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The Rise and Rise of Behavioural Finance

Abstract Behavioural finance discards the assumptions of rationality and fair pricing, seeking to explain observed behaviour in financial markets by using the principles of psychology. Irrationality can be attributed to behavioural biases, which are either cognitive or emotional, both of which can lead to poor and irrational financial decisions. Kahneman and Tversky provided the early psychological theories that constitute the foundation of behavioural finance, and they also developed prospect theory that explains loss aversion. Irrationality is readily observable when, for example, people gamble against the odds or accept higher risk for lower return. Behavioural finance seeks to explain irrationality and the presence of market anomalies such as the calendar effects and profitable trading.

Keywords Behavioural finance · Rationality · Cognitive biases
Emotional biases · Psychology

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2.1 Discarding Rationality

Unlike neoclassical finance, behavioural finance discards the assumption of rationality by introducing and allowing a role for emotion and other psychological factors, seeking to combine finance theory with behavioural and cognitive psychology to explain why people make irrational financial decisions. It also discards the assumption of fair pricing, allowing for the possibilities of overvaluation and undervaluation. While neoclassical finance seeks to explain the actions of the theoretical rational person, behavioural finance seeks to explain observed behaviour, which is significantly different from the behaviour of the rational decision maker envisaged by neoclassical thinking. According to Statman (1999), "people are rational in standard [neoclassical] finance; they are normal in behavioral finance". Behavioural finance provides explanations for why market participants make irrational systematic errors, contrary to the neoclassical assumption of rationality, which implies that market participants are immune to systematic errors. Inefficiencies, such as under-reaction and overreactions to the arrival of new information, may lead to the formation of bubbles, which are bound to be followed by crashes. Various kinds of biases lead to disproportional reactions.

Behavioural finance is based on the following assumptions: (i) investors do not simply look at mean–variance configurations to make investment decisions as they may be influenced by other non-statistical characteristics such as taste, preference and other psychological factors; (ii) investors may perceive trends even though no obvious pattern is present; (iii) imperfect information exists in the presence of trader heterogeneity; (iv) different investors tend to have different investment opportunities, depending on taste, while herd behaviour may result in a common taste; and (v) the market is not necessarily in equilibrium, and while arbitrage opportunities exist they may be subject to market sentiment. Shiller (2003) defines behavioural finance as "finance from a broader social science perspective including psychology and sociology", describing it as "one of the most vital research programs" and that "it stands in sharp contradiction to much of efficient markets theory".

One of the earliest contributions to behavioural finance was made by Selden (1912) who suggested, long before the emergence of behavioural finance as a discipline or school of thought, that stock price movements depended crucially on the mental attitude of market participants. It took some brave mavericks to challenge the neoclassical orthodoxy, making important theoretical and empirical contributions to behavioural finance as an alternative paradigm to the orthodoxy. The most prominent names are Daniel Kahneman and Amos Tversky, two cognitive psychologists who are considered to be the founders of behavioural finance as we know it today. Their most influential piece of work pertains to the development of prospect theory and the principle of loss aversion.

While Kahneman and Tversky provided the early psychological theories that constitute the foundation of behavioural finance, this field would not be the same as it is now if it were not for the work of Richard Thaler. Inspired by Kahneman and Tversky's work on prospect theory, Thaler was quick to recognize the shortcomings of neoclassical finance and its inability to explain observed behaviour in financial markets. Realizing that psychology can be used to explain irrational behaviour, Thaler went on to collaborate with Kahneman and Tversky, blending finance with psychology to develop concepts such as mental accounting, the endowment effect and other biases. As a result of his work, Thaler became convinced that "markets can veer off course when individuals make stupid decisions" (Hilsenrath 2004). Once he had an exchange with the most prominent opponent of behavioural finance, Eugene Fama, who is quoted by Hilsenrath (2004) as saying that behavioural economists like Thaler "haven't really established anything in more than 20 years of research". In response, Thaler describes Fama as "the only guy on earth who doesn't think there was a bubble in Nasdaq in 2000".

Another maverick is Robert Shiller who has for long argued that "efficient-market theorists made one huge mistake: just because markets are unpredictable doesn't mean they are efficient" (Hilsenrath 2004). Shiller further suggests that belief in market efficiency is a "leap in logic", which he describes as "one of the most remarkable errors in the history of economic thought". Fama responds by saying the following: "behavioral economists made the same mistake in reverse: the fact that

some individuals might be irrational doesn't mean the market is inefficient". Fama also suggests that even though some anomalies cannot be explained by "modern financial theory", market efficiency should not be totally abandoned in favour of behavioural finance. Fama (1998) argues that many of the findings in behavioural finance appear to contradict each other, and that all in all, behavioural finance itself appears to be a collection of anomalies that can be explained by market efficiency. How is that possible when no anomalies are supposed to be observed in an efficient market?

Fox (2009) argues that it took a new group of young economists, the behaviouralists, to nudge the profession back towards reality. In the ensuing debate, behavioural finance specialists proved to be more humble, less arrogant and more accurate in their predictions and explanations. Robert Shiller, for example, gave an early warning that the US housing market was dangerously overvalued. Unlike the EMH brigade, the behavioural finance mavericks do not believe that investors are rational decision makers and that prices reflect the true and intrinsic value of each trade. Rather, they believe that market participants are human beings who have emotions, fears, greed and hopes. As a result, some decisions and patterns of behaviour may appear to be inconsistent and irrational.

Shiller (2003) describes behavioural finance as the product of "collaboration between finance and other social sciences", suggesting that the discipline "has led to a profound deepening of our knowledge of financial markets". In his review of the literature on behavioural finance, Fama (1998) identifies two problems (which are not really problems). The first is that financial market anomalies tend to appear to be as often under-reaction by investors as overreaction. The second is that the anomalies tend to disappear, either as time passes or because of improvement in methodology. According to Shiller (2003), Fama's first criticism reflects an incorrect view of the psychological underpinnings of behavioural finance. Since there is no fundamental psychological principle dictating that people tend always to overreact or under-react, it is no surprise that research on financial anomalies does not reveal such a pattern. Shiller argues that "it is the nature of scholarly research, at the frontier, in all disciplines, that initial claims of important discoveries

are often knocked down by later research". Accordingly, he dismisses Fama's second criticism as "weak" because "the most basic anomaly, of excess volatility, seems hardly to have been knocked down, and it is in fact graphically reinforced by the experience of the past few years in the stock markets of the world". He further argues that "the mere fact that anomalies sometimes disappear or switch signs with time is no evidence that the markets are fully rational".

An example of methodological improvement is the use of models with stochastic seasonality to investigate the January effect. Most of the work on this anomaly is based on models incorporating deterministic dummies to determine monthly seasonals. The use of stochastic seasonality implies the possibility of changing seasonal patterns over time, which is more realistic. Fama is right in the sense that models with stochastic seasonality, which represent a methodological improvement, do not detect a January effect in the most recent period. However, he is wrong because these studies show that the January effect has been replaced by the July effect or something else (e.g. Moosa 2007). There is indeed no reason why methodological improvements should lead to the conclusion that anomalies do not exist. However, someone who is determined not to find anomalies, because he or she is a member of the EMH fan club, will always find a methodology that gives him this result.

2.2 Sources and Examples of Irrationality

Irrationality can be attributed to behavioural biases, which are either cognitive or emotional, both of which can lead to poor and irrational financial decisions. Parker (2013) defines cognitive bias, or cognitive error, as a "rule of thumb that may or may not be factual". A cognitive process is different from an emotional process, which pertains to wanting and intending. In the finance world, investors make assumptions that are not necessarily valid, which would give rise to (among others) confirmation bias, gamblers' fallacy, status-quo bias, negativity bias and the bandwagon effect.

Cognitive biases (or errors) stem from the misunderstanding of data, faulty reasoning, statistical miscalculations or memory errors. Emotional biases, on the other hand, are exhibited when people act on feelings rather than facts. A cognitive process is a psychological process involving the acquisition and understanding of knowledge and the formation of beliefs and attitudes, as well as decision-making and problem-solving. Thus, cognition is the mental action of acquiring knowledge through thought, experience and the senses. Emotional biases stem from feelings, intuition or impulsive thinking. Examples of emotional biases include loss-aversion bias, overconfidence bias and endowment bias. Emotional biases can be difficult to remedy because they often stem from instinctive reactions and hunches. Cognitive biases, on the other hand, are often the result of flawed reasoning and can be addressed effectively through better information and awareness.

Irrationality can be observed readily. For example, logic tells us that it does not make sense to buy a lottery ticket when the odds of winning are overwhelmingly against the ticket holder—yet millions of people spend large sums of money on this activity. In this section, we describe some cases of irrational behaviour.

2.2.1 High Risk for Low Return

In financial markets, one form of irrationality is that investors accept low return for high risk when they buy stocks near the top of the cycle. Al-Nakeeb (2016) challenges the very concept of risk-return trade-off, which he describes as the "central premise of neoclassical portfolio theory". He argues that any measure of the validity of this central premise is limited to static, stationary analysis, but it breaks down in a dynamic setting. In a dynamic investment process, he argues, the reward for assuming less risk is greater return and vice versa. While this proposition may sound counterintuitive, he presents an explanation by considering turning points in a market cycle. Near the market bottom, the risk of further price decline is limited while the potential for capital gains is significant. This implies high expected return for low risk. At the top end of the cycle, the risk of a price decline is high while the potential

for further capital appreciation is low. In this case, low expected return goes hand in hand with high risk. In a bull market, realized return is positive but as the price keeps on rising, expected return falls while the risk of a market downturn grows bigger. In a market bubble, the herd mentality dictates that no matter how high the price is, it will keep on rising. In this case, the expected return is high while the risk of a downturn, as envisaged by the herd mentality, is low. Assuming high risk for low return is irrational, but this kind of observation is conspicuous when people buy stocks close to the market peak and sell close to the market bottom.

2.2.2 Gambling Against the Odds in a Casino

Although being in a casino is fun, the rules are overwhelmingly against the players—yet people gamble. While some gamblers believe that a loss would be paying for the entertainment, most gamblers seem to believe that they can win. For example, in a side bet on a Blackjack table, a perfect pair pays 30 to 1, but the probability of getting a perfect pair is far less than the pay-off. So why is it that the majority of gamblers look at the 30:1 pay-off without considering the probability of getting the perfect pair? A decision to play for a perfect pair is irrational if the objective is to maximize wealth, but it is perfectly rational if the players realize that the odds are against them and play just for fun, considering losses as payment for entertainment. As long as the pay-off (m dollars per a dollar of betting) is smaller than the reciprocal of the probability of winning, the gambler will lose. This is always the case in any casino.

In what follows an explanation is presented as to why casino gamblers lose or should expect to lose. The rules in any casino are such that the pay-off is less than the reciprocal of the probability of winning. It can be shown that if this is the case, the expected value of the return is always negative from the perspective of the gambler. Let m be the pay-off on each dollar and n the reciprocal of the probability of winning (hence the probability of winning is $1/n$). The gambler gets paid m dollars with a probability of $1/n$ and loses one dollar with a probability of $1 - (1/n)$. The expected value of the outcome is

$$E = m\left(\frac{1}{n}\right) - 1\left(1 - \frac{1}{n}\right) = \frac{m+1}{n} - 1 \tag{2.1}$$

If $n = km$, where $k > 1$, it follows that

$$E = \frac{m+1}{km} - 1 = \frac{1}{k} + \frac{1}{km} - 1 \tag{2.2}$$

Since $m > 1$ and $k > 1$, it follows that $E < 0$. No matter how big the pay-off is, the odds are against the gambler. It follows that

$$\frac{\partial E}{\partial m} = -\frac{k}{k^2 m^2} < 0 \tag{2.3}$$

which means that the bigger are the odds, the greater will be the loss endured by the gambler. Also, consider the following

$$\underset{m\to\infty}{Lim}(E) = \underset{m\to\infty}{Lim}\left(\frac{1}{k} + \frac{1}{km} - 1\right) = \frac{1}{k} - 1 \tag{2.4}$$

which means that as m increases, the value of the loss converges on $(1/k) - 1$.

These results can be seen in the simulated data presented in Figs. 2.1, 2.2. In Fig. 2.1, we can see the expected value of the return (E) for various values of m when $k = 2$ (e.g. a game that pays 30 to 1 when the probability of winning is 1 in 60). As we can see, the return is always negative and that the loss increases with the pay-off. As the value of the pay-off increases, the expected loss converges on the value of $(0.5 - 1) = -0.5$. In Fig. 2.2, we observe the same for $k = 2$, 2.5 and 3. The expected loss converges on -0.5, -0.6 and -0.67 for $k = 1$, 2.5 and 3, respectively. Notice also that as the value of k increases, the loss will be bigger for any pay-off.

As an example, consider the side bet on a perfect pair in Blackjack using eight decks. The probability of obtaining a perfect pair, which pays 30:1, is 0.016867. In this case, $m = 59.29$ and $n = 30$, which

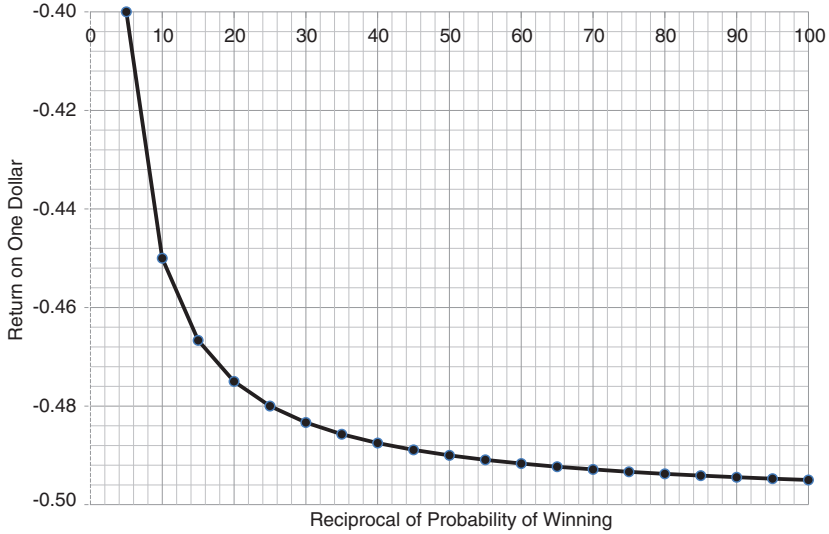

Fig. 2.1 The expected value of return for various values of m when $k = 2$

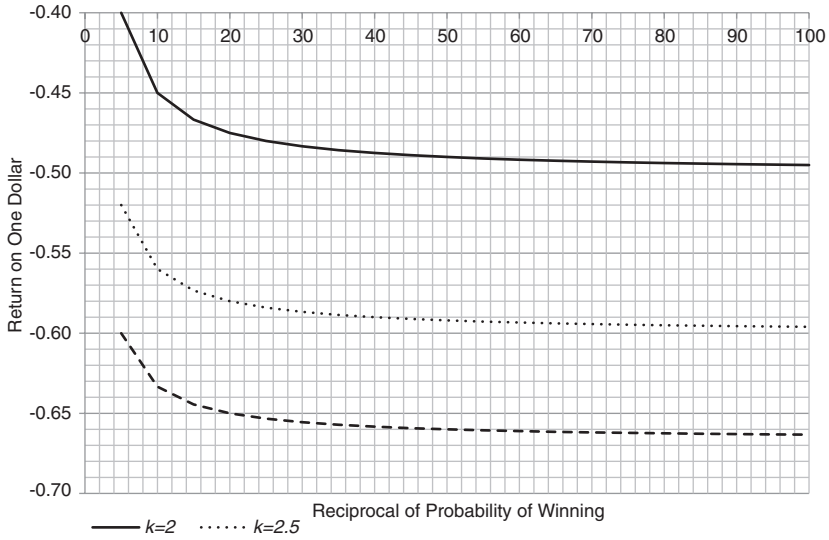

Fig. 2.2 The expected value of the return for various values of m when $k = 2$, 2.5, and 3

gives $E = -0.48$, meaning that a player betting on a perfect pair would on average lose 48 cents in the dollar. A coloured pair pays 10:1, with a probability of 0.019277, which gives $m = 51.88$, $n = 10$ and $E = -0.79$. Because it is a combination of the pay-off and odds that determines the return, the gambler loses on average 0.79 cents in the dollar by betting on a coloured pair. Notice, however, that these figures are valid only for a game involving either a perfect pair or a coloured pair. But even if the game allows for the perfect pair, coloured pair and mixed pair, the gambler will still lose on average.

2.2.3 Anchoring and Mental Accounting

Anchoring is the tendency to use a reference point that has no logical relevance to the decision at hand. For example, it is common to spend two months' worth of salary on a diamond engagement ring, as if it is a yardstick for the valuation of love, which works to the benefit of the jewellery industry. The majority of would-be grooms cannot afford a ring that costs two months of salary while paying for living expenses. As a result, debt becomes inevitable if the objective of meeting the "standard" is to be accomplished. Although a more logical criterion to use for deciding how much to spend on a ring is affordability, men tend to anchor their decision (of how much to spend) to the two-month standard.

In financial markets, anchoring occurs when investors base their decisions on irrelevant figures and statistics. For example, some investors buy stocks whose prices have fallen considerably. In this case, the investor anchors on a recent high, believing that the drop in price provides a good opportunity to buy. Sometimes anchoring may take the form of basing buy and sell decisions on the level of another variable that only has a tenuous relation to the price. For example, a trader may decide to buy the Australian dollar whenever an announcement is made that the unemployment rate is down by a quarter of a percentage point. The fact of the matter is that the currency may appreciate, depreciate or stay unchanged on unemployment news. Anchoring on a single, presumably related, a variable can be rather hazardous.

Mental accounting is the tendency for people to keep their money in separate, specifically designated accounts: an account to pay the bills, one for the next holiday and another to buy a new car. Irrationality arises in this case because an account designated for purpose A cannot be used to finance purpose B, in which case the latter is financed by borrowing. This is irrational because refraining from using available funds to pay the debt or avoid new debt leads to higher interest payments and reduces net worth. Another aspect of mental accounting is that money is treated differently, depending on its source. For example, people tend to spend more of the funds obtained from tax returns, bonuses and gifts, compared to the money obtained from regular salary. It is illogical to treat money differently, depending on the source. Regardless of the money's source, spending it (on consumer goods) leads to a drop in net worth. In investment, mental accounting occurs when an investor keeps two portfolios, a safe one and a speculative one. While holding two portfolios rather than one is not cost-free, it does not affect net worth.

2.2.4 The Winner's Curse

In neoclassical finance, investors are rational to the extent that they can estimate accurately the intrinsic value of an asset that they are bidding for. In reality, however, incomplete information or emotions may obstruct the ability of investors to come up with a reasonable valuation. The winner's curse, therefore, is the tendency for the winning bid in an auction setting to exceed the intrinsic value of the asset. An aggressive bidder may win by dissuading others from bidding, but this may boost the likelihood that the winning bid exceeds the intrinsic value. Irrationality in this case takes the form of paying more for an asset than its intrinsic value.

An extreme form of the winner's curse is that the winner does not only buy an asset at an inflated price, but also that the acquisition of this asset leads to the eventual demise or bankruptcy of the winner. A prominent example of this situation from the world of business and finance is the curse brought about upon the Royal Bank of Scotland

when it won the bidding to acquire the Dutch bank ABN-Amro in 2007. The RBS paid some $50 billion for ABN-Amro, which was (like the RBS itself) laden with toxic assets. As a result, the RBS collapsed under the pressure of huge losses. It has been kept afloat (because it is "too big to fail") by bailout and government ownership, but it is still struggling and failing to pass the Bank of England's stress tests. Robbins (2009) presents similarly bad deals, including AOL-Time Warner (2000), Invensys-Baan (2000), Taylor Woodrow-Wimpey (2007), HSBC-Household (2003) and others.

2.2.5 Irrationality Exposed by Prospect Theory

Prospect theory of Kahneman and Tversky (1979) was designed to explain a situation like this: a gambler in a casino values a straight win of $100 more favourably than winning $200 then losing $100, although in both cases, the net gain is the same ($100). The theory postulates that people value gains and losses differently, in which case, they base decisions on perceived gains rather than perceived losses. Out of two equivalent choices in terms of pay-off, people tend to choose the option expressed in terms of possible gains, not the one expressed in terms of possible losses. This tendency, which makes no sense if the two options give exactly the same result, is observed because a loss of a certain amount has a more emotional impact than an equivalent gain. In other words, a loss is weighted more heavily than an equivalent gain.

Kahneman and Tversky conducted a series of experiments in which the participants were asked to choose between two options involving prospective gains and losses. In one case, participants were asked to put themselves in a situation where they have $100 and have to choose between (i) making $50 or nothing with equal probabilities and (ii) making $50 with certainty. In another case, the choice was between (i) losing $50 or 0 with equal probabilities and (ii) losing $50 with certainty. Logically, a participant should pick either (i) or (ii) in both cases, depending on the level of risk aversion. However, most participants went for (ii) in the first case and (i) in the second case. The implication of this choice is that people are willing to settle for a reasonable level of

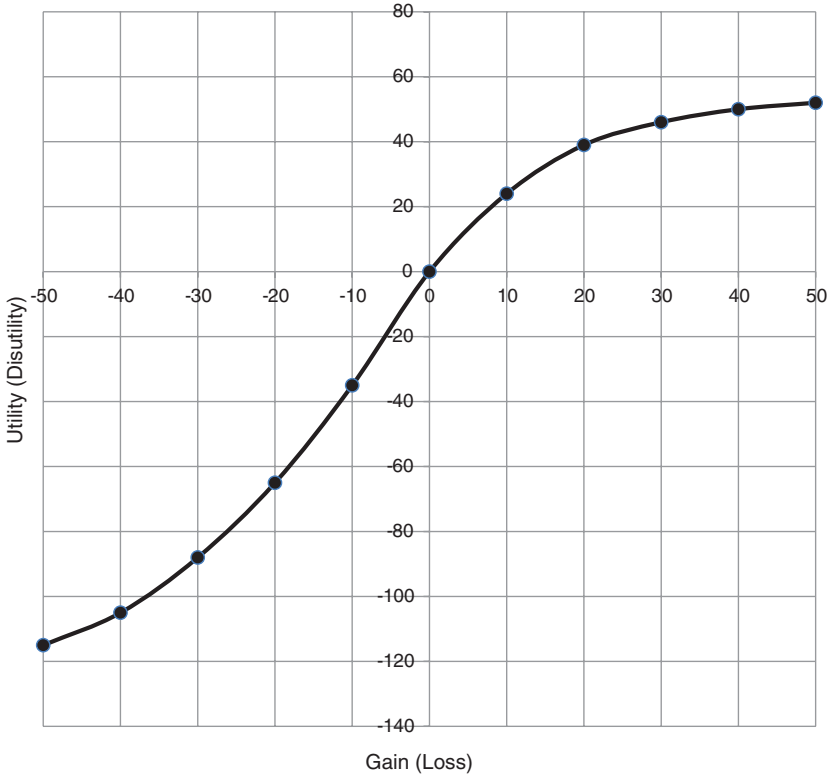

Fig. 2.3 An asymmetric utility function

gains (even if they have a reasonable chance of earning more), but they are willing to take on risk to reduce their losses. This line of thinking creates an asymmetric utility function as in Fig. 2.3, where utility (disutility) depends on gains (losses). A loss of $50 generates bigger disutility than the utility generated by winning $50.

Prospect theory can be used to explain irrational behaviour. For example, some people refuse to work overtime because they do not want to pay more taxes, although the after-tax income would be greater (of course it is a different matter if they value leisure more than the extra income). In this case, the utility generated by the extra after-tax income is not good enough to overcome the feelings of loss incurred

by paying taxes. In fact, some people express the view that they do not want to be promoted or get a salary raise because they will have to pay more taxes. The theory also explains why investors tend to hold on to losing stocks for too long and sell winning stocks too soon. The most logical course of action would be to hold on to winning stocks in order to boost gains and to sell losing stocks in order to avoid escalating losses.

2.3 Market Anomalies

The observation of market anomalies, which are inconsistent with the EMH, was a major reason for seeking salvation in behavioural finance. The term "anomaly" can be traced back to Kuhn (1970). An anomaly is a strange or unusual occurrence, but in financial markets, anomalies refer to situations when the behaviour of financial prices is different from what should be observed in an efficient market, a market in which prices reflect all available information at any point in time. Irrespective of whether or not there are plausible explanations for the anomalies, the presence of observable and exploitable anomalies provides evidence against the EMH and for behavioural finance. Financial market anomalies, which appear as cross-sectional or time series patterns in financial returns, are described briefly in this section.

2.3.1 The January Effect

The January effect refers to the observation of high stock returns in January compared to December. One version of the January effect is that stocks that underperformed in the fourth quarter of the previous year tend to outperform the market in January. In another version, it refers to the observed phenomenon that the average monthly return for small firms is consistently higher in January than any other month of the year. This proposition is inconsistent with the EMH, which predicts that stock prices behave like a random walk, implying that no seasonal pattern should be observed in stock prices or returns.

Wachtel (1942) was the first economist to examine and document seasonality in the Dow Jones Industrial Average from 1927 to 1942. He observed frequent bullish tendencies from December to January in eleven of the fifteen years he studied. Rozeff and Kinney (1976) detected the presence of seasonality in monthly rates of return on the stocks listed on the New York Stock Exchange over the period 1904–1974. With the exception of the 1929–1940 period, statistically significant differences in monthly mean returns were observed, due primarily to large January returns. Specifically, they found that the average January return for small firms was around 3.5%, whereas returns for all other months were closer to 0.5%. This finding suggests that the monthly performance of small stocks follows a relatively consistent pattern, which is contrary to what is predicted by the theories of neoclassical finance.

More recent evidence, however, indicates the absence of the January effect. For example, Lindley et al. (2004) demonstrated that a significant January effect was not observed in many years during the period 1962–2000 and that a negative January effect appeared in some years. This, however, does not mean that the market has become efficient but rather that the pattern of seasonality has changed. Moosa (2007) uses a model with stochastic seasonality to examine the Dow Jones Industrial Average over the period 1970–2005. The results reveal the presence of a significant January effect except in the latter part of the period, 1990–2005, when a strong negative July effect surfaced.

2.3.2 Other Calendar Effects

Calendar effects, including the January effect, are anomalies that are linked to a particular time. Apart from the January effect, there is the weekend effect, the turn-of-the-month effect, the turn-of-the-year effect and the day-of-the-week effect. The w*eekend effect* refers to the tendency of stock prices or returns to decline on Monday to a lower level than what is observed on the previous Friday. Some theories that explain the effect in terms of the tendency of firms to release bad news on Friday after the markets close, which depresses stock prices on

Monday. The weekend effect might be linked to short selling, which would affect stocks with high short-interest positions. Alternatively, the effect could simply be a result of traders' fading optimism between Friday and Monday.

The turn-of-the-month effect refers to the tendency of stock prices to rise on the last trading days of the month and the first days of the following month. Therefore, it is possible for investors to capture a substantial part of stock returns during this fraction of the market time and stay invested in safe cash during the rest of the year. This effect can be explained in terms of the timing of the monthly cash flows received by pension funds and reinvested in the stock market. End of the month is also a natural point for portfolio/trading models rebalancing between retail and professional investors. The turn-of-the-year effect describes a pattern of increased trading volume and higher stock prices in the last week of December and the first two weeks of January.

2.3.3 Profitable Trading

Against the EMH is the observation that profitable trading can be based on earnings reports, as a result of earnings surprises. For example, profit can be generated by investing immediately when a company reports its financial results because it takes time for the market to absorb new information. There is also the size effect, which refers to the observation that small firms produce higher returns (on a risk-adjusted basis) than large firms—this may be attributed to small firms' greater potential for growth. The value effect refers to the positive relation between security returns and the ratio of accounting-based measures of cash flows or value to the market price of the security. Examples of the accounting-based measures are earnings per share and the book value of common equity per share. Other indicators are earnings per share, price–earnings ratio and dividend yield. One may also add the "green effect", which can produce profitable trading by betting on abnormal returns following the announcement of environmental regulation (e.g. Ramiah et al. 2013).

Profitable trading may be based on serial correlation in returns. Stocks with prices on an upward (downward) trajectory over a prior

period of 3–12 months are more likely to continue on that upward (downward) trajectory over the subsequent 3–12 months. This temporal pattern in prices is referred to as momentum. Yet another observation of systematic behaviour is that stocks at either end of the performance spectrum, over a period of time (generally a year), tend to reverse course in the following period—that is, top performers become underperformers and vice versa. This kind of behaviour can be the basis of a profitable trading strategy. The underlying pattern can be explained intuitively because a top performer becomes so expensive that it turns out to be an underperformer when the demand for that stock drops. Reversals could also result from a self-fulfilling prophecy: when traders act upon the strategy by selling winners and buying losers, stock prices move in the expected direction.

2.4 The Rest of This Book

In this book, we will describe a number of the most important behavioural of biases. In Chap. 3, we deal with overconfidence and self-serving bias. Chapter 4 is about the disposition effect, loss aversion and representativeness. In Chap. 5, we examine the gambler's fallacy, hindsight, panic, herd behaviour, status quo, survivorship bias, money illusion, attachment, familiarity and home bias, the illusion of control, conservatism and narcissism. Chapter 6 is devoted to a description of recent developments, including ecological finance, environmental finance, emotional finance, experimental finance and neurofinance. Chapter 7 presents an epilogue, as well as a discussion of how conspiracy theory is related to behavioural biases. A full list of behavioural biases can be found in the glossary.

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