University of Fribourg (Switzerland)
Faculty of Economics and Social Sciences

F U N D A M E N T A L   E Q U I T Y   V A L U A T I O N

Stock Selection based on Discounted Cash Flow

Thesis

Presented to the Faculty of Economics and Social Sciences
of the University of Fribourg (Switzerland)
in fulfillment of the requirements for the degree of
Doctor of Economics and Social Sciences

by

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from Le Noirmont (JU)

Accepted by the Faculty's Council on 1 July 2004 at the proposal of

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Fribourg (Switzerland)
2004

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Abbreviations and Symbols

'Analysts only'	Analysts only input specification of the model
APT	Arbitrage Pricing Theory
Avg.	Average
B	Book value of equity
B/M	Book value of equity-to-Market value of equity ratio
'Best Estimate'	Best Estimate input specification of the model
CAP	Competitive Advantage Period
Capex	Capital expenditures
CAPM	Capital Asset Pricing Model
CF	Cash Flow
CFO	Cash Flow from Operations
Consumer	Consumer discretionary industry
CORR	Pearson correlation coefficient
D	Dividend
D&A	Depreciation and Amortization
DCF	Discounted Cash Flow
DDM	Dividend Discount Model
DFCF	Discounted Free Cash Flow
DFP	Debt Financing Proportion
DY	Dividend Yield
E	Earnings
'Earnings'	Earnings input specification of the model
EARBEANA	EarningsBestAnalysts input specification of the model
EARCAANA	EarningsCAPMAnalysts input specification of the model
EARCABEST	EarningsCAPMBest input specification of the model
EBIT	Earnings Before Interest and Taxes
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
e.g.	for example
EPS	Earnings Per Share
et al.	and others
EV	Enterprise Value
EVA	Economic Value Added
FCFE	Free Cash Flow to Equity
FCFF	Free Cash Flow to Firm
FDR	Fundamental Discount Rate
FEV	Fundamental Equity Valuation
FEVM	Fundamental Equity Valuation Model

FGR	Fundamental Growth Rate
‘Foresight’	Foresight input specification of the model
FRP	Fundamental Risk Premium
g	Growth rate
GAAP	Generally Accepted Accounting Principles
GDP	Gross Domestic Product
GE	General Electric
Healthcare	Healthcare industry
I/B/E/S	Institutional Brokers Estimate System
IDR	Implied Discount Rate
i.e.	in other words
Industrial	Industrial goods and services industry
IT	Information Technology
ITT	Information Technology and Telecommunication industry
k	Discount rate
Max	Maximum
Mean	Arithmetic average
Min	Minimum
MPT	Modern Portfolio Theory
n	Number of observations
NA	Not available
No	Number
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
P	Price
p.	Page
p.a.	per year
P/E	Price-to-Earnings ratio
P/S	Price-to-Sales ratio
PEG	Price-to-Earnings-to-Growth ratio
PPE	Property, Plant and Equipment
R&D	Research and Development
Rank	ranking of the input specification in generating abnormal returns
RI	Residual Income
RIM	Residual Income Model
ROA	Return on Assets
ROE	Return on Equity
RR	Retention Rate
S	Sales
S&P	Standard and Poor’s

STDEV	Standard deviation
t	Variable for time
TM	Trademark
US	United States of America
V	Value
WACC	Weighted Average Cost of Capital
WSJ	Wall Street Journal

Abstract

In this dissertation, we take a behavioral view on the process of common stock valuation. Our main goal is to value common stocks using a sophisticated discounted cash flow (DCF) valuation model. We build the model and estimate its inputs by trying to replicate as closely as possible investors' behavior in valuing stocks in the stock market and consequently use a mix of different methods to determine cash flow growth, the growth duration and the discount rate.

We test the model's ability to differentiate between under- and overvalued stocks in the US market over the ten year period from 1993-2002. The results of the approach are very promising: an investment strategy buying undervalued stocks as identified by the model yields an annual return of 27.57% over the ten year testing period compared to a benchmark return of 19.47% and the returns of a portfolio of overvalued stocks as identified by the model of only 6.26%. We conclude therefore that a complex discounted cash flow valuation model can identify and exploit systematic mispricing in the stock market.

This dissertation is dedicated to my wife. The author also gratefully acknowledges the contribution of Thomson Financial for providing earnings per share forecast data, available through the Institutional Brokers Estimate System. These data have been provided as part of a broad academic program to encourage earnings expectations research. We also thank the University of Hawai'i for the use of Research Insight.

1. Introduction

We believe that what a researcher chooses to study in the field of capital markets is largely a function of his level of belief in the efficiency of these markets. In our opinion, a naïve view of market efficiency in which price is assumed to equal intrinsic value is an inadequate conceptual starting point for market-based research. This view is an oversimplification that fails to capture the richness of market pricing dynamics and the complex process of price formation in the stock market.

We investigate the subject of market efficiency by scientifically approaching common stock valuation in the belief that replicating the price discovery process and identifying possible mistakes in the market pricing of stocks can yield abnormal returns. We try to use all relevant fundamental information available to investors to determine intrinsic values of stocks mechanically. For this we build an objective and verifiable discounted cash flow valuation model. The model follows an interactive approach combining many fundamental input factors into a flexible spreadsheet model. The model is thus not algebraic in nature and therefore difficult to describe in its entity.

We find that our DCF model is able to identify mispriced stocks in the US stock market. A trading strategy based on the model's investment recommendations earns large and stable excess returns. We would like to emphasis at this point already that the model is in its original form purely objective and does not require any human input - although such input is possible and improves the model's results.

The remainder of this dissertation is organized as follows. Part one consists of a short introduction to investment, including an overview of the investment process and of different valuation models commonly applied in this process. In part two, we develop our own valuation model and determine the appropriate input factors. In the third part, we test the valuation model to examine whether it is able to differentiate between under- and overvalued stocks in the US stock market and thus whether it is a practically useful investment tool.

PART I: COMMON STOCK INVESTMENT AND VALUATION

"Happily, there is nothing in the law of value which remains
for the present or any future writer to clear up;
The theory of the subject is complete."
John Stuart Mill, 1848

Despite John Stuart Mill's view, common stock valuation today is still a very subjective and unscientific matter. Most financial professionals compare different ratios of one stock with the same ratios of other, similar stocks. Others calculate efficient frontiers and buy stocks based on correlation coefficients, but only few apply the fundamental principle of valuation which states that the value of any financial asset is the cash flow this asset generates for its owner, discounted at the required rate of return. In this part of the dissertation, we present a short overview of the current investment practices and equity valuation approaches.

2. The Investment Process

In his book 'Capital' Karl Marx (Marx, 1887) uses a remarkably simple equation to explain the capitalist system: M-C-M'. In words, the capitalist starts with Money (M), converts it into Capital (C) by investing it and ends up with More Money (M') – that is in essence the investment process. Investing is essential for the functioning of the capitalist system. Investors provide money to entrepreneurs that build businesses to produce goods and services demanded by society. In return for providing capital, the investor is compensated with a share of the profits of the business.

An investment can therefore be defined as the current commitment of dollars for a period of time in order to derive future payments that will compensate the investor for (1) the time the funds are committed, (2) the expected rate of inflation, and (3) the uncertainty of future payments or risk.[1]

In relation to common stocks, two different methods of investing can be distinguished: modern portfolio theory and fundamental analysis. In the following pages, we take a more detailed look at both approaches.

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[1] Based on Reilly and Brown (2003), p. 5

2.1 Market Efficiency: Modern Portfolio Theory vs. Fundamental Analysis

The stock investment process looks considerably different depending on the investor's belief about market efficiency. The discussion in the academic literature about whether the stock market is efficient or not is endless long and the conclusions differ.[2] Based on the belief in the degree of market efficiency, two major investment theories emerged that still separate the financial community. On the one hand is fundamental analysis based on the idea of non-efficient markets and on the other hand modern portfolio theory (MPT) with a strong faith in market efficiency.

Fundamental Analysis

Fundamental analysis is an investment approach that uses existing economic information, such as historical financial statements or different fundamental information about a company, to make investment decisions. The principles of fundamental analysis were first outlined in the book 'Security Analysis' of Graham and Dodd (Graham and Dodd, 1934).

Two approaches to fundamental analysis are widely used today: the 'Top down' and the 'Bottom up' approach.

The idea behind the *'Top down'* approach is to use all information available, including macroeconomic data, to make an investment decision. In general, fundamental analysts look first at the current macroeconomic conditions, because for them the decision to invest depends mainly on what stage of the business cycle the economy is heading and which industry is expected to perform well in the forecasted economic environment. Then analysts try to find the best companies in these industries. The stock selection process is based on the idea that the stock of the selected company must outperform its peers in the industry and the industry must outperform other industries.

The top-down approach is widely accepted and followed on Wall-Street and well documented in investment textbooks. Investment strategies based on that approach include sector rotation (changes in the sector allocation based on changes in the economic environment) and style investing (the differentiation between value and growth stocks).

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[2] For a discussion supporting efficient markets see e.g. Fama (1991); for a case against efficient markets see Haugen (1995) or Dreman (1998).

In contrast to the top-down approach, the '*Bottom-up*' approach to fundamental analysis does not attempt to forecast the economic environment. It consists mainly of estimating the value of a stock and comparing it to its current market price. If a stock is significantly undervalued, it is considered a buying candidate independent of future market or macroeconomic conditions. The proponents of this approach try to find good companies that are selling at a low price in relation to their fundamentals. Mainly because academics feel uncomfortable ignoring some important available information, the bottom-up approach is less of a focus in textbooks and empirical research and therefore also known as the practical approach to investing.

Although we know of no academic study comparing the empirical validity of the top-down and bottom-up approach to fundamental analysis, it seems that the bottom-up approach produced the most profit for its followers (Buffet, 1984). Forecasting the economy has been proven to be a very difficult task that rarely produces satisfactory investment returns. The most common mistake in the top-down approach is however that investors focus on companies rather than on stocks. Investors must recognize that a good company is not necessarily a good investment. The stock selection process should always be based on a comparison between the intrinsic value of a stock and its current market price. Investors must thus determine whether a stock is under- or overvalued based on the fundamentals of the business. Only when value exceeds price by a high enough margin of safety should a stock be bought.

Modern Portfolio Theory

Modern portfolio theory (MPT) is based on the idea of efficient markets. The underlying philosophy of this investment theory is that all investors in the marketplace are intelligent, profit-oriented and are trying to find mispriced stocks. The large number of informed participants will ultimately drive a stock price to its intrinsic value and hence create an efficient market. In such an environment mispriced stocks would be detected immediately, the under- or overvaluation would disappear and no profit could be gained from using any form of investment analysis.

In other words, the MPT states that all stocks are priced fairly and nobody can persistently outperform the market. Consequently, followers of this method of investing will try to reduce risk by diversification and costs by minimizing transaction fees and taxes. The optimal investment strategy is the creation of an efficient portfolio based on covariances of all the stocks in the global marketplace. In praxis however, this strategy usually means investing in index funds.

Conclusion: It's about value and price

A postulate of sound investing is that an investor should not pay more for an asset than it is worth. The two different approaches to investment (MPT and fundamental analysis) are based on two fundamentally different understanding of the relationship between intrinsic value and price.

Price balances supply and demand for stocks on the stock exchange and therefore can be exactly determined. *Intrinsic value* is more difficult to establish and measure. Value must be determined in a valuation process. This process requires forecasting the future and is therefore unavoidably subjective and various approaches are generally used. The differences in methods and views about future prospects of a company make value individualistic and unobservable.

In efficient markets price should equal intrinsic value, but fundamental analysis assumes that value and price can deviate. In our opinion, it is too simplistic to assume that markets are always efficient so that prices adjust to intrinsic value instantly. According to Lee (2001) price convergence towards intrinsic value is better characterized by a process, which is accomplished through the interplay between noise traders and information arbitrageurs. Prices move as investors' trade on the basis of imperfect informational signals. Eventually, through trial and error, the information procession is completed and prices fully reflect the impact of a particular signal. However by that time, many new informational signals have arrived, starting a new adjustment process. Consequently, the market is in a continuous state of adjusting prices to intrinsic values.

Based on this view is price discovery an on-going market process and the current price of a stock should be regarded as a noisy proxy for that stock's intrinsic value. In that context, market-based research should focus on understanding the dynamics of price discovery and, based on the findings, on deriving an independent measure of intrinsic value through a systematic valuation process.

2.2 Valuation – more Art than Science?

Valuation is the process of determining the intrinsic value of common stocks. In order to understand valuation, two main concepts of value must be understood. First, the commonly accepted theoretical principle to value any financial asset is the discounted cash flow methodology (Reilly and Brown, 2003). An asset is worth the amount of all future cash flows to the owner of this asset discounted at an opportunity rate that reflects the risk of the investment (Pratt, 1998). This fundamental principle does not change and is valid through time and geography. A valuation model that best converts this theoretical principle into practice should be the most useful.

Based on the first concept, the second concept states that valuation is inherently forward looking. Valuation requires an estimate of the present value of all expected future cash flows to shareholders. In other words, it involves looking into an uncertain future and making an educated guess about the many factors determining future cash flows. Since the future is uncertain, intrinsic value estimates will always be subjective and imprecise. Better models and superior estimation techniques may reduce the degree of inaccuracy, but no valuation technique can be expected to deliver a single correct intrinsic value measure.

These main concepts illustrate that there are few things more complex than the valuation of common stocks. Thousands of variables affect the future cash flows of a company and thus the value of a stock. Most variables are known, but very few are understood; they are independent and related, they are measurable, but not necessarily quantitative, and they affect stock values alone and in combination. The combination of thousands of factors with each other leads to such high numbers of possible outcomes that in the stock market every moment must be viewed as unique. This view is explicitly considered in newer theories like the chaos theory. According to this theory even a small change in an insignificant variable may lead to a complete different final outcome. It is not that the changing variable is of that great importance, but that the small change results in a different combination with other variables and thus leads to a multiplication of changes until the outcome is completely unpredictable (Mouck, 1998).

This makes every day in the stock market unique. Historical data is everything available to forecast the future, but investors should adequately consider the uniqueness of the current situation. The fact that each economic and social set of facts is unique implies that strict scientific models should not work satisfactory. Valuation is therefore not a science.

In our opinion is valuation much more of an art than it is science; at best it can be viewed as a scientific attitude towards art. Given the complexities of analyzing all factors influencing a company's value directly, and indirectly in combination with other factors, it is impossible to scientifically determine what a stock is worth at a certain point in time. The best we can do to deal with this immense complexity is to build a comprehensive and systematic valuation model based on an accepted valuation theory. In this dissertation, we try to build such a valuation model.

3. Equity Valuation Models

As discussed above is equity valuation a complex and therefore diverse process. In this process, equity valuation models help specifying what is to be forecasted, directs to the information needed to make the forecast, and shows how to relate the forecasted data into an intrinsic value estimate. Three major valuation model categories can be distinguished:

1. Asset based Valuation
2. Absolute Valuation or Discounted Cash Flow models
3. Relative Valuation or Price Multiple models.

Other methods exist like the yield-based valuation method, which focuses on dividend yield when the investment priority is income, or option valuation models that explicitly consider management flexibility in the value creation process. We focus on the three main valuation techniques above as they are conceptually the most appealing, generally applicable and widely used.

3.1 Asset based Valuation

Asset based valuation is closely associated with Value investing dating back to Benjamin Graham's book 'Security Analysis' (Graham and Dodd, 1934). After several years of confusion about the value of equity prices in the largest bear market in history, Graham researched stock prices and outlined for the first time something like a scientific approach to common stock valuation. He finds that the law of diminishing returns in a competitive economy implies that growth does not always create value and furthermore is usually not persistent.

Graham suggested therefore to value stocks based first of all on the market value of the existing tangible assets of a company. He noticed that since the book value of an asset in the balance sheet reflects its historical cost, it might deviate significantly from market value if the earning power of the asset has increased or decreased significantly since its acquisition and needs therefore to be adjusted. He proposes to adjust book value to reflect reproduction costs of the asset because these are the costs a competitor would have to incur to enter the business and consequently represent the economically best estimate of the current market value of the assets. When a company is earning excess returns in a competitive economy, new firms will enter the business driving down these excess returns. This process will go on until it costs more for a new company to reproduce the necessary assets to enter the business than the excess returns justify in terms of economic benefit. Consequently, reproduction costs reflect the fair value of a company's assets.

Increasingly, it is however not sufficient to correct reported book values to reflect reproduction costs as certain valuable assets are not reflected in the balance sheet. The asset based valuation process requires also the requantification of non-monetary real assets. R&D or advertisement expenses, for example, represent a cost for new entrants that are not reflected in the balance sheet. To adjust, estimates should be made to reflect the number of years of expenses the competitor would need to invest in order to enter the business. These expenses then would be capitalized and included into the asset value. The sum of the adjusted book values of all assets would then equal the value of the company.

As these adjustments require some difficult and subjective assumptions about values, Graham favored stocks that were selling below the reproduction costs of their current assets after all liabilities have been paid. These assets do not require any adjustment. It was however easier to find such stocks during the Great Depression than it is today and since then Value investors adjusted their approach by valuing the reproduction cost of all assets as described above.

In asset based valuation, the second most reliable measure of a firm's intrinsic value is the value of the current earnings the company is able to generate with its assets. Graham calls this 'past performance value' (Graham, 1973). He assumes that the current earnings correspond to the sustainable level of distributable cash flow and that this level remains constant over the infinite future. Graham assumes though no growth in discounted earnings based on the same belief that in a competitive economy growth usually does not create value and therefore has no value.

Consequently, the third and least likely source of firm value according to Graham is the value of growth. This element is the most difficult to estimate and is accordingly highly uncertain. In a competitive environment growth creates value only when the firm is operating at a sustainable competitive advantage. The 'past-performance value' should therefore only be adjusted for growth if "the future appears reasonably predictable" (Graham, 1973).

3.2 Absolute Valuation or Discounted Cash Flow Models

Discounted cash flow (DCF) valuation models recognize that common stock represents an ownership interest in a business and that its value must be related to the returns investors expect to receive from holding it. A business generates a stream of cash flow in its operations and as owners of the business, shareholders have a legal claim on these cash flows. The value of a stock is therefore the share of cash flow the business generates for its owners discounted at their required rate of return. This is the fundamental principle of valuation as developed in the 'Theory of Investment Value' by John Burr Williams in 1938 (Williams, 1938). Mathematically, the principle is expressed as follows:

$$V_0 = \sum_{t=1}^{n} \frac{CF_t}{(1+k)^t}$$

V_0 = Value of the stock in period t=0
CF_t = Cash flow generated by the asset for the owner of the asset in period t
k = Discount rate
n =Number of years over which the asset will generate cash flows to investors.

The value of common stocks in DCF models is determined by the stream of expected future cash flows to investors in the nominator and their required rate of return in the denominator. In the following, we take a closer look at the three most widely used versions of DCF models:

1. Dividend discount models,
2. Free cash flow discount models, and
3. Residual income models.

The models differ only in their definition of expected cash flow to investors. As we are valuing one specific company, we theoretically should obtain the same value no matter which expected cash flows are discounted, as long as the assumptions are coherent (Lundholm and O'Keefe, 2001a,b).

3.2.1 Dividend Discount Models

The dividend discount model (DDM) is the theoretically most correct model for firm valuation (Miller and Modigliani, 1961). It's a very intuitive approach as well. When investors buy a stock, they expect to receive two types of cash flows: the dividends in the period over which the stock is owned and the market price at the end of the holding period. The market price however is again determined by the dividends the new owner of the security expects to receive over his holding period. From this follows that the market price can be replaced again by a stream of dividends, until the entire value of the stock is expressed in terms of dividends. Consequently, even from the perspective of an investor with a finite investment horizon, the value of a stock always depends on all future dividends:

$$V_0 = \frac{D_1}{(1+k)} + \frac{D_2}{(1+k)^2} + ... + \frac{D_t}{(1+k)^t} + \frac{P_t}{(1+k)^t} \quad \text{with} \quad P_t = \frac{D_{t+1}}{(1+k)^{t+1}} + \frac{D_{t+2}}{(1+k)^{t+2}} + ... + \frac{D_n}{(1+k)^n}$$

becomes $V_0 = \sum_{t=1}^{n} \frac{D_t}{(1+k)^t}$ (1-1)

V_0= Value of the stock in t=0
D_t = Dividend received in period t
P_t = Market price in period t
k = Discount rate
n = Number of years over which the asset will generate dividends for investors.

The most widely known DDM model is the Gordon growth model (Gordon, 1962). It expresses the value of a stock based on a constant growth rate of dividends so that $D_t = D_{t-1}(1+g)$ where g is the expected constant growth rate in dividends. For any time t, D_t equals the t=0 dividend, compounded at g for t periods: $D_t = D_0(1+g)^t$. If D_t is substituted into equation 1-1 we obtain $V_0 = \sum_{t=1}^{n} \frac{D_0(1+g)^t}{(1+k)^t}$. As this represents a geometric series, the equation can be simplified into the Gordon growth model: $V_0 = \frac{D_0(1+g)}{k-g}$ or even simpler $V_0 = \frac{D_1}{k-g}$.[3] These equations show that the value of a stock is determined by the current dividend, its growth rate and the discount rate.

Even though the DDM is the theoretical correct valuation model for common stocks, it has some major weaknesses related to its practical application. The main problem is that observed dividends are not directly related to value creation within the company and therefore to future dividends. According to Miller and Modigliani (1961) currently observed dividends are not informative unless the pay-out policy is tied to the value generation within the company. Penman (1992) describes this as the dividend conundrum: “price is based on future dividends but observed dividends do not tell us anything about price”. The missing link between value creation and value distribution leads to a problem in forecasting dividends as it is difficult to forecast pay-out ratios.

Today, share repurchases are further complicating the practical application of the DDM. Grullon and Michaley (2002) document that since the mid 1980’s, many corporations have been repurchasing large amounts of shares. Repurchases transmit cash from the corporation to investors and are, in that sense, not different from dividends.

For these reasons, dividends as the relevant cash flow to investors have been more and more replaced since the 1980’s with free cash flows.

3.2.2 Free Cash Flow Discount Models

Although dividends are the actual cash flows paid out to stockholders, the discounted free cash flow (DFCF) models are based on the cash available for distribution but not necessarily distributed to shareholders. Common equity can be valued either directly discounting free cash flow to equity (FCFE) or indirectly by calculating the value of the firm using free cash flow to the firm (FCFF) and then subtracting the value of non-common stock capital (usually debt and preferred stock) from this value.

FCFE is the cash flow available to the company’s suppliers of equity capital after all operating expenses (including interest and taxes) and principal repayments have been paid,

[3] For a detailed deviation of the Gordon growth model see Reilly and Brown (2003), p. 406.

and necessary investments into short-term assets (working capital) and long-term assets (net capital expenditures) have been made (Damodaran, 2004). It is called ‘free’ cash flow to equity to indicate that it is the amount of money free to distribute to equity investors without negatively affecting the continuation of the business.

A related approach to discounted free cash flow valuation is the use of FCFF instead of FCFE. Using this method, the value of the firm is obtained by discounting expected cash flows to the firm, i.e. the cash flows after covering all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital (WACC). Problematic in discounting FCFF is that it introduces circularity into the valuation model. The FCFF must be discounted at the WACC to calculate firm value, but in order to calculate the WACC the value of the firm is needed in the first place. Consequently, valuation becomes an iterative process.

The discounted free cash flow models were most popular after the 1980’s until recently when Ohlson (Ohlson, 1995) proposed a new DCF approach that had a considerable impact on the academic valuation literature. This approach is discussed next.

3.2.3 Residual Income Models

Residual income (RI) is net income less a charge for investors opportunity cost in generating this net income (the cost of capital or required rate of return). Recognized by economists since the 1770’s, residual income is based on the premise that in order for a firm to add wealth to its owners, it must earn more on its invested capital than the total cost of that capital.[4] A company can have positive net income but may still not be adding value in dollar terms for shareholders if it does not earn more than the dollar cost of equity capital.

Residual income models (RIM) have been referred to by a variety of names (residual income, economic profit, discounted abnormal earnings, excess profit) and variations (Edwards-Bell-Ohlson, Ohlson, Ohlson-Juettner etc). Commercial variations of the model have resulted in ‘brand name’ products such as Stern Stewart's EVA™, or McKinsey's Economic Profit Model. All these models are based on the concept of residual income developed by Edwards and Bell (1961) and Ohlson (1991, 1995).

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[4] See e.g. Hamilton (1777) or Marshall (1890)

In the following, the concept of the residual income model is explained shortly. All model variations mentioned above are based on the same principle but make slightly different assumptions in their implementation.[5]

The residual income model starts with the same assumptions about the value of a stock as the DDM: $V_0 = \sum_{t=1}^{n} \frac{D_t}{(1+k)^t}$ (1-2). Rearranging the clean surplus relation $B_t = B_{t-1} + E_t - D_t$,[6] where B is book value and E earnings, to $D_t = E_t - (B_t - B_{t-1})$ and substituting it into the first equation yields $V_0 = \sum_{t=1}^{n} \frac{E_t - (B_t - B_{t-1})}{(1+k)^t}$. After some algebraic rearrangement,[7] this formula can be expressed as $V_0 = B_0 + \sum_{t=1}^{n} \frac{E_t - kB_{t-1}}{(1+k)^t}$. As $E_t = ROE_t * B_{t-1}$, the formula is often expressed as $V_0 = B_0 + \sum_{t=1}^{n} \frac{(ROE_t - k)B_{t-1}}{(1+k)^t}$ (1-3).

Thus, the value of the firm is defined in terms of current book value (B_0) and abnormal earnings ($(ROE_t - k)B_{t-1}$). From formula 1-3 can be seen that investors are only willing to pay a premium over book value of equity if the company is able to earn a rate of return on equity above the equity cost of capital (i.e. the firm produces positive residual income).

The advantage of the RIM valuation approach is that it is expressed entirely in terms of accounting numbers and therefore should reduce estimation error in the application of the model. Furthermore, the assumptions made to estimate the terminal value in DFCF models are crucial. In the RI model book value, which often represents a sizable portion of firm value, is given and does not have to be estimated so that the portion of terminal value to total value is smaller. The main advantage of the RI model is thus that investors only need to estimate the difference between firm value and book value while in DFCF models firm value itself has to be estimated.

Despite its merits and the academic effort, residual income models were not widely used in valuation practices until recently (Demirakos, Strong, and Walker, 2002).

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[5] For a survey of the literature see Lee (1999).

[6] The clean surplus relation states that all changes in book value (other than transactions with stockholders) must flow through the income statement without any direct charges to stockholders equity. US GAAP is generally consistent with clean surplus accounting (White, 1998).

[7] For a more detailed deviation of the model see White (1998), p. 1063.

3.3 Relative Valuation or Price Multiple Models

In absolute valuation the objective is to find the intrinsic value of an asset given its cash flow, growth and risk characteristics. In relative valuation the objective is to value assets based on how similar assets are priced in the market. The principle underlying relative valuation models is the law of one price - the economic theory that two similar assets should sell for similar prices.

There are two steps in correctly applying relative valuation techniques. First, stock prices have to be standardized and made comparable, usually by converting them into multiples of earnings, book values or sales. In a second step, similar firms have to be found to compare the standardized multiples to in order to determine their relative adequacy.

Four main methods using different multiples are commonly used in the relative approach to valuation of common stocks (Stowe et al., 2002):

1. Relative earnings valuation method: P/E ratio or earnings multiple, PEG ratios[8]
2. Relative revenue valuation method: P/S ratio[9]
3. Relative cash-flow valuation method: P/EBIT, P/EBITDA, P/CFO, EV/EBITDA ratios[10]
4. Relative asset valuation method: P/B or B/M ratios.[11]

Earnings multiples are commonly used when analysts have high confidence in the quality of historical and projected earnings per share (EPS) and when EPS are expected to grow. The revenue based valuation method is used when earnings are negative or declining, or when earning figures are not comparable or not representative for the future. Cash flow ratios are used in industries characterized by low or negative EPS due to large non-operating expenses or for cyclical companies with high earnings volatility.

In general, the use of earnings multiples is best when earnings are reliable. In case of a non-reliable bottom line, investors should move the income statement up to EBIT, then EBITDA and if nothing else is reliable, sales. The relative asset valuation approach gained on

[8] P/E ratio = Price / Earnings per share; PEG = P/E / g where g is the expected growth rate of earnings
[9] P/S ratio = Price / Sales per share
[10] EBIT = Earnings Before Interest and Taxes, EBITDA= Earnings Before Interest, Taxes, Depreciation and Amortization, CFO = Cash Flow from Operation, EV = Enterprise Value = market value of equity + market value of debt - cash and investments
[11] P/ B = Price / Book value of equity per share; B/M = Book value of equity / Market value of equity

popularity after a study by Fama and French (1992) showing that the B/M ratio is one of the best explanatory variables of historical stock returns.

Most commonly used is however the earnings multiple approach (Demirakos, Strong and Walker, 2002). In this method, analysts need to forecast EPS for the year ahead and determine an appropriate price-to-earnings multiple (P/E ratio). The P/E ratio expresses how many dollars the investor is willing to pay for a dollar of expected future earnings per share. By multiplying the earnings multiple with the estimated earnings, analysts find the target price for the stock (P/E*E = P).

Key and at the same time major weakness in this method of common stock valuation is the earnings multiple. It is determined usually in a rather subjective way relative to multiples of other 'comparable' companies and is therefore subject to biases and even manipulation. Bhojraj and Lee (2001) write that "the aura of mystique that surrounds this technique is discomforting from a scientific perspective, limits its coverage in financial analysis courses, and ultimately threatens its credibility as a serious alternative in equity valuation."

Another problem associated with the widespread use of relative valuation techniques is an obsessive focus on short-term earnings numbers. While research shows that reported earnings are decreasingly important in explaining stock prices (e.g. Lev and Zarowin, 1999), the market's focus on earnings has steadily increased.[12] Related to this problem of relying too heavily on next year's earnings is the problem of accurately forecasting them. Several studies have shown that analysts make large mistakes in forecasting earnings (e.g. Dreman, 1998, Karceski and Lakonishok, 2001). Some authors even argue that the mistakes are too large to derive any kind of meaningful information from these forecasts (Dreman, 1998).

Another often ignored fact in using relative valuation approaches is that relative valuation models only give relative investment recommendations. A stock selling at a P/E that is low relative to the P/E of another comparable stock is *relatively* undervalued. If the comparison stock is overvalued (in an absolute sense) so might be the stock the relative valuation model identified as undervalued.

In summary, the relative valuation techniques are only useful when a good set of comparable companies exists, when the market is not at a valuation extreme and when the

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[12] Rappaport, Alfred; WSJ, March 10 2003, page R2.

company's fundamentals are difficult to forecast. While the multiple approach bypasses explicit projections and present value calculations, it relies on the same principles underlying the more comprehensive absolute valuation approach: value is an increasing function of future cash flows and a decreasing function of risk. Multiples are therefore only a poor substitute for comprehensive valuations.

3.4 What is Used and what Works in Practice

Barker (1999) reviews the actual use of valuation models by professional investors and financial analysts. He finds that both groups rank the simple P/E model as the most important valuation model. His results confirm earlier studies of Moizer and Arnold (1984), and Pike, Meerjanssen and Chadwick (1993). In a recent survey Demirakos, Strong, and Walker (2002) analyze analyst valuation methodologies in the research reports they provide. They find that relative valuation is the dominant valuation approach and that 89% of valuation reports contain some form of earnings multiple. Surprisingly, considering the large number of published papers about the RIM model in the academic literature, they find no case in which this model is the dominant valuation model and only 2% of the reports use RIM. However, they do find several instances (21% of all research reports) where a multi-stage DFCF model is the dominant valuation model and DFCF is used in 36% of the analyst reports.

These results suggest that the use of valuation models is divers but relatively stable over time. The actual use tells a lot about what the investment professionals think which models work best in valuation. In the following, we provide an overview of academic studies that illustrate the ability of different valuation models to explain or predict stock prices.

Asset based Valuation studies

Asset based valuation studies are almost non-existent in the academic literature as they require subjective adjustments to accounting numbers. The soundness of the approach is however confirmed by the many practitioners of Value investing who produce extraordinary returns using this approach. Greenwald et al. (2001) names some money managers of the Graham school that have consistently beaten stock market averages over extended periods of time. Walter Schloss, for example, has with 45 years (1956-2000) one of the longest uninterrupted records as a money manager. His return over the period averaged 15.3% per year, compared to 11.5% for the S&P 500. The risk was low too, Schloss lost money in only seven out of the 45 years. Nothing however compares to Warren Buffets realized returns: a $10,000 investment in Berkshire Hathaway when Buffet took over in 1965 grew to be worth over $50 million by 2003 compared to only $500,000 for the S&P 500.[13]

Absolute Valuation studies

Most tests of DCF models have been done in the 1980’s using dividend discount models. Sorensen and Williamson (1985) for example, test four DDM models that differ in their complexity. They find that the top-ranked (bottom-ranked) portfolios of all four models outperformed (underperformed) the market average and that portfolio returns improve considerably as the complexity of the model used is increased.

More academic research compares the DCF and various RI models. The evidence regarding the relative superiority of these models is mixed. Bernard (1995), Penman and Sougiannis (1998), Frankel and Lee (1998) and Francis et al. (2000b) find that the RI valuation models predict or explain stock prices better than the models based on discounting short-term forecasts of dividends or cash flows. On the other hand, provide studies by Stober (1996), Dechow, Hutton and Sloan (1999), Myers (1999) and Callen and Morel (2000) evidence that the RI model is of limited empirical validity.

Relative Valuation studies

While multiples are used extensively in practice, there exists little published academic research documenting the relative superiority of different multiples. Empirical evidence in Kim and Ritter (1999) and Liu, Nissim, and Thomas (2002) suggest that in the earnings multiple approach forward earnings perform better than historical earnings. Liu et al. (2002) show that in terms of accuracy relative to current prices, the performance of forward earnings is followed by that of historical earnings, cash flow, book value, and finally sales. Furthermore find Liu et al. (2002) that contrary to the popular view that different industries have different ‘best’ multiples, the previous rankings are observed consistently for almost all industries examined.

[13] www.investopia.com

More empirical tests have been done on the absolute investment performance of different multiples. Studies over many decades and in different countries have shown that low multiple stocks (value stocks) perform better than high multiple stocks (growth stocks). Among many others show Basu (1977), Lakonishok, Shleifer and Vishny (1994), and Dreman (1998) that low P/E stocks earn positive abnormal returns relative to the market and high P/E stocks negative abnormal returns. Goodman and Peavy (1983) find the same using industry relative P/E ratios. Peters (1991) tests the PEG ratio approach and finds significant higher returns for low PEG stocks than for high PEG stocks. Fama and French (1992) and Dreman (1998), again among many others, find that low P/B (or low B/M) stocks perform better than stocks with high such ratios. Capaul, Rowley and Sharpe (1993) extend the analysis of P/B ratios across international markets, and conclude that low multiple stocks earn abnormal returns in every market they analyzed. The results of studies on the P/S and P/CF and even P/DY are no different (Dreman, 1998).

These results arise the question of whether the abnormal returns associated with a low multiple investment strategy represent a market anomaly in relation to relative valuation (Lakonishok, Shleifer and Vishny, 1994) or whether they simply represent a premium for taking on extra risk (Fama and French, 1992). Empirical and behavioral evidence points more to the mispricing hypothesis than to the risk explanation (Daniel, Hirshleifer and Subrahmanyam, 1998; Froidevaux, 2001).

Conclusion

In summary, the practical implementation of the three main approaches to valuation – asset based, absolute and relative valuation – will generally yield different estimates of intrinsic values for the same firm and the results are inconclusive on which model works best in praxis.

We believe that behind the inconclusive results of the practical validity of the different valuation models lies a conceptual problem. In our opinion, we need to differentiate two different types of valuation models: conceptual models and application models. *Conceptual models* are related to the explanation of an idea or concept. By doing so, the model can be simple and schematic. Assumptions and restrictions are tolerated in order to facilitate the explanation. *Application models* on the other hand are related to the application of a conceptual model to economic reality. This type of model must be comprehensive and must include all the variables that were omitted in a conceptual model.

The results about the relative superiority of different valuation models are inconclusive because most previous research tested conceptual models instead of application models. A realistic test of the different valuation approaches requires the test of more complex models. In the following parts of this dissertation, we will develop and test such a comprehensive application oriented valuation model to examine whether it can be used to generate abnormal returns in the US stock market.

PART II: THE FUNDAMENTAL EQUITY VALUATION MODEL

"The greatest gift is the power to estimate correctly the value of things."
Francois, Duc de la Rochefoucauld
Maximes, 1664

4. The Fundamental Equity Valuation Model

From the previous discussion of valuation models becomes evident that even though the monetary reward couldn't be higher in any economic subject, there is still great diffusion of what valuation model captures best the intrinsic value of common stocks. In the following, we present and later test a sophisticated discounted cash flow valuation model based on a behaviorally inspired approach of replicating investors' value finding process in financial markets.

4.1 Overview of the Fundamental Equity Valuation Model

Before presenting a short overview of the model, the idea, goal and underlying logic of the model are discussed.

Idea, Goal and Logic behind the Fundamental Equity Valuation Model

The idea of model development is to derive a stock valuation model that explicitly relates a stock's intrinsic value to currently observable fundamental variables. We recognize that stock prices in the market are generated by expectations of investors about the intrinsic value of the stock. A valuation model to be practically useful must therefore as closely as possible replicate investors' expectations and thus the price finding process in the stock market. In the fundamental approach to valuation presented in this dissertation, we try to replicate the processes behind investors' stock pricing decisions in form of a complex application oriented valuation model.

In order to determine the conception of the model and its inputs, we have to understand how and which information market participants transfer into stock prices. Capital market theory should explain how capital markets work. Unfortunately, the modern capital market theory based on Markowitz (1959) is too simplistic and rigid to capture the complex process of human beings transferring information into stock prices. In our opinion, ironically, the best work on capital market theory is done by practitioners and not by academics. Books by De La Vega (1688), Mackay (1852), Levèvre (1923), Graham (1949), Fisher (1958), Malkiel (1973), Hunt (1987), Soros (1987), Lynch (1990), Peters (1991), Vaga (1994), Hagstrom (1994) or Shefrin (2000) provide valuable insights into the mind of the stock market and its participants.

Peters (1991), for example, shows that stability in the market exists because of different expectations of investors. One investor sells a stock based on his expectations of value to another investor who buys the stock based on different expectations. It is therefore likely that investors in the market have different assessments of the relevant input factors to a valuation model. Consequently, the input factors reflected in the stock prices are a weighted average of these different individual assessments, where the weights are based on the wealth the investor invests in the stock market.

Shefrin's (2000) review of behavioral finance provides some additional insights into the way people form expectations and price stocks in financial markets. When the many behavioral factors (such as fear, greed, loss aversion, mental accounting, overconfidence etc.) are considered together, must the resulting behavior of investors be viewed as more complex than the purely rational behavior assumed by the 'modern' capital market theory. Kent et al. (2001) show that behavioral factors indeed do affect stock prices in many different ways.

In building a valuation model, we must recognize that financial markets are characterized by complex and dynamic price finding processes. Replicating these processes requires equally complex valuation models. Based on the results of the empirical and theoretical discussion of valuation approaches in chapter 3, we believe that a DCF model using FCFE as the relevant cash flow is best suited to fulfill this difficult task. The fundamental valuation principle is clear enough: the value of all financial assets is the cash flow the asset generates for its owners discounted at their required rate of return. The discounted free cash flow model is therefore the only theoretical correct valuation method reflecting directly the cash flow available for distribution and hence should capture best the pricing mechanism of the stock market (Rappaport and Mauboussin, 2001). RI models rely on transformations of the original principle of discounted cash flow. Even though equivalent on a conceptual basis, their implementation requires moving away from the distribution focus of financial markets. Compared to relative valuation models, a FCFE model is more objective as it states explicitly the assumptions that go into the valuation process. It is also superior to asset based valuation models that require subjective adjustments to already questionable accounting numbers.

The purpose of this part of the dissertation is therefore to develop the so called *‘Fundamental Equity Valuation Model’* (FEVM or FEV model) based on the discounted cash flow valuation theory. The model is ‘fundamental’ in such a way that it attempts to convert all relevant available information about the fundamentals of a company into one estimate of value for the stock - just like the stock market is doing. Although the actual valuation process of investors is unobservable, we believe that a comprehensive application oriented DCF valuation model is the most useful proxy for that process.

Overview of the Fundamental Equity Valuation Model (FEVM)

Our fundamental equity valuation model is based on the discounted cash flow methodology originally developed in Williams (1938). As our goal is to find mispricing in the stock market, it must be application oriented and complex enough to capture the way perceived economic reality finds its way into stock prices. Previous valuation research (e.g. Sorensen and Williamson, 1985) shows clearly that investment returns improve considerably as the complexity of the valuation model used is increased.

Like for every discounted cash flow model, we have to estimate two main input factors: the cash flows in the nominator and the discount rate in the denominator. We know of no economically and behaviorally sound approach to estimate the discount rate and develop therefore in the following our own approach. It consists of a mix of different methods suggested in the literature and of a new method linking fundamental risk factors to a market implied risk premium.

In the nominator, we use free cash flow to equity (FCFE) as the relevant measure of cash flow. FCFE is the amount of cash that can be distributed to investors in any given year without negatively affecting the future of the company. The most difficult variable to forecast in the nominator is the growth rate of these cash flows. According to Sharpe et al. (1999) investors assume that economic growth of a corporation falls into three phases: a high growth phase, a transition phase and a mature phase. A company in its high growth phase typically enjoys rapidly expanding markets, high profit margins and an abnormally high growth rate of sales and earnings. In the transition phase to maturity, earnings growth slows as competitors put pressure on prices and profit margins or as sales growth slows because of increased market saturation. In the mature phase, the company reaches an equilibrium in which sales and earnings grow in line with long-term economic growth.

As we attempt to replicate the actual valuation process of investors' in the stock market, we replicate in our model these three different growth stages. The initial growth period ranges from five to 15 years and requires a forecast for all input variables in the first two years and a growth rate for the remainder of the period. It is build upon the best practice of analysts to forecast complete financial statements two years into the future and thereafter to provide a long-term growth forecast for the most important variables like earnings (Cornell, 2000).

After this initial period, the company's growth rate is expected to revert to the average growth rate of the economy. The economic law of diminishing returns indicates, and many empirical studies have shown (e.g. Little, 1962; Lev, 1983), that a company cannot grow for an extended period of time faster than the industry in which it operates. For most companies, sales growth will eventually slow down to the level of nominal GDP growth. This fact is captured in the intermediate fading period in the second stage of the model. Growth rates, profit margins and all other input factors are faded from the forecasted first stage level to the steady state long-term growth stage level.

The third and final stage assumes that the company has reached its maturity stage in the life cycle and will grow only as fast as the general economy from there on. Depending on the business of the company, profit margins in this period can be faded to reflect the deterioration of competitive advantage over time. The model is also flexible enough to allow for time-varying discount rates, where the time variation is caused by expected changes in interest rates and risk over time.

The sum of the discounted free cash flows to equity in all three stages equals the intrinsic value of the stock. Mathematically the model looks as follows:[14]

$$V_0 = \frac{FCFE_1}{(1+k_1)} + \frac{FCFE_2}{(1+k_1)^2} + \sum_{t=3}^{n} \frac{FCFE_t}{(1+k_1)^t} + \sum_{t=n+1}^{N} \frac{FCFE_t}{(1+k_t)^t} + \sum_{t=N+1}^{M} \frac{FCFE_t}{(1+k_T)^t}$$

V_0 = Value of the stock in t=0

[14] In our model, we implicitly assume that cash flows are received at the end of each year. It might be more reasonable to assume that the cash flows are distributed evenly throughout the year (Pratt, 1998). We however do not adjust the model for the mid-year convention, as the difference would be small and the potential error appears on the conservative side.

$FCFE_1$ = Free cash flow to equity in year 1
$FCFE_2$ = Free cash flow to equity in year 2
$FCFE_t$ = Free cash flow to equity in year t
k_1 = Discount rate in stage 1
k_t = Discount rates in stage 2
k_T = Discount rate in stage 3
n = Year ending stage 1
N= Year ending stage 2; (N-n) is the length of stage 2
M = Year ending stage 3; (M-N) is the length of stage 3

A short but comprehensive overview of the model is presented in figure 2 in the appendix.

4.2 Determining the Nominator: Cash Flow, Cash Flow Growth and the Growth Duration

In this chapter, we determine the nominator of our fundamental equity valuation model: the cash flows. According to the theoretical DCF model, three main variables must be determined in the nominator:

1. what are the relevant cash flows and how to measure them (cash flow to discount),
2. how much the asset generates in cash flows to investors (cash flow growth rate),
3. when these cash flows are expected to occur (cash flow growth duration).

In the following pages, we will examine these important input variables to our FEV model.

4.2.1 The Cash Flow to Discount

In the chapter about valuation models, we identified three main candidates for the relevant cash flows to discount in a discounted cash flow valuation model: dividends, residual earnings, or free cash flow.

While dividends are the right measure in explanatory models, in an application model they are inappropriate. It is not the actual dividend that determines stock prices but the potential dividend in each year because, as discussed in the previous chapter, observed dividends are not directly related to the actual cash flow generated by the company in each year.

In recognition of this fact, two alternative cash flow definitions have been proposed in the literature (e.g. Gentry et al., 2002). The accounting approach assumes the relevant cash flow to investors to be earnings, while the finance approach assumes that the value of a stock is more related to the actual amount of cash generated for investors.

In recent years, academic research has attempted to provide empirical evidence on the relative superiority of cash flow versus earnings based valuation techniques. Dechow (1994) finds that stock returns are more highly associated with earnings than with cash flow. Similarly document Penman and Sougiannis (1998) that earnings valuation techniques consistently outperform cash flow valuation techniques over alternative forecasting horizons. In another study, however, Black (1998) finds that the relative superiority of earnings versus cash flow exists only for companies in mature life cycle stages. In the start-up stage, growth stage and the declining stage operating cash flow is more value relevant. Furthermore Biddle, Seow and Siegel (1995) show that the relative superiority differs from industry to industry, without however differentiating the life cycle of the industries.

A study by Sloan (1996) brought another interesting insight into the discussion. He finds that when the market considers earnings, it makes a cognitive error in relation to the two types of information contained in earnings – accrual earnings[15] and cash flows. He shows that investors systematically overreact to accrual earnings, despite their lower persistence than cash earnings. Sloan captures the mispricing with a trading strategy that holds a long position in low accrual firms and a short position in high accrual firms. This simple strategy yields an average annual excess return of more than 10% and generates positive returns in 28 of the 30 years in the sample. His results were later confirmed by Houge and Loughran (2000) and Xie (2001).

These studies show that firms with large accrual earnings have lower subsequent returns. It seems therefore that investors focus too much on earnings and do not consider adequately the temporary accrual components of those earnings. Block (1999) provides evidence that earnings fixation is persistent throughout the financial community. His survey reveals that financial analysts rank earnings as a more important valuation tool than cash flows. Because the market anchors on earnings, investors consistently underestimate the transitory nature of accruals and the long-term persistence of cash flows. This mistake can be avoided by focusing on cash flow rather than earnings. Furthermore, Gentry et al. (2002) show that all

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[15] Accrual earnings are the difference between the income recognized and actual cash flows for the period (White, 1998)

individual components of free cash flow are significantly related to capital gains and hence are value relevant.

Empirical evidence therefore favors, although inconclusively, free cash flow over earnings as the relevant cash flow to discount. Theoretically, free cash flow is superior as well. One conceptual difference between earnings and free cash flow is that earnings measure the accounting based value creation and free cash flow the potential value distribution. So the question is mainly whether the stock market discounts the value created or the value distributable. In this respect, the economic concept behind the DCF model favors clearly value distribution and thus free cash flow. Economically, the relevant cash flow to investors is the amount of money available for distribution to shareholders because the shareholders as legal owners of the firm have the right to demand whatever amount they want distributed up to the rational maximum amount where the future of the company would be 'cannibalized'. This amount is free cash flow to equity (FCFE).

FCFE adds back all non-cash charges to net income and accounts for future reinvestment needs such as capital expenditures and necessary investments in working capital. It can be therefore distributed without compromising the economic survival or future growth of the firm.

For these reasons, FCFE is the relevant cash flow to discount in our fundamental equity valuation model. Based on Damodaran (1996, 2004), we calculated FCFE in our model in the following way:

Sustainable net income
+/- Change in working capital * (1-debt financing proportion of working capital)
+ Depreciation & amortization * (1-debt financing proportion of depreciation
& amortization)
- Capital expenditures * (1-debt financing proportion of capital expenditures)
= **Free Cash Flow to Equity**

Sustainable net income is the most important input variable for calculating FCFE as it usually accounts for the biggest portion of the final FCFE number. Our long term valuation perspective requires earnings that are persistent rather than transitory (Sharpe et al., 1999). Three such persistent earnings measure are generally considered valid: 'The Street' earnings (a pro-forma operating income proxy obtained from firms' earnings releases), earnings from operations, and earnings before extraordinary items and discontinued operations. Brown and

Sivakumar (2001) and Bradshaw and Sloan (2002) compare the three measures based on predictive ability, valuation relevance and information content. They find that for all three criteria the pro-forma operating income measure released by managers (‘The Street’) is of higher quality than EPS from operations and both ‘The Street’ and EPS from operations are of higher quality than is EPS before extraordinary items and discontinued operations.

Nevertheless we choose as our measure of sustainable net income a mix of all the different measures proposed in the literature. We are assuming though that more than one estimate is actually reflected in stock prices given the common divergence of opinion among investors.

In a second step, the change in working capital must be added or subtracted from these earnings depending on whether more or less short-tem capital must be contained in the business to deal with future economic growth (Damodaran, 2004). However only the part financed by equity investors (1-debt financing proportion of working capital) will affect the available cash to equity holders. If the company finances the increasing working capital needs with more debt, no additional equity capital must be contained in the business and nothing needs to be subtracted from earnings.

In a next step, all non-cash expenses like depreciation and amortization are added back and future capital expenditure needs are subtracted (Damodaran, 2004). This amount of net investment into long lived assets is needed to continue or grow the operations of the business and consequently cannot be distributed to shareholders. Again only the part financed by equity investors will reduce the distributable income.[16]

The sum of the sustainable earnings, working capital changes, depreciation and amortization, and subtracting capital expenditure equals the FCFE in any given year.

As our goal is to determine the intrinsic value of one stock, we divide the resulting FCFE values by the number of shares. In our model, we measure the number of shares by the fully diluted number of shares outstanding and furthermore forecast this number in the first stage using an average of a regression estimate, the geometric average and the arithmetic average of the past 5 year share dilution percentage.

[16] We thus implicitly assume that working capital changes and net capital expenditures are financed using a fixed mix of debt and equity and consequently that principal repayments are made from new debt issues. This procedure eliminates the need to make difficult forecasts about absolute changes in debt levels over time and facilitates the application of the model (Damodaran, 2004).

4.2.2 Fundamental Cash Flow Growth

A DCF model shows that for investors not the actual free cash flows but the future free cash flows are value relevant. This creates a forecasting problem since projections of dollar cash flows cannot be made throughout infinity and growth rates need to be applied instead. To deal with this forecasting problem, our model separates the infinite horizon into the three different life cycle stages explained earlier.

First stage: Explicit Forecasting

First, earnings - the most volatile part of FCFE - are forecasted directly for the next two years and thereafter indirectly through an earnings growth rate for the remainder of the first stage. The other components of FCFE are estimated after forecasting earnings.

Earnings estimates

To estimate the next two years earnings of the company, we use three methods simultaneously: (1) a simple mechanical extrapolation model, (2) a comprehensive mechanical extrapolation model, and (3) analysts' consensus earnings forecasts. We use different earnings estimates because, as explained earlier, it is unlikely that stock prices reflect only one single estimate given the common divergence of opinions among investors.

Evidence from the earnings forecasting literature provides some insight into the forecast accuracy of each method. Many researchers (e.g. Collins and Hopwood, 1980; Fried and Givoly, 1982; O'Brian, 1988) examine analysts' ability to forecast earnings compared to mechanical extrapolation models. The results of their studies confirm that analysts do better in forecasting earnings - at least over the short term. O'Brien (1988) finds that analysts outperform time series models for one-quarter ahead and two-quarter ahead forecasts, do as well for three-quarter ahead forecasts and do worse than the time series models for four quarter ahead forecasts. Thus, the advantage gained by analysts from other information sources than financial statements seems to deteriorate as the time horizon for forecasting is extended.

Furthermore Dreman and Berry (1995) find that analysts' forecast errors are large across industries and through various stages of the business cycle and that they are increasing over time. They conclude that the average forecast error is too high for investors to rely on as a major input factor to stock valuation models.

The many problems associated with analyst forecasts indicate that the market might not rely on these forecasts alone when discounting cash flow information into stock prices. We should keep in mind that we are not necessary looking for the most accurate forecast, but for the forecast that is most likely to be reflected in the stock prices. As mentioned earlier, we use therefore in addition to analyst forecasts two mechanical extrapolation models (a simple and a complex mechanical forecasting model) to estimate earnings for the next two years.[17] That mechanical models can be used in equity valuation is shown in Francis et al. (2000a).

The *simple mechanical forecasting model* extrapolates earnings into the future using the following statistical methods applied to the past 5 years of realized earnings data:

1. Arithmetic average
2. Moving arithmetic average
3. Weighted moving arithmetic average
4. Geometric average
5. Moving geometric average
6. Linear regression
7. Moving linear regression
8. Loglinear regression
9. Moving loglinear regression.

Each of these extrapolation techniques producing an estimate within a 30% band of analysts' consensus earnings forecasts is considered a valid estimate of future earnings and included into the model. The assumption behind the bands is that large errors caused by extrapolating a volatile data series are to a certain degree (the bands) detectable by investors.[18] Only the estimates producing values within the bands can be considered valid forecasts and are included into the model.

In the *comprehensive mechanical forecasting model*, earnings are estimated based on best practices of earnings forecasting used by financial analysts: first sales are forecasted from which all forecasted costs (cost of goods sold, depreciation and amortization, interest expenses, and other costs) are subtracted. Estimated sales minus all estimated costs yields estimated earnings in this method. To forecast sales and costs, the same statistical

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[17] Where analysts' forecasts for a third year into the future were available, they have been used as well.
[18] The band has been fixed at 30% because the average analyst forecast error reported in the literature (e.g. Collins et al., 1980, Dreman, 1998) has been about 30% historically.

extrapolation techniques used for the simple mechanical forecasting model have been used and again bands are applied to minimize the distortion caused by large outliers.

The final earnings estimate is a weighted average of the estimates from the simple mechanical forecasting model (25%), the comprehensive mechanical forecasting model (30%) and the consensus forecasts of analysts (45%).

By including other forecasts than the analysts' consensus earnings estimates, we recognize that the forecasts will generally be less accurate than those made by security analysts alone. In the broad context of equity valuation, we however think it is important to diversify the input source to reflect the market's divers pricing mechanism better.[19]

Earnings growth forecasting

Forecasting earnings growth over the remainder of the first stage is one of the most important and challenging task in DCF valuation. To estimate the growth rate of earnings, we rely again on several different approaches because of our belief that an input mix is necessary to reflect the process of investors weighting different estimates and pricing them into the value of the stock. The methods used are the following:

1. Analysts' consensus earnings growth rate
2. Simple mechanical forecasting model
3. Comprehensive mechanical forecasting model
4. Sustainable growth rate
5. Estimate based on profit margins
6. Own estimate.

The *analysts' consensus growth rate* is generally the most accurate estimate of the earnings growth rate. Vander Weide and Carleton (1988) and Chatfield et al. (1990) find that analysts' consensus forecasts of five-year earnings growth is superior to historically oriented growth measures in predicting future growth. This view has however recently been challenged by several authors. For example, Chan et al. (2001) show that analyst forecasts are in general too optimistic and have low predictive power for long-term growth. They

[19] In our opinion, the real test of input usefulness to a valuation model is not accuracy but valuation relevance. In chapter 5, we will however examine whether a DCF model works better when only consensus analyst estimates are used rather than the mix of different estimates.

write that "caution should be exercised before relying too heavily on I/B/E/S long-term forecasts as estimates of expected growth in valuation studies."

For this reason, we also use other methods like the *simple mechanical forecasting model*. In this method, earnings are forecasted by extrapolating realized earning numbers of the past 5 years into the future using the mix of different extrapolation techniques described earlier. The earnings growth rate is then calculated as the geometrical average of forecasted earnings in the fifth year and the last year of available realized earnings.

Another method used again is the *comprehensive mechanical forecasting model*. Like before, the method is comprehensive in such a way that earnings are not forecasted directly, but rather are the result of forecasting the individual components that make up earnings. Sales and all costs are again estimated using the same mix of statistical forecasting techniques used previously. The earnings growth rate is again the geometrical average of forecasted earnings in the fifth year and the last year of available realized earnings.

The two historical extrapolation techniques assume that future earnings growth is somewhat related to past earnings growth (Damodaran (2004) shows that this is indeed the case). As the past earnings growth rates are more likely to slow down than to accelerate, these methods are, like the analyst estimates, mostly optimistic. To correct for this tendency, we also use the sustainable growth rate approach outlined in Sharpe et al. (1999) and suggested as a forecasting method in Copeland et al. (2000).

The *sustainable growth rate* is the rate of earnings growth a company can sustain for a given level of return on equity while keeping the capital structure constant. It is defined as the retention rate multiplied by the return on equity (ROE). The greater the proportion of earnings a firm reinvests, the greater is its potential for growth and given a level of reinvestment a firm will grow faster, if it earns a higher rate of return on the reinvested capital. This approach captures a firms' value creation potential by focusing on ROE and its components (profit margin, asset turnover and leverage). It however underestimates the true growth potential for most firms because they can issue new capital and hence increase their growth potential beyond the theoretical sustainable growth rate. We therefore modify the traditional model of sustainable growth slightly to allow the debt ratio to be increased up to the debt ratio of the S&P 500. An average of both sustainable growth rate estimates, the original and the modified version, are used in the model.

The *margin method* forecasts the more stable and therefore relatively easier to forecast profit margin instead of the diverse and volatile cost components. In this method, four different profit margins are forecasted: the gross profit margin, the EBITDA profit margin, the operating or EBIT profit margin, and the net profit margin. Multiplying each forecasted profit margin by the level of sales yields earnings estimates from which the earnings growth rate is derived. The average of the earnings growth rate estimates obtained from each profit margin yields the earnings growth rate estimate included into the model.

The final method used is an *own estimate* of earnings growth. However, in order to reduce subjectivity, the own forecast consists simply of an average of the geometrical average, the arithmetical average and a simple regression estimate based on the latest five years of realized annual earnings growth adjusted for extraordinary factors and implausible results. This approach corrects the previous approaches for extraordinary and non-recurring earnings as according to Sharpe et al. (1999) such transitory earnings should not be considered in the nominator of a DCF model but rather be added at the end of the valuation process to the obtained intrinsic value of the stock.

The earnings growth rate used in the first stage of the model is a fundamental growth rate (FGR) consisting of a weighted average of the six estimates just described. Most weight is given to the consensus forecasts of analysts, the smallest weight to the profit margin method.[20]

Forecasting the other components of FCFE

After forecasting earnings, the other components of FCFE are estimated. *Working capital* in the first stage is determined using the average of an estimate based on the historical working capital-to-sales ratio and an estimate based on regressing working capital-to-sales ratios. The debt financing proportion of additional working capital is proxied by the average current ratio of the past 5 years.

Capital expenditures tend to be volatile and are therefore not estimated directly but a growth rate is applied instead to the latest normalized numbers available. The growth rate is estimated using four different methods: (1) an average of the geometrical average, the arithmetical average and a linear regression of the latest 5 year capital expenditure data, (2) an estimate based on the historical capital expenditure-to-sales ratio, (3) an estimate based

[20] The actual weights used are for analysts' consensus earnings growth rate 40%, the comprehensive mechanical forecasting model 25%, the simple mechanical forecasting model 15%, the own estimate 10%, the sustainable growth rate 5%, and the profit margin method 5%.

on the historical capital expenditure growth-to-sales growth ratio, and (4) a method decomposing historical capital expenditure into growth capital expenditure and maintenance capital expenditure. The debt financing proportion is estimated using the average debt-to-asset ratio of the past 5 years.

The growth rate of *depreciation and amortization* is analogously determined by (1) an average of the geometrical average, the arithmetical average and a linear regression of the latest 5 years data, (2) an estimate based on the historical depreciation-to-capital expenditure ratio, (3) an estimate based on historical asset growth and depreciation rate, and (4) a method based on the maintenance capital expenditure-to-sales ratio. The debt financing proportion is again estimated by using the average debt-to-asset ratio of the past 5 years.

Second Stage: Fading Period

In the transition or fading stage, all growth rates, except of the earnings growth rate, are faded linearly over the total length of the fading period from the first stage level to the steady state growth level determined in stage three.[21] The earnings growth rate is not directly estimated anymore in this stage as such an estimate would certainly prove to be unreliable. Instead a sustainable profit margin is estimated based on the average profit margin in the high growth phase.[22] The profit margin from the end of the high growth phase is then faded linearly to this sustainable profit margin over the length of the fading period.

The length of the fading period is determined in relation to the length of the high growth stage (see chapter 4.2.3) adjusted with ratios that proxy for the competitive situation of the company (e.g. sales growth, ROE, P/B ratio). The minimum fading period length is three years, the maximum 10 years.

Third Stage: Stable long-term Growth Stage

In the long-term growth stage only the sales growth rate is still estimated directly. All other inputs are determined in relation to sales as these relationships are stable enough in

[21] The fading is achieved trough simple linear interpolation.

[22] As such a profit margin requires forecasting sales, we estimate a sales growth rate for the first stage based on the average of (1) a simple extrapolation model, (2) an average of the arithmetic average, geometric average and a simple regression forecast of 5 year historical sales data, and (3) an economic estimate based on the average GDP growth, the average inflation rate and a company specific growth premium determined by factors such as the current profit margin, the ROE and the relative P/B ratio.

maturing companies and explicit forecasts are unreasonable in that period. To determine earnings, sales are multiplied with the profit margin from the last year of the fading growth stage.

We assume that sales growth in the long-term growth stage is determined by (1) the average long-term corporate profit growth, and (2) the long-term historical average real GDP growth plus the average long-term historical inflation rate. We choose these two factors because the assumption that sales growth is constant perpetually puts strong constraints on how high this growth rate can be. Economically, no firm can be expected to grow forever at a rate higher than the growth rate of the economy in which it operates. Consequently can the constant growth rate not be greater than the overall nominal growth rate of the economy. It is more likely to be even lower as new products outside the company's now mature industry are introduced constantly leading to a lower share of economic growth attributable to maturing companies (Damodaran, 2004). The average historical GDP growth rate is therefore most likely too high an estimate for most existing industries so that we deflate mechanically both historical estimates by a fixed percentage depending on the industry.[23] On the other hand, some companies can sustain competitive advantages so that the average long-term economic growth estimate might be again too low.[24] We use a ratio to inflate or deflate average long-term sales growth by up to 20% based on certain proxies for competitive advantage like the relative profit margin, relative P/B ratios and the relative average ROE.

The length of the third stage has been fixed at 150 years. This time frame is a valid proxy for the theoretical infinite life of a company because our methodology produces in the third stage a discount rate that is always higher than the FCFE growth rate. Consequently, the present value of the cash flows is approaching zero before the end of the 150 year time period. Nevertheless assumes our approach a going concern for all companies over the entire three-stage forecast horizon of up to 175 years. This is conventional for this type of research as valuation models are generally applied using similar terminal value calculations (Penman and Sougiannis, 1998).

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[23] The percentages are 10% in the consumer discretionary industry and the healthcare industry, 25% in the industrial industry and 0% in the ITT industry.
[24] The same argument applies to international firms that have the potential to grow at a higher rate than the domestic nominal GDP growth rate.

4.2.3 The Fundamental Growth Duration

Notably the growth estimate in a DCF model must not only consider the absolute level of growth but also for how long a company can sustain this growth rate. While in praxis the duration of the growth phase can be linked to a company's life cycle and to the competitive position within its industry, it is difficult to convert these qualitative estimates into a specific time period.

The measure with which we try to capture the inescapable decline of sales and earnings growth in later life cycle stages is the growth duration (also known as competitive advantage period (CAP) or value growth duration). The growth duration is not directly observable and difficult to estimate. To reduce uncertainty and to reflect the divergence of opinion in the stock market, our model uses three different methods to determine the growth duration: (1) a relative growth duration approach, (2) an absolute growth duration approach, and (3) an economical growth duration approach. The first two growth duration estimates are derived from market prices and the third from fundamental variables.

1. Relative growth duration approach

The relative growth duration approach answers the question of how long the earnings of a growth company must grow at the expected higher rate relative to a stock in the stable growth phase (usually an index like the S&P 500) to justify its prevailing P/E ratio. Holt (1962) shows that if equal risk between a growth stock (g) and an average stock or market security (a) is assumed, the differences in P/E ratios can be explained by differential growth rates. Assuming though the growth stock and the average stock have similar risk, the market should value the two securities in direct proportion to their earnings in year T, where T is the time the growth company will begin to grow at the same rate as the average stock. In other words, current prices should be in direct proportion to the expected P/E ratio that will prevail in year T. This relationship can be stated as $\frac{P_g(0)}{P_a(0)} \cong \left(\frac{E_g(0)(1+G_g+D_g)^T}{E_a(0)(1+G_a+D_a)^T} \right)$ or $\left(\frac{P_g(0)/E_g(0)}{P_a(0)/E_a(0)} \right) \cong T \ln \left(\frac{(1+G_g+D_g)^T}{(1+G_a+D_a)^T} \right)$. Solving for T now yields the implied growth duration, a market based estimate of the length of the high growth stage of a company.[25]

[25] For a detailed derivation of the formula see Reilly and Brown (2003), p. 594-595.

2. Absolute growth duration approach

The obvious choice for a duration measure would be the traditional Macaulay duration measure generally used in bond valuation. Unfortunately, for stocks this duration is usually much longer than the reasonable growth duration because of the relative higher importance of later cash flows in determining stock prices relative to bond prices. The absolute growth duration approach described below is based on Pratt (1998) and corrects for the shortcomings of the traditional duration method in relation to stocks.

In the absolute duration approach, we use the current market price of the stock to determine when the sum of the expected discounted cash flows equals this price. For this purpose, we develop a simplistic two-stage DCF model. Using the forecasted FCFE and FCFE growth rates developed in the previous chapter, we calculate the present value of these cash flows assuming different lengths for the growth period. We extend the growth period until the present value of the cash flows matches the market price of the stock. The number of years it takes for the company to grow FCFE at the high growth rate serves as a proxy for the growth duration in this approach.

3. Economical growth duration approach

In the third approach to estimate the growth duration, we use economic factors that indicate in what life cycle the firm currently is to find out how long it can be expected to continue growing at a higher rate. The economical growth duration approach is conceptually based on Porter's (1980) work on competitive advantage. The approach assumes that the further away a company's economic factors are from the norm (in our case the S&P 500), the more time the factors need to approach this norm and the longer the company can grow at a higher rate. The economic factors considered in this method are:

1. *Size of the firm:* The larger a company, the more difficult it becomes to maintain high growth rates.
2. *Current growth rate:* While past growth is not a reliable indicator of future growth, there is a correlation between current growth and future growth (Damodaran, 2004). Thus, a firm growing sales at 30% currently probably has a longer expected growth duration than one growing 5% a year.
3. *Barriers to entry and competitive advantages:* Ultimately, high growth comes from high project returns, which in turn come from barriers to entry and sustainable

competitive advantages. A high ROE indicates competitive advantage that justifies a longer growth duration.

4. *Growth characteristics:* In the stable growth phase, firms should have the characteristics of other stable growth firms:
   - P/E and P/B ratios should be comparable to the average
   - beta should be close to one
   - the debt-to-asset ratio of the firm should approach the average
   - depreciation should approximately equal capital expenditure
   - the ratio of sales growth to earnings growth should be close to one
   - the retention ratio should be comparable to the average.

Given the complexity of the task of estimating the number of years a company is expected to grow at an exceptional growth rate, it is unlikely that only one estimate is reflected in the stock price. The fundamental growth duration estimate included into our model is therefore a weighted average of the estimates obtained from the three methods outlined above.[26] Based on findings of Dechow (2001) has the minimum growth duration been fixed at five years and the maximum growth duration at 15 years.

4.3 Determining the Denominator: The Fundamental Discount Rate

The fundamental valuation principle states that the value of financial assets is the sum of all future cash flows to their owners discounted at their required rate of return. The discount rate represents therefore a very important variable in a DCF valuation model determining directly how much an asset is worth. Unfortunately, as with the growth duration, the discount rate is not observable or estimated by analysts. In this chapter, we will briefly review the current methods for determining the discount rate and propose thereafter an own, more fundamental method.

[26] The weights were assigned as follows: 30% for the relative growth duration, 40% for the absolute growth duration and 30% for the economical growth duration approach.

4.3.1 Risk and the Required Rate of Return

In the academic literature, estimating a firm's cost of equity capital is a very underdeveloped concept in relation to valuation models. What we know is that the required rate of return or discount rate is a market-driven rate (Pratt, 1998). It represents the expected rate of return necessary to induce investors to commit available funds to the subject investment given its level of risk (Stowe et al., 2002).[27]

Risk is the main concept behind the required rate of return. It is commonly accepted that the discount rate for risky assets consists of two parts: a risk-free rate that compensates investors for the opportunity of investing in a risk free asset, and a risk premium compensating for bearing additional risk (Pratt, 1998). The risk premium should be a function of how risk adverse investors are and how risky they perceive the risky asset to be relative to a risk free investment (Bodie et al., 2001). The required rate of return is therefore mainly a function of perceived risk; it translates the market's risk preference and perception of risk into stock prices.

What we would like to find out in this chapter is how risk, especially the investment risk reflected in the discount rate, can be measured in a single number. Unfortunately, throughout most of the history of the stock market, it never occurred to anyone to define risk with a number. Stocks were risky and some were riskier than others and people let it go at that (Bernstein, 1998). Things only changed with the modern portfolio theory (MPT) and the capital asset pricing model (CAPM) in the 1960's and the introduction of volatility and beta as risk measures. Both concepts assume that investors define risk as the volatility of returns. Results from behavioral finance however clearly show that they dislike losses and not necessarily volatility (e.g. Kahneman, 1979). This may be explained by the distribution of stock returns that is right skewed, meaning that most of the volatility is actually on the good side. Consequently, a relevant risk estimate should be based on a downside risk measure. Volatility or standard deviation is a very poor risk measure from that view – especially for longer investment horizons considered in a DCF model.

That beta also might not be a good risk measure for the longer term has been shown in many recent studies of the CAPM which find that beta is not related to realized returns over

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[27] The discount rate reflects not only the opportunity cost for the investor, but at the same time the cost of equity capital for the company. It is the rate of return that companies would have to offer in order to attract new equity capital from investors (Pratt, 1998). The terms 'discount rate', 'required rate of return', and 'cost of equity capital' therefore are used interchangeably.

time (e.g. Fama and French, 1992) or ex ante risk premiums (e.g. Gebhardt et al., 2001). It is however not the purpose of this chapter to review 30 years of academic discussion on the CAPM. For us, it is only important to realize that given these problems, it is unlikely that the CAPM is the only model reflected in the discount rate and thus in stock prices.

In recent years the evidence against the CAPM has motivated a search for alternative measures of risk and models to determine the discount rate. Fama and French (1993) suggest the use of an "empirically inspired" *three-factor model* in which the CAPM is augmented by two additional variables, the book-to-market ratio (B/M) and market capitalization. The problem with this kind of approach is the missing link to fundamental risk. It's an adaptation to the facts, the result of extensive data mining. Statistically have reverse engineered models the problem that their validity may be non-stationary; because of the missing economic logic, the results are valid for the considered historical measurement period only. It seems however to be true that size (i.e. market capitalization) and the B/M ratio are important determinants of stock returns. We believe however that not size determines risk, but that the characteristics of small companies justify a higher risk premium. Small companies have for example higher business risk, financial risk, or earnings variability. Size is not directly responsible for risk, but indirectly through the different underlying risk factors. The same holds true for the B/M ratio: companies with high growth and lots of intangible assets and thus low B/M ratios have simply different risk characteristics than average stocks. Market capitalization and the B/M ratio can be used as proxy variables for risk, but to gain a more detailed understanding of the real risk factors of a stock, another approach is needed.

The theoretical foundation for such an approach to estimate the discount rate originates from the *arbitrage pricing theory* (APT) first presented in Ross (1976). The APT attempts to measure the various dimensions of market related risk in terms of several underlying economic factors that systematically affect the prices of all stocks (such as the inflation rate, GDP growth or the term structure of interest rates). Empirical evidence indicates that the APT indeed explains expected returns better than the single factor CAPM (e.g. Chen, 1983; Chen, Ross and Roll, 1986; Berry, Burmeister and McElroy, 1988). The practical application of the APT is however confronted with immense measurement difficulties because the theory neither specifies the relevant risk factors nor their sensitivities.

In the next chapter, we will present a more fundamental approach based on the concept of the APT that corrects for the weaknesses in the application of this theory.

4.3.2 The Fundamental Risk Premium

A reliable estimate of the very value sensitive discount rate is essential in testing our fundamental equity valuation model. Prior research however does not provide us with an unmistakably superior method to determine the discount rate.

In the following pages, we propose therefore an alternative method that better reflects the process of investors transferring risk into a return requirement. In short, we estimate a stock's risk premium based on company characteristics that indicate fundamental risk. Our primary goal is to gain more understanding of the market's perception of the risk variables associated with investing in a firm's stock. If the market tends to consistently assign a higher (or lower) risk premium to firms with certain fundamental risk characteristics, these characteristics could be used to estimate a market based cost of equity capital measure (Gebhardt et al., 2001).

Our approach consists of identifying all relevant risk factors, measuring the risk inherent in each risk factor, assigning a market implied risk premium to the measured risk level of each risk factor and aggregating the individual risk premiums to a comprehensive fundamental risk premium for the stock. The result of this approach is a market implied discount rate based on fundamental risk factors.

This fundamental risk premium approach can be summarized in the following four steps:

1. Identify relevant risk factors
2. Measure the risk inherent in each risk factor
3. Assign a specific risk premium to the risk measured in each risk factor
4. Aggregate the risk premium from each factor to a risk premium for the stock.

We hope that with this approach, we are better able to replicate the markets process of transforming risk into a return requirement than with any of the existing models. In the following, each step is explained in greater detail.

Step 1: Identification of relevant risk factors

First, we have to answer the question of what are the risk factors relevant for the equity risk premium. Our opinion is that investors look at variables that indicate lower than expected returns. Lower than expected returns come from lower than expected cash flows as in a

DCF model this downside potential directly translates into lower prices. Consequently our idea of risk is that the greater the downside uncertainty of a firm's future cash flows and thus returns, the greater investors perceive investment risk to be and the higher will be the risk premium they require for investing in a stock.

From this idea follows that in order to replicate investors' risk pricing behavior, we have first to identify factors that show investment risk. Based on fundamental analysis and empirical research we find 90 fundamental variables that indicate lower than expected returns for investors and are therefore considered risk factors in our fundamental risk premium approach.[28] We use the following risk factor categories to structure the various risk factors:

1. Business risk factors
2. Financial risk factors
3. Profitability risk factors
4. Operational risk factors
5. Market risk factors
6. Valuation risk factors.

Our approach assumes that risk transferred into the discount rate is a function of the risk factors in these six risk categories. In the academic literature there is no evidence on the optimal set of fundamental risk signals; with 90 risk factors extents our study the risk proxies suggested in Gebhardt et al. (2001) and Gode and Mohanram (2001). Although our risk factors are typically correlated, each is designed to capture one potential source of investment risk. The probable correlation between the factors is therefore intentional as in the market multiple risk factors represent multiple risks.

In the following, each risk category is explained shortly.

1. Business risk factors

Business risk reflects the incidence of fixed operating costs on the cash flows to investors. It reflects the uncertainty of income due largely to two factors: fluctuation in sales and the level of a company's fixed operating costs (Brigham and Gapenski, 2000).

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[28] A detailed list of all the individual risk factors and a brief justification is provided in table 1 in the appendix.

We separate business risk factors in accounting based risk factors and analyst based risk factors. *Accounting based risk factors* measure the variability of the business as visible from the financial statements. *Analyst based risk factors* are not based on financial statements but on financial analysts who use a broader information set. We think that measures like the dispersion of analysts' earnings forecasts and the magnitude of analysts' forecast errors are valid proxies for business risk. The more difficult it is for analysts to forecast earnings, the more volatile is the business of the company and the higher therefore its business risk.

2. Financial risk factors

Financial risk reflects the incidence of fixed financing costs on the fluctuation of cash flows to investors (Reilly and Brown, 2003). Borrowing also increases the risk of bankruptcy or costly restructuring and reduces management flexibility. Financial risk factors include leverage ratios, expense ratios and financial exposure ratios.

Leverage ratios signal how much debt the company is taking on in relation to its size. *Expense ratios* measure the ability to service that debt and *financial exposure ratios* measure, among others, the need of additional financing in the future.

It is important to note that financial risk is related to other risk categories. A firm's ability to tolerate debt depends mostly on the availability and volatility of future operating cash flows. The optimal level of financial risk depends therefore on the company's level of business risk. Our approach is considering this interrelationship explicitly in the aggregation step.

3. Profitability risk factors

Profitability risk factors are factors than examine the potential of a company to sustain its current level of profitability. Lower profitability translates directly into lower cash flows and lower than expected returns. The main risk factors affecting the future profitability of the company are competition risk and management risk.

Competition risk is the risk that competitors within the industry or new entrants will erode market share and profit margins of a company resulting in lower future cash flows.

Management risk is the risk of bad management. Wrong management decisions turn directly into lower cash flows and therefore represent risk. The importance of management increases in a fast changing business environment and the evaluation of management is an important part of investors' assessment of company risk.

4. Operational risk factors

Operational or company risk factors summarize factors affecting the company's operations. They include factors like life cycle risk, product risk and exposure risk.

Life cycle risk or time horizon risk reflects investors' desired compensation for the time to payouts. Investors require a higher compensation for holding investments with relatively longer times to payout as these payments are more uncertain and therefore riskier (Pratt, 1998). The concept is similar to the concept of duration in bonds; long duration stocks have higher life cycle risk than short duration stocks and are therefore considered riskier by the market.

Product risk or technology risk is the risk that a change in the external environment will have a negative impact on a company's products and thus on sales and earnings. Changes in demand and technology are the two major determinants of product risk.

Exposure risk is the risk that a company will run into some kind of trouble due to the nature of its operations that require either management attention or the use of funds.

5. Market risk factors

Lower than expected returns and thus investment risk can not only come from lower than expected cash flows but also lower prices caused by market related factors. We identified several market risk factors: expectation risk, variability risk, marketability risk and market efficiency risk.

Expectation risk is the risk of a change in the market's expectations of the company. High expectations about future cash flows bear the risk of disappointment when the expectations cannot be met for whatever reason. Disappointment turns directly into lower prices and lower than expected returns and therefore indicates risk.

Variability risk considers the human desire for stability. A stock is considered more risky if its returns are more unstable than returns of other stocks. Variability is considered costly to investors because it can at times result in lower than expected returns requiring compensation in form of a higher risk premium.

Marketability risk or market liquidity risk reflects the ability of investors to convert the stock investment quickly into cash with minimum transaction costs. Being able to do so results in a higher degree of certainty of realizing the expected return and thus lowers risk. *Market efficiency risk* reflects the risk that a stock price might not reflect all available information and therefore is mispriced. Mispriced securities, especially overvalued stocks, bear a higher risk of lower than expected future returns and are thus riskier.

6. Valuation risk factors

Valuation or estimation risk refers to investors' uncertainty in estimating future cash flows (Lewellen et al., 2000). It should capture how much confidence an investor can put into the input factors of a DCF valuation model. All inputs are uncertain and so include the probability of error; the higher this probability, the higher is the valuation risk. We consider two main sources of valuation risk. First, inputs are considered risky when they divert from industry averages and second when they divert from their normal historical range.

The relevant risk factors in the five categories can be considered a stock's fundamental risk because they deal with the intrinsic factors that affect a security's standard deviation of returns over longer time periods. Some might expect a conflict between the market measure of risk (systematic risk or beta) and our fundamental risk factors. Studies (e.g. Thompson, 1976) have shown that a significant relationship exists between systematic and fundamental risk. This consistency seems reasonable because in a properly functioning capital market, the market measure of risk should reflect the fundamental characteristics of the stock.

Step 2: Measurement of risk inherent in each risk factor

After having identified the relevant risk factors, the risk inherent in each factor needs to be measured. We measure risk relative to the average of the industry: a risk factor above (below) the average reflects more (less) risk. Gebhardt et al. (2001) find a wide range of risk among different industries at a point in time but the results of the analysis of risk stability within the industries are positive. This indicates that risk measurement must be done industry specific and that historical risk analysis is useful when estimating future risk within an industry. In our approach, we will therefore measure whether a stock is fundamentally riskier or less risky than the average stock in its industry.

Problematic is the measurement of the risk inherent in the risk factors mainly because the various risk factors involve different sets of natural units and ranges. Furthermore does the need for aggregation in the fourth step require a standardization of all risk factors and the measurement relative to industry averages requires rescaling. A method standardizing and at the same time rescaling factors is proposed in Grinold and Kahn (1994). We use their method to measure risk inherent in each risk factor: $X_{norm} = \frac{X_{raw} - MEAN(X_{raw})}{STDEV(X_{raw})}$, where x_{raw} is the original value for the risk factor and x_{norm} is the standardized and rescaled value of the risk factor.[29]

The result of this procedure is that each risk factor has a mean of zero and a standard deviation of one. In this way, results are also easy to interpret: as an example, a size exposure of 0.8 indicates below average size and therefore above average risk, while an exposure of -0.5 signals above average size exposure and thus below average risk.

This standardization procedure also facilitates the detection and handling of outliers that could distort the risk level measurement. We furthermore winsorize the inputs to the risk factors at the top and bottom 5% of observations. This allows enough room for reflecting differences in relative risk while at the same time not significantly distorting the whole measurement process because of a few large outliers.

Step 3: Assignment of a specific risk premium to the risk measured in each risk factor

After coming up with a measure for risk, we are faced with an even more difficult problem: the assignment of a risk premium to the measured risk level of each risk factor. We have to keep in mind that the discount rate is a market-based rate and that we must consequently use market data to link the fundamental risk level to a risk premium. In recent years, studies have used different versions of discounted cash flow models to infer the ex ante cost of capital from stock prices (e.g. Claus and Thomas, 2001; Gebhardt, Lee, and Swaminathan, 2001; Lee, Ng and Swaminathan, 2003). Based on our previous discussion of the relative attractiveness of different DCF valuation models, we suggest the use of a risk premium implied from a comprehensive application oriented DFCF valuation model. Given the market price of the stock and forecasts of future free cash flows provides this method a market implied and thus forward looking ex ante estimate of the otherwise unobservable risk premium for the stock.

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[29] We believe that this method is superior to the methodology of e.g. Piotroski (2000) who measures each factor as being either “good” or “bad” depending on its implication for risk. This qualitative measurement is less informative than our quantitative measure and information relevant to the risk level is lost. Our procedure allows stating whether the measure is good or bad and also how much better or worse than the average. We believe that this additional differentiation is important in a fundamental approach to risk.

The level of fundamental risk inherent in each risk factor can then be linked to this risk premium by using a multiple linear regression model (OLS regression). In our approach, we regress the risk inherent in each risk factor for each risk category to the market implied risk premium obtained from our DFCF model and use the coefficients from the regression to calculate a theoretical risk premium for each risk factor in the risk category.

Step 4: Aggregation of the risk premium from each factor to a risk premium for the stock

The last step consists of the aggregation of the individual risk premia the market assigns to each risk factor to a comprehensive fundamental risk premium for the stock.

An important point in this aggregation process is the weighting of each risk factor. Our approach of linking a market implied risk premium to each risk factor within a risk category using multiple regression statistics solves this problem automatically. The risk factors that have the strongest relationship with the risk premium will also have the highest regression coefficients and thus the highest risk premium values. To calculate the risk premium for each risk category we thus can simply add the risk premiums of each factor within the category together.

Our approach does however not solve the problem which risk category is the most relevant for investors. This is a difficult problem as the weighting is mostly circumstantial. For example, financial risk is more important for a stock with high business risk or is valuation risk more important for stocks with high market risk. In absence of a reliable indicator, we assume that on average the categories are more or less equally important and assigned the weights as follows: business risk 25%, financial risk 20%, profitability risk 15%, operational risk 15%, market risk 15%, and valuation risk 10%.

The discount rate estimate of the fundamental risk premium approach is then calculated as the weighted average of the risk premium from each category and by adding the nominal risk free rate (yield on the 20 year US Treasury bond) to this risk premium.

The fundamental risk premium approach is a cross-sectional microeconomic multifactor model that measures risk relative to industry averages and that recognizes that the relationships between different risk factors and the risk premium are not stable over time. Recalculating the coefficients of the regression annually is hence more a market based adaptation to the new investment environment rather than a sign of instability of the results.

The model is designed to give a better sense of how the risk exposure of stocks differs and therefore helps in identifying the underlying sources of investment risk for each stock. Its main use however is that it can provide us with a market implied estimate of the discount rate that can be used in a DCF valuation model.

4.3.3 The Fundamental Discount Rate

Our behavioral approach advises against relying too heavily on one approach to estimate uncertain input factors to a DCF valuation model. Consequently, for the application in our FEV model we use a weighted average of the following methods to estimate the discount rate:

1. CAPM
2. Fundamental method
3. Fundamental risk premium
4. Market implied discount rate
5. Economic method.

The *CAPM* is the most widely accepted method of estimating the cost of equity capital and can therefore not be ignored in a valuation model no matter whether it actually works or not. We use as inputs to the CAPM, as recommended in the literature (e.g. Stowe, 2002), the yield on the 20-year Treasury bond for the risk free rate. For the equity risk premium, we use an average of the arithmetic and geometric average of realized stock returns from 1927 to 2002 and for beta the estimate obtained from Research Insight. When such betas were not available we calculated them using 60 monthly returns. We furthermore adjust the historical betas using the smoothing technique suggested by Blume (1975): historical betas in the high growth phase are adjusted 1/3 towards one, while the stable growth betas are adjusted by 50% in the same direction. This procedure corrects for the tendency of future betas to move towards the mean value of one.

The *fundamental method* is a conceptual mix of the CAPM and the Fama and French three-factor model (Fama and French, 1993). It is a ‘build-up’ or ‘bottom up’ model as conceptually outlined in Pratt (1998). The fundamental method attempts to correct the CAPM for some of its problems documented in the literature. We accept the conceptual structure of the CAPM but build a more fundamental beta using the three factors identified in Fama and French (1993) (beta, market capitalization and the B/M ratio) and in addition to that the P/E ratio to measure expectation risk and the debt-to-asset ratio as a measure of financial risk. The higher, or lower respectively, each of these five factors is compared to the average of all stocks, the higher is the stock's fundamental beta. By multiplying this fundamental beta with the CAPM estimate of the risk premium and adding the nominal long term risk free rate, we obtain a measure for the discount rate.

The *fundamental risk premium* approach is explained in detail in the previous chapter.

In recognition of the findings of e.g. Gebhardt et al. (2001) that the most direct approach to estimate a market determined discount rate is to infer it from market prices, we use the *market implied discount rate* as well. To avoid circular reasoning, we are not considering the discount rate implied in the current stock price but rather the average of the market implied risk premium of the past four years and a regression forecast based on that data. The historic market implied risk premia have been determined using our FEV model.

In addition to the ex ante methods, we use also a so called *economic method*. This method is based on a rearrangement of the sustainable growth rate equation proposed in Damodaran (2004): g = ROE * RR, where the return on equity (ROE) over the long term is assumed to be a proxy for the long term cost of equity capital and RR is the retention rate. Replacing ROE with cost of capital and solving for it in the above equation yields: cost of equity capital = g / RR. The higher the growth rate and the lower the retention rate, the higher the risk and thus the cost of equity capital.

The fundamental discount rate used in our FEV model is a weighted average of the discount rate estimates obtained from the five methods above.[30]

[30] The weights are assigned as follows: CAPM 25%, fundamental method 25%, fundamental risk premium 25%, market implied discount rate 20% and economic method 5%.

PART III: EMPIRICAL TEST OF THE FUNDAMENTAL EQUITY VALUATION MODEL

"It might work in practice, but it will never work in theory."
Ewa A. Froidevaux, 2003

This final part of the dissertation brings everything written before together. We will empirically test the Fundamental Equity Valuation Model (FEVM) developed in the preceding parts. The inputs to the model are determined in the way outlined in part two: the fundamental growth rate, the fundamental growth duration and the fundamental discount rate. After presenting the results, the implications and findings are discussed, limitations evaluated and future research suggested.

5. Test of the Fundamental Equity Valuation Model

The DCF valuation model is the conceptually best valuation model. In this chapter, we will test whether it is also practically rewarding. The ultimate goal of every valuation model is to find mispriced stocks and to make an economic profit based on the findings – our FEV model is not different.

5.1 Previous Research

Practical tests of DCF valuation models are rare in the empirical academic literature. A simple study of the dividend discount model was conducted by Sorensen and Williamson (1985) who valued 150 stocks from the S&P 400 in December 1980. They use the difference between the market price and the intrinsic value obtained from the model to form five portfolios based upon the degree of under- and overvaluation. They make fairly broad assumptions by testing the dividend discount model: (a) the average of the earnings per share between 1976 and 1980 is used as the sustainable earnings per share, (b) the cost of equity is estimated using the CAPM, (c) the extraordinary growth period is assumed to be five years for all stocks, (d) the I/B/E/S consensus forecasts of earnings growth is used as the growth rate for this period, (e) the stable growth rate is assumed to be 8% for all stocks, and (f) the payout ratio is assumed to be 45% for all stocks.

The returns of these five portfolios are calculated for the following two years (January 1981-January 1983) and excess returns are measured relative to the S&P 500 index. Nevertheless the crude assumptions produces the undervalued portfolio a positive annualized abnormal return of 16%, while the overvalued portfolio has a negative abnormal return of -15%. Sorensen et al. also test whether the investment performance could be increased by using more sophisticated models and test therefore one-, two-, and three-stage dividend discount models. They conclude that model performance improves as model sophistication increases.

In another study, Haugen (1997) reports on the results of a fund that used the DDM to analyze 250 large capitalization US firms from 1979 to 1991 and to classify them into five quintiles. The valuation was done by six analysts who estimated an extraordinary growth rate for the initial high growth phase, the length of the high growth phase and a transitional phase for each of the firms. They find that the undervalued portfolio earned significantly higher returns (22.2% p.a.) than the overvalued portfolio (13.75% p.a.) and the S&P 500 (16.8% p.a.).

Skantz and Marcheini (1992) use a DCF model to value liquidating firms where the cash flows and growth patterns are known. They conclude that the market appears to value stocks by discounting expected cash flows using a risk-adjusted required rate of return. The uniqueness of their sample however makes a generalization to going concern companies difficult.

Frankel and Lee (1998) test the residual income model of Ohlson (1995) operationalized with analysts' earnings forecasts. They find that the model predicts abnormal returns over one-, two, and three-year holding periods. Specifically, a portfolio constructed by taking a long position in the most undervalued quintile of firms and a short position in firms in the most overvalued quintile produces cumulative returns of 3.1%, 15.2%, and 30.6%, over one-, two-, and three-year holding periods. Herzberg (1998) shows that the Frankel and Lee results can be improved further by using more refined model estimation procedures. Bradshaw (2000) and Ali, Hwang and Trombley (2003) confirm these results.

In a similar study Frankel and Lee (1999) find that the residual income model applied internationally produces abnormal returns in a cross-country investment strategy.

Dechow, Hutton and Sloan (1999) implement the RIM using a number of different time-series models for predicting future ROEs, as opposed to analyst based forecasts in Frankel and Lee (1998). Despite this fact, they still find that under- (over-)valued stocks as identified by the model earn higher (lower) future returns, particularly over horizons of 3 to 5 years.

In different variations describe Chang, Chen, and Dong (1999) and Lee, Myers and Swaminathan (1999) also profitable trading strategies based on comparing stock prices to intrinsic values from residual income models.

5.2 Research Design

In the tradition of fundamental analysis, we test in our study whether observed stock prices tend to revert towards the intrinsic values predicted by our DCF model. This test assumes the possibility of temporary stock mispricing that can be systematically predicted and exploited by a comprehensive application oriented valuation model. We test our fundamental equity valuation model (FEVM) described in the previous part of this dissertation. Conceptually, the model looks as follows:

$$V_0 = \frac{FCFE_1}{(1+k_1)} + \frac{FCFE_2}{(1+k_1)^2} + \sum_{t=3}^{n} \frac{FCFE_t}{(1+k_1)^t} + \sum_{t=n+1}^{N} \frac{FCFE_t}{(1+k_t)^t} + \sum_{t=N+1}^{M} \frac{FCFE_t}{(1+k_T)^t}$$

V_0 = Value of the stock in t=0
$FCFE_1$ = Free cash flow to equity in year 1
$FCFE_2$ = Free cash flow to equity in year 2
$FCFE_t$ = Free cash flow to equity in year t
k_1 = Discount rate in stage 1
k_t = Discount rates in stage 2
k_T = Discount rate in stage 3
n = Year ending stage 1
N= Year ending stage 2; (N-n) is the length of stage 2
M = Year ending stage 3; (M-N) is the length of stage 3

Even though a DCF valuation model is the theoretically correct method for valuing stocks, it is difficult to apply in practice because the input factors are difficult to forecast and very sensitive - small changes in certain inputs lead to great differences in intrinsic values. Consequently is any test of a DCF valuation model a joint test of the model and of the quality of the numerous input factors that go into the model. For this reason at least two possible sources of errors exist in testing the model: model uncertainty and input uncertainty.

Model uncertainty refers to the degree of simplification in the empirical implementation process of an application oriented valuation model. We try to reduce model uncertainty with the comprehensive and fundamental model construction. Since a spreadsheet is a convenient way to implement complex but flexible models, we use the spreadsheet modeling technique as the base of our model construction. Spreadsheets allow the building of complicated and interrelated models that would be very difficult to describe using standard programming research practices.

Input uncertainty refers to the quality of the input factors that go into a valuation model. In our model, three input factors are highly sensitive and therefore important: (1) earnings per share forecasts, (2) earnings growth rates, and (3) the discount rate. Our approach to deal with input uncertainty is to test the model using different input specifications in the same valuation model. The performance of the different input specifications will then show which inputs best reflect market expectations and should be used in valuation studies. We will test the model with the following ten input specifications:

1. *As entered*: leaves all the fundamental input factors unchanged and values the stock "as is";
2. *Best estimate*: the fundamental inputs are adjusted manually to reflect economic logic better and to correct for outliers caused by mergers and other extraordinary circumstances;
3. *Analysts only*: considers only analysts' forecasts as valid inputs, the other earnings and earnings growth rate estimates are ignored;
4. *Excluding analysts*: considers all fundamental estimates as valid and analysts' forecasts are ignored;
5. *FRP only*: uses in the denominator only the approach of the fundamental risk premium (FRP) and in the nominator the 'Best estimate' input specification;
6. *IDR only*: uses in the denominator only the approach of the market implied discount rate (IDR) and in the nominator the 'Best estimate' input specification;
7. *CAPM only*: uses in the denominator only the CAPM and in the nominator the 'Best estimate' input specification;
8. *Foresight only*: uses in the nominator the actually realized earnings and earnings growth rates over the next five years following portfolio formation;

9. *Earnings methods*: considers instead of FCFE earnings as the relevant cash flow to discount. Three different earnings specifications are tested using in the nominator either analyst forecasts or 'Best estimate' forecasts and in the denominator either the CAPM or the 'Best estimate' discount rate;[31]
10. *Mix*: calculates intrinsic values as the average of the intrinsic value estimates obtained from the previous nine methods.

The different input specifications of the model provide insight into the two possible sources of valuation errors (model uncertainty and input uncertainty) and furthermore help to examine the stability of the DCF valuation methodology.

Sample Selection and Description

We test the FEV model in the ten years from 1993 to 2002 in the four main economic sectors in the US: healthcare, industrial goods and services, consumer discretionary, and the information technology and telecommunication (ITT) industry. In each case, the first fourty companies in the Compustat database of Research Insight with their fiscal year ending in December and without any missing input data, including earnings estimates from I/B/E/S, for the years 1987 to 2002 have been selected and included into the sample.

The healthcare and industrial goods industries have been selected for their relative stability of earnings and earnings growth, while the ITT industry has been selected to test whether the model can detect mispricing in a very dynamic industry that is usually not valued with an absolute valuation model. The test of consumer discretionary stocks examines whether the model is able to deal with a certain degree of economic cyclicality.

We choose the US stock market because it is generally perceived to be the most efficiently priced market in the world. A successful test of a valuation model in this market would indicate that it should work in other markets as well.

The sample selection yields a total of 1600 companies in the four industries over the ten years from 1993 to 2002. Some companies later have been excluded from the sample

[31] The three earnings specifications are: (1) EARBEANA which uses in the nominator only analyst earnings forecasts and in the denominator the estimate from the 'Best estimate' input specification; (2) EARCAANA uses analyst earnings forecasts in the nominator and the CAPM to estimate the discount rate; (3) EARCABEST uses the 'Best estimate' earnings estimates in the nominator and the CAPM in the denominator.

because of either missing data or different kinds of logical errors caused by mathematical calculation problems that made it impossible to derive an intrinsic value estimate. Especially in the ITT industry many companies had to be excluded because the valuation yielded implausible values.

Descriptive statistics in relation to the sample (table 3) and the industry sub-samples (tables 4-7) are provided in the appendix. It is to notice that the average market capitalization of the sample over the testing period is $15.9 billion with a median value of $4.3 billion. Both measures indicate that we are valuing on average large stocks. Companies are relatively larger in the industrial and ITT industries and smaller in the healthcare and the consumer discretionary industries. The betas of our sample companies average about 1 showing that we are valuing a representative sample for the overall market in terms of systematic risk. P/B values and trailing P/E ratios are generally lower than those of the market, probably because we are valuing larger and more stable companies.

Methodology

Two steps are necessary to test the validity of our FEV model. First, intrinsic values have to be estimated using the model and second, investment strategies have to be defined based on the intrinsic values found.

In the first step, intrinsic values are estimated using the ten different input specifications of the model outlined earlier. We thus test the accuracy of the inputs not by comparing them against each other or the realized numbers. In our opinion, the real test of the quality of an input factor to a valuation model is not its accuracy compared to the at the time unknowable realized number but whether it produces a valid intrinsic value estimate of the stock. Valid intrinsic value estimates are estimates that either explain or predict abnormal returns in the stock market. It is however likely that the most accurate forecasts also are the most value relevant input factors.

In order to reduce subjectivity in the ‘Best estimate’ specification where manual adjustments to the calculated input factors are permitted, a set of rules for these adjustments is developed:

1. The name of the company is hidden from the spreadsheet to avoid human tendency to subconsciously use future knowledge about the company in the adjustment process;

2. Changes in the earnings and sales growth rates are only allowed to bring the net profit margin in line with either the arithmetic average growth rate of the past 5 years or a regression estimate based on this data, or to filter out distortions from mergers and acquisitions;
3. Changes in capital expenditure and depreciation are only allowed to bring the ratio of capital expenditure to depreciation in line with normalized historical averages or a regression forecast;
4. Changes in the degree of share dilution can only be made to correct for merger and acquisition distortions in the data;
5. Discount rates can only be changed to correct for unrealistically high or low estimates; no discount rate is lower than 7% or higher than 20% for any of the companies to avoid moving too far away from historical averages.

After having determined the intrinsic values of the stocks in the sample, we must in a second step judge the quality of these estimates. The quality is best measured by using them in an investment strategy.

We suggest an investment strategy where the market price as of the end of June[32] is compared to the intrinsic values estimates obtained from the FEV model and investment decisions are made mechanically based on the following simple rule: in case the intrinsic value is within plus or minus 10% of the market price, the stock is assigned a ‘Hold’ because the model signals that it is approximately fairly valued and to include a ‘margin of safety’[33] into the valuation. A stock with an intrinsic value above 10% of the market price is rated a ‘Buy’ and below 10% a ‘Sell’ because the model indicates either a clear over- or undervaluation. The ranked stocks are then assigned to one of three portfolios according to their Buy, Hold and Sell recommendation. The portfolios are held for a period of six months in a first test, one year in a second test, and three years in a third test. The different holding periods are used to study the speed of the potential price adjustment process in the market over time.

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[32] This month has been chosen to ensure that the most recent financial statements were publicly available at the time of the valuation. Although long after the end of the fiscal year, the lag is conventional for this type of research.

[33] According to Graham the margin of safety is “that of rendering unnecessary an accurate estimate of the future” (Graham, 1973).

This trading strategy is requiring a higher degree of precision from the model than generally used research practices in that subject examining quintiles of mispricing (e.g. Frankel and Lee, 1998). In our methodology, we explicitly decide whether a stock is a Buy, Hold or Sell candidate by comparing the intrinsic value with the market price. We demand thus from the model not only a relative rank based on the degree of mispricing but a concrete investment recommendation based on the absolute degree of mispricing.

We expect the stocks rated Buy to outperform the stocks rated Hold and the stocks rated Hold to outperform the Sell-rated stocks over the various holding periods. We also expect most of the mispricing, in case we find any, to correct over the one year holding period. Based on prior research (e.g. Frankel and Lee, 1998) we however expect some mispricing to persist over the three year holding period. We furthermore expect Buys (the stocks rated buy) to have positive excess returns,[34] Holds (the stocks rated hold) should have excess returns around zero and Sells (the stocks rated sell) should have negative excess returns.

Theoretically, the discounted cash flow valuation model can be used to value all stocks. In our opinion it is however not adequate to invest indifferently in all stocks the model defines as under- or overvalued. Graham (Graham and Dodd, 1934) defined an investment as follows: “an investment operation is one which, upon thorough analysis promises safety of principal and an adequate return. Operations not meeting these requirements are speculative.” In respect to this definition, we differentiate in our methodology investment from speculation. Stocks that are determined to be ‘Safe’ are considered investments and are included into our main testing sample. Stocks named ‘Speculative’ are excluded. The differentiation between ‘Safe’ and ‘Speculative’ stocks is based on the sensitivity of the intrinsic value estimate on small changes in the major input variables (earnings growth, sales growth and net capital expenditure). ‘Speculative’ stocks are stocks in which a small change in one of these variables would change the investment recommendation or where the reliability of the input data could not be verified by historical relationships.[35] Stocks that could not be valued because either the intrinsic value was not meaningful or data was missing were excluded completely from the analysis.

[34] Excess returns are defined as the returns above or below the returns of all stocks in the sample.
[35] Table 15 and 21 in the appendix present the results of a trading strategy where both the ‘Safe’ and ‘Speculative’ stocks are included into the portfolios. They are not significantly different from the results of the ‘Safe’ stocks alone.

Data Selection and Measurement

Three main input factors have to be estimated to test our FEV model: (1) the cash flow to discount, (2) the cash flow growth rate, and (3) the discount rate. The data used as well as the measurement of each of these input factors is explained below.

1. The cash flow to discount

As explained earlier is the cash available to shareholders or free cash flow to equity (FCFE) the most correct measure of cash flow to use in the nominator of a discounted cash flow valuation model. We calculated FCFE in the following way:

Sustainable net income
+/- Change in working capital * (1-debt financing proportion of working capital)
+ Depreciation & amortization * (1-debt financing proportion of depreciation & amortization)
- Capital expenditures * (1-debt financing proportion of capital expenditures)
= **Free Cash Flow to Equity**

As discussed in greater detail in chapter 4.2, we use an average of the pro forma earnings, last year's earnings per share and last year's operating earnings per share as our measure for sustainable net income. We believe that an average of these measures represents best the ongoing performance of the company priced by investors into stock prices. The debt financing proportion of capital expenditure and depreciation and amortization is proxied by the average debt-to-asset ratio and the debt financing proportion of working capital by the average current ratio of the past 5 years.

All financial data is obtained from Compustat in Research Insight and pro forma earnings are obtained from I/B/E/S.

2. The growth rate of FCFE

We differentiate in our model three stages of growth and consequently need growth rate forecasts for the initial high growth stage, the transition stage and the long term growth stage.

In the first stage, we base the growth rate of earnings on the fundamental growth rate (FGR) approach developed in chapter 4.2. The FGR is an average of six different earnings growth rate estimates: (1) the analyst's consensus earnings growth rate, (2) a simple mechanical forecasting model estimate, (3) a comprehensive mechanical forecasting model estimate, (4) the sustainable growth rate, (5) an estimate based on profit margins, and (6) an own estimate.

The other components of FCFE are estimated based on the several casual forecasting techniques making assumptions about the economic relationships between sales, working capital, capital expenditure and depreciation also outlined in chapter 4.2.

In order to avoid applying the growth rates to an extraordinary base year, the model normalizes current input data like working capital, capital expenditure and depreciation. Base working capital is recalculated based on the same ratio of working capital to sales later used in the high growth phase. Base capital expenditure and depreciation are adjusted by a linear regression to reflect more normalized values on which to apply estimated growth rates.

In the transition stage, the first stage growth rates are faded through linear interpolation to the stable growth rate in stage three of the model. The third stage growth rate is determined by the long-term average nominal GDP growth and the average historical net profit growth rate in the US economy.

The relevant input factors are obtained from Research Insight (historical financial data), I/B/E/S (consensus EPS forecasts and long-term earnings growth forecasts) and the bureau of economic activity (estimates for the long-term growth rate of earnings).

3. The discount rate

The discount rate is estimated using the approach of the fundamental discount rate (FDR) outlined in chapter 4.3. The FDR is a mix of five different discount rate estimates: (1) the CAPM, (2) a fundamental method, (3) the fundamental risk premium approach, (4) the market implied discount rate, and (5) an economic method.

Theoretically, each cash flow should be discounted at a different discount rate as the risk free rate and the risk premium are likely to change over time. We however do not believe that it is necessary to assign a different risk premium to each annual cash flow separately. The main reason is that implicit in a constant discount rate is already included a larger deduction for risk from later cash flows because the discount rate compensates for the risk borne per period (Brealey and Myers, 2000). The more distant the cash flows, the greater the number of periods and the larger the total risk adjustment of the later cash flows.[36] A change in the discount rate is only warranted when the underlying investment risk of the company changes significantly. We identified three such instances: the three main life-cycle stages of each company. Consequently, we are using three different discount rates reflecting the different risk levels in the three life cycle stages. In particular, we adjust in the methods using either market or fundamental betas, the beta towards one as suggested in Blume (1975) and adjust the risk free rate and the risk premium to better align the long-term discount rate forecasts with historical averages.

The various relevant input factors needed to determine the FDR are obtained from Research Insight (historical financial data), I/B/E/S (consensus EPS forecasts and pro forma earnings), the bureau of economic activity (estimates for the long-term earnings and sales growth rate) and Ibbotson Associates (risk free rate averages, market risk premium estimates and data related to the S&P 500 index).

5.3 Empirical Results

Before presenting the results of our fundamental equity valuation model test, we would like to highlight the fact that all inputs to the model are estimated based solely on historical data. All information included into our model was publicly available at the time of the valuation. We present first the results of the different input specifications, followed by more detailed results for the three main input specifications, and the results in the different industries.

5.3.1 Input Specification Results

As discussed earlier, to test whether our valuation model is valid or not we must separate the effect of model uncertainty from input uncertainty. To solve this problem, we proposed a test of the model using different input specifications. In the following, the excess returns of a hedging strategy buying the top ten 'Buy' stocks and selling short the top ten 'Sell' stocks identified by each input specification in each year and for three different holding

[36] Technically, the increased risk of later cash flow is reflected in steadily declining certainty equivalents. For a discussion of certainty equivalents see Brealey and Myers (2000), p. 243.

periods are presented. RANK indicates the ranking of the input specification of the model in generating abnormal returns.

Table 5.1: Average returns; Different input specifications; Buy-Sell; All industries; Top 10; 1994-2002 [37]

	BUY-SELL										
	Results 94-02	6 MONTHS			Results 94-02	1 YEAR			Results 94-00	3 YEARS	
RANK		STDEV	Avg Return	RANK		STDEV	Avg Return	RANK		STDEV	Avg Return
2	BEST ESTIMATE	17.64%	24.86%	*3*	BEST ESTIMATE	13.16%	24.34%	*2*	BEST ESTIMATE	7.26%	13.94%
9	AS ENTERED	18.45%	12.29%	*9*	AS ENTERED	14.23%	12.95%	*9*	AS ENTERED	6.18%	6.87%
6	ANALYSTS ONLY	17.80%	21.56%	*4*	ANALYSTS ONLY	14.10%	23.94%	*6*	ANALYSTS ONLY	9.51%	10.71%
12	EXCL. ANALYSTS	15.28%	-3.64%	*12*	EXCL. ANALYSTS	10.11%	-4.21%	*12*	EXCL. ANALYSTS	2.84%	-4.87%
10	FRP	12.91%	11.29%	*10*	FRP	15.00%	9.92%	*10*	FRP	4.36%	1.75%
11	IDR	13.04%	4.58%	*11*	IDR	17.63%	4.26%	*11*	IDR	10.24%	-1.25%
3	CAPM	18.15%	24.47%	*6*	CAPM	14.47%	23.47%	*8*	CAPM	7.34%	10.13%
1	FSIGHT	10.88%	26.96%	*8*	FSIGHT	9.22%	20.74%	*1*	FSIGHT	7.36%	16.59%
5	EARBEANA	16.32%	22.41%	*2*	EARBEANA	13.25%	25.55%	*3*	EARBEANA	8.49%	13.15%
8	EARCAANA	20.04%	16.85%	*5*	EARCAANA	15.23%	23.49%	*5*	EARCAANA	9.12%	11.14%
7	EARCABEST	19.82%	20.28%	*1*	EARCABEST	15.97%	25.98%	*4*	EARCABEST	9.76%	11.43%
4	MIX	15.82%	23.72%	*7*	MIX	12.82%	23.05%	*7*	MIX	9.92%	10.33%
	Average	*0.00%*	*0.00%*		*Average*	*0.00%*	*0.00%*		*Average*	*0.00%*	*0.00%*

In the above table can be seen that all specifications with the exception of 'Excluding analysts' show positive excess hedge returns over the ten year testing period. This and that 'Foresight' performs best over the 6 months and the 3 year investment horizon indicates that the model is valid and that input uncertainty appears to be the main reason for performance differences. The fact that the only specification not showing positive excess returns over the testing period uses unadjusted and purely backward looking inputs demonstrates furthermore that the model is even rather insensitive to mistakes in the input factors - remotely correct inputs produce investment returns.

By looking in more detail at the results of the different input specifications, we find that over the one year holding period earnings seem to be more value relevant than cash flows. Two out of the three earnings based measures beat the cash flow measures in relation to their relative investment performance. The 'Best estimate' specification follows closely on the third place with only 1.2% less annual return; 'Analysts only' performs not much worse on the fourth place. Additional human input like in the 'Best estimate' specification does therefore not seem to improve model performance in a significant way.

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[37] The results for all input specifications are for the years 1994 to 2002 because not all specifications produced a result in 1993 due to missing data. To make the results comparable, we choose 1994 as the starting year for our investment strategy. The results of the 3 year holding period are from 1994 to 2000 as no later realized 3 year returns are available. For the same reason are the results for the 'Foresight' specification requiring 5 year ahead data only from 1994 to 1998.

The CAPM input specification worked well in the short term (up to 1 year). One possible explanation for this fact might be that the CAPM is widely used by financial professionals (Welch, 2000) so that it is reflected at least temporarily in stock prices no matter whether it actually works or not. The other discount rate approaches (IDR and FRP) did not produce satisfactory investment returns. That the IDR approach does not work well indicates that past information about the discount rate is not particularly helpful in estimating future discount rates. The FRP approach works only slightly better because it is based on the IDR approach and therefore strongly correlates with it.

The ranking of the input specifications is rather robust over the different holding periods. ‘Foresight’ works best over the short and long term but surprisingly not over the one year holding period. The ‘Best estimate’ specification appears to be most reliable with ranks of 2 over six months, 3 over one year and again 2 over three years. It might consequently be best suited for an investment strategy, even though it never produced the highest returns. In the following, we focus therefore on the results of this specification test.

5.3.2 Portfolio Strategy Results

The validity of the model becomes even more evident when comparing the individual portfolio excess returns. From the following graphs can be seen that the model ranks the valued stocks correctly: the stocks rated Buy outperform those rated Hold, and Hold stocks outperform Sell stocks. A clear step formation appears in every holding period.

Over the 6 months holding period (figure 5.2) the stocks the model identified as a Buy have positive excess returns of 9.37%, Hold stocks produce excess returns around zero (-1.38%) and Sell stocks have negative excess returns of -12.52%. All returns are annualized.

Over the one year holding period (figure 5.3) the results are similar: Buy stocks returned 27.6% annually while the Sell stocks returned only 6.3% and the Holds 18%. Just as expected are thus the excess returns for Buy stocks again positive (8.11%), Holds have excess returns around zero (-1.44%) and Sells have negative excess returns (-13.2%). That the absolute Buy excess returns are smaller than the absolute Sell excess returns indicates that the model is better able to identify stocks to sell than stocks to buy. We explain this fact by a higher degree of market inefficiency in relation to overvalued stocks. The institutional money management industry is still more focused on finding undervalued stocks and gives more buy recommendation than sell recommendations (Barber et al., 2001). The only slightly negative excess returns of stocks rated Hold show that the model identifies successfully which stocks not to buy or sell.

Figure 5.2: Returns and excess returns; All industries; 'Best estimate'; 1993-2002; 6 month holding period

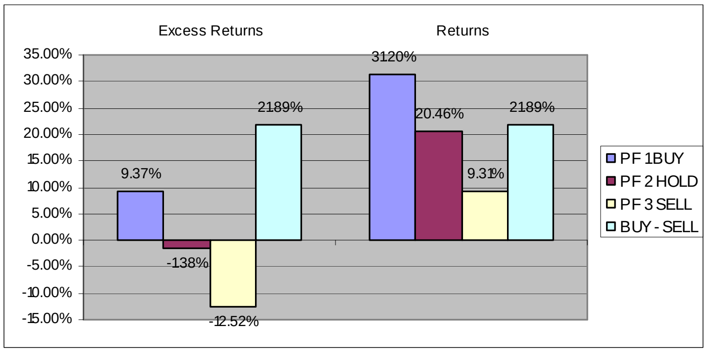
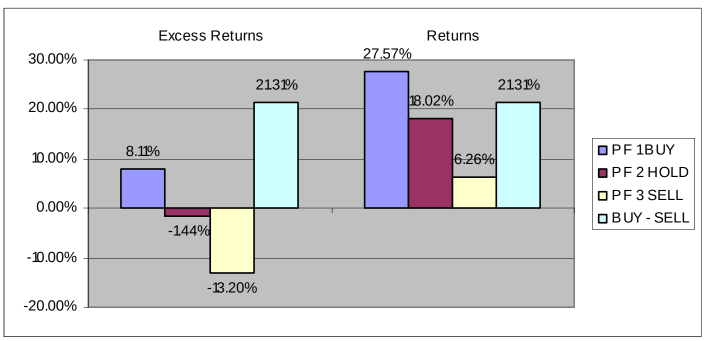
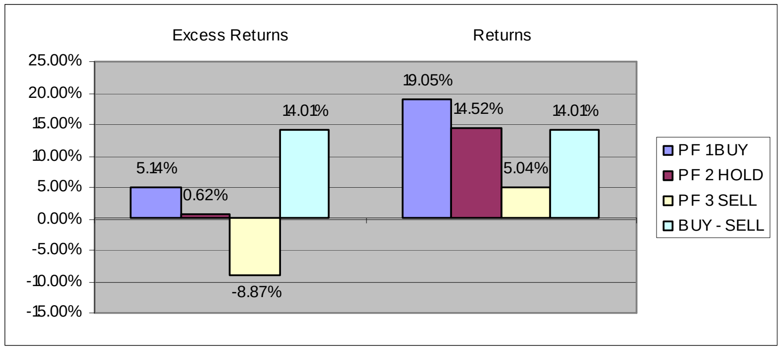


Figure 5.3: Returns and excess returns; All industries; 'Best estimate'; 1993-2002; 1 year holding period



Like documented in prior research generates a strategy based on a DCF valuation model excess returns over extended periods of time. Our model is able to distinguish between future winners and losers in the stock market over a period of three years (figure 5.4). This shows that the market needs more than three years to correct the pricing mistakes detected by the model. In opposition to Frankel and Lee (1998) we find however that the mispricing effect diminishes over time; annualized excess returns over the short and medium holding periods are larger than over the three year investment horizon.

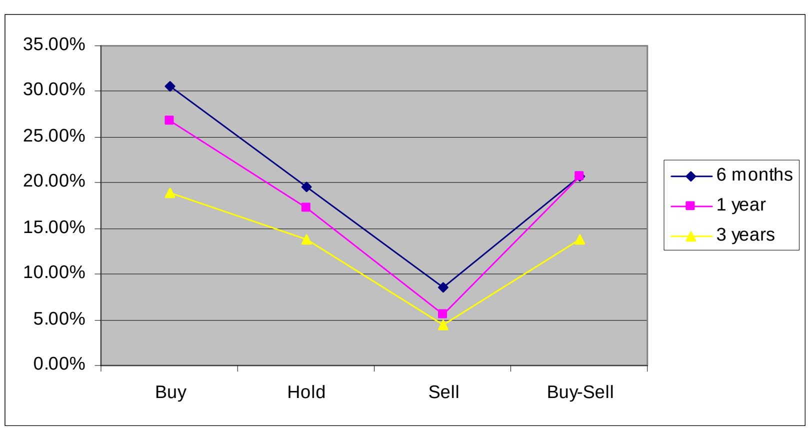
Figure 5.4: Returns and excess returns; All industries; 'Best estimate'; 1993-2002; 3 year holding period



Given the return differences over the various holding periods and considering transaction costs and reinvestment uncertainty, it appears that the optimal holding period for stocks selected with a DCF valuation model is the 1 year holding period. Although rebalancing after 6 months produces the highest absolute returns, these returns are annualized and to actually realize them, investors needed to assume that the reinvestment in the second half of the year would produce the same rate of return. It would also be necessary to deduct more transaction costs. Rebalancing the portfolios only every three years reduces these transaction costs but at the cost of much lower annual returns.

The return differences between the various holding periods can be seen more clearly in figure 5.5. As discussed above, the absolute annualized returns for all portfolios are decreasing from the 6 month investment horizon to the 1 and 3 year horizons. The mispricing is thus correcting over time. The results also show again that the model correctly identifies what stocks to buy, hold and sell.

Figure 5.5: Holding period returns; All industries; 'Best estimate'; 1993-2002

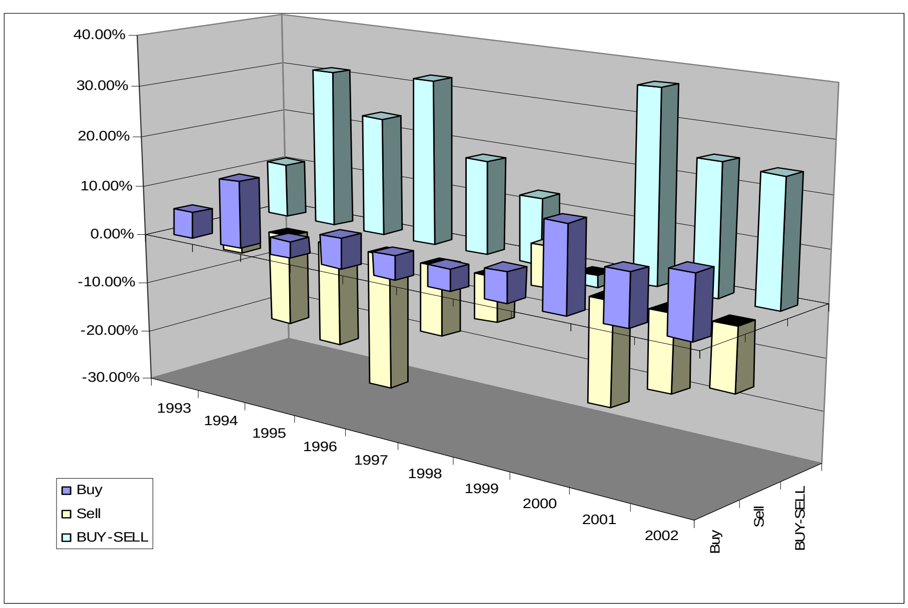


The differences in returns of the three portfolios for each holding period are statistically highly significant using a t-test assuming two-sample equal variances. This type of t-test examines whether the means of two data sets are equal. The p-values associated with this t-test for Buy vs. Hold, Buy vs. Sell and Hold vs. Sell stocks are all significant at more than the 1% level of statistical significance over all holding periods (table 27 in the appendix).

In order to be useful, the model should also show some stability in the individual annual returns. Examining the results of each year separately in figure 5.6, we find that the ability of the model to detect mispricing in the stock market is stable over time. The Buy portfolios have positive excess returns in all years; Sell stocks have, with the exception of 1999, always negative excess returns. Together this produces hedge returns (Buy-Sell) that are always positive, except again for the year 1999. In that year the overvalued stocks became more overvalued before collapsing in 2000 and producing large hedge returns for our strategy. The irrational pricing during the stock market bubble years found thus its way into our model performance.

We view the negative performance of our strategy in 1999 not as a potential weakness of the model but rather as a strength. The model is able to identify when stocks are mispriced in the market – from time to time the market just needs more time to find out itself. Over the three year holding period excess returns always behave as predicted and not one single three year period produces losses in the hedging strategy (table 10 in the appendix).

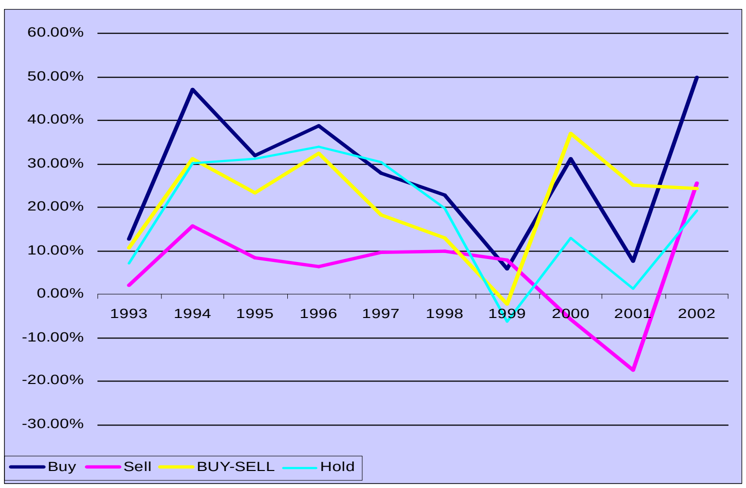
Figure 5.6: Annual excess returns; All industries; 'Best estimate'; 1993-2002; 1 year holding period



When looking at the absolute level of returns over time (figure 5.7) instead of the excess returns, we find that the stocks the model identified as undervalued and thus assigned a Buy recommendation have positive returns in every year, including the years of the latest bear market. Investors using the FEV model for stock selection would thus not incur one single year of losses over the entire 10 year testing period that includes one of the largest bear market since the great depression.

We also note that most of the time even the Sell stocks have positive returns, although well below the average of all stocks in the sample. This shows that selling stocks short is in general not a good idea given the positively skewed equity returns over time. On the other hand, a no-cash hedging strategy selling short the Sells and buying with the money the Buys would produce large positive absolute returns in all but one year (1999) where they are only slightly below zero (-2.21%).

Figure 5.7: Annual returns; All industries; 'Best estimate'; 1993-2002; 1 year holding period



What we also find out from figure 5.7 is that the portfolio returns are generally volatile. It appears that the hedging strategy produces returns with the least amount of volatility. The annual returns produced by that strategy are generally within 20% to 30%, they are lower only in the boom years (1998-1999) before correcting in the bust year (2000) and returning to the average level in 2001. Volatility data of annual returns in table 5.8 confirm these findings.

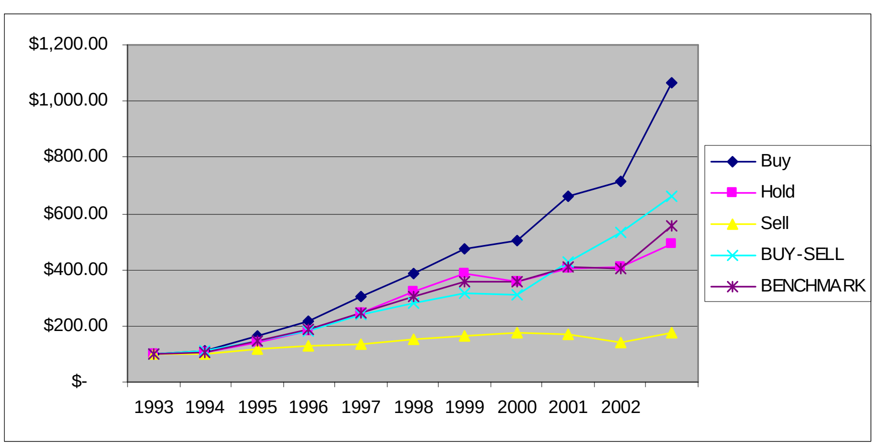
Table 5.8: Returns, volatility and correlation coefficients of annual returns to S&P 500 returns; All industries; 'Best estimate'; 1993-2002; 1 year holding period

	Return	*Volatility*	*Correlation to S&P 500*
Buy	27.57%	15.44%	56.82%
Hold	18.02%	13.93%	77.66%
Sell	6.26%	11.63%	76.53%
BUY-SELL	21.31%	11.72%	-1.07%
BENCHMARK	19.47%	14.31%	76.51%
S&P 500	11.51%	18.19%	100.00%

The results in table 5.8 show that the high returns of the long and the hedging strategy are actually realized with less risk (volatility) than the returns of the S&P 500 index. Especially interesting for portfolio managers is also the fact that the correlation coefficient between the hedge returns and the returns of the S&P 500 is negative. The model thus does not only produce high returns with low risk but the returns are also negatively correlated to the index returns making this investment strategy a perfect tool for diversification.[38]

The most important implication from an investor's point of view is certainly that substantial monetary profits can be made by applying our model to common stock valuation. Presented below are the monetary results of an investment strategy based on the recommendations of the model. The strategy assumes that an investor invests at the beginning of 1993 $100 in each portfolio and rebalances at the beginning of each following year.

Figure 5.9: Trading results; All industries; 'Best estimate'; 1993-2002; 1 year holding period



[38] This fact can be partly explained by our sample selection process as our benchmark returns of all stocks valued in the sample has only a correlation coefficient of 76.5% with the S&P 500 returns.

The results are remarkable as the stocks rated Buy produce an ending wealth after ten years with annual rebalancing of $1076, the Hold stocks of $491, and the Sell stocks of only $173. The no-cash hedging strategy would produce an ending wealth of $661 by actually leaving the capital untouched on a bank account.

These differences are large and clearly show that the model successfully identifies mispriced stocks and thus can separate future winners from future losers in the stock market. The returns translated into monetary wealth emphasize the excellent performance of the model in combination with the power of compounded returns: relatively small differences in annual returns compounded over time produce large differences in ending wealth.

The results presented in this chapter have important implications for the valuation of common stocks:

1. The market is not efficient in valuing common stocks
2. Discounted cash flow is a valid method to value common stocks
3. The FEV model works better in identifying what stocks to sell than in what stocks to buy
4. Substantial excess returns can be realized by investing according to our FEV model.

The most important implication however is that the model works; it can be used to generate abnormal returns over extended periods of time in the US stock market.

It should also be noted that the results are not significantly different when the 'Speculative' stocks are included into the portfolios (table 15 in the appendix).

5.3.3 Industry Specific Results

On the following pages, the results of the industry specific tests are presented. These tests provide further evidence of the stability of the model performance among companies with different fundamental characteristics. The results are not significantly different from the results of the test of all industries together presented in the previous chapter but nevertheless exhibit some interesting characteristics. The ITT industry is treated separately in the next chapter.

Industrial Goods and Services Industry

The valuation model proved to be useful in the industrial goods and services industry. The portfolio returns of three different input specifications in this industry are presented in table 5.10.

Table 5.10: Total returns; Industrial industry, 1993-2002; 6 month, 1 year and 3 year holding periods

6 months	Best Estimate	Analysts only	Earnings
Buy	16.64%	18.37%	13.07%
Hold	15.31%	15.35%	16.18%
Sell	-5.17%	-9.03%	-8.94%
Buy-Sell	21.81%	27.40%	22.01%

1 year	Best Estimate	Analysts only	Earnings
Buy	23.91%	28.01%	19.17%
Hold	13.66%	13.56%	13.57%
Sell	-1.74%	-2.42%	-3.62%
Buy-Sell	25.65%	30.43%	22.79%

3 years	Best Estimate	Analysts only	Earnings
Buy	12.61%	13.39%	10.62%
Hold	9.35%	10.02%	10.40%
Sell	5.28%	5.29%	3.04%
Buy-Sell	7.33%	8.10%	7.58%

The results show that absolute returns are generally lower for industrial stocks than for the average of all stocks, whereas the hedge returns are comparable to the previous results.

The 'Analysts only' specification of the model worked best over all three holding periods, followed by the 'Best estimate' specification and the 'Earnings' specification. To be consistent we nevertheless focus on the 'Best estimate' input specification in presenting the results in greater detail below.

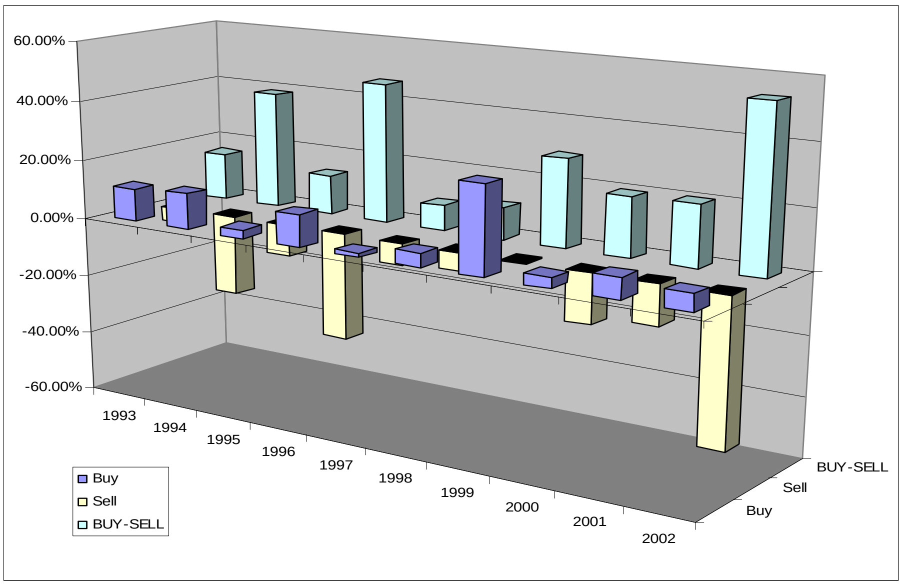
Over the one year holding period, Buy stocks in the 'Best estimate' specification returned 23.91%, the stocks rated Hold earn annual returns of 13.66% and the Sell stocks have negative returns of -1.74% on average over the ten year testing period. This produces average annual returns for the hedging strategy of 25.65%. This magnitude indicates that industrial stocks are not priced more efficiently than the average of all stocks.

We find again a high degree of stability in the direction of excess returns over time. Figure 5.11 shows that Buy excess returns are always positive and those of Sell stocks always negative. Even the year 1999 shows the predicted relationship indicating that industrial companies were less affected by the stock market mania of that time.

From the graph can also be seen that it proved again more difficult to find undervalued stocks than overvalued ones. The excess returns of the Buy stocks are positive but rather small, while Sell stocks have much larger negative excess returns.

We however note that due to rather stable average returns over time, the magnitude of the results is heavily influenced by a few extreme values. The large negative excess returns for the Sell stocks in 2002, for example, are due mainly to one single stock.[39]

Figure 5.11: Annual excess returns; Industrial industry; 'Best estimate'; 1993-2002; 1 year holding period



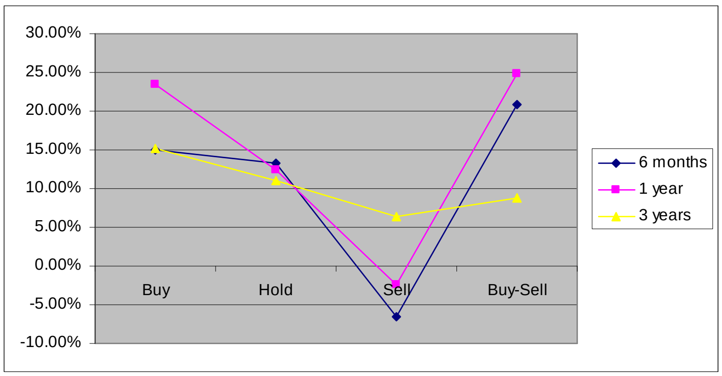
In relation to the adjustment of mispricing over time (figure 5.12), we find that in this industry the one year holding period is clearly superior to the 6 month period. Especially the returns of the Buy stocks are much higher over 1 year than over 6 months. The hedge returns show most clearly that the 1 year holding period is the optimal holding period for industrial stocks.

Figure 5.12 also shows that the 3 year holding period returns for Buy, Hold and Sell stocks are more narrowly distributed than in the previous results of all industries meaning that the mispricing is correcting more quickly in this industry after one year. The smaller excess returns over the longer term might be attributable to the relatively larger size of the

[39] Lockheed Martin Corp. (NYSE: LMT) was correctly identified as a Sell as it lost 19.6% of its value in that year while the average of all stocks in the sample gained 28.8%.

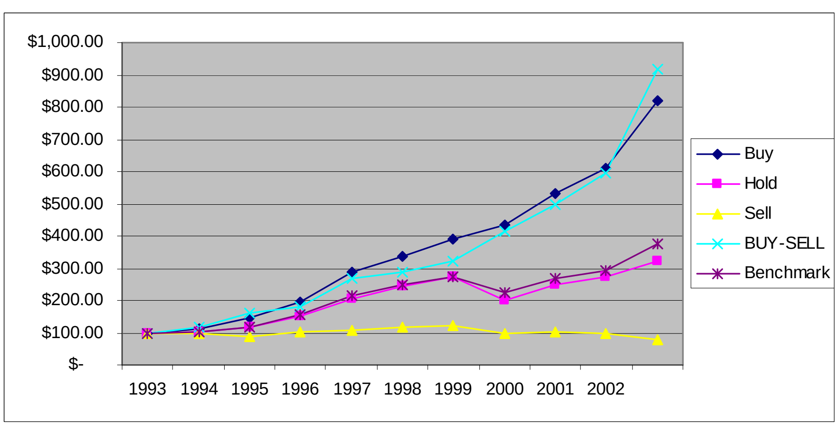
companies in this industry (see descriptive statistics). Larger companies are generally followed by more analysts, have higher institutional ownership and consequently should be valued more efficiently. That this is however not always the case is illustrated by the example of General Electric (NYSE: GE). The model identified GE in all years from 1997-2001 as a Sell; nevertheless continued the stock to outperform until the steep correction in 2000 and 2001. Sometimes individual stocks, especially the 'darlings' of analysts and portfolio managers, need more time to adjust to intrinsic values. Investors should keep this in mind when forming portfolios.

Figure 5.12: Holding period returns; Industrial industry; 'Best estimate'; 1993-2002



The monetary results of the trading strategy (figure 5.13) show that the ending wealth is lower in the industrial goods industry than in all industries together. It is so mostly because of the lower magnitude of returns for these stocks over the testing period and not because of more efficient pricing of industrial stocks. Here the hedging strategy produced even the highest ending wealth.

Figure 5.13: Trading results; Industrial industry; 'Best estimate'; 1993-2002; 1 year holding period



Healthcare Industry

The model also works well in the healthcare industry generally perceived to be more stable and therefore more efficiently priced. The returns of the Buy portfolio are substantially larger than the returns of the Hold and the Sell portfolios for the three main input specifications over all three holding periods (table 5.14).

Table 5.14: Total returns; Healthcare industry; 1993-2002; 6 month, 1 year and 3 year holding periods

6 months	Best Estimate	Analysts only	Earnings
Buy	48.36%	47.98%	42.75%
Hold	29.88%	33.50%	30.20%
Sell	19.84%	20.34%	10.76%
Buy-Sell	28.52%	27.64%	31.99%

1 year	Best Estimate	Analysts only	Earnings
Buy	36.88%	39.89%	31.13%
Hold	19.55%	20.40%	20.21%
Sell	9.39%	11.85%	2.42%
Buy-Sell	27.49%	28.04%	28.71%

3 years	Best Estimate	Analysts only	Earnings
Buy	18.79%	20.30%	16.83%
Hold	11.51%	12.35%	10.11%
Sell	5.58%	7.91%	2.04%
Buy-Sell	13.21%	12.39%	14.79%

Just like in the industrial industry produces over one year the ‘Analysts only’ specification the highest returns, closely followed by the ‘Best estimate’ and the ‘Earnings’ specification. The superiority is however not uniform for the different holding periods and the differences are not very large.

In the ‘Best estimate’ specification, the hedge portfolio capturing the difference in return between the Buy and Sell stocks produces annualized returns over the 10 year testing period of 28.5% for semiannual rebalancing, 27.5% for the one year holding period and still more than 13% for the three year holding period. One reason for the models’ superior performance in this industry might be that healthcare stocks had on average higher returns over the testing period. Higher returns create more volatility which in turn creates a higher potential for mispricing that can be exploited by the model. Another reason might be that the median size of companies in the healthcare industry is lower and that smaller companies are more often mispriced than large companies.

The results are impressive also when compared over time (figure 5.15). In the healthcare industry, the results are unambiguous: in every year for the last 10 years the model was able to identify what stocks to buy and what stocks to sell. This time, the excess returns for Buy and Sell stocks are about evenly distributed, indicating that the model was equally successful in identifying what stocks to sell and what stocks to buy. This fact certainly contributes to the higher magnitude of returns of the hedging strategy in this industry.

The hedging strategy is furthermore profitable in every single year showing that not only the magnitude of the returns is remarkable but at the same time the return distribution over time.

Figure 5.15: Annual excess returns; Healthcare industry; 'Best estimate'; 1993-2002; 1 year holding period

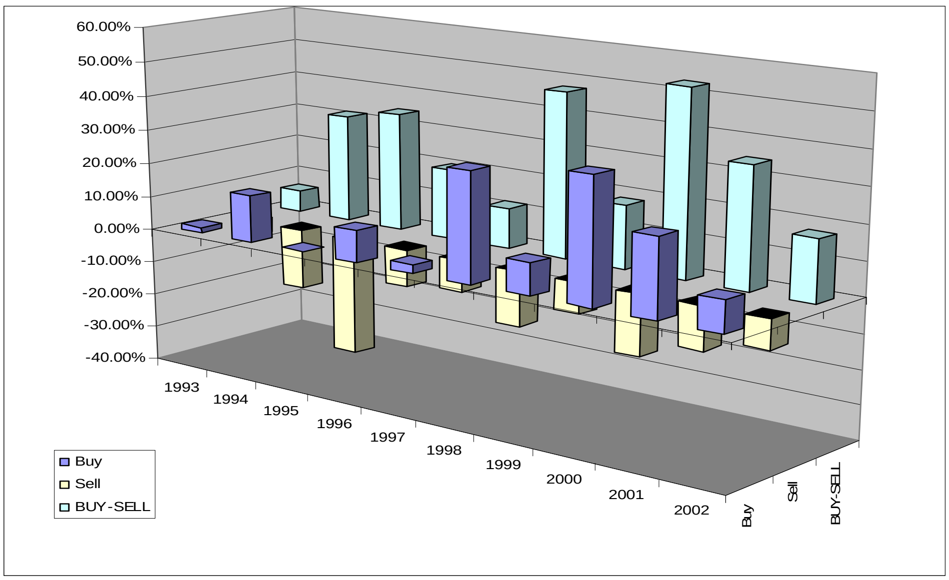
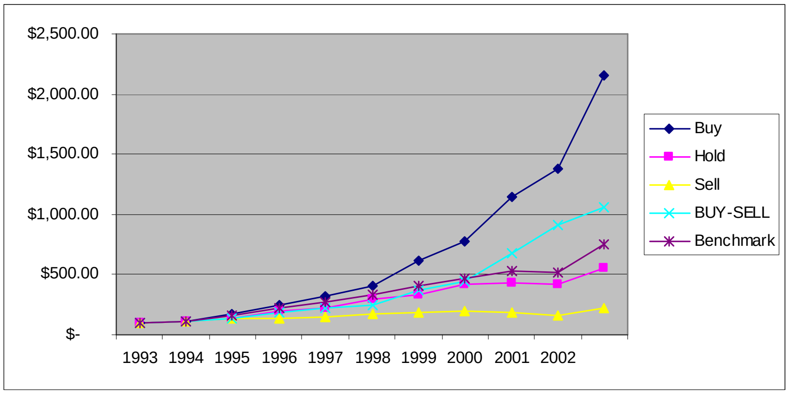


Figure 5.16 illustrates the trading results of a strategy investing $100 in each of the portfolios in 1993. The Buy portfolio produces an ending wealth of about $2200 while the Sell portfolio ends up with only $228 - almost ten times less. Clearly large profits can be made in this industry by following the investment advice of the model.

The holding period returns over 6 months, 1 year and 3 years are not significantly different from the average of all industries (table 12 in the appendix). The magnitude of the excess returns however remains larger for all three holding periods.

Figure 5.16: Trading results; Healthcare industry; 'Best estimate'; 1993-2002; 1 year holding period



Consumer Discretionary Industry

The results in the consumer discretionary industry (table 5.17) are comparable in their magnitude to the results of the industrial industry. This might be explained by the fact that in both of these industries mostly large and therefore more efficiently priced companies are valued. This industry has furthermore the highest number of hold recommendations (45.85%) compared to the average of all industries of 39.26% (table 28 in the appendix).

The 'Best estimate' input specification produces here the best results over the one year holding period. This time the differences are quite large between the three specifications examined.

Figure 5.17: Total returns; Consumer discretionary industry; 1993-2002; 6 month, 1 year and 3 year holding periods

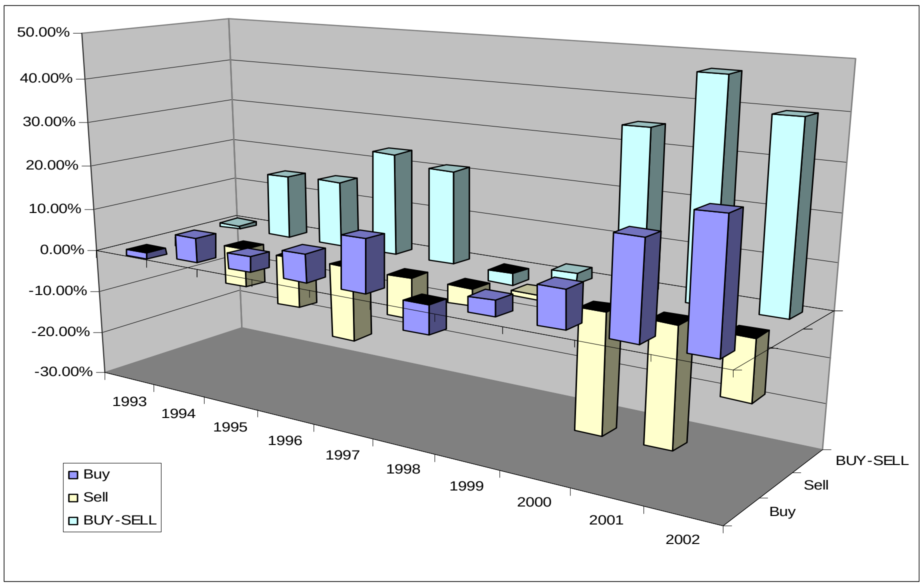
6 months	**Best Estimate**	**Analysts only**	**Earnings**
Buy	23.19%	16.96%	15.59%
Hold	10.43%	9.68%	11.24%
Sell	5.41%	6.30%	-2.58%
Buy-Sell	17.78%	10.67%	18.17%

1 year	**Best Estimate**	**Analyst only**	**Earnings**
Buy	24.08%	21.83%	19.96%
Hold	14.41%	11.82%	10.50%
Sell	4.41%	7.66%	3.74%
Buy-Sell	19.67%	14.16%	16.22%

3 years	**Best Estimate**	**Analysts only**	**Earnings**
Buy	11.23%	9.85%	10.24%
Hold	9.49%	8.13%	8.52%
Sell	2.61%	3.22%	0.93%
Buy-Sell	8.62%	6.63%	9.32%

When the results are examined over time (table 5.18), we note that the returns are not as evenly distributed as in the previous industries. The stock market boom years produce very disappointing results while the three years following the boom produce hedge returns well above 30% annually. Again are these returns to a certain degree caused by a few badly mispriced stocks,[40] less so are the returns of the comparably disappointing earlier years.

Figure 5.18: Annual excess returns; Consumer discretionary industry; 'Best estimate'; 1993-2002; 1 year holding period



Overall, the model worked well despite the fact that cyclical stocks are more difficult to value than other stocks. How well it worked is illustrated by the high average correlation coefficients between intrinsic values and one year ahead market prices of 97% and a maximum correlation of 99.58% in the year 2002 (table 29 in the appendix). This appendix shows also that the consumer discretionary industry has the highest ratio of correct recommendations over all three holding periods. It seems that in this industry the model is able to very adequately predict future stock prices without however especially profiting from that ability in terms of returns. This finding indicates that the stocks in this industry are more efficiently priced.

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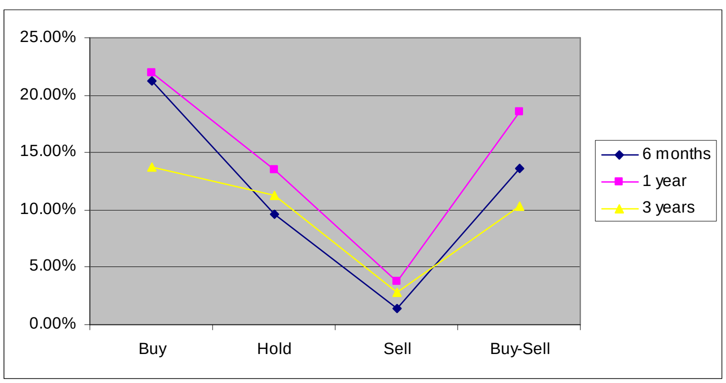
[40] NVR Inc. (AMEX: NVR), for example, soared from $5 in 1995 to over $470 today; Ryland Group (NYSE: RYL) went from $5.8 in June 1997 to over $80 today.

During testing this industry, we noted that most recommendation mistakes by the model are caused by misleading analyst forecasts of earnings. Our model requires an input for the sustainable level of earnings and not the cyclical highs or lows forecasted by analysts. To find this level of sustainable earnings, we had in this industry to determine whether earnings forecasts of analysts represent a permanent or only a cyclical level. The inputs could thus not be applied per se into the valuation model and adjustments were necessary to correct for the cyclical nature of earnings. This additional difficulty explains the much better performance of the 'Best estimate' specification of the model in this industry compared to the non-adjusted other specifications. On the other hand, show the results that the model works best in rather unstable macroeconomic times like in the years 2000-2002. Accurately forecasting the long-term earnings potential is thus an important additional determinant for success of the model in this industry.

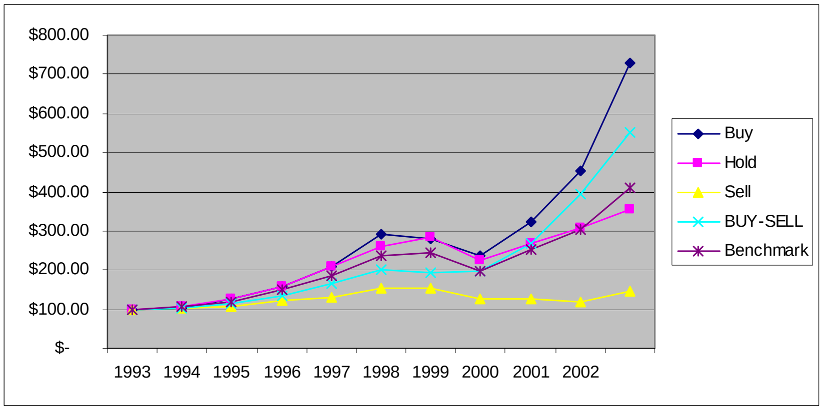
The graph showing the results of the different holding periods looks slightly different this time (figure 5.19). The one year holding period provides clearly the highest returns, followed by the 6 month holding period. That the three year holding period worked still quite well is surprising given the fact that investors usually do not hold this kind of stocks for such a long period of time but rather are timing them based on the expected future macroeconomic environment.

Figure 5.19: Holding period returns; Consumer discretionary industry; 'Best estimate'; 1993-2002



That monetary profits can be made in this industry is illustrated in figure 5.20. The Buy stocks produce an ending wealth of $730 after ten years, the Hold stocks of $353 and the Sell stocks of $145. The hedging strategy produces an ending wealth of $293. These levels are considerably lower than the ones in previous industries, showing the more efficient pricing of stocks in that industry or the difficulties of the model in identifying the mispricing.

Figure 5.20: Trading results; Consumer discretionary industry; 'Best estimate'; 1993-2002; 1 year holding period



In the next chapter, we will test our model in the most challenging industry to value – the information technology and telecommunication industry. It is treated separately because stocks in this industry are generally not valued with a DCF model.

5.4 Discounted Cash Flow Valuation in High-Tech Industries

After the successful test of the model in the healthcare, industrial goods and even the consumer discretionary industry, we applied our discounted cash flow model to the more dynamic and therefore more volatile information technology and telecommunication (ITT) industry.

Arguably all equity valuations are made in conditions of extreme uncertainty. However, it does appear that certain industries, like the high tech industries, have particularly dynamic conditions that make valuation especially challenging. In the high tech sector estimating the drivers of future cash flows, sales growth, earnings growth and net investments is extremely difficult. Stocks in the ITT industry are therefore generally not valued with an absolute valuation model but rather with relative valuation techniques. Indeed there are several problems associated with valuing these kinds of stocks with a DCF model.

First, the importance of expectations is enormous for these stocks. In the high tech sector what matters is less the currently realized results, but the expectations of future growth in sales and earnings. Prices of high tech companies, or growth stocks in general, are determined primary by supply and demand for the stock and only secondary by the underlying fundamentals of the company. Demand and supply is much more unstable than fundamentals and that is why investors' degree of control over these kinds of stocks is very limited and objective valuation very difficult.

Second, even if all the high tech companies would have successful business models, the reversion to the mean effect due to increased competition in profitable areas makes it impossible for most companies to sustain growth rates of 30% or even 50% over an extended period of time. In this industry, a valuation model must take into account the mean reversion effect and cannot use analysts' forecasts or historical extrapolated inputs.

A *third* problem is that the values of high tech companies are highly sensitive to small changes in the discount rate. The low or negative current free cash flows and the large expected cash flows in the distant future result in very long equity durations which make the present value of the cash flow stream very sensitive to changes in the discount rate.

These problems are not necessarily linked to the valuation model, but to the general difficulties investors have when forecasting the future of dynamic companies. Despite all these difficulties, we test our FEV model in this industry. The results however are mixed.

First of all we find, opposed to the previous more mature industries, that the market seems to value earnings and not cash flow in the ITT industry (table 5.21). Over the short and medium term, the difference between the earnings and free cash flow input specification is large and earnings are clearly more value relevant. Over the 3 year holding period the relationship reverses and FCFE becomes again more value relevant than earnings. This shows that in the long run also for high tech companies' cash is king.

Comparing the magnitude of returns, we find that they are lower than in most other industries despite the more volatile prices. The more volatile the prices, the higher is theoretically the potential for earning excess returns caused by mispricing. On the other hand, it is also more difficult to realize this potential. In our model depends the magnitude of excess returns on the successful detection of mispricing. Stocks in this industry are likely to be mispriced but the detection of mispricing proved to be difficult.

After valuing all these companies, we think that most valuation mistakes are not caused by the model but, as in the consumer discretionary industry, by wrong input factors. In the ITT industry, we found many cases where analysts' forecast strong earnings growth that later simply did not materialize. Such stocks are wrongly valued not only by the market but also by the model.

Table 5.21: Total returns; ITT industry; 1993-2002; 6 month, 1 year and 3 year holding periods

6 months	Best Estimate	Analysts only	Earnings
Buy	36.62%	40.18%	36.63%
Hold	26.21%	23.37%	19.77%
Sell	17.18%	17.64%	10.53%
Buy-Sell	19.45%	22.54%	26.10%

1 year	Best Estimate	Analysts only	Earnings
Buy	25.43%	27.69%	25.99%
Hold	24.46%	22.61%	21.09%
Sell	12.99%	13.79%	7.67%
Buy-Sell	12.44%	13.90%	18.32%

3 years	Best Estimate	Analysts only	Earnings
Buy	18.32%	17.78%	14.79%
Hold	16.12%	15.58%	15.57%
Sell	2.65%	3.74%	3.24%
Buy-Sell	15.68%	14.04%	11.55%

The results from the different holding periods show again that the mispricing persists over three years for all three input specifications. The returns of a hedging portfolio rebalanced only every three years are even larger than previously documented. This is quite surprising given the stock price volatility and the rather unstable business environment for this kind of stocks.

Nevertheless produce the shorter holding periods higher annualized returns. Especially the 6 month holding period seems to work better than in the other industries. In figure 5.22 can be seen that Buys for the 6 month holding period have almost linearly higher excess returns than Hold and Sell stocks. It seems that the dynamic nature of this industry requires more frequent portfolio rebalancing. The optimal investment strategy in the more dynamic industries is therefore to discount earnings and to rebalance portfolios every 6 months.

Based on these findings, we present in the following the excess returns over time for an investment strategy based on the 'Earnings' input specification with a 6 month holding period (figure 5.23). As the returns are annualized, we thus implicitly assume to earn the same magnitude of returns in the second half of the year. This however has not been verified empirically. Consequently, the results should be interpreted cautiously.

Figure 5.22: Holding period returns; ITT industry; 'Earnings'; 1993-2002

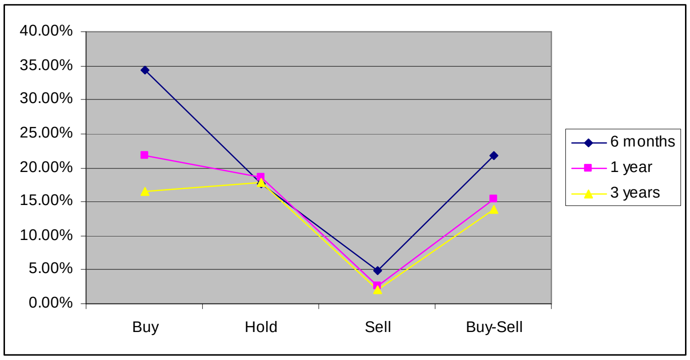
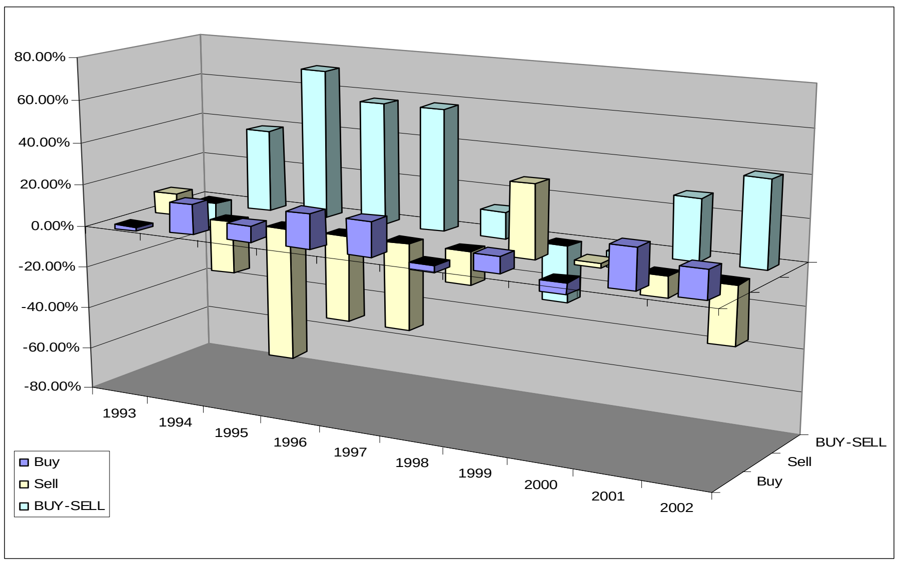


Figure 5.23: Annual excess returns; ITT industry; 'Earnings'; 1993-2002; 6 month holding period



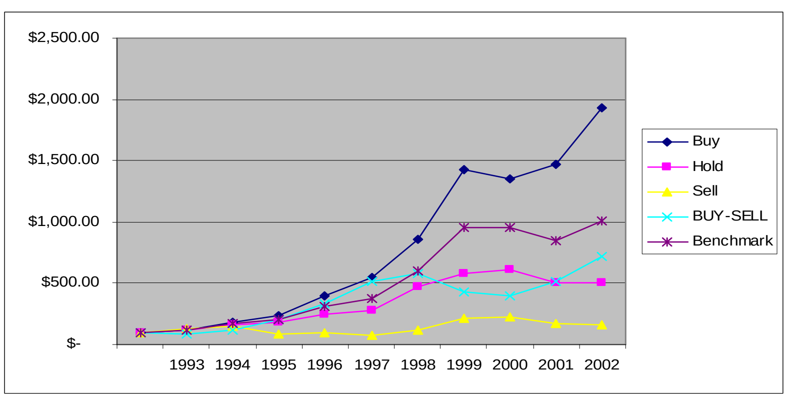
The results of the investment strategy in figure 5.23 show that return in all years until 1997 are in line with returns in previous industries, slightly better though, before in the later phase of the bull market the problems start. In 1998, the excess returns of Buy stocks turn negative but produce still higher returns than the Sell stocks and thus remains the hedging strategy profitable. In 1999 also the hedge returns turn negative. The stocks the model recommended to buy based on their fundamentals have negative excess returns while the stocks to sell have positive excess returns. The negative hedge returns persist until the year 2000, although at a lower magnitude. After the tech bubble burst the hedge returns are again in line with pre-bubble returns. Clearly had the irrational stock market behavior at the end of the last century an effect on the performance of our model in this industry.

The results of this investment strategy should be interpreted with caution in respect to one more industry specific aspect. In some years the model identified only a limited number of stocks to sell or buy and the reported returns are thus based on a small number of stocks in certain portfolios. This makes the returns sensitive to outliers.[41] For example, the model identified in 1999 only two stocks as a Buy and six stocks as a Sell (table 28 in the appendix).

The mispricing in this industry finds its way also into the returns of our trading strategy (figure 5.24 and 5.25). Not surprisingly are the monetary returns more volatile than in the previous industries. We also note a temporary decline in wealth in 1999, showing the losses incurred by the strategy in that year. The losses are however much larger for the hedging strategy with annual rebalancing than for the shorter holding period. An investment strategy based on DCF is therefore generally more risky in this industry than in the previous ones, especially over the medium term. The application of the FEV in the high tech industries should thus be more oriented towards shorter holding periods.

These results show that in the ITT industry the degree of input precision required by the model is not always achievable over the longer term. Earnings forecast can be far off, growth forecasts reverse, the number of shares jumps up and down and capital expenditures are completely unpredictable. We recognize here that the model is only as good as the inputs that go into it: garbage in - garbage out.

Figure 5.24: Trading results; ITT industry; 'Earnings'; 1993-2002; 6 month holding period



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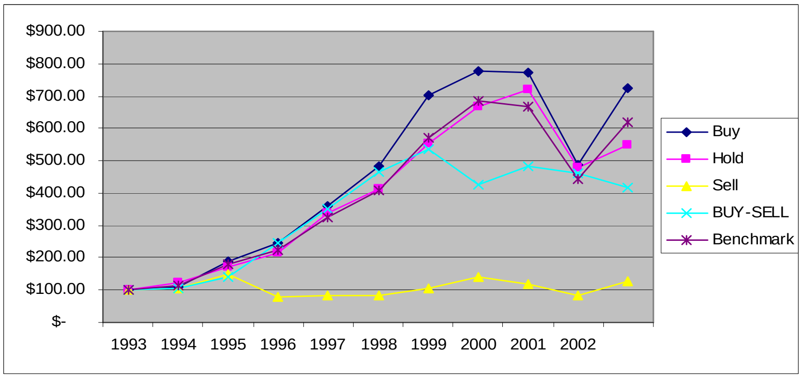
[41] The loss in the strategy in 1999 is actually entirely attributable to Nortel Networks (NYSE: NT). The stock was identified a Sell by the model but moved up more than 200% before loosing more than 90% of its value within the following 2 years.

Figure 5.25: Trading results; ITT industry; 'Earnings'; 1993-2002; 1 year holding period



A related problem we noticed while valuing ITT stocks is that some companies don't seem to care much about their current financial situation. Such companies have usually large capital expenditures, negative earnings over extended periods of time, increase sales mostly by acquisitions and finance all that annually with additional equity capital. In good economic times, this strategy might work well but when equity markets are drying up, these companies face immense difficulties to survive. Some companies in the sample nevertheless managed to survive the ten year testing period with not a single profitable year or even a single year with positive EPS forecasts by analysts. The intrinsic values as measured with a DCF model of such companies consequently are usually very low or even negative.

In summary, we think that investors should only cautiously use a DCF valuation model in high tech industries. It is however not that the model does not work in these industries, but much more that the data available are not accurate enough to provide a reliable input estimate.

6. Results, Implications and Consequences

After a summary of the results of our model test, we propose in this chapter an investment strategy based on the findings that best exploits the market inefficiencies found. After that we present potential limitations of our study and suggest ideas for future research.

6.1 Summary and Results

While the DCF model is often criticized as being of limited practical value, we have proven it to be useful in a wide range of circumstances. Despite the high degree of precision required by the methodology of our study, the model worked well in 'normal' markets, bull and bear markets, in stable industries, cyclical industries and even in very dynamic industries.

From the ten input specification tested in this dissertation, nine earned positive excess returns over the entire ten year testing period. Only the specification based on purely historical extrapolation of input factors did not work. Given remotely correct input factors, the model is thus able to identify under- and overvalued stocks and is consequently capable of earning significant excess returns in the stock market over 6 months, 1 year and even 3 years.

The magnitude of the returns (excess returns) is that in the 'Best estimate' input specification Buy stocks produce an average annual return with annual rebalancing over the ten year testing period of 27.6% (8.11%) compared to the Hold stocks of 18% (-1.44%) and the stocks the model recommended to sell of 6.3% (-13.2%). That the model is able to differentiate between under- and overvalued stocks over a period of three years is surprising and shows that the US market is not that efficient after all. The optimal holding period for stocks in our sample appears to be one year even though six months also produce satisfactory returns, especially in the more dynamic industries.

Another important finding of our study is that common stocks are indeed valued based on their expected future cash flows and that it therefore pays off to take a long-term view when investing. Our approach consists of forecasting up to 175 years of future cash flows, which stands in complete opposition to the current practices of focusing only on next quarter's or next year's earnings.

Discounted cash flow valuation is based upon discount future cash flows. Given these informational requirements, our results confirm that the approach is best used for firms whose cash flows are currently positive and can be estimated with some reliability for future periods. The further we move away from this idealized setting, the more difficult and risky discounted cash flow valuation becomes. The model is only as good as the inputs that go into it.

The success of our model is dependant on the number of identifiable mispriced stocks in an industry. We find that some industries are rarely mispriced (e.g. the consumer cyclical industry), others are mispriced but not clearly identifiable by the model (e.g. the ITT industry). The overall success of the model nevertheless shows some stocks to be always mispriced in an identifiable way. Mispriced stocks are stocks of companies that are on average small, have a low P/E ratio, a low P/B ratio, a low price and are profitable (table 3 in the appendix). These preliminary findings regarding the determinants of mispricing confirm earlier research into the subject documenting a size effect and a low multiple effect in the stock market. Our investment strategy thus partly exploits these anomalies. The fact that the mispriced companies have a low price and are more profitable indicates furthermore that the model follows a contrarian investment approach by identifying temporary weakness in fundamentally strong stocks.

Given these findings, we believe that the already good results could be improved considerably by valuing more small companies that are less followed by analysts and thus less efficiently priced.

Taken as a whole, the results show that statistically significant excess returns can be earned formulating an investment strategy based on the DCF valuation approach. What these findings mean for market efficiency has however not been determined yet. Damodaran (2004) writes that in the case of statistically significant excess returns in the stock market, these returns first have to be adjusted for risk in order to examine whether a market inefficiency exists and then also for transaction costs to conclude on a market anomaly. The crucial difference between a market anomaly and a market inefficiency is that it is possible to make money in the first case but not in the second – a crucial difference for investors.

In relation to risk, the DCF approach produces automatically risk adjusted returns as risk is explicitly considered in the discount rate of the model. Our approach however exploits some of the market anomalies documented in the literature such as the size effect or the low P/B and low P/E anomaly. We thus have to determine whether our results are caused by omitted risk variables or are the result of market mispricing. It could well be that the approaches of the FRP and IDR which did not produce large positive hedge returns simply reflect better the true ex ante cost of equity capital so that the results could be explained by omitted risk factors in the fundamental discount rate.

Bernard et al. (1997) write about the distinction between mispricing and omitted risk variables that mispricing is more likely if (1) economically large returns are predictably concentrated around earnings announcements, and (2) zero-investment portfolio returns are consistently positive for different sub-periods. In our study, we could clearly show that returns of the hedging strategy are consistently positive in different years and market conditions. Empirical studies of related research in Frankel and Lee (1998) and Ali, Hwang and Trombley (2002) find furthermore that the price convergence to intrinsic value occurs mostly around earnings announcements. Our results are thus much more consistent with the mispricing hypotheses than with the omitted risk variables explanation.

Overall, these facts indicate that excess returns so high cannot be explained by missing risk factors alone, especially if one is considering that in the ten year testing period, the strategy produced only one year of slightly negative hedge returns and stocks rated Buy never show a loss. The results strongly point to another market inefficiency.

Before concluding on a market anomaly, we must consider explicitly the transaction costs associated with actually executing our investment strategy. Transaction costs include the trading costs, the bid-ask spread and the price impact of the trade (Sharpe et al., 1999). Transaction costs therefore are mainly a function of the liquidity of the stock. In general, small and less liquid stocks are more neglected by the market and therefore more likely to be mispriced. These same firm characteristics however also create higher transaction costs so that the mispricing might not be fully exploitable economically. The stocks in our sample have an average (median) market capitalization of $15.9 billion ($4.2 billion) and are therefore considered large stocks. In that size range and given our low portfolio turnover, the total transaction costs should not amount to more than 1% per year for a roundtrip trade (Sharpe et al., 1999). The excess returns remain therefore positive at about 7% annually for the simple long strategy and about 20% for the hedging strategy. The results thus suggest that we have not only found another market inefficiency but also a market anomaly.
In the following chapter, we present an investment strategy that shows how to best exploit this market anomaly.

6.2 Investing in non-efficient Markets

In the stock market, two things are essential to earn abnormal returns using a DCF valuation model: (1) a successful identification of mispriced stocks, and (2) a convergence of price towards intrinsic value. Identifying mispricing that will not correct over time does not contribute to excess returns. The results of our previous study show that convergence occurs and that most of it takes place within one year. In an investment strategy, stocks should therefore be held for a period of one year.

The investment strategy comes thus down to identifying mispriced stocks. Obviously we suggest the use of a DCF valuation model, but with two strict rules attached to its application.

The *first rule* is to reduce potential behavioral biases as much as possible. Valuation is not a science; even though the valuation model is quantitative do leave the inputs plenty of room for subjective judgment. Thus, the intrinsic value obtained from the model is colored by the biases brought into the valuation process. We suggest two ways to reduce these potential biases. The first is to avoid taking a strong public or financial position on the value of a stock before the valuation is completed. In many cases, the decision on whether a stock is under- or overvalued precedes the actual valuation, leading to seriously biased intrinsic value estimate. The second way to reduce behavioral factors is to ignore the name of the company in the valuation process and like this to value stocks really solely based on the quantitative numbers. Like this, the influence of subconscious associations and prejudices are eliminated and the valuation becomes more objective.

The *second rule* in the application of the fundamental equity valuation model is to be prudent in the stock selection process. When the intrinsic value obtained from the model is significantly different from the market price, we suggest to assume first that the market is correct and to look for arguments that support this view. Especially, investors should check whether the inputs are correct and reliable. Only if the inputs are reasonably conservative and the stock is still significantly mispriced should the stock be bought or sold. Furthermore should, like in our study, a clear differentiation being made between an investment and speculation. We documented in our previous study that ‘Speculative’ stocks do not provide considerably better returns than the ‘Safe’ stocks but add a lot more volatility to the portfolios (table 15 in the appendix). We suggest therefore to include only stocks into the portfolios that are an investment in the sense of Graham and provide a clear margin of safety. In general, these are stocks of companies with a somewhat stable past, no mergers or acquisition that distort historical relationships, that are profitable, exhibit a stable relationship between capital expenditure and depreciation and have reasonable debt levels. We advice thus not directly against using the model in certain very dynamic industries, but rather to use it for stocks where the investor has a reasonable degree of control over the input factors. The degree of control is greatest where stock prices are determined by fundamentals, where the fundamentals are positive and predictable, and where the stock is substantially mispriced given these fundamentals.

Following the above rules, about 100 stocks should be valued in each industry to create sub-samples of under- and overvalued stocks. From these sub-samples the most grossly mispriced stocks should be analyzed using fundamental analysis. Making the valuation in the way described above before the traditional analysis reduces behavioral biases in this more subjective part of the investment process. The other way around, it is mostly that investors like the fundamentals of a company and then bring this bias to the valuation model ending up with their favorite companies being undervalued as well.

The sub-sample of under- and overvalued stocks that pass the first valuation test and have sound fundamentals should then be valued again using other methods like relative valuation techniques to double check the previous findings. Only the stocks that pass all three tests are valid investment candidates.

In the portfolio selection process, we have to revise the generally accepted view that diversification reduces risk while not reducing expected returns. Unfortunately, this statement is only true in efficient markets. In inefficient markets diversification is costly because it means investing in the second best stocks (second most mispriced) and so forgiving higher returns.

Our study clearly demonstrates that the more stocks are included into a portfolio, the more investors move away from the mispriced stocks and the more average the returns become. In that sense, diversification in a non-efficient market is a defense against ignorance. As everybody is in some way ignorant about the intrinsic value of common stocks, some defense is good, but like with insurance, too much is costly. Too much money might be put into mediocre investments and too few into good ones.[42] Investors must recognize that in non-efficient markets diversification offers no free lunch.

We therefore suggest including into a portfolio not more than 10 stocks per industry or a total of 25 to 30 stocks. Fewer stocks not only increase the potential of earning higher returns but at the same time reduce transaction costs.

[42] This point is also made by Warren Buffet who asks to consider the following about diversification: “If the best business you own presents the least financial risk and has the most favorable long term prospects, why would you put money into you twentieth-favorite business rather then add money to the top choice?”(Hagstrom, 1995, p. 266).

In respect of these recommendations, we test in the following a trading strategy investing in only the top 10 (top 5) most undervalued stocks as identified by our FEV model and selling short the top 10 (top 5) most overvalued stocks in each industry and each year over the ten year testing period. We thus create a portfolio of 40 (20) stocks to buy and 40 (20) stocks to sell.

The strategy outlined above is a hedging strategy meaning that we are selling an overvalued stock short and buy with the money an undervalued stock. In essence therefore, this strategy is a zero investment strategy and does not require any capital investment, except of a margin requirement that could be invested in US Treasury securities. In the hedge fund industry, this kind of strategy is known as 'long-short equity' or 'market neutral equity'.

In more detail, the strategy requires that in each year an equal amount of money is invested in each stock bought and sold short. Due to our limited sample of 40 companies per industry in each year, we have to regulate for cases where the model identified less than 10 stocks (5 stocks) as either a Buy or a Sell. In the case of more stocks to sell than to buy, we solve the problem by investing the money from the short sale in one year Treasury securities with an assumed return of 0%. In the case of more stocks to buy than to sell, we assume that money is borrowed to buy the additional stock. We thus assume that in such cases no stock is sold short but rather that the money to invest in the Buy stocks is borrowed at the cost of 0%.[43] The results of this hedging strategy for the three main input specifications are presented in figure 5.26.

For all three input specifications, the results show an increase in returns as the portfolio size is reduced. The strategy investing in only the top 5 most mispriced companies (buying the 5 most undervalued stocks and selling short the 5 most overvalued stocks) produces always the highest returns (up to 30.3% per year), followed by the top 10 strategy (up to 23.9%) and the previous strategy including all stocks identified as either a Buy or Sell with up to 21.6% annual performance over the ten year testing period. These results show that the more mispriced a stock is as identified by the model, the higher is the subsequent correction and the higher are the hedge returns of our investment strategy. This further confirms the validity of our DCF model and proves that diversification is indeed costly in non-efficient markets.

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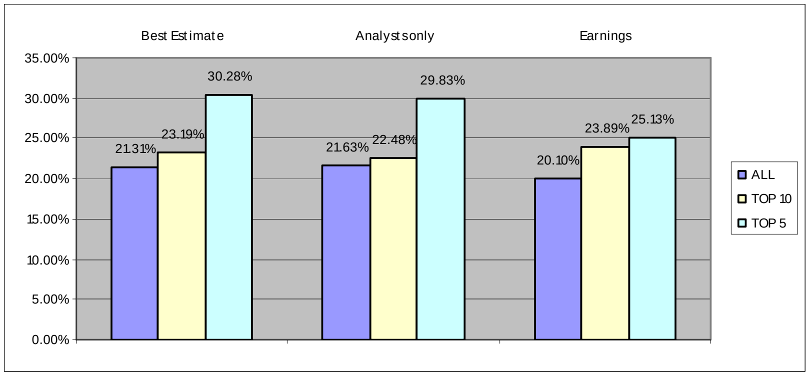
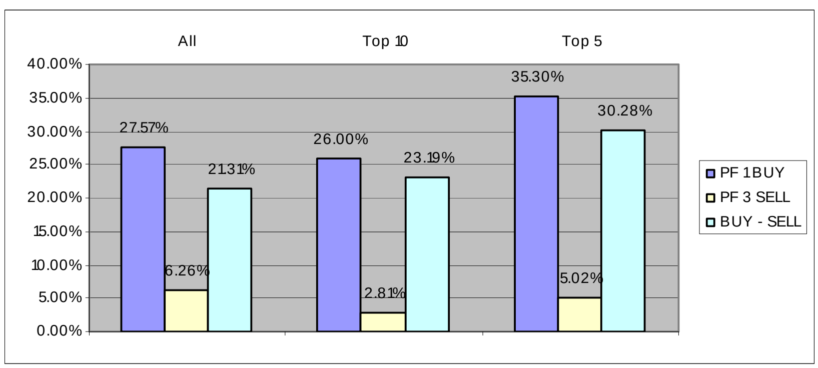
[43] Although these assumptions are generally not met in reality, the difference between the interest rate received and the interest rate paid in the security lending process is small. Furthermore could instead of using borrowed money own money be used to eliminate the interest rate payable altogether.

Figure 5.26: Total returns; All industries; 1993-2002; 1 year holding period



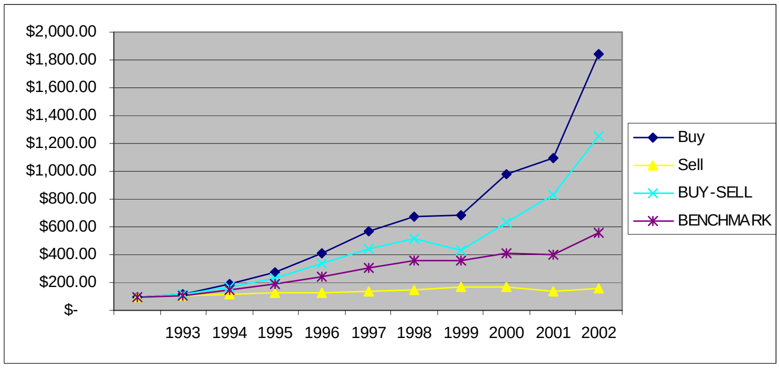
In figure 5.27 we present the portfolio returns for the Buy and Sell stocks of the 'Best estimate' input specification in more detail. It can be seen that the top 5 Buy (Sell) stocks have significantly higher (lower) returns compared to the average of all Buy (Sell) stocks. These results show again that an investment strategy should focus on the most under- and overpriced stocks.

Figure 5.27: Total returns; All industries; 'Best estimate'; 1993-2002; 1 year holding period



The monetary returns of such an investment strategy are presented in figure 5.28. There we see how the differences in percentage returns translate into monetary differences over time. Buying the Buys with the money from shorting the Sell stocks turns an initial $100 investment into an ending wealth of $1250 after 10 years. This kind of return is earned with no capital requirements besides a margin requirement on a bank account. They are also produced using no leverage. In essence, investors could earn more than 30% annual return over ten years by simply leaving their money on a bank account. The more traditional long strategy produces an ending wealth after 10 years of $1842 compared to the Sell stocks of just $154 and the benchmark of all stocks of $554.

Figure 5.28: Trading results; All industries, 'Best estimate'; 1993-2002; Top 5; 1 year holding period



By examining the results in each year in figure 5.29, we see that the top 5 hedging strategy does, like in the previous results, produce a loss in 1999. We attribute this loss to the irrational stock market behavior in relation to high tech stocks during that time. In 1999, the top 5 hedging strategy in the ITT industry produced a return of -76.6% (table 26 in the appendix). Excluding this more volatile industry would improve the results in such a way that the top 5 hedging strategy would be profitable in every single year.

The results of the top 10 hedging strategy are not significantly different (table 16 in the appendix).

Figure 5.29: Total annual returns; All industries; 'Best estimate'; 1993-2002; Top 5; 1 year holding period

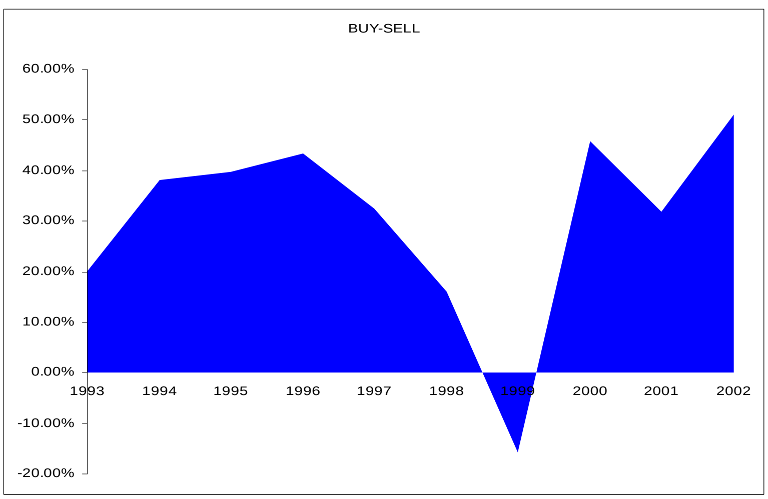


Figure 5.29 also shows that the return distribution over time is comparable to the previous results of all stocks but the magnitude both to the upside and downside is larger. In inefficient markets diversifying portfolios thus indeed implies a tradeoff between risk and return.

The total returns of the top 5 investment strategy vary in general from 35% to 45% per year. The strategy is not only very profitable but at the same time comparable in terms of risk to a simple buy-and-hold strategy as indicated by the losses and the traditional statistical risk measures in table 5.30.

Table 5.30: Returns, volatility and correlation coefficients of annual returns to S&P 500 returns; All Industries; 'Best estimate'; 1993-2002; Top 5; 1 year holding period

	Return	*Volatility*	*Correlation to S&P 500*
Buy	35.30%	20.82%	47.83%
Sell	5.02%	11.54%	63.49%
BUY-SELL	30.28%	19.53%	13.46%
BENCHMARK	19.47%	14.31%	76.51%
S&P 500	11.51%	18.19%	100.00%

The low correlation with the S&P 500 returns make both the simple long strategy (Buy) as well as the hedging strategy (Buy-Sell) interesting for portfolio managers. With the hedging strategy investors could earn almost independently of the direction of the general stock market a 30% annual return with volatility comparable to investing in an index fund.

At this point we would like to emphasis again that the model uses only objective and verifiable data known to everybody at the time of the valuation. The results shown in any of the many strategies (except for the 'Foresight' input specification) in every industry could actually have been achieved by simply using our fundamental equity valuation model.

The reported results could even be improved when instead of focusing only on the 'Best estimate' input specification, the specification that worked best for each industry would be selected. We however believe that this would be unfair and not necessarily representative for future returns as people may lack the discipline to follow the recommendation of the input specification blindly, without having the possibility to adjust these estimates. We therefore consider the 'Best estimate' specification to be the behaviorally best and practically most realistic test of the model.

Whether these returns will be realizable in the future is another question. It is important in that respect to examine what normally happens to abnormal returns once a successful strategy has been uncovered and publicized. In the case of the DCF model have many studies (e.g. Sorensen and Williamson, 1985; Haugen, 1997, Frankel and Lee, 1998) shown its practical validity in the past. Nevertheless were we still able to identify mispriced stocks. Besides that is the DCF model a rather old valuation model and all finance students learn how to use it. It is therefore unlikely that the excess returns of an investment strategy based on DCF are simply going to disappear once this dissertation has been published. We thoroughly believe that in the stock market psychological and institutional factors always will create mispricing and therefore the potential to earn abnormal returns using a systematic and disciplined investment approach like the one based on DCF valuation.

6.3 Possible Limitations and Future Research

Investors are constantly in search of the 'Holy Grail': an investment strategy producing high returns with low risk. It seems that we might have found such a strategy. According to Sharpe et al. (1999) it is imperative in the final evaluation of a successful trading system to check for the following potential problems:

1. Failure to adjust for risk
2. Failure to consider transaction costs
3. Failure to consider dividends
4. Non-operational systems
5. Data mining
6. Efficient market forces
7. Failure to use out-of-sample data

In our study, we tried to avoid all of these possible sources of errors. We adjusted for *risk* by using many estimates, also new ones, to determine an appropriate discount rate for each stock. Furthermore does the hedging strategy produce only one year with actual losses that were even comparably small. The annual return volatility is also comparable to a simple buy-and-hold strategy and in the discussion of omitted risk factors vs. mispricing we concluded against the risk explanation of excess returns as large as the once documented in this study.

We did not explicitly adjust our returns for *transaction costs*. The annual rebalancing however requires only a low portfolio turnover rate. The costs are thus comparable to a passive investment strategy. Subtracting 1% annually for total transaction cost differentials would also not materially impact the impressive performance of more than 30% annual return in the hedging strategy. This strongly suggest that our strategy remains profitable after transactions costs and the cost of performing the necessary analysis.

Our study measures the total return and is thus considering *dividends* explicitly. The return differences can therefore not be explained by differences in dividend yields.

Our system is furthermore fully *operational*. It only considers information publicly available at the time of the valuation. We only use analyst earnings forecasts and historical financial information. While adjusting these data in the 'Best estimate' study, the names of the companies were omitted to avoid as much as possible unconscious knowledge transfer about future events. However it might be possible that because the year of the valuation was visible, we unconsciously adjusted the inputs slightly in the direction of the existing market trend of that time. To minimize that, we followed the adjustment rules outlined in chapter 5.2. That the returns cannot be explained by that potential problem show the comparable returns of the manually unadjusted 'Analysts only' input specification.

A small operational problem arises however from the sample selection of our database. The large input requirements of the model forced us to consider companies with rather long historical data records. We thus might be subject to an ex post selection bias or survivorship bias as we included only companies that survived until 2002 into our sample. Theoretically, it was not possible at the time of valuation to know which company will survive that long. We however believe that model performance would actually improve if we would consider the possibility of bankruptcy because the model did a better job in identifying what stocks to sell than it did in what stocks to buy. Furthermore does the bias in no way negate the successful relative performance of the model. The comparisons between the model's Buy and Sell portfolios and the average of all stocks in the sample are valid and the hedging strategy remains fully operational. Precaution should only be taken when comparing the Buy portfolio returns to market averages that include bankrupt stocks.

Data mining refers to coincidental statistical significance. Without a causal relationship any empirical result may be coincidental and might not continue to exist in the future. Considering the strong theoretical basis of our approach and given that it is not one of a thousand valuation models tested but the only one, it is very unlikely that data mining plays a role in our study.

More dangerous is the power of *efficient markets*. Once discovered and copied by other investors, the anomaly documented in this dissertation could disappear. As discussed earlier, we do not believe that this will be the case in our approach.

Out of sample testing is not a major problem in our study as the model is stationary so that every year in every industry must already be considered an actual out of sample test. It remains to be seen whether the results will continue to be so great in the future. Past performance is never a guarantee for future performance, but it gives a hint.

Given the results and limitations, we think future research in this area of valuation should focus on:

1. Model building: increase the degree of detail in DCF valuation models
2. Risk and the discount rate
3. Additional model testing: formation date, other industries, other countries
4. Determinants of pricing efficiency.

1. Model building

Improvements of the model should be made in relation to the degree of detail. However given the large input uncertainty, the benefits of small improvements in details might be rather small. On the other hand point Levin and Olsson (1998) out that uncertainty is additive. The fact that there is a lot of uncertainty in the data should really encourage researchers to reduce this uncertainty as much as possible and therefore increase detail.

When increasing detail in future research, it is of major importance to think about the internal consistency of the input variables. For example would increasing details like the capitalization of R&D expenditures require a corresponding adjustment to capital expenditures, depreciation and probably also the forecasted earnings growth rate.

More effort should definitively be put into the quantitative determination of the length of the extraordinary growth period. Since the growth rate is expected to decline to a stable level after this period, the value of a stock will increase as the growth period is extended. While we developed criteria and methods that might be useful in making this judgment in chapter 4.2.3, it remains difficult to estimate the growth duration quantitatively.

The model could also be improved in relation to the implicit assumption about the infinite life of each company. A consequence of the assumed survival of the firms in our model is that discounted cash flow valuations tends to have an optimistic bias because the likelihood of the firm going bankrupt is not considered adequately.

The most neglected value driver however is the discount rate. This challenging field for future research is discussed next.

2. Risk and the discount rate

In our opinion should much more effort be put into the development of a valid risk-return model to determine the appropriate discount rate. Lee (1999) writes that this problem "is perhaps the single most pressing research issue in corporate finance". The theories proposed today, e.g. the CAPM or the three-factor model, are still too simplistic and capture only poorly the actual market process of translating risk into a return requirement.

Future research should consider investment risk more broadly. Risk is multidimensional and the most important dimension of risk is often ignored in theory: time. Risk and time are in essence two sides of the same coin. In the short term, price volatility might be an acceptable measure for the probability of lower than expected returns for investors. But in the longer term, past price volatility is no longer a good proxy for future cash flow uncertainty and therefore return uncertainty. For investing over the long term, fundamental factors that indicate higher uncertainty of future cash flows and thus increase the possibility of lower than expected returns are a better indicator of risk than simply historical price volatility. We believe therefore that our fundamental risk approach is a very promising concept and future research should build on our findings.

We identify three main problems associated with the fundamental risk premium approach of determining an ex ante risk premium based on fundamental risk factors. First, the measures for uncertainty of future cash flows must be correct; in other words, the fundamental risk premium must capture the main risks as well as their individual weights priced into the discount rate. Second, the link between the risk level inherent in each risk factors and the risk premium must prove reliable. Critical for the successful application of the model is the long term stability of the relationship between the risk factors and the implied risk premium. The fact that our multivariable approach did not produce large returns means either that the approach is misspecified and markets indeed inefficient or that the approach actually captures better the true required rate of return of investors so that the excess returns found in our study are nothing else than a compensation for omitted risk factors in the discount rate. Future research should answer this question by validation or dismissing the FRP approach, for example by comparing the discount rate estimates to realized returns or other risk proxies such as size or the B/M ratio.

The third problem in our fundamental risk premium approach is related to the directional predictions of the different risk factors. The effect of some risk factors can be ambiguous. For example, an increase in leverage can be either a positive or negative risk signal depending on the situation of the company. To the extent that the implications of these signals about future cash flows are not uniform across the set of firms, the power of the aggregate fundamental risk premium to differentiate between high risk and low risk firms will ultimately be reduced.

3. Additional model testing

After having improved the model in relation to the degree of detail and the discount rate, it should be further tested in other industries in the US and also in stock markets outside the US. We expect the results in foreign equity markets to be even better than in the more efficient US market. The model should also be tested by valuing more small and mid-size companies where we also see the potential of earning even higher returns.

Another important question future research should address is when to best form the portfolios. Differences in formation dates can have an impact on the magnitude of realized returns. Damodaran (1996) reports on a study that examines the winner-looser portfolio study of DeBondt and Thaler (1985) and finds that portfolios formed in December earn significantly higher returns than portfolios formed in June. We could thus probably improve our results further by forming the portfolios in December and profiting from the well documented January effect.

4. Determinants of pricing efficiency

Future research should also focus on identifying why certain stocks are mispriced and examine consequently the determinants of pricing efficiency. If stocks with certain characteristics are more or more often mispriced than others, then by selecting these stocks, the returns from an investment strategy based on a DCF valuation model could be improved further while at the same time reducing the risk of such a strategy.

Future research should also examine the interrelationship between the market inefficiency found in this dissertation and the other inefficiencies documented in previous research. It might be that a DCF model exploits to a certain degree the existing anomalies. In the descriptive statistics in the appendix (table 3) we find that the degree of mispricing is strongly negatively correlated to the P/E ratio. This means that the model identifies low P/E stocks as undervalued. That low P/E stocks have higher subsequent returns is already documented extensively in the literature. Our preliminary findings into the determinants of pricing efficiency also exhibit the well documented P/B effect and the size effect.

Final Word

We show in this dissertation that while valuing a stock is not an exact science, it is also not a total mystery. Our discounted cash flow model is able to identify under- and overvalued stocks in the US stock market and therefore is able to differentiate between superior and inferior investments.

In respect of the model's usefulness in generating abnormal returns also in the future, we would like to quote Benjamin Graham in his classical book on value investing: "the moral seems to be that any approach to moneymaking in the stock market which can be easily described and followed by a lot of people is by its terms too simple and too easy at last. […] All things excellent are as difficult as they are rare." [44]

[44] Graham (1973), page 100

References

Ahmed, A. S., R. M. Morton, and T. F. Schaefer, 2000, “Accounting conservatism and the valuation of accounting numbers: Evidence of the Feltham-Ohlson (1996) model”, Journal of Accounting, Auditing and Finance 15, 271-292 (2000).

Alford, Andrew W., 1992, “The effect of the set of comparable firms on the accuracy of the price earnings valuation method”, Journal of Accounting Research 30, 94-108.

Ali, A., L.-S. Hwang, and M. A. Trombley, 2003, “Residual-income-based valuation predicts future stock returns: Evidence on mispricing versus risk explanations”, Accounting Review 78, 377-396.

Altman, E. I., 1968, “Financial ratios, discriminant analysis and the prediction of corporate bankruptcy”, Journal of Finance 23, 589–609.

Barber, Brad M., Reuven Lehavy, Maureen McNichols, and Brett Trueman, 2001, “Can investors profit from the prophets? Security analysts’ recommendations and stock returns”, Journal of Finance 56, 531-563.

Barker, R., 1999, “The role of dividends in valuation models used by analysts and fund managers”, The European Accounting Review 8 (2), 195-218.

Barth, M., J. Elliott, and M. Finn, 1999, “Market rewards associated with patterns of increasing earnings”, Journal of Accounting Research 37 (Autumn): 387-413.

Basu, S., 1977, “Investment performance of common stocks in relation to their price-earnings ratios: A test of the efficient market hypothesis“, Journal of Finance 32, 6763-6782.

Belsky, Gary and Thomas Gilovich, 1999, “Why smart people make big money mistakes and how to correct them”, Fireside, New York 1999.

Bernard, V.L., 1995, “The Feltham-Ohlson framework: Implications for empiricists”, Contemporary Accounting Research, pp. 733-747.

Bernard, Victor, Jacob Thomas, and James Wahlen, 1997, “Accounting-based stock price anomalies: Separating market inefficiencies from risk”, Contemporary Accounting Research Vol. 14 No.2 (Summer 1997), 89-136.

Bernstein, Jake, 1993, “The investor’s quotient; The psychology of successful investing in commodities & stocks”, John Wiley & Sons, Inc., New York 1993.

Bernstein, Peter L, 1998, “Against the Gods; The remarkable story of risk”, John Wiley & Sons, Inc.; New York 1998.

Berry, Michael A., Edwin Burmeister, and Marjorie B. McElroy, 1988, “Sorting out risks using known APT factors”, Financial Analysts Journal 44 (March/April 1988b): 29-42.

Bhojraj, Sanjeev and Charles M. C. Lee, 2001, “Who is my peer? A valuation-based approach to the selection of comparable firms”, Journal of Accounting Research, 2001 Annual Conference.

Biddle, G.C., G.S Seow and A. Siegel, 1995, “Relative versus incremental information content”, Contemporary Accounting Research 12 (Summer 1995): 1-23.

Billings, B., 1999, “Is earnings variability related to future stock returns?”, Working paper, Florida State University.

Black, Ervin L., 1998, “What is more value relevant: earnings or cash flow? A life cycle examination”, Working paper, May 1998.

Block, Stanley B., 1999, “A study of financial analysts: Practice and theory”, Financial Analysts Journal, 55 (1999), July/August, 86-92.

Blume, M. E., 1975, “Betas and their regression tendencies”, Journal of Finance, 30(3): 785-795.

Boatsman, J. R., and E. F. Baskin, 1981, “Asset valuation with incomplete markets”, Accounting Review 56, 38-53.

Bodie, Z., Kane A., and Marcus A.J., “Essentials of investments”, Fourth edition, Irwin/McGraw-Hill, New York N.Y. 2001.

Botosan, C. A., 1997, “Disclosure level and the cost of equity capital”, The Accounting Review, 72(3): 323-349.

Botosan, C. A., and Plumlee, M. A., 2000, “Disclosure level and expected cost of equity capital: An examination of analysts’ rankings of corporate disclosure and alternative methods of estimating expected cost of equity capital”, Working paper, University of Utah, April.

Bradshaw, M., and R. Sloan, 2002, “GAAP versus the Street: An empirical assessment of two alternative definitions of earnings”, Journal of Accounting Research 40, 41-65.

Bradshaw, Mark, 2000, “How do analysts use their earnings forecasts in generating stock recommendations?”, University of Michigan working paper, January 2000.

Brealey, Richard A., and Myers, Stewart C., 2000, “Principles of corporate finance”, 6th Edition, New York, The McGraw-Hill Companies, Inc., New York.

Brennan, M. J., N. Jegadeesh, and B. Swaminathan, 1993, “Investment analysis and the adjustment of stock prices to common information”, Review of Financial Studies (1993): 6, 799-824.

Brennan, M. J., and A. Subrahmanyam, 1995, “Market microstructure and asset pricing: on the compensation for illiquidity in stock returns”, Journal of Financial Economics (1995): 41, 341-364.

Brigham, Eugene and Louis Gapenski, 2000, "Financial management, theory and practice", 9th ed., Fort Worth, Tex., Dryden Press.

Brown, L. D., and Rozeff, M. S., 1978, "The superiority of analyst forecasts as measures of expectations: evidence from earnings", Journal of Finance, 33(1): 1-16.

Brown, L., and K. Sivakumar, 2001, "Comparing the quality of three earnings measures", Working paper, Georgia State University.

Brown, P., Foster, G., Noreen, E., 1985, "Security analyst multi-year earnings forecasts and the capital market", American Accounting Association, Sarasota, FL.

Buffet, Warren, 1973, "The Superanalyst of Graham and Doddsville", in Graham, Benjamin, 1973, "The intelligent investor", Harper & Row, New York.

Buffet, Warren; Letters to shareholders 1984-2001; www.berkshirehathaway.com

Callen, J. L., J. Livnat, and S. Ryan, 1996, "Capital expenditures: Value-relevance and fourth-quarter effects", The Journal of Financial Statement Analysis (Spring): 13-24.

Callen, J. L. and M. Morel, 2001, "Linear accounting valuation when abnormal earnings are AR(2)", Review of Quantitative Finance and Accounting 16, 191-203 (2001).

Capaul, C., and I. Rowley, and W. Sharpe, 1993, "International value and growth stock returns?", Financial Analysts' Journal, January-February, 1993.

Chan, Louis K. C., Jason Karceski, and Josef Lakonishok, 2000, "New paradigm or same old hype in equity investing?", Financial Analysts Journal 56, 23-36.

Chan, Louis K.C., Jason Karceski, and Josef Lakonishok, 2001, "The Level and Persistence of Growth Rates", Working paper, March 2001.

Chang, C., Z. Chen, and M. Dong, 1999, "Investing with a stock valuation model", Working paper, Ohio State University and Yale University.

Charles M. C. Lee, 2001, "Market efficiency and accounting research", Forthcoming Journal of Accounting and Economics, January 2001.

Chatfield, R. E., S.C. Hein and R.C. Moyer, 1990, "Long-term earnings forecasts in the electric utility industry: Accuracy and valuation implications", Financial Review, 25(3), 1990, 421-440.

Chan, K., L.K.C. Chan, N. Jegadeesh, and J. Lakonishok, 2001, "Earnings quality and stock returns", Working paper, SSRN.

Chan, K., and N.-F. Chen, 1991, "Structural and return characteristics of small and large firms", Journal of Finance 46, 1467–1484.

Chen, Nai-fu, 1983, "Some empirical tests of the theory of arbitrage pricing", Journal of Finance 38 (December 1983): 1393-1414.

Chen, Nai-fu, Richard Roll and Stephen A. Ross, 1986, "Economic forces and the stock market: Testing the APT and alternative asset pricing theories", Journal of Business 59: 383-403.

Claus, J. and J. Thomas, 2001, "Equity premia as low as three percent: Evidence from analysts' earnings forecasts for domestic and international stock markets", Journal of Finance 56, 1629-1666.

Cole, K., J. Helwege, and D. Laster, 1996, "Stock market valuation indicators: Is this time different?", Financial Analysts Journal 52, 56-64.

Collins, W., and W. Hopwood, 1980, "A multivariate analysis of annual earnings forecasts generated from quarterly forecasts of financial analysts and univariate time series models", Journal of Accounting Research, v18, 390-406.

Copeland, Tom, Tim Koller, and Jack Murrin, 2000, "Valuation; Measuring and managing the value of companies", John Wiley & Sons.

Cornell, Bradford, 2000, "Valuing Intel: A strange tale of analysts and announcements", Working paper, November 2000.

Cragg, John G., and Burton G. Malkiel, 1982, "Expectations and the structure of share prices", Chicago: University of Chicago Press, 1982.

Damodaran, A., 1996, "Investment valuation", John Wiley and Sons, New York.

Damodaran, A., 2001, "The dark side of valuation", Prentice-Hall, Upper Saddle River, NJ.

Damodaran, A., 2004, "Investment valuation", preliminary second version, www.damodaran.com.

Daniel, Kent, David Hirshleifer, and Avanidhar Subrahmanyam, 1998, "Investor psychology and security market under- and over-reactions", Journal of Finance 53, 1839-1885.

De la Vega, Joseph, 1688, "Confusion de confusiones", John Wiley and Sons, New York, 1996.

DeBondt, Werner F. M., and Richard H. Thaler, 1985, "Does the stock market overreact?", Journal of Finance 40, 793-805.

Dechow, Patricia M., Richard G. Sloan, and Mark T. Soliman, 2001, "Implied equity duration: A new measure of equity security risk", Working paper, June 2001.

Dechow, P., 1994, "Accounting earnings and cash flow as measures of firm performance: the role of accounting accruals", Journal of Accounting and Economics, pp. 3-42.

Dechow, P., Sloan, R., 1997, “Returns to contrarian investment strategies: tests of naive expectation hypotheses”, Journal of Financial Economics 43, 3-27.

Dechow, R. M., A. P. Hutton, and R. G. Sloan, 1999, “An empirical assessment of the residual income valuation model”, Journal of Accounting and Economics 26, 1-34.

Demirakos, Efthimios G., Norman Strong, and Martin Walker, 2002, “The valuation methodologies of financial analysts”, Working paper, University of Manchester, 2002.

Douglas, Mark, 1990, “The disciplined trader”, New York Institute of Finance, New York, 1990.

Doyle, Jeffrey T., Russell J. Lundholm and Mark T. Soliman, 2002, “The predictive value of expenses excluded from ‘pro forma’ earnings”, Working paper, October 2002.

Dreman, D.N., and M. Berry, 1995, “Analyst forecasting errors and their implications for security analysis”, Financial Analysts Journal, May/June, 30-41.

Dreman, David N., 1998, “Contrarian investment strategies: The next generation”, Simon & Schuster, New York, NY.

Edwards, Edgar O., and Philip W. Bell, 1961, “The theory and measurement of business income”, University of California Press: Berkeley, CA.

Fama, Eugene F., 1991, “Efficient capital markets: II”, Journal of Finance 46, 1575-1617.

Fama, Eugene F., and Kenneth R. French, 1992, “The cross-section of expected returns”, Journal of Finance, 47 (2): 427-465.

Fama, Eugene F., and Kenneth R. French, 1993, “Common risk factors in the returns on stocks and bonds”, Journal of Financial Economics, 33 (1993), 3-56.

Fama, Eugene F., and Kenneth R. French, 1995, “Size and book-to-market factors in earnings and returns”, Journal of Finance 50: 131-155.

Fama, Eugene F., and Kenneth R. French, 1996, “The CAPM is wanted, dead or alive”, Journal of Finance, 51 (5): 1947-1958.

Fama, Eugene F., and Kenneth R. French, 1997, "Industry costs of equity", Journal of Financial economics 43 (February 1997): 153-193.

Fama, Eugene F., 1998, “Market efficiency, long-term returns and behavioral finance”, Journal of Financial Economics, 49 (3): 283-306.

Feltham, G., and Ohlson, J., 1995, “Valuation and clean surplus accounting for operating and financial activities”, Contemporary Accounting Research, 11(2): 689-731.

Feltham, G. and J. Ohlson, 1996, “Uncertainty resolution and the theory of depreciation measurement”, Journal of Accounting Research 34: 209-234.

Fisher, Philip A., 1958, “Common stocks and uncommen profits”, John Wiley & Sons, Inc; 1996.

Francis, J., P. Olsson, and D.R. Oswald, 2000a, “Using mechanical earnings and residual income forecasts in equity valuation”, Working paper, University of Chicago.

Francis J., P. Olsson, and D.R. Oswald, 2000b, “Comparing the accuracy and explainability of dividend, free cash flow, and abnormal earnings equity value estimates”, Journal of Accounting Research, Spring: 45-70.

Frankel, Richard and Charles M. C. Lee, 1998, “Accounting valuation, market expectation, and crosssectional stock returns”, Journal of Accounting and Economics 25, June 1998, 283-320.

Frankel, Richard and Charles M. C. Lee, 1999, “Accounting diversity and international valuation.” Working paper, University of Michigan and Cornell University, 1999.

Fried, D. and Givoly, D., 1982, “Financial analysts’ forecasts of earnings: A better surrogate for market expectations”, Journal of Accounting and Economics, 4(2): 85-107.

Froidevaux, Pascal, 2001, “Contrarian investment and behavioral finance”, Diploma paper, University of Fribourg, Switzerland.

Gebhardt, W., C. Lee, and B. Swaminathan, 2001, “Toward an implied cost of capital”, Journal of Accounting Research, 39(1), June 2001, 135-176.

Gentry, James A., David T. Whitford, Theodore Sougiannis, and Shigeo Aoki, 2002, “Do accounting earnings or free cash flows provide a better estimate of capital gain rates of return on stocks?”, 2002 FMA European Conference, Copenhagen, 2002.

Givoly, Dan and Josef Lakonishok, 1984, “The quality of analysts' forecasts of earnings”, Financial Analyst Journal, 40 (5): 40-47.

Glantz, Morton, 2002, “Managing bank risk”, Academic Press, London, 2003.

Gode, Dan, and Partha Mohanram, 2001, “What Affects the Implied Cost of Equity Capital”, Working paper, New York University, February 2001.

Goodman, David A., and John W. Peavy III, 1983, “Industry relative price-earnings ratios as indicators of investment returns”, vol. 39, no. 4 (July/August 1983): 60-66.

Gordon, Myron, 1962, “The investment financing and valuation of the corporation”, Irwin: Homewood, IL.

Graham, Benjamin, 1973, “The intelligent investor”, Harper & Row, New York, 1949 and 1973.

Graham, Benjamin and David L. Dodd, 1934, “Security analysis”, first edition, Mc-Graw Hill, New York.

Greenwald, Bruce C.N., Judd Kahn, Paul D. Sonkin and Michael van Biema, 2001, “Value investing; From Graham to Buffet and beyond”, John Wiley & Sons, Inc; 2001.

Grinold, Richard and Ronald Kahn, 1994, “Multiple-factor models for portfolio risk”, in “A practitioner's guide to factor models”, Charlottesville: The Research Foundation of the Institute of Chartered Financial Analysts, 1994.

Grullon, G., and R. Michaely, 2002, “Dividends, share repurchases, and the substitution hypothesis”, Journal of Finance 57, 1649-1684.

Hagstrom, R.G., 1994, “The Warren Buffett way”, John Wiley and Sons, New York.

Hamilton, R., 1777, “An introduction to merchandize”, Edinburgh.

Haugen, Robert A., 1995, “The New Finance; The case against efficient markets”, Prentice Hall, Englewood Cliffs, New Jersey (NJ) 1995.

Haugen, Robert A., 1997, “Modern investment theory”, Prentice Hall, New Jersey.

Herzberg, M.M, 1998, “Implementing EBO/EVA analysis in stock selection”, The Journal of Investing: 45–53.

Holt, Charles C., 1962, “The influence of growth duration on share prices”, Journal of Finance 7, no.3 (September 1962): 465-475.

Houge, Todd, and Tim Loughran, 2000, “Cash flow is king: Cognitive errors by investors”, Journal of Psychology and Financial Markets, forthcoming.

Hribar, Paul, 2000, “The market pricing of components of accruals”, Working paper, Cornell University.

Hunt, Lacy H., 1987, “A time to be rich”, Rawson Associates, Macmillan, New York, NY.

Kahneman, Daniel, and Amos Tversky, 1979, “Prospect theory: An analysis of decision making under risk“, Econometrica 47, no.2, 263-291.

Kent, Daniel, David Hirshleifer, and Siew Hong Teoh, 2001, “Investor psychology in capital markets: Evidence and policy implications”, Working paper, 2001.

Jones, C., and S. Weingram, 1996, “The determinants of 10b-5 litigation risk”, Working paper Stanford Law School, Stanford, CA.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1994, “Contrarian investment, extrapolation, and risk “, Journal of Finance 49, 1541-1578.

Lamdin, D.J., 2001, “New results on stock prices and fundamental value”, Journal of Investing 10, 67-69.

LaPorta, R., 1996, “Expectations and the cross-section of stock returns”, Journal of Finance 51, 1715-1742.

LeClair, M.S., 1990, “Valuing the closely-held corporation: the validity and performance of established valuation procedures”, Accounting Horizons 4 (September, 1990) 31-42.

Lee, C. M. C., 1999, “Accounting-based valuation: Impact on business practice and research”, Accounting Horizons 13, 413-425.

Lee, C. M. C., 2001, “Market efficiency and accounting research: A discussion of 'Capital market research in accounting' by S. P. Kothari”, Journal of Accounting and Economics 31(1-3): 233-253.

Lee, C. M., J. Myers, and B. Swaminathan, 1999, “What is the intrinsic value of the Dow?”, Journal of Finance 54, 1693-1741.

Lee, C. M., and B. Swaminathan, 2000, “Price momentum and trading volume”, Journal of Finance 55, 2017–2069.

Lee, C. M., D. Ng, and B. Swaminathan, 2003, “The cross-section of international cost of capital”, Working paper 2003.

Lev, B., 1983, “Some economic determinants of the time series properties of earnings”, Journal of Accounting and Economics 5, 31-48.

Lev, B., and R. Thiagarajan, 1993, “Fundamental information analysis”, Journal of Accounting Research 31, 190-202.

Lev, B., and T. Sougiannis, 1996, “The capitalization, amortization, and value-relevance of R&D”, Journal of Accounting and Economics 21, 107–138.

Lev, B. and Zarowin, P., 1999, “The boundaries of financial reporting and how to extend them”, Journal of Accounting Research 37, 353-385.

Levèvre, Edwin, 1923, “Reminiscences of a stock operator”, John Willey & Sons, Inc., New York, 1923.

Levin, J. and P. Olsson, 1998, “Company valuation with a periodically adjusted cost of capital”, published in P. Olsson, 1998, ”Studies in company valuation”, Stockholm School of Economics.

Lewellen, Jonathan and Jay Shanken, 2000, “Estimation risk, market efficiency, and the predictability of returns”, NBER Working paper, May 2000.

Little, I., 1962, “Higgledy piggledy growth”, Institute of Statistics, Oxford.

Liu, J., D. Nissim, and J. Thomas, 2002, “Equity valuation using multiples”, Journal of Accounting Research. 40 (March), 135-172.

Lundholm, R., and T. O’Keefe, 2001a, “Reconciling value estimates from the discounted cash flow model and the residual income model”, Contemporary Accounting Research 18 (2), 311-335.

Lundholm, R., and T. O'Keefe, 2001b, "On comparing residual income and discounted cash flow models of equity valuation: a response to Penman 2001", Contemporary Accounting Research 18 (4), 693-696.

Lynch, Peter, 1990, "One up on Wall Street", Penguin Books, New York (NY) 1990.

Mackay, C., 1852, "Extraordinary popular delusions and the madness of crowds", reprinted by John Wiley & Sons, New York.

Malkiel, Burton G., 1973, "A random walk down Wall Street", W. W. Norton & Company, Inc.; New York (NY) 1973.

Markowitz, Harry, 1959, "Portfolio selection", Yale University Press, New Haven and London.

Marshall, A., 1890, "Principles of economics", The Macmillan Press Ltd., London, NY.

Marx, Karl, 1887, "Capital", First English edition of 1887, Progress Publishers, Moscow, USSR; edited by Frederick Engels.

Miller, M. H. and F. Modigliani, 1961, "Dividend policy, growth, and the valuation of shares", Journal of Business, No. 4, 411-433.

Minton, Bernadette and Catherine Schrand, 1999, "The impact of cash flow volatility on discretionary investment and the costs of debt and equity financing", Journal of Financial Economics 54, 423-460.

Moizer, P., and J. Arnold, 1984, "Share appraisal by investment analysts - Portfolio vs. non-portfolio analysts", Accounting & Business Research 14 (56), 341.349.

Mouck, Tom, 1998, "Capital markets research and real world complexity: The emerging challenge of chaos theory", Accounting, Organizations and Society, 23 (2), 1998, 189-215.

Myers, J. N., 1999, "Implementing residual income valuation with linear information dynamics", The Accounting Review 74, 1-28.

O'Brien, P., 1988, "Analyst forecasts as earnings expectations", Journal of Accounting and Economics 10, 53 - 33.

Ohlson, J. A., 1991, "The theory of value and earnings, and an introduction to the Ball and Brown Analysis", Contemporary Accounting Research 8, 1–19.

Ohlson, J. A., 1995, "Earnings, book values, and dividends in security valuation", Contemporary Accounting Research 11, 661-687 (1995).

Penman, S.H. and T. Sougiannis, 1998, "A comparison of dividend, cash flow, and earnings approaches to equity valuation", Contemporary Accounting Research, 343-383.

Penman, S.H., 1992, "Return to fundamentals", Journal of Accounting, Auditing and Finance, 465-484.

Peters, D.J., 1991, "Valuing a growth stock", Journal of Portfolio Management 17, 49-51.

Peters, Edgar E., 1991, “Chaos and order in the capital markets”, John Wiley and Sons, New York.

Pike, R., J. Meerjanssen, and L. Chadwick, 1993, “The appraisal of ordinary shares by investment analysts in United Kingdom and Germany”, Accounting and Business Research 23, 489-499.

Piotroski, J., 2000, “Value Investing: The use of historical financial statement information to separate winners from losers”, Journal of Accounting Research, Vol. 38 Supplement 2000, 1-41.

Pratt, Shannon P., 1998, “Cost of capital”, New York: John Wiley and Sons 1998.

Rappaport, Alfred and Michael Mauboussin, 2001, “Expectations investing: Reading stock prices for better returns”, Harvard Business School Press, 2001.

Reilly, Frank K., and Keith C. Brown, 2003, “Investment analysis and portfolio management”, Thomson, South-Western, Seventh Edition, 2003.

Richardson, Scott A., and Richard G. Sloan, 2003, “External financing and future stock returns”, Working paper.

Rosenberg, B., K. Reid and R. Lanstein, 1985, “Persuasive evidence of market inefficiency”, The Journal of Portfolio Management 11 (1985): 9-17.

Ross, Stephen, A., 1976, “The arbitrage theory of capital asset pricing model (CAPM)”, Journal of Economic Theory (1976): 13, 341-360.

Sharpe, William F., Gordon J. Alexander and Jeffrey V. Bailey, 1999, “Investments”, Sixth edition, Prentice Hall, Englewood Cliffs, New Jersey 1999.

Shefrin, Hersh, 2000, “Beyond greed and fear; Understanding behavioral finance and the psychology of investing”, Harvard Business School Press, Boston 2000.

Skantz, T.R., and R. Marchesini, 1992, “A Test of a Risk-Adjusted Dividend capitalization Model: The Case of Liquidating Firms”, Journal of Financial Research, 15(1), 1992, 11-26.

Sloan, R., 1996, “Do stock prices fully reflect information in accruals and cash flows about future earnings?”, The Accounting Review 71: 305-333.

Sorensen, Eric H. and Dabid A. Williamson, 1985, “Some evidence on the value of Dividend Discount Models”, Financial Analyst Journal, November-December 1985.

Soros, George, 1987, “The alchemy of finance: Reading the mind of the market”, Simon and Schuster, New York, NY.

Stober, T., 1996, “Do prices behave as if accounting are conservative? Cross-section tests of the Feltham-Ohlson (1995)model,” Working paper, University of Notre Dame.

Stowe, John, D., Thomas R. Robinson, Jerald E. Pinto and Dennis W. McLeavey, 2002, “Analysis of equity investments: Valuation”, AIMR 2002.

Thompson, Donald J. II, 1976, “Sources of systematic risk in common stocks”, Journal of Business 49, no. 2 (April 1976):173-188

Tvede, Lars, 1990, “The psychology of finance”, Norwegian University Press, Oslo 1990.

Vaga, Tonis, 1994, “Profiting from chaos”, McGraw Hill, New York, NY.

Vander Weide, J.H., and W.T. Carleton, 1988, “Investor growth expectations: Analysts vs. history”, Journal of Portfolio Management, v14, 78-83.

Welch, Ivo, 2000, “Views of financial economists on the equity premium and on professional controversies”, Journal of Business 73, 501–537.

White, G. I., A. C. Sondhi and D. Fried, 1998, “The analysis and use of financial statements”, John Wiley & Sons, Inc.

Williams, J., 1938, “The theory of investment value”, Cambridge, MA, Harvard University Press.

Xie, Hong, 2001, “The mispricing of abnormal accruals”, The Accounting Review 76, 357–373.

Appendix

Table 1: Risk Factors considered in the Fundamental Risk Premium Approach

No	Risk categories and risk factors	Sign	Explanation and Justification
I	**Business risk**		
	Accounting based business risk measures		
1	Standard deviation of sales / 5 year average of sales	+	LaPorta (1996) shows that firms that exhibit stable growth are more like to show stable future growth
2	Standard deviation of EBIT / 5 year average of EBIT	+	Measures the volatility of operating income
3	Standard deviation of CFO / 5 year average of CF	+	Minton et al. (1999) show that cash flow volatility leads to underinvestment, which in turn reduces expected future cash flows
4	%-change in EBIT / %-change in sales	+	Operating leverage
5	Worst year ROE / average 5 year ROE	+	%-decline in ROE: measure for the volatility of ROE
6	Worst year EBIT / average 5 year EBIT	+	%-decline in EBIT: Barth et al. (1999) find that earnings volatility is a proxy for operating risk
7	%-change EBIT / %-change industry EBIT	+	Billings (1999) finds that a strategy investing in stocks with low earnings volatility and selling short high earnings volatility stocks generates consistently large, positive returns
8	Net PPE / sales	+	A higher level of fixed costs creates higher earnings variability
9	Past year EPS growth	+	Higher past growth indicates more volatile future growth due to the life cycle of the firm
10	5 year average exchange rate effect / EBIT	+	Measures the degree of exposure to international risk factors
11	Market capitalization	-	Chan et al. (1991) argue that small firms are more sensitive to economic shocks than large firms
	Analyst based business risk measures		
12	Dispersion of analysts' earnings forecasts	+	Cragg et al. (1982) argue that dispersion in analysts' earnings forecasts is the best single risk proxy
13	Magnitude of analysts' earnings forecast errors	+	Givoly et al. (1984) find that the predictability of earnings correlates with traditional risk measures
14	Standard deviation of long-term growth forecast	+	Gebhardt et al. (2001) find that the long term growth forecast of analyst proxies for risk
II	**Financial risk factors**		
	Leverage ratios		
15	Cash / current liabilities	-	Cash or quick ratio: captures balance sheet distress

16	Current assets / current liabilities	-	Current ratio: captures balance sheet distress
17	%-change in current ratio	-	Early indicator of weakening in financial position
18	Book value of debt / book value of equity	+	Book leverage ratio: A firm's cost of equity is an increasing function of the amount of debt (Fama and French, 1992)
19	%-change in short-term debt	+	Early indicator of higher risk of financial distress
20	%-change in long-term debt	+	Richardson et al. (2003) find a consistently strong negative relation between all major categories of external financing transactions and future stock returns
21	5 year average %-change in shares outstanding		See item 20
22	%-change in accounts payable	+	Chan et al. (2001) find that following an increase in accounts payable future returns are disappointing
23	%-change in EBIT/ %-change in net income	+	Measures the degree of financial leverage
	Expense ratios		
24	EBIT / interest expense	-	Interest coverage: captures risk of financial distress
25	%-change in interest coverage	-	Change in interest coverage: indicates improvement or deterioration in financial position
26	(CFO + interest expense) / interest expense	-	Cash flow coverage: captures risk of financial distress
	Financial exposure ratios		
27	CFO / short-term debt	-	Captures sustainable short term debt level
28	CFO / long-term debt	-	Captures sustainable long term debt level
29	Altman z-score	+	Altman's z score captures the possibility of bankruptcy (Altman, 1968)
30	%-change in Altman z-score	+	Captures change in bankruptcy probability
III	**Profitability risk factors**		
	Competition risk		
31	%-change in gross profit margin	-	Indicates intensity of competition
32	5 year average sales growth / 5 year average EBIT growth	+	Captures how good the company is able to translate sales growth into earnings growth
33	%-change in inventory / %-change in sales		Early indicator of future profitability
34	Retained earnings / total assets	-	Cumulative profitability: captures age, profit accumulation and dividend policy over time (Glantz, 2002)
35	Change in operating cycle	-	Leading indicator for the direction of profitability
	Management risk		
36	EBIT / total assets	-	ROA: Low ROA indicates less competent management
37	EBIT / total equity	-	ROE: Low ROE indicates less competent management

38	Accumulated depreciation / depreciation expense	-	Average asset life: newer assets indicate that management takes a long term view of the business
39	%-change in dividends	+	An increase in dividends is a signal of confidence
40	Return on average investment	+	Indicator for the quality of management in project selection
41	3 year stock price performance	-	Comprehensive performance measure
42	Net income / cash flow	+	Measure for the quality of earnings
43	(EBIT – CFO) / ROA	-	Accruals-to-ROA ratio: proxies for the degree of earnings quality
44	5 year average tax rate	-	Measure for the degree of earnings management
45	Sustainable EPS growth / expected growth	-	Measure for the investment discipline of management
IV	**Operational risk factors**		
	Life cycle risk		
46	EPS in year 10 / current stock price	-	Measure for the time to payout; the higher the ratio, the lower the long term uncertainty of cash flows
47	Price / book value per share	+	P/B ratio: Fama and French (1992) show that high B/M firms earn higher ex post returns than low B/M firms stocks
48	Price / EPS	+	P/E ratio: % of payout today vs. later years
49	Dividend / EPS	-	Pay out ratio: higher ratios signal a stable position in the life cycle and therefore less risk
50	Total assets / market capitalization	-	Shows excess of market value over the value of all assets; higher in early life cycle stages
51	Sales / total assets	+	The higher the ratio, the earlier is the company in its life cycle and the higher the risk
	Product risk		
52	R&D expenditure / sales	-	R&D intensive firms earn excess returns in future periods (Lev et al., 1996)
53	Depreciation / total assets	+	A high depreciation rate indicates higher risk of obsolete technology or products
54	Capital expenditure / sales	+	Lev et al. (1993) report a positive association between returns and changes in capital expenditure
55	Capital expenditure / 5 year average capital expenditure	-	Callen et al. (1996) find that returns are increasing in the ratio of current capital expenditures to average capital expenditures for prior years
56	Capital expenditure / depreciation	-	A ratio above one indicates expansion and therefore higher risk
	Exposure risk		
57	Average extraordinary items / average net income before extraordinary items	+	Measure the influence of extraordinary items on net income; the higher the ratio, the higher the risk

58	GAAP earnings / pro-forma earnings as measured by I/B/E/S	-	Doyle et al. (2002) find that firms with large exclusions of pro forma earnings have lower future cash flows and lower stock returns
59	Number of basic shares / number of diluted shares	-	Measures the degree of earnings dilution
60	Average daily turnover	-	Jones et al. (1996) find turnover to be a strong indicator for litigation risk
61	S&P Quality rank	-	Measures the overall quality of the company
V	**Market risk factors**		
	Expectation risk		
62	Price / expected EPS	+	Forward P/E ratio: the higher this ratio, the higher are the expectations and thus the risk
63	Forward PEG ratio	+	Measure of expectations adjusted for growth; the higher the ratio, the higher the risk
64	Mechanical EPS forecast / consensus EPS forecast	+	Indicates the potential of future earnings disappointments
65	Earnings growth rate	+	Gebhardt et al. (2001) find that the market consistently assigns a higher risk premium to firms with higher forecasted earnings growth rates
66	Expected earnings growth / 5 year average earnings growth	+	La Porta (1996) finds a negative association between realized returns and expected earnings growth
67	Price / book value per share	+	P/B ratio: Gebhardt et al. (2001) establish a positive association between P/B ratios and the cost of equity capital
	Variability risk		
68	Price volatility	+	Traditional risk measure; higher volatility reflects higher uncertainty about future returns
69	Beta	+	The CAPM indicates that stocks with high betas are more risky
70	(52 week high – 52 week low) / price	+	Measure of short term price volatility
71	Standard deviation of annual returns (5 years)	+	Measure of long term price volatility
	Marketability risk		
72	Average daily volume	-	Lee et al. (2000) show that average dollar trading volume is negatively correlated with future returns
73	S&P liquidity index	-	A comprehensive measure of liquidity
74	Number of security owners	-	The larger the number of shareholders, the more liquid should be the stock
75	Market capitalization	-	Brennan et al. (1995) document that stocks of smaller firms are generally less liquid
	Market efficiency risk		
76	Number of analysts following the company	-	Brennan et al. (1993) report that stocks with greater analyst coverage react faster to market-wide information compared to those with less analyst coverage

77	Institutional ownership	-	The higher the degree of institutional ownership, the higher is generally the liquidity
VI	**Valuation risk factors**		
	All important input factors in the DCF model compared to the industry average		*The higher these factors compared to the average of the industry, the higher is the risk of lower future returns*
78	Earnings growth rate	+	
79	EPS year 1	+	
80	EPS year 2	+	
81	Share dilution	+	
82	Working capital in % of revenue	+	
83	Incremental fixed capital investment	+	
84	Growth duration	+	
	All important input factors in the DCF model compared to their historical range		*The higher these factors compared to the historical average, the higher is the uncertainty about the correct inputs*
85	Earnings growth rate	+	
86	EPS year 1	+	
87	EPS year 2	+	
88	Share dilution	+	
89	Working capital in % of revenue	+	
90	Incremental fixed capital investment	+	

Figure 2: Graphical Overview of the Fundamental Equity Valuation Model

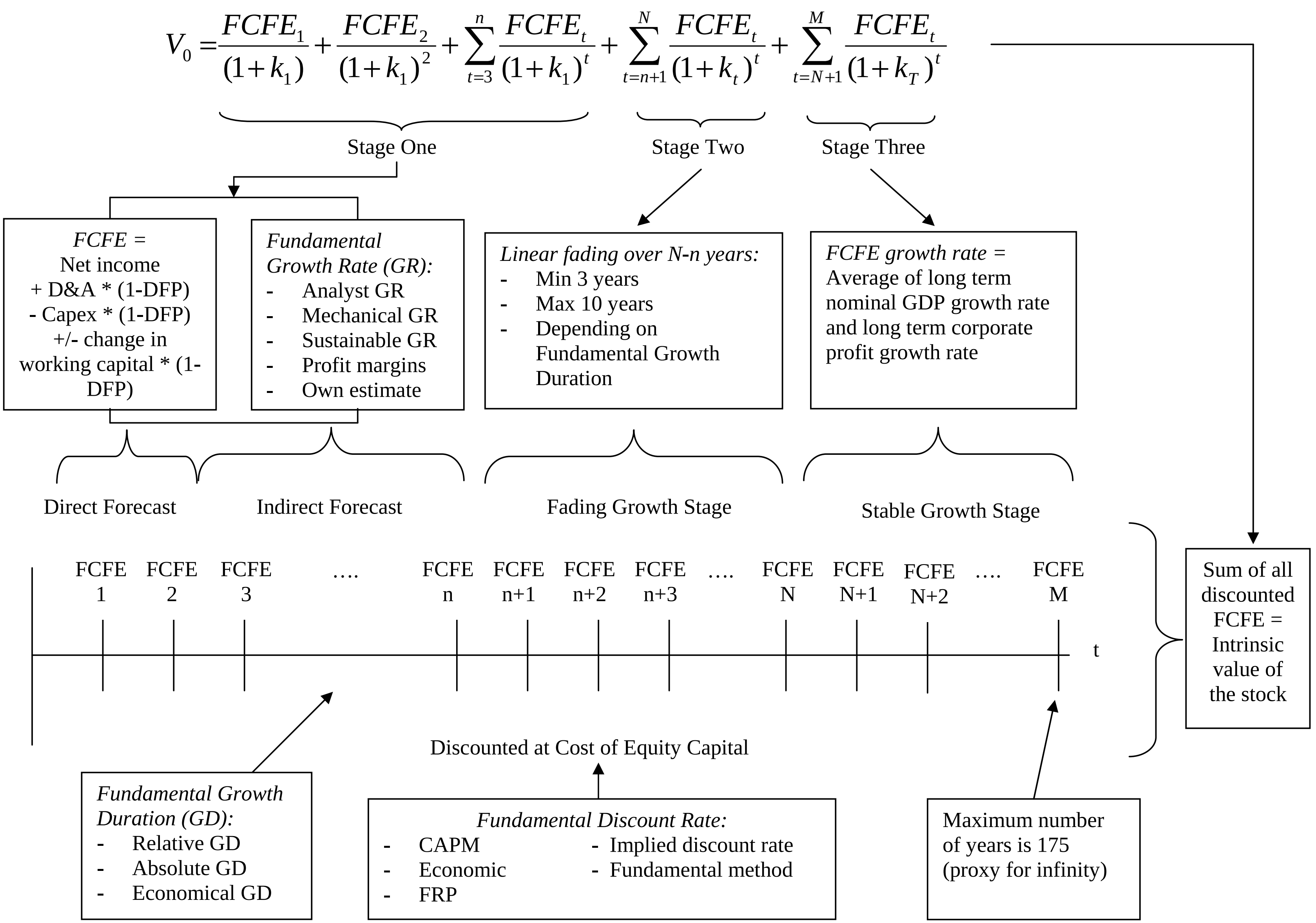


Table 3: Descriptive Statistics All Industries

		Degree of Mispricing	Avg. 1 year Return	Market Capitalization	Sales	Adjusted Beta	P/BV Ratio	Price / trailing EPS	Price	Return on avg. equity
All Years	MEAN	7.51%	19.40%	15,876	8,859	0.97	4.04	19.61	34.46	18.99
	MEDIAN	4.53%	15.65%	4,271	3,197	0.95	3.29	17.97	27.61	17.50
	CORR MISPRICING	1	28.69%	-11.46%	-6.28%	-1.50%	-8.75%	-31.51%	-10.23%	9.50%
2002	MEAN	26.63%	38.00%	13,494	9,979	1.01	2.40	17.99	42.99	21.22
	MEDIAN	21.93%	32.90%	3,709	3,573	0.95	2.11	15.99	30.34	14.09
	CORR MISPRICING	1	38.25%	-14.31%	-4.55%	7.58%	-14.10%	-41.70%	-11.58%	8.55%
2001	MEAN	1.64%	-2.76%	24,573	9,783	0.84	3.59	19.68	42.45	22.41
	MEDIAN	-1.88%	-4.58%	5,790	3,881	0.80	3.87	18.49	38.30	19.43
	CORR MISPRICING	1	32.12%	-7.17%	-7.40%	-6.52%	-16.36%	-4.41%	0.69%	9.93%
2000	MEAN	7.17%	14.35%	28,292	11,837	0.93	5.10	20.31	38.40	21.44
	MEDIAN	4.15%	13.63%	4,338	4,440	0.91	3.19	16.49	33.41	18.84
	CORR MISPRICING	1	47.09%	-28.19%	-11.95%	4.63%	-36.40%	-53.79%	-29.70%	2.24%
1999	MEAN	-1.34%	1.34%	23,441	10,310	0.96	5.97	22.50	47.01	20.22
	MEDIAN	-4.92%	-8.47%	5,996	3,787	0.94	4.03	19.92	38.24	19.06
	CORR MISPRICING	1	4.36%	-19.03%	-9.88%	-0.38%	-27.17%	-44.78%	-5.75%	6.52%
1998	MEAN	0.22%	17.81%	20,666	11,221	0.92	4.86	22.95	43.56	15.97
	MEDIAN	0.60%	15.34%	6,177	3,534	0.90	3.81	21.60	34.94	17.42
	CORR MISPRICING	1	7.40%	-18.84%	-5.34%	-8.92%	3.39%	-26.70%	-4.63%	-12.86%
1997	MEAN	4.60%	23.13%	15,415	9,811	0.89	4.35	20.76	36.63	19.22
	MEDIAN	2.68%	19.59%	5,029	3,134	0.88	3.46	19.52	30.39	17.89
	CORR MISPRICING	1	31.01%	-10.63%	-4.47%	-17.01%	-9.17%	-41.66%	-3.16%	7.99%
1996	MEAN	7.47%	32.69%	11,024	6,482	0.99	4.19	19.32	28.47	19.52
	MEDIAN	4.83%	27.77%	3,620	2,561	0.98	3.40	18.58	22.94	18.37
	CORR MISPRICING	1	37.92%	-9.25%	-3.60%	3.22%	-10.70%	-41.39%	-14.35%	19.60%
1995	MEAN	13.78%	28.39%	7,744	5,174	1.05	3.45	17.27	23.76	18.53
	MEDIAN	9.80%	26.31%	2,856	2,649	1.06	2.98	16.24	18.19	17.70
	CORR MISPRICING	1	19.54%	-9.79%	-18.92%	-3.93%	4.76%	-21.10%	-6.71%	7.05%
1994	MEAN	7.15%	33.63%	7,117	6,848	1.05	3.18	16.29	20.12	16.22
	MEDIAN	3.37%	30.11%	2,513	2,064	1.05	2.88	15.96	14.88	16.88
	CORR MISPRICING	1	36.60%	-2.09%	-0.94%	-6.20%	19.03%	-23.94%	-12.65%	33.09%
1993	MEAN	7.73%	7.40%	6,988	7,141	1.01	3.32	18.99	21.20	15.11
	MEDIAN	4.74%	3.92%	2,681	2,347	1.02	3.14	16.87	14.50	15.30
	CORR MISPRICING	1	32.56%	4.66%	4.28%	12.56%	-0.81%	-15.65%	-14.47%	12.93%

Table 4: Descriptive Statistics Industrial Goods and Services Industry

		Degree of Mispricing	Avg. 1 year Return	*Market Capitalization*	*Sales*	*Adjusted Beta*	*P/BV Ratio*	*Price / trailing EPS*	*Price*	*Return on avg. equity*
	MEAN	5.95%	15.00%	*16,543*	*9,622*	*0.92*	*2.91*	*16.75*	*37.38*	*19.24*
All Years	*MEDIAN*	4.97%	13.65%	*5,462*	*4,952*	*0.92*	*3.10*	*16.30*	*32.54*	*17.54*
	CORR MISPRICING	1	*32.08%*	*-16.02%*	*-12.52%*	*-8.70%*	*-1.14%*	*-45.36%*	*-11.20%*	*16.35%*
	MEAN	27.25%	27.28%	*18,146*	*14,082*	*0.84*	*1.55*	*11.52*	*39.07*	*12.17*
2002	*MEDIAN*	30.75%	23.48%	*5,590*	*7,195*	*0.83*	*2.30*	*14.74*	*32.27*	*11.94*
	CORR MISPRICING	1	33.48%	*-6.19%*	*13.51%*	*26.57%*	*1.18%*	*-11.21%*	*-11.46%*	*19.29%*
	MEAN	3.46%	7.42%	*27,547*	*13,104*	*0.80*	*-1.69*	*17.40*	*46.54*	*21.57*
2001	*MEDIAN*	4.81%	6.28%	*7,733*	*7,243*	*0.77*	*3.11*	*16.86*	*39.59*	*19.03*
	CORR MISPRICING	1	32.87%	*-20.72%*	*-27.38%*	*-4.08%*	*-33.75%*	*-49.49%*	*-6.28%*	*-12.65%*
	MEAN	15.37%	20.00%	*27,891*	*13,267*	*0.95*	*3.67*	*14.50*	*37.81*	*22.05*
2000	*MEDIAN*	13.93%	24.07%	*6,760*	*6,987*	*0.94*	*2.71*	*12.73*	*34.69*	*18.48*
	CORR MISPRICING	1	36.57%	*-28.87%*	*-34.63%*	*-20.19%*	*-30.26%*	*-59.63%*	*-19.29%*	*6.78%*
	MEAN	-5.48%	-17.69%	*22,803*	*9,826*	*0.97*	*4.97*	*19.69*	*47.74*	*21.76*
1999	*MEDIAN*	-6.03%	-24.53%	*7,468*	*4,345*	*0.93*	*3.83*	*18.39*	*43.44*	*19.67*
	CORR MISPRICING	1	21.78%	*-28.24%*	*-24.62%*	*-23.80%*	*-16.51%*	*-44.03%*	*-6.51%*	*-1.49%*
	MEAN	-1.90%	10.34%	*18,643*	*8,728*	*0.92*	*3.48*	*19.82*	*45.95*	*19.62*
1998	*MEDIAN*	-1.73%	9.42%	*6,024*	*4,119*	*0.91*	*3.23*	*17.91*	*43.28*	*18.42*
	CORR MISPRICING	1	18.12%	*-22.76%*	*-14.82%*	*-3.88%*	*9.76%*	*-62.42%*	*20.36%*	*-1.01%*
	MEAN	1.50%	15.94%	*17,631*	*9,504*	*0.88*	*4.08*	*18.76*	*45.22*	*20.54*
1997	*MEDIAN*	-0.57%	12.76%	*6,736*	*5,140*	*0.89*	*3.52*	*18.22*	*37.34*	*18.49*
	CORR MISPRICING	1	10.73%	*-40.84%*	*-37.09%*	*-33.60%*	*0.59%*	*-37.19%*	*-13.18%*	*18.18%*
	MEAN	8.71%	39.53%	*12,563*	*9,248*	*0.94*	*3.43*	*16.45*	*33.89*	*19.99*
1996	*MEDIAN*	2.02%	39.53%	*4,520*	*4,839*	*0.98*	*3.17*	*15.77*	*28.96*	*18.89*
	CORR MISPRICING	1	71.36%	*-18.85%*	*-15.78%*	*6.66%*	*7.10%*	*-44.85%*	*-32.85%*	*38.16%*
	MEAN	10.48%	29.92%	*4,562*	*4,732*	*1.00*	*3.06*	*16.48*	*25.89*	*19.17*
1995	*MEDIAN*	9.03%	28.26%	*2,571*	*3,023*	*1.01*	*2.98*	*15.86*	*25.25*	*18.08*
	CORR MISPRICING	1	18.24%	*-27.41%*	*-23.41%*	*4.88%*	*17.54%*	*-65.36%*	*6.05%*	*23.10%*
	MEAN	4.71%	17.28%	*7,717*	*6,794*	*0.98*	*3.24*	*15.58*	*23.11*	*18.76*
1994	*MEDIAN*	2.35%	17.06%	*3,668*	*2,959*	*1.01*	*2.90*	*15.64*	*18.47*	*17.39*
	CORR MISPRICING	1	58.54%	*12.82%*	*21.37%*	*-25.22%*	*-1.78%*	*-53.20%*	*1.30%*	*32.20%*
	MEAN	-4.59%	1.72%	*7,931*	*6,938*	*0.95*	*3.32*	*17.26*	*28.55*	*16.76*
1993	*MEDIAN*	-4.88%	0.18%	*3,551*	*3,669*	*0.95*	*3.21*	*16.86*	*22.09*	*15.05*
	CORR MISPRICING	1	19.12%	*20.84%*	*17.62%*	*-14.39%*	*34.71%*	*-29.47%*	*-50.16%*	*40.96%*

Table 5: Descriptive Statistics Healthcare Industry

		Degree of Mispricing	Avg. 1 year Return	*Market Capitalization*	*Sales*	*Adjusted Beta*	*P/BV Ratio*	*Price / trailing EPS*	*Price*	*Return on avg. equity*
	MEAN	10.77%	23.38%	*20,754*	*5,003*	*1.01*	*5.41*	*21.51*	*29.58*	*20.31*
All Years	*MEDIAN*	8.06%	19.95%	*3,296*	*1,571*	*1.00*	*4.11*	*20.00*	*27.01*	*17.94*
	CORR MISPRICING	1	*36.90%*	*-10.07%*	*-11.04%*	*-15.01%*	*-7.24%*	*-47.48%*	*-22.73%*	*-5.36%*
	MEAN	32.18%	47.82%	*10,575*	*4,925*	*1.28*	*1.69*	*17.38*	*32.67*	*15.85*
2002	*MEDIAN*	30.92%	41.77%	*2,701*	*1,746*	*1.15*	*1.36*	*17.64*	*31.77*	*18.16*
	CORR MISPRICING	1	56.14%	*-13.42%*	*-30.62%*	*-33.74%*	*-9.31%*	*-53.74%*	*-61.64%*	*-58.93%*
	MEAN	-3.49%	-2.65%	*32,153*	*7,134*	*0.75*	*6.53*	*26.43*	*43.76*	*24.99*
2001	*MEDIAN*	-7.18%	-4.09%	*5,383*	*1,919*	*0.73*	*5.20*	*22.93*	*40.80*	*19.49*
	CORR MISPRICING	1	47.51%	*6.80%*	*13.40%*	*-33.54%*	*-14.40%*	*-55.81%*	*-29.73%*	*-0.56%*
	MEAN	-5.30%	12.76%	*45,684*	*7,124*	*0.84*	*9.84*	*28.02*	*46.94*	*27.78*
2000	*MEDIAN*	-5.55%	12.73%	*6,315*	*2,072*	*0.84*	*7.96*	*25.54*	*46.28*	*26.57*
	CORR MISPRICING	1	49.46%	*-23.77%*	*-20.00%*	*5.43%*	*-40.22%*	*-54.17%*	*-47.02%*	*-20.03%*
	MEAN	3.37%	15.69%	*35,639*	*6,918*	*0.96*	*7.55*	*25.97*	*40.67*	*16.94*
1999	*MEDIAN*	-2.64%	11.94%	*6,605*	*2,541*	*0.95*	*5.64*	*25.91*	*35.95*	*12.87*
	CORR MISPRICING	1	9.30%	*-29.11%*	*-8.88%*	*4.94%*	*-35.37%*	*-60.93%*	*-47.90%*	*-3.47%*
	MEAN	2.06%	20.80%	*29,029*	*5,705*	*1.03*	*7.18*	*26.03*	*33.34*	*11.94*
1998	*MEDIAN*	-1.50%	13.47%	*3,446*	*1,679*	*1.01*	*4.22*	*24.05*	*27.78*	*12.01*
	CORR MISPRICING	1	23.62%	*-22.70%*	*-37.94%*	*-22.08%*	*3.10%*	*-12.73%*	*-35.50%*	*-38.24%*
	MEAN	2.54%	24.99%	*16,445*	*4,324*	*0.94*	*5.41*	*22.81*	*29.41*	*19.93*
1997	*MEDIAN*	3.31%	20.02%	*2,077*	*1,192*	*0.93*	*3.49*	*19.58*	*24.03*	*18.11*
	CORR MISPRICING	1	22.98%	*-13.60%*	*-12.11%*	*-27.52%*	*-15.51%*	*-67.98%*	*-27.39%*	*11.40%*
	MEAN	6.66%	21.02%	*12,631*	*3,446*	*1.08*	*4.63*	*20.87*	*22.79*	*21.26*
1996	*MEDIAN*	11.22%	21.02%	*1,927*	*1,103*	*1.15*	*3.42*	*19.65*	*21.19*	*17.45*
	CORR MISPRICING	1	24.31%	*11.32%*	*11.94%*	*-27.06%*	*15.83%*	*-49.04%*	*35.03%*	*26.01%*
	MEAN	26.20%	34.91%	*11,560*	*4,570*	*1.09*	*3.94*	*16.58*	*19.02*	*21.07*
1995	*MEDIAN*	14.40%	34.47%	*2,414*	*1,648*	*1.08*	*3.38*	*15.66*	*16.33*	*17.65*
	CORR MISPRICING	1	20.46%	*-12.86%*	*-18.21%*	*-13.78%*	*-11.34%*	*-2.96%*	*-11.57%*	*-5.60%*
	MEAN	18.75%	46.36%	*6,672*	*2,801*	*1.13*	*3.37*	*14.83*	*13.42*	*21.49*
1994	*MEDIAN*	18.27%	42.98%	*1,007*	*859*	*1.13*	*3.12*	*13.94*	*13.63*	*17.76*
	CORR MISPRICING	1	59.38%	*-7.77%*	*-15.00%*	*-26.32%*	*21.22%*	*-5.95%*	*7.72%*	*31.40%*
	MEAN	24.70%	9.95%	*7,155*	*3,087*	*1.03*	*4.00*	*16.14*	*13.77*	*21.87*
1993	*MEDIAN*	19.35%	5.23%	*1,086*	*950*	*1.03*	*3.34*	*15.14*	*12.34*	*19.35*
	CORR MISPRICING	1	55.83%	*4.38%*	*6.97%*	*23.55%*	*13.57%*	*-21.17%*	*-9.27%*	*4.41%*

Table 6: Descriptive Statistics Consumer Discretionary Industry

		Degree of Mispricing	Avg. 1 year Return	Market Capitalization	Sales	Adjusted Beta	P/BV Ratio	Price / trailing EPS	Price	Return on avg. equity
	MEAN	5.00%	16.22%	7,313	10,047	0.94	3.68	17.36	44.33	20.60
All Years	MEDIAN	2.13%	12.40%	3,855	3,176	0.94	2.91	16.99	29.13	17.61
	CORR MISPRICING	1	30.11%	-17.43%	-3.55%	3.80%	-21.22%	-51.17%	-0.36%	17.51%
	MEAN	20.81%	34.81%	5,803	5,787	0.87	4.05	16.74	69.04	44.64
2002	MEDIAN	7.79%	26.81%	3,591	3,545	0.88	2.75	15.59	31.33	15.47
	CORR MISPRICING	1	49.04%	-13.58%	26.96%	39.15%	-32.18%	-59.13%	-9.85%	22.16%
	MEAN	6.25%	19.57%	7,203	6,525	0.84	4.75	17.41	41.90	22.89
2001	MEDIAN	2.72%	13.05%	4,334	4,279	0.83	2.86	16.47	35.15	19.48
	CORR MISPRICING	1	60.08%	-5.91%	-9.82%	29.31%	16.52%	-54.30%	26.23%	40.23%
	MEAN	19.87%	27.76%	7,303	11,612	0.94	3.14	13.77	33.77	19.38
2000	MEDIAN	13.88%	17.35%	3,241	4,324	0.94	1.99	10.48	26.63	17.99
	CORR MISPRICING	1	48.87%	-30.19%	-3.14%	1.66%	-33.74%	-56.31%	-24.46%	14.75%
	MEAN	-3.73%	-18.19%	11,369	14,520	0.90	4.79	18.87	59.07	21.78
1999	MEDIAN	-7.31%	-19.73%	5,572	3,720	0.93	3.12	17.73	43.31	19.00
	CORR MISPRICING	1	7.44%	-23.07%	-6.93%	5.68%	-30.33%	-48.71%	4.83%	24.01%
	MEAN	-0.72%	2.45%	11,876	17,026	0.86	3.87	19.97	61.33	14.26
1998	MEDIAN	-0.16%	-1.50%	5,798	3,384	0.88	3.24	20.12	37.34	18.35
	CORR MISPRICING	1	-11.75%	-31.77%	-0.12%	9.35%	-27.59%	-37.43%	-3.90%	26.33%
	MEAN	4.01%	28.24%	7,677	13,569	0.88	3.41	18.60	45.74	18.58
1997	MEDIAN	1.91%	18.77%	4,189	2,937	0.90	3.12	19.36	32.38	18.32
	CORR MISPRICING	1	50.37%	-5.34%	2.47%	-17.72%	-16.11%	-45.71%	8.24%	1.13%
	MEAN	-1.38%	26.65%	5,892	4,400	0.95	3.69	18.50	38.78	17.44
1996	MEDIAN	-1.40%	26.65%	3,519	2,391	0.92	3.40	19.09	24.94	17.60
	CORR MISPRICING	1	49.15%	-54.19%	-41.10%	-18.00%	-29.16%	-38.32%	-12.57%	3.84%
	MEAN	7.12%	24.43%	5,156	5,248	1.06	2.93	15.97	33.20	17.90
1995	MEDIAN	8.33%	24.88%	2,909	2,580	1.06	2.75	16.52	20.28	18.34
	CORR MISPRICING	1	18.56%	-31.80%	-26.22%	-0.01%	-7.20%	-29.46%	2.80%	22.29%
	MEAN	-3.17%	14.72%	5,259	9,270	1.06	3.09	16.09	30.90	16.98
1994	MEDIAN	-2.55%	14.76%	2,708	2,273	1.05	2.81	16.90	23.13	17.04
	CORR MISPRICING	1	22.34%	5.87%	7.54%	-2.43%	-13.75%	-37.55%	-3.30%	14.79%
	MEAN	0.90%	4.51%	5,596	12,512	1.01	3.08	17.72	29.51	12.18
1993	MEDIAN	-1.95%	2.97%	2,684	2,330	1.02	3.10	17.64	16.78	14.54
	CORR MISPRICING	1	6.99%	15.73%	14.84%	-8.97%	-38.71%	-64.87%	8.41%	5.58%

Table 7: Descriptive Statistics ITT Industry

		Degree of Mispricing	Avg. 1 year Return	*Market Capitalization*	*Sales*	*Adjusted Beta*	*P/BV Ratio*	*Price / trailing EPS*	*Price*	*Return on avg. equity*
	MEAN	8.29%	22.83%	*21,062*	*10,628*	*1.02*	*4.42*	*22.96*	*23.37*	*15.47*
All Years	*MEDIAN*	2.98%	16.43%	*5,478*	*2,901*	*0.98*	*3.75*	*21.27*	*19.84*	*16.57*
	CORR MISPRICING	1	*10.79%*	*-14.57%*	*-6.05%*	*3.57%*	*-9.38%*	*-30.19%*	*-16.05%*	*12.02%*
	MEAN	26.58%	40.55%	*20,624*	*15,876*	*1.15*	*2.00*	*20.83*	*21.65*	*6.89*
2002	*MEDIAN*	19.48%	37.81%	*4,348*	*2,153*	*1.12*	*1.91*	*19.66*	*16.18*	*8.82*
	CORR MISPRICING	1	7.30%	*-39.82%*	*-24.83%*	*10.20%*	*-37.51%*	*-43.94%*	*-13.54%*	*13.92%*
	MEAN	0.33%	-35.37%	*32,466*	*14,119*	*1.07*	*4.85*	*15.73*	*34.76*	*18.51*
2001	*MEDIAN*	-7.86%	-33.58%	*7,955*	*1,846*	*1.02*	*4.34*	*23.13*	*29.00*	*18.17*
	CORR MISPRICING	1	-11.59%	*5.12%*	*1.87%*	*-10.16%*	*7.26%*	*22.71%*	*10.20%*	*20.21%*
	MEAN	-1.26%	-3.13%	*40,436*	*14,906*	*0.99*	*4.97*	*28.84*	*37.18*	*17.40*
2000	*MEDIAN*	-5.65%	0.38%	*7,380*	*6,302*	*0.97*	*4.17*	*23.71*	*29.06*	*18.58*
	CORR MISPRICING	1	44.59%	*-25.23%*	*-7.77%*	*28.38%*	*-21.89%*	*-43.23%*	*-23.48%*	*12.31%*
	MEAN	0.47%	25.55%	*29,675*	*8,020*	*1.05*	*7.66*	*29.46*	*31.13*	*19.56*
1999	*MEDIAN*	-3.69%	-1.56%	*3,921*	*1,959*	*1.02*	*5.84*	*25.92*	*22.69*	*22.43*
	CORR MISPRICING	1	-24.23%	*-23.36%*	*-19.31%*	*-6.83%*	*-41.30%*	*-54.52%*	*-12.21%*	*12.54%*
	MEAN	1.38%	37.34%	*23,888*	*14,326*	*0.89*	*4.96*	*26.77*	*30.22*	*19.06*
1998	*MEDIAN*	4.88%	39.96%	*8,570*	*3,554*	*0.86*	*4.71*	*26.71*	*30.58*	*17.42*
	CORR MISPRICING	1	-20.82%	*-8.39%*	*5.81%*	*-11.14%*	*9.86%*	*-31.95%*	*10.03%*	*9.62%*
	MEAN	9.97%	23.55%	*22,830*	*11,330*	*0.87*	*4.59*	*23.79*	*22.18*	*17.01*
1997	*MEDIAN*	5.87%	26.81%	*7,918*	*3,438*	*0.78*	*3.96*	*21.82*	*20.87*	*14.69*
	CORR MISPRICING	1	23.94%	*6.71%*	*-10.66%*	*-0.26%*	*-2.33%*	*-28.28%*	*-10.15%*	*9.25%*
	MEAN	15.91%	23.87%	*13,350*	*8,596*	*1.00*	*5.03*	*21.49*	*18.00*	*19.65*
1996	*MEDIAN*	7.48%	23.87%	*5,000*	*2,096*	*0.96*	*3.54*	*17.16*	*15.98*	*19.94*
	CORR MISPRICING	1	28.78%	*-20.20%*	*0.28%*	*21.86%*	*-27.73%*	*-50.39%*	*-30.79%*	*13.67%*
	MEAN	11.32%	24.27%	*10,908*	*6,321*	*1.06*	*4.02*	*19.97*	*15.31*	*16.76*
1995	*MEDIAN*	7.43%	17.64%	*3,991*	*3,805*	*1.07*	*3.17*	*17.56*	*12.62*	*17.18*
	CORR MISPRICING	1	18.82%	*-13.32%*	*-15.61%*	*-9.85%*	*10.20%*	*-18.87%*	*-32.48%*	*-13.27%*
	MEAN	8.30%	56.17%	*9,069*	*7,533*	*1.02*	*3.09*	*18.28*	*11.34*	*9.06*
1994	*MEDIAN*	-4.59%	45.65%	*3,636*	*1,995*	*1.01*	*2.94*	*18.59*	*9.34*	*14.26*
	CORR MISPRICING	1	20.54%	*-14.92%*	*-3.61%*	*-3.98%*	*44.76%*	*-20.43%*	*-34.98%*	*41.63%*
	MEAN	9.91%	13.41%	*7,378*	*5,250*	*1.07*	*3.00*	*24.43*	*11.89*	*10.75*
1993	*MEDIAN*	6.42%	7.31%	*2,063*	*1,857*	*1.04*	*2.93*	*18.43*	*12.09*	*14.19*
	CORR MISPRICING	1	20.58%	*-12.25%*	*13.35%*	*17.47%*	*-35.17%*	*-11.44%*	*-23.09%*	*0.30%*

Table 8: Distribution over Time of Degree of Mispricing and 1 year Stock Returns; All Industries; 'Best estimate'

				Percentiles					Standard
		n	Mean	1%	25%	50%	75%	99%	Deviation
All Years	*Avg. Mispricing*	*1,054*	*7.51%*	*-38.31%*	*-9.27%*	*4.54%*	*19.79%*	*75.95%*	*27.79%*
	Avg. 1 year returns	*1,054*	*19.39%*	*-32.42%*	*-1.24%*	*15.63%*	*34.64%*	*99.54%*	*32.74%*
2002	*Mispricing*	*101*	*26.70%*	*-31.02%*	*1.17%*	*22.23%*	*40.95%*	*143.76%*	*41.12%*
	1 year returns	*101*	*37.82%*	*-12.09%*	*14.50%*	*32.68%*	*57.94%*	*118.73%*	*34.45%*
2001	*Mispricing*	*109*	*1.64%*	*-45.79%*	*-13.04%*	*-1.88%*	*13.93%*	*56.95%*	*24.87%*
	1 year returns	*109*	*-2.76%*	*-50.17%*	*-21.24%*	*-4.58%*	*14.04%*	*57.61%*	*27.34%*
2000	*Mispricing*	*104*	*7.17%*	*-46.35%*	*-11.32%*	*4.15%*	*20.68%*	*82.06%*	*30.09%*
	1 year returns	*104*	*14.35%*	*-47.19%*	*-10.20%*	*13.63%*	*30.02%*	*99.78%*	*35.94%*
1999	*Mispricing*	*104*	*-1.34%*	*-37.18%*	*-21.83%*	*-4.92%*	*8.45%*	*78.46%*	*30.05%*
	1 year returns	*104*	*1.34%*	*-54.53%*	*-23.10%*	*-8.47%*	*15.10%*	*116.78%*	*42.72%*
1998	*Mispricing*	*104*	*0.20%*	*-39.75%*	*-13.57%*	*0.37%*	*10.76%*	*48.19%*	*22.38%*
	1 year returns	*104*	*17.94%*	*-46.50%*	*-6.12%*	*15.36%*	*36.30%*	*103.50%*	*37.89%*
1997	*Mispricing*	*110*	*4.60%*	*-42.07%*	*-9.44%*	*2.68%*	*17.72%*	*56.19%*	*24.89%*
	1 year returns	*110*	*23.13%*	*-36.10%*	*3.64%*	*19.59%*	*39.36%*	*111.20%*	*34.56%*
1996	*Mispricing*	*106*	*7.47%*	*-37.86%*	*-6.29%*	*4.83%*	*20.08%*	*72.05%*	*25.50%*
	1 year returns	*106*	*32.69%*	*-14.24%*	*11.67%*	*27.77%*	*53.02%*	*101.15%*	*30.88%*
1995	*Mispricing*	*104*	*13.78%*	*-30.92%*	*-0.67%*	*9.80%*	*25.37%*	*71.17%*	*24.76%*
	1 year returns	*104*	*28.39%*	*-25.15%*	*10.96%*	*26.31%*	*41.22%*	*113.30%*	*31.58%*
1994	*Mispricing*	*104*	*7.15%*	*-34.79%*	*-8.85%*	*3.37%*	*19.84%*	*80.35%*	*27.43%*
	1 year returns	*104*	*33.63%*	*-15.60%*	*10.81%*	*30.11%*	*44.14%*	*121.64%*	*34.02%*
1993	*Mispricing*	*108*	*7.73%*	*-37.42%*	*-8.89%*	*4.74%*	*20.10%*	*70.31%*	*26.79%*
	1 year returns	*108*	*7.40%*	*-22.64%*	*-3.34%*	*3.92%*	*15.27%*	*51.70%*	*18.03%*

Table 9: Distribution across Industries of Degree of Mispricing and 1 year Stock Returns; 'Best estimate'

		n	Mean	Percentiles 1%	25%	50%	75%	99%	Standard Deviation
All Industries	*Avg. Mispricing*	*1,054*	*7.51%*	*-38.31%*	*-9.27%*	*4.54%*	*19.79%*	*75.95%*	*27.79%*
	Avg. 1 year returns	*1,054*	*19.39%*	*-32.42%*	*-1.24%*	*15.63%*	*34.64%*	*99.54%*	*32.74%*
Industrial	*Mispricing*	*264*	*5.95%*	*-35.43%*	*-7.46%*	*4.97%*	*18.19%*	*51.12%*	*20.89%*
	1 year returns	*264*	*15.16%*	*-27.08%*	*0.74%*	*13.75%*	*26.16%*	*70.84%*	*23.40%*
Healthcare	*Mispricing*	*256*	*10.81%*	*-33.06%*	*-8.69%*	*8.08%*	*22.53%*	*86.56%*	*30.39%*
	1 year returns	*256*	*23.36%*	*-32.99%*	*0.88%*	*19.95%*	*40.98%*	*114.29%*	*36.04%*
ITT	*Mispricing*	*233*	*8.29%*	*-41.28%*	*-11.58%*	*2.98%*	*20.31%*	*90.01%*	*32.77%*
	1 year returns	*233*	*22.83%*	*-43.36%*	*-6.21%*	*16.43%*	*41.81%*	*131.36%*	*45.53%*
Consumer	*Mispricing*	*301*	*5.00%*	*-43.48%*	*-9.36%*	*2.13%*	*18.13%*	*76.11%*	*27.09%*
	1 year returns	*301*	*16.22%*	*-26.25%*	*-0.38%*	*12.40%*	*29.61%*	*81.66%*	*26.00%*

Table 10: Results Portfolio Strategy; All Industries; 'Best estimate'

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	31.20%	20.46%	9.31%	21.89%	*21.84%*	*9.37%*	9.37%	-1.38%	-12.52%	21.89%
	1 YEAR	27.57%	18.02%	6.26%	21.31%	*19.47%*	*11.51%*	8.11%	-1.44%	-13.20%	21.31%
	3 YEARS	19.05%	14.52%	5.04%	14.01%	*13.91%*	*11.58%*	5.14%	0.62%	-8.87%	14.01%
2002	*6 MONTHS*	26.25%	10.55%	18.82%	7.43%	*19.22%*	*7.16%*	7.02%	-8.67%	-0.41%	7.43%
	1 YEAR	49.99%	19.26%	25.64%	24.34%	*37.94%*	*18.62%*	12.05%	-18.67%	-12.29%	24.34%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	17.12%	11.68%	-10.73%	27.85%	*6.64%*	*-12.08%*	10.48%	5.04%	-17.37%	27.85%
	1 YEAR	7.73%	1.41%	-17.32%	25.04%	*-2.33%*	*-19.16%*	10.06%	3.74%	-14.99%	25.04%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	49.68%	29.67%	30.99%	18.70%	*32.66%*	*-17.62%*	17.02%	-2.99%	-1.67%	18.70%
	1 YEAR	31.11%	12.90%	-5.77%	36.88%	*14.42%*	*-15.82%*	16.69%	-1.52%	-20.19%	36.88%
	3 YEARS	11.24%	-0.70%	-8.79%	20.02%	*1.69%*	*-12.26%*	9.55%	-2.39%	-10.47%	20.02%
1999	*6 MONTHS*	13.78%	-12.83%	25.82%	-12.04%	*5.35%*	*14.56%*	8.43%	-18.17%	20.47%	-12.04%
	1 YEAR	5.77%	-6.29%	7.99%	-2.21%	*0.03%*	*5.97%*	5.75%	-6.31%	7.96%	-2.21%
	3 YEARS	14.05%	-4.72%	-8.15%	22.20%	*-1.72%*	*-10.33%*	15.77%	-3.01%	-6.43%	22.20%
1998	*6 MONTHS*	16.86%	36.27%	-0.45%	17.31%	*21.12%*	*17.53%*	-4.26%	15.15%	-21.57%	17.31%
	1 YEAR	22.73%	19.78%	9.82%	12.91%	*18.53%*	*21.07%*	4.20%	1.25%	-8.71%	12.91%
	3 YEARS	12.93%	2.15%	1.78%	11.15%	*4.82%*	*2.60%*	8.11%	-2.67%	-3.04%	11.15%
1997	*6 MONTHS*	32.92%	30.40%	-0.11%	33.04%	*22.57%*	*20.20%*	10.35%	7.83%	-22.68%	33.04%
	1 YEAR	28.00%	30.54%	9.72%	18.27%	*23.39%*	*28.10%*	4.61%	7.15%	-13.66%	18.27%
	3 YEARS	10.65%	19.32%	5.36%	5.29%	*11.73%*	*18.01%*	-1.08%	7.60%	-6.37%	5.29%
1996	*6 MONTHS*	32.69%	19.80%	-4.42%	37.12%	*22.68%*	*22.00%*	10.01%	-2.88%	-27.10%	37.12%
	1 YEAR	38.68%	34.04%	6.29%	32.39%	*32.80%*	*31.99%*	5.88%	1.24%	-26.51%	32.39%
	3 YEARS	22.61%	22.60%	4.01%	18.61%	*21.15%*	*26.97%*	1.46%	1.45%	-17.15%	18.61%
1995	*6 MONTHS*	37.32%	35.16%	12.04%	25.28%	*32.72%*	*27.84%*	4.60%	2.45%	-20.68%	25.28%
	1 YEAR	31.87%	31.21%	8.41%	23.45%	*28.55%*	*23.11%*	3.31%	2.66%	-20.14%	23.45%
	3 YEARS	27.45%	31.65%	4.58%	22.86%	*26.40%*	*27.68%*	1.04%	5.24%	-21.82%	22.86%
1994	*6 MONTHS*	56.31%	22.49%	7.75%	48.56%	*32.30%*	*6.87%*	24.01%	-9.82%	-24.55%	48.56%
	1 YEAR	47.03%	30.09%	15.76%	31.27%	*33.77%*	*22.62%*	13.26%	-3.68%	-18.01%	31.27%
	3 YEARS	31.34%	26.54%	28.07%	3.27%	*28.45%*	*25.83%*	2.89%	-1.91%	-0.38%	3.27%
1993	*6 MONTHS*	29.11%	21.38%	13.44%	15.67%	*23.11%*	*7.19%*	6.00%	-1.73%	-9.67%	15.67%
	1 YEAR	12.83%	7.27%	2.07%	10.77%	*7.55%*	*-1.39%*	5.28%	-0.28%	-5.48%	10.77%
	3 YEARS	22.12%	19.35%	13.44%	8.67%	*18.74%*	*14.18%*	3.38%	0.62%	-5.29%	8.67%

Table 11: Results Portfolio Strategy; Industrial Industry; 'Best estimate'

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	16.64%	15.31%	-5.17%	21.81%	*12.17%*	*9.37%*	4.48%	3.14%	-17.33%	21.81%
	1 YEAR	23.91%	13.66%	-1.74%	25.65%	*15.19%*	*11.51%*	8.72%	-1.52%	-16.93%	25.65%
	3 YEARS	15.77%	11.69%	6.61%	9.16%	*12.37%*	*11.58%*	3.40%	-0.68%	-5.76%	9.16%
2002	*6 MONTHS*	10.72%	5.02%	-25.28%	36.00%	*8.22%*	*7.16%*	2.51%	-3.20%	-33.49%	36.00%
	1 YEAR	34.26%	17.91%	-19.55%	53.81%	*28.84%*	*18.62%*	5.43%	-10.93%	-48.39%	53.81%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	6.58%	8.34%	-10.31%	16.89%	*3.17%*	*-12.08%*	3.41%	5.17%	-13.48%	16.89%
	1 YEAR	14.21%	9.08%	-5.87%	20.07%	*7.42%*	*-19.16%*	6.79%	1.66%	-13.28%	20.07%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	40.42%	53.19%	31.45%	8.97%	*41.55%*	*-17.62%*	-1.14%	11.63%	-10.10%	8.97%
	1 YEAR	23.48%	23.75%	3.66%	19.82%	*20.00%*	*-15.82%*	3.48%	3.75%	-16.34%	19.82%
	3 YEARS	9.90%	8.23%	-2.25%	12.14%	*7.37%*	*-12.26%*	2.53%	0.86%	-9.62%	12.14%
1999	*6 MONTHS*	-19.24%	-31.11%	-9.38%	-9.86%	*-21.23%*	*14.56%*	1.99%	-9.88%	11.85%	-9.86%
	1 YEAR	11.15%	-25.66%	-18.04%	29.19%	*-17.69%*	*5.97%*	28.84%	-7.97%	-0.34%	29.19%
	3 YEARS	8.63%	0.63%	-0.16%	8.79%	*1.43%*	*-10.33%*	7.20%	-0.80%	-1.59%	8.79%
1998	*6 MONTHS*	-3.94%	25.46%	-15.88%	11.94%	*3.77%*	*17.53%*	-7.71%	21.69%	-19.65%	11.94%
	1 YEAR	15.17%	12.24%	4.72%	10.45%	*10.66%*	*21.07%*	4.51%	1.58%	-5.94%	10.45%
	3 YEARS	2.41%	-3.33%	5.56%	-3.15%	*1.17%*	*2.60%*	1.24%	-4.50%	4.39%	-3.15%
1997	*6 MONTHS*	23.68%	28.83%	-0.86%	24.54%	*20.39%*	*20.20%*	3.29%	8.43%	-21.25%	24.54%
	1 YEAR	17.33%	18.58%	8.80%	8.52%	*15.94%*	*28.10%*	1.39%	2.64%	-7.14%	8.52%
	3 YEARS	-1.74%	-2.80%	0.17%	-1.91%	*-1.79%*	*18.01%*	0.05%	-1.01%	1.96%	-1.91%
1996	*6 MONTHS*	36.96%	23.46%	-9.37%	46.33%	*26.65%*	*22.00%*	10.31%	-3.19%	-36.02%	46.33%
	1 YEAR	48.69%	34.03%	2.12%	46.57%	*37.78%*	*31.99%*	10.91%	-3.75%	-35.66%	46.57%
	3 YEARS	19.17%	23.18%	10.72%	8.45%	*20.53%*	*26.97%*	-1.36%	2.66%	-9.80%	8.45%
1995	*6 MONTHS*	28.75%	20.11%	11.48%	17.27%	*23.49%*	*27.84%*	5.26%	-3.38%	-12.01%	17.27%
	1 YEAR	32.74%	28.92%	19.48%	13.26%	*29.92%*	*23.11%*	2.82%	-1.01%	-10.44%	13.26%
	3 YEARS	34.29%	26.88%	6.53%	27.76%	*28.66%*	*27.68%*	5.63%	-1.77%	-22.13%	27.76%
1994	*6 MONTHS*	3.71%	7.12%	-26.02%	29.73%	*1.51%*	*6.87%*	2.19%	5.60%	-27.54%	29.73%
	1 YEAR	29.38%	16.96%	-9.64%	39.02%	*17.28%*	*22.62%*	12.10%	-0.33%	-26.92%	39.02%
	3 YEARS	29.79%	26.29%	22.11%	7.69%	*26.83%*	*25.83%*	2.96%	-0.54%	-4.73%	7.69%
1993	*6 MONTHS*	38.79%	12.69%	2.51%	36.28%	*14.13%*	*7.19%*	24.66%	-1.44%	-11.62%	36.28%
	1 YEAR	12.70%	0.83%	-3.09%	15.78%	*1.72%*	*-1.39%*	10.98%	-0.89%	-4.81%	15.78%
	3 YEARS	23.69%	14.44%	10.18%	13.51%	*14.73%*	*14.18%*	8.96%	-0.29%	-4.55%	13.51%

Table 12: Results Portfolio Strategy; Healthcare Industry; 'Best estimate'

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	48.36%	29.88%	19.84%	28.52%	*34.54%*	*9.37%*	13.82%	-4.65%	-14.70%	28.52%
	1 YEAR	36.88%	19.55%	9.39%	27.49%	*23.36%*	*11.51%*	13.52%	-3.81%	-13.98%	27.49%
	3 YEARS	23.49%	14.39%	6.98%	16.51%	*15.65%*	*11.58%*	7.84%	-1.26%	-8.68%	16.51%
2002	*6 MONTHS*	36.66%	34.67%	66.46%	-29.80%	*37.26%*	*7.16%*	-0.61%	-2.59%	29.19%	-29.80%
	1 YEAR	56.88%	33.03%	39.33%	17.55%	*47.82%*	*18.62%*	9.06%	-14.80%	-8.49%	17.55%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	25.80%	14.81%	14.37%	11.43%	*17.00%*	*-12.08%*	8.80%	-2.18%	-2.63%	11.43%
	1 YEAR	19.65%	-3.99%	-15.01%	34.66%	*-2.65%*	*-19.16%*	22.30%	-1.34%	-12.36%	34.66%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	99.47%	44.40%	16.63%	82.83%	*48.06%*	*-17.62%*	51.41%	-3.66%	-31.42%	82.83%
	1 YEAR	48.36%	4.83%	-4.80%	53.16%	*12.76%*	*-15.82%*	35.60%	-7.94%	-17.56%	53.16%
	3 YEARS	22.03%	-3.53%	-7.81%	29.85%	*1.69%*	*-12.26%*	20.34%	-5.22%	-9.50%	29.85%
1999	*6 MONTHS*	-18.65%	-1.96%	4.63%	-23.28%	*-3.16%*	*14.56%*	-15.49%	1.20%	7.79%	-23.28%
	1 YEAR	24.97%	24.25%	6.75%	18.22%	*15.69%*	*5.97%*	9.28%	8.56%	-8.94%	18.22%
	3 YEARS	31.21%	-6.55%	-2.53%	33.74%	*5.63%*	*-10.33%*	25.58%	-12.18%	-8.16%	33.74%
1998	*6 MONTHS*	67.67%	40.34%	-2.10%	69.76%	*32.99%*	*17.53%*	34.67%	7.35%	-35.09%	69.76%
	1 YEAR	52.29%	11.56%	4.86%	47.44%	*20.80%*	*21.07%*	31.49%	-9.25%	-15.95%	47.44%
	3 YEARS	24.38%	8.77%	3.60%	20.78%	*11.38%*	*2.60%*	13.00%	-2.62%	-7.78%	20.78%
1997	*6 MONTHS*	31.95%	34.02%	1.90%	30.04%	*22.88%*	*20.20%*	9.06%	11.14%	-20.98%	30.04%
	1 YEAR	27.30%	31.71%	15.63%	11.67%	*24.81%*	*28.10%*	2.49%	6.90%	-9.18%	11.67%
	3 YEARS	6.06%	25.73%	10.96%	-4.90%	*13.26%*	*18.01%*	-7.19%	12.47%	-2.29%	-4.90%
1996	*6 MONTHS*	19.33%	-12.76%	-6.02%	25.34%	*6.03%*	*22.00%*	13.30%	-18.78%	-12.04%	25.34%
	1 YEAR	32.52%	11.91%	12.38%	20.14%	*23.17%*	*31.99%*	9.35%	-11.26%	-10.79%	20.14%
	3 YEARS	26.14%	5.91%	-6.89%	33.04%	*14.20%*	*26.97%*	11.94%	-8.29%	-21.10%	33.04%
1995	*6 MONTHS*	65.72%	74.55%	49.79%	15.92%	*66.56%*	*27.84%*	-0.85%	7.99%	-16.77%	15.92%
	1 YEAR	35.19%	45.51%	0.76%	34.42%	*34.91%*	*23.11%*	0.28%	10.60%	-34.15%	34.42%
	3 YEARS	25.40%	36.40%	0.92%	24.48%	*26.08%*	*27.68%*	-0.68%	10.32%	-25.16%	24.48%
1994	*6 MONTHS*	110.06%	47.26%	46.09%	63.97%	*82.55%*	*6.87%*	27.51%	-35.29%	-36.46%	63.97%
	1 YEAR	60.15%	28.27%	28.70%	31.45%	*46.36%*	*22.62%*	13.79%	-18.10%	-17.66%	31.45%
	3 YEARS	27.29%	21.93%	44.02%	-16.73%	*28.80%*	*25.83%*	-1.51%	-6.87%	15.22%	-16.73%
1993	*6 MONTHS*	45.57%	23.46%	6.60%	38.97%	*35.17%*	*7.19%*	10.40%	-11.72%	-28.57%	38.97%
	1 YEAR	11.49%	8.43%	5.26%	6.23%	*9.95%*	*-1.39%*	1.54%	-1.51%	-4.69%	6.23%
	3 YEARS	25.37%	26.48%	13.55%	11.83%	*24.17%*	*14.18%*	1.20%	2.31%	-10.63%	11.83%

Table 13: Results Portfolio Strategy; Consumer Discretionary Industry; 'Best estimate'

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	23.19%	10.43%	5.41%	17.78%	*12.53%*	*9.37%*	10.66%	-2.11%	-7.13%	17.78%
	1 YEAR	24.08%	14.41%	4.41%	19.67%	*16.22%*	*11.51%*	7.86%	-1.81%	-11.81%	19.67%
	3 YEARS	14.03%	11.87%	3.26%	10.77%	*10.57%*	*11.58%*	3.47%	1.30%	-7.31%	10.77%
2002	*6 MONTHS*	33.30%	-5.64%	20.33%	12.97%	*13.16%*	*7.16%*	20.14%	-18.80%	7.17%	12.97%
	1 YEAR	61.62%	14.63%	21.77%	39.85%	*34.81%*	*18.62%*	26.81%	-20.18%	-13.04%	39.85%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	38.98%	12.90%	-13.20%	52.19%	*17.56%*	*-12.08%*	21.43%	-4.65%	-30.76%	52.19%
	1 YEAR	40.03%	14.33%	-6.83%	46.86%	*19.57%*	*-19.16%*	20.46%	-5.24%	-26.40%	46.86%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	44.52%	19.44%	87.11%	-42.59%	*40.55%*	*-17.62%*	3.97%	-21.11%	46.56%	-42.59%
	1 YEAR	36.05%	20.85%	1.04%	35.01%	*27.76%*	*-15.82%*	8.29%	-6.91%	-26.72%	35.01%
	3 YEARS	15.11%	2.90%	-5.24%	20.34%	*9.20%*	*-12.26%*	5.91%	-6.30%	-14.44%	20.34%
1999	*6 MONTHS*	-16.55%	-11.09%	-13.26%	-3.29%	*-13.00%*	*14.56%*	-3.54%	1.91%	-0.26%	-3.29%
	1 YEAR	-14.71%	-21.02%	-17.04%	2.33%	*-18.19%*	*5.97%*	3.48%	-2.83%	1.14%	2.33%
	3 YEARS	23.29%	0.29%	-3.58%	26.87%	*2.83%*	*-10.33%*	20.46%	-2.54%	-6.41%	26.87%
1998	*6 MONTHS*	-10.68%	-0.38%	-27.24%	16.56%	*-11.22%*	*17.53%*	0.54%	10.84%	-16.02%	16.56%
	1 YEAR	-3.99%	8.09%	-1.40%	-2.59%	*2.45%*	*21.07%*	-6.44%	5.64%	-3.85%	-2.59%
	3 YEARS	2.67%	-2.59%	-6.79%	9.46%	*-2.81%*	*2.60%*	5.48%	0.22%	-3.98%	9.46%
1997	*6 MONTHS*	45.26%	23.62%	12.50%	32.76%	*27.04%*	*20.20%*	18.22%	-3.42%	-14.54%	32.76%
	1 YEAR	40.05%	25.90%	19.02%	21.04%	*28.24%*	*28.10%*	11.81%	-2.34%	-9.23%	21.04%
	3 YEARS	5.77%	2.00%	-10.68%	16.45%	*-0.25%*	*18.01%*	6.02%	2.25%	-10.43%	16.45%
1996	*6 MONTHS*	18.53%	12.16%	-12.82%	31.35%	*6.62%*	*22.00%*	11.91%	5.54%	-19.43%	31.35%
	1 YEAR	30.23%	30.86%	6.89%	23.34%	*23.85%*	*31.99%*	6.38%	7.00%	-16.96%	23.34%
	3 YEARS	7.96%	22.75%	11.59%	-3.63%	*15.86%*	*26.97%*	-7.91%	6.89%	-4.27%	-3.63%
1995	*6 MONTHS*	22.48%	27.25%	-12.49%	34.97%	*18.56%*	*27.84%*	3.92%	8.69%	-31.05%	34.97%
	1 YEAR	27.93%	25.52%	12.73%	15.20%	*24.43%*	*23.11%*	3.50%	1.09%	-11.70%	15.20%
	3 YEARS	25.18%	27.48%	12.61%	12.57%	*24.01%*	*27.68%*	1.17%	3.47%	-11.39%	12.57%
1994	*6 MONTHS*	38.84%	0.57%	-15.90%	54.75%	*1.26%*	*6.87%*	37.59%	-0.69%	-17.16%	54.75%
	1 YEAR	20.41%	17.38%	5.58%	14.83%	*14.72%*	*22.62%*	5.69%	2.65%	-9.15%	14.83%
	3 YEARS	21.01%	23.19%	14.93%	6.08%	*20.78%*	*25.83%*	0.23%	2.41%	-5.85%	6.08%
1993	*6 MONTHS*	17.22%	25.43%	29.05%	-11.82%	*24.82%*	*7.19%*	-7.60%	0.61%	4.22%	-11.82%
	1 YEAR	3.13%	7.56%	2.33%	0.80%	*4.51%*	*-1.39%*	-1.38%	3.05%	-2.18%	0.80%
	3 YEARS	11.27%	18.90%	13.23%	-1.95%	*14.91%*	*14.18%*	-3.64%	3.99%	-1.68%	-1.95%

Table 14: Results Portfolio Strategy; ITT Industry; 'Best estimate'

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	36.63%	19.77%	10.53%	26.10%	*28.11%*	*9.37%*	8.52%	-8.34%	-17.58%	26.10%
	1 YEAR	25.99%	21.09%	7.67%	18.32%	*23.10%*	*11.51%*	2.90%	-2.01%	-15.42%	18.32%
	3 YEARS	18.49%	19.46%	4.05%	14.44%	*17.05%*	*11.58%*	1.44%	2.41%	-13.00%	14.44%
2002	*6 MONTHS*	31.59%	0.73%	-8.99%	40.58%	*18.25%*	*7.16%*	13.35%	-17.52%	-27.23%	40.58%
	1 YEAR	47.72%	14.53%	57.01%	-9.29%	*40.27%*	*18.62%*	7.45%	-25.75%	16.74%	-9.29%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	8.00%	-17.93%	-20.87%	28.87%	*-11.18%*	*-12.08%*	19.18%	-6.75%	-9.69%	28.87%
	1 YEAR	-36.50%	-33.27%	-31.58%	-4.92%	*-33.65%*	*-19.16%*	-2.85%	0.38%	2.07%	-4.92%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	-4.91%	6.89%	2.66%	-7.56%	*0.47%*	*-17.62%*	-5.38%	6.42%	2.18%	-7.56%
	1 YEAR	-1.08%	7.94%	-14.54%	13.46%	*-2.83%*	*-15.82%*	1.74%	10.77%	-11.72%	13.46%
	3 YEARS	-11.63%	-7.21%	-15.04%	3.40%	*-11.51%*	*-12.26%*	-0.12%	4.31%	-3.52%	3.40%
1999	*6 MONTHS*	66.72%	22.16%	93.20%	-26.48%	*58.78%*	*14.56%*	7.94%	-36.62%	34.42%	-26.48%
	1 YEAR	10.57%	20.83%	31.31%	-20.74%	*20.29%*	*5.97%*	-9.72%	0.54%	11.02%	-20.74%
	3 YEARS	-13.84%	-11.20%	-26.94%	13.10%	*-16.76%*	*-10.33%*	2.92%	5.56%	-10.18%	13.10%
1998	*6 MONTHS*	55.93%	70.30%	43.43%	12.50%	*58.94%*	*17.53%*	-3.00%	11.36%	-15.51%	12.50%
	1 YEAR	46.52%	34.23%	31.10%	15.41%	*40.22%*	*21.07%*	6.30%	-5.99%	-9.12%	15.41%
	3 YEARS	12.59%	6.82%	4.74%	7.85%	*9.55%*	*2.60%*	3.04%	-2.72%	-4.81%	7.85%
1997	*6 MONTHS*	36.49%	10.06%	-21.35%	57.84%	*19.97%*	*20.20%*	16.52%	-9.90%	-41.32%	57.84%
	1 YEAR	33.32%	21.17%	0.28%	33.04%	*24.55%*	*28.10%*	8.77%	-3.38%	-24.27%	33.04%
	3 YEARS	40.40%	33.81%	22.72%	17.68%	*35.69%*	*18.01%*	4.71%	-1.88%	-12.96%	17.68%
1996	*6 MONTHS*	68.06%	37.07%	10.51%	57.56%	*51.42%*	*22.00%*	16.64%	-14.35%	-40.92%	57.56%
	1 YEAR	47.10%	58.06%	3.77%	43.33%	*46.40%*	*31.99%*	0.70%	11.66%	-42.63%	43.33%
	3 YEARS	38.02%	37.66%	0.61%	37.40%	*34.02%*	*26.97%*	3.99%	3.63%	-33.41%	37.40%
1995	*6 MONTHS*	29.88%	13.92%	-40.92%	70.80%	*22.25%*	*27.84%*	7.64%	-8.33%	-63.16%	70.80%
	1 YEAR	28.53%	26.37%	-47.23%	75.75%	*24.95%*	*23.11%*	3.58%	1.42%	-72.18%	75.75%
	3 YEARS	22.39%	40.58%	-6.46%	28.85%	*26.88%*	*27.68%*	-4.49%	13.71%	-33.34%	28.85%
1994	*6 MONTHS*	58.02%	37.85%	18.94%	39.08%	*43.88%*	*6.87%*	14.14%	-6.04%	-24.94%	39.08%
	1 YEAR	74.30%	36.65%	42.45%	31.85%	*56.72%*	*22.62%*	17.58%	-20.07%	-14.27%	31.85%
	3 YEARS	45.33%	21.85%	39.56%	5.77%	*37.39%*	*25.83%*	7.95%	-15.54%	2.17%	5.77%
1993	*6 MONTHS*	16.54%	16.64%	28.71%	-12.17%	*18.31%*	*7.19%*	-1.78%	-1.67%	10.40%	-12.17%
	1 YEAR	9.45%	24.39%	4.15%	5.30%	*14.02%*	*-1.39%*	-4.58%	10.36%	-9.88%	5.30%
	3 YEARS	14.68%	33.34%	13.20%	1.48%	*21.13%*	*14.18%*	-6.45%	12.21%	-7.93%	1.48%

Table 15: Results Portfolio Strategy; All Industries; 'Best estimate'; Speculative and Safe stocks

All returns annualized

		RETURNS						EXCESS RETURNS			
		BUY	HOLD	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	HOLD	SELL	BUY-SELL
All Years	*6 MONTHS*	31.88%	29.07%	11.86%	20.02%	*24.64%*	*9.37%*	7.24%	4.43%	-12.79%	20.02%
	1 YEAR	29.27%	18.95%	9.96%	19.31%	*20.56%*	*11.51%*	8.71%	-1.61%	-10.60%	19.31%
	3 YEARS	18.38%	13.74%	7.77%	10.61%	*13.89%*	*11.58%*	4.49%	-0.14%	-6.11%	10.61%
2002	*6 MONTHS*	39.63%	83.86%	17.64%	21.99%	*41.87%*	*7.16%*	-2.24%	41.99%	-24.23%	21.99%
	1 YEAR	58.97%	21.71%	31.41%	27.56%	*43.20%*	*18.62%*	15.76%	-21.49%	-11.79%	27.56%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2001	*6 MONTHS*	16.44%	11.12%	-11.80%	28.24%	*4.63%*	*-12.08%*	11.81%	6.48%	-16.44%	28.24%
	1 YEAR	10.71%	2.31%	-16.48%	27.19%	*-1.69%*	*-19.16%*	12.40%	4.00%	-14.79%	27.19%
	3 YEARS	NA	NA	NA	NA	*NA*	*NA*	NA	NA	NA	NA
2000	*6 MONTHS*	74.78%	42.52%	16.11%	58.67%	*42.71%*	*-17.62%*	32.07%	-0.19%	-26.60%	58.67%
	1 YEAR	43.66%	17.77%	-1.49%	45.15%	*20.34%*	*-15.82%*	23.32%	-2.57%	-21.83%	45.15%
	3 YEARS	10.73%	0.60%	-7.01%	17.74%	*1.66%*	*-12.26%*	9.07%	-1.06%	-8.67%	17.74%
1999	*6 MONTHS*	11.72%	-6.12%	24.10%	-12.38%	*8.61%*	*14.56%*	3.11%	-14.73%	15.49%	-12.38%
	1 YEAR	9.88%	4.37%	2.30%	7.58%	*2.09%*	*5.97%*	7.79%	2.28%	0.21%	7.58%
	3 YEARS	11.71%	-3.49%	-5.86%	17.56%	*-0.23%*	*-10.33%*	11.94%	-3.26%	-5.62%	17.56%
1998	*6 MONTHS*	15.62%	27.28%	5.28%	10.34%	*17.96%*	*17.53%*	-2.34%	9.32%	-12.68%	10.34%
	1 YEAR	22.75%	15.75%	12.28%	10.47%	*17.01%*	*21.07%*	5.74%	-1.26%	-4.73%	10.47%
	3 YEARS	14.79%	1.87%	2.06%	12.73%	*5.57%*	*2.60%*	9.22%	-3.70%	-3.51%	12.73%
1997	*6 MONTHS*	34.27%	26.43%	9.48%	24.79%	*23.80%*	*20.20%*	10.47%	2.63%	-14.32%	24.79%
	1 YEAR	32.62%	24.16%	19.29%	13.32%	*25.74%*	*28.10%*	6.87%	-1.59%	-6.45%	13.32%
	3 YEARS	9.59%	13.14%	10.63%	-1.04%	*10.98%*	*18.01%*	-1.39%	2.17%	-0.35%	-1.04%
1996	*6 MONTHS*	22.05%	19.23%	0.15%	21.90%	*17.18%*	*22.00%*	4.87%	2.05%	-17.03%	21.90%
	1 YEAR	32.59%	33.07%	13.05%	19.54%	*29.29%*	*31.99%*	3.29%	3.77%	-16.25%	19.54%
	3 YEARS	23.04%	22.29%	8.02%	15.02%	*20.48%*	*26.97%*	2.57%	1.82%	-12.46%	15.02%
1995	*6 MONTHS*	38.33%	34.35%	18.51%	19.82%	*33.28%*	*27.84%*	5.06%	1.07%	-14.77%	19.82%
	1 YEAR	30.51%	27.41%	11.29%	19.22%	*26.87%*	*23.11%*	3.64%	0.54%	-15.58%	19.22%
	3 YEARS	27.40%	27.07%	9.41%	17.99%	*24.84%*	*27.68%*	2.56%	2.23%	-15.44%	17.99%
1994	*6 MONTHS*	38.55%	21.17%	18.31%	20.23%	*27.88%*	*6.87%*	10.66%	-6.72%	-9.57%	20.23%
	1 YEAR	39.04%	30.62%	24.53%	14.50%	*32.92%*	*22.62%*	6.11%	-2.30%	-8.39%	14.50%
	3 YEARS	28.25%	26.54%	28.58%	-0.34%	*27.51%*	*25.83%*	0.74%	-0.96%	1.08%	-0.34%
1993	*6 MONTHS*	27.40%	30.89%	20.78%	6.63%	*28.52%*	*7.19%*	-1.11%	2.37%	-7.74%	6.63%
	1 YEAR	12.03%	12.31%	3.43%	8.60%	*9.84%*	*-1.39%*	2.19%	2.48%	-6.41%	8.60%
	3 YEARS	21.52%	21.92%	16.34%	5.18%	*20.29%*	*14.18%*	1.23%	1.63%	-3.95%	5.18%

Table 16: Results Portfolio Strategy; All Industries; 'Best estimate'; Top 10 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	27.58%	3.47%	24.10%	*21.84%*	*9.37%*	5.74%	-18.29%	24.03%
	1 YEAR	26.00%	2.81%	23.19%	*19.47%*	*11.51%*	6.53%	-16.66%	23.19%
	3 YEARS	16.49%	3.15%	13.34%	*14.01%*	*11.58%*	2.58%	-10.76%	13.34%
2002	*6 MONTHS*	19.90%	3.93%	15.97%	*19.22%*	*7.16%*	0.68%	-14.97%	15.65%
	1 YEAR	51.96%	8.23%	43.73%	*37.94%*	*18.62%*	14.03%	-29.71%	43.73%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	15.17%	-5.81%	20.98%	*6.64%*	*-12.08%*	8.53%	-12.44%	20.98%
	1 YEAR	9.92%	-12.97%	22.89%	*-2.33%*	*-19.16%*	12.24%	-10.64%	22.89%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	43.58%	11.96%	31.62%	*32.66%*	*-17.62%*	10.92%	-20.70%	31.62%
	1 YEAR	24.66%	-5.14%	29.80%	*14.42%*	*-15.82%*	10.24%	-19.56%	29.80%
	3 YEARS	11.25%	-6.40%	17.66%	*20.02%*	*-12.26%*	9.57%	-8.09%	17.66%
1999	*6 MONTHS*	0.55%	15.15%	-14.61%	*5.35%*	*14.56%*	-4.80%	9.81%	-14.61%
	1 YEAR	3.40%	4.31%	-0.90%	*0.03%*	*5.97%*	3.38%	4.28%	-0.90%
	3 YEARS	9.30%	-4.12%	13.42%	*22.20%*	*-10.33%*	11.02%	-2.40%	13.42%
1998	*6 MONTHS*	12.94%	-6.97%	19.91%	*21.12%*	*17.53%*	-8.18%	-28.09%	19.91%
	1 YEAR	16.33%	4.29%	12.03%	*18.53%*	*21.07%*	-2.21%	-14.24%	12.03%
	3 YEARS	8.54%	0.98%	7.56%	*11.15%*	*2.60%*	3.72%	-3.84%	7.56%
1997	*6 MONTHS*	31.65%	1.01%	30.64%	*22.57%*	*20.20%*	9.08%	-21.56%	30.64%
	1 YEAR	26.72%	8.43%	18.28%	*23.39%*	*28.10%*	3.33%	-14.95%	18.28%
	3 YEARS	9.62%	3.24%	6.39%	*5.29%*	*18.01%*	-2.10%	-8.49%	6.39%
1996	*6 MONTHS*	31.65%	-3.00%	34.65%	*22.68%*	*22.00%*	8.98%	-25.67%	34.65%
	1 YEAR	35.49%	3.32%	32.18%	*32.80%*	*31.99%*	2.69%	-29.49%	32.18%
	3 YEARS	20.98%	2.04%	18.94%	*18.61%*	*26.97%*	-0.17%	-19.12%	18.94%
1995	*6 MONTHS*	41.94%	1.45%	40.48%	*32.72%*	*27.84%*	9.22%	-30.75%	39.97%
	1 YEAR	35.83%	2.65%	33.17%	*28.55%*	*23.11%*	7.27%	-25.90%	33.17%
	3 YEARS	27.63%	1.82%	25.81%	*22.86%*	*27.68%*	1.23%	-24.58%	25.81%
1994	*6 MONTHS*	50.72%	5.76%	44.96%	*32.30%*	*6.87%*	18.42%	-26.54%	44.96%
	1 YEAR	41.63%	13.71%	27.92%	*33.77%*	*22.62%*	7.85%	-20.06%	27.92%
	3 YEARS	25.07%	17.29%	7.77%	*3.27%*	*25.83%*	-3.38%	-11.16%	7.77%
1993	*6 MONTHS*	27.68%	11.25%	16.43%	*23.11%*	*7.19%*	4.57%	-11.95%	16.52%
	1 YEAR	14.02%	1.24%	12.78%	*7.55%*	*-1.39%*	6.47%	-6.31%	12.78%
	3 YEARS	19.49%	10.36%	9.12%	*8.67%*	*14.18%*	0.75%	-8.37%	9.12%

Table 17: Results Portfolio Strategy; Industrial Industry; 'Best estimate'; Top 10 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	15.16%	-2.01%	17.18%	*12.17%*	*9.37%*	3.00%	-14.18%	17.18%
	1 YEAR	20.94%	-1.37%	22.32%	*15.19%*	*11.51%*	5.76%	-16.56%	22.32%
	3 YEARS	12.39%	2.66%	9.73%	*9.16%*	*11.58%*	0.02%	-9.71%	9.73%
2002	*6 MONTHS*	1.02%	-2.53%	3.55%	*8.22%*	*7.16%*	-7.19%	-10.74%	3.55%
	1 YEAR	31.07%	-1.96%	33.02%	*28.84%*	*18.62%*	2.23%	-30.79%	33.02%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	9.27%	-7.22%	16.49%	*3.17%*	*-12.08%*	6.10%	-10.39%	16.49%
	1 YEAR	15.67%	-4.11%	19.77%	*7.42%*	*-19.16%*	8.25%	-11.52%	19.77%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	40.64%	15.73%	24.91%	*41.55%*	*-17.62%*	-0.92%	-25.83%	24.91%
	1 YEAR	21.62%	1.83%	19.80%	*20.00%*	*-15.82%*	1.63%	-18.17%	19.80%
	3 YEARS	11.05%	-1.12%	12.18%	*12.14%*	*-12.26%*	3.68%	-8.49%	12.18%
1999	*6 MONTHS*	-7.70%	-6.18%	-1.51%	*-21.23%*	*14.56%*	13.54%	15.05%	-1.51%
	1 YEAR	4.46%	-17.66%	22.12%	*-17.69%*	*5.97%*	22.15%	0.03%	22.12%
	3 YEARS	3.45%	-1.97%	5.42%	*8.79%*	*-10.33%*	2.02%	-3.40%	5.42%
1998	*6 MONTHS*	-3.15%	-14.29%	11.14%	*3.77%*	*17.53%*	-6.92%	-18.06%	11.14%
	1 YEAR	12.14%	4.25%	7.89%	*10.66%*	*21.07%*	1.48%	-6.41%	7.89%
	3 YEARS	1.93%	5.00%	-3.07%	*-3.15%*	*2.60%*	0.76%	3.84%	-3.07%
1997	*6 MONTHS*	18.94%	-0.51%	19.46%	*20.39%*	*20.20%*	-1.45%	-20.91%	19.46%
	1 YEAR	13.86%	5.28%	8.58%	*15.94%*	*28.10%*	-2.08%	-10.66%	8.58%
	3 YEARS	-1.39%	0.10%	-1.49%	*-1.91%*	*18.01%*	0.40%	1.89%	-1.49%
1996	*6 MONTHS*	36.71%	-1.87%	38.58%	*26.65%*	*22.00%*	10.06%	-28.52%	38.58%
	1 YEAR	48.65%	0.42%	48.23%	*37.78%*	*31.99%*	10.87%	-37.36%	48.23%
	3 YEARS	17.54%	2.14%	15.40%	*8.45%*	*26.97%*	-2.98%	-18.38%	15.40%
1995	*6 MONTHS*	33.93%	2.30%	31.63%	*23.49%*	*27.84%*	10.44%	-21.20%	31.63%
	1 YEAR	35.06%	3.90%	31.17%	*29.92%*	*23.11%*	5.14%	-26.03%	31.17%
	3 YEARS	33.83%	1.31%	32.53%	*27.76%*	*27.68%*	5.18%	-27.35%	32.53%
1994	*6 MONTHS*	2.60%	-7.81%	10.40%	*1.51%*	*6.87%*	1.08%	-9.32%	10.40%
	1 YEAR	20.57%	-2.89%	23.46%	*17.28%*	*22.62%*	3.28%	-20.18%	23.46%
	3 YEARS	20.85%	6.63%	14.22%	*7.69%*	*25.83%*	-5.98%	-20.20%	14.22%
1993	*6 MONTHS*	19.39%	2.26%	17.14%	*14.13%*	*7.19%*	5.26%	-11.87%	17.14%
	1 YEAR	6.35%	-2.78%	9.13%	*1.72%*	*-1.39%*	4.63%	-4.50%	9.13%
	3 YEARS	11.85%	9.16%	2.68%	*13.51%*	*14.18%*	-2.89%	-5.57%	2.68%

Table 18: Results Portfolio Strategy; Healthcare Industry; 'Best estimate'; Top 10 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	44.39%	7.41%	36.97%	*34.54%*	*9.37%*	9.85%	-26.82%	36.68%
	1 YEAR	34.76%	4.06%	30.70%	*23.36%*	*11.51%*	11.40%	-19.30%	30.70%
	3 YEARS	20.53%	3.35%	17.18%	*16.51%*	*11.58%*	4.87%	-12.31%	17.18%
2002	*6 MONTHS*	14.99%	6.65%	8.34%	*37.26%*	*7.16%*	-22.27%	-29.34%	7.07%
	1 YEAR	59.17%	3.93%	55.24%	*47.82%*	*18.62%*	11.35%	-43.89%	55.24%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	18.06%	16.30%	1.77%	*17.00%*	*-12.08%*	1.06%	-0.70%	1.77%
	1 YEAR	13.75%	-11.80%	25.55%	*-2.65%*	*-19.16%*	16.40%	-9.15%	25.55%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	59.68%	14.97%	44.71%	*48.06%*	*-17.62%*	11.62%	-33.09%	44.71%
	1 YEAR	29.02%	-4.32%	33.34%	*12.76%*	*-15.82%*	16.26%	-17.08%	33.34%
	3 YEARS	13.22%	-7.03%	20.25%	*29.85%*	*-12.26%*	11.53%	-8.72%	20.25%
1999	*6 MONTHS*	-13.05%	9.23%	-22.29%	*-3.16%*	*14.56%*	-9.90%	12.39%	-22.29%
	1 YEAR	17.48%	14.49%	2.99%	*15.69%*	*5.97%*	1.79%	-1.21%	2.99%
	3 YEARS	21.85%	1.93%	19.92%	*33.74%*	*-10.33%*	16.22%	-3.70%	19.92%
1998	*6 MONTHS*	54.13%	-2.10%	56.23%	*32.99%*	*17.53%*	21.14%	-35.09%	56.23%
	1 YEAR	41.84%	4.86%	36.98%	*20.80%*	*21.07%*	21.03%	-15.95%	36.98%
	3 YEARS	19.51%	3.60%	15.91%	*20.78%*	*2.60%*	8.12%	-7.78%	15.91%
1997	*6 MONTHS*	34.67%	1.71%	32.96%	*22.88%*	*20.20%*	11.79%	-21.17%	32.96%
	1 YEAR	28.37%	14.07%	14.30%	*24.81%*	*28.10%*	3.56%	-10.74%	14.30%
	3 YEARS	4.86%	9.86%	-5.01%	*-4.90%*	*18.01%*	-8.40%	-3.39%	-5.01%
1996	*6 MONTHS*	9.18%	-3.01%	12.19%	*6.03%*	*22.00%*	3.15%	-9.03%	12.19%
	1 YEAR	23.76%	6.19%	17.57%	*23.17%*	*31.99%*	0.59%	-16.98%	17.57%
	3 YEARS	22.08%	-3.45%	25.52%	*33.04%*	*26.97%*	7.88%	-17.65%	25.52%
1995	*6 MONTHS*	82.40%	9.96%	72.44%	*66.56%*	*27.84%*	15.84%	-54.54%	70.38%
	1 YEAR	43.27%	0.15%	43.11%	*34.91%*	*23.11%*	8.35%	-34.76%	43.11%
	3 YEARS	24.14%	0.18%	23.95%	*24.48%*	*27.68%*	-1.94%	-25.90%	23.95%
1994	*6 MONTHS*	119.40%	18.44%	100.96%	*82.55%*	*6.87%*	36.85%	-64.12%	100.96%
	1 YEAR	67.42%	11.48%	55.93%	*46.36%*	*22.62%*	21.05%	-34.88%	55.93%
	3 YEARS	28.47%	17.61%	10.86%	*-16.73%*	*25.83%*	-0.33%	-11.19%	10.86%
1993	*6 MONTHS*	64.41%	1.98%	62.43%	*35.17%*	*7.19%*	29.24%	-33.55%	62.78%
	1 YEAR	23.52%	1.58%	21.94%	*9.95%*	*-1.39%*	13.57%	-8.37%	21.94%
	3 YEARS	30.09%	4.06%	26.02%	*11.83%*	*14.18%*	5.91%	-20.11%	26.02%

Table 19: Results Portfolio Strategy; Consumer Discretionary Industry; 'Best estimate'; Top 10 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	22.86%	-0.25%	23.11%	*12.53%*	*9.37%*	10.33%	-12.78%	23.11%
	1 YEAR	23.30%	2.37%	20.93%	*16.22%*	*11.51%*	7.08%	-13.85%	20.93%
	3 YEARS	11.58%	3.05%	8.53%	*10.77%*	*11.58%*	1.01%	-7.52%	8.53%
2002	*6 MONTHS*	38.33%	6.10%	32.23%	*13.16%*	*7.16%*	25.17%	-7.06%	32.23%
	1 YEAR	67.65%	6.53%	61.11%	*34.81%*	*18.62%*	32.83%	-28.28%	61.11%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	35.09%	-5.28%	40.37%	*17.56%*	*-12.08%*	17.53%	-22.84%	40.37%
	1 YEAR	36.03%	-2.73%	38.76%	*19.57%*	*-19.16%*	16.46%	-22.30%	38.76%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	65.39%	26.13%	39.26%	*40.55%*	*-17.62%*	24.84%	-14.42%	39.26%
	1 YEAR	38.08%	0.31%	37.76%	*27.76%*	*-15.82%*	10.31%	-27.45%	37.76%
	3 YEARS	21.99%	-1.57%	23.57%	*20.34%*	*-12.26%*	12.79%	-10.77%	23.57%
1999	*6 MONTHS*	-9.93%	-15.21%	5.28%	*-13.00%*	*14.56%*	3.07%	-2.21%	5.28%
	1 YEAR	-8.83%	-15.75%	6.93%	*-18.19%*	*5.97%*	9.36%	2.43%	6.93%
	3 YEARS	13.97%	-0.64%	14.61%	*26.87%*	*-10.33%*	11.14%	-3.47%	14.61%
1998	*6 MONTHS*	-6.41%	-24.52%	18.11%	*-11.22%*	*17.53%*	4.81%	-13.30%	18.11%
	1 YEAR	-2.39%	-1.26%	-1.13%	*2.45%*	*21.07%*	-4.84%	-3.71%	-1.13%
	3 YEARS	1.60%	-6.11%	7.71%	*9.46%*	*2.60%*	4.41%	-3.30%	7.71%
1997	*6 MONTHS*	45.26%	11.25%	34.01%	*27.04%*	*20.20%*	18.22%	-15.79%	34.01%
	1 YEAR	40.05%	17.11%	22.94%	*28.24%*	*28.10%*	11.81%	-11.13%	22.94%
	3 YEARS	5.77%	-9.61%	15.39%	*16.45%*	*18.01%*	6.02%	-9.37%	15.39%
1996	*6 MONTHS*	12.97%	-10.25%	23.22%	*6.62%*	*22.00%*	6.35%	-16.87%	23.22%
	1 YEAR	21.16%	5.51%	15.65%	*23.85%*	*31.99%*	-2.69%	-18.34%	15.65%
	3 YEARS	5.57%	9.27%	-3.70%	*-3.63%*	*26.97%*	-10.29%	-6.59%	-3.70%
1995	*6 MONTHS*	20.31%	-6.25%	26.56%	*18.56%*	*27.84%*	1.76%	-24.81%	26.56%
	1 YEAR	30.87%	6.37%	24.51%	*24.43%*	*23.11%*	6.44%	-18.07%	24.51%
	3 YEARS	27.42%	6.31%	21.11%	*12.57%*	*27.68%*	3.41%	-17.70%	21.11%
1994	*6 MONTHS*	15.54%	-12.72%	28.26%	*1.26%*	*6.87%*	14.28%	-13.98%	28.26%
	1 YEAR	8.16%	4.46%	3.70%	*14.72%*	*22.62%*	-6.56%	-10.26%	3.70%
	3 YEARS	8.40%	11.95%	-3.54%	*6.08%*	*25.83%*	-12.38%	-8.83%	-3.54%
1993	*6 MONTHS*	12.06%	28.28%	-16.22%	*24.82%*	*7.19%*	-12.76%	3.46%	-16.22%
	1 YEAR	2.19%	3.15%	-0.96%	*4.51%*	*-1.39%*	-2.32%	-1.36%	-0.96%
	3 YEARS	7.89%	14.77%	-6.88%	*-1.95%*	*14.18%*	-7.02%	-0.13%	-6.88%

Table 20: Results Portfolio Strategy; ITT Industry; 'Best estimate'; Top 10 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	33.18%	8.75%	24.44%	*28.11%*	*9.37%*	5.07%	-19.36%	24.44%
	1 YEAR	27.45%	6.17%	21.28%	*23.10%*	*11.51%*	4.35%	-16.93%	21.28%
	3 YEARS	18.90%	3.56%	15.34%	*14.44%*	*11.58%*	1.85%	-13.49%	15.34%
2002	*6 MONTHS*	20.92%	5.50%	15.42%	*18.25%*	*7.16%*	2.67%	-12.75%	15.42%
	1 YEAR	44.79%	24.41%	20.38%	*40.27%*	*18.62%*	4.52%	-15.87%	20.38%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	4.80%	-27.02%	31.82%	*-11.18%*	*-12.08%*	15.98%	-15.84%	31.82%
	1 YEAR	-21.90%	-33.25%	11.34%	*-33.65%*	*-19.16%*	11.75%	0.40%	11.34%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	-4.91%	-9.00%	4.10%	*0.47%*	*-17.62%*	-5.38%	-9.48%	4.10%
	1 YEAR	-1.08%	-18.38%	17.30%	*-2.83%*	*-15.82%*	1.74%	-15.56%	17.30%
	3 YEARS	-11.63%	-15.88%	4.24%	*3.40%*	*-12.26%*	-0.12%	-4.36%	4.24%
1999	*6 MONTHS*	40.03%	72.78%	-32.75%	*58.78%*	*14.56%*	-18.75%	14.00%	-32.75%
	1 YEAR	6.34%	36.16%	-29.82%	*20.29%*	*5.97%*	-13.95%	15.87%	-29.82%
	3 YEARS	-8.30%	-15.80%	7.50%	*13.10%*	*-10.33%*	8.46%	0.96%	7.50%
1998	*6 MONTHS*	54.76%	13.03%	41.73%	*58.94%*	*17.53%*	-4.18%	-45.91%	41.73%
	1 YEAR	40.64%	9.33%	31.31%	*40.22%*	*21.07%*	0.42%	-30.89%	31.31%
	3 YEARS	12.43%	1.42%	11.01%	*7.85%*	*2.60%*	2.89%	-8.12%	11.01%
1997	*6 MONTHS*	41.86%	-8.40%	50.25%	*19.97%*	*20.20%*	21.89%	-28.36%	50.25%
	1 YEAR	41.63%	-2.74%	44.36%	*24.55%*	*28.10%*	17.07%	-27.29%	44.36%
	3 YEARS	43.65%	12.59%	31.06%	*17.68%*	*18.01%*	7.97%	-23.09%	31.06%
1996	*6 MONTHS*	86.95%	3.15%	83.80%	*51.42%*	*22.00%*	35.53%	-48.27%	83.80%
	1 YEAR	64.15%	1.13%	63.02%	*46.40%*	*31.99%*	17.75%	-45.27%	63.02%
	3 YEARS	46.91%	0.18%	46.72%	*37.40%*	*26.97%*	12.88%	-33.84%	46.72%
1995	*6 MONTHS*	7.12%	-0.19%	7.31%	*22.25%*	*27.84%*	-15.12%	-22.44%	7.31%
	1 YEAR	13.71%	0.20%	13.50%	*24.95%*	*23.11%*	-11.24%	-24.74%	13.50%
	3 YEARS	11.77%	-0.52%	12.29%	*28.85%*	*27.68%*	-15.10%	-27.39%	12.29%
1994	*6 MONTHS*	55.17%	25.13%	30.04%	*43.88%*	*6.87%*	11.29%	-18.75%	30.04%
	1 YEAR	75.61%	41.79%	33.82%	*56.72%*	*22.62%*	18.89%	-14.93%	33.82%
	3 YEARS	41.92%	32.98%	8.94%	*5.77%*	*25.83%*	4.53%	-4.40%	8.94%
1993	*6 MONTHS*	25.13%	12.48%	12.64%	*18.31%*	*7.19%*	6.81%	-5.83%	12.64%
	1 YEAR	10.62%	3.01%	7.62%	*14.02%*	*-1.39%*	-3.40%	-11.02%	7.62%
	3 YEARS	14.45%	13.46%	1.00%	*1.48%*	*14.18%*	-6.68%	-7.68%	1.00%

Table 21: Results Portfolio Strategy; All Industries; 'Best estimate'; Top 10 Safe and Speculative stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	36.78%	6.99%	29.79%	*24.64%*	*9.37%*	12.14%	-17.65%	29.79%
	1 YEAR	32.54%	6.25%	26.29%	*20.56%*	*11.51%*	11.97%	-14.31%	26.29%
	3 YEARS	18.16%	6.05%	12.10%	*13.89%*	*11.58%*	4.27%	-7.83%	12.10%
2002	*6 MONTHS*	51.32%	7.65%	43.67%	*41.87%*	*7.16%*	9.45%	-34.22%	43.67%
	1 YEAR	79.44%	15.10%	64.34%	*43.20%*	*18.62%*	36.24%	-28.11%	64.34%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	18.43%	-9.35%	27.78%	*4.63%*	*-12.08%*	13.79%	-13.98%	27.78%
	1 YEAR	14.45%	-16.12%	30.57%	*-1.69%*	*-19.16%*	16.14%	-14.43%	30.57%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	93.87%	12.01%	81.86%	*42.71%*	*-17.62%*	51.16%	-30.70%	81.86%
	1 YEAR	48.12%	-1.10%	49.22%	*20.34%*	*-15.82%*	27.78%	-21.44%	49.22%
	3 YEARS	13.87%	-6.91%	20.78%	*1.66%*	*-12.26%*	12.21%	-8.57%	20.78%
1999	*6 MONTHS*	5.01%	16.10%	-11.09%	*8.61%*	*14.56%*	-3.60%	7.49%	-11.09%
	1 YEAR	6.10%	1.05%	5.06%	*2.09%*	*5.97%*	4.02%	-1.04%	5.06%
	3 YEARS	10.48%	-4.73%	15.22%	*-0.23%*	*-10.33%*	10.72%	-4.50%	15.22%
1998	*6 MONTHS*	14.45%	4.76%	9.69%	*17.96%*	*17.53%*	-3.51%	-13.20%	9.69%
	1 YEAR	17.29%	10.87%	6.42%	*17.01%*	*21.07%*	0.28%	-6.15%	6.42%
	3 YEARS	13.72%	1.85%	11.87%	*5.57%*	*2.60%*	8.15%	-3.72%	11.87%
1997	*6 MONTHS*	31.66%	6.06%	25.60%	*23.80%*	*20.20%*	7.86%	-17.74%	25.60%
	1 YEAR	28.32%	18.45%	9.87%	*25.74%*	*28.10%*	2.57%	-7.30%	9.87%
	3 YEARS	7.93%	12.06%	-4.13%	*10.98%*	*18.01%*	-3.05%	1.09%	-4.13%
1996	*6 MONTHS*	25.99%	0.16%	25.82%	*17.18%*	*22.00%*	8.80%	-17.02%	25.82%
	1 YEAR	36.15%	10.05%	26.10%	*29.29%*	*31.99%*	6.85%	-19.25%	26.10%
	3 YEARS	22.40%	6.60%	15.80%	*20.48%*	*26.97%*	1.93%	-13.87%	15.80%
1995	*6 MONTHS*	48.88%	5.66%	43.22%	*33.28%*	*27.84%*	15.60%	-27.61%	43.22%
	1 YEAR	38.44%	5.01%	33.42%	*26.87%*	*23.11%*	11.57%	-21.86%	33.42%
	3 YEARS	27.91%	4.19%	23.73%	*24.84%*	*27.68%*	3.07%	-20.66%	23.73%
1994	*6 MONTHS*	47.87%	9.75%	38.11%	*27.88%*	*6.87%*	19.98%	-18.13%	38.11%
	1 YEAR	42.54%	16.93%	25.60%	*32.92%*	*22.62%*	9.61%	-15.99%	25.60%
	3 YEARS	27.03%	21.46%	5.57%	*27.51%*	*25.83%*	-0.47%	-6.04%	5.57%
1993	*6 MONTHS*	30.35%	17.10%	13.26%	*28.52%*	*7.19%*	1.84%	-11.42%	13.26%
	1 YEAR	14.52%	2.28%	12.25%	*9.84%*	*-1.39%*	4.69%	-7.56%	12.25%
	3 YEARS	21.91%	13.91%	8.00%	*20.29%*	*14.18%*	1.62%	-6.38%	8.00%

Table 22: Results Portfolio Strategy; All Industries; 'Best estimate'; Top 5 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	39.40%	7.59%	31.81%	*21.84%*	*9.37%*	*17.57%*	*-14.24%*	*31.81%*
	1 YEAR	35.30%	5.02%	30.28%	*19.47%*	*11.51%*	*15.83%*	*-14.45%*	*30.28%*
	3 YEARS	21.41%	4.66%	16.75%	*14.01%*	*11.58%*	*7.50%*	*-9.25%*	*16.75%*
2002	*6 MONTHS*	20.70%	7.86%	12.84%	*19.22%*	*7.16%*	1.48%	-11.36%	12.84%
	1 YEAR	67.48%	16.46%	51.02%	*37.94%*	*18.62%*	29.54%	-21.48%	51.02%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	27.10%	-11.65%	38.75%	*6.64%*	*-12.08%*	20.46%	-18.29%	38.75%
	1 YEAR	12.75%	-19.05%	31.81%	*-2.33%*	*-19.16%*	15.08%	-16.73%	31.81%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	75.01%	29.31%	45.70%	*32.66%*	*-17.62%*	42.35%	-3.34%	45.70%
	1 YEAR	41.83%	-4.01%	45.84%	*14.42%*	*-15.82%*	27.41%	-18.43%	45.84%
	3 YEARS	21.23%	-7.46%	28.69%	*20.02%*	*-12.26%*	19.54%	-9.15%	28.69%
1999	*6 MONTHS*	0.34%	36.86%	-36.52%	*5.35%*	*14.56%*	-5.01%	31.51%	-36.52%
	1 YEAR	2.86%	18.61%	-15.75%	*0.03%*	*5.97%*	2.83%	18.58%	-15.75%
	3 YEARS	14.09%	-7.51%	21.60%	*22.20%*	*-10.33%*	15.81%	-5.79%	21.60%
1998	*6 MONTHS*	7.45%	-4.77%	12.22%	*21.12%*	*17.53%*	-13.67%	-25.89%	12.22%
	1 YEAR	17.85%	1.84%	16.01%	*18.53%*	*21.07%*	-0.68%	-16.70%	16.01%
	3 YEARS	14.11%	1.09%	13.02%	*11.15%*	*2.60%*	9.29%	-3.73%	13.02%
1997	*6 MONTHS*	51.71%	-0.16%	51.87%	*22.57%*	*20.20%*	29.14%	-22.73%	51.87%
	1 YEAR	39.59%	7.12%	32.47%	*23.39%*	*28.10%*	16.21%	-16.26%	32.47%
	3 YEARS	10.61%	9.51%	1.10%	*5.29%*	*18.01%*	-1.12%	-2.22%	1.10%
1996	*6 MONTHS*	44.69%	-3.07%	47.76%	*22.68%*	*22.00%*	22.01%	-25.75%	47.76%
	1 YEAR	48.08%	4.60%	43.48%	*32.80%*	*31.99%*	15.27%	-28.20%	43.48%
	3 YEARS	23.08%	0.09%	22.99%	*18.61%*	*26.97%*	1.93%	-21.06%	22.99%
1995	*6 MONTHS*	64.59%	2.91%	61.68%	*32.72%*	*27.84%*	31.88%	-29.81%	61.68%
	1 YEAR	45.15%	5.31%	39.84%	*28.55%*	*23.11%*	16.60%	-23.24%	39.84%
	3 YEARS	27.17%	3.64%	23.53%	*22.86%*	*27.68%*	0.76%	-22.77%	23.53%
1994	*6 MONTHS*	75.51%	12.10%	63.41%	*32.30%*	*6.87%*	43.21%	-20.20%	63.41%
	1 YEAR	56.82%	18.74%	38.08%	*33.77%*	*22.62%*	23.05%	-15.03%	38.08%
	3 YEARS	35.32%	25.30%	10.03%	*3.27%*	*25.83%*	6.87%	-3.15%	10.03%
1993	*6 MONTHS*	26.92%	6.54%	20.38%	*23.11%*	*7.19%*	3.81%	-16.57%	20.38%
	1 YEAR	20.58%	0.56%	20.02%	*7.55%*	*-1.39%*	13.03%	-6.99%	20.02%
	3 YEARS	25.68%	12.60%	13.08%	*8.67%*	*14.18%*	6.94%	-6.14%	13.08%

Table 23: Results Portfolio Strategy; Industrial Industry; 'Best estimate'; Top 5 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	21.20%	-0.82%	22.02%	*12.17%*	*9.37%*	*9.04%*	*-12.99%*	*22.02%*
	1 YEAR	27.39%	-1.96%	29.35%	*15.19%*	*11.51%*	*12.20%*	*-17.15%*	*29.35%*
	3 YEARS	18.67%	3.34%	15.33%	*9.16%*	*11.58%*	*6.30%*	*-9.02%*	*15.33%*
2002	*6 MONTHS*	17.79%	-5.06%	22.84%	*8.22%*	*7.16%*	9.57%	-13.27%	22.84%
	1 YEAR	53.54%	-3.91%	57.45%	*28.84%*	*18.62%*	24.71%	-32.75%	57.45%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	9.02%	-9.42%	18.44%	*3.17%*	*-12.08%*	5.85%	-12.59%	18.44%
	1 YEAR	5.30%	-2.43%	7.74%	*7.42%*	*-19.16%*	-2.11%	-9.85%	7.74%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	45.57%	31.45%	14.12%	*41.55%*	*-17.62%*	4.02%	-10.10%	14.12%
	1 YEAR	29.39%	3.66%	25.74%	*20.00%*	*-15.82%*	9.40%	-16.34%	25.74%
	3 YEARS	18.35%	-2.25%	20.59%	*12.14%*	*-12.26%*	10.98%	-9.62%	20.59%
1999	*6 MONTHS*	-15.39%	4.13%	-19.53%	*-21.23%*	*14.56%*	5.84%	25.37%	-19.53%
	1 YEAR	8.92%	-15.63%	24.55%	*-17.69%*	*5.97%*	26.61%	2.06%	24.55%
	3 YEARS	6.90%	-4.37%	11.27%	*8.79%*	*-10.33%*	5.47%	-5.80%	11.27%
1998	*6 MONTHS*	-5.17%	-15.11%	9.93%	*3.77%*	*17.53%*	-8.94%	-18.88%	9.93%
	1 YEAR	13.44%	-7.09%	20.53%	*10.66%*	*21.07%*	2.79%	-17.74%	20.53%
	3 YEARS	5.11%	3.37%	1.74%	*-3.15%*	*2.60%*	3.95%	2.21%	1.74%
1997	*6 MONTHS*	31.26%	1.89%	29.37%	*20.39%*	*20.20%*	10.87%	-18.50%	29.37%
	1 YEAR	19.22%	9.14%	10.08%	*15.94%*	*28.10%*	3.28%	-6.80%	10.08%
	3 YEARS	3.03%	1.36%	1.67%	*-1.91%*	*18.01%*	4.82%	3.15%	1.67%
1996	*6 MONTHS*	41.08%	-3.75%	44.83%	*26.65%*	*22.00%*	14.44%	-30.39%	44.83%
	1 YEAR	58.65%	0.85%	57.80%	*37.78%*	*31.99%*	20.87%	-36.93%	57.80%
	3 YEARS	22.66%	4.29%	18.37%	*8.45%*	*26.97%*	2.13%	-16.24%	18.37%
1995	*6 MONTHS*	37.37%	4.59%	32.78%	*23.49%*	*27.84%*	13.88%	-18.90%	32.78%
	1 YEAR	39.68%	7.79%	31.88%	*29.92%*	*23.11%*	9.75%	-22.13%	31.88%
	3 YEARS	38.26%	2.61%	35.65%	*27.76%*	*27.68%*	9.61%	-26.04%	35.65%
1994	*6 MONTHS*	11.69%	-15.61%	27.31%	*1.51%*	*6.87%*	10.18%	-17.13%	27.31%
	1 YEAR	33.05%	-5.78%	38.83%	*17.28%*	*22.62%*	15.76%	-23.07%	38.83%
	3 YEARS	31.33%	13.26%	18.07%	*7.69%*	*25.83%*	4.50%	-13.57%	18.07%
1993	*6 MONTHS*	38.79%	-1.35%	40.14%	*14.13%*	*7.19%*	24.66%	-15.48%	40.14%
	1 YEAR	12.70%	-6.20%	18.90%	*1.72%*	*-1.39%*	10.98%	-7.92%	18.90%
	3 YEARS	23.69%	8.45%	15.24%	*13.51%*	*14.18%*	8.96%	-6.28%	15.24%

Table 24: Results Portfolio Strategy; Healthcare Industry; 'Best estimate'; Top 5 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	61.34%	9.00%	52.34%	*34.54%*	*9.37%*	*26.80%*	*-25.53%*	*52.34%*
	1 YEAR	48.73%	5.60%	43.13%	*23.36%*	*11.51%*	*25.37%*	*-17.76%*	*43.13%*
	3 YEARS	23.62%	7.35%	16.27%	*16.51%*	*11.58%*	*7.97%*	*-8.30%*	*16.27%*
2002	*6 MONTHS*	26.30%	13.29%	13.01%	*37.26%*	*7.16%*	-10.96%	-23.97%	13.01%
	1 YEAR	94.70%	7.87%	86.84%	*47.82%*	*18.62%*	46.88%	-39.96%	86.84%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	32.77%	22.86%	9.91%	*17.00%*	*-12.08%*	15.78%	5.86%	9.91%
	1 YEAR	25.55%	-16.19%	41.75%	*-2.65%*	*-19.16%*	28.20%	-13.54%	41.75%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	113.56%	23.88%	89.68%	*48.06%*	*-17.62%*	65.50%	-24.18%	89.68%
	1 YEAR	52.30%	0.37%	51.93%	*12.76%*	*-15.82%*	39.54%	-12.39%	51.93%
	3 YEARS	30.31%	-5.30%	35.61%	*29.85%*	*-12.26%*	28.62%	-6.99%	35.61%
1999	*6 MONTHS*	-15.04%	-10.69%	-4.35%	*-3.16%*	*14.56%*	-11.89%	-7.54%	-4.35%
	1 YEAR	19.37%	21.35%	-1.98%	*15.69%*	*5.97%*	3.68%	5.66%	-1.98%
	3 YEARS	30.87%	4.70%	26.17%	*33.74%*	*-10.33%*	25.23%	-0.93%	26.17%
1998	*6 MONTHS*	36.58%	-1.43%	38.00%	*32.99%*	*17.53%*	3.58%	-34.42%	38.00%
	1 YEAR	36.25%	-2.52%	38.77%	*20.80%*	*21.07%*	15.45%	-23.33%	38.77%
	3 YEARS	25.67%	4.54%	21.13%	*20.78%*	*2.60%*	14.28%	-6.84%	21.13%
1997	*6 MONTHS*	69.06%	-12.63%	81.69%	*22.88%*	*20.20%*	46.18%	-35.52%	81.69%
	1 YEAR	44.01%	6.34%	37.67%	*24.81%*	*28.10%*	19.20%	-18.47%	37.67%
	3 YEARS	-1.21%	18.05%	-19.25%	*-4.90%*	*18.01%*	-14.46%	4.79%	-19.25%
1996	*6 MONTHS*	28.64%	-6.02%	34.66%	*6.03%*	*22.00%*	22.62%	-12.04%	34.66%
	1 YEAR	39.07%	12.38%	26.69%	*23.17%*	*31.99%*	15.90%	-10.79%	26.69%
	3 YEARS	17.23%	-6.89%	24.13%	*33.04%*	*26.97%*	3.03%	-21.10%	24.13%
1995	*6 MONTHS*	118.80%	19.92%	98.89%	*66.56%*	*27.84%*	52.24%	-46.65%	98.89%
	1 YEAR	50.30%	0.31%	50.00%	*34.91%*	*23.11%*	15.39%	-34.61%	50.00%
	3 YEARS	24.23%	0.37%	23.86%	*24.48%*	*27.68%*	-1.85%	-25.71%	23.86%
1994	*6 MONTHS*	159.57%	36.87%	122.70%	*82.55%*	*6.87%*	77.02%	-45.68%	122.70%
	1 YEAR	86.47%	22.96%	63.50%	*46.36%*	*22.62%*	40.10%	-23.40%	63.50%
	3 YEARS	25.20%	35.22%	-10.02%	*-16.73%*	*25.83%*	-3.60%	6.41%	-10.02%
1993	*6 MONTHS*	43.16%	3.96%	39.19%	*35.17%*	*7.19%*	7.98%	-31.21%	39.19%
	1 YEAR	39.29%	3.15%	36.13%	*9.95%*	*-1.39%*	29.34%	-6.79%	36.13%
	3 YEARS	36.67%	8.13%	28.55%	*11.83%*	*14.18%*	12.50%	-16.04%	28.55%

Table 25: Results Portfolio Strategy; Consumer Discretionary Industry; 'Best estimate'; Top 5 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	6 MONTHS	29.95%	3.03%	26.91%	*12.53%*	*9.37%*	*17.41%*	*-9.50%*	*26.91%*
	1 YEAR	30.17%	4.61%	25.56%	*16.22%*	*11.51%*	*13.95%*	*-11.61%*	*25.56%*
	3 YEARS	16.13%	3.31%	12.81%	*10.77%*	*11.58%*	*5.56%*	*-7.25%*	*12.81%*
2002	6 MONTHS	28.49%	12.20%	16.30%	*13.16%*	*7.16%*	15.33%	-0.96%	16.30%
	1 YEAR	71.08%	13.06%	58.01%	*34.81%*	*18.62%*	36.27%	-21.75%	58.01%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	6 MONTHS	60.30%	-10.56%	70.87%	*17.56%*	*-12.08%*	42.75%	-28.12%	70.87%
	1 YEAR	59.39%	-5.47%	64.86%	*19.57%*	*-19.16%*	39.83%	-25.03%	64.86%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	6 MONTHS	120.80%	52.27%	68.53%	*40.55%*	*-17.62%*	80.25%	11.71%	68.53%
	1 YEAR	61.44%	0.62%	60.81%	*27.76%*	*-15.82%*	33.68%	-27.14%	60.81%
	3 YEARS	34.54%	-3.14%	37.68%	*20.34%*	*-12.26%*	25.34%	-12.34%	37.68%
1999	6 MONTHS	-33.95%	-2.85%	-31.10%	*-13.00%*	*14.56%*	-20.95%	10.15%	-31.10%
	1 YEAR	-17.87%	-8.89%	-8.98%	*-18.19%*	*5.97%*	0.32%	9.29%	-8.98%
	3 YEARS	22.76%	-0.72%	23.49%	*26.87%*	*-10.33%*	19.93%	-3.55%	23.49%
1998	6 MONTHS	-15.98%	-28.59%	12.61%	*-11.22%*	*17.53%*	-4.76%	-17.37%	12.61%
	1 YEAR	-5.75%	-1.70%	-4.04%	*2.45%*	*21.07%*	-8.20%	-4.16%	-4.04%
	3 YEARS	3.40%	-6.41%	9.81%	*9.46%*	*2.60%*	6.21%	-3.60%	9.81%
1997	6 MONTHS	53.80%	24.45%	29.35%	*27.04%*	*20.20%*	26.76%	-2.59%	29.35%
	1 YEAR	53.79%	24.64%	29.15%	*28.24%*	*28.10%*	25.54%	-3.61%	29.15%
	3 YEARS	9.86%	-10.09%	19.95%	*16.45%*	*18.01%*	10.11%	-9.84%	19.95%
1996	6 MONTHS	17.27%	-8.81%	26.08%	*6.62%*	*22.00%*	10.65%	-15.43%	26.08%
	1 YEAR	28.26%	2.90%	25.36%	*23.85%*	*31.99%*	4.40%	-20.95%	25.36%
	3 YEARS	4.96%	2.60%	2.36%	*-3.63%*	*26.97%*	-10.90%	-13.26%	2.36%
1995	6 MONTHS	16.83%	-12.49%	29.32%	*18.56%*	*27.84%*	-1.73%	-31.05%	29.32%
	1 YEAR	27.06%	12.73%	14.33%	*24.43%*	*23.11%*	2.63%	-11.70%	14.33%
	3 YEARS	23.58%	12.61%	10.97%	*12.57%*	*27.68%*	-0.42%	-11.39%	10.97%
1994	6 MONTHS	31.08%	-16.91%	47.99%	*1.26%*	*6.87%*	29.82%	-18.17%	47.99%
	1 YEAR	16.33%	5.40%	10.93%	*14.72%*	*22.62%*	1.60%	-9.32%	10.93%
	3 YEARS	16.81%	15.69%	1.12%	*6.08%*	*25.83%*	-3.97%	-5.09%	1.12%
1993	6 MONTHS	20.81%	21.62%	-0.81%	*24.82%*	*7.19%*	-4.01%	-3.20%	-0.81%
	1 YEAR	7.99%	2.83%	5.15%	*4.51%*	*-1.39%*	3.48%	-1.68%	5.15%
	3 YEARS	13.12%	15.98%	-2.86%	*-1.95%*	*14.18%*	-1.79%	1.08%	-2.86%

Table 26: Results Portfolio Strategy; ITT Industry; 'Best estimate'; Top 5 Safe stocks

All returns annualized

		RETURNS					EXCESS RETURNS		
		BUY	SELL	BUY-SELL	*Benchmark*	*S&P 500*	BUY	SELL	BUY-SELL
All Years	*6 MONTHS*	45.12%	19.17%	25.96%	*28.11%*	*9.37%*	*17.02%*	*-8.94%*	*25.96%*
	1 YEAR	34.90%	11.82%	23.09%	*23.10%*	*11.51%*	*11.81%*	*-11.28%*	*23.09%*
	3 YEARS	27.23%	4.62%	22.61%	*14.44%*	*11.58%*	*10.18%*	*-12.43%*	*22.61%*
2002	*6 MONTHS*	10.21%	11.00%	-0.79%	*18.25%*	*7.16%*	-8.04%	-7.25%	-0.79%
	1 YEAR	50.58%	48.82%	1.76%	*40.27%*	*18.62%*	10.30%	8.54%	1.76%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2001	*6 MONTHS*	6.30%	-49.48%	55.78%	*-11.18%*	*-12.08%*	17.48%	-38.30%	55.78%
	1 YEAR	-39.24%	-52.12%	12.89%	*-33.65%*	*-19.16%*	-5.59%	-18.48%	12.89%
	3 YEARS	NA	NA	NA	*NA*	*NA*	NA	NA	NA
2000	*6 MONTHS*	20.12%	9.66%	10.46%	*0.47%*	*-17.62%*	19.65%	9.19%	10.46%
	1 YEAR	24.20%	-20.68%	44.87%	*-2.83%*	*-15.82%*	27.02%	-17.85%	44.87%
	3 YEARS	1.72%	-19.16%	20.88%	*3.40%*	*-12.26%*	13.23%	-7.65%	20.88%
1999	*6 MONTHS*	65.73%	156.85%	-91.12%	*58.78%*	*14.56%*	6.96%	98.07%	-91.12%
	1 YEAR	1.01%	77.61%	-76.60%	*20.29%*	*5.97%*	-19.28%	57.31%	-76.60%
	3 YEARS	-4.16%	-29.63%	25.47%	*13.10%*	*-10.33%*	12.60%	-12.87%	25.47%
1998	*6 MONTHS*	14.39%	26.06%	-11.67%	*58.94%*	*17.53%*	-44.55%	-32.88%	-11.67%
	1 YEAR	27.45%	18.66%	8.79%	*40.22%*	*21.07%*	-12.77%	-21.56%	8.79%
	3 YEARS	22.26%	2.84%	19.42%	*7.85%*	*2.60%*	12.72%	-6.70%	19.42%
1997	*6 MONTHS*	52.73%	-14.34%	67.06%	*19.97%*	*20.20%*	32.76%	-34.30%	67.06%
	1 YEAR	41.35%	-11.63%	52.98%	*24.55%*	*28.10%*	16.80%	-36.18%	52.98%
	3 YEARS	30.75%	28.73%	2.03%	*17.68%*	*18.01%*	-4.93%	-6.96%	2.03%
1996	*6 MONTHS*	91.76%	6.30%	85.45%	*51.42%*	*22.00%*	40.34%	-45.12%	85.45%
	1 YEAR	66.32%	2.26%	64.06%	*46.40%*	*31.99%*	19.92%	-44.13%	64.06%
	3 YEARS	47.48%	0.37%	47.11%	*37.40%*	*26.97%*	13.45%	-33.66%	47.11%
1995	*6 MONTHS*	85.37%	-0.38%	85.75%	*22.25%*	*27.84%*	63.13%	-22.62%	85.75%
	1 YEAR	63.57%	0.41%	63.16%	*24.95%*	*23.11%*	38.62%	-24.54%	63.16%
	3 YEARS	22.60%	-1.04%	23.64%	*28.85%*	*27.68%*	-4.28%	-27.91%	23.64%
1994	*6 MONTHS*	99.70%	44.07%	55.63%	*43.88%*	*6.87%*	55.81%	0.18%	55.63%
	1 YEAR	91.45%	52.39%	39.06%	*56.72%*	*22.62%*	34.73%	-4.33%	39.06%
	3 YEARS	67.96%	37.03%	30.94%	*5.77%*	*25.83%*	30.58%	-0.36%	30.94%
1993	*6 MONTHS*	4.93%	1.91%	3.01%	*18.31%*	*7.19%*	-13.39%	-16.40%	3.01%
	1 YEAR	22.36%	2.46%	19.90%	*14.02%*	*-1.39%*	8.34%	-11.57%	19.90%
	3 YEARS	29.23%	17.82%	11.40%	*1.48%*	*14.18%*	8.09%	-3.31%	11.40%

Table 27: Statistical Significance Buy, Hold, Sell Recommendations; All Industries; 'Best estimate'

6 month holding period

T-TEST P-VALUES	BUY	HOLD	SELL
BUY	1.00000		
HOLD	0.00055	1.00000	
SELL	0.00000	0.00073	1.00000

1 year holding period

T-TEST P-VALUES	BUY	HOLD	SELL
BUY	1.00000		
HOLD	0.00000	1.00000	
SELL	0.00000	0.00000	1.00000

3 year holding period

T-TEST P-VALUES	BUY	HOLD	SELL
BUY	1.00000		
HOLD	0.00043	1.00000	
SELL	0.00000	0.00000	1.00000

Table 28: Buy, Hold, Sell Recommendation Distribution; 'Best estimate'

		ALL INDUSTRIES			INDUSTRIAL			HEALTHCARE			CONSUMER			ITT		
		n	n in %	Mispricing	n	n in %	Mispricing	n	n in %	Mispricing	n	n in %	Mispricing	n	n in %	Mispricing
All Years	BUY	391	37.10%	35.04%	102	38.64%	25.62%	108	42.19%	38.19%	94	31.23%	34.96%	87	37.34%	41.39%
	HOLD	414	39.28%	0.00%	105	39.77%	-0.14%	83	32.42%	0.25%	138	45.85%	0.14%	88	37.77%	-0.24%
	SELL	249	23.62%	-25.46%	57	21.59%	-23.75%	65	25.39%	-23.23%	69	22.92%	-27.76%	58	24.89%	-27.11%
2002	BUY	57	56.44%	53.64%	20	74.07%	37.82%	14	60.87%	55.01%	11	37.93%	64.12%	12	54.55%	57.62%
	HOLD	35	34.65%	-0.20%	6	22.22%	0.71%	8	34.78%	-1.36%	15	51.72%	1.14%	6	27.27%	-1.28%
	SELL	9	8.91%	-27.12%	1	3.70%	-24.94%	1	4.35%	-19.20%	3	10.34%	-39.60%	4	18.18%	-24.73%
2001	BUY	33	30.28%	30.22%	11	37.93%	23.42%	7	21.21%	30.01%	9	32.14%	28.65%	6	31.58%	38.81%
	HOLD	46	42.20%	-0.10%	10	34.48%	3.59%	16	48.48%	-3.18%	15	53.57%	0.78%	5	26.32%	-1.60%
	SELL	30	27.52%	-25.64%	8	27.59%	-24.13%	10	30.30%	-27.45%	4	14.29%	-23.66%	8	42.11%	-27.31%
2000	BUY	45	43.27%	36.13%	17	60.71%	36.00%	5	22.73%	27.26%	18	58.06%	38.79%	5	21.74%	42.46%
	HOLD	32	30.77%	-0.71%	5	17.86%	0.72%	8	36.36%	-3.41%	10	32.26%	-0.41%	9	39.13%	0.26%
	SELL	27	25.96%	-27.24%	6	21.43%	-30.85%	9	40.91%	-25.08%	3	9.68%	-25.99%	9	39.13%	-27.06%
1999	BUY	21	20.19%	43.24%	4	13.79%	19.83%	7	26.92%	54.75%	7	21.21%	41.88%	3	18.75%	56.50%
	HOLD	40	38.46%	-0.03%	14	48.28%	0.23%	7	26.92%	0.33%	12	36.36%	-0.49%	7	43.75%	-0.18%
	SELL	43	41.35%	-25.71%	11	37.93%	-21.95%	12	46.15%	-24.82%	14	42.42%	-29.31%	6	37.50%	-26.79%
1998	BUY	27	25.96%	28.21%	8	29.63%	21.82%	8	28.57%	36.39%	6	21.43%	31.48%	5	23.81%	23.14%
	HOLD	47	45.19%	0.01%	10	37.04%	-1.50%	10	35.71%	0.80%	14	50.00%	-0.16%	13	61.90%	0.89%
	SELL	30	28.85%	-26.56%	9	33.33%	-23.42%	10	35.71%	-24.15%	8	28.57%	-25.85%	3	14.29%	-32.80%
1997	BUY	39	35.45%	29.91%	8	30.77%	21.57%	11	39.29%	30.69%	10	29.41%	32.32%	10	45.45%	35.06%
	HOLD	43	39.09%	0.31%	12	46.15%	-0.46%	8	28.57%	0.16%	16	47.06%	0.88%	7	31.82%	0.68%
	SELL	28	25.45%	-25.55%	6	23.08%	-21.33%	9	32.14%	-28.55%	8	23.53%	-25.14%	5	22.73%	-27.18%
1996	BUY	46	43.40%	28.46%	12	46.15%	24.22%	13	54.17%	22.84%	8	28.57%	23.93%	13	46.43%	42.85%
	HOLD	42	39.62%	-1.07%	12	46.15%	-1.98%	6	25.00%	-0.89%	12	42.86%	-0.59%	12	42.86%	-0.82%
	SELL	18	16.98%	-27.09%	2	7.69%	-20.20%	5	20.83%	-26.36%	8	28.57%	-27.87%	3	10.71%	-33.95%
1995	BUY	53	50.96%	30.28%	11	47.83%	28.27%	17	68.00%	39.71%	13	43.33%	22.03%	12	46.15%	31.10%
	HOLD	40	38.46%	0.80%	10	43.48%	-0.47%	6	24.00%	1.82%	13	43.33%	2.71%	11	42.31%	-0.87%
	SELL	11	10.58%	-24.57%	2	8.70%	-32.58%	2	8.00%	-15.51%	4	13.33%	-27.02%	3	11.54%	-23.15%
1994	BUY	34	32.69%	35.07%	7	31.82%	24.38%	12	52.17%	41.04%	5	16.13%	28.83%	10	35.71%	46.03%
	HOLD	46	44.23%	-0.18%	12	54.55%	-1.20%	7	30.43%	3.43%	19	61.29%	-1.52%	8	28.57%	-1.43%
	SELL	24	23.08%	-22.74%	3	13.64%	-17.56%	4	17.39%	-21.28%	7	22.58%	-30.49%	10	35.71%	-21.65%
1993	BUY	36	33.33%	35.25%	4	14.81%	18.91%	14	58.33%	44.18%	7	24.14%	37.62%	11	39.29%	40.30%
	HOLD	43	39.81%	1.20%	14	51.85%	-1.06%	7	29.17%	4.83%	12	41.38%	-0.90%	10	35.71%	1.94%
	SELL	29	26.85%	-22.39%	9	33.33%	-20.53%	3	12.50%	-19.90%	10	34.48%	-22.64%	7	25.00%	-26.47%

Table 29: Quality of Intrinsic Value Estimates; 'Best estimate'

		ALL INDUSTRIES			INDUSTRIAL			HEALTHCARE			CONSUMER			ITT		
		Right	Wrong	Corr Prices	Right	Wrong	Corr Prices	Right	Wrong	Corr Prices	Right	Wrong	Corr Prices	Right	Wrong	Corr Prices
All Years	*6 MONTHS*	11.6	14.9	88.84%	11.7	14.9	88.02%	10.9	14.7	86.80%	14.2	15.9	97.02%	9.5	14.2	83.53%
	1 YEAR	13.1	13.4	85.37%	12.9	13.7	87.78%	12.8	12.8	80.71%	16.9	13.2	97.13%	9.9	13.8	75.87%
	3 YEARS	15.7	10.8	65.62%	16.6	9.5	75.74%	13.9	11.1	46.38%	18.6	11.9	92.84%	13.5	10.8	47.51%
2002	*6 MONTHS*	6.5	19.3	88.77%	*1*	*27*	*91.57%*	*7*	*16*	*77.05%*	*12*	*17*	*97.46%*	*6*	*17*	*89.00%*
	1 YEAR	10.5	15.3	89.92%	*11*	*17*	*93.00%*	*10*	*13*	*79.48%*	*16*	*13*	*99.58%*	*5*	*18*	*87.64%*
	3 YEARS	NA	NA	NA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
2001	*6 MONTHS*	14.0	13.5	91.81%	*17*	*12*	*89.44%*	*14*	*19*	*83.79%*	*12*	*16*	*98.27%*	*13*	*7*	*95.73%*
	1 YEAR	15.8	11.8	87.07%	*17*	*12*	*89.46%*	*21*	*12*	*76.93%*	*18*	*10*	*95.11%*	*7*	*13*	*86.80%*
	3 YEARS	NA	NA	NA	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
2000	*6 MONTHS*	12.0	14.0	82.05%	*15*	*13*	*71.61%*	*12*	*10*	*87.22%*	*10*	*21*	*82.37%*	*11*	*12*	*86.99%*
	1 YEAR	13.5	12.5	78.18%	*14*	*14*	*75.80%*	*13*	*9*	*75.57%*	*13*	*18*	*84.38%*	*14*	*9*	*76.96%*
	3 YEARS	15.5	10.5	59.71%	*18*	*10*	*75.54%*	*13*	*9*	*43.84%*	*18*	*13*	*62.10%*	*13*	*10*	*57.35%*
1999	*6 MONTHS*	9.8	16.5	79.33%	*10*	*19*	*78.33%*	*11*	*15*	*82.27%*	*13*	*20*	*97.67%*	*5*	*12*	*59.04%*
	1 YEAR	12.5	13.8	71.66%	*14*	*15*	*78.70%*	*14*	*12*	*77.70%*	*17*	*16*	*97.73%*	*5*	*12*	*32.50%*
	3 YEARS	17.5	8.8	56.34%	*20*	*9*	*78.21%*	*19*	*7*	*37.75%*	*23*	*10*	*92.29%*	*8*	*9*	*17.09%*
1998	*6 MONTHS*	11.8	14.5	83.65%	*14*	*14*	*77.77%*	*12*	*16*	*87.79%*	*15*	*13*	*99.52%*	*6*	*15*	*69.50%*
	1 YEAR	11.8	14.5	77.74%	*14*	*14*	*74.01%*	*13*	*15*	*77.96%*	*13*	*15*	*99.18%*	*7*	*14*	*59.80%*
	3 YEARS	16.3	10.0	67.73%	*18*	*10*	*68.68%*	*16*	*12*	*43.51%*	*17*	*11*	*98.82%*	*14*	*7*	*59.91%*
1997	*6 MONTHS*	11.8	15.8	90.97%	*11*	*15*	*93.82%*	*9*	*19*	*85.08%*	*15*	*19*	*99.26%*	*12*	*10*	*85.72%*
	1 YEAR	11.5	16.0	83.27%	*9*	*17*	*88.36%*	*8*	*20*	*68.78%*	*16*	*18*	*99.14%*	*13*	*9*	*76.80%*
	3 YEARS	14.8	12.8	46.08%	*15*	*11*	*57.47%*	*14*	*14*	*22.45%*	*20*	*14*	*97.32%*	*10*	*12*	*7.09%*
1996	*6 MONTHS*	15.0	11.8	91.81%	*17*	*9*	*97.67%*	*14*	*10*	*86.58%*	*17*	*11*	*99.35%*	*12*	*17*	*83.65%*
	1 YEAR	12.3	14.5	87.84%	*10*	*16*	*96.24%*	*12*	*12*	*76.05%*	*18*	*10*	*99.57%*	*9*	*20*	*79.48%*
	3 YEARS	14.3	12.5	61.58%	*12*	*14*	*61.12%*	*17*	*7*	*34.29%*	*12*	*16*	*97.37%*	*16*	*13*	*53.53%*
1995	*6 MONTHS*	10.5	15.5	91.58%	*9*	*14*	*91.68%*	*9*	*16*	*90.56%*	*16*	*14*	*99.07%*	*8*	*18*	*85.02%*
	1 YEAR	13.3	12.8	89.17%	*11*	*12*	*91.07%*	*12*	*13*	*88.89%*	*20*	*10*	*99.18%*	*10*	*16*	*77.54%*
	3 YEARS	15.5	10.5	68.32%	*15*	*8*	*85.95%*	*10*	*15*	*49.46%*	*22*	*8*	*98.67%*	*15*	*11*	*39.19%*
1994	*6 MONTHS*	11.3	14.8	94.32%	*7*	*15*	*93.36%*	*9*	*14*	*92.24%*	*19*	*12*	*99.05%*	*10*	*18*	*92.63%*
	1 YEAR	15.0	11.0	93.93%	*11*	*11*	*97.37%*	*14*	*9*	*90.98%*	*21*	*10*	*98.79%*	*14*	*14*	*88.57%*
	3 YEARS	15.5	10.5	78.47%	*13*	*9*	*86.09%*	*9*	*14*	*57.78%*	*22*	*9*	*97.60%*	*18*	*10*	*72.39%*
1993	*6 MONTHS*	13.3	13.8	94.13%	*16*	*11*	*94.95%*	*12*	*12*	*95.41%*	*13*	*16*	*98.16%*	*12*	*16*	*88.02%*
	1 YEAR	15.3	11.8	94.95%	*18*	*9*	*93.82%*	*11*	*13*	*94.74%*	*17*	*12*	*98.67%*	*15*	*13*	*92.58%*
	3 YEARS	16.0	11.0	86.74%	*22*	*5*	*92.83%*	*13*	*11*	*81.98%*	*15*	*14*	*98.58%*	*14*	*14*	*73.56%*