Investor psychology in New Zealand

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This paper investigates, in the New Zealand context, the use of two opposing models of investor decision making. The purpose of this investigation is to determine whether New Zealand investors are economically rational. In this context we investigate an alternative model of rationality, founded in psychology rather than economics. This model - based on the representative heuristic - proposes that investors will overreact to small pieces of more recent information, hence stock prices will temporarily overshoot their true value. The results show strong support for the representative heuristic and the notion of overreaction in the New Zealand Stock Exchange.

Traditional economic theory views investors as rational decision makers (Fama, 1970; Basu, 1977), who apply Bayesian decision making criteria (Brown, Harlow & Tinic, 1988). In Bayesian decision making, probability estimates are altered to reflect new information. When new information becomes available it is weighted *equally* with information that is already known (Neter, Wasserman & Whitmore, 1988).

Not all Bayesian decision making is made under certainty as there are often uncontrollable variables that make decision making uncertain. Under conditions of uncertainty, the decision-maker can follow one of two different approaches: First he or she may be unwilling, or unable, to assign probabilities to the outcomes and may regard them simply as uncertain. Alternatively, the decision-maker may assign probabilities to the outcomes (Neter, Wasserman & Whitmore, 1988).

There are two possible methods that incorporate prior information, namely *objective interpretation* and *subjective interpretation*. An objective interpretation bases probabilities on observed relative frequencies in past information, which is similar to the conditions that are currently prevailing. However due to the lack of any past experience, relative frequencies are not always available. In such cases, subjective or personal probability assessments may be used. Bayesian decision making proceeds whether the probabilities assigned are subjective or objective.

The economic view of individual behaviour outlined above presumes that individual behaviour aims at "utility" maximisation. Empirical studies in the psychology literature suggest that this is not the case. In contrast to the economist view of the rational person, Kahneman & Tversky (1972) and Tversky and Kahneman (1974) present strong evidence indicating that individual reasoning does not follow the laws of mathematical statistics. Instead, they find that there may be a *representative heuristic* that influences decision makers more strongly than the prior odds hypothesis proposed by Bayes. An example of the representative heuristic is provided by Triplet (1992) who investigated discriminatory biases in the perception of illness. The study gave 172 individuals case descriptions of hypothetical patients who varied by gender and sexual preference and who displayed symptoms of one of two different unknown diseases. Consistent with the representativeness heuristic, Triplet found that people perceived homosexuals to be more likely to have AIDS.

The representative heuristic can be described as an influencing factor in an individual's decision process, whereby "... individuals tend to give too much weight to the 'evidence' and thus too little weight to their prior beliefs, although priors are not ignored" (Grether, 1980, p.553). Therefore, Bayes' theorem, which assumes that individuals weight information using prior odds, will not describe the individual's decision making process. Instead, individuals will base their decision mainly on the most recent information. This over-weighting of more recent information will lead to a situation of imperfect information, leading to decisions that are irrational from an 'economic' view but are justified with reference to, for example, a heuristic (DeBondt & Thaler, 1985).

If the decision maker concentrates on the most recent information, he or she is limiting the scope of the information search. Such a limited search means that decisions are based on comparatively small amounts of information (Grether, 1980). The apparent willingness of the layperson to make strong inferences based on small amounts of information

leads Tversky and Kahneman (1971) to argue that people act as if the law of large numbers applies to small numbers. Therefore, it appears that decision makers feel comfortable making decisions with a small and biased (due to perceived importance) amount of information. This decision making based on the small pieces of information has been termed 'overreaction' (De Bondt & Thaler, 1985).

Therefore, the work of Kahneman & Tversky (1972) suggests another approach to decision making: one which is based in psychology, rather than economics. Moreover, this form of decision making, as with economic rationality, can be extrapolated to explain aggregate market behaviour. This is because the sharemarket, under economic theory, is seen as the sum of individual behaviours; therefore the behaviour of the individual can be use to explain the behaviour of the sharemarket and vice versa. The behaviour of the sharemarket is in isomorphic correspondence with the behaviour of the individual. Therefore, any study of overreaction in the sharemarket is implicitly be a study of overreaction by the individual investor.

The sharemarket has been recognised as involving two distinct major groups of investors: First, the individual investor and, second, the analyst or fund manager. Therefore, if either of these groups were to overreact this would be reflected in the aggregate behaviour of the sharemarket (Elton, Gruber & Gultekin, 1984).

With regard to the individual investor - who is considered in most of the finance literature to invest using publicly available information - there is considerable evidence that suggests overreaction in investment patterns (O'Hanlon & Whiddett, 1991).[1] This hypothesis appears to have great intuitive appeal for the individual investor, as they generally do not seek out large amounts of information on companies before investing (Hogarth, 1981). Furthermore, the publicly available information can often 'hype' the investor, causing further over-confidence in a fallible position.

However, for the analyst or institutional investor this same intuitive appeal does not apply. Analysts would be expected to take into account all information before proceeding with investment decisions. That is, one expects analysts to be Bayesian efficient. However, Elton, Gruber and Gultekin (1984) found that analysts in the United States over-estimated the growth for high growth companies and over-estimated the shrinkage for low growth companies. It, therefore, appears that all investors are prone to 'overreaction' (DeBondt & Thaler, 1990).

This paper investigates whether or not investors in the New Zealand share market overreact. It is proposed that if shares exhibit an initial significant return (positive or negative) that is followed by a subsequent return reversal, then this would confirm the 'overreaction' hypothesis. Here the return reversal would indicate that investors had overreacted and, realising this, had subsequently adjusted the share price to relect its true economic value. However, if there was no significant reversal then the results would support, for example, the Bayesian decision approach, rejecting the model of decision making proposed by the representative heuristic.

Tests and results

In order to test the proposition of overreaction, all New Zealand Stock Exchange companies were examined for a twelve month period from April 1994 until March 1995. On each of 50 randomly selected trading days the top three and bottom three performing companies were analysed.[2] The selection of 50 randomly selected days was to ensure, following Neter, Wasserman and Whitmore (1988), statistical validity of the regression tests. The use of the top three and bottom three companies is consistent with tests employed by Atkins and Dyl (1990) and Bremer and Sweeney (1989), who find support for the proposition that the majority of overreaction occurs in these stocks.

Overreaction was measured as the market adjusted returns[3] on the shares for each of 11 days, where t=0 is the day on which an initial large positive or negative return was found, and t=1..10 are the subsequent 10 days. The focus on the top and bottom three companies is consistent with the representative heuristic as these are the companies that have most likely had the largest 'information shocks'. That is, the top three companies are most likely to have experienced 'good' news, whereas, the bottom three companies are likely to have received recent 'bad' news.[4]

The six companies for each of these 50 formation days were then analysed over the 10 days subsequent to formation to investigate any reversal in stock prices that may occur. The use of ten subsequent days allows the reversal to be examined thoroughly, and to investigate the period over which the reversal persists. Analysis of the results past 10 days is considered parsimonious (Atkins & Dyl, 1990).

The data presented in Table 1 are divided into losing stocks (those that show large negative returns at t=0), and winning stocks (those that show large positive returns at time t=0). Examination of the results shows that there exists strong support for the overreaction hypothesis. The results show that the initial price increases and decreases, for the
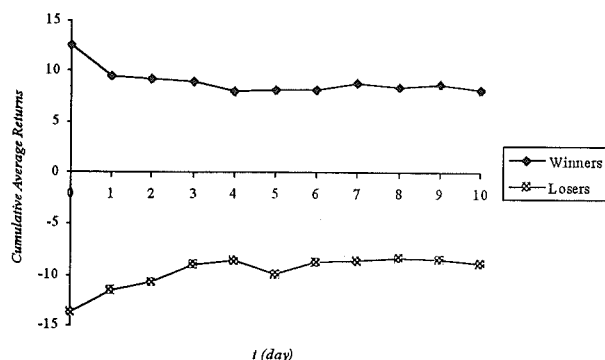
Table 1: Abnormal returns in the New Zealand Stock Exchange for "Winner" and "Loser" Share Portfolios

Day (t)	Winning Stocks i.e., Large Positive Returns (150 observations)		Losing Stocks i.e.,Large Negative Returns (150 observations)	
	Abnormal return (%)	*t*-value	Abnormal return (%)	*t*-value
0	12.57	75.86**	-13.64	-85.86**
1	-3.09	-25.67**	2.15	20.21**
2	-0.24	-1.60	0.81	4.93**
3	-0.30	1.78	1.65	12.30**
4	-0.86	-4.56**	0.46	2.96
5	0.12	0.80	-1.33	-8.73**
6	0.03	0.12	1.25	7.97**
7	0.58	3.13*	0.14	0.90
8	-0.40	-2.50*	0.23	1.60
9	0.33	2.03	-0.22	-1.47
10	-0.58	-3.15	-0.34	-1.92

Note: * represents significance at the 0.10 level; ** represents significance at the 0.05 level.

Abnormal returns are those returns which occur following a market adjustment (refer Note 2).

Figure 1: The Cumulative Average Returns for Winner and Loser shares on the New Zealand Stock Exchange.

Notes
1   This was first documented by Hogarth (1981), who described the illusion of validity, whereby the investor makes a decision on small pieces of recent information in the belief that the decision is completely valid and justified.
2   The 50 days on which observation are made are the same for all six companies.
3   The market adjustment was made using the New Zealand Stock Exchange Top 40 index. The use of a market adjustment ensures that all returns are due to information relating to the company under investigation, and not a result of market fluctuations. Furthermore, the use of a market adjustment biases the results against the overreaction hypothesis. Therefore, any findings of overreaction will be more pervasive (DeBondt & Thaler, 1985).
4   The idea of overreaction to "good" or "bad" news was first described by Keynes (1930, p.130) when he proposed that "unexpectedly good or bad news will often cause the capital value of the shares to fluctuate by an amount which far exceeds any possible change in profit due to an event"

respective winner and loser shares, are partially offset at t=1. This correction at t=1 suggests that the investors in the New Zealand share market overreacted to the 'good' or 'bad' news that led to abnormal returns on these days. Therefore it appears that, in the short-term, investors in the New Zealand markets invest according to the representative heuristic as suggested by Kahneman and Tversky (1972).

Further investigation of Table 1 shows the degree of overreaction that exists in the New Zealand Stock Exchange. First for the winner shares the subsequent reversal, at t=1, is almost one-quarter of the initial movement at t=0, as is demonstrated in Figure 1. Therefore, the initial overreaction was approximately 32.6 per cent. That is, the decision maker (investor) weighed the information more than it should have been. Therefore, these small amounts of information apparently cause unrealistic optimism. In essence the decision maker has attached a far greater weight to the information than would be justifiable under a Bayesian decision approach.

The second panel of Table 1, that of the loser shares, shows even more significant overreaction. Furthermore, the correction in this overreaction is over a longer time frame than the winner correction, as shown in Figure 1. The corrections over days t=1,2,3 are all significant, and in total add to 4.61 per cent which represents almost 35 per cent of the initial change at t=0. Thus the initial overreaction is 51.1 per cent, suggesting an unrealistic pessimism on behalf of investors.

Conclusions
Our findings indicate that investors overreact to negative information more zealously than they overreact to positive information. This suggests a conservative factor in the representative heuristic, that is, bad news is more harshly criticised than good news. Furthermore, the longer correction period suggests that there is a bias in the representative heuristic towards negative information. That is investors are more wary of bad news, and are less willing to adjust the results in a positive direction. However, investors are more willing to accept that they overreacted in a positive direction and make a subsequent downward reversal. This is again consistent with the notion of conservatism, and a willingness to accept and react to bad news more easily than good news.

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