UNIVERSITY OF CRETE
DEPARTMENT OF ECONOMICS
POSTGRADUATE PROGRAMME

MASTER THESIS IN FINANCE

A SURVEY IN BEHAVIOURAL FINANCE AND PSYCOLOGY OF INVESTING

Supervisor: Dr. Roman Kraeussl
Student: Zacharias Kounoupas

"A Survey in Behavioural Finance and Psychology of Investing"

Zacharias Kounoupas[*]

Abstract:
Behavioral finance is a new field in economics that has recently become of significant interest to investors as many psychological theories have been applied successfully to understanding phenomena in financial markets. This project provides a general discussion of behavioral finance and presents its main concepts. We first show that investors often deviate from the standard finance paradigm. This helps us to understand the limits to arbitrage. Because of limits of arbitrage less than perfect agents survive and influence market outcomes. Next, we discuss a series of key behavioral concepts that affect people's beliefs and preferences, e.g., people's well-known tendencies to give too much weight to vivid information, to show excessive self-confidence, to make the error of anchoring and to make judgments using the representativeness heuristic. Then we provide the current research evidences in important behavioral finance applications. We close by assessing progress in the field and speculating about its future course with some thoughts on how research in behavioural finance might become even more successful.

Keywords: Behavioral Finance, Standard Finance, Psychology of Financial Markets, IPOs

December 2003

[*]Department of Economics, Postgraduate Programme, University of Crete, 74100, Rethymno, GREECE, Phone: +30 (2810) 251625, Fax: +30 (2810) 823824, Mob:+306944599862, Email: zaxariaskounoupas@hotmail.com.

C O N T E N T S

I. INTRODUCTION

Academic finance has evolved a long way from the days when the efficient markets theory was widely considered to be proven beyond doubt. Alongside this, a new room for search was developed. Behavioural finance – that is, finance from a broader social science perspective – is nowadays one of the most vital research programmes and it stands in sharp contradiction to much efficient markets theories. In other words, behavioural finance is the application of psychology, sociology and anthropology to finance. Moreover behavioral finance models are usually developed to explain investor behaviour or market anomalies when rational models provide no sufficient explanations.

This project analyses in depth the importance of behavioral finance in the current scientific research. To understand the research agenda, methodology and contributions, it is necessary to review standard finance theory first and to examine its limits. We concentrate more on the efficient markets hypothesis- which has been for decades the standard paradigm - and we will show why those who used this approach believed, on theoretical grounds, that other factors- mainly psychological– could not affect asset prices. In the second section, we summarize the psychology that may be of particular interest to financial economists and to the behavioural finance field generally. The central concepts in the analysis of that chapter are heuristic-driven bias, frame dependence and inefficient prices that underlie behavioural finance. More specifically the behavioural principles discussed are: prospect theory, regret, overconfidence, anchoring, loss aversion, mental accounting, emotional aspects, representativeness and other psychological principles helping understand investor behaviour.

The third part is devoted to applications which illustrate the effect of the above psychological principles on market efficiency. We concentrate in IPOs activity. We close by assessing progress in the field and speculating about its future course with some thoughts on how research in behavioural finance might become even more successful. The last becomes more possible, as many writers such as Thaler (1999), claim that the term *"behavioral finance"* will be correctly viewed as a redundant phrase in the future.

II. BEHAVIOURAL FINANCE VERSUS STANDARD FINANCE

II.1 Behavioural Finance

In the 1990s, a lot of the focus of academic discussion shifted away from econometric analyses of time series on stock prices, dividends and earnings that comprise the field of the standard finance, towards developing models of human psychology as it relates to financial markets. It was the decade during which the advances made by psychologists came to the attention of economists. Indeed, the proponents of behavioural finance argue that a few psychological phenomena pervade the entire landscape of finance. Behavioral finance development has given rise to a new approach to the financial markets, at least in part, in response to the difficulties faced by the standard paradigm.

To start with, the term financial behaviour concerns the behaviour of practitioners in such areas. But who are really practitioners? The term covers a wide range of people: portfolio managers, traders, investors, brokers, strategists, financial analysts and advisors, investment bankers and corporate executives. They all share the same psychological traits and they all make particular types of mistakes. Behavioural finance can help practitioners recognize their owns errors as well as the errors of others[1], because they both are important.

In addition, it should be noted that theories of human behaviour from other social sciences as psychology, sociology and anthropology often have underlying motivation that is different from that of economic theories. Their theories are often intended to be robust in application to a variety of everyday, unstructured experiences, while the economic theories are often intended to be robust in a different sense that, even if the problems the economic agents face become very clearly defined, their behaviour will not change after they learn how to solve the problems. Behavioural finance follows the first way of underlying motivation.

At this point we can give a definition of *behavioural finance*. Behavioural finance is a new approach to financial markets and it basically analyses what happens when we relax one, or both, of the two tenets that underlie the finance view of rationality. Furthermore, in order to make sharp predictions behavioural models often need to specify the form of agents irrationality. Behavioural

[1] That because one investors mistakes can become another investor's profits.

economists typically turn to the extensive experimental evidence compiled by cognitive psychologists on the biases that creep in when people form beliefs and on people's preferences, or on how they make decisions, given the beliefs (Barberis and Thaler (2001), p.4).

Shefrin (2000) refers three categories of psychological phenomena that permeate the landscape of behavioural finance. The first is that behavioural finance recognizes that practitioners use rules of thumb called *heuristics* to process data. One example of a rule of a thumb is: ''Past performance is the best predictor of future performance, so invest in a mutual fund having the best five year record''. Now, rules of thumb are like back-of-the-envelope calculations; they are generally imperfect. Therefore, practitioners hold biased beliefs that predispose them to commit errors. The last drives us to assign the label *heuristic-driven bias* to the first behavioral theme. At this point I should add that standard finance assumes that when processing data, practitioners use statistical tools appropriately and correctly.

Secondly, behavioural finance postulates that in addition to objective considerations, practitioners' perceptions of risk and return are highly influenced by how decisions are framed. For this reason, Shefrin (2000) assigns such effects the label *frame dependence*. On the other hand, standard finance assumes frame independence, meaning that practitioners view all decisions through transparent, objective lens of risk and return (Shefrin (2000), p.4).

Finally, the third theme of behavioural finance is labeled as *inefficient markets*[2]*.* That states that heuristic-driven bias and framing effects – the two other themes of behavioural finance – cause market prices to deviate from fundamental values. So, iinefficient markets are caused by this deviation because of biases, i.e., they exist because people are behaving like this. In contrast, standard finance assumes that markets are completely efficient. Efficiency means that the price of each security coincides with fundamental value, even if some practitioners suffer from heuristic-driven bias or frame dependence.

According to the above psychological phenomena, which consist the core of behavioural finance, we can understand that these are both ubiquitous and germane. Ubiquitous because everyone could find them wherever people make

[2] This third theme is examined parallel to the others because it results by them. It is described more as a general point.

financial decisions and germane because heuristic-driven bias and framing effects are very expensive. Behavioural finance and standard finance differ sharply in respect to these three themes around which the psychological phenomena are organized. These differences are further below described.

II.2 Efficient Markets Theory

The efficient markets theory reached its height of dominance in academic circles around the 1970s. At that time, the rational expectations revolution in economic theory was in its first blush of enthusiasm, a fresh idea that occupied the center of attention. The idea that speculative asset prices such as stock prices always incorporate the best information about fundamental values and that prices change only because of good and sensible information meshed very well with theoretical trends of the time. Prominent finance models of the 1970s related speculative asset prices to economic fundamentals, using rational expectations to tie together finance and the entire economy in one elegant theory.

In addition, the next decade -the 1980s - were a time of important academic discussion of the consistency of the efficient markets model for the aggregate stock market with econometric evidence about the time series properties of prices, dividends and earnings (Shiller (2002), pp.3-4). At the same time, scholars began to discover a host of empirical results that were *not* consistent with the view that market returns were determined in accordance with the capital asset pricing model, widely known as CAPM, and the efficient market model. Proponents of standard finance regarded these findings as anomalous, and thus called them so. As they discovered new anomalies, scholars began to wonder whether standard finance was incapable of explaining what determines security prices (Shefrin (2000), pp.8-9). In other words, just because water likes to find its own level does not mean that the ocean is flat (Lee (2001)).

To be more specific, standard finance theory assumes that agents are *rational* and *the law of one price* holds. This implies, for example, that choices are time-consistent and if we examine that from a market perspective, standard finance theory rests on the law of one price which states that securities with the same payoff have the same price. Arbitrageurs eliminate instantaneously any

violations of the law of one price by simultaneously buying and selling these securities at advantageously different prices[3]. That fact is the main obligation of the standard paradigm to the ‘’modern’’ behavioural finance, that rationality prevents irrationality to effect security prices through a process, which is widely known as arbitrage.

Much of the scientific debate over market efficiency has a policy undercurrent, as Daniel, Hirshleifer and Teoh (2001) refer. The efficient market hypothesis is linked to the normative position that markets should be allowed to operate freely. We could argue that this link is logically weak. We can understand it from the following: if investors are imperfectly rational and assets are systematically mispriced, policymakers should still show some difference to market prices, as long as the political participants are not immune to the biases and self interest in private decisions. So government efforts to correct market perceptions are likely to waste resources and increase ex ante uncertainty, helping arbitrage behaviour to develop.

The key question is whether agents’ irrationalities really affect market outcomes – otherwise finance and government researchers and policy makers would not care. Even if some or even all market participants are irrational, it may be possible that the market absorbs – at least to some degree – these individual irrationalities and thus prevent their impact on prices and allocation. Whether the market can average out irrationalities depends on the structure of the observed behavior: unsystematic irrationalities can be absorbed more easily than systematic deviations from rational behaviour.

According to this, in standard paradigm where agents are rational is that security prices equal “fundamental value”[4]. The hypothesis that actual prices equal fundamental value is known as the *Efficient Market Hypothesis* (EMH) (Barberis and Thaler (2001), p.5). The last reflects the important insight that securities prices are influenced by a powerful corrective force. Put simply, under this hypothesis, “prices are right’’ in that they are set by rational agents. In an

[3] Consider, for example, the shares of DaimlerCrysler AG. They are traded at the same time on the New York Stock Exchange (NYSE) and in Frankfurt (Xetra) for 4,5 hours. For these hours, shares should trade for the same prices on both exchanges adjusted for the current EUR-USD exchange rate. If these adjusted prices are different from each other, an arbitrageur would sell shares at the higher price at one exchange and would buy the same number of shares at the other exchange and thus realize a risk-less profit (Glaser, Nöth and Weber (2003), p.2).

[4] As fundamental value is considered the discounted sum of expected future cashflows, where the expectation is taken over the correct distribution and where the discount rate is consistent with normatively acceptable preference specification (Barberis and Thaler (2001), p.5).

efficient market, there is "no free lunch''. No investment strategy can earn excess risk-adjusted returns or average returns greater than are warranted for its risk.

More generally, there is an implicit view of the world that the capital markets are destined to march steadily to nearly perfect market efficiency as smart investors pick off detected anomalies one by one. We believe this is naive, for two main reasons. First, the process of picking off predictability patterns is itself erratic and prone to under- and overreactions. If investors are irrational, they may traded based on the misperception that they have identified an anomaly, creating genuine mispricing. Second, since it is hard for an arbitrageur to guess what other arbs are doing, there is a coordination problem among arbitrageurs which can cause them to underexploit or to overexploit mispricing patterns. This creates the possibility that patterns of predictability persist, or that they reverse.

Finally, owning to limited attention, as one set of inefficiencies are removed or overexploited others are likely to pop up. In this fallible human process, improvements in information processing technology should help, but will not be a panacea.

II.3 Information and Market Inefficiency

If agents are rational and the law of one price holds, market efficiency may exist. Fama defines *an efficient market* as a "market in which prices always 'fully reflect' available information'' (Fama (1970), p. 383). Different forms of market efficiency exist due to the amount of information which is assumed to be "available"[5]. If the current price contains only the information consisting of past prices, the market is "weak-form'' efficient. If prices reflect all publicly available information such as historical prices and earnings announcements, the market is "semi-strong'' efficient. Finally, if prices reflect all private information, for instance

[5] Glazer, Nöth and Weber (2003) appear as a reason that rational investors trade at all only when they are heterogeneous i.e. when they differ with regard to tastes (such as degree of risk aversion), endowments or information. But even differences in information do not necessarily lead to trading.

all insider information, the market is "strong-form" efficient (Glaser, Nöth and Weber (2003), p.3)[6].

A paradox of the theory of efficient market is that market prices contain all private information. One explanation of this inefficiency is the existence of *noise traders* who trade randomly and not based on information. As a consequence, it is no longer possible to identify private information completely based on buying or selling activity by observing market prices because noise traders' orders jam the trading signal generated by insiders.

The "weak-form" market efficiency had long been successful in explaining security return patterns but can not survive the empirical tests. Studies as discussed in Fama (1970) show that stock returns are typically unpredictable based on past returns. However, empirical studies over the last 25 years demonstrated that future returns are predictable to some extent.

Furthermore, trading strategies exist, which are based on past returns and which earn statistically significant profits. One specific example is the momentum[7] strategy in which high returns over the last three to twelve months, called "winner", are bought and stocks with low returns over the same period, called "loser", are sold. Indeed, the short-selling of losers finances the buying of winners, i.e. there is no need to invest your own money. Closely related are the cross-sectional return patterns in which returns of stocks with low market capitalization have been on average higher than returns of stocks with high market capitalization. Analogous results come even when we examine the effect of dividends yield on stocks returns. Moreover, specific events may predict subsequent security returns, earnings announcements or stock splits (see Daniel, Hirshleifer and Subrahmanyam, (1998) and Fama (1991), (1998)).

As a consequence, somebody may wonder whether these findings are real profit opportunities and thus a violation of market efficiency, or just a proper reward for risk. Some researchers argue that the observed security return regularities are rational and can be explained by time-varying expected returns while others argue that securities are mispriced. Resolving this conflict is

[6] Stock prices are closely correlated to the public information. If prices reflect public information poorly, then there is an opportunity for smart investors to trade profitably to exploit the mispricing, which results.

[7] "Stocks with poor performance during a period of one year may later be subject to selling by investors keen to realize losses that can offset capital gains elsewhere. This selling pressure means that prior losers continue to lose, enhancing the momentum effect" (Barberis and Thaler (2001), p. 32).

problematic since because market efficiency can only be tested using a certain and a specific asset pricing model. In the next section we will show that some securities are obviously mispriced.

II.4 Mispricing

Even some of the fans of efficient market agree that investors frequently make large errors and such behavior makes market be subject to measurable and important mispricing. Recently, some puzzles have been discovered proving that the law of one price, that standard finance adopts, is violated. This violation is so severe that prices are in consistent with all valuation models. A representative example is that of Royal Dutch Petroleum and Shell Transport and Trading security prices, the "Siamese twin'' shares, that constitute the Royal Dutch/Shell Group, as documented in Rosental and Young (1990) and Froot and Dabora (1999).

Twin shares trade at different places or even in different countries and the division of current and future cash flows is fixed to each twin. Shares of Royal Dutch are primarily traded in the U.S. and in the Netherlands whereas Shell is primarily traded in the U.K. The current company emerged from a 1907 alliance between Royal Dutch and Shell Transport in which the two companies agreed to merge their interests on a 60/40 basis. According to any rational model, the shares of the two components (after adjusting for foreign exchange) should trade in a 60/40 ratio. They do not. The actual price ratio has deviated from the expected one by more than 35 percent. It is obvious that explanations such as taxes and transaction cost can not explain the disparity. According to this, hedge funds do make investments based on this disparity; they buy the cheaper stock and short-sell the more expensive.

The lesson from this example is that even when the relationship between two prices is easy to calculate and fixed by charter, prices can diverge and arbitrageurs are limited in their ability to restore the prices to parity[8].

[8] Take the case of Internet stocks. The most professional analysts believe that the valuations of internet stocks are too high. Evidence showed that the intrinsic value of a portfolio of five Internet stocks was 50 percent of the market price (Thaler (1999), p.13).

Moreover, there are rational explanations of why arbitrage is not sufficient to avoid violations of the law of one price. Bubbles and crashes occur from time to time and seem to reject the notion of efficient markets and the positive effect of arbitrage. Huge changes of market indices are difficult to explain using a standard finance model. For instance, the NASDAQ Index rose from about 1000 in late 1997 to more than 4500 in March 2000 before declining to 1000 in March 2003. The question arises is why arbitrage cannot dampen these swings which are not only due to new information.

Several models within the rational framework were developed to explain limits of arbitrage. If the investment horizon is shorter than the time until the fundamental value of an asset is reached with certainty, severe mispricing will not necessarily be eliminated by arbitrage of rational traders. (Dow and Gorton (1994), Daniel, Hirshleifer and Teoh (2001)). Mainly due to two reasons. One reason is that there are some psychological biases which virtually no one escapes. Secondly, when traders are risk averse, prices reflect a weighted average of beliefs[9]. The writers introduce us the base of behavioral finance, explaining in such way the existing market inefficiency.

Furthermore, mispricing can occur because of noise traders who create additional risk. This means that irrational investors, such as these noise traders, are not necessarily eliminated by the market due to their losses (DeLong, Scleifer, Summers and Waldmann (1990)). Finally, other market frictions such as short-sale constraints or non tradable future labour income may limit arbitrage too.

II.5 Risks

Summing up, limits of arbitrage exist and may lead to severe mispricing even with fully rational market participants and unsystematic irrational behaviour of noise traders. We ought to refer that when mispricing occurs, strategies designed to correct it can be very risky, allowing the mispricing to survive. Barberis and Thaler (2001) discuss how four sources of risk have been identified in the related

[9] Just as rational investors trade to arbitrage away mispricing, irrational investors trade to arbitrage away rational pricing.

literature. These risks are fundamental risk, noise trader risk, implementation costs and model risk.

The most obvious risk that an arbitrageur who buys a stock faces is that a piece of bad news, about the stocks' fundamental value, can cause the stock price to fall further. Arbitrageurs are well aware of this risk and the problem that exists is that substitute securities are rarely perfect in order to remove all the *fundamental risk*. The second source of risk is that known as *noise trader risk*. Noise trader risk is the risk that the mispricing being exploited by the arbitrageurs worsens in the short run. The reason that noise trader risk is important is that the most real arbitrageurs have short, rather than long, horizons[10].

Some strategies needed to exploit mispricing are often far from trivial to put in place, while some other arbitrageur strategies require the purchase or sale of securities in foreign countries. These strategies bring out implementation costs despite the legal restrictions preventing investors from doing so. Circumventing these restrictions via legal loopholes is costly. Finally, the implementation cost category also includes the generic transaction costs that arbitrageurs face, when implementing strategies such as commissions or bid-ask spreads.

Last but not least, arbitrage may be limited for the reason that even once a mispricing has occurred arbitrageurs will often still be unsure as to whether it really exists or not. This source of uncertainty, which we label model risk will also limit the arbitrageur's position.

Real world arbitrage involves a number of risks, which under some conditions will allow deviations from fundamental value to persist. To see what these conditions are, consider two cases. Suppose first that the mispriced security does not have a close substitute security. By definition then, the arbitrageur will be exposed to fundamental risk. In this case, sufficient conditions for arbitrage to be limited are: a) that arbitrageurs are risk averse and b) that the fundamental risk is systematic, in that it cannot be diversified by taking many such positions.

[10] This is because many of the people doing arbitrage – professional portfolio managers– are not managing their own money, but rather managing money for other people. This feature has important consequences. Investors lacking the specialized knowledge to evaluate the arbitrageurs' strategy may simply evaluate them based on their returns. If a mispricing that the arbitrageur is trying to exploit worsens in the short run, leading to losses, investors may decide that he is incompetent and withdraw their funds. Far from being able to wait out the short term losses, the arbitrageur may be forced to liquidate prematurely, just at the time when investment opportunities are at their most attractive. Fear of such premature liquidation makes him act as if his horizon is short. These problems will only be exacerbated by creditors (Barberis and Thaler (2001), p.7).

The first condition ensures that the mispricing will not be wiped out by a single arbitrageur taking a large position in the mispriced security while the second one prevents a large number of investors to exploit the mispricing. The presence of noise trader risk, model risk, or implementation cost will only limit arbitrage further.

Even if a perfect substitute does exist, arbitrage can still be limited. The substitute security immunizes the arbitrageur both from fundamental risk and from model risk. That's because if two securities with identical cash flows in future states of the world are at different prices, he or she can be confident of a mispricing. If we assume the total absence of implementation cost, then the noise trader risk is powerful enough. Thus arbitrage may also be limited by similar to the above conditions: first arbitrageurs are risk averse and have short horizons and second that the noise trader risk is systematic. The two conditions conclude to the same evidence as the case that the mispriced security does not have a close substitute security[11]. Attempts to capture other real world issues only make the case for complete arbitrage even more unlikely.

Some investors, individual and institutional, will exploit this market inefficiency but it is risky and not so easy to do so. For instance, hedge funds are not the only market participants trying to take advantage of noise traders; firm managers play this game too. Unfortunately, this game is risky for managers, just as it is for hedge funds. In conclusion, we could say that in principle any example of persistent mispricing is immediate evidence of limited arbitrage. If arbitrage were not limited, the mispricing would quickly disappear.

As an illustration of how large arbitrage risks might be, consider the meteoric rise of U.S large stocks indices from 1995 to 2000. To many observers, the S&P 500 and NASDAQ indexes seemed highly overvalued and yet few dared to act on their lunch. It is not hard to see why. An arbitrageur who shorts the S&P 500 or NASDAQ faces substantial fundamental risk because there is no effective substitute security for value-weighted indexes. He could try going long on a small stock index, but he would then still be vulnerable to fundamental news about large stocks that leave small stocks untouched. There is also noise trader risk. Whatever exuberance pushed the S&P 500 and NASDAQ up in the first place could push them up still in the short run. Of course, there is the model risk. An

[11] These two perfect cases that illustrate limits of arbitrage are from Barberis and Thaler (2001).

arbitrageur cannot be completely confident that the index is mispriced: perhaps valuations are justified after all, due to lower risk or prospects of higher future earnings (Barberis and Thaler (2001), p.13).

The theory of limited arbitrage shows that if irrational traders cause deviations from fundamental value, rational traders will be unable to reverse such situation. Furthermore, behavioural finance models often assume a specific form of irrationality, which turn to the extensive experimental evidence compiled by cognitive psychologists on the biases that creep in when people form beliefs, and on people's preferences. Before we will see in the next section the part of psychology that seems to be of particular interest to financial economists, we should remind ourselves the basic differences between the two fields of finance, efficient market theory and behavioural finance, with the addition of some explanatory notes.

II.6 The Debate

Concisely, we can describe the main theoretical differences between the standard paradigm and the behavioural finance. Firstly, behavioural finance argues that some features of asset prices are most plausibly interpreted as deviations from fundamental value and that these deviations are brought about by the presence of irrational traders in the economy. A long-standing objection to this view is that rational traders will quickly undo any dislocations caused by irrational part investors.

In addition, behavioural finance does not take issue with the second step in this argument: investment opportunities come to light. There is little doubt that they are quickly exploited. Rather it disputes the first argument. Another argument; one which we have already discussed above; is that even when an asset is widely mispriced, strategies designed to correct the mispricing can be very risky. As a result the mispricing remains unchallenged.

At this point it is interesting to think about standard finance terminology in this light. While irrational traders are often known as ‘‘noise traders’’, rational traders are typically referred as “arbitrageurs’’. Strictly speaking an arbitrage has the meaning of an investment strategy that offers riskless profits at no cost. It

became known in such a way because of the belief that a mispriced asset immediately creates an opportunity for riskless profits. On the other hand, behavioural finance does not accept that argument. It claims that the strategies that rational traders adopt are not necessarily arbitrages but quite often take the form of very risky strategies.

Barberis and Thaler (2001) also add that the phrases “prices are right“ and “there is no free lunch’’ are not equivalent. While both are true in an efficient market, “no free lunch’’ may also be true in an efficient market. Just because prices are away from fundamental value does not necessarily mean that there are any excess risk-adjusted returns for the taking. Whether or not a market contains free lunches, our concern as economists should be about whether prices are right: only then can we be sure that the capital of the economy is being correctly allocated to the most promising investment opportunities. In the next subsection we analyze the part of psychology, which is the main element of behavioral finance analysis.

III. Psychology of Financial Markets

A wide range of studies deals with another central pillar of standard finance which is agents' rationality. A central concept of these studies, which are described in Glazer, Nöth and Weber (2003), is that they try to examine how agents in financial markets; professional and individual investors; actually behave. This research usually demonstrates investor behavior that is difficult to reconcile with rationality or predictions of standard finance models.

The next analysis focus on main themes of behavioral finance; heuristic-driven bias, frame dependence and inefficient markets; all of which constitute the core concepts in this project. With that, let's take up the first theme.

III.1 BELIEFS

The dictionary definition for the word heuristic refers to the process by which people find things out for themselves, usually by trial and error. One of the great advances of behavioural psychology is the identification of the principles underlying these rules of thumb and the systematic errors associated with them. In turn, these rules of thumb have themselves come to be called *heuristics*.

Indeed, heuristics are like the back-of-the-envelope calculations that sometimes come close to providing the right answer. But heuristics may involve bias, meaning that they may tend to be off target in a particular direction and this can apply to an availability heuristic also. Availability heuristic is so called, based on the principle that says people are affected by the degree to which information is readily available for them. Kahneman and Tversky (1974) argue that people's judgments may be affected by the "ease with which instances or associations come to mind"[12].

Shefrin ((2000), p. 13) gives a nice example that illustrates the phenomenon of availability heuristics. In a U.S. survey, people were asked for the most frequent cause of death, homicide or stroke. The majority answered by seeing how many events type come readily to mind. If people more readily recall instances of homicide for example, then they will answer that the most frequent

[12] This is Kahneman's and Tversky's description of what availability heuristic is.

cause of death, at least in U.S.A. is homicide. According to these, people who rely on availability heuristic tend to be amazed by this and to make errors.

At this point, we can look at these steps from a broader perspective. People develop general principles as they find things out for themselves. Next, they rely on heuristics, rules of thumb, to draw inferences from the information at their disposal and due to the imperfection of the heuristics they use; they are susceptible to particular errors. As a result people actually commit errors in particular situations. These four steps define heuristic-driven bias.

III.1.1 Representativeness

One of the most important principles affecting financial decisions is known as representativeness. This type of heuristic bias refers to judgments based on stereotypes. Representativeness is about reliance on stereotypes. For instance, most people believe that a student at university can be as good as he or she was at high school. They base their predictions on how representative a student appears to be. But that is not necessarily valid . So, heuristics involves bias; representativeness can be misleading.

Kahneman and Tversky (1974) argue that when people try to determine the probability that a data set A was generated by a model B, or that an object A belongs to a class B, they often use the representativeness heuristic. This means that they evaluate the probability by the degree to which A reflects the essential characteristics of B. In other words, judgments of the probability of future returns tend to be made using a representative heuristic, whereby people try to predict by seeking the closest match to past patterns, without attention to the observed probability of matching the pattern . Much of the time, representativeness is a helpful heuristic, but it can also generate some severe biases. The first is base rate neglect.

To illustrate, Kahneman and Tversky (1974) present this description of a person named Linda: "*Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations*".

When asked whether of "Linda is a bank teller", which is statement A or "Linda is a bank teller and is active in the feminist movement", which is statement B, is

[13] You can see more evidence on Shefrin ((2000), pp.14-18).
[14] For example, when asked to guess the occupations of people whose personality and interests are described to them, subjects tended to guess the occupation that seemed to match the description as closely as possible, without regard to the rarity of the occupation (Shiller (2002), p. 18).

more likely, subjects typically assign greater probability to B. This is of course impossible and representativeness gives a simple explanation. The description of Linda sounds like the description of a feminist; leading subjects to pick B.

At this point, we will refer another bias that is closely related to representativeness heuristic that is the principle of biased *self-attribution* as have been identified by Daryl Bem (1965). This phenomenon is a pattern of human behavior whereby individuals attribute events that confirm the validity of their actions to their own high ability and skills, and attribute events that disconfirm their actions to bad luck or sabotage.

Additionally, representativeness also leads to another bias, sample size neglect. Sample size neglect means that in cases where people do not initially know the data generating process, that a particular model provide, they will tend to infer it too quickly on the basis of too few data points. For instance, they will come to believe that a financial analyst with four good stock picks is talented just because four successes are not representative of a bad analyst. It will also generate a "hot hand'' phenomenon, whereby sports fans become convinced that a basket ball player who has made three shots in arrow is on a hot streak, even though there is no evidence of a hot hand in the data[15].

A financial example illustrating representativeness is the winner-loser effect documented by Werner De Bondt and Richard Thaler ((1985), (1987)). De Bondt and Thaler find that stocks that have been extreme past losers in the preceding three years do much better than extreme past winners over the subsequent three years. De Bondt (1992) shows that the long-term earnings forecasts made by security analysts tend to be biased in the direction of recent success. Specifically, analysts overreact in that they are much more optimistic about recent winners than they are about recent losers. De Bondt and Thaler base their argument on the misapplication of representativeness.

It is obvious that financial professors and people generally tend not to recognize the regression to the mean and even if they do so, they may not apply it properly (Shefrin (2000), pp. 14-18). Regression to the mean suggests that future returns of a stock, for example, will be closer to their historical average. People behave in this way but it is not sure that they will confirm their

[15] This belief that even small samples will reflect the properties of the parent population is sometimes known as the "law of small numbers" (Rabin, (2001)).

expectations. The last stems from gambler's fallacy. If five tosses of a fair coin all turn out to be heads, the sixth toss can be either heads or tails, by one-half percentage. Yet many people have a mental picture that when a fair coin is tossed a few times in a row, the resulting pattern will feature about the same number of heads as tails. In other words, the representative pattern features about the same number of heads and tails.

Usually, after a run of five heads, people tend to predict tails on the sixth toss, because of the representativeness heuristic. From their perspective "a tail is due", a reasoning that is wrong. Gamblers fallacy arises because people misinterpret the law of averages. The think this law applies to small samples as well as to large samples and they act so, feeling overconfident. Overconfidence is our next issue.

III.1.2 Overconfidence

People often tend to show, in experimental settings, excessive confidence about their own judgments. Fischhoff, Slovic and Lichtenstein (1977) asked subjects to answer simple factual questions, e.g. is Quito the capital of Ecuador, and then asked them to give a probability that they were right. The majority subjects tended to overestimate the probability that they were right, in response to a wide variety of questions. Barberis and Thaler (2001) refer that most people display unrealistically rosy views of their abilities and prospects. Most people are not well calibrated in their guesses for several issues. Instead they are overconfident. When people are overconfident, they set overly narrow confidence bands[16]. They set their high guess too low and their low guess too high. Hence, they get surprised more frequently than they anticipated. In order to see how overconfidence[17] affects in investor behavior it is important to remember Wall Street strategists who, in the course of reviewing their predictions in the light of actual events, speak about being "humbled". In other words, they were

[16] According to this we add that people also display planning fallacy: they predict that tasks, such as writing survey papers, will be completed much sooner than is actually realized.
[17] Part of overconfidence may be nothing more than simple forgetting of contrary evidence; a tendency to forget is by its very nature not something that one can learn to prevent.

overconfident in their predictions. Before that, we will show an example that helps to understand the way that overconfidence is expressed.

In order to review the basic issue and be set for discussion of overconfident predictions, we will refer a perfect five-step quiz[18] that Shefrin (2000) had used, in order to illustrate the overconfidence that people feel in their predictions. The first two questions pertain to general knowledge and the remaining three to financial predictions. You will be asked to give your best guess in answering each of the five questions. In addition to giving your best guess, consider a range; a low guess and a high guess; so that you feel 90 percent confident that the right answer will lie between your low guess and your high guess.

Try to make the range neither too narrow nor too wide. In the first case you will appear to be overconfident while in the second you will appear to be underconfident. If you are well calibrated, you should expect that only one out of the five correct answers does not lie between your low and your high guess. The questions are:

- How long, in days, is the gestation period of an Asian elephant?
- How deep, in feet, is the deepest known point in the ocean?
- Figure 1 provides the share price chart for a particular security over a forty-eight-month period. What is your prediction for the share price value six months beyond this forty-eight-month period?
- Figure 2 provides the share price chart for a particular security over a forty-eight-month period. What is your prediction for the share price value six months beyond this forty-eight-month period?
- Figure 3 describes the dollar change in share price for a particular security over a forty-eight-month period. What is your prediction for the average change in the share price, per month, for the six months beyond this forty-eight-month period?

The answers given are 645 days for the first question, 36.198 feet for the second question, $100.30, $30.83 and $0.83, the answers for the third, forth and fifth questions, respectively. One should count an answer as a hit if the right response lies between his or her high guess and as a miss if the right response falls outside of the range between his or her low and high guess. What score did you get?

[18] This quiz is a variant of the one found in Rousso and Shoemaker (1989).

Figure 1: Share Price

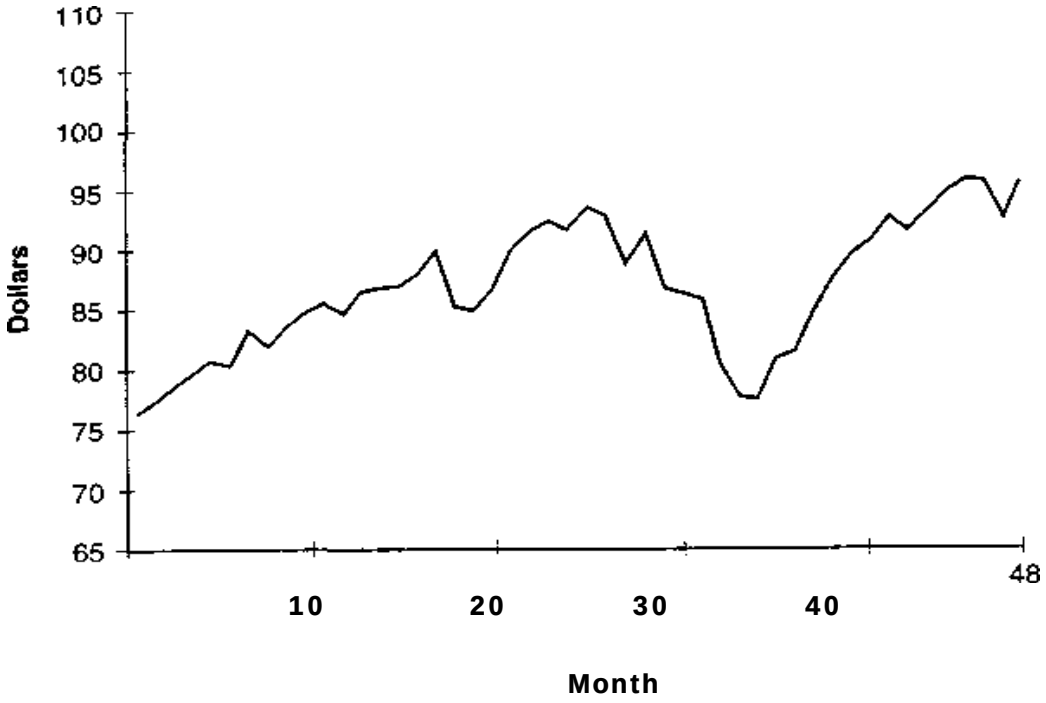


Figure 2: Share Price

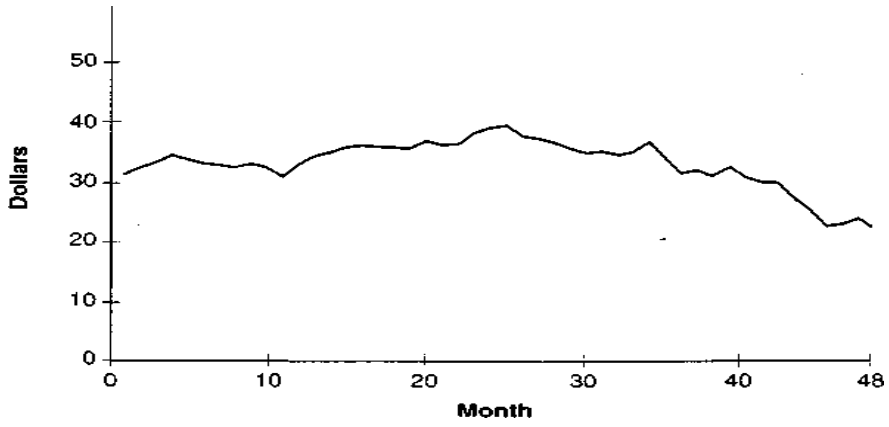
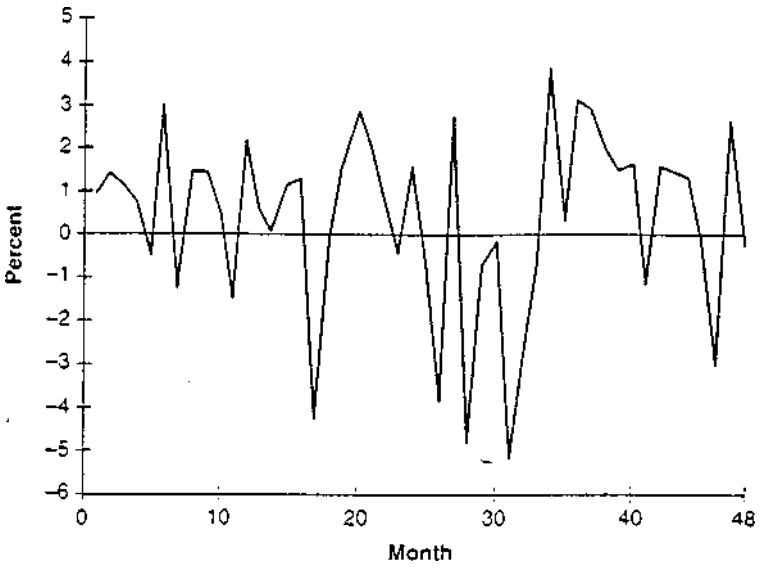


Figure 3: Dollar Change in Share Price



Most people miss more than one out of the five questions in that quiz. Actually, most miss four or even all five. Someone who is well calibrated should miss no more than one question. But Shefrin (2000) says that the percentage of people who miss only one question is less than 1 percent. This means that the other 99 percent are overconfident. Overconfidence not only just exists but it really abounds.

At this point, we come back to Wall Street strategists predictions for the future of the certain stock market. A study sponsored by PaineWebber, and administrated by the Gallup organization, found that experience is an important factor in investors' expectations about the market and it was the main factor that made them feeling overconfident. The results were summarized as follows: "As stock prices hover at or near records, a new poll indicates that experienced investors expect considerably higher returns on their portfolios than do longtime investors- and are more confident of their ability to beat the market". (Shefrin (2000), p.48). This finding is very interesting. Inexperienced investors are more confident that they will beat the market than are experienced investors. Given the difficulty that many investors actually have beating the market, newcomer investors may be not just confident, but overconfident.

Overconfident people get surprised more frequently than they anticipated. Take the strategists' predictions for 1997[19], as they are illustrated in Shefrin (2000). On June 20, 1997 the Dow closed at 7796, well above the expectations

[19] Lauren R.Rublin, "A very Good Year", Barron's, 30 December 1996.

of all seven analysts. Three days later, analysts were reinterviewed, and their reactions, to how the market had behaved during the first half of the year, were recorded and then collected their predictions for the remainder of the year. The reaction of strategists was just surprise. The article quotes Smith Barney (now Salomon Barney) stock strategist Marshall Acuff, who had the most optimistic prediction for the first half of 1997, as saying:" Certainly, I have been surprised, everyone has been surprised. We have all been humbled" (Shefrin (2000), p. 51).

So, the strategists June revisions indicate that the Dow would close at the end of 1997 at 6995, down 10.3 percent from its June value of 1997. The Gambler's fallacy, which was discussed above, existed. The Dow closed 1997 at 7908. If we asked from the investors to predict again the process Of Dow for the next year, we would see that investors would continue to be overconfident in their predictions and the surprises would continue, too. Clearly learning is a slow process.

Obviously, people do learn substantially in circumstances when the consequences of their errors are repeatedly presented to them and sometimes they even overreact and show too little confidence (Shiller (1997), p.13). But still there seems to be a common bias towards overconfidence. Overconfidence is related to some deep-set psychological phenomena. In principle, overconfidence is related to a broader difficulty with "situational construal", a difficulty in making adequate allowance for the uncertainty in one's own view of the broad situation, a more global difficulty tied up with multiple mental processes (Ross (1987)).

Overconfidence may also be traced to the representativeness heuristic, which we have discussed in the previous subsections; a tendency for people to try to categorize events as typical or representative of a well-known class, and then, in making probability estimates, to overstress the importance of such categorization, disregarding evidence about the underlying probabilities (Tversky and Kahneman (1974)). One consequence of this heuristic is a tendency for people to see patterns in data that is truly random, to feel confident, for instance, that a series which is in fact random walk is not a random walk[20].

There are two main implications of investor overconfidence. The first is that investors take bad bets because they fail to realize that they are at an

[20] Generally, the notion that speculative prices approximately describe "random walks" was first proposed by Bachelier (1964). It became widely associated with the efficient markets hypothesis, with the walk of Fama (1970). For further information on the literature on the random walk and efficient markets theory see also Cootner (1964), Malkiel (1981) and Fama (1991).

informational disadvantage. The second is that they trade more frequently than is prudent, which leads to excessive trading volume[21]. Proponents of behavioral finance, especially those who manage money, recognize that beating the market is so snap, and they try to avoid being overconfident.

The question that rises is why individual investors trade so much, even if the net effect is to reduce their returns. The answer clearly is that they believe they can pick "winners''. Some authors suggest that investors are overconfident in their abilities. There is good reason to expect that this is the case, since overconfidence is ubiquitous, especially when difficult tasks are involved. Table 1 shows that the most of the overconfidence models predict high trading volume in the market in the presence of overconfident traders. Barberis and Thaler (2001) suggest that a behavioural explanation of such an excessive trading is overconfidence; people believe that they have information strong enough to justify a trade, while in fact the information is too weak to warrant any action. Given Odean's (1999) evidence the situation may be even worse: not only people think that they have information when they don not, but they may even misinterpret valid information.

Moreover, at the individual level, overconfident investors will trade more aggressively. The higher the degree of overconfidence of an investor, the higher her or his trading volume[22]. Shefrin (2000) asked his MBA students to rate themselves as drivers relative to the general population. The most of them believe that they have better driving abilities than the average. So, people are as overconfident about their driving abilities as they are about trading abilities.

We close this section by saying that overconfidence can manifest itself, besides various findings subsumed as miscalibration, in the two following forms: people believe that their abilities are above average, they think that they can control random tasks and they are excessively optimistic about the future (Glaser, Nöth and Weber (2003), p.12).

Table 1

[21] See more in Shefrin and Statman, 1994 and Odean Terrance (1998b).

[22] Kyle and Wang (1997) find that overconfident traders might earn higher expected profits or have higher expected utility than rational traders as overconfidence works like a commitment device to aggressive trading.

Year	Authors	Journal	Evidence from psychology	Important findings and model predictions
2001	Barberis/Huang	JF	Mental accounting (individual stock vs. portfolio accounting), prospect theory	Equity premium, excess volatility, value/growth effect
		QJE	Prospect theory, house money effect	
2001	Barberis/Huang/Santos			Equity premium, excess volatility, time-series predictability of stock returns
		JF	Overconfidence RFS	
2001	Daniel/Hirshleifer/Subrahmanyam	Overconfidence, biased self-attribution		Cross-sectional return predictability
2001	Gervais/Odean	JFM	Overconfidence	High trading volume, higher trading volume after investment successes
2001	Hirshleifer/Luo	JFE	Conservatism, representativeness heuristic	Survival of overconfident investors in competitive security markets
1998	Barberis/Shleifer/Vishney			Positive short-lag autocorrelation, negative long-lag autocorrelation, value/growth effect, event-based return predictability
		JFM	Overconfidence JF	
1998	Benos	Overconfidence, biased self-attribution		High trading volume, excess volatility
1998	Daniel/Hirshleifer/Subrahmanyam			Positive short-lag autocorrelation, negative long-lag autocorrelation, excess volatility, event based return predictability
		JF	Overconfidence	
		JFM	Overconfidence	High trading volume
1998	Odean			High trading volume
1998	Wang			

Source: **GLASER, M., NÖTH M. AND M. WEBER**. 2003.

In a finance journal, Kahneman and Riepe ((1998), p. 54) summarize the motivation of overconfidence as follows: “The combination of overconfidence and optimism is a potent brew, which causes people to overestimate their knowledge, underestimate risks, and exaggerate their ability to control events”. Our next issue is anchoring.

III.1.3 Anchoring

It is well known that when people are asked to make quantitative assessments their assessments are influenced by suggestions. The tendency that people have to be influenced by such suggestions is called *anchoring* by

psychologists. An example of this is found in the results survey researchers obtain. These researchers often ask people about their incomes using questionnaires in which respondents are instructed to indicate which of a number of income brackets, shown as choices on the questionnaire, their incomes fall into. The results were impressive. It has been shown that the answers people give are influenced by the brackets shown on the questionnaire (Shiller (1997), p. 9). To be more specific, in forming estimates, people often start with some initial, possibly arbitrary value, and then adjust away from it. This adjustment is often insufficient. Put differently, people anchor too much on the initial value.

Shiller (1997) suggests that in some cases, at least, anchoring may be rational behaviour for respondents. They may rationally assume that the deviser of the questionnaire uses some information when devising the questionnaire. Not fully remembering their own income, they may rely on the information in the brackets to help them answer better. If the brackets do not contain any information for their income, then it is rational for subjects to allow themselves to be influenced by the brackets.

On the other hand, anchoring behaviour persists even when information is absent. In one experiment Tversky and Kahneman (1974), subjects should answer simple questions but the answers have to be in the form of percentages. For instance when asked to estimate the percentage of African nations belonging to the United Nations. More specifically, before giving a percentage, they were asked whether their guess was higher or lower than a randomly generated number between 1 to 100. Obviously, this number had no relevance to the question just asked. People who answered these questions were strongly influenced by the initial random number. Those who were asked to compare their estimate to 10, subsequently estimated 25%, while those who compared to 60, estimated 15%.

Values in the stock market and generally in speculative markets are inherently ambiguous. So there is no agreed-upon economic theory that would particularize the value of the Dow Jones Industrial Average for example. In the absent of any better information, past prices or asking prices or prices of similar objects are likely to be important determinants of prices today.

In contrast, one might object to the notion that anchoring on past prices helps determine present price in the stock market and might be inconsistent with the low serial correlation of stock price changes that is with the random-walk

behavior of daily or monthly stock prices that has been widely noted. This conclusion is not warranted however. Models of "smart money"[23]- in which people who are unusually alert to profit opportunities in financial markets- seeking to exploit serial correlation in price, models which include ordinary investors are consistent with the implications that serial correlation is low and yet the anchoring remains important for the level of stock prices (Shiller, 1997).

By extension from these experimental results, it is to be presumed that very many phenomena in the economic performance are influenced importantly by anchoring. Such phenomena are: the widely observed anomaly that forward discounts to not properly explain subsequent exchange rate movements, the "sticky prices'' in microeconomic theory, the tendency of new prices to be close to the past ones, if past prices are suggestions for the new prices and many others. This later situation illustrates that the more ambiguous the value of a commodity, the more important a suggestion is likely to be, and the more important anchoring is likely to be for price determination.

Finally, the anchoring phenomenon may help to explain certain international puzzles observed in financial markets. U.S. investors who thought in the late 1980s that Japanese stock price-earning ratios were too high then may have been influenced by the readily available anchor of the much lower U.S. price-earnings ratios (Shiller (1997), p. 10). By the mid 1990s, the Tokyo market was felt by U.S. investors as no longer an overpriced market, even though the price-earnings ratios remain much higher than these in the U.S.A. Maybe that happened because the anchor of the widely-publicized high Tokyo price-earnings ratios of the late 1980s appears to be another anchor.

In other words, most people respond conservatively to the new information in this case. Once people have formed a hypothesis, they sometimes misread additional evidence that goes against them as actually being in their favour. They will therefore keep believing in their hypothesis even when contradicted by new data. In a way, this bias is related to conservatism. By this way anchoring can be related to conservatism and to be known as confirmation bias (Barberis and Thaler (2001),

[23] The efficient markets theory, as it is commonly expressed, asserts that when irrational optimists buy a stock, smart money sells and when irrational pessimists sell a stock, smart money buys, thereby eliminating the effect of the irrational traders on market price. But, finance theory does not necessarily imply that smart money succeeds in fully offsetting the impact of ordinary investors (Shiller (2002), pp. 22-24).

p. 15). One reason for this may be that investors usually prefer the familiar to the unfamiliar. This phenomenon is known as aversion to ambiguity and we show it next.

III.1.4 Aversion to Ambiguity

Investors often do not participate in asset and security categories. A focus on what is salient may cause investors to invest only in securities that are ''on their radar screens'' (Daniel, Hirshleifer and Teoh (2001), p.6). Non-participation may also be related to familiarity or mere exposure effects, e.g., a notion that what is familiar is more attractive and less risky. The aversion can refer to different shorts of familiarity. Indeed, for many years prior to the rise of mutual funds and defined contribution retirement plans, participation in the U.S. stock market was very incomplete. Even now, many investors entirely neglect major asset classes, such as commodities, stocks, bonds, real estate, and omit many individual securities within each class. Investors seem to be strongly biased toward investing in stocks based in their own home town. There is more localized bias within Finland and within the U.S.A. Several studies confirm such results[24].

Aversion to ambiguity may be a possible reason of non-participation in the whole market. For instance, Sarin and Weber (1993) provide an example that illustrates this bias. By that example they find that graduate business students and bank executives were averse to gambles with ambiguous probabilities relative to equivalent lotteries, and that this aversion affected market prices[25]. According to this, employees tend to invest in their own firm's stocks and perceive this stock as a stock with low risk (Huberman (1999), (1997)). The degree to which they invest in their employer's stock does not predict the stock's future returns, suggesting that the investment is not based on superior inside knowledge of their own firm (Daniel, Hirshleifer and Teoh (2001), p.7).

[24] Cooper and Caplanis (1994), Kang and Stulz (1997), Lewis (1999), Huberman (1999).

[25] This example could have the following form: students and bank executives are offered the choice between accepting a sure $1000 or an even gamble in which there is a profit of $0 or $2000. The same choice is described by another way. Again students and bank executives participate in the following ''game'': there is a bag containing 100 poker chips, 50 black and 50 red. Everybody can choose a sure $1000, or a lottery ticket that pays $2000 if a black chip is drawn at random from the bag but $0 if a red chip is drawn. The proportions of the coloured chips the bag contains is unknown. Many people who are willing to gamble when the odds are even prefer to play it safe and take the sure $1000 when the odds are known.

In unfamiliar situations, the predominant emotion tends to be fear. That explains why Europeans concentrate their portfolios in European stocks, and Japanese concentrate in Japanese stocks. In a word, familiarity or the effect of the home bias. Of course, investors who act in such a way give up the benefits of diversification in their portfolio[26].

The issues discussed in the previous subsections involve cognitive errors, that is, errors that stem from the way that people think. In other words, cognitive dissonance[27] is the mental conflict that people experience when they are presented with evidence that their beliefs or assumptions are wrong. To be more specific, cognitive dissonance might be classified as a sort of pain of regret, regret over mistaken beliefs. The theory of cognitive dissonance asserts that there is a tendency for people to take actions to reduce cognitive dissonance that would normally be considered fully rational: the person may avoid the new information or knowledge or develop contorted arguments to maintain the beliefs or assumptions.

There is empirical support that people make errors represented by the above theory. For example, new car purchasers selectively avoid reading, after the purchase of their own new car is complete, advertisements for car models that they did not choose and are attracted to advertisements for the car they bought (Shiller (1997), p.8).

But in describing ambiguity to aversion in terms of fear of the unknown, it is logical to think that some phenomena involve a combination of cognition and emotion. Of course, both involve mental processes and may be physiologically linked, as opposed to being separate from each other. Scholars have produced ample evidence that emotion plays an important role in the way people remember events. So, phenomena involving the availability heuristic may reflect both cognitive and emotional elements. Here is an example.

In 1972, the Dow closed at 1020. In 1982 it closed a little bit higher, at 1047. It gyrated wildly, recording four years of negative growth. During this period,

[26]This section of behavioral finance is still important but--in my opinion--gradually losing some momentum in line with globalization of financial markets and the willingness of many investors to achieve more geographical diversification of assets. In this context it seems to be probable that financial markets in the future will get closer to the theories of Harry Markowitz. In Sweden, for example, the home bias has become much less pronounced in recent years. Even small investors increasingly purchase foreign shares.

[27]In a part of the literature we meet cognitive dissonance as factor that reflects frame dependence. I suggest that it mainly affects human's beliefs.

inflation reduced the purchasing power of a dollar by over 66 percent. A 1995 article in the Wall Street Journal quotes as follows: “People like myself, who have been in the business since before the 1973-74 crash, we were terrified by that crash’’ says Mr. Fuller, the money manager of the Fuller & Thaler Asset Management. He continues: ”That’s a very low probability event. But many of the people in this business have spent the last 20 years worrying about that happening again’’[28]. These parts of the article make clear that at least fear, but also greed, drive financial markets.

But this is partly correct. While fear does play a role, most investors react less to greed and more to hope. Fear induces an investor to focus on events that are especially unfavourable, while hope induces him or her to focus on events that are favourable. In addition to hope and fear, that apply generally, investors have specific goals to which they aspire. Typical goals include purchasing a home, funding children’s college education and having comfortable retirement.

Shefrin illustrates the variety of emotions that an investor feel, while participating in finance markets, with an excellent theory from psychologist Lola Lopes (Shefrin (2000), pp.119-125). Indeed investors experience a variety of emotions along an emotion time line. We can imagine this line as a line where time advances from left to right and in which investment decisions lie at the left, and goals lie at the right. Hope and fear are polar opposites, one positive and the other negative. Picture positive emotion above the time line and negative emotion below it. As time progresses from left to right hope becomes anticipation and is then transformed into pride. Below the line, fear becomes anxiety and then is transformed into regret.

More specifically, hope and fear affect the way that investors evaluate alternatives. Fear causes investors to look at possibilities from the bottom up and to wonder how the future would be. On the other hand, hope gets investors to look at the possibilities from the top down and ask how good it could get. In Lope’s terminology, the bottom-up perspective emphasizes the desire for security whereas the top-down perspective emphasizes the need for potential on the upside. Lopes tells us that these two perspectives reside within all of us, as opposite poles. But they tend not to be equally matched: one pole usually predominates. This is one of the greatest contributions by Lopes, to establish

[28] Jonathan Clements, “Getting Going: Behavioral Specialists Put Investors on Couch,”Wall Street Journal, 28 November 1995.

how the interaction of these conflicting emotions determines the tolerance of risk in portfolio selection.

We have seen the heuristic-driven bias and introduced some of the main heuristics upon which financial practitioners rely. So, it is easy for everybody to recognise in itself many instances of representativeness, anchoring, overconfidence, availability bias and aversion to ambiguity. These heuristic, of course, surface in many different contexts, such as analysts' earnings forecasts, investors' evaluation of mutual fund performance and portfolios selection decisions. Because of their reliance on heuristics, practitioners hold biased beliefs that render them vulnerable to committing errors.

III. 2 PREFERENCES

The second of the psychological phenomena that permeate the landscape of behavioral finance is *frame dependence*. The form used to describe a decision is called its frame. So, the term frame independence refers to the fact that the form is irrelevant to behaviour. Proponents of standard finance assume that framing is transparent. This means that practitioners can see through all the different ways cash flows might be described. Yet many frames are characterized as not transparent but opaque. That means that when a person has difficulty seeing through an opaque frame, his or her decisions typically depend on the particular frame he uses. Consequently, a difference in form is also a difference in substance. Behavior, and more specifically investors' behavior, reflects frame dependence.

In short, frame dependence holds that differences in form may also be substantive. It reflects a mix of cognitive and emotional elements, as we saw in the previous subsection which deals with heuristic bias. The cognitive issues pertain to the way that information is mentally organized, especially the coding of outcomes into gains and losses. On the other hand, there are also several emotional issues, the most fundamental of which is that people tend to feel losses much more intensively than they feel gains of comparable importance. This phenomenon has come to be known as loss aversion.

Furthermore, people prefer frames that obscure losses, if possible- and engage in hedonic editing. People tend to experience losses even more acutely when they feel responsible for the decision that led to the loss. This sense of responsibility often leads to regret. Regret is an emotion. People who have difficulties controlling their emotions are said to lack self-control. Some people use framing effects constructively to help themselves deal with self-control difficulties.

Of course, apart from these elements which constitute the frame dependence issue, we will show the basic concepts known as prospect theory, a descriptive frame work for the way people make choices in the face of risk and uncertainty.

We start our analysis from prospect theory.

III.2.1 Prospect Theory

In their landmark work on prospect theory Daniel Kahneman and Amos Tversky (1979) provide evidence of frame dependence. Prospect theory has probably more impact than any other behavioral theory on economic research. Among economists, prospect theory has a distinct but still prominent, second place to expected utility theory for most research. The axioms from which expected utility theory is derived are undeniably sensible representations of basic requirements of rationality.

Still, despite the obvious attractiveness of expected utility theory, it has long been known that the theory has systematically mispredicted human behavior, at least in certain circumstances[29] (Shiller (1997), p. 3). Prospect theory is a mathematically-formulated alternative to the theory of expected utility maximization. The question that arises is: should financial economists be interested in such an alternative to expected utility? After all, expected utility theory may be a good approximation to how people evaluate a risky gamble like the stock market, even if does not explain attitudes towards the kinds of gamble[30]. Studies in experimental settings have shown that people violate

[29] There are a lot of reported examples showing that in choosing between certain lotteries, people systematically violate the expected utility theory (see more in Kahneman and Tversky (1979)).

[30] Shiller (1997) refers that people specialize in certain games. The favoured forms of gambling tend to be associated with a sort of ego involvement: people may feel that they are especially

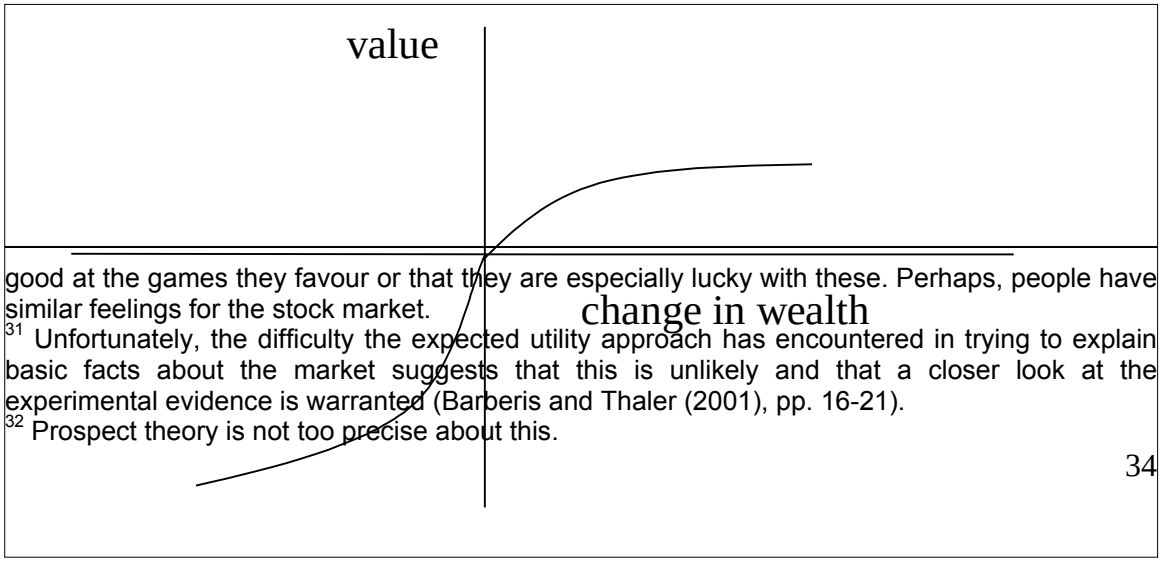
expected utility theory when choosing among risky gambles[31]. Gamblers may have very rational expectations, at some level, for the likely outcome of their gambling, and yet have other feelings that drive their actual behaviour.

Indeed, recent work in behavioral finance has argued that some of the insights psychologists have drawn from violations of expected utility are central to understanding a number of financial phenomena.

Actually, prospect theory resembles expected utility theory in that individuals are represented as maximizing a weighted sum of utilities, although the weights are not the same as probabilities and the utilities are determined by what they call value function (see Figure 4) rather than a utility function. The weights are, according to Kahneman and Tversky (1979) determined by a function of true probabilities which gives zero weight to extremely low probabilities and a weight of one to extreme high probabilities. That means, people behave as if they regard extremely improbable events as impossimple and extreme probable events as certain. However, events that are just very improbable; and not extremely improbable; are given too much weight and people behave as if they exaggerate the probability. In contrast, events that are just very probable; and not extremely probable; are given too little weight and in such cases people behave as if they underestimate the probability. These probabilities are determined by individuals' subjective impression[32].

In prospect theory's value function, representing an individual's preferences over gains and losses relative a reference point. The figure shows that the individual losses more value for small losses than he or she adds for a small gain of the same magnitude (loss aversion) and is risk averse (concave) for gains and risk seeking (convex) in losses.

Figure 4: Value Function



good at the games they favour or that they are especially lucky with these. Perhaps, people have similar feelings for the stock market.

[31] Unfortunately, the difficulty the expected utility approach has encountered in trying to explain basic facts about the market suggests that this is unlikely and that a closer look at the experimental evidence is warranted (Barberis and Thaler (2001), pp. 16-21).

[32] Prospect theory is not too precise about this.

We turn now to see how the expected utility function can become weighting function, and follow by this way the prospect theory. If we modify expected utility function only by substituting the Kahneman and Tversky weights for the probabilities in expected utility theory, we might help explain a number of puzzling phenomena in observed human behavior toward risk. For instance, such modification could explain the apparent public enthusiasm for high-prize lotteries, even though the probability of winning is so low that expected payout of the lottery is not high. It could also explain the phenomenon as the observed tendency of overpaying for airline flight insurance[33].

In addition, the weighting function may explain observed overpricing of out-of-the-money and in-the-money options. Empirical work on stock options pricing has uncovered phenomenon called the "options smile", that is that deep out-of-the-money and deep in-the-money options have relatively high prices, when compared with their theoretical prices using Black-Scholes formula. However, options theorists accustomed to describing the implied volatility of the stock implicit in options prices, like to state this phenomenon in terms of these implied volatilities. Graphically, when the implied volatility for options of various strike prices at a point in time derived using Black-Scholes formula, are plotted on the vertical axis, against the strike price on the horizontal axis, the curve often resembles a smile.

This option smile might possibly be explained in terms of the distortion in probabilities presented by Kahneman and Tversky weighting function. Since, the theory would suggest that people act as if they overestimate the small probability that the price of the underlying crosses the strike price and underestimate the high probability that the price remains on the same side of the strike price.

We now turn to the other foundation of prospect theory, the value function. The value function differs from the utility function in expected utility theory in the aspect that the function of wealth or the function of payout has a kink in it at a point, the "reference point", the location of which is determined by the subjective impressions of the individual. The reference point is the individual's point of comparison "the status quo" against which alternative scenarios are contrasted. Taking value as a function of wealth, the value function is upward sloping

[33] Life insurance policies refer to that one purchases before an airline flight, which has coverage only during the certain flight.

everywhere, but with an abrupt decline in the slope at the reference point (Shiller (1997)). The value function is concave over gains and convex over losses. In particular, people are risk-seeking over losses (Barberis and Thaler (2001), p. 18).

Perhaps the most significant thing to notice about the value function is just discontinuity in slope at the reference value. Prospect theory does not nail down accurately what determines the location of the reference point, just as it does the same for the weighting function; what is the difference between very high probabilities and extremely high probabilities? The reference point is thought to be determined by some point of comparison that the subject finds convenient, something readily visible or suggested by the wording of a question.

This discontinuity of the value function means that, in making choices between risky outcomes, people will behave in a risk averse manner, no matter how small the amounts at stake are. This is a contrast to the prediction of expected utility theory with a utility function of wealth without kinks, for which, since the utility function is approximately linear for small changes, people should behave as if they are risk neutral for small bets. That people would usually be risk neutral for small bets would be the prediction of expected utility theory even if the utility function has such slope discontinuity, since the probability that wealth is currently at the kink is generally zero. With prospect theory the kink always moves with the wealth to stay at the perceived current level of wealth. The kink is always relevant.

Schiller (1997) refers an example that illustrates the importance of the kink in the value function. A person was asked whether he could accept a bet that paid him $200 with a probability of 50% and lost him $100 with a probability of 50%. The person answered that he would not take the bet, but that he would take a hundred of them. His thought was that with a hundred such bets, his expected total winnings are $5000 and he has virtually no chance of losing any money. So, if this person would answer the same way at any wealth level, then he necessarily violates the expected utility theory. However, this person is not in violation of prospect theory. Viewing a single bet, the kink in the value function is the dominant consideration, as long as 100 bets are judged sequentially make the kink to be relevant in contrast with 100 bets that when judged together, the collective outcomes would be far above today's value function kink. The bet is, by prospect theory, clearly desirable.

The value function also has a kink at the origin, indicating a greater sensitivity, to losses than to gains, a feature known as loss aversion, which is our next issue.

III.2.2 Loss Aversion

The starting point in prospect theory is the role of ‘‘loss’’, an issue explored by Harry Markowitz (1952). Kahneman and Tversky studied how people respond to the prospect of a loss. They concluded that most people hate to lose. This is what Kahneman and Tversky call loss aversion. They find that a loss has about two and a half times the impact of a gain of the same magnitude (Shefrin (2000), p. 24). Losses are less painful after gains whereas they are more painful after losses. Loss aversion implies that people have a predisposition toward avoiding a certain loss. It is important to refer that loss aversion can also be counterbalanced by panic.

The aversion to selling at a loss definitely has very strong psychological roots. Investors who behave in accordance with prospect theory do not mark their assets to market, at least internally. Rather they keep track of their trades in terms of gains or losses relative to the price they originally paid. If an investor is loss averse and evaluates his or she portfolio at least every year, he faces a high probability of observing losses and thus requests a higher risk premium compared to the fully rational investor who is not influenced by short-term fluctuations (Benartzi and Thaler (1995)).

Some people learn about “get-evenitis’’, a phenomenon central in prospect theory, the hard way. Get-evenitis refers to the difficulty people experience in making peace with their losses and afflicts both sophisticated and unsophisticated investors. According to this, get-evenitis leads people to take chances in order to avoid taking a loss. Take the case of Nicholas Leeson. In 1995, Leeson become famous for having caused the collapse of his employer, 232-year-old Barings PLC. The way he did this, is amazing. He lost over $1.4 billion through trading, in 1992, Leeson began to engage in rogue trading in order to hide the errors made by his subordinates. Eventually, he brought out losses of

his own, and "get-evenitis" set in. He asserts that "he gambled on the stock market to reverse his mistakes and save the bank" (Shefrin (2000), pp. 24-25).

Shefrin and Statman (1985) suggest that people generally sell their winners too early and hold their losers too long. Realizing a loss is painful, despite the possibility of a tax advantage. An investor who recognizes the tax benefit but finds the psychological cost too painful experiences a self-control problem. Some investors find ways to realize tax losses eventually, notably, by using December as a deadline.

Recent work by Terrance Odean (1998a) reports his findings on the disposition effect[34] based on a study of approximately 163,000 customer accounts at a nationwide discount brokerage house. For each trading day and individual account, Odean looked at the value of all the stock positions that corresponded to capital gains. Some of these gains could be realized on that day and others would not. Odean compared the fraction of all gains sold on this particular day with the fraction of losses realized. Moreover, he showed that the individual investors trading through a large discount brokerage firm tend to be more likely to sell their winners than their losers. In addition, he showed that the stocks that investors choose to sell subsequently outperform the stocks that investors retain.

Investors who are loss averse realize more of their paper gains than they do their paper losses. It turns out that from January through December, investors realize gains 1.68 times more frequently than they realize losses. This means that a stock that is up in value is almost 70 percent more likely to be sold than as stock that is down. The Odean survey showed that only in December do investors realize losses more rapidly than gains, though only 2 percent.

A central concept in loss aversion analysis is that although investors tend to realize their smaller losses, they continue to hold on to their larger losses. Perhaps investors wait for their paper loss to disappear. Furthermore, one of the big surprises in Odean's study is that investors sell the wrong stocks. They receive subpar returns from the losers they keep but the losers they sell subsequently do great. It is logical to think that when investors hold losers, their trading activity has not so many possibilities to be profitable.

[34] Shefrin and Statman (1985) coined the term disposition effect, as shorthand for the predisposition toward get-evenitis.

In the past, loss aversion caused investors to shy away from stocks. Therefore, stocks earned very large returns relative to risk –free government securities. Economist Jeremy Siegal documents that over the last two centuries the real return to stocks has been about 7 percent more than risk-free securities. From a theoretical perspective, a premium of 7 percent is enormous and this differential has come to be called the equity premium puzzle (Mehra and Prescott (1985)). In other words, the term "equity premium puzzle'' is used to refer to the puzzlingly high historical risk-adjusted average returns of stocks relative to bonds. The equity premium[35] is the difference between the historical average return in the stock market and the historical average on investments in bonds or treasury bills.

Those who have tried to reconcile the equity premium with rational investor behavior commonly point out the higher risk that short-run stock market returns show: investors presumably are not fully enticed by the higher average returns of stocks since stocks carry higher risk. But, such riskiness of stocks is not a justification of the equity premium, at least assuming that investors are mostly long term. Indeed, most investors are long-term, since they expect to live for many decades and because of this they should invest in bonds.

Benartzi and Thaler (1995) show that if people use one-year horizon to evaluate investments in the stock market, then the equity premium is explained by myopic loss aversion. In other words, investors who are prone to myopic loss aversion can increase their comfort with equities by monitoring the performance of their portfolios less frequently, no more than once year. Moreover, prospect theory does not suggest that in this case riskless real interest rates need be particularly high. Thus, if we accept prospect theory and that people frame stock markets returns as short-term, the equity premium puzzle is solved.

Concluding, we see that these findings suggests that investors may form theories of how the market works based upon irrelevant historical values, somewhat analogous to making decisions based upon mental accounting with respect to arbitrary reference points. We examine mental compartments in the next subsection.

[35] Barberis and Thaler (2001) note that investors are only willing to hold the market supply of equity in return for a very substantial equity premium. Put differently, they find stocks unappealing and are unwilling to allocate much of their wealth to them.

III.2.3 Mental Accounting

People prefer frames that obscure losses, if possible-and engage in hedonic editing. More specifically, investors prefer some frames to others. The last is known as hedonic editing. In a financial context, hedonic editing offers some insight into investors' preference for cash dividends. When stock prices go up, dividends can be savored separately from capital gains. When stock prices go down, dividends serve as a "silver lining" to buffer a capital loss. Indeed, some investors prefer to keep dividends in their right pocket, having realized the importance of them. In his stockbroker manual, Gross (1982) raises the issue of frame dependence within the context of realizing a loss. Consider Gross's advice to stockbrokers:

> *"When you suggest that the client close at a loss a transaction that you originally recommended and invest the proceeds in another position you are currently recommending, a real act of faith has to take place. That act of faith can more easily be effected if you make use of some transitional words that I call ''magic selling words''. The words that I consider to have magical power in the sense that they make for an easier acceptance of the loss are these: ''Transfer your assets''*. (p.150)

These magic selling words induce the client to use a frame in which he or she reallocates assets from one mental account to another, rather than closing a mental account at a loss. So, we can understand that people's decisions involve hedonic editing, in the way they organize their mental accounts.

To be more specific, in relation to framing phenomena, it is a human tendency to place particular events into mental compartments based on superficial attributes. Instead of looking at the big picture, as would be implied by expected utility theory, they look at individual decisions separately. As Shefrin (2000) refers, decision problems constitute a concurrent "package" but most people do not see the package. They separate the choices into mental accounts.

People may tend to place their investments into arbitrarily separate mental compartments, and react separately to the investments based on which compartment they are in. Shefrin and Thaler (1988) have argued that people put their sources of income into three categories, current wage and salary income, asset income, and future income, and spend differently out of the present values of these different incomes. For example, people are reluctant to spend out of future income even if it is certain to arrive.

At this point, it is significant to note that one important feature of mental accounting is narrow framing, which is the tendency to treat individual gambles separately from other portions of wealth. In other words, when offered a gamble, people often evaluate it as if it is the only gamble they face in the world, rather than merging it with pre-existing bets to see if the new bet is a worthwhile addition (Barberis and Thaler (2001), pp. 19-21).

Furthermore, the tendency for people to allow themselves to be influenced by their own mental compartments might explain the observed tendency for stock prices to jump up in January, widely noted as the “January effect’’ anomaly. If people view the year end as a time of reckoning and a new year as a beginning, they may be inclined to behave differently at the turn of the year, and this may explain the January effect.

A tendency to separate out decisions into separate mental compartments may also be behind the observed tendency for “hedgers’’ to tend to hedge specific trades, rather than their overall profit situation.

III.2.4 Regret

We can imagine someone who makes a decision that turned out badly and engages in self-recrimination for not having done the right thing. Usually, people tend to experience losses even more acutely when they feel responsible for the decision that led to the loss. This sense of responsibility leads to regret. Regret is the emotion experienced with not having made the right decision. Regret is more than the pain of loss. It is the pain associated with feeling responsible for the loss. In such cases, one ‘’kicks oneself’’ at having done something foolish (Shiller, (1997)). If one wishes to avoid the pain of regret, one may alter one’s behavior in

ways that would in some cases be irrational unless account is taken of the pain of regret.

For instance, imagine someone who has a regular route to work. One day, for the sake of variety, he or she decides to try an alternative route. That particular day she winds up in an accident. Now, if he or she chastise him- or herself, thinking "if only I had done what I always do and taken my regular route!". If he or she thinks in this way, he or she is experiencing the frustration of regret. It is clear that when people deviate from what is for them a conventional way of acting, they become especially vulnerable to the pain of regret if things go badly.

Regret can effect the decisions people make. Someone who feels regret intensely, does not have a strong preference for variety, and thinks ahead, may follow the same route to work every day, the same way to live, in order to minimize possible future regret[36].

Regret theory may apparently explain the fact that investors defer selling stocks that have gone down in value and accelerate the selling of stocks that have gone up in value (Shiller (1997)). Regret theory may be interpreted as implying that investors avoid selling stocks that have gone down in order not to finalize the error they make and not to feel the regret. Moreover, regret minimization also leads some investors to use dividends, instead of selling stock, to finance consumer expenditures. Those who sell stock to finance a purchase, only to find that shortly thereafter the stock price soars, are liable to feel considerable regret[37].

III.2.5 Cognitive and Emotional Aspects

People who exhibit frame dependence do so for both cognitive and emotional reasons. The cognitive aspects concern the way people organize their information, while the emotional aspects deal with the way people feel as they register the information.

[36] The pain of regret at having made errors is in some senses embodied in the Kahneman and Tversky notion of a kink in the value function at the reference point, which we have noted before.
[37] That is often at the heart of expressions such as "this is my half-million-dollar car" (Shefrin (2000)).

Many practitioners think that investors and markets often make poor use for example of accounting information, and that the form, as well as, the content of financial disclosure are important[38]. In addition, Shiller (1997) suggests the disjunction effect that is a tendency for people to want to wait to make decisions until information is revealed, even if the information is not really important for the decision, and even if they would make the same decision regardless of the information. This sort of effect might help explain changes in the volatility of speculative asset prices or changes in the volume of trade of speculative asset prices at times when information is revealed.

Psychological principles suggest that in providing information to investors, it is important that relevant information be salient and easily processed. The form as well as the content of communicated information affects how well it is absorbed. Daniel, Hirshleifer and Teoh (2001) argue that market prices are also influenced by the form by which information is presented. Moreover, the presentation and the choice of accounting method influence the perceptions of investors. These perceptions are influenced by which accounting statement an item of information appears in; by footnote disclosure or financial statement recognition, or by explicit disclosure; by how items are labeled or classified within a statement[39]; by the timing of recognition of changes in performance and by whether accounting numbers meet key thresholds.

However, there are several indications that investors do not interpret accounting information in a fully rational way in forming their expectations. Misperceptions extend not just to reporting of cash flow performance, but to disclosures of risk. Practitioners and interest groups passionately debate reporting choices, even when they are apparently equivalent in the information they directly convey.

To improve information processing by investors, psychological principles such as attention effects, anchoring and adjustment should be explicitly taken into account. Greater disclosure is not an unalloyed virtue, because investors can lose the forest for the trees (Daniel, Hirshleifer and Teoh (2001), p.60). Clearly

[38] Faith in an extreme version of the efficient markets theory, on the other hand, limits what some academics have to say about this topic. Academics potentially have an important role to play by offering careful analysis of the economic implications of the psychological biases of accounting users.

[39] E.g. inclusion as a part of a salient accounting ratio.

important information that is hard for investors to process should be recognized and less important and easily processed information footnoted.

III.2.6 Self Control

Self control means controlling emotions. Some investors value dividends for self control reasons as well as for reasons that stem from hedonic editing, described in a previous section. In principle, people like the certainty of an income stream. The question to arise is what does a reliable dividend have to do with self-control. Shefrin ((2000), p. 30) gives the answer that involves the “don’t dip into capital’’ heuristic. Older investors, especially retirees who finance the daily living expenditure from their portfolios worry about spending their wealth quickly, thereby outliving their assets. The needs of the present make themselves feel/felt through emotion. They fear a loss of self-control, where the urge for immediate gratification leads them to go on a spending binge. Therefore they put rules into place to guard against the temptation to overspend.

“Don’t dip into capital’’ is akin/similar to “don’t kill the goose that lays the golden eggs’’. But if somebody does not dip into capital, how can he or she manage the current expenditures to be financed. At this point the dividends come in. Dividends are labeled as income, not capital. And investors tend to frame dividends as income, not capital. It is clear that such a view of dividends constitutes frame dependence. Investors feel quite comfortable choosing a portfolio of stocks that feature high dividend payout and spending those dividends.

III.2.7 Magical and Quasi-Magical Thinking

Arbitrary behaviour that are generated by no certain way and from no certain cause and have completely circumstantial results, are referred to with the term “magical thinking’’ by psychologists. For example, firms’ investment or management decisions that happened to precede increases in sales, and result

in profits, may tend to be repeated. If this happens in a period of rising profits[40], the notion that these decisions were the cause of the sales or profit increase will be reinforced. Since firms are similar to each other and observe each other too, the magical thinking may be social, rather than individual, and hence may have aggregate effects.

According to this, the tendency for speculative markets to respond to news variables may be generated analogously. For instance, the U.S. stock market used to frequently be buoyed by positive news about the economy, but in recent years it appears to tend to be moved in the opposite direction by such news. But this belief could be the result of a chain of events that was set off by some initial chance movements of the stock market. As people believe such theories and fames, they may then behave so that the stock price does indeed behave as hypothesized, the initial correlations will persist later, and thereby reinforce the belief.

In addition, the term “quasi-magical thinking” is used to describe situations in which people act as if they erroneously believe that their actions can influence an outcome but in which they in fact do not believe. It includes acting as if one thinks that one can take actions that will, in effect, undo what is obviously predetermined, or that one can change history (Shiller (1997), p.22). Quasi-magical thinking suggests that people behave as if they can influence and sometimes change predetermined conditions. This phenomenon appears to operate more strongly when outcomes of future events, rather than historical events are involved. Therefore, because of this people place larger bets if invited to bet before a coin is tossed than after, as if they think they are able to influence more a coin not yet tossed ((Langer) 1975).

Finally, quasi-magical thinking may also be related to the tendency investors have to want to sell winners and to hold the losers. That happens because people may think that holding on to losers can reverse the fact that they have already lost. Public demand for stocks at a time when they are apparently overvalued may be influenced by quasi-magical thinking, a notion that if I hold, then the stocks will continue to rise.

Quasi-magical thinking may explain why people vote. In most elections, people must know that the probability that they will decide the election must be

[40] For example, a period with rising profits is when the economy is recovering from a recession.

very small, and they would thus rationally decide not to vote. Quasi-magical thinking, thinking that in good and identical societies people vote and so if I vote I can increase the likelihood that we have a good society, might explain such voting. This example illustrates clearly the effect of quasi-magical thinking on people's behaviour.

IV. IPOs Activity

Many investors have experienced an IPO-adrenaline rush on the first day as they search the stock market for the "next Microsoft''. There are three behavioural phenomena associated with initial public offerings (IPOs). These have been termed initial underpricing, long-term underperformance and "hot-issue'' market. In addition to these terms, there are also three main parties to IPOs -the issuing firm[41], the underwriter, and investors. Although the role of all parties in the three phenomena is discussed, the emphasis is on the role of investors.

An immediate question raised by the difference between the offer price and the first-day market price is whether issuers or the stock market is pricing

[41] Terms issuer and preissue are synonym to the issuing firm.

offerings in line with a firm's fundamentals. The most common method for valuing firms going public is the use of comparable firm multiples. Unfortunately, accounting data are in many cases too unreliable a measure of valuation to facilitate powerful tests, especially because many firms going public are being valued on the basis of their growth options, not their historical financials.

The first phenomenon that is related to IPOs initial underpricing occurs when the offer price is too low. That is, the issue will be underpriced and its price will soar on the first trading day. But price may overshoot the fundamental value, in which case, it will fall back over time, giving rise to long-term underperformance. IPO activity also appears to move in hot and cold cycles. A hot-issue market is a period where investor demand for IPOs is especially high.

Shefrin (2000) suggests that these three IPO phenomena are not consistent with market efficiency. Indeed, in a hot-issue market, excessive optimism on the part of investors leads IPO prices to rise above fundamental value on the first trading day and remain so for long periods. This optimism is a manifestation of heuristic-driven bias. Investors may also be affected by other heuristics, including instances of similarity, betting on trends, and representativeness. Also, in a hot-issue market, the possibility of regret looms large in the minds of investors.

In the following subsections we analyze these three main phenomena which characterize the filed IPOs and we try to explain why firms go public, why they reward first-day investors with considerable underpricing, and how IPOs perform in the long run. We also describe the hot-issue market. This analysis uses not only theoretical but empirical tools.

The evidence of large variation in the number of IPOs suggests that market conditions are the most important factor in the decision to go public. The stage of the firm in its life cycle seems to be the second important factor. We start by mentioning some historical evidences of IPO activity during the time.

IV. 1 Choosing to Go Public

From 1980 to 2001, the number of companies going public in the U.S exceeded one per business day. Table A1 and Figure A1 in the Appendix

indicate the average initial returns for 38 counties on IPOs where the company is headquartered in that country.

The number of IPOs in the U.S. has varied from year to year, however with some years seeing fewer than 100 IPOs, and others seeing more than 400. These IPOs raised $488 billion (in 2001 dollars) in gross proceeds, an average of $78 million per deal. At the end of the first day of trading, their shares traded on average at 18.8 percent above the price at which the company sold them. For investors buying shares at the first-day closing price and holding them for three years IPOs returned 22.6 percent (Ritter and Welch, (2002))[42].

In some cases, the numbers are extreme: In Netscape's August 1995 IPO with Morgan Stanley as the lead underwriter, 5 million shares were sold to investors at $28.00 per share. With a closing market price of $58.25, $151 million was left on the table[43]. Yet in spite of this huge wealth transfer from Netscape's preissue shareholders to those lucky enough to have been allocated shares at the offer price, Netscape's major shareholders were satisfied with the pricing of the offering. Netscape retained Morgan Stanley as the lead underwriter for the November 1996 follow-on offering (Loughran and Ritter (2002)). And this reaction is not unusual. Indeed, issuing firms do not view large amounts of money left on the table as an important consideration in choosing underwriters for a follow-on offering.

According to this wide IPOs activity during the years, the first question that is generated is why firms go public. In most cases, the primary answer is the desire to raise equity capital for the firm and to create a public market in which the founders and other shareholders can convert some of their wealth into cash at a future date. The first formal theory of the "going public" decision is the life cycle theory[44]. Empirical evidences showed that it is much easier for a potential acquirer to spot a potential takeover target when it is public. Moreover, entrepreneurs realize that acquirers have the ability of pressing targets on pricing concessions more than they can pressure outside investors. By going public, entrepreneurs thus help facilitate the acquisition of their company for a higher value than what they would get from an outright sale.

[42]These numbers summarize the patterns in issuing activity, underpricing, and long-run underperformance, which have been the focus of a large theoretical and empirical literature.
[43] "Leave money on the table" is defined as the first-day price gain multiplied by the number of shares sold (Loughran and Ritter (2002)) (see Table A6 in the Appendix).
[44] This theory first appeared in Zingales (1995).

Chemmanur and Fulghieri (1999) develop the more conventional wisdom that IPOs allow more dispersion of ownership, with its advantages and disadvantages. Pre-IPO "angel'' investors or venture capitalists hold undiversified portfolios, and, therefore, are not willing to pay as high a price as diversified public-market investors. There are fixed costs associated with going public, however, and proprietary information cannot be costlessly revealed. After all, small investors cannot take a tour of the firm and its secret inventions. Thus, in its life cycle, a firm will be private, but if it grows sufficiently large, it becomes optimal to go public.

Public trading *per se* has costs and benefits. In spite of a high public price that can attract product market competition, public trading can, in itself, add value to the firm, as it may inspire more faith in the firm from other investors. We know that investors want to feel positive emotions when they act in the market and faith is one of them. Being the first in an industry to go public sometimes confers a first-mover advantage. The company often cited as an example is Netscape. However, Spyglass was a browser company that went public two months before Netscape and quickly faltered under Netscape's competition. Many Internet firms that went public in the late 1990's pursued an aggressive acquisition strategy, which they interpret as an attempt to preempt competitors.

Lucas and McDonald (1990) develop an asymmetric information model where firms postpone their equity issue if they know they are currently undervalued. If a bear market places too low a value on the firm, given the knowledge of entrepreneurs, then they will delay their IPOs until a bull market offers more favorable pricing. In addition, Choe, Masulis and Nanda (1993) argue that firms avoid issuing in periods where few other good-quality firms issue. Other theories have argued that markets provide valuable information to entrepreneurs, who respond to increased growth opportunities signaled by higher prices[45]. The above theories constitute the field of the market-timing theories, which try to explain why firms go public.

In contrast, a plausible semi rational theory without asymmetric information can also explain cycles of issuing activity by firms. An entrepreneurs' sense of enterprise value derives more from their internal perspective, their day-to-day involvement with the underlying business fundamentals, and less so from the

[45] Subrahmanyam and Titman (1999), Schultz (2000).

public stock market. Sudden changes in the value of publicly traded firms are not as quickly absorbed into the private sense of value held by entrepreneurs. Thus, the entrepreneurs adjust their valuation with a lag. As a result, even if the market price is driven by irrational public sentiment or the entrepreneurs' are more inclined to sell shares after valuations the public markets have increased.

Empirical surveys have shown important evidence about IPOs activity[46]. So, larger companies and companies in industry with high market-to-book ratios are more likely to go public, and that companies going public seem to have reduced their costs of credit. Remarkably, they also find that IPO activity follows high investment and growth, not vice versa. Furthermore, aggregate numbers disguise the fact that the type of firms going public has changed over the years. Table 2 shows that the percentage of technology firms increased from about 25 percent of the IPO market in the 1980s and early 1990s to 37 percent after 1995 and an amazing 72 percent during the Internet bubble, before returning to 29 percent in 2001[47]. Loughran and Ritter (2001) report that the median age of enterprises going public has been remarkably stable at about 7 years old since 1980. The exception to this pattern is the Internet bubble period, when the median age fell to 5 years, and 2001, when the median age rose to 12 years. This can be explained by the large number of IPOs offered by young Internet firms in 1999 to 2000, and their almost complete disappearance in 2001.

The increase in the percentage of technology firms over time is mirrored in the number of firms with negative earnings in the 12 months prior to going public. This percentage was 19 percent in the 1980s, in the 1990s was about 37 percent and then rose precipitously to 79 percent during the Internet bubble.

Table 2

[46] Such surveys are these of Lerner (1994), Pagano, Panetta and Zingales (1998).
[47]Tech stocks are defined as Internet stocks, computer software and hardware, communications equipment, electronics, navigation equipment, measuring and controlling devices, medical instruments, telephone equipment, and communications services, but do not include biotechnology.

Fraction of IPOs with Negative Earnings (Trailing last 12 Months), 1980 to 2001

IPOs with an offer price below $5.00 per share, unit offers, ADRs, closed-end funds, REITs, bank and S&L IPOs, and firms not listed on CRSP within six months of the offer date are excluded. When available, we use the earnings per share for the most recent 12 months (commonly known as LTM for last 12 months) prior to going public. When a merger is involved, we use the pro forma numbers (as if the merger had already occurred). When unavailable, we use the most recent fiscal year EPS numbers. Loughran and Ritter (2001) list the SIC codes in their appendix 4.

Time Period	Number of IPOs	Percentage Tech Stocks	Percentage of IPOs with EPS < 0	Mean First-day Returns	
				EPS < 0	EPS > 0
1980-1989 1990-	1,982	26%	19%	9.1%	6.8%
1994	1,632	23%	26%	10.8%	11.4%
1995-1998	1,752	37%	37%	19.2%	17.4%
1999-2000	803	72%	79%	72.0%	43.5%
2001	80	29%	49%	13.4%	14.6%
1980-2001	6,249	34.5%	34%	31.4%	12.5%

Source: RITTER, J. AND I. WELCH. 2002

During the bubble, firms with no immediate prospect of becoming profitable became common. For instance, public forecasts for eToys projected no profits for at least two years. At the time of going public in May 1999, forecasted EPS was -$0.27 for 199 and -$0.55 for 2000. These turned out to be overly optimistic forecasts, as eToys liquidated in 2001.

Table 2 shows also that there is a reasonably strong relation across time between the percentage of firms with negative earnings and the average first-day returns. Except for the bubble period, there is little difference between the last two columns in the average first-day returns. Thus, the relative lack of cross-sectional pattern suggests that the increase in the fraction of firms with negative earnings is not a primary cause of the increase in underpricing over time.

To summarize, firms go public in response to favourable market conditions, but only if they are beyond a certain stage in their life cycle. So, the high IPO activity may follow high underpricing because underwriters encourage more firms to go public when public valuations turn out to be higher than expected, and because underwriters discourage firms from proceeding with an offering when public valuations turn out to be lower than expected. Of course, more favourable investor sentiment could also play a role in the increased or not valuations of firms.

IV.2 IPO Pricing and Allocation

Initial underpricing occurs when the offer price is too low. That is, the issue will be underpriced and its price will rise on the first trading day (see Figure A2 and A3 in the Appendix). Academics use the terms first-day returns and underpricing interchangeably, in order to document the systematic increase from the offer price to the first day closing price. In Ritter and Welch (2002) a sample of 6.249 IPOs from 1980 to 2001 in Table 3, the average first-day return is 18.8 percent. Although not shown in this table, approximately 70 percent of the IPOs end the first day of trading at a closing price greater than the offer price and about 16 percent have a first-day return of exactly zero.

From 1980 to 1994, only 15 out of 3.614 IPOs doubled in value on their first day of trading while during 1995 to 1998, 34 out of 1.752 IPOs doubled on the first day. During the Internet bubble years of 1999 to 2000, 182 out of 803 offerings doubled in price on the first day, with the last occurrence in November 2000 (Ritter and Welch (2002)). It is obvious that the IPOs of operating companies are underpriced, on average, in all countries while the offerings of nonoperating companies, such as closed-end funds, are generally not underpriced. In the next subsections we provide a list of possible explanations for underpricing.

IV.2.1 Asymmetric Information Theories

One way of classifying theories of underpricing is to categorize them on the basis of whether asymmetric information or symmetric information is assumed. The former can, in turn, be classified into theories in which IPO issuers are more informed than investors (perhaps about internal projects) and into theories in which investors are more informed than the issuer perhaps about demand). We start our analysis with theories based on asymmetric information. All theories of underpricing based on asymmetric information share the prediction that underpricing is positively related to the degree of asymmetric information.

Table 3

Number of IPOs, First-day Returns, Gross Proceeds, Amount of Money Left on the Table, and Long-run Performance, by Cohort Year, 1980 to 2001

The equally weighted (EW) average first-day return is measured from the offer price to the first CRSP-listed closing price. Gross proceeds is the amount raised from investors in millions (2001 purchasing power using the CPI, global offering amount, excluding over-allotment options). Money left on the table (millions of dollars, 2001 purchasing power) is calculated as the number of shares issued times the change from the offer price to the first-day closing price. EW average three-year buy-and-hold percentage returns (capital gains plus dividends) are calculated from the first closing market price to the earlier of the three-year anniversary price, the delisting price, or September 30, 2001. Buy-and-hold returns for initial public offerings (IPOs) occurring after September 30, 2000 are not calculated. Market-adjusted returns are calculated as the buy-and-hold return on an IPO minus the compounded daily return on the CRSP value-weighted index of AMEX, NASDAQ, and NYSE firms. Style-adjusted buy-and-hold returns are calculated as the difference between the return on an IPO and a style-matched firm. For each IPO, a non-IPO matching firm that has been CRSP listed for at least five years with the closest market capitalization and book-to-market ratio as the IPO is used. If this is delisted prior to the IPO return's ending date, or if it conducts a follow-on stock offering, a replacement matching firm is spliced in on a point-forward basis. IPOs with an offer price below $5.00 per share, unit offers, REITs, closed-end funds, banks and S&Ls, ADRs, and IPOs not listed on CRSP within six months of issuing have been excluded.

Year	Number of IPOs	Average First-day Return	Aggregate Gross Proceeds,	Aggregate Money Left on the	Average 3 -Year Buy-and-Hold Return		
					IPOs	Market-Adjusted	Style-Adjusted
1980	70	14.5%	$ 2,020	$ 408	88.2%	35.5%	17.1%
1981	191	5.9%	$ 4,613	$ 264	12.8%	-26.2%	-7.4%
1982	77	11.4%	$ 1,839	$ 245	32.2%	-36.5%	-48.7%
1983	442	10.1%	$ 15,348	$ 1,479	15.4%	-38.7%	2.5%
1984	172	3.6%	$ 3,543	$ 86	27.7%	-51.3%	3.0%
1985	179	6.3%	$ 6,963	$ 354	7.6%	-39.5%	7.3%
1986	378	6.3%	$ 19,653	$ 1,030	18.6%	-20.4%	14.3%
1987	271	6.0%	$ 16,299	$ 1,019	-1.8%	-18.9%	4.5%
1988	97	5.4%	$ 5,324	$ 186	55.7%	8.3%	51.3%
1989	105	8.1%	$ 6,773	$ 336	51.1%	16.8%	32.5%
1990	104	10.8%	$ 5,611	$ 454	12.2%	-34.1%	-32.4%
1991	273	12.1%	$ 15,923	$ 1,788	31.5%	-1.7%	5.8%
1992	385	10.2%	$ 26,373	$ 2,148	34.8%	-2.3%	-19.4%
1993	483	12.8%	$ 34,422	$ 3,915	44.9%	-7.8%	-23.9%
1994	387	9.8%	$ 19,323	$ 1,650	74.1%	-8.3%	1.0%
1995	432	21.5%	$ 28,347	$ 5,033	24.8%	-62.3%	-14.1%
1996	621	16.7%	$ 45,940	$ 7,383	25.6%	-57.0%	8.6%
1997	432	13.8%	$ 31,701	$ 4,664	67.7%	6.8%	41.0%
1998	267	22.3%	$ 34,628	$ 5,352	27.1%	9.1%	12.2%
1999	457	71.7%	$ 66,770	$ 37,943	-46.2%	-32.9%	-74.2%
2000	346	56.1%	$ 62,593	$ 27,682	-64.7%	-36.4%	-42.6%
2001	80	14.0%	$ 34,344	$ 2,973	n.a.	n.a.	n.a.
1980-1989	1,982	7.4%	$ 82,476	$ 5,409	20.8%	-24.7%	6.9%
1990-1994	1,632	11.2%	$101,652	$ 9,954	44.7%	-7.2%	-12.7%
1995-1998	1,752	18.1%	$140,613	$ 22,436	36.0%	-32.3%	11.6%
1999-2000	803	65.0%	$129,363	$ 65,625	-53.8%	-34.3%	-61.2%
2001	80	14.0%	$ 34,344	$ 2,973	n.a.	n.a.	n.a.
1980-2001	6,249	18.8%	$488,448	$106,397	22.6%	-23.4%	-5.1%

Source: RITTER, J. AND I. WELCH. 2002

To start with, if the issuer is more informed than investors, rational investors fear a lemons problem: Only issuers with worse-than-average quality are willing to sell their shares at the average price. To distinguish themselves from the pool of low quality issuers, high quality issuers may attempt to signal their quality. Better quality issuers deliberately sell their shares at a lower price than the

market believes they are worth, which deters lower quality issuers from imitating. With some patience, these issuers can recoup their up-front sacrifice post-IPO, either in future issuing activity, favourable market responses to future dividend announcements, or analyst coverage. So, high-quality firms in order to demonstrate that they are high-quality, leave money on the table in the IPO. On theoretical grounds, however, it is unclear why underpricing is a more efficient signal than, say, committing to spend money on charitable donations or advertising.

The evidence in favour of these signaling theories is, at best, mixed: there is evidence of substantial post-issuing market activity by IPO firms (Welch (1989)) and it is clear that some issuers approach the market with an intention to conduct future equity issues. Jegadeesh, Weinstein and Welch (1993) find that returns after the first day are just as effective in inducing future issuing activity as the first-day returns. Michaely and Shaw (1994) reject outright signaling: they find no evidence of either a higher propensity to return to the market for a seasoned offering or a higher propensity to pay dividends for IPOs that were more underpriced. Still, aside from the persistence of the signaling explanation on the street, its most appealing feature is that some issuers voluntarily desire to leave money on the table to create ‘‘a good taste in investors’ mouths’’. As such, it is relatively compatible with higher levels of IPO underpricing.

If investors are more informed than the issuer, for example, about general market demand for shares, then the issuer faces a placement problem. In such cases, the issuer does not know the price that the market is willing to bear. In other words, an issuer faces an unknown demand for its stock. According to this theory, one can simply assume that all investors are equally informed, and thus purchase shares only if their price is below their common assessment. Observed successful IPOs thus are necessarily underpriced. There are, however, some overpriced firms going public, which would not be predicted because all investors are assumed to know that these would be overpriced. A more realistic assumption is that investors are differentially informed. Pricing to high might induce investors and issuers to fear a winner’s curse or a negative cascade (Rock (1986), Welch (1992)).

In a winner’s curse, investors fear that they will only receive full allocations if they happen to be among the most optimistic investors. When everyone desires the offering, then he or she gets rationed. An investor would receive a full

allocation of overpriced IPOs but only a partial allocation of underpriced IPOs. Thus, his average return, conditional on receiving shares, would be below the unconditional return. To break even, investors need to underprice. In an informational cascade, investors attempt to judge the interest of other investors. They only request shares when they believe the offering is hot. Pricing just a little too high leaves the issuer with too high a probability of complete failure, in which investors abstain because other investors abstain.

According to this, the common practice of "bookbuilding" allows underwriters to obtain information from informed investors. With bookbuilding, a preliminary offer price range is set, and then underwriters and issuers go on a "road show" to market the company to prospective investors. This allows underwriters to gauge demand as they record "indications of interest" from potential investors (Ritter and Welch (2002)). If there is strong demand, the underwriter will set a higher offer price. But if potential investors know that showing a willingness to pay a high price will result in a higher offer price, these investors must be offered something in return. So, underwriters must offer them a combination of more IPO allocations and underpricing.

Bookbuilding theories lend themselves unusually well to empirical tests with available data. The most commonly cited evidence in favor of bookbuilding theories is the effect of revisions in the offer price during the filing period, first documented by Hanley (1993). She finds that underwriters do not fully adjust their pricing upward to keep underpricing constant when demand is strong. Thus, when underwriters revise the share price upward from their original estimate in the preliminary prospectus, underpricing tends to be higher. Table 4 shows that this pattern has held throughout 1980 to 2001- When the offer price exceeds the maximum of the original file price range, the average underpricing of 53 percent is above the 12 percent for IPOs priced within their filing range, or the 3 percent for IPOs adjusting their offer price downward. This extra underpricing is interpreted to be compensation that is necessary to induce investors to reveal their high personal demand for shares[48].

[48] The information perspective of bookbuilding is useful, but the theory also suggests that the information provided by one incremental investor is not very valuable when the investment banker can canvas hundreds of potential investors. Thus, the average underpricing of 53 percent, conditional on the offer price having been revised upwards, seems too large to be explained as equilibrium compensation for revealing favourable information.

Table 4

Mean First-day Returns for IPOs Conditional upon Offer Price Revision, 1980 to 2001

IPOs are categorized by whether the offer price is below, within, or above the original file price range. For example, an IPO would be classified as within the original file price range of $10.00— $12.00 if its offer price is $12.00. Initial public offerings with an offer price below $5.00 per share, unit offers, ADRs, closed-end funds, REITs, bank and S&L IPOs, and those not listed by CRSP within six months of the offer date are excluded. Eleven IPOs from 1980 to 1989 have a missing file price range, and are deleted from this table.

		Percentage of IPOs with Offer Price Relative to File Range			Mean First-day Returns			% of First-day Returns > 0		
Time Period	Number of IPOs	Below	Within	Above	Below	Within	Above	Below	Within	Above
1980-1989	1,971	27.6%	59.9%	12.5%	0.6%	7.8%	20.5%	32%	62%	88%
1990-1994	1,632	26.1%	54.2%	19.7%	2.4%	10.8%	24.1%	49%	75%	93%
1995-1998	1,752	25.0%	49.1%	25.9%	6.1%	13.8%	37.6%	59%	80%	97%
1999-2000	803	18.1%	36.8%	45.1%	7.9%	26.8%	119.0%	59%	77%	96%
2001	80	25.0%	60.0%	15.0%	7.2%	12.5%	31.4%	70%	83%	92%
1980-2001	6,238	25.2%	52.3%	22.5%	3.3%	12.0%	52.7%	47%	72%	94%

Source: RITTER, J. AND I. WELCH. 2002

Baron (1982) offers a different, agency-based explanation for underpricing, in which the issuer is less informed, but relative to its underwriter, not relative to investors. To induce the underwriter to put in the requisite effort to market shares, it is optimal for the issuer to permit some underpricing, because the issuer cannot monitor the underwriter without cost. Muscarella and Vetsuypens (1989) find that when underwriters themselves go public, their shares are just as underpriced even though there is no monitoring problem. As with all other theories of underpricing, however, these trade-off theories do not plausibly explain the severe underpricing of IPOs during the Internet bubble. During this period, the IPOs of many Internet firms were the easiest shares ever to sell because of the intense interest by many investors[49].

IV.2.2 Symmetric Information Theories

There are also theories of underpricing that do not rely on asymmetric information that is resolved on the first day of trading. These theories are based on symmetric information and they are related to the notion that issuers underprice to reduce their legal liability. On the other hand, the most convincing

[49] It is difficult to believe that an underwriter could not have easily placed shares with half the underpricing that was observed.

evidence that legal liability is not the primary determinant of underpricing is that countries, in which U.S. litigative tendencies are not present, have similar levels of underpricing (Ritter and Welch (2002)).

One popular explanation for the high IPO underpricing during the Internet bubble is that underwriters could not justify a higher offer price on Internet IPOs, perhaps out of legal liability concerns, given the already lofty valuations on these companies. One way of interpreting this is that underwriters were "leaning against the wind" by not taking advantage of temporary overoptimism on the part of some investors. Although this argument has a certain plausibility, we find it unconvincing because investment banking firms were making other efforts to encourage overvaluations during the Internet bubble, such as subsequently issuing "buy'' recommendations when market prices had risen far above the offer price[50].

Boehmer and Fishe (2001) advance another explanation for underpricing. They note that trading volume in the aftermarket is higher, the greater is the underpricing. Thus, an underwriter that makes a market in NASDAQ–listed IPO gains additional trading revenue. Unlike the lawsuit-avoidance explanation of underpricing, it is not clear how the issuing firm benefits from the underpricing, unless the increased liquidity is persistent.

IV.2.3 Theories Focusing on Allocation of Shares

In recent years, more attention has been drawn to how IPOs are allocated and how their shares trade. Share allocation has an impact on many topics, including theories of underpricing, post-issue ownership structure, and underwriter compensation. Part of the reason for the increased academic

[50] For example, Credit Suisse First Boston (CSFB) took Corvis public on July 28, 2000, at an offer price $36.00. At the closing price of $84.719 on the first day of trading, the first-day return was 135 percent. When the quiet period ended 25 calendar days after the IPO, the five co-managing underwriters all put out ''buy'' recommendations, and CSFB initiated coverage with a ''strong buy'' recommendation, even though the price had increased to $90. At $90 per share, Corvis had a market capitalization of $30 billion, despite never having had any revenue.

attention on share allocation is related to the increased public attention on perceived unfairness in how shares are allocated, given the large amount of money left on the table in recent years. To be more specific, the allocation of shares to institutional investors versus individuals has been a topic of interest[51]. Usually, underwriters guard information about specifics of their share allocations, posing significant challenges to empiricists. Table 5 classifies this literature into some popular lines of inquiry and lists some recent representative papers.

The seminal model focusing on the allocation of shares was Benveniste and Spindt (1989), which has been previously discussed along with other asymmetric information-based theories. In this model, underwriters use their discretion to extract information from investors, which reduces average underpricing and increases proceeds to the issuers. In other words, this dynamic information acquisition model argues that regular investors, in order to truthfully reveal their demand to an underwriter during the bookbuilding phase of an IPO's marketing, must be rewarded with more underpricing on deals for which there is strong demand. Thus deals in which the offer price is revised upward will have greater underpricing.

It is worth noting that the average level of underpricing required to induce information revelation is reduced if underwriters have the ability to allocate shares in future IPOs to investors. Sherman and Titman (2002) argue that there is an equilibrium degree of underpricing which compensates investors for acquiring costly information.

[51] We discuss this literature on allocation and trading initiation separately from the previous papers that we have reviewed because, in my opinion, it explores the most interesting open questions today such as how investors decide in which issues to request IPO allocations, and how heavily influenced this is by perceptions of what others are going to do, or who receives IPO allocations e.t.c.

Table 5

Recent Articles Concerning the Allocation and Trading of IPO Shares

Discrimination to induce information revelation	
Benveniste, Busaba, and Wilhelm (1996)	Penalty bids allow discrimination to reward repeat investors
Sherman (2000)	Discretion allows bundling with book building
Sherman and Titman (2002)	Underpricing is the reward to investors for acquiring information
Discrimination due to agency problems between underwriters and issuers	
Loughran and Ritter (2002)	State-contingent issuer psychology boosts underwriter profits
Loughran and Ritter (2001)	Allocations of hot issues boost underwriter profits
Empirical documentation of institutional versus individual investors	
Aggarwal, Prabhala, and Puri (2002)	Institutions receive more hot IPOs than bookbuilding suggests
Cornell! and Goldreich (2001)	Underwriters use discretion to favor repeat investors (bundling)
Hanley and Wilhelm (1995)	Institutions are favored on hot IPOs, but bundling occurs
Lee, Taylor, and Walter (1999)	Institutions ask for more shares on hot IPOs, but suffer discrimination
Ljungqvist and Wilhelm (2002a)	Across countries, there is less underpricing if institutions are favored
Ownership structure: Monitoring and liquidity	
Booth and Chua (1996)	Allocations to many investors increase liquidity
Brennan and Franks (1997)	Underpricing results in many investors, entrenching managers
Field and Sheehan (2001)	Empirically, there is no relation between underpricing and blockholders
Mello and Parsons (1998)	Allocate IPO shares diffusely with a separate offer to blockholders
Stoughton and Zechner (1998)	Underpricing allows creation of a blockholder, inducing monitoring
Trading initiation: Supply and demand effects	
Aggarwal (2000)	Cold issues are overallocated
Cornell! and Goldreich (2002)	Offer price is more related to prices bid than to quantity demanded
Zhang (2001)	Overallocation of cold issues boosts aftermarket demand
Aftermarket trading: Flipping and stabilization	
Aggarwal (2002)	Hot IPOs are commonly flipped, especially by institutions
Aggarwal and Conroy (2000)	Opening trade price follows many quote revisions
Benveniste, Erdal, and Wilhelm (1998)	Penalty bids constrain selling by individuals on cold IPOs
Chowdhry and Nanda (1996)	Stabilization activities reduce the winner's curse
Ellis, Michaely, and O'Hara (2000)	Stabilization activities are a minor cost to underwriters
Fishe (2002)	Flipping creates artificial demand which is sometimes useful
Houge et al. (2001)	IPOs with heterogeneous valuations have worse long-run performance
Krigman, Shaw, and Womack (1999)	Institutions flip IPOs more successfully than individuals do
Ljungqvist, Nanda, and Singh (2001)	Selective flipping allows price discrimination

Source: RITTER, J. AND I. WELCH. 2002

Many models are at least partly based on the notion that if IPOs are underpriced on average, investors have an incentive to acquire information about the firms to try and discern which will be underpriced the most.

Loughran and Ritter (2002) explore the conflict of interest between underwriters and issuers. If underwriters are given discretion in share allocations, the discretion will not automatically be used in the best interests of the issuing firm. Underwriters might intentionally leave more money on the table than necessary, and then allocate these shares to favored buy-side clients.

The mystery is why issuing firms appear generally content to leave so much money on the table, and more so when their value has recently increased. Using the prospect theory of Kahneman and Tversky (1979), one argues that entrepreneurs are more tolerant of excessive underpricing if they simultaneously learn about a postmarket valuation that is higher than what they expected. Indeed, prospect theory assumes that issuers care about the change in their wealth rather than the level of wealth. So, issuers will sum the wealth loss from leaving money on the table with the larger wealth gain on the retained shares from a price jump, producing a net increase in wealth for preissue shareholders. In other words, the greater the recent increase in their wealth, the less is the bargaining effort of issuers in their negotiations over the offer price with underwriters (Loughran and Ritter (2002)).

This cognitive psychology argument for why issuers will not be greatly upset with leaving money on the table in IPOs. The key element is the covariance of money left on the table and wealth gains accruing to the issuer. This is an example of the importance of framing. If issuers viewed the opportunity cost of underpricing by itself, issuers would be more resistant to severe underpricing. But because it comes as part of a package that includes the good news of an increase in wealth, there is much less resistance. Of course, it is not claimed that this conditional underpricing is an optimal contract among the class of all possible contracts. Indeed, our suspicion is that bookbuilding is favored by underwriters partly because it allows them to take advantage of risk-averse issuing firms. The road show period immediately before an IPO is a high-stress period for issuing firms. Furthermore, the terms of the offering are subject to substantial revisions, and there is a nontrivial chance that the offering may be completely canceled due to forces outside of management’s control, such as a sharp market drop. Thus there is a sense of relief with a completed offering,

especially if the proceeds are higher than expected. And the media associates a large price jump with a successful IPO.

At this point, it is interesting to put the magnitude of the underpricing and its possible influence on trading volume into perspective. In Table 3, it is reported that $66 billion was left on the table during the Internet Bubble. If investors rebated 20 percent of this back to underwriters in the form of extra commissions, this would amount to $13 billion. At an average commission of 10 cents per share, this would amount to 130 billion shares traded, or an average of 250 million shares per trading day during 1999 to 2000. Because combined NASDAQ and NYSE volume averaged about 10 times this amount during these years, this would suggest that portfolio churning by investors to receive IPO allocation may have accounted for as much as 10 percent of all shares traded during the Internet bubble. Although 10 percent might be an overestimate of the effect on overall trading volume, the January 22, 2002, SEC settlement with CSFB states that extra share volume was concentrated in certain highly liquid stocks[52].

Both the Benveniste and Spindt bookbuilding theory and the Loughran and Ritter conflict of interest theory predict sluggish price adjustment. The final offer price is not fully adjusted from the midpoint of the file price range when underwriters receive favourable information. The revelation theory does not predict that there should be anything less than full adjustment to public information.

In contrast, the prospect theory explanation predicts that there will be sluggish adjustment to both private and public information, because prospect theory makes no distinction about the source of good news. Specifically, the prospect theory explanation of the partial adjustment phenomenon predicts that all IPOs that are in the road show stage of going public when there is an overall market rally will have higher expected underpricing because offer prices are not raised as much as they could be in this scenario. Since there is partial adjustment to public information, first day returns are predictable. Because the bookbuilding period is typically about four weeks in length, the first-day returns of these IPOs will be correlated, which provides a partial explanation for the phenomenon of hot-issue markets.

[52] At this point, there has been no academic research investigating how the money left on the table during the Internet bubble was split among buy-side participants and sell-side participants.

Many empirical papers examining IPO allocations focus on the distinction between institutional and individual investors. Institutions are different from individual investors, in that their scale should make it more likely that they are both better informed and more important clients. The evidence to date suggests that where bookbuilding is used, institutions do receive preferential allocations (Hanley and Wilhelm (1995)). Institutions are also naturally blockholders, potentially capable of displacing poorly performing management. Who purchases an IPO's shares may in turn influence IPO activity, underpricing and long-run performance.

Furthermore, academic research suggests that underpricing creates excess demand and thus allows issuers and underwriters to decide to whom to allocate shares. Indeed, underpricing is needed to create an incentive to acquire a block of stock and then monitor the firm's management, creating a positive externality for atomistic investors. In the U.S, large blockholders are common prior to the IPO in the form of venture capitalists and leveraged buyout financiers, but the venture capitalists typically distribute shares to their limited partners as soon as the lockup period ends. Additionally, the general partners typically also relinquish control via open market sales, rather than selling a strategic block. This suggests that corporate control considerations related to blockholders may not be of primary importance for many of these companies.

As we discussed above, underpricing results in excess demand, which permits underwriters to place shares with specific clienteles. A number of articles focus on the actions of the lead underwriter when aftermarket trading begins. Underwriters can influence the aftermarket price not only by their pre-IPO decisions on pricing and allocation, but also through actively participating in the aftermarket themselves. Underwriters not only have price discretion, but also quantity discretion. In allocating shares, they control not only who gets shares, but how many shares in the aggregate are allocated. Almost all IPOs contain an over allotment option for up to 15 percent of the shares offered. In allocating shares, if there is strong demand, the underwriter will allocate 115 percent of the shares. Then, if the price weakens in aftermarket trading, the underwriter can buy back the extra 15 percent and retire the shares, as if they had never been offered in the first place.

Aggarwal (2000) and Zhang (2001) focus on the number of shares that are allocated. Aggarwal reports that if the underwriter anticipates weak demand, it

will typically allocate up to 135 percent of the offering, taking a naked short position. The underwriter then buys back the incremental 20 percent, and has the option of buying back the other 15 percent, treating the shares as if they were never issued in the first place. Zhang argues that the allocation of these extra shares boosts the aftermarket demand for the stock[53]. The extra demand that results from the overallocation boosts the aftermarket price and increases the price at which issuers can offer shares. If the demand for an IPO is strong, underwriters do not take a naked short position because covering it would be too costly.

Once trading commences, if there is weak demand, the lead underwriter might attempt to "stabilise" the price through various activities aimed at reducing selling pressure. Price stabilisation is the only instance in which the SEC[54] permits active attempts at stock price manipulation. Price stabilisation activities include pre-IPO allocation policy, post-IPO purchases of shares by the lead underwriter[55], and the discouragement of selling.

Concluding, we come away with the view that underpricing is a persistent feature of the IPO market, and while cyclical, may have increased in magnitude over time. In my own view, there is no single dominant theoretical cause for underpricing. Thus, it is not so much a matter of which model is right, but more a matter of the relative importance on different models.

IV.3 Long-Run Performance

Perhaps the facet of IPOs that has attracted the most interest from academics in recent years is the stock price performance of IPOs in the years after the offering. Efficient markets proponents would argue that once an IPO is publicly treated, it is just like any other stock and thus the aftermarket stock price should appropriately reflect the shares intrinsic value. Consequently, risk-adjusted post-IPO stock price performance should not be predictable. In this sense, post-IPO long-run performance is less of an IPO (or corporate finance)

[53] This is because institutional investors who have allocated shares are likely to continue holding them, whereas if they had not received any shares in the first place, they would have been unlikely to buy them in the aftermarket.
[54] Security and Exchange Commission.
[55] Because of the importance that an underwriter has, it should be noted that the choice of underwriter is determined by the issue's size and industry on one hand and the underwriter's prestige and expertise on the other (Logue, Rogalski, Seward and Foster-Johnson (2002)).

issue than it is a standard asset-pricing issue. Still, many IPO shares have been difficult to sell short and thus have retained some peculiarity even post-IPO.

In measuring long-run performance, one can focus either on raw (absolute) performance, or performance relative to a benchmark (abnormal returns). Table 3 shows that investing in an equal-weighted portfolio of IPOs over a three-year horizon did not lose money in absolute terms, but an investment in the value-weighted market portfolio would have yielded about twice the return, resulting in a three-year market-adjusted return of -23,4 percent. Still, there is far from consensus with respect to the proper measurement technique. We believe that the sample used in Ritter and Welch (2002), both in terms of the sample period and the sample selection criteria, is also an important determinant of the difference in findings across studies.

IV.3.1 Long-Run Performance Evidence

Statistical inference is problematic when the returns on individual IPOs overlap, as they do when multi-year buy-and-hold returns (as in Table 3) are used. Indeed, this is a problem for all long-term performance studies, not just those examining IPO performance. Table 3 highlights one important issue plaguing this literature: -When publicly traded firms similar in market capitalization and book-to-market values are used as a benchmark, it becomes clear that the poor long-run performance of firms “similar to IPO firms” extends beyond the IPO market.

To be more specific, IPOs are strongly tilted towards small growth firms, and this has been the worst-performing style category of the last several decades. In Table 3, the three-year average market-adjusted return on IPOs is –23.4 percent, whereas the average style-adjusted return is –5.1 percent. In other words, seasoned firms matched by market capitalization and book-to-market underperform the broader market by almost as much as IPOs do. Row 1 reports the results of a simple one-factor regression, with the market excess return as an explanatory variable.

An alternative statistical approach that avoids the overlap problem with buy-and-hold returns is to measure returns in calendar time rather than event time[56] (Ritter and Welch (2002)). This approach indicates that IPOs have a high level of systematic risk. This accords with the common sense notion that IPOs tend to be risky stocks. Furthermore, because IPOs tend to be small growth stocks, a small firm portfolio will have more IPOs than a large firm portfolio, especially after periods of heavy issuing volume. Similarly, a portfolio of value stocks will have fewer IPOs than a portfolio of growth stocks. This "factor contamination" biases the intercept towards zero.

The underperformance in the 1990 to 1999 (see Tables A2, A3, A4, A5 in the Appendix) period is virtually identical to that in the 1973 to 1989 period, a statistically insignificant –14 or –15 basis points per month. The estimates of this approach, however, are very sensitive to the ending date. While the internet bubble was inflating in the late 1990s, post-IPO returns were exceptionally good. Most remarkably, Table 1 showed that IPOs from 1999 and 2000 performed poorly by any measure during the well known collapse of the internet bubble. For IPOs from calendar year 2000, the average return from the closing price on its first day of trading until September 2001 was –64.7 percent.

This evidence suggests two areas of caution: First, one must be careful comparing papers which attribute a weakening or disappearance of the IPO effect to novel measurement techniques; instead, the sample period may be responsible for some of the conclusions. Second, unless one is comfortable concluding that IPOs with –64.7 percent returns offered investors positive risk-adjusted returns, one should be wary of considering the Fama-French factors to be equilibrium risk factors and using them as controls. When using either a multifactor model or matching firms to examine abnormal performance, these tests should be regarded as testing "similarity to certain public firms", rather than as tests of IPO mispricing (Ritter and Welch (2002)).

Furthermore, long-run returns, even if remarkably low, are sufficiently noisy to make any statistical inference difficult. For example, in Brav (2000), it can require an abnormal return of –40 percent (depending upon specification) to reject the hypothesis that long-run buy-and-hold returns are not underperforming. After controlling for the poor performance of size and book-to-market matched non-

[56] The report time series regression results using the Fama-French (1993) three-factor model.

IPO firms, ‘‘similarity” between IPO and non-IPO firms can no longer be rejected for some sample periods. Eckbo and Norli (2001) use size and liquidity matching, and find that similar publicly traded firms also performed poorly.

Because the asset-pricing literature itself has failed to provide an accepted model of risk-adjusted performance against which one can measure post-IPO performance, it still remains unclear how abnormally poor post-IPO performance is. Many papers have argued that the magnitude of long-run abnormal performance is sensitive to the procedure employed.

Comparing the market-adjusted buy-and-hold returns in Table 3 with the style-adjusted buy-and-hold returns in Table 3 demonstrates this sensitivity. The three-year market-adjusted returns on IPOs are –23.4 percent versus just –5.1 percent for the style-adjusted returns. Relative to other firms with similar size and book-to-market characteristics, IPOs have had very modest underperformance. Thus, it is clear that IPOs and firms with characteristics similar to IPOs had rather unappealing performance at a time when the overall stock market performed exceptionally well. It is not in dispute that equally weighted post-IPO returns have been low relative to broad market indices during recent decades.

Long-run performance may be the most controversial area of IPO research, with some researchers lining up behind an efficient markets point of view and others lining up behind a behavioural point of view.

Either way, the behavioural implications are much the same. High market-to-book stocks tend to earn inferior returns because investors overreact to the positive events that led to the run-up in stock price. They overweight the recent good news and wind up being disappointed, on average, in the long run.

Shiller and Pound (1989) suggested that the market for IPOs is subject to fads, and that investment bankers behave like impresarios who organize rock concerts. To make the concert an “event”, the impresario underprices admission charges. On one hand, the strategy does work to create an event, and for IPOs, it induces investors to overvalue the offering initially. However, over time, the market will correct its originally optimistic opinion. Therefore, long-run underperformance will be strongest among stocks with the best initial performance.

IV.3.2 Sources of Long-Run Performance

We know of only two semirational explanations for the long-run underperformance of IPOs. Miller (1977) assumes that there are constraints on shorting IPOs, and that investors have heterogeneous expectations regarding the valuation of a firm. The most optimistic investors buy the IPO. Over time, as the variance of opinions decreases, the marginal investor's valuation will converge towards the mean valuation, and its price will fall. This argument works better when the float is small and not too many investors are required. This is consistent with the drop in share price at the end of the lock-up period[57], as documented in academic literature.

Specifically, Bradley, Jordan, Roten and YI (2001) show that the negative effect is much more pronounced for venture-capital-backed IPOs. Typically with these IPOs, the VCs distribute shares to their limited partners on the lock up expiration date, and many limited partners immediately sell. This shows up not only in negative returns, but exceptionally high volume.

Schultz (2001) offers a second explanation: He argues that more IPOs follow successful IPOs. Thus, the last large group of IPOs would underperform and be a relatively large fraction of the sample. If underperformance is being measured weighting each IPO equally, the high-volume periods carry a larger weight, resulting in underperformance, on average. Although this is a logical argument, it cannot predict underperformance when each time period is weighted equally.

Other papers are less ambitious, and simply attempt to find variables that result in cross-sectional predictability, indicating that long-run return performance is also accompanied by poor financial accounting performance post-IPO relative to pre-IPO performance and/or industry conditions. So, what drives this long-run underperformance and can it be predicted?

Several papers address whether flipping by institutions can be used to predict long-term returns on IPOs. That is, do institutions succeed in identifying IPOs that are being overvalued when trading commences? Krigman, Shaw and Womack (2001) find evidence suggesting that indeed they do.

Managers tend to be over-optimistic and thus prone to over-investment if the funds are available. Teoh, Welch, and Wong (1998) attribute some of the poor

[57] When more public shares become available to the public.

post-IPO stock performance to ‘‘optimistic” accounting early in the life of the firm. It is not surprising that firms are eager to look good when they conduct their IPO, and that the market has difficulties in disentangling carefully hidden warning signals. This suggests that at least a part of the poor long-run performance is due to a market that is unduly optimistic and unable to properly forecast tougher times ahead. Similarly, IPOs that are priced high relative to public market comparables tend to perform worse in the long run, even though they show higher first-day returns. Both papers point towards overconfidence, perhaps by both entrepreneurs (Bernardo and Welch (2001) and investors (Daniel, Hirshleifer, and Subrahmanyam (1998)).

There have been some other less successful attempts to correlate long-run performance to pre-IPO characteristics. For example, there is no reliable relationship between short-run underpricing and long-run performance, although this evidence is sensitive to whether penny stocks IPOs are included or not. These IPOs, which were common before the 1990s, frequently had high first-day returns and exceptionally low long-run returns. Many of these issues involved stock price manipulation. For samples excluding penny stock IPOs, whether there is a reversal of the highest first-day returns in the long run depends mostly on whether the internet bubble period is included in the sample. Almost all of the IPOs from 1999 to 2000 with large first-day returns have subsequently collapsed. Since most of these were Internet related, the number of independent observations is limited.

The recent bubble has made it amply clear that even if there is systematic long-run underperformance, it is difficult or impossible to exploit it in a reliable manner. Many short sellers lost a great deal of money on internet bubble IPOs, and had to close out their shorts before they would have paid off. Still, we hope to see further work to tell us which sub-samples are particularely prone to poor post-IPO performance, both in the U.S. and in other countries.

IV.4 Hot-Issue Markets

One of the puzzles regarding IPOs is the existence of "hot-issue" markets. A hot-issue market is defined as a month in which the average first-day return is above the median month's average first-day return. Thus, in this period investors' demand for IPOs is especially high.

The owners of firms going public clearly hope to obtain the best price for their shares that they can. Therefore, it will be to their benefit to time the issue for when sentiment is positive, meaning investors are especially optimistic. The evidence for hot markets is actually strong. Historically, the IPO market has moved in cycles, both for average initial returns and for volume of IPOs.

The hot issue market appears to have become part of the financial landscape. For example, in late January 1998, a Wall Street Journal headline read: "Tough road is predicted for IPOs". A tough road means a lukewarm market. The article states "By the end of last week, underwriters had brought (a partly) five new companies to the market……The least appealing deals to investors right now are small deals without lengthy histories" [58]. We are going to show the existence of the hot-issue markets through the case study of Netscape's Communications Corp. as described in Shefrin (2000).

We are reminded that the market campaign, which was followed up to August 1995, had generated tremendous interest in the offering. Institutional investors had to be turned away at the New York roadshow luncheon when the room reached capacity at nearly 500. Morgan Stanley, the lead underwriter for the offering, was forced to set up a tol-free number that to dealt with requests for information on the deal. Of course, Morgan Stanley and Hambrecht & Quist, co-manager of Netscape, were allocating shares to their institutional clients, as well as to some lucky individual investors.

At the time, Netscape did indeed plan to offer the huge number of 3.5 million shares, including 500.000 to international investors, from $12 to $14. However, on August 9, underwriters doubled the offer price to $28 per share and increased the size of the offering to 5 million. This change did not prevent initial underpricing: The stock opened at $71, quickly jumped to $72.50 and closed at $58.25.

[58] Shefrin 2000, p. 254.

Netscape hardly trod water during the first year it went public. And over the long term it definitely underperformed. On January 6, 1998, an article in a daily newspaper reported that "stock in Netscape Communications fell 20 percent yesterday after the company, staggered by competition from Microsoft, said it lost money in the fourth quarter and will lay off an undetermined number of workers……News of the loss and restructuring knocked the wind out of Netscape's stock, which fell $4.81 to close at $18.56- the lowest since it went public in August 1995".

Interestingly, the risk posed by Microsoft had been clearly foreseen in 1995, prior to the offering. In any case, the story of Netscape Communications Corp. ended on November 24, 1998, when it was bought by America Online (AOL) for about $4.2 billion[59]. The last months of 1998 and beginning of 1999 constituted a very interesting period for IPOs. In early November myriads of companies were postponing or canceling IPOs. Then the IPO market turned hot overnight. On November 12, Web page provider theglobe.com set a new record for the biggest first-day gain in IPO history. Starting from an offer price of $9, the stock soared as high as $97 before closing at $63.50, a 606 percent gain for the day. But the best performing IPO for 1998 was eBay, an online auction service. eBay went public on September 23,1998, at an offer price of $18, and closed 1998 at $241.25, 1,240.03 percent increase.

Obviously, the end of 1998 was a clearer case of a hot-issue market for IPOs. Certainly several firms went public during these months and experienced rapid price gains; and they were not all Internet firms. On Friday, January 15, 1998, financial news provider MarketWatch.com went public. From an offer price of $17 per share, the stock raised to $130, closing the day at $97.50, a first-day gain of 474 percent. This was the second highest first-day gain for an IPO, behind theglobe.com. MarketWatch.com joined the company of five other recent Internet star-ups whose value tripled or more on the first trading day.

As for the timing of the Netscape IPO, practitioners held different opinion. On one side we find Robert Natale, an emerging-growth analyst, who in August 1995 opined that the timing of the Netscape offering was chosen to exploit a hot-issue market. He stated "Normally, this company would go public in about a year and a

[59] AOL's takeover of Netscape also took place in the midst of a major anti-trust trial against Microsoft. Attorneys for the Justice Department and twenty states charged Microsoft with inflicting harm on Netscape by employing anti-competitive practices in the browser market.

half when it's further along in executing its business strategy and earning profit. But the market is so strong now and the valuation is so high that they are not waiting". In contrast, David Menlow, president of the IPO Financial Network, in Spriengfield, New Jersey, expressed the view that Netscape's first-day performance provided no grand insights into the IPO market. "It doesn't say anything about the IPO market at all. It's a singular situation and shouldn't be confused for any frothiness in the market or excessive tendencies of investors".

At this point, investors' behaviour should be noted. The question that arises is do investors recognize that newly issued shares tend to be overvalued? Well, firms that issue new shares tend to have high market-to-book ratios. In addition, investors bet on trends. For the most part, they expect continuation, and they overweight the recent past when making long-term projections. As a general matter, high market-to-book stocks and the stocks of firms that have been growing rapidly underperform in the long term[60].

Loughran and Ritter suggest that investors and managers are unduly optimistic about the future prospects of the issuing firm. Moreover, psychological studies document that people are predisposed to be excessively optimistic, at least until experience leads them to think differently. We can conclude by saying that hot-issue markets are as a result based on investors and managers optimism. It may be that similarity, overconfidence, regret, betting on trends, and frame dependence also play key roles in explaining the phenomenon of hot-issue markets.

[60] Seasoned equity offerings are part of this group.

V. Conclusion

The field of behavioural finance is not new. Many investors have long considered that psychology plays a key role in determining the behaviour of markets. However, it is only in recent times that a series concerted formal studies have been undertaken in this area and behavioural finance has become widely accepted among finance academics. It is neither a minor subdiscipline nor a new paradigm of finance. Behavioural finance tries to improve existing models via more realistic assumptions. Thus, behavioral finance follows the traditional way of financial modelling that incorporates real world imperfections such as transaction costs, taxes, or asymmetric information on the one hand or observed traits of individual such as risk aversion on the other hand into finance models.

It is critically important for research to maintain an appropriate perspective about human behaviour, and an awareness of its complexity. When one does produce a model, in whatever tradition, one should do so with a sense of the limits of the model, the reasonableness of its approximations, and the sensibility of its proposed applications.

The lesson from the literature surveyed here, and the list of varied behavioural phenomena, is not that “anything can happen" in financial markets. Indeed, while the behavioral theories have much latitude for interpretation, when they are combined with observations about behaviour in financial markets, they allow us to develop theories that do have some restrictive implications. Moreover, conventional efficient markets theory is not completely out the window.

Behavioral finance models are currently not able to replace traditional finance theory but we have also to distance ourselves from the presumption that financial markets always work well, and that prices changes always reflect genuine information. Evidence from behavioural finance helps us to understand, for example, that the recent stock worldwide stock market boom and then crash after 2000; mainly in IPOs activity as was analyzed; had its origins in human foibles and arbitrary feedback relations, and must have generated real and substantial misallocation of resources. Indeed, even though the majority of the investors during 1998 to 2000 seem to have realized the seriousness of the speculative bubble they nevertheless continued their investment activities knowing that the risk for a collapse was imminent. The challenge for economists is to make this reality a better part of their models.

In my opinion, the collaboration between finance and other social sciences that has become known as behavioural finance has led to a profound deepening of our knowledge of financial markets. Behavioural finance has a significant contribution in understanding the way that investors, agents, analysts act and behave in financial markets. This field of research embodies the results of psychology study of the financial practitioners, and thus presents financial actions combined with the real human behaviour. Of course, practitioners should not expect such research to provide a method to make a lot of money off of financial market inefficiency very fast, easily and reliably. We should not expect market efficiency to be so egregiously wrong that in other senses. For example, efficient markets theory may lead to drastically incorrect interpretations of events such as major stock market bubbles.

However, a more common understanding of the way in which psychological factors affect our decision-making should help to avoid the occurrence of speculative bubbles such this of year 2000, and enhance the efficiency of today's global financial market. Furthermore, much of the benefit to be gained from understanding behavioral biases will result simply from remembering to consider them in evaluating investment opportunities and before making final decisions. Few would dispute that most are obvious; the challenge in overcoming them lies in their largely reflexive, unconscious nature.

To help, I could suggest some questions which may aid investors in avoiding the common behavioral finance decision errors. On whether to continue to own an investment investors should think of their portfolio as if they were forced to liquidate all of their holdings; if they are afraid to sell because it might come back; how would it make them feel, if you were wrong in your decision. These considerations may help cut through loss aversion and anchoring, where investors assess the value of an investment based on what has happened to them specifically. On whether to purchase an investment, an investor should first think why he or she considers buying it, and how it fits in to his or her overall portfolio. It is important also for an investor to consider the reasons that have made him or her to think that it will perform well. Such questions help investors overcome the biases that affect on their beliefs and preferences as concerning their financial behaviour.

From a long-term historical perspective investing in the equity market has been profitable and the understanding of the behavioral factors affecting this

market can help to better understand its periodically unpredictability but can not give abilities and “tips” to investors who speculate.

Thaler (1999) predicts the end of behavioral finance as all financial theorists will sooner or later incorporate realistic assumptions: *‘‘I predict that in the not-too-distant future the term ‘‘behavioral finance’’ will be correctly viewed as a redundant phrase. What other kind of finance is there?’’*. In their enlightenment, economists will routinely incorporate as much as behaviour into their models as they observe in the real world. After all, to do otherwise would be irrational.

Thaler’s argument seems very obvious, if we think through that everyday more bankers, investors, firms, venture capitalists, portfolio managers, security analysts, financial planners, brokers, investors, traders and individuals with financial concerns coextend in their decisions the theories of behavioural finance. In accordance, institutional investors are also helped in their actions by behavioural finance’s study. Basic mission is to improve the financial decision making of organizations and individuals and help them to improve their decision making profitability.

Finally, it would be important to see more behavioural finance research in the field of corporate finance. Most of the research so far has been in the field of asset pricing and much less has been devoted on corporate finance- at least recently. In addition, everybody hopes more data for online traders and day traders to become available, in order to understand and study in depth the recent Internet stock bubble and other important financial phenomena. Some private firms have this kind of data, and I think that soon they will see the benefits of studying these data and they will provide them.

We conclude with some thoughts on how research in behavioural finance might become even more successful. From the perspective of psychology, it would be helpful to extend the research programme beyond individual decision making by investigating problems or open questions which are central to a financial context. Examples are, strategic and dynamic interaction of economic agents in markets, decision making in organizations or principle-agents situations. In addition, it would be helpful to read more carefully what psychologists have found, in order researchers in finance to extract those findings which are robust as well as useful for modelling purposes. Clearly, it would be best to join forces from both disciplines to further enhance behavioural

finance which after all is an interdisciplinary field of research. That's because Investors are human beings and as so live feeling sentiments. But investors also live in financial markets. So sentiments affect their financial behaviour.

R E F E R E N C E S

AGGARWAL, R. 2000. ''Stabilization Activities by Underwriters after Initial Public Offerings''. *Journal of Finance* 55, pp. 1075-1103.

BACHELIER, L. 1964. ''Theory of Speculation''. In Paul Cootner (ed), The Random Character of Stock Market Prices. Cambridge, MA: MIT Press, pp. 17-75.

BARBERIS, N. AND R. THALER. 2001. ''A Survey of Behavioral Finance''. Working Paper W9222, National Bureau of Economic Research, Cambridge, USA.

BARON, D. 1982. ''A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues''. *Journal of Finance* 37, 955-976.

BEM, D. 1965. ''An experimental Analysis of Self Persuasion''. *Journal of Experimental Social Psychology* 1, pp. 199-218.

BENARTZI, S. AND R. THALER. 1995. ''Myopic Loss Aversion and the Equity Premium Puzzle''. *Quarterly Journal of Economics* 110, no.1, pp. 73-92.

BENVENISTE, L. AND P. SPINDT. 1989. ''How Investment Bankers Determine the Offer Price and Allocation of New Issues''. *Journal of Financial Economics* 24, pp. 343-362.

BOEHMER, E. AND P.R. FISHE. 2001. ''Equilibrium Rationing in Initial Public Offerings of Equity''. Working Paper, University of Miami.

BRABAZON, T. 2000. "Behavioural Finance: A new sunrise or a false dawn?". *Proceedings, CoIL / EvoNet Summer School*, University of Limerick.

BRADLEY, D., JORDAN B., ROTEN I. AND H.C. YI. 2001. ''Venture Capital and IPO Lockup Expirations: An Empirical Analysis''. *Journal of Financial Research* 24, pp. 465-492.

BRAV, A. 2000. ''Inference in Long-Horizon Event Studies: A Bayesian approach with Applications to Initial Public Offerings''. *Journal of Finance* 55, pp. 1979-2016.

CHEMMANUR, T. AND P. FULGHIERI. 1999. ''A Theory of Going-Public Decision''. *Review of Financial Studies* 12, no.2 pp. 249-279.

CHOE, H. , , MASULIS R., AND V. NANDA. 1993. ''Common Stock Offerings Across the Business Cycle: Theory and Evidence''. *Journal of Empirical Finance* 1, pp.3-31.

COOPER, I. AND E. KAPLANIS. 1994. ''Home Bias in Equity Portfolios, Inflation Hedging and International Capital Market Equilibrium''. *Review of Financial Studies 7*, pp. 45-60.

COOTNER, P. 1964. ''The Random Character of Stock Market Prices''. Cambridge, MA: MIT Press.

DANIEL, K., HIRSHLEIFER D. AND A. SUBRAHMANYAM. 1998. ''Investor Psychology and Security Market Under- and Overreactions''. *Journal of Finance* 53, pp. 1839-1885.

DANIEL, K., HIRSHLEIFER D. AND S. H. TEOH. 2001. ''Investor Psychology in Capital Markets: Evidence and Policy Implications''. *Journal of Monetary Economics* 49, pp.139-209.

DE BONT, W. 1992. ''Earnings Forecasts and Share Price Reversals''. Charlottesville, Va.: Research Foundation of the Institute of Chartered Financial Analysts.

DE BONT, W. AND R. THALER. 1987. ''Further Evidence on Investor Overreaction and Stock Market Seasonality''. *Journal of Finance* 42, pp. 557-581.

DELONG, B., SHLEIFER A., SUMMERS L. AND R. WALDMANN. 1990. ''Positive Feedback Investment Strategies and Destabilizing Rational Speculation''. Journal of Finance 45, pp. 379-395.

DOW, J. AND G. GORTON. 1994. ''Arbitrage Chains''. Journal of Finance 49, pp. 819-849.

FAMA, E. 1970. ''Efficient Capital Markets: A Review of Theory and Empirical Evidence''. *Journal of Finance 25*, no.2, pp. 383-417.

FAMA, E. 1991. ''Efficient Capital Markets II''. *Journal of Finance 46*, no.5, pp. 1575-1618.

FAMA, E. 1998. ''Market Efficiency, Long-terms Returns, and Behavioral Finance''. *Journal of Financial Economics 49*, no.3, pp. 283-306.

FAMA, E. AND K. FRENCH .1993. ''Common Risk Factors in the Returns on Bonds and Stocks''. *Journal of Financial Economics 33*, pp. 3-56.

FISCHHOFF, B., P. SLOVIC AND S. LICTENSTEIN. 1977. ''Knowing With Uncertainty: The Appropriateness of Extreme Confidence''. *Journal of Experimental Psychology: Human Perception and Performance 3*, pp. 552-564.

FROOT, K. AND E.M. DABORA. 1999. ''How Are Stocks Prices Affected by the Location of Trade?''. *Journal of Financial Economics* 53, no. 2, pp. 189-216.

GLASER, M., NÖTH M. AND M. WEBER. 2003. ''Behavioral Finance''. Working Paper No. 03-14, University of Mannheim, Mannheim, Germany.

GROSS, L. 1982. ''The Art of Selling Intangibles: How to Make Your Million($) by Investing Other People's Money''. New York Institute of Finance, New York.

HANLEY, K.W. 1993. ''The Underpricing of Initial Public Offerings and the Partial Adjustment Phenomenon''. *Journal of Financial Economics* 34, pp. 231-250.

HANLEY, K.W. AND W. WILCHELM. 1995. ''Evidence on the Strategic Allocation of Initial Public Offerings''. *Journal of Financial Economics* 37, pp. 239-257.

HUBERMAN, G. 1999. ''Familiarity Breeds investment''. Working Paper, Columpia University, New York, N.Y.

JEGADEESH, N., WEINSTEIN M. AND I. WELCH. 1993. ''An Empirical Investigigation of IPO Returns and Subsequent Equity Offerings''. *Journal of Financial Economics* 34, pp. 153-175.

KAHNEMAN, D. AND M. RIEPE. 1998. ''Aspects of Investors Psychology''. *Journal of Portfolio Management*, pp. 52-65.

KAHNEMAN, D. AND A. TVERSKY. 1974. ''Judgments Under Uncertainty: Heuristics and Biases''. *Science 185,* pp. 1124-1131.

KAHNEMAN, D. AND A. TVERSKY. 1979. ''Prospect Theory: An Analysis of Decision Under Risk''. *Econometrica 47,* pp. 263-291.

KANG, J.K., AND R. STULZ. 1997. ''The Underreaction Hypothesis and the New Issue Puzzle: Evidence from Japan''. *Journal of Financial Economics* 46, pp. 3-28.

KRIGMAN, L., SHAW W., AND K. WOMACK. 2001. ''Why Do Firms Switch Underwriters?''. *Journal of Financial Economics* 60, pp. 245-284.

KYLE, A. AND A. WANG. 1997. ''Speculation Duopoly with Agreement to Disagree: Can Overconfidence Survive the Market Test?''. *Journal of Finance 5,* pp. 2073-2090.

LANGER, E. 1975. ''The Illusion of Control''. *Journal of Personality and Social Psychology* 32, pp. 311-328.

LEE, C. 2001. ''Market Efficiency and Accounting Research''. Forthcoming, *Journal of Accounting and Economics.*

LERNER, J. 1994. ''Venture Capitalists and the Decision to Go Public''. *Journal of Financial Economics 35*, pp. 293-316.

LEWIS, K. 1999. ''Trying to Explain Home Bias in Equities and Consumption''. *Journal of Economic Literature* 37, pp. 571-608.

LOGUE, D., ROGALSKI R., SEWARD J. AND L. FOSTER-JOHNSON. 2002. ''What's Special about the Role Of Undewriter Reputation and Market Activities in IPOs?''. Journal of Business 75, pp. 213-243.

LOUGHRAN, T. AND J. RITTER. 2001. ''Why Has IPO Underpricing Increased Over Time''. Working Paper, University of Florida.

LOUGHRAN, T. AND J. RITTER. 2002. ''Why Don't Issuers Get Upset About Leaving Money on the Table in IPO's''. *Review of Financial Studies* 15, no.2 pp. 413-443.

LUCAS, D. AND R. MCDONALD. 1990. ''Equity Issues and Stock Price Dynamics''. *Journal of Finance* 45, pp. 1019-1043.

MALKIEL, B. 1981. ''A Random Walk Down Wall Street, 2nd ed. New York: Norton.

MARKOWITZ, H. 1952. ''Portfolio Selection''. *Journal of Finance* 6, pp. 77-91.

MEHRA, R. AND E. PRESCOTT. 1985. ''The Equity Premium Puzzle''. *Journal of Monetary Economics* 40, no.2, pp. 145-161.

MICHAELY R. AND W. SHAW. 1994. ''The Pricing of Initial Public Offerings: Tests of Adverse-Selection and Signaling Theories''. *Review of Financial Studies* 7, pp. 279-319.

MILLER, E. 1977. ''Risk, Uncertainty, and Divergence of Opinion''. *Journal of Finance* 32, pp. 1151-1168.

MUSCARELLA, C. AND M. VETSUYPENS. 1989. ''A Simple Test of Baron's Model of IPO Underpricing''. *Journal of Financial Economics* 24, pp. 125-136.

ODEAN, T. 1998a. ''Are Investors Reluctant to Realize Their Losses?''. *Journal of Finance* 53, pp. 1775-1798.

ODEAN, T. 1998b. ''Volume, Volatility, Price, and Profit When All Traders Are Above Average''. *Journal of Finance* 53, pp. 1887-1934.

PAGANO, M., PANETTA F. AND L. ZINGALES. 1998. ''Why Do Computers Go Public? An Empirical Analysis''. *Journal of Finance* 53, pp.27-64.

PASTOR, L. AND P. VERONESI. 2003. ''Stock Prices and IPO Waves''. Working Paper, University of Chicago.

RITTER, J. AND I. WELCH. 2002. '' A Review of IPO Activity, Pricing, and Allocations''. *Journal of Finance 4*, pp. 1795-1828.

ROCK, K. 1986. ''Why New Issues are underpriced''. *Journal of Financial Economics* 15, 187-212.

ROSENTAL, L , and C. YOUNG. 1990. ''The seemingly Anomalous price behavior of Royal Dutch/Shell and Unilever N.V./PLC''. *Journal of Financial Economics* 26, no. 1, pp. 123-142.

ROSS, L. 1987. ''The Problem of Construal in Social Inference and Social Psychology''. In Grunberg, R.E.Nisbett and J.Singer (eds.), *A Distinctive Approach to Psychological Research: The Influence of Stanley Schachter*. Hillsdale, NJ: Erlbaum.

ROUSSO, E. and P. SHOEMAKER. 1989. ''Decision Traps''. New York: Simon & Schuster.

SARIN, R. and M. WEBER. 1993. ''Effects of Ambiguity in Market Experiments''. *Management Science* 39, pp. 602-615.

SHEFRIN, H. 2000. ''Beyond Greed and Fear: Understanding Behavioral Finance and the Psychology of Investing''. Harvard Business School Press, Boston, Massachusetts.

SHEFRIN, H. AND R. THALER. 1988. ''The Behavior Life-Cycle Hypothesis''. *Economic Inquiry*. Reprinted in Thaler, Richard, *Quasi Rational Economics.*

SHEFRIN, H. AND M. STATMAN. 1985. ''Explaining Investor Preference for Cash Dividends''. Journal of Financial Economics 13, no.2, pp. 253-282.

SHERMAN, A. AND S. TITMAN. 2002. '' Building the IPO order Book: Underpricing and Participation Limits with Costly Information''. *Journal of Financial Economics*, forthcoming.

SHILLER, R. 2002. ''From Efficient Market Theory to Behavioral Finance''. Discussion Paper NO. 1385, Cowles Foundation for Research in Economics, Yale University, New Haven.

SHILLER, R. 1997. ''Human Behavior and the Efficiency of the Financial System''. Published in J.B. Taylor and M. Woodford (eds.), Handbook of Macroeconomics, Vol. 1, 1999.

SHILLER, R. AND J. POUND. 1989. ''Survey Evidence on Diffusion of Internet and Information among Investors''. *Journal of Economic Behavior and Organization* 12, pp. 47-66.

SCHULTZ, P. 2000. ''The Timing of Initial Public Offerings''. Working paper, University of Notre Dame.

SCHULTZ,P.2001.''Pseudo Market Timing and the Long-Run Underperformance of IPOs''. Working paper, University of Notre Dame.

SUBRAHMANYAM, A. AND S. TITMAN . 1999. ''The Going Public Decision and the Development of Financial Markets''. *Journal of Finance* 54, pp.1045-1082.

THEO, S.H, WELCH I. AND T.J WONG. 1998. ''Earnings Management and the Long-run Performance of Initial Public Offerings''. *Journal of Finance* 53, pp. 1935-1974.

THALER, R. 1999. ''The End of Behavioral Finance''. *Financial Analysts Journal*, pp.12-17.

WELCH, I. 1989. ''Seasoned Offerings, Imitation Costs, and the Underpricing of Initial Public Offerings''. *Journal of Finance* 44, pp. 421-450.

ZHANG, D. 2001. ''Why Do IPO Underwriters Allocate Extra Shares When They Expect to Buy Them Back?''. Working Paper, University of Florida.

ZINGALES, L. 1995. ''Insider Ownership and the Decision to Go Public''. *Review of Economic Studies* 62, pp. 425-448.

Electronic Sources

University of Mannheim, www.behavioral-finance.de/e/e_band2.htm

Yahoo!, http://groups.yahoo.com/group/Behavioral-Finance/

Jay Ritter's Website, http://bear.cba.ufl.edu/ritter/

A P P E N D I X

Table A1
Average initial returns for 38 countries

Country	Source	Sample Size	Time Period	Avg. Initial Return
Australia	Lee, Taylor & Walter; Woo	381	1976-1995	12.1%
Austria	Aussenegg	83	1984-2002	6.3%
Belgium	Rogiers, Manigart & Ooghe; Manigart	86	1984-1999	14.6%
Brazil	Aggarwal, Leal & Hernandez	62	1979-1990	78.5%
Canada	Jog & Riding; Jog & Srivastava Kryzanowski & Rakita	500	1971-1999	6.3%
Chile	Aggarwal, Leal & Hernandez; Celis & Maturana	55	1982-1997	8.8%
China	Datar & Mao; Gu and Qin (A shares)	432	1990-2000	256.9%
Denmark	Jakobsen & Sorensen	117	1984-1998	5.4%
Finland	Keloharju; Westerholm	99	1984-1997	10.1%
France	Husson & Jacquillat; Leleux & Muzyka; Paliard & Belletante; Derrien & Womack; Chahine	571	1983-2000	11.6%
Germany	Ljungqvist	407	1978-1999	27.7%
Greece	Kazantzis & Thomas; Nounis	338	1987-2002	49.0%
Hong Kong	McGuinness; Zhao & Wu; Ljungqvist & Yu	857	1980-2001	17.3%
India	Krishnamurti & Kumar	98	1992-1993	35.3%
Indonesia	Hanafi; Ljungqvist & Yu	237	1989-2001	19.7%
Israel	Kandel, Sarig & Wohl; Amihud & Hauser	285	1990-1994	12.1%
Italy	Arosio, Giudici & Paleari; Cassia, Paleari & Redondi	181	1985-2001	21.7%
Japan	Fukuda; Dawson & Hiraki; Hebner & Hiraki; Pettway & Kaneko; Hamao, Packer, & Ritter; Kaneko & Pettway	1,689	1970-2001	28.4%
Korea	Dhatt, Kim & Lim; Dim; Choi & Heo	477	1980-1996	74.3%
Malaysia	Isa; Isa & Yong	401	1980-1998	104.1%
Mexico	Aggarwal, Leal & Hernandez	37	1987-1990	33.0%
Netherlands	Wessels; Eijgenhuijsen & Buijs; Jenkinson, Ljungqvist, & Wilhelm	143	1982-1999	10.2%
New Zealand	Vos & Cheung; Camp & Munro	201	1979-1999	23.0%
Nigeria	Ikoku	63	1989-1993	19.1%
Norway	Emilsen, Pedersen & Saettern	68	1984-1996	12.5%
Philippines	Sullivan & Unite	104	1987-1997	22.7%
Poland	Jelic & Briston	140	1991-1998	27.4%
Portugal	Almeida & Duque	21	1992-1998	10.6%
Singapore	Lee, Taylor & Walter; Dawson	441	1973-2001	29.6%
South Africa	Page & Reyneke	118	1980-1991	32.7%
Spain	Ansotegui & Fabregat	99	1986-1998	10.7%
Sweden	Rydqvist; Schuster	332	1980-1998	30.5%
Switzerland	Drobetz, Kammermann & Walchli	120	1983-2000	34.9%

Country	Source	Sample Size	Time Period	Avg. Initial Return
Taiwan	Lin & Sheu; Liaw, Liu & Wei	293	1986-1998	31.1%
Thailand	Wethyavivorn & Koo-smith; Lonkani & Tirapat	292	1987-	46.7%
Turkey	Kiymaz	163	1990-	13.1%
United Kingdom	Dimson; Levis; Ljungqvist	3,122	1959-	17.4%
United States	Thhotson, Sindelar & Ritter	14,840	1960-	184%

Source: LOUGHRAN, T. AND J. RITTER. 2002

In general, the numbers for a given country represent the average first-day return on IPOs where the company is headquartered in that country. For Belgium, for example, during 1991-1999, 61 companies went public, for which first-day return information is available on 41 IPOs. Of the 61 IPOs, 39 went public on the Brussels Stock Exchange, 3 on Nasdaq, 9 on Easdaq, and 10 on Euro.NM. Of the 3 Nasdaq IPOs by Belgian companies (Lernout et Hauspie, Xiekon, and ICOS Vision Systems), only Xiekon was an American Depository Share (ADS) issue. The other 2 Nasdaq IPOs have been included in the U.S. totals, resulting in double-counting. The U.S. numbers exclude ADS issues, but in general include other foreign firms going public in the U.S., especially on NASDAQ Many larger Canadian companies and Israeli tech companies went public in the U.S. in the 1990s. The Israeli numbers in the table are based on Israeli companies going public in Israel.

Table A2

Percentage returns on IPOs from 1970-2002 during the first five years after issuing

	First six months	Second six months	First Year	Second year	Third year	Fourth year	Fifth year	Geometric Mean years 1-5
IPO firms	6.3%	0.0%	6.6%	5.0%	9.1%	13.7%	11.6%	9.2%
Size-matched	4.6%	5.3%	10.2%	13.8%	14.2%	16.3%	12.4%	13.4%
Difference	1.7%	-5.3%	-3.6%	-8.8%	-5.1%	-2.6%	-0.8%	-4.2%
No of IPOs	7,428	7,362	7,381	7,427	6,522	5,565	4,759	
IPO firms	6.7%	0.2%	7.1%	7.5%	9.8%	13.1%	9.7%	9.4%
Size & BM-Matched	2.4%	4.4%	7.6%	11.6%	12.9%	16.5%	10.8%	11.8%
Difference	4.3%	-4.2%	-0.5%	-4.1%	-3.1%	-3.4%	-1.1%	-2.4%
No. of IPOs	7,026	6,982	6,999	6,888	6,045	5,135	4,366	

Source: JAY RITTER'S WEBSITE

The returns are measured from the closing market price on the first day of issue until the sixth-month or one-year anniversary. All returns are equally weighted average returns for all IPOs that are traded on NASDAQ, the Amex, or the NYSE at the start of a period. Each year, the portfolios are rebalanced to equal weights. If an issuing firm is delisted within a year, its return for that year is calculated by compounding the CRSP value-weighted market index for the rest of the year. For the size-matched returns, each IPO is matched with a non-issuing firm having the same market capitalization (using the closing market price on the first day of trading for the IPO, and the market capitalization at the end of the previous month for the matching firms). For the size & BM-matched returns, each IPO is matched with a non-issuing firm in the same size decile (using NYSE firms only for determining the decile breakpoints) having the closest book-to-market ratio. For the IPOs, book-to-market ratios are calculated using the first recorded post-issue book value and the post-issue market cap calculated using the closing market price on the first CRSP-listed day of trading. For non-issuing firms, the Compustat-listed book value of equity for the most recent fiscal year ending at least four months prior to the IPO date is used, along with the market cap at the close of trading at month-end prior to the month of the IPO with which it is matched. Non-issuing firms are those that have been listed on the Amex-Nasdaq-NYSE for at least five years, without issuing equity for cash during that time. If a non-issuer subsequently issues equity, it is still used as the matching firm. If a non-issuer gets delisted prior to the delisting (or the fifth anniversary), the second-closest matching firm on the original IPO date is substituted, on a point-forward basis. For firms with multiple classes of stock outstanding, market cap is calculated based using only the class in the IPO for the IPO. For non-issuing firms, each class of stock is treated as if it is a separate firm. The sample size is 7,850 IPOs from 1970-2002, excluding IPOs with an offer price of less than $5.00, ADRs, REITs, closed-end funds, and unit offers. Returns are measured through December 31, 2002. For partial event-years that end on this date, the last partial year is deleted from the computations. In other words, for an IPO that issued on March 15, 2001, it's first-year return is included, but not the second-year return.

Table A3
Percentage returns on IPOs from 1970-1979 during the first five years after issuing

	First six months	Second six months	First year	Second Year	Third year	Fourth year	Fifth Year	Geometric mean years 1-5
IPO firms	-7.5%	-6.9%	-13.8%	-19.1%	-0.1%	27.3%	32.7%	3.3%
Size-matched	-3.0%	-1.8%	-4.8%	-5.3%	14.1%	28.1%	21.7%	9.9%
Difference	-5.8%	-7.5%	-11.0%	-14.6%	-14.2%	-1.9%	10.2%	-6.6%
No. of IPOs	396	394	396	643	634	621	580	
IPO firms	-1.0%	-0.1%	-0.3%	1.0%	10.2%	27.8%	27.0	12.5%
Size & BM-Matched	0.9%	5.1%	7.2%	1.0%	17.8%	31.3%	21.5	15.3%
Difference	-1.9%	-5.2%	-7.5%	0.0%	-7.6%	-3.5%	5.5%	-2.8%
No. of IPOs	205	204	205	273	275	271	254	

NASDAQ did not start until February 1971, and CRSP did not carry NASDAQ firms until December 1972.

Table A4
Percentage returns on IPOs from 1980-1989 during the first five years after issuing

	First six months	Second six months	First year	Second year	Third year	Fourth year	Fifth year	Geometric mean years 1-5
IPO firms	4.5%	-0.2%	4.9%	11.0%	12.3%	-0.4%	6.8%	6.8%
Size-matched	3.5%	2.6%	5.7%	14.9%	13.0%	5.5%	9.4%	9.6%
Difference	1.0%	-2.8%	-0.8%	-3.9%	-0.7%	-5.9%	-2.6%	-2.8%
No. of IPOs	2,394	2,386	2,394	2,356	2,208	2,014	1,829	
Size & BM-Matched	-0.6%	0.1%	-1.1%	10.6%	8.3%	3.4%	10.1%	6.2%
Difference	4.9%	-0.5%	5.4%	0.3%	3.8%	-3.8%	-3.4%	0.4%
No. of IPOs	2,368	2,360	2,368	2,330	2,184	1,992	1,809	

Source: JAY RITTER'S WEBSITE

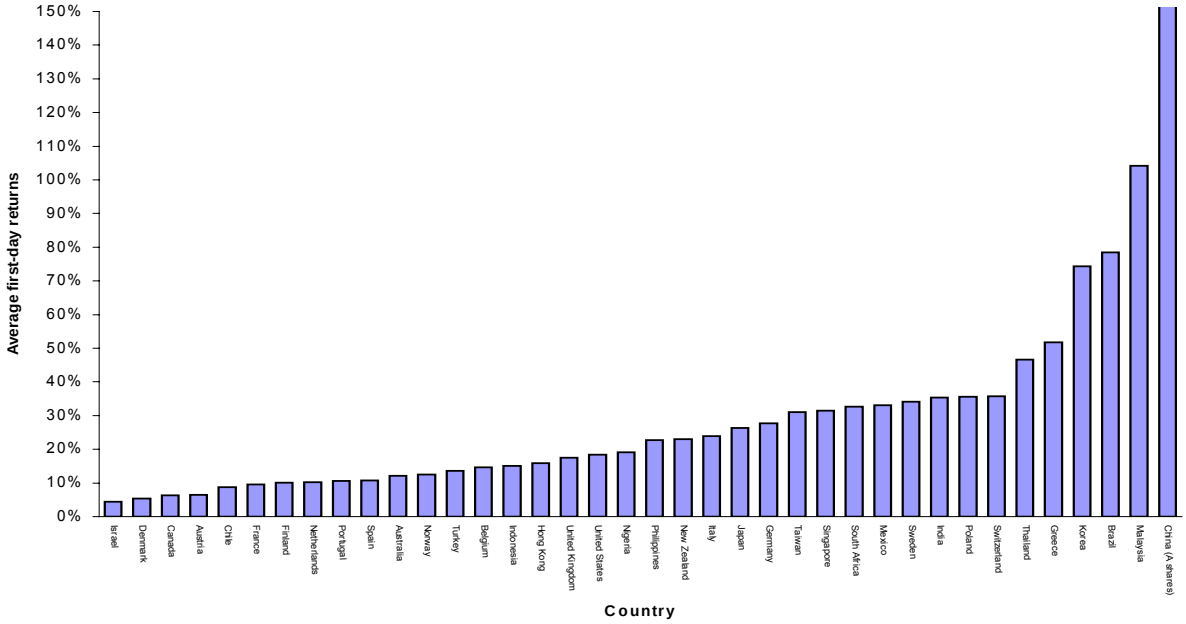
Table A5

Percentage returns on IPOs from 1990-2002 during the first five years after issuing

	First six months	Second six months	First year	Second year	Third year	Fourth year	Fifth year	Geometric mean years 1-5
IPO firms	8.4%	0.7%	9.2%	5.3%	8.7%	20.5%	10.2%	10.7%
Size-matched	5.8%	7.3%	13.8%	16.1%	15.0%	21.2%	12.5%	15.9%
Difference	2.6%	-6.6%	-4.6%	-10.8%	-6.3%	-0.7%	-2.3%	-5.2%
No. of IPOs	4,638	4,582	4,591	4,428	3,680	2,930	2,350	
IPO firms	8.3%	0.5%	9.0%	6.2%	8.4%	21.0%	10.2%	10.8%
Size & BM-matched	4.0%	6.7%	12.3%	12.8%	15.3%	24.2%	10.1%	14.8%
Difference	4.3%	-6.2%	-3.3%	-6.4%	-6.9%	-3.2%	0.1%	-4.0%
No. of IPOs	4,453	4,418	4,426	4,285	3,586	2,872	2,303	

Source: JAY RITTER'S WEBSITE

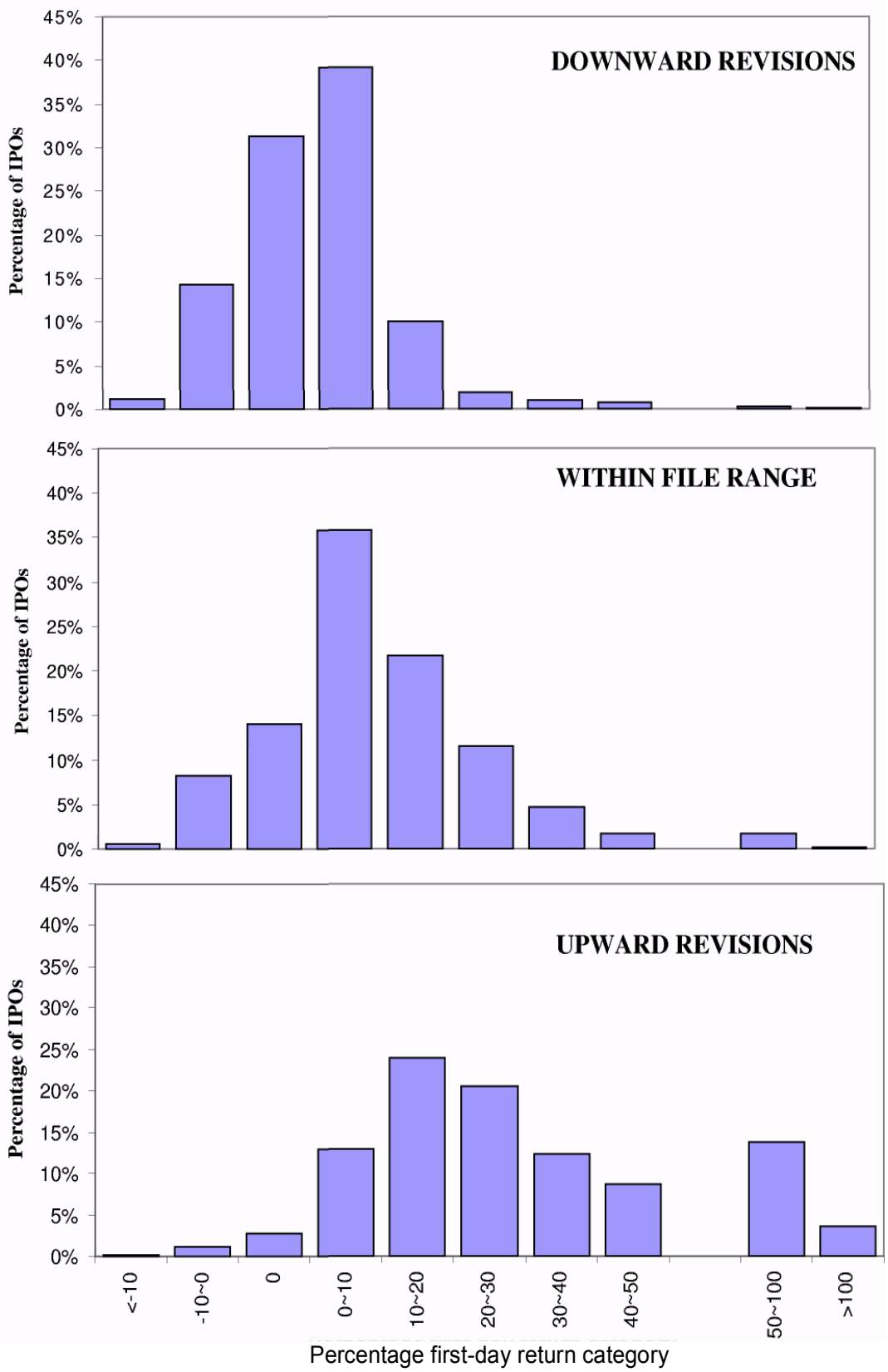
FIGURE A1: Average First-day Returns on IPOs



Source: JAY RITTER'S WEBSITE

Average initial returns (offer price to first closing market price unaffected by price limits) for 38 countries. The sample periods and the number of IPOs differs from country to country, and is described in the accompanying Table A1. Data come from a variety of studies by various authors. For China, the average initial return on A share IPOs (available only to residents of China) is 257%.

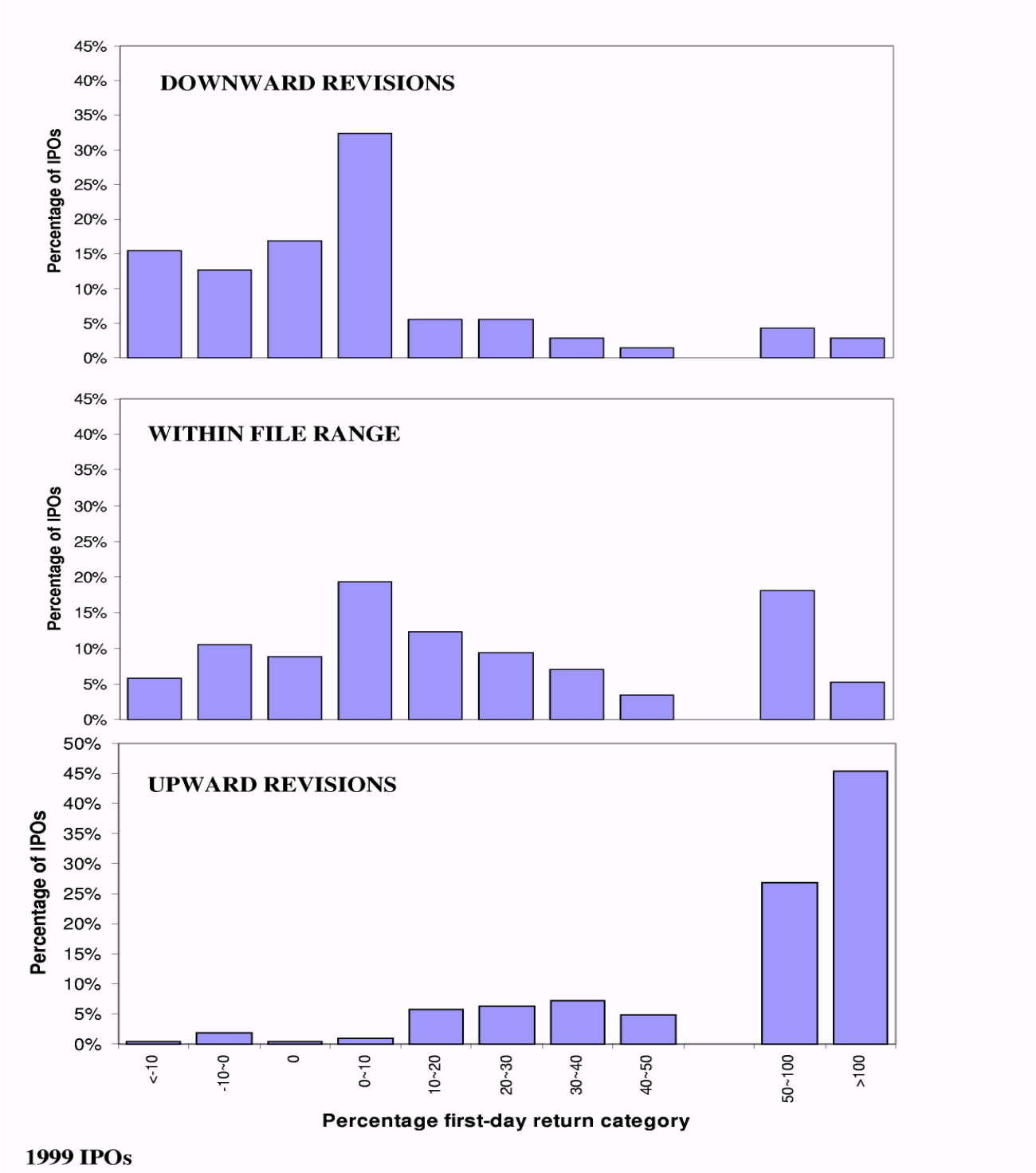
FIGURE A2: First-day returns categorized by the revision in the offer price from the file price range, 1990-1998 IPOs



1990-1998 **IPOs**

Source: JAY RITTER'S WEBSITE

FIGURE A3: First-day returns categorized by the revision in the offer price from the file price range, 1999 IPOs**.**



Source: JAY RITTER'S WEBSITE

Figures A2 and A3 present the first day return distributions for IPOs categorized by whether the offer price is below, within, or above the original file price range. For example, an IPO with a file price range of $10-12that went public at $10 would be classified as “within’’ the file price range, but if it went public at $9.50 it would be classified as in the downward revision category. The 1990-1998 sample is composed of 3025 IPOs. These figures are contained in the Loughran-Ritter paper ‘‘Why Don’t Issuers Get Upset About Leaving Money on the Table in IPO’s?’’. The 1999 sample is composed of 465 IPOs. For both 1990-1998 and 1999, the samples exclude IPOs with a midpoint of the file price range of less than $8.00, unit offers, REITs, closed-end funds, and partnerships.