↓	↓	↓	→	↓	→	→	→	→	→	↓	→	→	→	→		→	→	→	↑	→
CAPITAL ONE FINL.													↑	→	↓	↓	↑	↑	↑	↑	↑	↑
CATERPILLAR	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	→	→	↓	↓	→	→
CBS 'B'										→	→	↑	→	↓	↓	↓	↓	↓	→	→	→	→
CHEVRON	↑	→	→	→	↓	→	→	→	→	↓	↓	↓	→	→	→	→	→	→	→	→	↑	→
CIGNA	→	→	→	→	→	↑	↑	↑	→	↑	→	→	→	↑	→	→	→	→	→	→	↑	→
CISCO SYSTEMS							→	→	↑	↑	↑	↑	↑	→	→	→	→	↓	↓	→	→	→
CITIGROUP													↑	↓	↓	→	→	→	→	→	→	↑
CLEAR CHL.COMMS.						→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	→	↓
COCA COLA	↓	→	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	→	→		→
COLGATE-PALM.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑
COMCAST 'A'	→	→	→	→	→		↑					→	→	→	↑	→	→	→	→	→	↓	↓
CONOCOPHILLIPS	→	↓	↓	→	→	→	→	→	→	→	↓	→	→	↑	→	↑	↑	→	→	↑	↑	→
CVS CAREMARK	→	→	→	→	→	→	↑	→	↑	↑	→	→	→	→	→	→	→	↑	→	→	→	↓
DELL					↑	↑	↑	↑	→	→	→	→	→	↑	↑	↑	↑	→	→	→	↑	↑
DOW CHEMICALS	↓	→	→	→	→	↑	↑	→	→	↓	→	→	→	→	→	→	→	↓	↓	→	→	→
E I DU PONT DE NEMOURS	→	↓	↓	↓	→	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	↓	↓	↓	↓	↓
EL PASO											→	→	→	→	→	→	→	→	→	→	↓	↓
EMC							→	→	→	→	↑	↑	↑	→	↓	↓	→	→	→	→	→	↓
ENTERGY	↑	↑	↑	↑	→	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓	↓	↓
EXELON	↑	↑	↑	→	↑	→	→	→	→	→	→	↑	→	→	→	→	↑	↑	→	→	↓	↓
EXXON MOBIL	→	→	↓	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→
FEDEX	→	→	→	↑	↑	↑	↑	→	→	→	→	→	→	↓	→	→	→	→	→	→	→	→
FORD MOTOR	→	→	↑	↑	↑	↑	→	→	↓	→	→	→	→	↑	↑	↑	→	→	→	→	→	↑
GENERAL DYNAMICS	→	→	→	↑	↑	→	↑	↑	→	→	↑	→	→	→	→	→	→	↑	↑	↑	→	→
GENERAL ELECTRIC	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→
GENERAL MOTORS	↑	↑	↑	↑	↑	↑	→	↓	→	↑	↑	↑	↑	↑	↑	↑	↑	→	↑	↑	→	↑
GOLDMAN SACHS GP.																			→	→	→	→
GOOGLE 'A'																						→
HALLIBURTON	→	→	→	→	→	→	↓	↓	↓	↓	↓	→	→	→	↓	↓	→	↓	↓	↓	→	→
HARTFORD FINL.SVS.GP.															↑	→	↑	↑	→	→	→	→
HEINZ HJ	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	↓	→	→	→	→	→	→	→	→	→
HEWLETT-PACKARD	→	→	→	→	→	→	→	→	→	↓	↓	→	→	→	↓	↓	→	→	→	→	↓	↓
HOME DEPOT	→	↑	→	→	→	↓	↓	↓	↓	→	→	↓	↓	↓	↓	↓	↓	→	→	↓	→	→
HONEYWELL INTL.	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	→	→	→	→	→	↓	↓	↓
INTEL	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	→	→	→	→	→	→	→	→
INTERNATIONAL BUS.MACH.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	→	↑	↑	↑	→
INTL.PAPER	→	→	→	→	→	→	↑	↑	→	↓	→	→	→	→	→	↓	↓	↓	↓	↓	→	↓
JOHNSON & JOHNSON	→	→	→	→	→	→	→	→	↑	↑	→	↑	↑	→	→	↑	↑	↑	↑	↑	↑	↑
JP MORGAN CHASE & CO.	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
KRAFT FOODS																	↓	↑	↑	↑		→
LEHMAN BROS.HDG.												→	→	↑	→	→	→	→	↑	→	→	→
MCDONALDS	↓	↓	↓	↓	↓	→	↓	→	↓	↓	↓	↓	↓	↓	↓	→	→	↑	→	→	→	→
MEDTRONIC	→	→	→	→	→	↓	↓	↓	→	→	→	→	→	→	→	→	↓	↓	↓	→	→	→
MERCK & CO.	↓	↓	→	→	→	→	↑	↑	↑	↑	↑	→	→	→	→	↑	↑	↑	↑	↑	↑	→
MERRILL LYNCH & CO.	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
MICROSOFT		↑	↑	↑	→	→	→	↑	↑	→	→	→	→	→	↑	↑	→	→	→	↓	→	↓
MORGAN STANLEY												→	→	→	→	→	↑	→	→	→	→	→
NORFOLK SOUTHERN	↑	↑	→	→	→	→	→	→	→	→	→	↓	→	→	↑	→	→	→	→	→	→	→
NYSE EURONEXT																						
ORACLE				↑	↑	↑	↑	→	→	→	→	↑	↑	↑	→	→	→	→	→	→	↑	↑
PEPSICO	↓	→	→	→	→	→	→	→	↓	→	↓	→	↓	→	↓	→	↓	↑	↑	↑	→	↑
PFIZER	→	→	↑	↑	↑	→	↓	↓	↓	↓	→	→	→	↓	↓	↓	→	→	↑	↑	↑	→
PROCTER & GAMBLE	→	→	→	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	↓	↓	↓	→	→	→	↑	↑
RAYTHEON 'B'	→	↓	→	→	↑	↑	↑	↑	↑	→	→	→	↑	→	↑	↑	→	↓	↓	↓	↓	↓
REGIONS FINL.NEW	→	→	↑	↑	↑	↑	→	→	→	↑	↑	↓	↓	→	↑	→	→	↑	↑	↑	↑	↑
ROCKWELL AUTOMATION	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	↓	↓	↓	→
SARA LEE	→	→	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	→
SCHLUMBERGER	↑	→	→	→	→	→	↓	↓	→	→	↓	↓	↓	→	↓	↓	↓	↓	↓	↓	↓	→
SOUTHERN	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↓	↓	→	→	→	↓
SPRINT NEXTEL	→	→	→	→	→	→	↑	→	↓	→	→	→	→	→	→	↑	→	↑	→	↓	→	→
TARGET	↓	→	→	↓	→	→	→	→	→	→	→	↓	↓	↓	→	↓	↓	→	↓	↓	→	↓
TEXAS INSTS.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	→	→	↓	→
TIME WARNER											→	→	→	→	→	→	↑	→	→	→	→	→
TYCO INTERNATIONAL							↑	↑	→	→	↓	→	→	→	→	→	→	→	→	→	→	→
UNITED PARCEL SER.															→	→	↓	→	→	→	→	→
UNITED TECHNOLOGIES	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	↓	→	→	→	↓	↓	↓
UNITEDHEALTH GP.							→	→	↑	↑	↑	↑	→	→	→	→	→	→	→	↑	↑	↑
US BANCORP	↑	↑	↑	→	→	→	→	↑	↑	↑	↑	↑	→	→	→	↑	→	→	→	→	→	→
VERIZON COMMS.	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→	→
WACHOVIA	→	↑	↑	↑	↑	↑	→	→	→	↑	→	↓	↓	↓	→	→	→	→	→	→	→	↑
WAL MART STORES	→	→	→	→	↓	↓	↓	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓	→	→	↑
WALT DISNEY	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	→
WELLS FARGO & CO	↑	↑	→	→	→	→	→	↓	↓	→	↑	→	↓	→	→	→	→	→	→	→	→	↑
WEYERHAEUSER	↓	↓	↓	→	→	→	→	→	↓	→	→	→	→	→	↑	→	↓	→	↓	→	→	→
WILLIAMS COS.	↑	→	→	→	→	→	→	↓	→	→	↑	↑	↑	↑	→	↓	→	↓	↓	↓	↓	↓
XEROX	→	↓	→	→	↑	→	→	→	↓	↓	↓	→	→	→	→	→	→	↓	→	→	→	→

Table A.17: Trading signals over time for "Benchmark"

Arrows pointing up (down) [right] indicate buy (sell) [neutral] candidates.

Benchmark	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
3M	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	↓
ABBOTT LABS.	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	→	→	→	→
AES								↓	→	→	→	↓	→	→	→	→	↑		↓	↓	↓	→
ALCOA	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→	→	→	↑	→	→
ALLSTATE												→	→	↑	↑	↑	↑	→	↑	→	→	↑
ALTRIA GROUP	↓	→	→	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
AMER.ELEC.PWR.	→	↑	→	↑	→	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
AMERICAN EXPRESS	→	→	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	↓	↓
AMERICAN INTL.GP.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑
AMGEN						↓	↓	↓	↓	↓	↓	↓	→	↓	↓	↓	↓	→	→	→	→	→
ANHEUSER-BUSCH COS.	→	→	→	↓	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓
APPLE	↓	↓	↓	↓	→	→	→	→	↑	→	↑	↑	→	→	→	↑	→	↑	→	↓	↓	↓
AT&T	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑
AVON PRODUCTS	→	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓			↓		↓	↓	↓	↓
BAKER HUGHES		→	→	→	→	→	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	↓	→
BANK OF AMERICA	→	→	→	→	→	→	→	↑	↑	↑	↑	→	↑	↑	↑	↑	→	→	→	→	↑	↑
BANK OF NEW YORK MELLON	→	→	↑	→	↑	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→	↑
BAXTER INTL.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	→	↓	↓	→	→
BOEING	→	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓
BRISTOL MYERS SQUIBB	↓	↓	↓	→	↓	↓	↓	→	→	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	→
BURL.NTHN.SANTA FE C	↑	↑	↑	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→
CAMPBELL SOUP	→	→	→	→	→	↓	→	→	↓	↓	↓	↓	↓	↓	↓	↓		↓	↓	↓	↓	↓
CAPITAL ONE FINL.													→	→	→	→	→	→	→	→	↑	↑
CATERPILLAR	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓
CBS 'B'										↑	↑	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	↑
CHEVRON	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
CIGNA	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	→	→
CISCO SYSTEMS							↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	→
CITIGROUP													→	→	→	→	→	→	→	→	→	→
CLEAR CHL.COMMS.						↓	↓	↓	↓	↓	↓	→	→	→	→	↑	↑	→	↑	↑	↑	→
COCA COLA	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		↓
COLGATE-PALM.	→	→	↓	→	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
COMCAST 'A'	↓	↓	↓	↓	↓		↓					↓	↓	→	→	→	→	→	↑	↑	↑	↑
CONOCOPHILLIPS	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑
CVS CAREMARK	→	→	→	→	→	→	→	→	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→
DELL					→	↓	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
DOW CHEMICALS	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
E I DU PONT DE NEMOURS	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
EL PASO											↑	↑	↑	↑	→	→	↑	↑	↑	→	→	→
EMC							→	↓	↓	↓	→	→	↓	↓	↓	→	→	→	→	→	→	→
ENTERGY	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→
EXELON	↑	↑	↑	↑	↑	↑	→	↑	↑	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→
EXXON MOBIL	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
FEDEX	→	→	→	→	→	→	↑	↑	→	↑	↑	→	↑	→	↑	→	→	→	→	→	→	→
FORD MOTOR	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	→	→	→	→	↑	↑	↓
GENERAL DYNAMICS	→	→	→	↑	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→
GENERAL ELECTRIC	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	→	→	→	→	→	→
GENERAL MOTORS	↑	↑	↑	↑	↑	↑	↑	↓	↓	→	↑	↑	↑	→	↑	↑	↑	→	↑	↑	↑	↓
GOLDMAN SACHS GP.																			→	→	→	→
GOOGLE 'A'																						↓
HALLIBURTON	↑	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	↑	→	→	→	↓	→
HARTFORD FINL.SVS.GP.															↑	→	→	↑	↑	↑	↑	↑
HEINZ HJ	↓	↓	↓	→	↓	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓
HEWLETT-PACKARD	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	→	→
HOME DEPOT	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	↓	→	→	→	→	→	→	→	→
HONEYWELL INTL.	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
INTEL	→	↓	↓	→	→	→	→	→	→	↓	→	→	→	→	↓	→	→	→	→	→	→	→
INTERNATIONAL BUS.MACH.	→	→	→	→	→	→	↑	↑	→	→	→	→	→	↓	↓	↓	→	↓	→	→	→	→
INTL.PAPER	↑	→	→	↑	↑	→	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	↑
JOHNSON & JOHNSON	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	↓	↓	↓	→	→
JP MORGAN CHASE & CO.	↑	↑	↑	↑	↑	↑	→	↑	↑	↑	↑	↑	→	↑	→	→	↑	↑	↑	↑	↑	↑
KRAFT FOODS																	→	→	↑	→		↑
LEHMAN BROS.HDG.												↑	↑	↑	↑	→	→	→	↑	→	→	→
MCDONALDS	↓	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
MEDTRONIC	→	→	→	→	→	↓	↓	→	↓	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→
MERCK & CO.	↓	↓	↓	↓	↓	↓	↓	↓	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	↓
MERRILL LYNCH & CO.	→	→	↑	↑	↑	→	↑	→	↑	↑	→	→	→	→	→	→	→	→	→	↑	→	→
MICROSOFT		↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	↓	→	↓
MORGAN STANLEY												→	→	→	→	→	→	→	→	→	→	→
NORFOLK SOUTHERN	→	↑	↑	↑	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	→	→
NYSE EURONEXT																						
ORACLE				↓	↓	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓
PEPSICO	↓	↓	↓	↓	↓	↓	→	→	→	↓	↓	→	↓	→	→	↓	↓	↓	↓	↓	↓	↓
PFIZER	↓	→	→	→	→	→	→	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→
PROCTER & GAMBLE	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	→	→	↓	↓	↓	↓	→	→
RAYTHEON 'B'	→	→	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑	↑	↑	→	→
REGIONS FINL.NEW	→	→	→	→	↑	→	→	→	→	→	→	→	→	↑	↑	↑	→	→	→	↑	↑	↑
ROCKWELL AUTOMATION	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	↓	→
SARA LEE	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	↓	↓	→	↓	→	→	→
SCHLUMBERGER	→	→	→	→	↓	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	↓	↓	↓
SOUTHERN	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	→
SPRINT NEXTEL	↑	↑	→	→	→	→	↑	→	→	↑	→	↑	→	→	→	↑	↑	↑	↑	→	↑	↑
TARGET	→	→	→	→	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→
TEXAS INSTS.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	↓	→	→	→	→	→	→	→
TIME WARNER											↓	↓	↓	↓	↓	↓	↑	↑	↑	↑	↑	↑
TYCO INTERNATIONAL							→	→	→	→	→	→	→	→	→	→	↑	↑	→	↑	↑	↑
UNITED PARCEL SER.															→	→	→	↓	→	→	→	→
UNITED TECHNOLOGIES	→	→	→	→	→	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
UNITEDHEALTH GP.							↓	↓	↓	→	→	→	↑	↑	→	→	↓	↓	↓	↓	→	→
US BANCORP	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→	→
VERIZON COMMS.	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
WACHOVIA	→	→	→	→	↑	↑	→	↑	↑	↑	↑	→	→	↑	↑	↑	↑	↑	→	↑	↑	↑
WAL MART STORES	↓	↓	↓	↓	↓	↓	↓	↓	↓	→	→	→	→	→	↓	→	→	↓	→	→	→	→
WALT DISNEY	↓	↓	↓	↓	↓	→	→	→	→	→	→	→	→	→	→	→	→	↑	→	→	→	→
WELLS FARGO & CO	↑	↑	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→	→
WEYERHAEUSER	→	→	→	→	→	→	→	→	→	→	↑	↑	↑	↑	↑	↑	→	↑	→	↑	↑	↑
WILLIAMS COS.	↑	↑	↑	↑	→	→	↑	→	↑	→	↑	↑	→	→	→	→	↑	↑	↑	→	→	→
XEROX	→	→	↑	↑	↑	↑	→	→	→	→	→	→	→	→	→	↑	→	→	→	→	→	→