Financial Decision-making & Investor Behaviour

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To Pernille, and my daughter Marie,
through whom my life has been so greatly enriched.

Contents

1 Preface

The content of this book has become ever more relevant after the recent 2007–2009 and 2011 financial crises, one consequence of which was greatly increased scepticism among investment professionals about the received wisdom drawn from standard finance, modern portfolio theory and its later developments. The combined collapse of Goldman Sachs Asset Management quantitative funds during the summer of 2008 and then the formal academic recognition in 2009 that an equally divided asset-allocation strategy performed better than any statically optimised portfolio strategy cast serious doubts on the capability of modern standard finance, relying as it does on quantitative analytics, to provide value to investors. Modern portfolio theory suddenly appeared terribly old-fashioned and out of date for a very simple and straightforward reason: It did not work!

Finance and investment management are not like physics. In finance, there are very few systematic "laws of nature" to be observed. We instead observe the effects of compounded human behaviour on asset prices in an open environment where exogenous shocks take place on a continuous basis. Standard finance theory tackles this complexity through some rather extreme shortcuts. These include, for example, the assumption that the dynamics of asset prices are random and that the distribution of possible outcomes follows a Gaussian law. Further embedded within standard finance is the concept of "Homo economicus" being the idea that humans make perfectly rational economic decisions at all times. These shortcuts make it much easier to build elegant theories, but, after all in practice, the assumptionsdid not hold true.

So what is the alternative? Behavioural finance may be part of the solution, with its emphasis on the numerous biases and heuristics (i.e. deviations from rationality) attached to the otherwise exemplary rational "Homo economicus" individual assumed in standard finance. Anomalies have been accumulating that are difficult to explain in terms of the standard rational paradigm, many of which interestingly are consistent with recent findings from psychology. Behavioural finance makes this connection, applying insights from psychology to financial economics. It puts a human face on the financial markets, recognising that market participants are subject to biases that have predictable effects on prices. It, thus, provides a powerful new tool for understanding financial markets and one that complements, rather than replaces, the standard rational paradigm.

At its core, behavioural finance analyses the ways that people make financial decisions. Besides the impact on financial markets, this also has relevance to corporate decision making, investor behaviour, and personal financial planning. Our psychological biases and heuristics have real financial effects, whether we are corporate manager, professional investors, or personal financial planners. When we understand these human psychological phenomena and biases, we can make better investment decisions ourselves, and better understand the behaviours of others and of markets.

1.1 Outlining the structure of the book

In Chapter 2, the concepts of behavioural finance are introduced atop of a brief review of the individual economic decision-making and the efficient market hypothesis. Prospect theory is introduced and the coherent concepts of loss aversion, framing, mental accounting as well as integration versus segregation in decision-making are presented. Chapter 3 examines the numerous heuristics and biases related to financial investments including financial behaviour stemming from familiarity, financial behaviour stemming from representativeness, anchoring, path-dependent decision behaviour as well as overconfidence and excessive trading. Examples of financial anomalies related to the stock market is reviewed in the fourth chapter includingthe January effect, small-firm effect, the winner's curse, the equity premium puzzle, the value puzzle and other anomalies. Chapter 5 introduces a selection of the most famous historical financial bubbles and chapter 6 provides a sum-up of behavioural investing presented in seven main points to consider for the modern investor.

1.2 Acknowledgements and author's foreword

This book is for everyone interested in finance and investing. Although some of the sections will require some preceding knowledge, the aim has been to write a book for the "mass" rather than for the "class", i.e. to introduce the eye-opening evidence of the behavioural side of investing, and to demonstrate its relevance, terms, and terminology. Readers acquainted with financial literature will be surprised to find very few equations. Although finance has much of its elegance (and most likely also its shortcomings!) from its mathematical representation, behavioural finance has not. Hopefully, however, those with a deep interest in the mathematical representation of finance will too be convinced, through this book, that there is far more to finance and investing, than what can be depicted by mathematical equations.

My thanks and gratitude to Assistant Professor Nigel Barradale and Professor Michael Møller (both at Copenhagen Business School, Denmark) as well as to Professor Terrence Odean (Haas School of Economics, Berkeley, California, U.S.), Professor Lucy Ackert (Michael J. Coles Colleges of Business, Kennesaw State University, Georgia, U.S.), and Richard Deaves (DeGroote School of Business, McMaster University, Ontario, Canada) for graciously allowing me to use some of their written material in this book.

A special thanks to graduate students of finance; Melena Johnsson, Henrik Lindblom, and Peter Platan (all at the School of Economics and Management, Lund University, Sweden), for generously giving me access to their comprehensive works on behavioural finance.

It is my sincere hope that you will find this book both interesting and relevant. I myself always find it amusing to realise how much alike our financial behaviour are, despite that fact that we all believe we are better-than-average. And even if this book will not make you rich overnight, it hopefully will make your investment decisions stronger and more contemplated, as well as bring your own general financial behaviour into a greater enlightenment!

I'll be happy to receive any comments or suggestions for improvement.

Peter Dybdahl Hede,
Vesterbro, 2012

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2 From standard finance to behavioural finance?

Standard finance stand on the arbitrage principles of Miller & Modigliani, the portfolio principles of Markowitz, the capital asset pricing theory of Sharpe, Lintner & Black, and the option-pricing theory of Black, Scholes & Merton. These approaches consider markets to be efficient and are highly normative and analytical.

Modern financial economic theory is based on the assumption that the representative market actor in the economy is rational in two ways: the market actor makes decisions according to the axiom of expected utility theory and makes unbiased forecasts about the future. According to the expected utility theory a person is risk averse and the utility function of a person is concave, i.e. the marginal utility of wealth decreases. Assets prices are set by rational investors and, consequently, rationality based market equilibrium is achieved. In this equilibrium securities are priced according to the efficient market hypothesis. This hypothesis will be presented in section 2.2 but first we will look briefly at the economic decision making process for the view point of the individual human.

2.1 Individual economic decision-making

In traditional economics, the decision-maker is typically rational and self-interested. This is the Homo economicus[1] view of man's behaviour in which a man acts to obtain the highest possible well-being for himself given available information about opportunities and other constraints on his ability to achieve his predetermined goals (Persky, 1995). According to conventional economics, emotions and other extraneous factors do not influence people when it comes to making economic choices. Homo economicus is seen as "rational"[2] in the sense that well-being, as defined by the personal utility function, is optimized given perceived opportunities. That is, the individual seeks to attain very specific and predetermined goals to the greatest extent with the least possible cost[3] (Gilboa, 2010).

In most cases, however, this assumption doesn't reflect how people behave in the real world. The fact is people frequently behave irrationally. Consider how many people purchase lottery tickets in the hope of hitting the big jackpot. From a purely logical standpoint, it does not make sense to buy a lottery ticket when the odds of winning are overwhelming against the ticket holder (roughly 1 in 146 million, or 0.0000006849%, for the famous Powerball jackpot). Despite this, millions of people spend countless Euros on this activity. These anomalies prompted academics to look to cognitive psychology to account for the irrational and illogical behaviours that modern economics had failed to explain.

2.1.1 The Decision-Making Process – Choice under Uncertainty

When referring to single-decision problems, it has become practise in normative theoretical models to divide the decision-making process into four steps. Although these steps may not always be followed explicitly, the subdivision of the process in decision-making into steps is useful in an analytical sense. The four steps are: First, one recognises the present situation or state. Second, one evaluates action candidates or options in terms of how much reward or punishment each potential choice would bring. Third, one acts in reference to one's needs. Fourth, one may re-evaluate the action based on the outcome (Doya, 2008). Such normative approaches to decision-making typically assume that the decision-maker has all relevant information available, and all the time in world to make his decision. Sometimes such models even assume that all possible outcomes of the decision are known beforehand.

In practise, individuals are seldom capable of knowing the possible outcome of the decision with certainty. Many choices involve uncertainty[4] or imperfect knowledge about how choices lead to outcomes. Problems raised by decision-making under uncertainty are typically addressed by two separate branches of economics: The economics of uncertainty and the economics of information. The first sees the decision-maker as accepting the limitations of his knowledge and getting on with making the best decisions he can. The second asks what new information an individual might seek out before taking any decisions at all (Gilboa, 2010). This means that economics of uncertainty studies decisions whereas the economics of information studies the preparation for decision-making (Ackert & Deaves, 2010).

As an example, the choice of choosing a higher education is indeed associated with uncertainty and risks. Uncertainty of the returns to high education has been identified by Ji (2008) to mainly come from three types of risks. Firstly, the individual experiences market risks. In a typical dynamic economy frequently exposed to technical and organisational changes along with labour supply shocks etc., the value of human capitals and skills often shifts over time. As a result, employees with the same level of education may receive different wages. Secondly, the individual cannot be certain that he actually is able to complete his education. Thirdly, given the individual's cognitive ability, the individual also cannot predict precisely what his relative position in the post-education earnings distribution will be. Before going into a deeper analysis of the factors behind human decision-making we will start with the most basic choice theories based on probability theory.

2.1.2 Expected Value Theory

In the seventeenth-century, Blaise Pascal recognised that by calculating the likelihood of the different outcomes in a gamble, an informed bettor could choose the option that provided the greatest combination of value and probability. This quantity of value multiplied by probability is now known as "Expected value" (Platt & Huettel, 2008). In other words, the expected value of a random variable is the weighted average of all possible values that this random variable can take on. The weights used in computing this average correspond to the probabilities in case of a discrete random variable, or densities in case of a continuous random variable. From a mathematical standpoint, the expected value is thus the integral of the random variable with respect to its probability measure (Gilboa, 2010).

The expected value may be intuitively understood by the law of large numbers as the expected value is the limit of the sample mean as the sample size grows to infinity. More informally, it can be interpreted as the long-run average of the results of many independent repetitions of an experiment (e.g. a die roll). The expected value, however, does not exist for some practical distributions with large "tails", such as the Cauchy distribution (Petruccelli et al., 1999). Furthermore, the expected value may not be expected in the general sense and the expected value itself may be practically unlikely or even impossible, just like the sample mean (Gilboa, 2010).

In the case of a one-shot decision as an educational choice, it is worth noting that there is no rule saying that for single-decision problems, one should maximise the expected value (Gilboa, 2010). As explained above, expectation is a way of summarising a distribution of a random variable by a number. It is a simple and intuitive measure, but it does not mean that the only rational thing is to maximise it. Indeed, expected value is often a poor predictor of people's choices as variables in practice seldom are identically and independently distributed and the law of large numbers not always applies (Platt & Huettel, 2008).

2.1.3 Expected Utility Theory

In the mid-eighteenth century, Daniel Bernoulli assumed that states of wealth have a specific utility, and proposed that the decision rule for choice under risk is to maximise the expected utility rather than expected value (Kahneman, 2002). He suggested that if one wants to predict human behaviour, one will do better if instead of calculating the expected monetary value of various choices, one calculates the expected value of a utility function of these monetary values (Gilboa, 2010). The Expected utility theory was further developed by Neumann and Morgenstern in an attempt to define rational behaviour when people face uncertainty (Ackert & Deaves, 2010). The theory is normative in the sense that it describes how people should rationally behave5 and Expected utility theory is set up to deal with risk and not uncertainty.

Introducing utility into the weighted sum allows much more freedom, and maximisation of expected utility can explain many more phenomena than maximisation of expected value. In particular, the choice of education is incompatible with expected value maximisation, but is in principle compatible with expected utility maximisation (Gilboa, 2010). Formally, however, it is not clear why people should maximise expected utility rather than some other formula that may or may not involve a utility function. It is also not necessarily clear whether or not it is reasonable to assume that in reality people behave as if they had a utility function whose expectation they are seeking to maximise (Gilboa, 2010).

The theory of expected utility maximisation is more general than expected value maximisation, but we may still not be convinced that maximisation of expected utility makes sense (Gilboa, 2010). An important point, however, is that maximisation of utility does not preclude emotional decision-making. To say that someone maximises a utility function is merely to say that he is coherent in his choices (Gilboa, 2010).

In response to the growing literature on the psychology of decision-making, Akerlof & Kranton (2000 & 2002) were among the first to emphasize the physiological aspects of educational choice by introducing exogenous physiological gains and costs determined by their own social category into a frame of Expected utility theory. Akerlof & Kranton (2002) proposed a utility function that incorporates "identity"6 as a motivation for educational choice-behaviour. Identity, associated with a certain social category, defines how people in this category should behave. They also claim that each social category imposes an "identity" on its members, which creates the relevant psychological and social costs when the individual violates the identity (Ji, 2008). The psychological and social costs are derived from the difference between the agents' own characteristics and the ideal of the assigned category, as well as from the difference between the agents' educational choice and the educational level in the ideal social category (Akerlof & Kranton, 2000 & 2002).

Based on given utility settings, Akerlof & Kranton (2002) then constructed a game-theoretic model where schools promote a single social category, and the students choose between the "ideal academic identity" and an identity fitting their social backgrounds. When the students hold two contradictory ideas simultaneously, Akerlof & Kranton (2002) term the phenomena as "cognitive dissonance". When experiencing such dissonance, individuals have a fundamental cognitive drive to reduce it by modifying the existing belief, or by rejecting one of the contradictory ideas at a physiological cost. An interesting example is when the cognitive dissonance is so large that the psychological costs of keeping an "ideal academic identity" are greater than the benefits of future wages and of an ideal self-image. Akerlof & Kranton (2002) point out that students from lower social classes are often trapped in such situations, and then end up rejecting the higher educational system.

Although, expected utility models in general provide a simple and powerful theoretical framework for choice under risk, and advanced expected utility models, as the one by Akerlof & Kranton (2002), does give indications of why some individuals fail in higher educational achievements, the model, however, does not give any suggestions of how to address and overcome this problem.

Decision-problems can be presented in many different ways and Ackert & Deaves (2010) argue that some evidence suggests that people's decisions are not the same across various presentations. When a choice problem is presented to a person, a change in frame can lead to a change in decision. There is numerous evidence of such phenomenon (e.g. Kahneman, 2002, Camerer, 1981 and Tversky & Kahneman 1974). Such framing effects are violations of Expected utility theory, as the theory rests on the assumption that people should have consistent choices regardless of presentation (Ackert & Deaves, 2010). This is presented further in section 2.7.4.

Similarly, across a wide range of economic situations and situations similar to the educational choice, uncertainty leads to systematic violations of expected utility models. As highlighted by Camerer (1981), many real-world decisions have a complex form of uncertainty, because the distribution of outcomes itself is unknown. For example, no one can know in advance all of the consequences that will follow from enrolling at one higher education or another. When the outcomes of a decision cannot be specified, even with estimated risk probabilities, the decision is said to be made under ambiguity (Platt & Huettel, 2008). Under such circumstances, people are observably even more averse to ambiguity than to risk alone (Forbes, 2009). Such observations have formed the basis for Prospect theory which will be presented in the following section.

2.1.4 The Allais Paradox

A persistent documentation of contradiction of Expected utility theory is the so-called "Allais paradox" suggested by the French economist Maurice Allais in the 1950s. The Allais paradox arises when comparing participants' choices in two different experiments, each of which consists of a choice between two gambles, A and B. By changing only the likeliness of outcomes, Allais proved that people do not make choices in accordance with certain axioms on which the Expected utility theory rests (Ackert & Deaves, 2010). The inconsistency stems from the fact that in Expected utility theory equal outcomes added to each of the two choices should have no effect on the relative desirability of one gamble over the other. That is, equal outcomes should "cancel out" (Forbes, 2009). The paradox is an example of how the Expected utility theory seems to be struggling to explain choices under uncertain outcomes. Such observations encouraged the development of a more descriptive theory of choice such as the Prospect theory as we will look into in section 2.3. Firstly, however, we will return to the homo economicus assumption in a broader market sense expressed in terms of the efficient market hypothesis.

2.2 The efficient market hypothesis

According to the efficient market hypothesis, financial prices incorporate all available information and prices can be regarded as optimal estimates of true investment value at all times. The efficient market hypothesis is based on the notion that people behave rationally, maximise expected utility accurately and process all available information. In other words, financial assets are always priced rationally, given what is publicly known. Stock prices approximately describe random walks through time, i.e. price changes are unpredictable since they occur only in response to genuinely new information, which by the very fact that it is new, is unpredictable. Due to the fact that all information is contained in stock prices it is impossible to make an above average profit and beat the market over time without taking excess risk.

Eugene Fama has provided a careful description of an efficient market that has had a lasting influence on practitioners and academics in finance. According to Fama (1965), an efficient market is:

"...a market where there are large numbers of rational profit maximisers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants. In an efficient market, on the average, competition will cause the full effects of new information on intrinsic values to be reflected "instantaneously" in actual prices. A market in which prices always "fully reflect" all available information is called "efficient".

Notice that the definition of an efficient market relies critically on information. Fama (1965) defined three versions of market efficiency to clarify what is intended by "all available information". In the weak form, prices reflect all the information contained in historical returns. In the semi-strong form, prices reflect all publicly available information, including past earnings and earnings forecasts, everything in the publicly released financial statements (past and most recent), everything relevant appearing in the business press, and anything else considered relevant. In the strong form, prices even reflect information that is not publicly available, such as insiders' information. Notice that if prices always reflect all information, we must be assuming that the cost of information acquisition and information generation is zero. Of course, we know that this is not reasonable. Thus, a better working definition of the efficient market hypothesis is that prices reflect all information such that the marginal benefit of acting on the information does not exceed the marginal cost of acquiring the information.

2.1.1 What does market efficiency imply?

In finance and economics, an efficient market is often taken to imply that an asset's price equals its expected fundamental value. For example, according to the present value model of stock prices, a stock's price equals the present value of expected future dividends. Price in this specific case is thus simply expressed as:

$$p_t = \sum_{i=1}^{\infty} \frac{E_t(d_{t+i})}{(1+\delta)^i} \tag{2.1}$$

where p_t is the stock price today at time t, $E_t(d_{t+i})$ is the expected value of the future dividend at time t+i using information available today, and δ is the discount rate, which reflects the stock's risk. Some of the evidence against the efficient market hypothesis discussed later in the book is based on violations of this relationship. Test of the present value model must specify the information available to traders in forming their expectations of future dividends. The present model of stock prices says that, in an efficient market, a stock's price is based on reasonable expectations of its fundamental value.

Note that market efficiency does not suggest that individuals are ill-advised to invest in stocks. Nor does it suggest that all stocks have the same expected return. The efficient market hypothesis in essence says that while an investment manager cannot systematically generate returns above the expected risk-adjusted return, stocks are priced fairly in an efficient market. Because investors have different attitudes toward risk, they may have different portfolios. The efficient market hypothesis, hence, does not suggest that any stock or portfolio is as good as any other.

In addition, while the efficient market hypothesis suggests that excess return opportunities are unpredictable, it does not suggest that prices levels are random. Prices are fair valuations of the firm based on the information available to the market concerning the actions of management and the firm's investment and financing choices.

2.2 Behavioural Finance

For a while, theoretical and empirical evidence suggested that the capital asset pricing model, the efficient market hypothesis and other rational financial theories did a respectable job of predicting and explaining certain events. However, as time went on, academics in both finance and economics started to find anomalies and behaviours that couldn't be explained by theories available at the time. While these theories could explain certain "idealised" events, the real world proved to be a very messy place in which market participants often behaved very unpredictably.

Behavioural finance is an add-on paradigm of finance, which seeks to supplement the standard theories of finance by introducing behavioural aspects to the decision-making process. Contrary to the Markowitz and Sharp approach, behavioural finance deals with individuals and ways of gathering and using information. At its core, behavioural finance analyses the ways that people make financial decisions. Behavioural finance seeks to understand and predicts systematic financial market implications of psychological decision processes. In addition, it focussed on the application of psychological and economic principles for the improvement of financial decision-making.

2.2.1 Challenging the efficient market hypothesis

Market efficiency, in the sense that market prices reflect fundamental market characteristics and that excess returns on the average are levelled out in the long run, has been challenged by behavioural finance. There have been a number of studies pointing to market anomalies that cannot be explained with the help of standard financial theory, such as abnormal prices movements in connection with initial public offerings (IPOs), mergers, stock splits, and spin-offs. Throughout the 1990s and 2000s statistical anomalies have continued to appear which suggests that the existing standard finance models are, if not wrong, probably incomplete. Investors have been shown not to react "logically" to new information, but to be overconfident and to alter their choices when given superficial changes in the presentation of investment information. During the past few years there has, for example, been a media interest in social media stocks, as with Facebook IPO's recently. Most of the time, as we know in retrospect, there was a positive bias in media assessments, which might have led investors in making incorrect investment decisions. These anomalies suggest that the underlying principles of rational behaviour, underlying the efficient market hypothesis, are not entirely correct and that we need to look, as well, at other models of human behaviour, as have been studied in other social sciences. The following sections introduce some of the basic findings and principal theories within behavioural finance that often contradict the basic assumption of standard financial theory.

2.3 Prospect theory

The first part of this chapter briefly presented the traditional standard economic approach to understanding individual behaviour, financial decision-making, and market outcomes. This subsection will consider more recent attempts to describe behaviour that incorporate observed aspects of human psychology. At the core of behavioural finance is the prospect theory suggested by two psychologists Kahnemann & Tversky in the 1970s.

Prospect theory is a mathematically formulated alternative to the theory of expected utility maximisation. The expected utility theory offers a representation of truly rational behaviour under certainty. According to the expected utility theory investors are risk averse. Risk aversion is equivalent to the concavity of the utility function, i.e. the marginal utility of wealth decreases. Every additional unit of wealth is valued less than the previous equivalent increase in wealth. Despite the obvious attractiveness of the expected utility theory, it has long been known that the theory has systematically failed to predict human behaviour, at least in certain circumstances[7]. Kahnemann & Tversky (1974) found empirically that people underweight outcomes that are merely probably in comparison with outcomes that are obtained with certainty; also that people generally discard components that are shared by all prospects under consideration. Under prospect theory, value is assigned to gains and losses rather than to final assets. Also probabilities are replaced by decision weights.

Another foundation of the prospect theory is the value function (see figure 1). The value function differs from the utility function in expected utility theory due to a reference point, which is determined by the subjective impression of individuals. According to the conventional expected utility theory, the utility function is concave downward for all levels of wealth. On the contrary, according to the value function the slope of the utility function is upward sloping for wealth levels under the reference point and downward sloping for wealth levels after the reference point. The reference point is determined by each individual as a point of comparison, e.g. a measure of a target level of wealth. For wealth levels under this reference point investors are risk seekers, i.e. they are prepared to make riskier bets in order to stay above their preferred target of wealth. Whereas, for wealth levels above this reference point, the value function is downward sloping, in line with conventional theories, and investors here are risk averse. Kahnemann & Tversky (1974) asserted that people are risk seekers for losses.

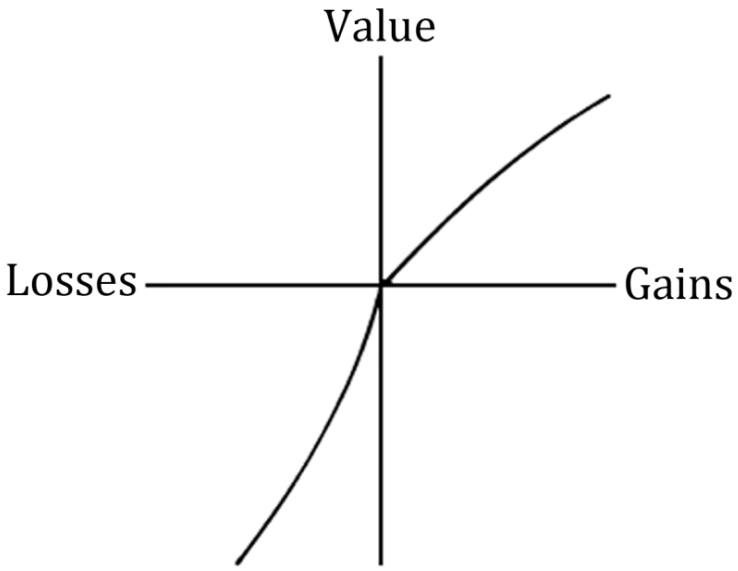

Figure 1: Kahnemann & Tversky's Value Function (Based on Kahnemann & Tversky, 1974)

The two phenomena observed by Kahnemann & Tversky (1974), the preference for certain outcomes and the preference for risk when faced with losses, may explain some premises of investors' irrational behaviour. Due to the fact that the reference point in the value function always moves with wealth to stay at the perceived current level of utility, investors will always behave in a risk adverse manner even when small amounts of wealth are in question (people are risk-seeking in losses, but risk-averse in gains). Subsequently, they will always prefer taking a risk when confronted with losses. This phenomenon, called "loss aversion", is presented briefly in the following subsection. Likewise, regret is an aspect of the prospect theory that can be traced to the value function theory.

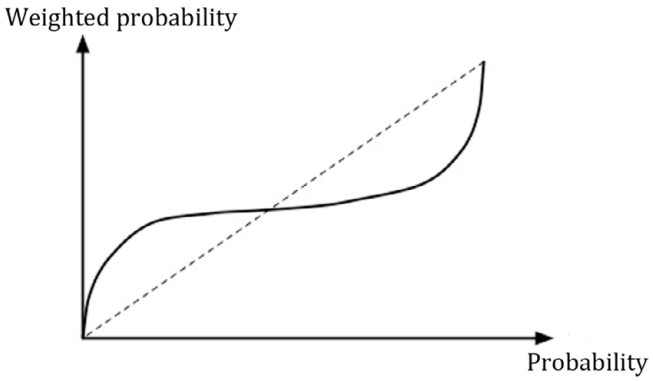

Figure 2: Kahnemann & Tversky's Weighting Function (Based on Kahnemann & Tversky, 1974)

Like many theories, prospect theory has changed since its original form. While in the original version of prospect theory published in 1979 Kahnemann & Tversky spoke of what conditions an appropriate weighting function should embody, they did not attempt to formulate such a function. This was left to their more mathematically rigorous version of prospect theory, known as "cumulative prospect theory". Cumulative prospect theory answers some technical objections to the original theory (for example that prospect theory originally violated statistical dominance). In this book, only graphical illustrations of the value function (see figure 1) and the weighting function (see figure 2) are presented. Cumulative prospect theory has been used to explain the "equity premium puzzle" (why stocks enjoy such high returns compared to bonds) and various stock market anomalies as is presented in chapter 4.

2.3.1 Loss aversion

Prospect theory supposes that people's utility derives from losses and gains, rather than from final wealth. People work from a psychological reference point and strongly prefer to avoid losses below it. The value function shows the sharp asymmetry between the values that people put on gains and losses. This asymmetry is called "loss aversion". Empirical tests indicate that losses are weighted about twice as heavily as gains, i.e. losing 1€ is about twice as painful as the pleasure of gaining 1€. This can also be expressed as the phenomenon in which people will tend to gamble in losses, i.e. investors will tend to hold on to losing positions in the hope that prices will eventually recover. This is due to the fact that the utility function under the prospect theory is upward sloping for wealth levels under each individual's reference point.

Loss aversion can help to explain the tendency of investors to hold on to loss making stocks while selling winning stocks too early. Shefrin (2000) called this occurrence the "disposition effect". This hypothesis has been supported empirically for field data (Heisler, 1994; Odean, 1998), and in experimental asset markets (Heilmann et al., 2000; Weber & Camerer, 1998). Odean (1998) analysed trading records for 10,000 accounts at a large discount brokerage house and found that investors held losing stocks for a median of 124 days, while winners were held for only 104 days. Using an experimental call market, Heilmann et al. (2000) showed that the number of assets offered and sold was higher during periods of rising trading prices than during periods of falling trading prices. When investors view stocks on an individual basis, then risk aversion in gains will cause them to sell too quickly into rising stock prices, thereby depressing prices relative to fundamental values. Conversely, risk seeking in losses will cause investors to hold on too long when prices decline, thereby causing the prices of stocks with negative momentum to overstate fundamental values. Loss aversion also implies that decision-making is sensitive to the description of the action choices, i.e. to the way the alternatives are "framed". This important role of frames is presented in the following section.

2.3.2 Framing and mental accounting

Framing and mental accounting are both parts of the prospect theory. A decision frame is a decision-makers view of a problem and the possible outcomes. A frame is affected by the presentation, the person's perception of the question, and personal characteristics. If a person's decision changes simply because of a change in frame, expected utility theory is violated because it assumes that people should have consistent choices, regardless of presentation. Mental accounting describes the tendency of people to place particular events into different mental accounts, based on superficial attributes. The main underlying idea is that decision-makers tend to separate the different types of gambles they face into separate accounts, and then apply prospect theoretic decisions rules to each account, thereby ignoring possible interaction between the accounts. Mental accounts can be isolated not only by content, but also in respect to time.

The mental accounting bias also enters into investing. For example, some investors divide their investments between a safe investment portfolio and a speculative portfolio in order to prevent the negative returns that speculative investments may have from affecting the entire portfolio. The problem with such a practice is that despite all the work and money that the investor spends to separate the portfolio, the investor's net wealth will be no different than if he had held one larger portfolio. Mental accounting can serve to explain why investors are likely to refrain from readjusting his or her reference point for a stock. When the stock is purchased, a new mental account for the particular stock is opened. The natural reference point, as in the Kahnemann & Tversky valuation function described in a previous subsection, is the asset purchase price. A running score is then kept on this account indicating gains or losses relative to the purchase price. When another stock is purchased, another separate account is created. A normative frame recognises that there is no substantive difference between the returns distributions of the two stocks, only difference in names. However, a situation involving the sale of the first stock when it has decreased in price and using the proceeds to buy the second stock may be framed as closing the first stock account at a loss. It has been argued that decision-makers encounter considerable difficulty in closing a mental account at such a loss.

The role of frames is also illustrated in the dividend puzzle according to which private investors treat dividends separately from capital gains. In a world without taxes and transaction costs, investors should be indifferent between a dividend Euro and a capital Euro. Moreover, in a world where dividends are taxed more heavily than capital gains, standard investors know that they are actually better off when companies refrain from paying dividends. So why do companies pay dividends? A dividend Euro is different from a capital Euro according to the prospect theory because the investor frames the Eurosinto two distinct mental accounts. Therefore, even though a stock paying out dividends might be decreasing in price an investor may be reluctant to sell the stock in fear of closing a mental account containing dividend income. Dividends can be thought of as a separate gain from the capital gain due to the rise in the stock price itself. Financing consumption out of dividends further avoids the anticipated regret of selling a stock that might later rise in value. One could argue that private investors think naturally in terms of having a "safe" part of their portfolio that is protected from downside risk and a risky part that is designed for getting rich.

Mental accounting can also result in "good money being thrown after bad money" by a continuous operation of non-profitable ventures in the hope that recovery will somehow take place. It may also explain framing which is beneficial to investors with imperfect self-control. Glick (1957) reports that the reluctance to realise losses constitutes a self-control problem. He describes professional traders who are very prone to let their losses "ride". It is the control of losses that constitutes the essential problem. The traders' problem was to exhibit sufficient self-control to close accounts at a loss even though they were clearly aware that riding losses was not rational. Self-control is also exhibited in the dividends puzzle, mentioned above. For example, old investors, especially retirees who finance their living expenditures from their portfolios, worry about spending their wealth too quickly, thereby outliving their assets. They fear a loss of self-control, where the urge for immediate gratification can lead to overspending.

2.3.3 Integration versus segregation

In many cases, the decision-maker chooses a reference point, and whether an outcome is perceived as positive or negative will depend on the reference point selected. For example, as adapted from Tversky & Kahnemann (1981), suppose you lost 150€ at the horse track today. You are considering betting another 10€ in the next and final race of the day on a horse with 15:1 odds. This means that if your horse wins, your payoff for the race will be 150€, but if your horse loses, you lose the 10€ bet.

Notice how important the bettor's reference point is here. If he includes his losses over the day, the bet will result in either a break even position if the horse wins or an overall loss of 150€ if the horse loses (plus the 10€ lost in the final race). But if the bettor ignores his prior losses and considers his reference point to be a fresh slate, the outcome of the final bet is either a gain of 150€ or a loss of 10€. Prospect theory predicts that a decisions-maker who adopts the latter approach of segregating outcomes will be less inclined to accept risk in this situation, both because the gamble crosses over between loss and a gain so that loss aversion stares at the decision-maker, and, to the extent that we are in the domain of gains, the value function is concave. In contrast, a decision-maker who takes the first reference point and intergrates the outcomes of the bets on the day will be more risk seeking since thisdecision-maker will be in the domain of losses.

Integration occurs when positions are lumped together, while segregation occurs when situations are viewed one at a time. Standard prospect theory mostly assumes that people segregate, though Kahnemann & Tversky (1981) did recognise that sometimes people adopt the frame of integration. They note, for example, that more bets are places on long shots at the end of the racing day, suggesting that a least some bettors are integrating the outcomes of races and taking risks they would not ordinarily take in order to try to break even.

In the horse racing example, some people are willing to increase their risk in order to break even. When risk increases after losses, this is called the "break-even effect". How would people behave, according to the prospect theory, after gains? Symmetry might suggest that risk taking would decline, but the reality is otherwise. If new decisions (e.g. whether and how much to bet on the next race) are integrated with prior gains, then, because you have moved up the value function and are some distance from the loss boundary, it is likely that you will be willing to assume greater risk. Using the language of the casino rather than from the track, you are betting with the "house money". The "house money effect" is said to be operative when someone increases risk taking after prior gains. Both the break even effect and the house money effect are quite important in the context of financial decision-making because they may influence decisions after portfolio growth or shrinkage. We will look more into this in section 3.5.1. At first, however, we will introduce the theories behind heuristics and biases.

3 Heuristics and biases related to financial investments

The presence of regularly occurring anomalies in conventional economic theory was a big contributor to the formation of behavioural finance. These so-called anomalies, and their continued existence, directly violate modern financial and economic theories, which assume rational and logical behaviour. A relevant point of criticism, levied against traditional models in economics and finance, is that they are often formulated as if the typical decision-maker were an individual with unlimited cerebral RAM. Such a decision-maker would consider all relevant information and come up with the best choice under the circumstances in a process known as constrained optimisation.

Normal humans are imperfect and information requirements are for some financial models egregious. A well-known example is that capital asset pricing model, the famous model important enough that William Sharpe won the 1990 Nobel Prize for Economics Sciences for this contribution. This model assumes that investors are capable of studying the universe of securities in order to come up with all required model inputs. These inputs include expected returns and variances for all securities, as well as covariances among different securities. Only then is the investor able to make appropriate portfolio decisions.

The dictionary definition for heuristics refers to the process by which people find things out for themselves usually by trial and error. Trial and error often leads people to develop "rules of thumb", but this process often leads to other errors. Heuristics can also be defined as the "use of experience and practical efforts to answer questions or to improve performance". Due to the fact that more and more information is spread faster and faster, life for decision-makers in financial markets has become a mostly inevitable approach, but not always beneficiary. Heuristics may help to explain why the market sometimes acts in an irrational manner, which is opposite to the model of perfectly informed markets. The interpretation of new information may require heuristic decision-making rules, which might later have to be reconsidered.

There is a large number of identified heuristics and biases from psychology and they come in all shapes and sizes. One dichotomy is between those heuristics that are reflexive, autonomic, and noncognitive, and economise on effort (Type A); and others, which are cognitive in nature (Type B). Type A heuristics are appropriate when a very quick decision must be made or when the stakes are low (e.g. "I choose a burger over a pizza because I usually prefer them"). Type B heuristics are more effortful and are appropriate when the stakes are higher. In some cases, an initial reaction using Type A heuristic can be overruled or corroborated using Type B heuristic (e.g. "No, I will choose the pizza today because it is prepared a bit differently and I like to try new things"). In this book we shall focus on both types, but limit ourselves to only the most relevant for decision-making relevant for financial investments.

3.1 Financial behaviour stemming from familiarity

In this section we explore a series of related heuristics that induce investors to exhibit preferences unrelated to objective considerations. One example is that investors are more comfortable with the familiar. They dislike ambiguity and normally look for ways to avoid unrewarded risk. Investors tend to stick with what they have rather than investigate other options. They put off undertaking new initiatives, even if deep down they know the effort could be worthwhile. All of these observations point to a tendency to seek comfort.

As an example, people are more likely to accept a gamble if they feel they have a better understanding of the relevant context, i.e. if they feel more competent. Heath & Tversky (1991) demonstrated based on an experimental questionnaire-based study that when people felt they had some competence on the question, they were more likely to choose a gamble based on this competence rather than a random lottery. This is evidenced by the positive relationship between judged probability of beingright on the questions and the percentage choosing the competence bet. The logical conclusion is that people have a preference for the familiar.

3.1.1 Home bias – domestic investors hold domestic securities

Although preferences are slowly changing in this regard, it continues to be truethat domestic investors hold mostly domestic securities, i.e. German investors hold mostly German securities; Japanese investors hold mostly Japanese securities and so on, as reported by French & Poterba (1991). Referring to the first column of table 1, we see displayed the aggregate market value of the six biggest stock markets in the world. The United States as of 1989 had 47.8% of the world market, Japan 26.5% etc. Nevertheless, a typical U.S. investor held 93.8% in U.S. stocks; a typical Japanese investor held 98.1% in Japanese stocks etc. Thus, domestic investors overweight domestics stocks. This behaviour is often referred to as the "Home bias".

Bias toward the home country contradicts evidence indicating that diversifying internationally allows investors to reduce risk without surrendering return. This is particularly true since stock markets in different countries still are not highly correlated. Ackert & Deaves (2010) report that the average pairwise correlation coefficient for the countries listed in table 1during 1975–1989 was 0.502, which attests to the gains from diversification. One reason why investors might hold domestic securities is because they are optimistic about their markets relative to foreign markets. Another behavioural explanation is along the lines of comfort-seeking and familiarity. Investors tend to favour that which is familiar; German investors are more familiar with German stocks and markets, and so they are more comfortable investing in German securities. The same holds equally true for other foreign investors.

	Market value weights	U.S. investors	Japanese investors	U.K. investors
U.S.	47.8%	93.8%	1.3%	5.9%
Japan	26.5%	3.1%	98.1%	4.8%
U.K.	13.8%	1.1%	0.2%	82.0%
France	4.3%	0.5%	0.1%	3.2%
Germany	3.8%	0.5%	0.1%	3.5%
Canada	3.8%	0.1%	0.1%	0.6%

Table1: Estimated country weights among international investors (adapted from French & Poterba, 1991)

3.1.2 Investing in your employer or brands you know

There is abundant evidence that investors overweight the stocks of companies whose brands are familiar or that they work for. Regarding the first, Frieder & Subrahmanyam (2005) looked at a survey data on perceived brand quality, brand familiarity and brand recognition, and asked whether these attributes impacted investor preferences. To answer this question, they correlated institutional holdings with these factors. Note that high institutional holding in a stock implies low retail holding in that same stock. Frieder & Subrahmanyam (2005) found that institutional holdings are significant and negatively related to brand recognition, but no discernible impact was present for brand quality. The former implies that retail investors have a higher demand for firms with brand recognition, which is consistent with comfort-seeking and familiarity.

As for overweighting companies that one works for, while the same sort of familiarity versus informational advantage debate is possible, the extent to which some investors invest in these companies seems to transcend an informational explanation. According to Ackert & Deaves (2010), many employee-investors put a very high percentage of their investible wealth in their employer's stock, thus foregoing a significant amount of possible diversification.

3.1.3 Diversification heuristic – "the 1/N buffet rule"

The diversification heuristic suggests that people in general like to try a bit of everything when choices are not mutually exclusive. A common behaviour among buffet diners is to sample most (if not all!) dishes. To concentrate on one or two runs the risk of not liking your selections and/or missing out on a good thing. Such behaviour is similar to that reported by Simonsen (1992), who reports shoppers are more likely to choose a variety of items when they must make multiple purchases for future consumption, versus the case when they make single purchases just prior to each consumption decision. Simonsen (1992) argues that certain factors drive such behaviour. First, many people have a hardwired preference for variety and novelty. This preference is much more salient when multiple purchases are made. Second, future preferences embody some uncertainty. Spreading purchases over different categories reduces risk in the same fashion that spreading your money over different stocks accomplishes the same risk-reduction goal in a well-diversified portfolio. A final motivation for variety-seeking is it makes your choice simpler, thus saving time and reducing decision conflict.

One popular form of naive diversification amongst investors is the 1/N strategy. The 1/N strategy entails equal division of investment money between the available funds. For example when given a choice of five funds for pension investments people will often divide their pension contributions equally between the funds. Siebenmorgen & Weber (2003) found that financial advisers were also prone to recommending 1/N strategies, and to ignoring correlations between investments when estimating portfolio risk. The 1/N strategy is often seen as irrational behaviour since it involves the loss of the benefits of Markowitz diversification in standard finance.

3.2 Financial behaviour stemming from representativeness

One of the more common heuristics is judging things by how they appear rather than how statistically likely they are. The classic example comes from works by Kahneman & Tversky (1973). It concerns Linda, a 31-year-old who is single, out spoken and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and equality. Which is more likely?

1. Linda works in a bank
2. Linda works in a bank and is active in the feminist movement.

Analarmingly highpercentage of people go for the second option. However, it can't possibly be true, as it represent saconjunction fallacy. That is, there must always be more people who work in banks than there are who work in banks and are active in the feminist movement. So why do somany people get this question wrong? The answer seems to be that the description is biased, it sounds like some one who might plausibly be involved in the feminist movement. People are driven by the narrative of the description rather than by the logic of the analysis.

Montier (2007) reports another example of representativeness: a health survey was conducted in a sample of adult males, in New Jersey, of all ages and occupations. Nearly 300 professional fund managers coming from all over the globe submitted themselves to the task of trying to answer these two questions:

1. What percentage of the men surveyed have had one or more heart attacks?
2. What percentage of the men surveyed are both over 55 and have had one or more heart attacks?

The question is a conjunction fallacy in the same way as the Linda problem. There are always going to be more men who had one or more heart attacks than there are men over 55 and one or more heart attacks. However, across the 300 fund managers the estimate daverage percentage of men suffering one or more heart attacks was 12.5%, while the estimated percentage of men over 55 and suffering one or more heart attacks was 16%. Of course, averages can hide all sorts of things, so looking at the full data setreveals that 40% of the sample suffered from representativeness in as much as they had higher estimates of the latter part of the question compared to the first section answer!

3.2.1 Good investments vs. good companies

There is a lot of empirical evidence in literature that representativeness and related biases induce inappropriate investment decisions. To casual observers it seems obvious that if a company has high-quality management, a strong image, and consistent growth in earnings, it must be a good investment. Students of finance, of course, know better. In valuation, future cash flows are forecasted and discounted back to the present using appropriate risk-adjusted discount rate. All the aforementioned attributes that make a company a good company should theoretically be reflected in these estimates of future cash flows (including the growth in cash flows) and the risk-adjusted discount rate, i.e. they should already be impounded in the stock price. In other words, good companies will sell at high prices, and bad companies will sell at low prices. But, once the market has adjusted, there is no reason to favour a good company over a bad company, or, for that matter, a bad company over a good company. Quite simply, it is a mistake to think that a good company is representative of a good investment, and yet, that is exactly what people often seem to believe.

In works by Shefrin & Statman (1995) some very revealing evidence is provided from a survey of senior executives on company attributes for a number of years. Executives are asked to assign values between "0" (poor) and "10" (excellent) to each company in their industry for the following items: quality of management; quality of products/services; innovativeness; long-term investment value: financial soundness; ability to attract, develop, and keep talented people; responsibility to the community and environment; and wise use of corporate assets. Because 82% of the respondents consider quality of management as the most important attribute of a company's quality, Shefrin & Statman (1995) used it as their proxy for company quality. Results show that management quality (i.e. good company measure) and value as a long-term investment (i.e. good stock measure) are very highly correlated. The R2 value from the first regression of survey data suggests a correlation of 0.93. Executives apparently believe that good companies are good stocks. As discussed in the section above, it is important to understand that no company attributes should be associated with investment value. That is, all information on company quality should already be embedded in stock prices so that all companies (good and bad ones) on an ex ante basis are equally good investments.

Other regressions from the same survey by Shefrin & Statman(1995) reveal that two company characteristics, size and the book-to-market ratio, are strongly associated with perceived management quality. Specifically, big companies and those that have low book-to-market ratios (where the latter are considered growth companies) are seen to be good companies. This is not overly surprising. Big companies have often become big because they are good (i.e. well managed), and growth should come from quality. Additionally, size and book-to-market, even after accounting for their impact on management quality, are observed to interdependently influence investment value. Big firms are viewed as good investments, and growth companies are viewed as good investments. In other words, big high-growth firms are perceived as representative of good investments. Interestingly, as discussed earlier, the empirical evidence points in the exact opposite direction. It is small-cap value firms that have historically outperformed. Indeed, the tendency for individuals to use representativeness in the context of investments may have contributed to the small-firm and value anomalies. We will address this further in chapter 4.

3.2.2 Chasing winners

Research has also shown that investors choose securities and investment funds based on past performance. To those with this view, investment performance in recent past is representative of future investment performance. This form of representativeness is often referred to as the "recency bias". Such trend-following or momentum chasing, has long been a popular strategy, and, coupled with detecting turning points, it is the heart of technical analysis. Trend-following is indeed an international phenomenon in all stock markets. So is there any evidence in favour of the popular notion that momentum-chasing is profitable? Ackert & Deaves (2010) answers both yes and no to this question. There is evidence that risk-adjusted returns are positively correlated for three to twelve month return intervals. For longer periods of three years or more, however, the evidence favours reversals or negative serial correlation.

3.2.3 Gambler's fallacy in investing

It's not hard to imagine that under certain circumstances, investors or traders can easily fall prey to the gambler's fallacy being the erroneous belief that additional observations should be such that a sample will closely resemble the underlying distribution. For example, some investors believe that they should liquidate a position after it has gone up in a series of subsequent trading sessions because they don't believe that the position is likely to continue going up. Conversely, other investors might hold on to a stock that has fallen in multiple sessions because they view further declines as "improbable". Nevertheless, as students of finance will know: just because a stock has gone up on six consecutive trading sessions does not mean that it is less likely to go up on during the next session.

It's important to understand that in the case of independent events, the odds of any specific outcome happening on the next chance remains the same regardless of what preceded it. With the amount of noise inherent in the stock market, the same logic applies: Buying a stock because you believe that the prolonged trend is likely to reverse at any second is irrational. One could suggest the investors to base their decisions on fundamental and/or technical analysis before determining what will happen to a trend.

3.3 Anchoring

Anchoring refers to the decision-making process where quantitative assessments are required and where these assessments may be influenced by suggestions. The concept of anchoring draws on the tendency to attach our thoughts to a reference point, even though it may have no logical relevance to the decision at hand. People have in their mind some reference points (i.e. anchors) for example of previous stock prices. When they get new information they adjust this past reference insufficiently to the new information acquired. Anchoring describes how individuals tend to focus on recent behaviour and give less weight to longer time trends.Although it may seem an unlikely phenomenon, anchoring is even fairly prevalent in situations where people are dealing with concepts that are novel.

Values in speculative markets, like the stock market, are inherently ambiguous. It is hard to tell what the value of e.g. the Dow Jones Industrial Average should be as there is no agreed-upon economic theory that would provide an answer to this question. In the absence of any better information, past prices are likely to be important determinations of prices today. Therefore, the anchor is the most recent remembered price. The tendency of investors to use this anchor enforces the similarity of stock prices from one day to the next. Other possible anchors are remembered historical prices, and the tendency of past prices to serve as anchors may explain the observed tendency for trends in individual stocks prices to be reversed. For individual stocks, price changes may tend to be anchored to the price changes of other stocks, and price-earnings ratios may be anchored to other firms' price-earnings levels. This kind of anchoring may explain why individual stock prices move together as much as they do, and thus why stock price indices are as volatile as they are. Likewise, it may help to explain why the averaging across stocks that is inherent in the construction of the index does not more solidly dampen its volatility. It may also explain why stocks of companies that are in different industries, but are headquartered in the same location, tend to have more similar price movements than stocks of companies that are in the same industry, but headquartered in different countries. This obviously being contrary to one's expectation that the industry would defined the fundamentals of the company better than the location of its headquarters.

Anchoring can indeed be a source of frustration in the financial world, as investors base their decisions on irrelevant figures and statistics. For example, some investors invest in the stocks of companies that have fallen considerably in a very short amount of time. In this case, the investor is anchoring on a recent "high" that the stock has achieved and, consequently, believes that the drop in price provides an opportunity to buy the stock at a discount. While, it is true that the fickleness of the overall market can cause some stocks to drop substantially in value, allowing investors to take advantage of this short-term volatility, stocks most often decline in value due to changes in their underlying fundamentals.

As an example, suppose that stock X had a very strong revenue in the last year, causing its share price to shoot up from 25€ to 80€. Unfortunately, one of the company's major customers, who contributed to 50% of X's revenue, has decided not to renew its purchasing agreement with X. This change of events causes a drop in X's share price from 80€ to 40€. By anchoring to the previous high of 80€ and the current price of 40€, the investor erroneously believes that X is undervalued. Keep in mind that X is not being sold at a discount, instead the drop in share value is attributed to a change to X's fundamentals (loss of revenue from a big customer). In this example, the investor has fallen prey to the dangers of anchoring.

When it comes to avoiding anchoring, there's no substitute for rigorous critical thinking. Be especially careful about which figures you use to evaluate a stock's potential. Successful investors don't just base their decisions on one or two benchmarks. They evaluate each company from a variety of perspectives in order to derive the truest picture of the investment landscape.

3.3.1 Herding

A fundamental observation about human society is that people who communicate regularly with one another think similarly. This naturally also goes for investors. It is important to understand the origins of this similar thinking, so that one can judge the plausibility of theories of speculative fluctuations that ascribe price changes to faulty thinking. There are two primary reasons why herd behaviour happens. The first is the social pressure of conformity indeed being a powerful force. This is because most people are very sociable and have a natural desire to be accepted by a group, rather than be branded as an outcast. Therefore, following the group is an ideal way of becoming a member. The second reason is the common rationale that it's unlikely that such a large group could be wrong. After all, even if you are convinced that a particular idea or course of action is irrational or incorrect, you might still follow the herd, believing they know something that you don't. This is especially prevalent in situations in which an individual has very little experience.

Part of the reasons why people's judgements are similar at similar times is that they are reacting to the same information. The social influence has an immense power on individual judgement. When people are confronted with the judgement of a large group of people, they tend to change their "wrong" answers. They simply think that all the other people could not be wrong. They are reacting to the information that a large group of people had reached a judgement different form theirs. This is a rational behaviour also viewed in terms of evolution. In everyday living we have learned that when a large group of people is unanimous in its judgement, they are certainly right. Herding and anchoring are thus closely related.

People are influenced by their social environment and they feel pressure to conform. Fashion is a mild form of herd behaviour while an example of the strong form is fads that constitute speculative bubbles and crashes. Herd behaviour may be the most generally recognised observation on financial markets in a psychological context. Herd behaviour can play a role in the generation of speculative bubbles as there is a tendency to observe "winners" very closely, particularly when good performance repeats itself a couple of times. It seems plausible to make distinction between voluntary and enforced herd behaviour. Many players on financial markets might think that a currency or equity is not correctly priced, but they refrain, nevertheless, from a contrary financial exposure. These people simply feel that it is not worthwhile to combat the herd. This is an example of enforced herd behaviour. They follow the herd, not voluntarily, but to avoid being trampled and are therefore enforced into following the herd.

Even otherwise completely rational people can participate in herd behaviour when they take into account the judgements of others, and even if they know that everyone else is behaving in a herd-like manner. The behaviour, although individually rational, produces group behaviour that is irrational and causes fluctuations in the market. The "noise trading" theory stems from the fact that investors with a short time horizon are influencing the stock prices more than the long-term investors are. Investors, with no access to inside information, irrationally act on noise as if it were information that would give them an edge.

Another important variable to herding is the word of mouth. People generally trust friends, relatives and working colleagues more than they do the media. The conventional media, printed information, televisions, and radio have a profound capability for spreading ideas, but their ability to generate active behaviours is still limited. Talking to other people and other kinds of interpersonal communication are among the most important social connections humans have. It is therefore likely that news about buying opportunity will rapidly spread. In a study by Shiller & Pound (1989) private investors were asked what first draw their attention to a company they recently had invested in. Only six percent of the respondents specified newspapers and periodicals. Even if people read a lot, their attention and actions appear to be more stimulated by interpersonal communication.

A strong herd mentality can even affect financial professionals. The ultimate goal of an investment manager is obviously to follow an investment strategy to maximise a client's invested wealth. The problem lies in the amount of scrutiny that investment managers receive from their clients whenever a new investment fad pops up. For example, a wealthy client may have heard about an investment gimmick that's gaining notoriety and inquires about whether the investment manager employs a similar strategy.In many cases, it's tempting for an investment manager to follow the herd of investment professionals. After all, if the aforementioned gimmick pans out, his clients will be happy. If it doesn't, the money manager can justify his poor decision by pointing out just how many others were led astray.

Herd behaviour is usually not a very profitable investment strategy and the cost of being led astray can often be very high. Investors that employ a herd-mentality investment strategy constantly buy and sell their investment assets in pursuit of the newest and hottest investment trends. For example, if a herd investor hears that internet stocks are the best investments right now, he will free up his investment capital and then dump it on internet stocks. If biotech stocks are all the rage six months later, he'll probably move his money again, perhaps before he has even experienced significant appreciation in his internet investments. Keep in mind that all this frequent buying and selling incurs a substantial amount of transaction costs, which can eat away at available profits. Furthermore, it's extremely difficult to time trades correctly to ensure that you are entering your position right when the trend is starting. By the time a herd investor knows about the newest trend, most other investors have already taken advantage of this news, and the strategy's wealth-maximising potential has probably already peaked. This means that many herd-following investors will probably be entering into the game too late and are likely to lose money as those at the front of the pack move on to other strategies.

3.4 Overconfidence and excessive trading

The key behavioural factor and perhaps the most robust finding in the psychology of financial judgement needed to understand market anomalies is overconfidence. Investors tend to exaggerate their talents and underestimate the likelihood of bad outcomes over which they have no control. The combination of overconfidence (i.e. overestimating or exaggerating one's ability to successfully perform a particular task) and optimism causes people to overestimate the reliability of their knowledge, underestimate risks and exaggerate their ability to control events, which leads to excessive trading volume and speculative bubbles. The greater confidence a person has in himself, the more risk there is of overconfidence. This applies, in particular, to areas where people are not well-informed. Self-confidence, interestingly, usually bears no relation to the relationship between overconfidence and competence. March & Shapira (1987) demonstrated as one of many examples that portfolio managers overestimate the probability of success in particular when they think of themselves as experts.

In a 2007 study Montier found that 74% of the 300 professional fund managers surveyed believed that they had delivered above-average job performance. Of the remaining 26% surveyed, the majority viewed themselves as average. Incredibly, almost 100% of the survey group believed that their job performance was average or better. Clearly, only (slightly less than) 50% of the sample can be above average, suggesting the irrationally high level of overconfidence these fund managers exhibited. Clearly, overconfidence is not a trait that applies only to fund managers.

In terms of investing, overconfidence can be detrimental to the individual's stock-picking ability in the long run. In a 1998 study Odean found that overconfident investors generally conduct more trades than their less-confident counterparts. Odean found that overconfident investors and traders tend to believe they are better than others at choosing the best stocks and the best times to enter/exit a position. Unfortunately, Odean (1998) also found that traders that conducted the most trades tended, on average, to receive significantly lower yields than the market.Keep in mind that professional fund managers, who have access to the best investment/industry reports and computational models in the business, can still struggle at achieving market-beating returns. High trading volumes and the pursuit of active investment strategies thus seems inconsistent with common knowledge of rationality.

Apparently, many investors feel that they do have speculative reasons to trade often, and apparently this have to do with a tendency for each individual to have beliefs that he or she perceives better than others' beliefs. It is as if most people think that they are above average. Shiller (1987) observed in a survey of the market crash in 1987, a surprisingly high confidence among investors in intuitive feelings about the direction the market would take after the crash. Therefore, overconfidence may help to explain possible general market overreactions as well as excess volatility and speculative asset prices. It may also explain why investment professionals hold actively managed portfolios with the intention of being able to choose winners and why pension funds hire active equity managers.

3.4.1 Evidence from the field of trading

Are the predications of overconfidence and excessive trading corroborated by evidence from the real world? Barber & Odean (2000) investigated the performance of individual investors by examining the trading histories of more than 60,000 U.S. discount brokerage investors between 1991 and 1996. Their goal was to see if the trades of these investors were justified in the sense that they led to improvements in portfolio performance. There is an important point to consider in respect to why and when a market transaction would make sense at all. Suppose, for example, you sell one stock and use the proceeds to buy another, and in doing so incur 100€ in transaction costs. This transaction is only logical if you expect to generate a higher portfolio return, i.e. high enough to at least offset the transaction cost. To be sure, individual investors do a lot of trading. Barber & Odean (2000) found that, on average, U.S. professional investors turn over 75% of their portfolio annually. This means that, for a typical investor who holds a 100,000€ portfolio, 75,000€ worth of stock is traded in a given year.

Barber & Odean (2000) divided their sample of individual investors into five equal groups (quintiles). Specifically, the 20% of investors who traded the least were assigned to the lowest turnover quintile (no. 1), the 20% of investors who traded the next least were assigned to quintile 2, and so on all the way to quintile no. 5, which was reserved for those investors trading the most. To put this into perspective, those trading the least only turned over 0.19% of their portfolio per month being a total of less than 3% per year. Those trading the most turned over 21.49% of their portfolio per month, being more than 300% per year. Referring to figure 3, we see for each quintile the gross average monthly return and the net (i.e. after transaction costs) average monthly return. The returns for all quintiles (both gross and net) were fairly high during the period (even for those trading excessively) because the overall stock market was performing well in the analysed period.

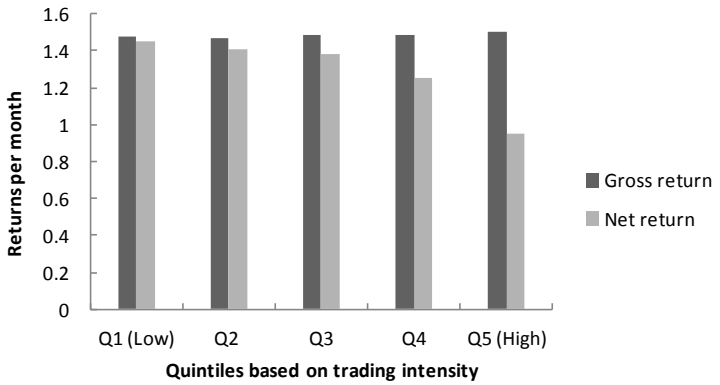

Figure 3: Gross and net returns for groups with different trading intensities (based on Barber & Odean, 2000)

Returning to the central question: Was this trading worthwhile? Was it based on superior information, or was it based on the perception of superior information (i.e. misinformation)? An inspection of figure 3 reveals that while the additional trading did lead to a very slight improvement in gross performance, net performance suffered. The evidence reported by Barber & Odean (2000) suggest that the trades were not based on superior information, but rather were often conducted because of misinformation. While it is impossible to prove without a doubt that overconfidence was the culprit, the view appears to be a reasonable one.

While figure 3 is in terms of raw returns, sometimes returns are high because greater risk is taken and investors are merely being properly rewarded for the risk borne. If an investor earns high average returns only because high risk has been borne, this does not imply any sort of stock-picking skill. After risk-adjusting returns, Barber & Odean (2000) found that their results were quite similar to those displayed in figure 3. For all investors, the net risk-adjusted annual return (i.e. after taking into account transaction costs, bid-ask spreads, and differential risk) was below the market return by well over 3%. The 20% of investors who traded the most underperformed the market (again on a net risk-adjusted basis) by close to 10% per year.

3.4.2 Better-than-average effect

Numerous studies have asked people to rate themselves relative to average on certain positive personal attributes such as athletic skill or investor ability, and, consistent with the "better-than-average effect", many rate themselves as above average on those attributes. Obviously, of course, only (slightly fewer than) 50% of the people in any pool can truly be superior. Similarly, people are likely to see themselves as "less than average" for negative traits. When subsequently asked how biased they themselves were, subjects rated themselves as being much less vulnerable to those biases than the average person.

One factor that facilitates a better-than-average belief is that often the exact definition of excellence or competence is unclear. Naturally enough, people have in the backs of their minds the definition that will make them look best. Some investors might see "best" as most adept at taking losses; others might see it as most competence at anticipating trends in technical analysis; while still others might see it as being most skilful at diversifying their portfolio. Both motivation and cognitive mechanisms are likely behind the better-than-average effect. On the motivational side, thinking that you are better than average enhances self-esteem. On the cognitive side, performance criteria that most easily come to mind are often those that you are best at.

3.4.3 Hindsight bias and confirmation bias

In social science, attribution theory investigates how people make causal attributions, i.e. how they come up with explanations for the causes of actions and outcomes. Certain persistent errors occur. For example, people, when observing others, tend to over-attribute behaviour to dispositional (as opposed to situational) factors. In other words, if someone seems to be behaving badly, we naturally believe them to be of bad character, rather than searching out environmental details that may be explanatory. It's often said that "seeing is believing". While this is often the case in certain situations, what you perceive is not necessarily a true representation of reality. This is not to say that there is something wrong with ones senses, but rather that our minds have a tendency to introduce biases in processing certain kinds of information and events.

It can be difficult to encounter something or someone without having a preconceived opinion. This first impression can be hard to shake because people also tend to selectively filter and pay more attention to information that supports their opinions, while ignoring or rationalising the rest. This type of selective thinking is often referred to as the "confirmation bias". In investing, the confirmation bias suggests that an investor would be more likely to look for information that supports his or her original idea about an investment rather than to seek out information that contradicts it. As a result, this bias can often result in faulty decision-making because one-sided information tends to skew an investor's frame of reference, leaving him or her with an incomplete picture of the situation. Consider, for example, an investor that hears about a hot stock from an unverified source and is intrigued by the potential returns. That investor might choose to research the stock in order to prove whether or not its touted potential is real. What ends up happening is that the investor finds all sorts of green flags about the investment (such as growing cash flow or a low debt/equity ratio), while glossing over financially disastrous red flags, such as loss of critical customers or dwindling markets.

Confirmation bias represents a tendency for us to focus on information that confirms some pre-existing thought. Part of the problem with confirmation bias is that being aware of it isn't good enough to prevent you from doing it. One solution to overcoming this bias would be finding someone to act as a "dissenting voice of reason". That way you'll be confronted with a contrary viewpoint to examine.

Another common perception bias is the "hindsight bias", which tends to occur in situations where a person believes (after the fact) that the onset of some past event was predictable and completely obvious, whereas in fact, the event could not have been reasonably predicted. Many events seem obvious in hindsight. Psychologists attribute hindsight bias to our innate need to find order in the world by creating explanations that allow us to believe that events are predictable. While this sense of curiosity is useful in many cases (take science, for example), finding erroneous links between the cause and effect of an event may result in incorrect oversimplifications. The hindsight bias appears to be especially prevalent when the focal event has well-defined alternative outcomes (e.g. an election or the European Cup final), when the event in question has emotional or moral overtones, or when the event is subject to process of imagination before its outcome is known.

3.4.4 Over and under-reaction in the market

One consequence of having emotion in the stock market is the overreaction toward new information. According to market efficiency, new information should more or less be reflected instantly in a security's price. For example, good news should raise a business' share price accordingly, and that gain in share price should not decline if no new information has been released since. Reality, however, tends to contradict this theory. Oftentimes, participants in the stock market predictably overreact to new information, creating a larger-than-appropriate effect on a security's price. Furthermore, it also appears that this price surge is not a permanent trend. Although the price change is usually sudden and sizable, the surge erodes over time.

De Bondt & Thaler (1985) show that people tend to overreact to unexpected and dramatic news events. Consistent with the predictions of the overreaction hypothesis, portfolio of prior "losers" are found to outperform prior "winners". In their study, they examined returns on the New York Stock Exchange for a three-year period. From these stocks, they separated the best 35 performing stocks into a "winners portfolio" and the worst 35 performing stocks were then added to a "losers portfolio". De Bondt & Thaler (1985) then tracked each portfolio's performance against a representative market index for three years. Surprisingly, it was found that the losers' portfolio consistently beat the market index, while the winners' portfolio consistently underperformed. In total, the cumulative difference between the two portfolios was almost 25% during the three-year time span. In other words, it appears that the original "winners" would became "losers", and vice versa.

So what happened? In both the winners and losers portfolios, investors essentially overreacted. In the case of loser stocks, investors overreacted to bad news, driving the stocks' share prices down disproportionately. After some time, investors realised that their pessimism was not entirely justified, and these losers began rebounding as investors came to the conclusion that the stock was underpriced. The exact opposite is true with the "winners' portfolio": investors eventually realised that their exuberance wasn't totally justified.

Overreaction seems to be related to some deep-set of psychological phenomena. Ross (1987) argues that much overconfidence is related to a broader difficulty in making adequate allowance for the uncertainty in one's own viewpoints. Kahnemann & Tversky showed in their 1974 paper that people have a tendency to categorise events as typical or representative of a well-known class, and then, in making probability estimates overstress the importance of such categorisation disregarding evidence of the underlying probabilities. One consequence of this phenomenon is for people to see patterns in data that is truly random, to feel confident, for example, that that a series which is in fact random walk is not a random walk.

Price reactions to information are crucial for market behaviour. Recent empirical research in finance has uncovered two families of pervasive regularities: under-reaction of stock prices to news such as earnings announcements, and overreaction of stock prices to a series of good or bad news. The under-reaction evidence shows that over horizons of one to twelve months, security prices under-react to news. As a consequence, news is incorporated only slowly into prices, which tend to exhibit positive autocorrelations over these horizons. A related way to make this point is to say that current good news has power in predicting positive returns in the future. The overreaction evidence shows that over longer horizons of three to five years, security prices overreact to consistent patterns of news pointing in the same direction. That is, securities that have had a long record of good news trend to become overpriced and have low average returns afterwards. The under-reaction evidence in particular is consistent with anchoringreferring to the phenomenon according to which people mistrust new data and give too much weight to prior probabilities of events in a given situation. Edwards concluded in a 1968 study that "it takes anywhere from two to five observations to do one observation's worth of work in inducing a subject to change his opinion". According to this principle, people are slow to change their opinions. For this reason, it takes some time before investors begin to conclude that a trend, such as price increases in connection with a speculative bubble, will not continue. Further, it is over- and under-reaction that is one of the primary causes of trends, momentum and fads.

3.4.5 Under-diversification and excessive risk taking

Another investor error likely related to overconfidence is the tendency to be under-diversified. Under-diversified people are too quick to overweight/underweight securities when they receive a positive/negative signal, and insufficient diversification then results. Another factor is that most investors, lacking the time to analyse a large set of securities, will stop after a few. As long as they believe they have identified a few "winners" in this group, they are content. After all, if they are so sure that certain stocks are good buys, why dilute their portfolio with stocks that they have not studied?

In a study by Kelly (1995), the portfolio composition of more than 3,000 U.S. individuals was examined. Most individuals indentified held no stocks at all. Of those households that did hold stocks (more than 600), Kelly (1995) found that the median number of stocks in their portfolios was only one. And only about 5% of stock-holding households held 10 or more stocks. Most evidence says that to achieve a reasonable level of diversification, one has to hold more than 10 different stocks and preferably in different sectors of the economy. Thus, it seems clear that many individual investors are quite under-diversified.

In their study, Groetzmann & Kumar (2005) sought to ascertain who were most prone to being under-diversified. Not surprisingly, they found that under-diversification increased with income, wealth, and age. Those who traded the most also tended to be the least diversified. This is likely because overconfidence is the driving force behind both excessive trading and under-diversification. Also less diversified were those people who were sensitive to price trends and those who were influenced by home bias.

Related to under-diversification is excessive risk taking. This is actually tautological, in that under-diversification is tantamount to taking on risk for which there is no apparent reward. It is done, of course, in the hope of finding undervalued securities. The disposition effect, as presented in section 2.3.1, is sometimes associated with overconfidence. An overconfident trader, overly wedded to prior beliefs, may discount negative public information that pushes down prices, thus holding on to looser and taking excessive risk. Indeed, there is evidence that especially futures traders exhibit this behaviour. As indentified by Groetzmann & Kumar (2005), traders with mid-day losses increase their risk and perform poorly subsequently.

3.4.6 Analysts and excessive optimism

Abundant research has established that analysts tend to be excessively optimistic about the prospects of the companies that they are following. This is true both in the U.S. and in Europe. Table 2 shows the distribution of analyst recommendations among strong buy, buy, hold, sell, and strong sell for G7 countries adapted from a study by Jagadeesh & Kim (2006). It is clear from table 2 that analysts are much more likely to recommend a purchase rather than a sale. In the U.S., where this tendency was most pronounced, buys/sells were observed 52%/3% of the time. In Germany, where the tendency was least pronounced, the buy/sell ratio was 39%/20%. While excessive optimism is one interpretation, another is a conflict of interest induced by a perceived need to keep prospective issuers happy.

	Strong buy	Buy	Hold	Sell/Strong sell
U.S.	28.6%	33.6%	34.5%	3.3%
U.K.	24.3%	22.3%	41.7%	11.8%
Canada	29.4%	28.6%	29.9%	12.1%
France	24.7%	28.3%	31.1%	15.9%
Germany	18.3%	20.3%	41.5%	19.9%
Italy	19.2%	20.0%	47.1%	13.6%
Japan	23.6%	22.4%	35.7%	18.3%

Table 2: Recommendation distributions in G7 countries during 1993–2002 (adapted from Jagadeesh & Kim, 2006)

3.5 Path-dependent behaviour

Decisions we make often have a path dependence to them. Path dependence exists if it is important to your decision how you got where you are rather than merely focusing on your current location. Such behaviour means that people's decisions are influenced by what has previously transpired. It takes enormous mental discipline to simply look forward without agonising or gloating over what has transpired.

Thaler & Johnson (1990) provide evidence regarding how individual behaviour is affected by prior gains and losses. After a prior gain, people become more open to assuming risk. This observed behaviour is referred to as the house money effect, alluding to casino gamblers who are more willing to risk money that was recently won. This was briefly introduced in section 2.3.3. Gamblers call this "playing with the house's money." Since they don't yet consider the money to be their own, they are willing to take more risk with it. The house money effect predicts that investors will be more likely to purchase risky stocks after closing out a profitable trade. After a prior loss, matters are not so clear-cut. On the one hand, people seem to value breaking even, so a person with a prior loss may take a risky gamble in order to break even. This observed behaviour is referred to as the "break-even effect". On the other hand, an initial loss can cause an increase in risk aversion in what has been called the "snake-bit effect".

3.5.1 Sequential decisions and prospect theory

Interestingly, at first, some of the findings on behaviour following gains and losses appear to contradict prospect theory. The house money effect suggests reduced risk aversion after an initial gain, whereas prospect theory makes no such prediction. It is notable, though, that the house money effect is not inconsistent with prospect theory, because prospect theory originally was developed to describe one-shot decisions. Recall the discussion of integration versus segregation in section 2.3.3. Under integration, an investor combines the results of successive gambles, whereas, under segregation, each gamble is viewed separately. Instead of presenting a challenge to prospect theory, the house money effect is best seen as evidence that sequential gambles are sometimes integrated rather than segregated. If one integrates after a large gain, one has moved safely away from the value function loss aversion kink in figure 1, serving to lessen risk aversion.

The evidence provided by Thaler & Johnson (1990) provides important insight into how individuals make sequential decisions. People do not necessarily combine the outcomes of different gambles. Financial theory is increasingly incorporating insights on individual behaviour provided by psychology and decision-making research on segregation vs. integration. For example, in the model by Barberis, Huang & Santos (2001), investors receive utility from consumption and changes in wealth. In traditional models, people value only consumption. In this extension, investors are loss averse so that they are more sensitive to decreases than to increases in wealth, and thus, prior outcomes affect subsequent behaviour. After a stock price increase, people are less risk averse because prior gains cushion subsequent losses, whereas after a decline in stock prices, people are concerned about further losses and risk aversion increases. Therefore, the model suggested by Barberis, Huang & Santos (2001) predicts that the existence of the house money effect in financial markets leads to greater volatility in stock prices. After prices rise, investors have a cushion of gains and are less averse to the risks involved in owning stocks. Indeed, as in this model, aspects of prospect theory are increasingly being embedded in modern financial models.

Despite some progress, it does not seem that our financial understanding of sequential behaviour in a market is complete. How does individual behaviour translate to a market setting? A recent experimental study by Ackert et al. (2006), which includes a market with sequential decision-making, provides some insight. Traders who are given a greater windfall of income before trading begins bid higher to acquire the asset, and, thus, the market prices are significantly higher. In fact, prices remain higher over the entirety of the three-period markets. As the house money effect would predict, people seem to be less risk averse after a windfall of money, as if the earlier gain cushions subsequent losses. Observed behaviour does not always suggest that traders will pay more to acquire stock after further increases in wealth. There is no evidence that traders become more risk taking if additional profits are generated by good trades when the market is open. The results also indicate that the absolute level of wealth has a dominant influence on subsequent behaviour so that changes in wealth are less important. This observed behaviour among traders could be because professional traders are trained to act in a more normative (i.e. less prospect theory-like, less emotional) fashion. Indeed, more work is required to allow us to better understand the dynamics of markets and whether individual behaviour adapts to or influences market outcomes.

4 Financial anomalies – Do behavioural factors explain stock market puzzles?

In the previous chapters, we argued that behavioural considerations can contribute to an understanding of certain anomalies in the pricing of individual stocks as well as in the aggregate value of the stock market. Remember that anomalies are defined as empirical results that, unless adequately explained, seem to run counter to market efficiency. It turns out that, just as there are cross-sectional anomalies, there are also aggregate stock market puzzles. In this chapter, we will introduce some of the most famous financial anomalies and consider whether behavioural factors can help us account for these puzzles.

4.1 The January effect & Small-firm effect

The January effect is named after the phenomenon in which the average monthly return for small firms is consistently higher in January than any other month of the year. This is at odds with the efficient market hypothesis, which predicts that stocks should move at a "random walk" as explained in section 2.1. However, a 1976 study by Rozeff & Kinney found that from 1904–74 the average amount of January returns for small firms was around 3.5%, whereas returns for all other months was closer to 0.5%. This suggests that the monthly performance of small stocks follows a relatively consistent pattern, which is contrary to what is predicted by conventional financial theory. Therefore, some unconventional factor (other than the random-walk process) must be creating this regular pattern.

One explanation is that the surge in January returns is a result of investors selling loser stocks in December to lock in tax losses, causing returns to bounce back up in January, when investors have less incentive to sell. While the year-end tax sell-off may explain some of the January effect, it does not account for the fact that the phenomenon still exists in places where capital gains taxes do not occur. This anomaly sets the stage for the line of thinking that conventional theories do not and cannot account for everything that happens in the real world.

Similar to the study by Rozeff & Kinney (1976), Gultekin & Gultekin (1983) studied stock markets in 15 different countries and discovered a January effect in all of them. This implies that the January effect is not explicable in terms of the specific tax (or other institutional) arrangements in a country. Keim (1983) found that about half of the small-firm effect occurred in January. In fact about a quarter of the small-firm effect for the year was typically accomplished during the first five trading days in January. Kato & Shallheim (1985) studied the Tokyo stock exchange and found excess returns for January and a strong relationship between size and returns (small firms substantially outperforming large firms).

Fama (1991) reported results from the United States for the period 1941–81. Stocks of small firms averaged returns of 8.06% in January, whereas the stocks of large firms averaged January returns of 1.342% (in both cases the January returns exceeded the average return in the other months). For the period 1982–91 the January returns were 5.32% and 3.2% for the stocks of small and large firms respectively. One possible explanation of the January effect is "window dressing" by fund managers. They are often required to publish the details of the portfolios that they hold at the end of the year. It has been suggested that they prefer to show large, well-known companies in their published portfolios. Thus, they sell small company shares and buy large company shares in December,and then do the opposite in January. Hence, the prices of small company shares rise in January. Although this may explain the relative outperformance of smaller company shares in January, it does not explain the general January effect (unless the window dressing entails a relative move to bonds and cash in December). Cooper et al. (2006) discovered another January-related anomaly. They found that stock market returns in January were predictive of returns during the next eleven months. Strong January returns were indicative of strong returns during the rest of the year. The effect was referred to as the "other January effect".

Cross (1973), French (1980) and others have documented a weekend effect. They found that the average returns to stocks were negative between the close of trading on Friday and the close of trading on Monday. Gibbons & Hess (1983) examined a 17-year period between 1962 and 1978 and found that, on average, Monday returns were negative on an annualised basis (33.5% p.a.). Keim & Stambaugh (1984) investigated the daily returns on the S&P 500 from 1928 to 1982 and found that,on average,Monday returns were negative. Kohers & Kohers (1995) also found a weekend effect,suggesting that there would be an advantage from buying on Mondays and selling on Fridays.

Calendar effects, such as the January effect and the weekend effect,have been brought into doubt by Sullivan et al. (1999).They claim to have shown that the calendar effects can be completely explained by what they refer to as "data snooping". They found that the same data that was used to identify a calendar effect was also used to test for the existence of the effect. They also demonstrated that,although the small number of calendar effects that have been reported are statistically significant, there are about 9,500 conceivable calendar effects. From these 9,500 some can be expected to be statistically significant through chance. Malkiel (2003) concluded that anomalies do not persist in the long run since they lose their predictive power when they are discovered. As an example, he stated that as soon as evidence of the January effect was made public investors acted on the information and the effect disappeared. Gu (2003, 2004) provided evidence consistent with Malkiel's view by showing a decline in the January effect and a reversal of the weekend effect. Some calendar anomalies may persist since it is difficult for arbitragers,and other traders,to make profits from them. One well-known strategy isto "Sell in May and walk away". This is an old stock market adage, which was researched by Keppler & Xue (2003). They studied the 18 most developed national stock markets over the period 1970 to 2001. It was found that during the months November to April the average rate of stock price rise was 8.36% whereas the average rate of price rise during the months May to October was 0.37%. Not only were returns higher between November and April, but also risk was lower. Keppler & Xue (2003) suggested a number of explanations including the observation that bonuses tend to be paid around the endor at the beginningof the year. Research on saving behaviour has found that people find it easier to save and invest from a lump sum than from regular earnings. Investment of such lump sums would tend to increase demand for stocks, and hence their prices, during the period in which the bonuses are invested.

4.2 The winner's curse

One assumption found in standard finance and economics is that investors and traders are rational enough to be aware of the true value of some asset and will bid or pay accordingly. However, anomalies such as the "winner's curse", being a tendency for the winning bid in an auction setting to exceed the intrinsic value of the item purchased, suggest that this is not the case. Simply speaking, the winner's curse is the problem that occurs when bidders of an auction have to estimate the true value of the good they are bidding for. Assuming that there are a reasonable number of bidders on the market, the average bid will be less than the true value (bidders are risk-averse), but the winning bid will be significantly higher (due to estimation errors). As the highest overestimation wins the auction, the winner will usually overpay in an auction. This observation contradicts the standard economic assumption of rationality and can be applied to various aspects of economic life. Rational-based theories assume that all participants involved in the bidding process will have access to all relevant information and will all come to the same valuation. Any differences in the pricing would suggest that some other factor not directly tied to the asset is affecting the bidding.

According to Robert Thaler's 1988 article on winner's curse, there are two primary factors that undermine the rational bidding process: the number of bidders and the aggressiveness of bidding. For example, the more bidders involved in the process means that you have to bid more aggressively in order to dissuade others from bidding. Unfortunately, increasing your aggressiveness will also increase the likelihood in that your winning bid will exceed the value of the asset.

Consider the example of prospective homebuyers bidding for a house. It's possible that all the parties involved are rational and know the home's true value from studying recent sales of comparative homes in the area. However, variables irrelevant to the asset (aggressive bidding and the amount of bidders) can cause valuation error, oftentimes driving up the sales price more than 25% above the home's true value. In this example, the curse aspect is twofold: not only has the winning bidder overpaid for the home, but now that buyer might have a difficult time securing financing.

Another interesting area where the winner's curse is observed is the market for initialpublic offerings (IPOs). In fact, the prices for IPOs are not set to clear the market, butto guarantee an excess demand (to alleviate buyers from the winner's curse). This willgenerally result in lower revenues for the IPOcompany. The offset is that during anopen-outcry auction-type, information of the other bidders is revealed that may havepositive or negative effects on the resulting end-price. Such irrational effects were,for example, observed recently with the Facebook IPO.

Winner's curse provides more proof that investors are not rational. Winner's curse has a number of explainable causes related to behavioural finance theories including incomplete information and emotions. Regardless of the cause, the item being auctioned is awarded to the bidder with the greatest overestimation. Paying more for something than what is worth is not rational behaviour. Theoretically, if markets were efficient, no overestimation would occur. However, the market has historically experienced many overestimations and corrections. Stock bubbles, such as the dot-com or housing bubble, prove that people buy stocks and real-estate at irrational prices beyond their true values.

4.3 The equity premium puzzle

Much research has examined the equity premiumpuzzle, which was originally brought to light by Mehra & Prescott (1985) and ever since has left academics in finance and economics scratching their heads. The equity premium is defined as the gap between the expected return on the aggregate stock market and a portfolio of fixed-income securities.

Studies by Siegel (1998) among many others have shown that over a 70-year period, stocks yield average returns that exceed government bond returns by 6–7%. Stocksreal returns are 10%, whereas bonds real returns are 3%. However, academics believe that an equity premium of 6% is extremely large and would imply that stocks are considerably risky to hold over bonds. Note of course that according to the capital asset pricing model, investors that hold riskier financial assets should indeed be compensated with higher rates of returns. Conventional economic models have, nevertheless, determined that this premium should be much lower than what it really is. This lack of convergence between theoretical models and empirical results represents a stumbling task for academics to explain. Rietz (1988) proposed a solution to the equity premiumpuzzle that incorporates a small probability of alarge drop in consumption. He found that the risk freerate in such a scenario is much lower than there turn on an equity security. This model requires a 1 in 100 chance of a 25 percent decline in consumption to reconcile the equity premium with a risk-aversion parameter of 10. Such a scenario has not been observed in the United States for the past 100 years (the time for which there is data available). Nevertheless, one can evaluate the implications of the model. One implication is that the real interest rate and the probability of the occurrence of the extremeevent move inversely. For example, the perceived probability of a recurrence of a depression was probably high just after WWII, but subsequently declined over time. If real interest rates had risen significantly as the war years receded, that evidence would support the Rietz (1988) hypothesis. Similarly, if the low-probability event precipitating the large decline in consumption is interpreted to be e.g. anuclear war, the perceived probability of such an event has surely varied over the past 100 years. It must have been low before 1945, the first and only year the atom bomb was used, and it must have been higher before the Cuban missile crisis than after it. If real interest rates moved with these sentiments as predicted, that evidence would support Rietz's disaster scenario. But interest rates did not move as predicted. So what then?

Constantinides et al. (2002) argued that the young part of the population, who should (in an economy scenario without frictions and with complete contracting) be holding equity, are effectively shut out of this market because of borrowing constraints. They have low wages; so, ideally, they would like to smooth lifetime consumption by borrowing against future wage income (consuming a part of the loan and investing the rest in higher-returning equity). They are prevented from doing so, however, because human capital alone does not collateralize major loans inmodern economies (for reasons of moral hazard and adverse selection among others). In the presence of borrowing constraints, equity is thus exclusively priced by middle-aged investors and the equity premium is high. If the borrowing constraint were to be relaxed, the youngwould borrow to purchase equity, thereby raisingthe bond yield. The increase in the bond yield would induce the middle-aged to shift their portfolio holdings from equity to bonds. The increase in the demand for equity by the young and the decrease in the demand for equity by the middle-aged would work in opposite directions. On balance, the effect in the Constantinides et al. (2002) model isto increase both the equity and the bond returnwhile simultaneously shrinking the equity premium. Furthermore, the relaxation of the borrowing constraint reduces the net demand for bonds, and the risk-free rate puzzle unfortunately re-emerges.

In conclusion, behavioural finance's answer to the equity premium puzzle revolves around the tendency for people to have "short-sighted (myopic) loss aversion", a situation in which investors, overly preoccupied by the negative effects of losses in comparison to an equivalent amount of gains, take a very short-term view on an investment. What happens is that investors are paying too much attention to the short-term volatility of their stock portfolios. While it is not uncommon for an average stock to fluctuate a few percentage points in a very short period of time, a short-sighted investor may not react too favourably to the downside changes. Therefore, it is believed that equities must yield a high-enough premium to compensate for the investor's considerable aversion to loss. Thus, the premium is seen as an incentive for market participants to invest in stocks instead of marginally safer government bonds.

4.4 Value premium puzzle

Extensive academic research has shown that value stocks (that is, stocks with low market prices relative to such financial statement fundamentals as earnings and book value) have a tendency to outperform growth stocks (stocks with high market values relative to their fundamentals) in the long run. Numerous test portfolios have shown that buying a collection of stocks with low price/book ratios will deliver market-beating performance. Such a simplistic strategy seems to be evidence against the efficient market hypothesis, but what if value stocks are riskier than growth stocks, and what if their risk is insufficiently captured by the capital asset pricing model? Then we do not have an anomaly after all, but just an inappropriate asset pricing model.

Many of the earlier empirical studies that identify a significant and consistent "value premium" suggest that a zero-net investment strategy of short-selling growth stocks and holding long positions in value stocks will produce consistent positive returns over time. More recent evidence, however, suggests that the value premium may not be robust or stable over time. For example, the value premium seems to have disappeared for almost all of the 1990s in the run-up to the technology bubble, only to reappear in 2000 when the bubble burst. It then persisted for a stretch of six years until the recent financial crisis started in 2007.

The debate about the cause of the value premium has been going on for as long as the empirical evidence of the phenomenon has existed. But what drives the value premium? Current explanations could be put into two broad categories. One explanation, first provided by Fama & French in 1992, is that the value premium is a rational phenomenon and represents an investor's compensation for systematic risk. Fama & French (1992) argue that the value premium is associated with a stock's relative financial distress. In a weakening economy, investors require a higher risk premium on firms with distress characteristics; value stocks thus must offer a higher average return in reward for the extra systematic risk borne by the investor. As argued in Bansal & Yaron (2004), risks related to long-term growth lead to large reactions in stock prices and, hence, entail a significant risk compensation. Assets' valuations and risk premia, therefore, by large depend on the amount of low-frequency risks embodied in assets' cash flows. As documented by Kiku (2006), value firms are highly exposed to long-run consumption shocks. Growth firm fluctuations, on the other hand, are mostly driven by short-lived fluctuations in consumption and risks related to future economic uncertainty. Consequently, value firms exhibit higher elasticity of their price/dividend ratios to long-run consumption news (relative to growth assets) and have to provide investors with high *ex ante* compensation.

Another explanation of the value premium is based on behavioural finance investor behaviour in the capital markets. Some investors have tendency to overreact to positive and negative news, which causes prices to move by more than what is justified by the underlying fundamentals. Thus, value stocks that have done badly are oversold at some point in time and get corrected at another point in the future when investor sentiment switches. Although the value premium puzzle makes sense to a point (unusually cheap stocks should attract buyers' attention and revert to the mean), this is a relatively weak anomaly. Though it is true that low price-to-book stocks outperform as a group, the individual performance is very idiosyncratic and it takes very large portfolios of low price-to-book stocks to see the benefits.

4.5 Other anomalies

The efficient market hypothesis implies that publicly available information in the form of analyses published by investment advisory firms should not provide means of obtaining rates of return in excess of what would normally be expected on the basis of the risk of the investments. However, stock rankings provided by "The Value Line Investment Survey" appear to provide information that could be used to enhance investors' returns (Huberman & Kandel 1990). There is, interestingly, evidence that the market adjusts to this information within two trading days (Stickel 1985). Similarly, Antunovich & Laster (2003) and Anderson & Smith (2006) found that companies identified by Fortunemagazine, as the most admired, subsequently performed better than the S&P 500. The Antunovich & Laster (2003) study indicated that stock price reaction to the information is subject to drift, in that it takes a significant amount of time to occur, hence permitting investors to profit from the information. Conversely, Shefrin & Statman (1997) obtained the opposite result when analysing annual surveys of firm reputation published by Fortune magazine. They found that, on average, the shares of firms with good reputations turned out to be relatively poor investments whereas the shares of companies with poor reputations subsequently performed well.

Lee et al. (1991) suggest that the existence of investment trusts (closed-end funds) is an anomaly because rational investors would not be expected to buy new issues. The tendency for investment trusts to fall to a discount subsequent to issue appears to offer an early loss. Rational investors should not make an investment that is expected to result in an almost immediate loss. An anomaly that is consistent with the belief that markets in the shares of large firms are more likely to be efficient than the markets for small company shares is the "neglected firm effect". Neglect means that few analysts follow the stock,or that few institutional investors hold it. So fewer market participants put new information into the market. Neglected stocks are more likely to be mispriced,and, hence, are more prone to offer profit opportunities. Arbel & Strebel (1983) found that an investment strategy based on changes in the level of attention devoted by security analysts to different stocks could lead to positive excess returns. Allen (2005) observed that institutional investment funds specialising in small capitalisation companies in the United States outperformed the Russell 2000 (a stock index for small companies) whereas the institutions underperformed stock indices when managing funds of large capitalisation stocks. Allen (2005) suggested that the outperformance in the small capitalisation sector was partly due to an "instant history bias" wherein performance figures are not reported unless there is a history of good performance prior to records being reported for the first time. However, the view was taken that the outperformance was primarily because small company stocks were often neglected and that the resulting mispricing offered fund managers profitable opportunities.

Merton (1987) showed that neglected firms might be expected to earn high returns as compensation for the risk associated with limited information. The information deficiency resulting from the limited amount of analysis renders neglected firms riskier as investments. The relative absence of investment analysis makes it less likely that all relevant information is reflected in the share price.There is greater likelihood that the stock is mispriced, and the mispricing could entail the stock being overpriced. Investors may require compensation for the risk that the stock is purchased at an overvalued price. This view sees the neglected firm premium as a form of risk premium rather than as a contradiction of the efficient market hypothesis. Investors require the higher returns as compensation for the additional risk, and the higher required rates of return entail lower prices. On a risk-adjusted basis, neglected firms do not provide returns above a normal level.

Doukas et al. (2005) observed that not only were the stocks of neglected firms likely to trade at relatively low prices, but also the shares of firms receiving excessive attention from analysts may trade at abnormally high prices. It was suggested that when an investment bank anticipates investment-banking business with a company, the coverage of that company by the bank's investment analysts increases. If it were accepted that investment analysts tend to be overly optimistic about the stocks of firms which are prospective clients of their banks,the result of increased attention from analysts could be rises in the prices of such stocks. If a number of investment banks seek business with a firm, the result could be excessive attention from analysts and a resultant overpricing of its shares.

Related to the small-firm effect (as presented in section 4.1) and the neglected firm effect is the effect of liquidity on returns. Amihud & Mendelson (1991) argued that investors demand a premium to invest in illiquid stocks that entail high transaction costs. They found that such stocks did provide relatively high rates of return. Since the shares of small and neglected firms tend to be relatively illiquid, the liquidity effect may constitute part of the explanation of their high returns. However, the lack of liquidity, and high transaction costs, may remove the potential to profit from the liquidity effect on stock returns.

Some of the anomalies that apply to stocks within countries also seem to apply to international stock markets. Selecting countries for overseas investment on the basis of the anomalies appears to have potential. Asness et al. (1997) noted that within the United States the relative performance of stocks was positively related to high book-to-market ratios, small firm size,and high past year returns. For a 20-year period ending in 1994 they found that countries satisfying those three characteristics outperformed countries that did not. Richards (1997) investigated 16 national markets over the period 1970–95 and found that the type of winner-loser reversals found for U.S. stocks also applied to other countries. In particular, he found that for periods up to a year, relatively strong performance persisted,whereas over longer periods past relative outperformers (winners) became underperformers (losers) and vice versa. Emanuelli & Pearson (1994) studied 24 national markets and separated them on the basis of relative earnings revisions. They found that a portfolio of stocks from the countries with the greatest relative experience of positive earnings revisions outperformed an average of the 24 countries. A portfolio from the countries with the lowest positive (highest negative) earnings revisions underperformed.

5 Famous real-world bubbles

Having concluded in the previous chapter that behavioural factors, to a large extent, can help us account for cross-sectional anomalies and aggregate stock market puzzles time has come to look into some of the most famous financial bubbles. The jargon of finance contains numerous colourful expressions to denote a market-determined asset price at odds with any reasonable economics explanation. Such words as "mania", "bubble", "panic", "crash", and "crisis" immediately evoke images of frenzied and probably irrational speculative activity. Many of these terms have emerged from specific speculative historical episodes which have been sufficiently frequent and important that they underpin a strong current belief among economists that key capital markets sometimes generate irrational and inefficient pricing and allocation outcomes (Garber, 1990).

A bubble (or speculative bubble) is said to exist when high prices seem to be generated more by traders' enthusiasm than by economic fundamentals. Notice that a bubble must be defined ex-post, i.e. at some point the bubble bursts and prices adjust downward, sometimes very quickly. Interestingly, hindsight bias then often kicks in. Many investors can be heard saying that they knew it all along, but if so why did they participate and, in some cases, lose vast sums of money? (Ackert & Deaves, 2010). We will look into some of the most interesting bubbles in the financial history and when possible include some behavioural finance comments to the events.

5.1 Tulipmania

Tulipmania, a surge in the demand for tulip bulbs in the Netherlands in 1637, is the mother of all subsequent bubble narratives. The episode has long served as the epitome of the financial bubble. In his book, Shiller (2005) calls it "the most famous bubble of all. No asset bubble is too small or too large or its bursting will be compared to the Dutch tulip craze". Indeed, references to tulips have come thick and fast in discussions of the current financial crisis.

The original story is often recounted based on Markay's classical text from 1841 (Markay, 1841). In this description, the Netherlands became a center of cultivation and development of new tulip varieties after the tulip's entry into Europe from turkey in the mid-1500s. They rapidly came to be prized above all other flowers, and the upper-class was willing to pay quite extraordinary sums to obtain the latest, most spectacularly coloured variety. Particularly prized were tulips with darker coloured stripes and "flames" on a lighterbackground. Many of the most valuable striations were created, as known now, by a virus. This was not understood at the time, however, hampering the systematic development of new varieties. Moreover, such "flaming" tulips were always a risky investment, since it was never certain whether their patterns would be as desirable, and valuable, from one year to the next. To minimize uncertainty, serious tulip collectors contracted to buy and sell bulbs while they were in bloom, making payment and taking delivery only later, once the bulbs were lifted from the ground.

Tulip prices were high because supplies of the most exciting new varieties were extremely limited. The supply of the most famous tulip of the 1620s, the Semper Augustus was in the hands of a single owner, who held on to the bulbs as prices offered rose from 1000 gulden per bulb in 1623 to over 3000 gulden per bulb in 1625. When a Semper Augustus bulb was finally sold some time later, the owner attached the stipulation that the buyer could sell neither the bulb itself, nor any of its offsets (i.e. smallbulbs that develop on the outside of the main bulb) without permission of the original seller. The problematic combination of uncertainty about the quality of a bulb's next flower and mostly informal inevitably resulted in some failed transactions. Indeed, most of our reliable knowledge about tulip prices during this period derives from such transactions, since the disappointed party would often approach a notary to file an official complaint (van der Veen, 2009).

Through the 1620s and 1630s, professional growers and wealthy flower fanciers created a market for rare varieties in which bulbs sold at high prices. By 1636, the rapid price rises attracted speculators, and prices of many varieties surged upward from November 1636 through January 1637. In February 1637, prices suddenly collapsed, and bulbs could not be sold at 10% of their peak value. By 1637 the prices of all of the most priced bulbs of the mania had fallen to no more than 1/200 of 1% of their peak price. Figure 4 summarises the available data on tulip prices with a quality-weighted price index over this short time interval. Since the relevant tulip bulbs are regularly planted in the fall and only dug up in the spring, the relevant prices here are the prices that appear in contracts for future delivery. Given the acknowledged absence of basic economic shocks over this short span of time, the unmistakable bubble pattern appears to speak for itself. The story concludes by asserting that the collapse led to economic distress in the Netherlands for years afterwards (Thompson, 2006).

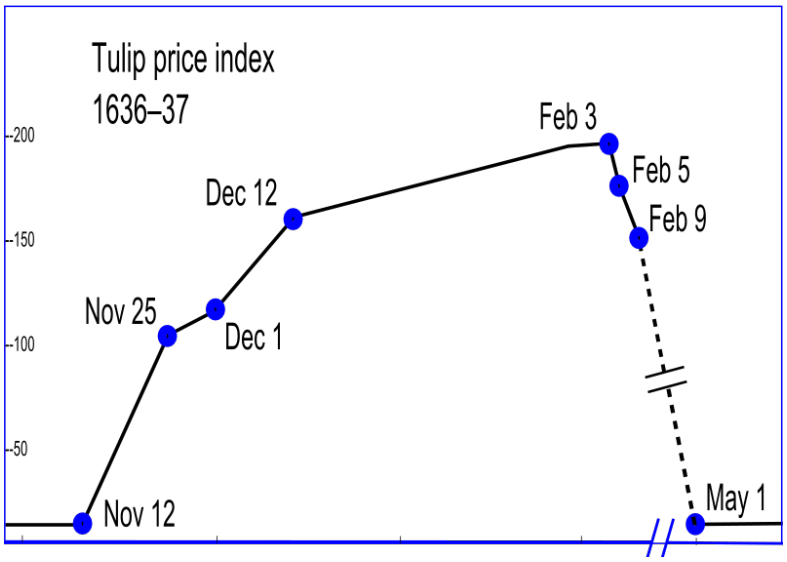

Figure 4: A standardised price index for tulip bulb contracts, created by Earl Thompson. Thompson had no price data between February 9 and May 1, thus the shape of the decline is unknown. The tulip market is known, however, to have collapsed abruptly in February (Based on Thompson, 2007)

Both the famous discussion of Mackay (1841) and the famous academic discussion by Posthumus (1929) point out a highly peculiar part of the episode. In particular, they tell us that, on February 24, 1637, a large organisation of Dutch florists and planters, in a decision that was later ratified by Dutch legislatures and courts, announced that all contracts written after November 30, 1636 and before the re-opening of the cash market in the spring possessed provisions that were not in the original contracts. The new provisions relieved their customers of their original unconditional contractual obligations to buy the future tulips at the specified contract price, but demanded that they compensate the planters with a fixed percentage of their contract prices. The provisions, in effect, converted the futures prices in the original contracts to exercise prices in options contracts. The corresponding option price paid to the planters was only later determined. In particular, after over a year of political negotiation, the legislature of Haarlem, the center of tulip-contract trade during the "mania", determined the compensation to the sellers to be only 3.5% of the contract price for those contracts made between November 30, 1636 and the spring of 1637 (Thompson, 2006).While it may be argued that expectations were not rational, that the traders were unaware of the conversion of futures to option contracts, Mackay (1841) emphasises the public nature of the extensive negotiations over the details of the contract conversions since almost the beginning of the upturn.

So was the Tulipmania a speculative bubble? In spite of numerous analyses through time, authors still disagree whether or not Tulipmania in fact is an example of a bubble phenomenon after all. Van der Veen (2009) concludes that the Dutch Tulipmania of 1636–1637 clearly qualifies as a bubble, in the sense that prices were not sustained by private estimations of value. Claims that market fundamentals explain the observed price patterns cannot be sustained, despite their popularity in recent years. Nor do arguments about inadequate government regulation offer much explanatory leverage. Authorities remained largely uninvolved in the bubble (although the States did consider taxing tulip profits in 1636–1637) and they mostly refused to be drawn into the adjudication of individual cases, at least until a year later. However, this does not mean that there was no regulation: the market was regulated by the rituals and norms that developed around the tulip trade, as well as by the broader social connections within which it was embedded.

Forbes (2009) calls the Tulipmania the classical bubble story in many ways. He argues that Tulipmania is an iconic story and that such stories form an important social and rhetoric purpose in our history and are open to strategic, if not manipulative, use by those opposed to the diffusion of the markets process. Several other authors have challenged the Tulipmania's iconic status as a financial bubble. Garber (1989, 1990) in a series of papers has argued that the Tulipmania story constitutes just such a handy myth which propagates even to this day. First, Garber (1989, 1990) has suggested that the pattern of price changes observed during the tulip craze matches the pattern one would expect for novel luxury goods in limited but gradually growing supply. His argument is widely cited but rarely examined closely. More recently, Thompson (2006) has claimed that the dramatic increases in tulip prices during the winter of 1636–1637 were due to a shift in market instruments from standard futures contracts to options. If either author is correct, the literature on financial bubbles may be forced to make do without this popular episode.

It probably cannot be known for sure whether or not Tulipmania is an example of an economic bubble, but Ackert & Deaves (2010) conclude that no matter what there is evidence that people bought tulips because they believed that others would pay even more. According to behavioural finance theories you buy an asset that you realise is overvalued because you think there is a foolish individual out there who will pay even more. Thus, you might really know the tulip bulb is not worth anywhere near 3000 gulden, but you think someone else will pay more to get it. One should perhaps not assume irrationality too quickly. Perhaps there is another interesting interpretation for the Tulipmania as suggested by Ackert & Deaves (2010). Tulips come in many varieties and colour patterns and many are truly rare. Is a tulip fancier who pays a high price for a bulb any more irrational than an art collector who pays millions of dollars for a painting? Ackert & Deaves (2010) conclude that as odd as it might seem to us today, the high values associated with tulip bulbs could have been rationally based on people's preference at that time in history. The bubble bursting could have been due to a sudden change in preferences, unlikely as it seems but not impossible.

5.2 The South Sea bubble

The South Sea bubble in 1720 was a great economic bubble leaded by speculation ofstock in the South Sea Company. During the War of the Spanish Succession, a largeamount of the British government debt was issued, and the government wanted tocut off the interest rate of the debt to relieve its financial pressure. At the sametime, the stock of South Sea Company was very popular because it was granted amonopoly to trade in Spain's South American colonies as part of a treaty during theWar of the Spanish Succession. The company would like to hedge its risk by buying the debts with its highly evaluated stocks and get stable income from the government.Under this circumstance, the South Sea Scheme was activated exactly the same asour discussion above. This scheme was considered to be a win-win trading. As aconsequence, the public started to buy the stocks of South Sea Company and theillegal actions from the company (fraud, lending money to the buyers to enable theirpurchase of the stocks, etc.) escalated the irrational behaviour (Yan, 2011). As figure 5 shows,the share price had risen from the time the scheme was proposed: from £128 inJanuary 1720 to £1,000 in early August, followed by a dramatic fall down to about 100pounds within several months. Hundreds of people lost a huge amount of money,including Sir Issac Newton. When he was asked about the continuance of the risingof South Sea stock, he answered: "I can calculate the movement of the stars, butnot the madness of men" (Taylor, 2004).

Figure 5: The development in stock price for the South Sea Company (from Shea, 2007)

The literature on the South Sea Bubble has emphasised irrational behaviour as the dominant behaviour in financial markets, at least as far as explaining the spectacular rise in South Sea equity values, in 1720. The literature largely predates, however, the usage of the term "irrational" as it appears in the writings on behavioural finance discussed in the earlier chapters. The literature moreover says nothing about the limits on arbitrage that could have limited irrational pricing of South Sea and other shares. The literature does present us with individual cases of successful and unsuccessful speculation, but the evidence does not clearly point to any instance of what the modern economist would call arbitrage. As tantalising as the evidence is that some individuals were engaged in what we would now call international risk arbitrage, the evidence is not conclusive. There also appears in the literature stories of individuals and institutions that made money in the South Sea Bubble simply by selling steadily into the rising market of 1720 (Shea, 2007).

5.3 The 1929 stock market crash

The sharp rise and subsequent crash of stock prices in late 1920s is perhaps the most striking episode in the history of American financial markets (De Long & Shleifer, 1990). Known as "the Great Depression" this episode was preceded by stock market booms that crashed inthe U.S. and U.K. in the late 1920s. A series of banking panics in the U.S. beginning in October 1930 were not successfully allayed by the Federal Reserve and this turned the situation from bad to ugly. The depression was transmitted around the world by the fixed exchange rate links of the gold exchange standard and numerous protectionist measures. Many countriesacross the world were finally hit by debt and currency crises (Yan, 2011).

Before the crash, hundreds of thousands of Americans invested heavily in the stock market in the belief that the development of utility would lead to a "new" economy, and a significant number of them were borrowing money to buy more stocks. The rising share prices encouraged more people to invest, which created a positive feedback loop. A massive bubble was generated by such kind of speculation. The bubble began to deflate, and October 24, 1929, which became known as "Black Thursday", marked the beginning of the "Great Crash". This crash is one of the most devastating stock market crashes in the history of the United States. It triggered the 12-year Great Depression that affected all Western industrialized countries and that did not end in the U.S. until the onset of American mobilisation for World War II at the end of 1941 (Yan, 2011).

Some observers have interpreted the 1929 price pattern as reflecting changing fundamentals in the economy. Fisher (1930), for example, argued throughout 1929 and 1930 that the high level of prices in 1929 reflected an expectation that future corporate cash flows would be very high. Fisher (1930) believed this expectation to be warranted after a decade of steadily increasing earnings and dividends, rapidly improving technologies, and monetary stability. According to this interpretation, the run-up of stock prices before the crash reflected shifts in expectations of the future that were ex-post faulty but ex-ante rational. The crash and the subsequent slide of stock prices then reflected a rational, and in this case an ex-post correct, revision of beliefs, as investors recognized the approach of the Great Depression and the end of the Roaring Twenties (De Long & Shleifer, 1990).

Other students of the Great Crash, notably Galbraith (1954), have argued that even though fundamentals appeared high in 1929, the stock market rise was clearly excessive. Galbraith (1954) cited margin buying, the formation of closed-end investment trusts, the transformation of financiers into celebrities, and other qualitative signs of euphoria to support his view. Over the past three decades, Galbraith's position has lost ground with economists, especially with financial economists, as the efficient-market hypothesis has gained.

Much following work sides with Fisher's interpretation of 1929. Sirkin (1975), for example, examined the revisions of long-run growth forecasts required for shifts in stock yields in 1929 to reflect shifts in perceived fundamental values. He found that, compared to actual post-World War 2 yields and stock returns, the implied growth rates of dividends were quite conservative, and in fact lower than post-World War 2 dividend growth rates. Santoni & Dwyer (1990) failed to find evidence of a bubble in stock prices in 1929. Along similar lines, Barsky & De Long (1990) argued that, if the long-run growth rate of dividends were thought to be unstable and if investors projected recent-past dividend growth rates into the future, then large swings in stock prices, such as those of the 1920s and 1930s, would be the rule rather than the exception. Barsky & De Long (1990) found that year-to-year movements in stock prices appear to have been no more sensitive to changes in current real dividends in the late 1920s and early 1930s than in the remainder of the twentieth century.

5.4 The dot.com/tech bubble

For many, the tech bubble of the late 1990s is probably the most prominent example of a stock market boomand bust. In the late 1990s it was common to believe the Internet and the knowledge economy more generally had fundamentally transformed both society and the productive possibilities open to mankind. In its most extreme form this sort of belief imagined a sort of "digital sublime" which promised almost unlimited wealth. As the internet and information technology spread throughout society, investors became ever more optimistic about the growth prospects and profit potential of companies involved in IT. Indeed this new age zeitgeist served an important unifying role for those engaged in the investment and development of the new economy almost regardless of its truth (Forbes, 2010).

During the late 1990s there was a bull market, particularly in technology stocks. During the bullmarket, individual investors increased their levels of trading. Investors allocated higher proportions oftheir portfolios to shares, invested in riskier (often technology) companies, and many investorsborrowed money in order to increase their shareholdings (Barber & Odean, 2001).The bubble and crash was particularly clear in the case of technology stocks. The NASDAQ index,which focuses on technology stocks, rose more than six-fold between 1995 and early 2000 (see figure 6). It then lostmore than three quarters of its peak value by late 2002 (Redhead, 2008).

Figure 6: The tech bubble at the end of the 1990s (Redhead, 2008)

Best (2005) investigated the dot.com stock bubble, which occurred in the late 1990s and burst in 2000, in a behavioural finance framework. One conclusion was that internet stocks acquired a form of celebrity status. Their prices exceeded fundamental value just as the earnings of celebrities appear to surpass the talent of the individuals concerned. Just as the perception of celebrities has an emotional dimension, investors in internet stocks were seen as having an emotional attachment to them. Just as the media promotes celebrities, and thecult of celebrity, the media promoted internet investing and a culture of internet investing. Part of the reasoning of the analysis provided by Best (2005) is similar to the familiarity heuristic of behavioural finance. As explained in previous chapters, the familiarity heuristic leads people to prefer to invest in things they think they know and understand. At the time of the internet stock bubble large numbers of people were beginning to use the internet, which therefore felt familiar to them. The internet was new, exciting and appeared to offer huge potential. It is possible that internet stocks, by association with the internet itself, came to be seen as exciting investments with huge potential.

The role of momentum in the development of the high-tech bubble was particularly significantaccording to Boswijk et al. (2007). They divided investors into two groups. One group comprised fundamentalists (price traders) who believed in the mean-reversion of stock prices towards a true (fundamental) value such that deviations from true values would be corrected. The other group consisted of trend followers (herd traders) who believed that a direction of price movement would continue. The proportions of investors in the two groups vary over time. The researchers found that in the late 1990s almost all investors were trend following, and that the dominance of trend followers persisted for several years. This is consistent with strong momentum in the formation of the bubble. The studies by Best (2005) indicated that high technology (including dot.com) stocks were particularly susceptible to momentum trading (i.e. trend following).

Taffler & Tuckett (2002) provided a psychoanalytic perspective on the technology-stock bubble andcrash of the late 1990s and early 2000s, and in so doing gave a description of investor behaviour totallyat odds with the efficient markets view of rational decision-making based on all relevant information.They made it clear that people do not share a common perception of reality; instead everyone has theirown psychic reality. These psychic realities will have varying degrees of connection with objective reality. Decisions are driven by psychic reality, which is a realm of feelings and emotions. Reason maybe secondary to feeling. Feeling affects the perception of reality. People are seen as engaging in wish fulfilment wherein they perceive reality so that it accommodates to what they want. People see what they want to see. Unpleasant aspects of reality may be subject to denial, which is the pretence that unpleasant events and situations have not happened. Denial reduces the ability to learn from unpleasant experiences, since unpleasant experiences are removed from conscious awareness.

5.5 The U.S. housing boom and bust

Few markets have had such a skyrocketing rise, followed immediately by an equally steep plummet to new depths, as the housing market in the U.S. has had in the early years of the twenty-first century. U.S. home prices increased from 1997 to 2006 by approximately 85% (see figure 7), adjusted for inflation, fostering the largest national housing boom in the nation's history. From 2000 to 2005 alone, the median sales price of American single-family homes rose by one-third. In some places, the rise was even sharper. Over those same years, the median home price in New York rose 79%, in Los Angeles 110% and in San Diego 127%. In costal California, the rise was especially sharp and so was the later fall (Sowell, 2009). The cost of owning houses relative to renting them increased dramatically from 2003 to 2006, suggesting the existence of a bubble, where home prices greatly exceeded their intrinsic values. Home prices have subsequently fallen by more than 30 percent (Shiller, 2007).

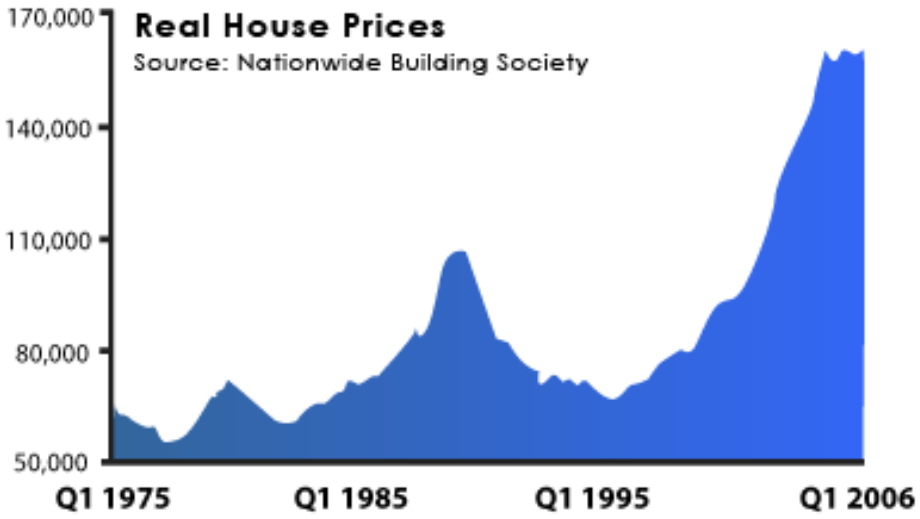

Figure 7: The U.S. Real housing prices from 1975 to 2006 (Based on Sowell, 2009)

In the aftermath of the global financial crisis and the Great Recession, research has sought to understand the behaviour of house prices. Before 2007, countries with the largest increases in household debt relative to income experienced the fastest run-ups in house prices (Glick & Lansing 2010). Within the United States, house prices rose faster in areas where subprime and exotic mortgages were more prevalent (Mian & Sufi 2009; Pavlov & Wachter 2011). In a given area, house price appreciation had a significant positive impact on subsequent loan approval rates (Goetzmann et al., 2012). Many studies have attributed the financial crisis of 2007–09 to a credit-fuelled bubble in the housing market. The U.S. Financial Crisis Inquiry Commission (2011) emphasized the effects of a self-reinforcing feedback loop in which an influx of new homebuyers with access to easy mortgage credit helped fuel an excessive run-up in house prices. This, in turn, encouraged lenders to ease credit further on the assumption that house prices would continue to rise.

By contrast, to explain the boom, others have used theories in which house prices were driven mainly by fundamentals, such as low interest rates, restricted supply, demographics, or decreased perceptions of risk. A recent paper (Favilukis et al, 2012) argues that the run-up in U.S. house prices relative to rents was largely due to a financial market liberalization that reduced buyers' perception of the riskiness of housing. The authors develop a theoretical model where easier lending standards and lower mortgage transaction costs contribute to a substantial rise in house prices relative to rents. But this is not a bubble. Rather, the financial market liberalisation allows rational households to better smooth their consumption in the face of unexpected income declines, thus reducing their perception of economic risk. Lower risk perception induces households to accept a lower rate of return on the purchase of risky assets such as houses. A lower expected return leads to an increase in the model's fundamental price-rent ratio.

A large number of authors have argued psychological factors rather than fundamentals play the keyrole in house price dynamics. The earliest academic papers on the role of psychology on realestate prices focused on unexplained serial correlation in real estate prices (Case & Shiller, 1989). Of course, serial correlation itself is not necessarily evidence of irrational markets if underlying rent growth is also serially correlated. Yet data on rents is very hard to obtain, confounding tests of market efficiency. Meese & Wallace (1994) obtained detailed rental data from advertisements and estimated an asset pricing model on houses in the San Francisco area.The authors concluded that the run-up in prices in the late 1980s was not fully justified by fundamentals. Both papers concluded that pricing inefficiencies are due to high transaction costs that limit arbitrage opportunities for rational investors.

Psychology, too, may affect how households set their expectations of future price appreciation. Case & Shiller (1988) surveyed recent home buyers in four cities about their expectations of future house price growth. Recent buyers in Los Angeles, a market with strong house price appreciation in the 1980s, reported that they expected much higher long-term house price appreciation than households in a control market, Milwaukee, where house prices were flat in the 1980s. In a subsequent survey (Case& Shiller, 2004), recent buyers in Milwaukee raised their reported expected appreciation in-line with the national housing boom. By 2006, recent home buyers in both Milwaukee and Los Angeles had lowered their reported expected appreciation for the next year, although they did not adjust down their 10-year expected appreciation rate as much (Shiller, 2007). Shiller (2007) cites the survey evidence and other case studies to support his conclusion that a psychological theory, that represents the boom as taking place because of a feedback mechanism or social epidemic that encourages a view of housing as an important investment opportunity, fits the evidence betterthan fundamentals such as rents or construction costs.

A second psychological theory proposed by Brunnermeier & Julliard (2007) argues that households cannot fully disentangle real and nominal changes in interest rates and rents. As a result, when expected inflation falls, home owners take into account low nominal interest rates when making housing purchase decisions without recognizing that future appreciation rates of prices and rents will fall commensurately. They argue that falling inflation leads to otherwise unjustified price spikes and housing frenzies and can help explain the run-up in U.S. and global prices in the 2000s. As evidence, Brunnermeier & Julliard show that inflation is correlated with the residuals of a dynamic rational expectations model of house prices.

Probably the most direct evidence on the importance of psychology in real estate markets focuses specifically on loss aversion in downturns (Engelhardt, 2003). Yet loss aversion may have a hard time explaining the current housing boom or even excess volatility in downturns. Since loss averse sellers set higher asking prices when house prices are falling, this particular psychological factor actually leads to lower volatility over the cycle, making the puzzle of possibly excess volatility in cycles an even more difficult problem to explain (Mayer & Sinai, 2007).

Shiller (2007) argue that the boom in the housing markets from 2000 onwards was largely driven by extravagant expectations of further price increases. Using data from questionnaires surveys for two majorUS cities he found that in times and places of high price changes, expectations of future price increases werehigher. Moreover he shows that as the rate of price increases changes, the expectations of future pricesincreases are also altered in the direction of the change. Further, he argues that the declining standards in lending and the proliferation of complex mortgage backedsecurities were a result of the institutional changes that resulted during the boom and concludes that there isa"coordination problem with psychological expectations" during periods of boom in that people find ithard to alter their expectations of future price increases since they find it difficult to coordinate on a time toalter their expectations inferring from the expectations of other investors.In line with previous arguments Shiller (2007) attribute the boom in the housing market to a "social contagion of boom thinking" and "new era stories" in the belief that home prices would continue to riseforever, this belief being further strengthened by the media with its overly optimistic stories around theprice increases. He calls this a "price-story-price" feedback loop that takes place repeatedly during aspeculative bubble.

5.6 Some behavioural finance thoughts on the present financial crises

The financial crisis of 2008, which started with an initially well-defined epicenter focused on mortgage backed securities8 (MBS), has been cascading into a global economic recession, whose increasing severity and uncertain duration has led and is continuing to lead to massive losses and damage for billions of people. Heavy central bank interventions and government spending programs have been launched worldwide and especially in the U.S. and Europe, with the hope to unfreeze credit and bolster consumption. One general overall conclusion regarding the fundamental cause of the unfolding financial and economic crisis is the accumulation of several bubbles and their interplay and mutual reinforcement leading to an illusion of a "perpetual money machine"allowing financial institutions to extract wealth from an unsustainable artificial process (Sornette & Woodard, 2008).

It has been argued that the immediate cause for the financial crisis is the bursting of the house price bubble principally in the U.S. and the U.K. and a few other countries including Denmark, leading to an acceleration of defaults on loans, translated immediately into adepreciation of the value of mortgage-backed security (Doms et al., 2007). After a peak inmid-2006, the real-estate market in many states reached a plateau andthen started to decrease. A number of studies have shown indeed a strong link betweenhouse price depreciation and defaults on residential mortgages (Demyanuk, 2009). In particular, Demyanyk & van Hemert (2008) explain that all along since 2001 subprime mortgages have been very risky, but their true riskiness was hidden by rapid house price appreciation, allowing mortgage termination by refinancing/prepayment to take place. Only when prepayment became very costly (with zero or negative equity in the house increasing the closing costs of a refinancing), did defaults took place and the unusually high default rates of 2006 and 2007 vintage loans occurred (Sornette & Woodard, 2008).

It is clear to all observers that banks have acted incompetently in the recent MBS bubble by accepting package risks, by violating their fiduciary duties to the stockholders, and by letting the compensation/incentive schemes run out of control (Sornette & Woodard, 2008). From executives to salesmen and trading floor operators, incentive mechanismshave promoted a generalized climate of moral hazard. Justified by the principles of good corporate governance, executive compensation packages have a perverse dark side of encouraging decision makers to favour strategies that lead to short-term irreversible profits for them at the expense of medium and long-term risks for their firm and their shareholders. Even if the number of CEOs facing forced turnover has increased 3 to 4-fold during the past 20 years while, simultaneously, most contractual severance agreements require the forfeiture of unvested options, lump-sum payments and waiving forfeiture rules often compensate for such losses. There is something amiss when the CEOs of Citibank and of Countrywide walk out of the mess they created for their firms with compensation packages. It is often the case that firms finally turn out losing significantly more when the risks unravel than their previous cumulative gains based on these risky positions, while the decision makers responsible for this situation keep their fat bonuses. As long as the risks areborne by the firm and not equally by the decision makers, the ensuing moral hazardwill not disappear. It is rational for selfish utility maximisers and it will therefore remain a major root of future financial crises.

Herding effects amplify the moral hazard factor discussed in previous chapters. Indeed, performance is commonly assessed on the basis of comparisons with the average industryperformance. Therefore, each manager cannot afford to neglect any high yield investment opportunity that other competitors seem to embrace, even if she believes that, on the long run, it could turn out badly. In addition, herding is often rationalizedby the introduction of new concepts, e.g. "the new economy" and new "real ption" valuation during the Internet bubble. And, herding provides a sense of safety in the numbers: how could everybody be so wrong? Evolutionary psychology andneuro-economics inform us that herding is one of the unavoidable consequences of our strongest cognitive ability, that is, imitation. In a particularly interesting study using functional magnetic resonance imaging on consumption decisions performedby teenagers, Berns et al. (2009) have recently shown that the anxiety generated bythe mismatch between one's own preferences and others motivates people to switch their choices in the direction of the consensus, suggesting that this is a major forcebehind conformity.

Greed, anxiety, moral hazard and psychological traits favouring risk taking in finance were prevalent in the past and are bound to remain with us for the foreseeable future. Therefore, the question whether greed and poor governance was at the origin of the crisis should be transformed into the question of timing, that is, why these traits were let loose to foster the development of anomalous excesses in the last few years.

Credit rating agencies have been implicated as principal contributors to the credit crunch and financial crisis. They were supposed to create transparency by rating accurately the riskiness of the financial products generated by banks and financial actors. Their rating should have provided the basis for sound risk-management by mortgage lenders and by creators of structured financial products. The problem is that the so-called AAA tranches of MBS have themselves exhibited a rate of default many times higher than expected and their traded prices are now just a fraction oftheir face values.

To provide the rating of a given Collateralized debt obligations (CDO) or MBS, the principal rating agencies (e.g. Moodys, Fitch and Standard & Poors) used quantitative statistical models based on Monte Carlo simulations to predict the likely probability of default for the mortgagesunderlying the derivatives. One problem is that the default probabilities fed into the calculations were in part based on historical default rates derived from the years 1990–2000, a period when mortgage default rates were low and home prices were rising. In doing so, the models could not factor in correctly the possibility of a general housing bust in which many mortgages are more likely to go into default. The models completely missed the possibility of a global meltdown of the real estatemarkets and the subsequent strong correlation of defaults. The complexity of the packaging of the new financial instruments added to the problem, since rating agencies had no historical return data for these instruments on which to base their risk assessments. In addition, rating agencies may have felt compelled to deliberately inflate their ratings, either to maximise their consulting fees or because theissuer could be shopping for the highest rating (Berg & Bech, 2009). Recently, Skreta& Veldkamp (2009) showed that all these issues were amplified by one single factor, the complexity of the new CDO and MBS. The sheer complexity makes very difficult the calibration of the risks from past data and from imperfect models that had not yet stood the test of time. In addition, the greater the complexity, the larger the variability in risk estimations and, thus, of ratings obtained from different models based on slightly different assumptions. In other words, greater complexity introduces a large sensitivity to model errors, analogous to thegreater sensitivity to initial conditions in chaotic systems. If the announced rating is the maximum of all realised ratings, it will be a biased signal of the asset's true quality. The more ratings differ, the stronger are issuers' incentives to selectively disclose (shop for) ratings.

Skreta & Veldkamp (2009) argue that the incentives for biased reporting of the true risks have been latent for a long time and only emerged when assets were sufficiently complex that regulation was no longer detailed enough tokeep them in check. Note that the abilities of ratings manipulation and shopping toaffect asset prices only exist when the buyers of assets are unaware of the games being played by the issuer and rating agency. This was probably true until 2007, when the crisis exploded.

The different elements described above are only pieces of a greater process that can be aptly summarised as the illusion of the "perpetual money machine." This term refers to the fantasy developed over the last 15 years that financial innovations and the concept that "this time, it is different" could provide an accelerated wealth increase. In the same way that the perpetualmotion machine is an impossible dream violating the fundamental laws of physics, it is impossible for an economy which expands at a real growth rate of 2–3 per cent per year to provide a universal profit of 10–15 per cent per year, as many investors have dreamed of (and obtained on mostly unrealised market gains in the last decade). The overall wealth growth rate has to equate to the growth rate of the economy. Of course, some sectors can exhibit transient accelerated growth due to innovations and discoveries. But it is a simple mathematical identity that global wealth appreciation has to equal GDP growth.

The lack of recognition of the fundamental cause of the financial crisis as stemming from the illusion of the "perpetual money machine" is symptomatic of the spirit of the time. The corollary is that the losses are not just the downturn phase of a business or financial cycle. They express a simple truth that is too painful to accept for most, that previous gains were not real, but just artificially inflated values that have bubbled in the financial sphere, without anchor and justification in the real economy. In the last decade, banks, insurance companies,Wall Street as well as Main Street and many of us have lured ourselves into believing that we were richer. But this wealth was just the result of a series of self-fulfilling bubbles. As explained in more details above and elsewhere, in the U.S. and in Europe, we had the Internet bubble (1996–2000), the real-estate bubble (2002–2006), the MBS bubble (2002–2007), an equity bubble (2003–2007), and a commodity bubble (2004–2008), each bubble alleviating the pain of the previous bubble or supporting and justifying the next bubble.

5.8 Bubbles: Past, Present and Future

As apparent from the previous subsections a common element of many speculative bubbles, if not scams, is the belief that the world has entered a new bright dawn of history which will liberate man from his life of want and struggle (Forbes, 2010). Despite the wide range of assets that have witnessed bouts of irrational exuberance (tulips and equities to name but a few), bubbles seem to follow a similar pattern. As Marx (Montier, 2007) noted, history repeats itself, first as tragedy, second as farce. This section attempts to outline the anatomy of an asset price bubble.

A number of authors have looked into common characteristics of bubbles. Band (1989) argued that market tops exhibited the following features:

1. Prices have risen dramatically.
2. Widespread rejection of the conventional methods of share valuation, and the emergence of new 'theories' to explain why share prices should be much higher than the conventional methods would indicate.
3. Proliferation of investment schemes offering very high returns very quickly.
4. Intense, and temporarily successful, speculation by uninformed investors.
5. Popular enthusiasm for leveraged (geared) investments.
6. Selling by corporate insiders, and other long-term investors.
7. Extremely high trading volume in shares.

The most famous model of bubbles is one promoted by Kindleberger (1989, 2005). It is largely the result of work carried out by the economist Hyman Minsky. A diagrammatic outline of the bubble stages is presented below (Montier, 2007):

Displacement
↓
Credit creation
↓
Euphoria
↓
Critical stage / financial distress
↓
Revulsion

Displacement is generally an exogenous shock that triggers the creation of profit opportunities in some sectors, while shutting down profit availability in other sectors. As long as the opportunities created are greater than those that get shut down, investment and production will pickup to exploit these new opportunities. Investment is likely to occurin both financial and physical assets. Essentially a boom is engendered. In the tech. bubble in the U.S. equity market, the exogenous shock was clearly the arrival of the internet. Here was something capable of revolutionising the way in which so many of us conducted our businesses (and lives more generally).

In the credit creation state the boom is then further exacerbated by monetary expansion and/or credit creation. Effectively, the model holds money/credit a send ogenous to the system, such that for any given banking system, monetary means of payment may be expanded not only within the existing system of banks, but also by the formation of new banks, the development of new credit instruments and the expansion of personal credit outside the banking system. Sooner or later demand for the asset will out strip supply, resulting in the perfectly natural response of price increases. These price increases give rise to yet more investment (bothreal and financial). A positive feed-back loop ensues: new investment leads to increases in income which, inturn, stimulate further investment. Monetary and credit creation in the U.S. hightech bubble were largely the result of overly accommodative monetary policy (Montier, 2007)

Euphoria is the term given when speculation for price increase is added to investment for production and sales. Effectively this is momentum trading or the "greater-fool-theory" of investment as previously presented. Adam Smith referred to such developments as "overtrading" (Montier, 2007). Kindle berger correctly notes that over trading is anebulous concept. However, he notes that over trading may involve purespeculation, an over estimate of prospective returns or excessive gearing. The U.S. experience between 1991 and 2002 certainly fit sall three of these elements. The massive popularity of such creations as aggressive growth funds testifiestothelargepurely speculative elements at work with in the U.S. equity market. Analysts clearly had excessive over estimates of the prospective return satleast in terms of the long-termearnings potential of U.S. corporate (Redhead, 2008).

Given that analysts and corporate tend to work so closely, these estimates essentially receive sign off from the companies as well. As such, they reflect the ridiculous levels of over optimism that infected corporate managers during the late 1990s. Further reflections of over optimism among corporate managers can be witnessed by the scale of recent good wil lwrite-downs. After all, a good will write-down is nothing more than an admission that a company over paid for its acquisitions.

The bubble phase leads to share prices reaching unrealistic levels. These are share price levels far in excess of what can be justified by fundamental analyses using dividend discount models or price-earnings ratios (see the chapters on dividend discount models and ratio analysis). Indeed one feature of bubbles, identified by Kindleberger (1989, 2005), is the emergence of "new age" theories. New age theories are ad hoc theories that seek to justify why prices should be far in excess of what conventional share valuation models suggest.

Eventually social mood passes its peak and cognitive rationality comes to dominate social mood. Investors sell and prices fall. If social mood continues to fall, the result could be a crash in which stock prices fall too far. The situation is then characterised by an unjustified level of pessimism, and investors sell shares even when they are already under-priced. Investors' sales drive prices down further and increase the degree of under-pricing. Fisher & Statman (2000, 2002) provided evidence that stock market movements affect sentiment. A vicious circle could develop in which falling sentiment causes prices to fall and declining prices lower sentiment.

There may then be an occurrence that causes prices to fall rapidly. One such occurrence might be the emergence of new companies. The new companies compete with existing ones and push down their profits. Also when the new companies float on the stock market, the additional supply of shares will help to depress share prices. Towards the end of the 1999–2000 technology stock bubble many new companies were issuing shares. This increased supply of shares overtook the growth in demand for shares. The result was that the prices of shares in the technology sector began to fall.

Rising interest rates could be another occurrence that leads to falling share prices. Bubbles often involve people borrowing money in order to buy shares. High interest rates could cause investors to sell shares in order to pay the interest. Such sales could set off a crash. In Japan in 1990 interest rates rose sharply. This was followed by collapses in the prices of both shares and property. Rising interest rates can also reduce the demand for shares by making alternatives such as bank deposits more attractive. Higher interest rates also reduce expenditure on goods and services and thereby lower corporate profits. Lower expected profits can cause a fall in share prices. Other factors that can precipitate share price collapses include share sales resulting from negative statements by people who are looked upon as experts. These may be genuine experts such as governors of central banks, or self-appointed experts such as newspaper gurus. Also prospective investors may stop buying because they deplete their sources of money. The flow of new investors on to the market will eventually stop. These factors can start a crash by increasing sales of shares and decreasing purchases. Cassidy suggested that a crash could be precipitated by a random event, or have no apparent catalyst, if stock prices have reached sufficiently unrealistic levels (Montier, 2007; Redhead, 2008).

According to Pepper & Oliver (2006) a long period of rising prices is associated with an accumulation of investors who need to sell (since their holdings of money are less than the desired levels). Such investors may delay asset sales while prices continue to rise. A continuing rise in prices is likely to attract speculative investors who do not plan to hold the investments for the long term; Pepper & Oliver (2006) refer to their investments as being loosely held. A long period of rising prices would lead to many investors needing to sell shares in order to raise money for other purposes, and to many speculators with loosely held shares. When the expectation of price rises disappears, both groups of investors will sell. Share prices fall sharply.

The psychoanalytic view of Taffler & Tuckett (2002) sees the unconscious mind as excluding uncomfortable aspects of reality from awareness. When the bubble bursts, and prices fall, it becomes impossible to completely exclude unpleasant aspects of objective reality from awareness. Feelings of anxiety, loss, panic and shame emerge. Selling the shares as quickly as possible could then become part of the process of denial.

The fourth stage of the bubble process is labelled the critical stage or the financial distress stage. The critical stageis the point where as etofinsiders decide to take their profit sand cash out. Significant selling by insider shasbeen a hallmark of 2000/2001. The fact that, by 2002, insiders were still selling four times the amount of stock they were buying should tell you some thing about how confident they were over the prospect forequity appreciation over the following 12 months (Montier, 2007).

Financial distress usually follows straight on from the critical stage (indeed the two can be hard to separate, hence we have tacked them together). The term "financial distress" is borrowed from the finance literature where it refers to a situation in which a firm must contemplate the possibility that it may not be able to meet its liabilities. For an economy as a whole, the equivalent condition is a nawarenesson the part of a consider able segment of the speculating community that arush for liquidity (out of assets into cash) may develop. As the distresspersists, so the perception of crisis increases. Kindle berger (1989, 2005) notes: "The specific signal that precipitates the crisis may be a failure of a bank, or a firm stretched too tight, the revelation of a swindle". The occurrence of swindling/fraud seems highly pro-cyclical and the role of swindles in bursting bubbles is intriguing.

Revulsion is the final stage of the bubble cycle. Revulsion refers to the fact that people are so badly scarred by the events in which they were embroiled that they can no longer bring themselves to participate in the market a tall. It is clearly related to that most dreadful of current buzzwords: "capitulation".Capitulation is generally used to describe the point when the final bull admits defeat and throws in the towel. In the language of the Kindle berger/Minsky model, capitulation is described as degeneratepanic.Revulsion is obviously not exactly the same thing, since it can (andfrequentlydoes)occurpost-capitulation. Interms of the 2002 market we saw no signs of capitulation. Most strategists were still amazingly bullish. Perhaps more significantly volumes remained very high (Redhead, 2008).

The degenerate panicends when one of three events occurs (Montier, 2007):

1. Prices fall so low that investors are tempted to move back into the asset.
2. Trade is cut off by setting limits on price declines.
3. Lender of the last resort steps in.

So let's assume we get a degenerate panic. Which, if any, of these option swill present it self as a potential escape route from the markets' declines? Well, equity price shave a considerable down side before we can start to claim valuation support. At the very least, 30% declines in prices are likely to be required before valuations look tempting to us. These condroute provides only temporary release from panic. Ahalton trading may allow people to reassess, however, it may simply result in the market dropping instages in the face of persistent panic. The third route is perhaps them ostappealing-alender (or rather buyer) of the last resort emerges. This is a favourite of the current market rumours that the U.S. authorities are buying equities (The World Bank, 2012).

6 Behavioural investing

Behavioural finance has contributed to our understanding of how people value assets in a variety of markets. Investors and academics alike strive to quantify asset values based on observable factors, but experience clearly indicates that the human side has very real effects. A clear challenge for behavioural finance is obviously to bring what we have learned about how people make decisions to markets. Behavioural investing is thus defined as the attempt to enhance portfolio performance by applying lessons learned from behavioural finance.

In a recent study by Wright et al. (2006) addressing whether it is possible to enhance portfolio performance using behavioural finance, the performance of 16 self-proclaimed or media-identified behavioural mutual funds was evaluated. These funds claim to base their investment strategies in whole or in part on the principles of behavioural finance. Of course one of the weaknesses of the study, as also acknowledges by the authors, is the sparseness of the sample. Other funds not included in the sample may be following behavioural precepts as well, but their identity is unknown. Moreover, there is no guarantee that behavioural investing is really being followed by the funds in the sample. There is after all evidence that changing your name or professed strategy to what might be viewed as the flavour of the month (i.e. claiming that you run a behavioural-based investment fund may attract investor money in itself!) is successful at attracting flows of funds. Indeed, it turns out that the behavioural funds in the study are luring investor money, and their name or professed investment strategy may be one reason.Still, likely the main reason that these funds have been able to attract investors is that they, as a group, have outperformed the S&P 500. Wright et al. (2006) conclude that they have mostly capitalised on the value advantage presented in section 4.4, but also conclude from statistical analyses of the risk-adjusted investments that there is no statistical significance regarding the performance of behavioural mutual funds, with respect to mutual funds not claiming to use a behavioural investment approach.

The collection of anomalies, heuristics and biases presented in the previous chapters is to a large extent common knowledge, having been published in many of the highest ranked journals and in the popular press. Indeed some of them have been shown to be implications of an array of behavioural models. Is the utilisation of this knowledge in portfolio management tantamount to behavioural investing? One can always find a set of selection screens that would have worked well in the past. The big question for investors is which of these are likely to be operative going forward. One could argue that one of the main determinants of whether a pattern of data has usefulness for the future is whether or not it is behaviourally based. So should we expect behavioural investing to provide a payoff? While there is no evidence of this yet, given the limitations of the existing evidence and the currently amorphous nature of behavioural investing, it is reasonable to believe that the jury is still on this important question.

In the following sub-section, I have suggested seven main points to consider when investing. These points in essence sum up the previous chapters and (hopefully) bring some useful points for the modern investor to consider.

6.1 Points to consider for the behavioural investor

 # Point 1: Biases and heuristics apply to me, you and everyone else as well!

Normal humans are imperfect. Psychological and emotional phenomena such as overconfidence, anchoring, availability and representativeness etc. are ever-present in all of us. Whether our brain controls our emotions, or vice versa, is important for us to understand, because, as financial decision-makers, we want to know how to control (or even put into good use) our emotional responses. Better awareness of these phenomena will not let you get rid of them, but it will increase your awareness in investment situations.

 # Point 2: You know much less than you think you do!

The illusion of knowledge is the tendency for people to believe that the accuracy of their forecasts increases with more information. The simple truth is that more information is not necessarily better information; it is what you do with it, rather than how much you have, that matters. So be less certain about your views, especially if they are forecasts. Don't be paralysed by informational overload and don't confuse familiarity with knowledge.

 # Point 3: Focus on the facts, not on the stories!

Listen to those who disagree with you and remember that more information is not better information. Judge asset prices on facts, not on appearance in the media: A watched stock almost never rises. Tune out from investor noise and focus on hard facts. Don't confuse good firms with good investments or good earnings growth with good returns.Think in terms of enterprise value, not stock price!

 # Point 4: Sell your losers and ride your winners!

Overcome your loss aversion and your preference for status quo. Taking a loss in due time is perhaps the most important quality an investor can have. Sell your mistakes and move on; you don't have to make it back the same way you lost it! And remember to examine your mistakes: Failures most often are not simply bad luck. Admit and learn from mistakes, but learn the right lessons and don't obsess!

 # Point 5: If it looks too good to be true, it probably is!

Don't take information at face value; think carefully about how it was presented to you. Big, vivid, easy to recall events are less likely than you think they are. Avoid projecting the immediate past into the distant future. Don't anchor on irrelevant data, historical information or perceptions of stock prices. Be aware of the ever-present misunderstanding of randomness: Avoid seeing patterns in the market that don't exist.

 # Point 6: Don't allow emotions to over-ride reason!

Know the inherent limitations of the human mind and behaviour, but don't let it control you. Know the gap between stated behaviour and actual behaviour: it is called an empathy gap, and it matters! Beaware of the strong group-psychological behaviour ever-present among investors: herd-like investing and mental-accounting are not good investment strategies if you want to become rich! Do not be fooled by your fear of making an incorrect investment decision and feeling stupid: You didn'tknowitallalong, anyway;youjustthinkyoudid!

 # Point 7: Know your investment horizon!

Be humble and patient; make sure time is on your side and don't try to get rich quick: It, most often, will lead you to the opposite! Go for stocks instead of options and forget a leverage-based investment strategy. Short-trading is both dangerous and leads to insomnia! Minimise trading and diversify your portfolio. Set buy and sell targets and stick to those, but be careful of panicking and selling at the bottom!

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8 Endnotes

1. Being Latin for ”Economic man” used for the first time in the late nineteenth century by critics of John Mill's work on political economy. It is the concept that humans are rational and narrowly self-interested actors who have the ability to make judgments toward their subjectively defined ends. This theory stands in contrast to the concept of “Homo reciprocans”, which states that human beings are primarily motivated by the desire to be cooperative, and improve their environment (Persky, 1995).
2. It is actually far from obvious what precisely is meant by “rational”. The definition accepted by most economist states that rationality is taken to imply the collection of models of individual choice developed in economics (Gilboa, 2010). Another more subjective definition by Gilboa (2010) states that a mode of behaviour is rational for a given person if this person feels comfortable with it, and is not embarrassed by it, even when it is analysed for him.
3. Please note that this kind of “rationality” does not say that the individual's actual goals are “rational” in some larger ethical, social, or human sense, only that he tries to attain them at minimal cost (Persky, 1995 and Gilboa, 2010).
4. With “uncertainty” is here considered the psychological state in which a decision-maker lacks knowledge about what outcome will follow him from what choice. “Risk” on the other hand refers to situations with a known distribution of possible outcomes (Platt & Huettel, 2008). In short, risk is measurable using probability, but uncertainty is not (Ackert & Deaves, 2010).
5. This is in contrast to “positive theory” which characterises how people actually behave (Ackert & Deaves, 2010).
6. Understood here as “self-image concerns” (Akerlof & Kranton, 2002).
7. For more info about the expected utility theory, please consult the e-book: “Behavioural Economics and Decision-making” by Peter Dybdahl Hede, available at BookBoon.com
8. A mortgage-backed security (MBS) is a pool of home mortgages that creates a stream of payments over time paid to its owner. The payments are taken from those produced by borrowers who have to service the interests on their debts (Ackert & Deaves, 2010).