
REINVESTMENT DECISIONS

BY ENTREPRENEURS:

RATIONAL DECISION-MAKING

OR ESCALATION OF

COMMITMENT?

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EXECUTIVE SUMMARY

Among the most important decisions made by entrepreneurs are those relating to whether to expand, maintain, or contract their businesses. We would expect these major commitments to be based upon expectations about future performance; these expectations, in turn, would be heavily influenced by performance to date. Thus, we might presume that businesses that have been receiving favorable feedback from the marketplace would be more likely to expand, and those receiving negative feedback would be more likely to contract. Ongoing research in decision-making suggests that psychological processes may play a role in influencing these decisions. Under certain conditions entrepreneurs may be influenced by a phenomenon termed "escalation of commitment." This may lead entrepreneurs to decide to expand the asset bases of their firms, regardless of feedback from the marketplace.

The literature on escalation of commitment suggests that, under certain conditions, decision-makers who make an initial decision become overly committed to the original choice and then subsequently make decisions biased by psychological commitment. Previous research (most of which has been conducted in laboratory settings) suggests that escalation bias is more likely to occur (1) if entrepreneurs have started their firms (rather than purchased them); (2) if entrepreneurs have partners; (3) if entrepreneurs expect to use their skills in the new business; and (4) if entrepreneurs are overconfident (that is, expected to do substantially better than others in the same kinds of business). It is also expected that these "escalation predictors" will have a relatively greater influence when feedback is negative than when it is positive; the negative feedback seems to invoke a self-justification process. It is also hypothesized that the influence of these predictors will be less in the third year of a business than in the second year. Finally, it is expected that these psychological influences will help

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to provide systematic explanation of reinvestment decisions over and beyond what one could predict based upon financial feedback.

The hypotheses were tested using data from a longitudinal study involving 1112 firms. It was found that entrepreneurs who had started their firms and those who had expressed substantial overconfidence were significantly more likely to make the decision to expand. The hypotheses that those who had partners and those who expected to apply their skills would be more likely to expand were not supported. Furthermore, and consistent with previous research, these psychological escalation predictors seemed to exert a greater influence when feedback from the marketplace was negative. As expected, there was a declining influence in the third year as compared with the second. Consistent with the prior literature and the hypotheses, these psychological predictors did show a small, but systematic influence upon reinvestment decisions.

Decisions to expand or contract a business are not necessarily good or bad; however, it is important that entrepreneurs be aware of the factors influencing their decisions. Entrepreneurs should recognize that the escalation bias tendency is likely to occur. Seeking independent opinions from advisors who do not feel as much personal responsibility for the original decision to start may lead to more objective evaluation of alternatives. Advisors should also realize that the inclination to escalate exists and is natural; they may thereby be able to guard against the tendency to be swept along by the entrepreneur's enthusiasm and propensity to escalate. Entrepreneurs and their advisors (as well as researchers) should recognize that important entrepreneurial decisions are often influenced by psychological as well as economic factors. This awareness should enable entrepreneurs to make more rational decisions.

INTRODUCTION

When entrepreneurs start their ventures, their concepts are unproven, the outcomes uncertain. Subsequently, as their ventures unfold, feedback is received from the marketplace. This new information can then be used as they make decisions about whether to increase financial investment, to continue the business as it is, to scale back investment, or to discontinue the business. We might expect that these decisions would be based upon the feedback being received, with the entrepreneur being more likely to increase investment when ventures are showing success and being more likely to scale back when results are disappointing. However, ongoing research in the field of decision-making suggests that psychological processes may play a role in these important decisions. Thus, under certain conditions entrepreneurs may be more likely to increase investment, regardless of feedback. This phenomenon, termed "escalation of commitment" by researchers in decision-making, may lead to non-rational decisions. They may be non-rational in the sense that psychological processes (which may not even be recognized by the entrepreneur) play an important role in shaping investment decisions.

This article examines financial investment decisions by entrepreneurs (specifically decisions to increase or decrease the total assets of their firms) in the years subsequent to the first year of operation. Specifically, we consider the following questions:

1. Do entrepreneurs behave according to a rational model of decision-making? That is, do objective measures of feedback (such as sales increases or decreases) have a systematic effect on levels of new investment?
2. Are investment decisions influenced systematically by psychological factors associated with the tendency to justify commitments previously made?

Researchers in the field of decision-making have identified systematic biases in human judgment that represent departures from the rational economic model (Bazerman 1986; Kahneman and Tversky 1973). One such decision bias, escalation of commitment, was first

described by Staw (1976). The escalation bias refers to the tendency of decision-makers who make an initial decision to become overly committed to the original choice and make subsequent decisions biased by psychological commitment.

DECISION-MAKING IN AN ENTREPRENEURIAL SETTING

In the entrepreneurship field, much of the research has examined characteristics of entrepreneurs, processes of formation, and influences upon performance. However, little research has focused on analyzing influences upon the decision-making in an entrepreneurial or small business setting.

A study by Mowen and Mowen (1986) investigated whether or not managers of small businesses were subject to decision bias resulting from the way in which the decision was framed. A more recent study by Smith et al. (1988) compared the comprehensiveness of decision-making of entrepreneurs with that of professional managers of larger firms. They found that firms exhibiting less comprehensive decision-making experienced lower levels of performance regardless of whether the firm was managed by an entrepreneur or a professional manager. This study, although important and useful, only looked at one aspect of decision-making. The present study seeks to add to this stream of research in entrepreneurship by investigating the "escalation of commitment" in entrepreneurial decision-making.

Escalation of Commitment

Previous research on escalation behavior has shown that individuals who are personally responsible for decisions in which there are negative outcomes then proceed consistently to commit a greater amount of resources than those who are not personally responsible (Bazerman et al. 1982; Bazerman et al. 1984; Staw 1976; Staw and Fox 1977). Most studies of escalation behavior have employed a research paradigm whereby subjects (typically in a laboratory setting) are asked to make a series of related resource decisions; the allocation behavior of a high commitment (i.e., experimental) group is then compared with that of a control group. Commitment is induced by having subjects choose an initial course of action that is then implemented, thus making the decision-maker responsible for the course of action. The decision-maker is then given feedback indicating that the chosen course of action is not achieving the desired goal and is asked to make a subsequent resource allocation decision. The control group is not given an initial choice regarding which course of action should be followed, but rather is told that a predecessor made the initial decision. Therefore, the control subjects are neither responsible for nor committed to the chosen course of action. Control subjects are then given the same negative feedback and asked to make the second resource allocation decision. As predicted by escalation theory, the high commitment (experimental) group allocates significantly more resources to the failing course of action than the low commitment (control) group. This increase in the mean allocation for the experimental group compared with that of the control group has been termed the *escalation bias* (Staw 1976).

Although much of the empirical literature on escalation examines the effect of psychological commitment (induced by responsibility for the decision) followed by negative feedback, the initial research by Staw (1976) examines the escalation effect under both positive and negative feedback conditions. That is, Staw's initial premise was that responsibility for the initial decision would lead to psychological commitment that in turn would produce the "escalation" effect regardless of the outcome of the decision. Staw's own research, as well as work by others in this area, has consistently demonstrated that when

the consequences of the initial decision are negative, the escalation of commitment is greater than when the consequences are positive. Recently Schoorman and Holahan (1988) have attempted to separate the effects of the initial commitment to the decision alone from the psychological processes that result from receiving negative feedback. Their research suggests that commitment to a course of action is a sufficient condition to create an escalation bias in subsequent decisions. However, when the initial decision results in negative consequences the magnitude of the escalation bias is much greater. In other words, when feedback is negative, the decision seems less rational, in the sense that variables associated with the psychological process of escalation seem to play a larger effect.

These results help to further differentiate two psychological processes that serve as explanatory variables or mediators of the escalation effect. Firstly, it is believed that decision-makers who choose an initial course of action and who feel personally responsible for the decision outcomes become psychologically committed to the chosen course of action. Secondly, this view holds that the receipt of negative performance feedback invokes a self-justification process whereby decision-makers attempt either to defend themselves psychologically against a perceived error in judgment or to make the previous choice appear rational through increasing their commitment to the failing course of action (Staw 1981; Staw and Ross 1987). These processes, in conjunction, are believed to produce the escalation effect.

With few exceptions (Arkes and Blumer 1985; Schoorman 1988; Whyte 1986), most of the research in escalation has been performed in experimental settings. Thus, the generalizability from experimental simulations to decision-making in real organizations is currently a question of great interest. The study of escalation among entrepreneurs presents an interesting opportunity to understand a decision process in a context that provides many of the antecedent conditions conducive to escalation. If we can develop an understanding of whether or not escalation biases influence entrepreneurs' decisions, there may be practical implications as well. It thereby becomes possible to be alert to potential biases and to assist entrepreneurs to make rational decisions that help them meet their own objectives.

Escalation Bias in Entrepreneurs' Decisions

The literature on entrepreneurial behavior suggests that entrepreneurs are likely to be optimistic (Cooper et al. 1988) and that they frequently make judgments based on subjective factors such as intuition or hunches (Timmons 1990). Evidence on whether or not entrepreneurs are risk-seeking is mixed, but there is widespread agreement that they not only have financial capital at risk, but also their time and reputation. This risk of their public image makes them particularly vulnerable to escalation bias. Research to date suggests that certain factors may increase the tendency toward escalation bias. We now consider conditions that may make it more likely that an entrepreneur will increase investment in a business, regardless of financial feedback.

One structural factor that differentiates entrepreneurial ventures is whether the business was started by the entrepreneur or whether the business was an existing one that was acquired. When a new business is started by an entrepreneur it is more likely that all aspects of the design and operation of the business reflect the preference or choice of the entrepreneur. This may not be the case when a business is acquired. The research on escalation has consistently and unequivocally indicated that choice is a critical antecedent of commitment and of the subsequent decision to escalate (Schoorman and Holahan 1988; Staw and Ross 1987). Therefore, entrepreneurs who start businesses, and thereby feel responsible for all aspects of strategy and operations, may be more subject to escalation bias.

H1: Entrepreneurs who start a new business (START) will add a larger percentage of new capital (NEWCAP2) to the business during the second year.¹

In the simulation of escalation of commitment in laboratory settings, the subjects are asked to make an initial investment decision. It is a common experimental procedure in the escalation paradigm to then require the subjects to write a paragraph defending their decision. This procedure serves to make the choice a public one, and the public nature of the choice is expected to increase the commitment to the decision. The early support for the position, that when opinions are expressed publicly the holder of that opinion becomes more committed to the opinion, comes from the research on cognitive dissonance theory (Cooper and Fazio 1984; Festinger 1957). Research on the escalation of commitment has utilized this finding by systematically introducing procedures that make the initial choice by a decision-maker a public one (e.g., Staw 1976). Conlon and Wolf (1980) argue that the visibility of the decision increases the tendency of decision-makers to escalate. This notion of visibility suggests that the context of the decision may determine how public the choice will be and therefore contribute to escalation.

Staw and Ross (1987) differentiate between psychological determinants and social determinants of escalation. While the psychological reasons for escalating include protecting one's self-concept and not wanting to admit failure to oneself, the social reasons would include the unwillingness to admit failure to others. In entrepreneurship, the context of the decisions made can range from being private to very public. In those circumstances where entrepreneurs are the sole owners of their business, the decision they make will be less public. When entrepreneurs enter into partnerships, decisions become more public. The research on decision-making would suggest that entrepreneurs who had partners in the business would be more likely to escalate than would entrepreneurs who were sole owners.

H2: Entrepreneurs who have partners (PARTNR) will add a larger percentage of new capital (NEWCAP2) to the business during the second year than those who are sole owners.

There is a growing body of research that has investigated the relationship between self-efficacy, or perceptions of self-competence on the part of the decision-maker, and the resulting persistence in a course of action (Cervone and Peak 1986; Lent et al. 1984). The concept of self-efficacy is generally defined as the strength of an individual's perception that he or she has the ability to successfully complete a task. These perceptions are based on education or training, prior experiences relevant to the task, and expectations of the difficulty of the task relative to their own skills. Therefore, when decision-makers perceive that they are very skilled as to the type of decision being made they are more likely to escalate commitment.

Entrepreneurs often begin new ventures in order to utilize their particular skills. When the success of the venture is based on the skills of the entrepreneur, there is likely to be a greater sense of self-efficacy; therefore, the entrepreneur is likely to be more committed to the course of action. This suggests the following hypothesis:

H3: The extent to which the entrepreneur expects to use his or her skills in the new business (SKILLS) will be positively related to the percentage of new capital (NEWCAP2) added to the business during the second year.

¹At the time of the first questionnaire, the average firm was about 11 months old, so that the focus upon reinvestment decisions occurs during the subsequent two 12-month periods.

A concept closely related to self-efficacy that has been linked to psychological commitment in escalation situations is self-esteem. Self-esteem is differentiable from self-efficacy in that self-esteem is viewed as an inherent characteristic of individuals that is relatively stable across situations, while self-efficacy is situation-specific. An individual high in self-esteem is more likely to express high levels of confidence about his or her own ability to be successful in a new business venture (Knight and Nadel 1986; Weiss and Knight 1980). One measure of self-esteem may be the extent to which an entrepreneur believes that he or she is more likely to succeed than others in the same kind of business; this propensity may be thought of as a measure of overconfidence. Based on these arguments, we propose the following hypothesis:

H4: The extent of the overconfidence (OVERCONF2) of the entrepreneur will be positively related to the percentage of new capital (NEWCAP2) added to the business during the second year.

Each of the preceding hypotheses has identified specific antecedents of the psychological commitment variable in the escalation model. As noted previously, an additional factor that increases the escalation bias is the psychological process of self-justification evoked when the decision-maker is faced with negative feedback about the initial decision. Thus, we would expect that the escalation predictors will account for more variance in the reinvestment decision when the feedback is negative than when the feedback is positive. Thus, poor performance may trigger the psychological process of self-justification to a greater degree, leading to more escalation bias. This prediction is counterintuitive when considered from a rational or economic perspective in that it argues that entrepreneurs prone to escalation bias will be more likely to reinvest additional resources when they receive negative feedback than when they receive positive feedback. In order to test the self-justification prediction of the theory, we propose the following hypothesis.

H5: The escalation predictors (START, PARTNR, SKILLS, OVERCONF2) will account for more variance in the percentage of new capital (NEWCAP2) added to the business during the second year when the feedback is negative than when the feedback is positive.

Although the basis of escalation theory is that the judgments following failure information are non-rational, there have been attempts to examine the persistence of decision-makers on a failing course of action following multiple successive failures. In early work on the escalation bias, Staw and Fox (1977) reported that subjects who initially escalated commitment following negative feedback tended to change their minds and withdraw from a course of action in subsequent trials in which they were provided with further negative feedback. More recently, McCain (1986) provided further evidence that the escalation effect may disappear after a few trials, and suggested that future research should examine the boundary conditions of the escalation effect. In order to test the belief that the magnitude of the escalation effect will diminish over multiple trials, we propose the following hypothesis:

H6: There will be a learning effect in that the amount of variance accounted for by the escalation predictors at the end of year three will be less than that accounted for at the end of year two.

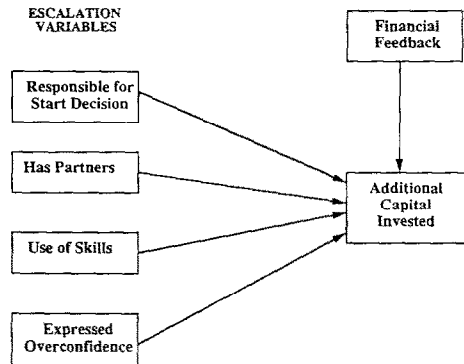


FIGURE 1. Proposed research model.

Escalation Versus Economic Predictors

The specific behavior of interest in the current research is the decision made by the entrepreneur during the first year of business regarding expansion of the asset base of the business. We presume that an entrepreneur may choose to add new capital to the business, reduce investment by withdrawing capital or allowing it to be reduced by losses, or maintain the same investment. From a financial perspective, the decision to reinvest would presumably be based upon the net present value of expected cash flows associated with investing the capital in different alternatives. The decision-maker would only expand the asset base of the firm if the expected cash flows from that investment were attractive, given the perceived risk associated with the investment.

Entrepreneurs probably vary in the extent to which they engage in this kind of systematic analysis. More often they may base investment decisions upon "feel" and general indicators of how their firms are doing (Timmons 1990; pp. 186–187). One indicator is current performance, particularly whether sales are expanding or contracting. In this study, we shall examine the extent to which financial feedback (in the form of first-year sales performance) is related systematically to investment decisions. We shall also examine whether or not the escalation predictors add substantially to the ability to predict investment in the asset base, regardless of financial feedback.

H7: The escalation predictors (START, PARTNR, SKILLS, OVERCONF2) will account for significant variance in the percentage of new capital (NEWCAP2) added to the business during the second year over and above that which will be accounted for by financial feedback (FEEDBACK2).

The research model proposed and tested in this article is presented in Figure 1. In addition to using the financial feedback variable as a comparison with the escalation predictors, it will also be used as a moderator to test the self-justification prediction of the escalation model described previously. Each of the four predictors of escalation described in this research is expected to influence the entrepreneur's reinvestment decision through the psychological commitment caused by the initial choice of venture, the investment of personal funds, and the utilization of skills.

METHODS

Sample

The sample of entrepreneurs is drawn from a three-year longitudinal survey of new businesses conducted in 1985, 1986, and 1987. The first questionnaire was mailed in 1985 to members of the National Federation of Independent Businesses (NFIB); 4814 firms from across the country responded to the survey, but only 2994 firms were less than one and one-half years old.² Thus, the original sample consisted of 2994 owner/managers of new, small firms.³ These firms were mailed follow-up questionnaires in 1986 and 1987. The non-respondents were tracked through the use of postcard, NFIB field data, or indicators that mail could not be delivered. The procedure used in year two was repeated for the third questionnaire in 1987.

We limited the sample to firms with 30 or less employees in order to avoid a few outliers in terms of initial firm size. This gave us a sample of 2953 firms who answered the first survey. Approximately 40% of these firms (1112) responded to the second survey and 28% (826) to the third survey. We used data from years one and two to test all hypotheses, with data from year three also being used to test hypothesis six. The questions used from each of the surveys are in Appendix I.

Variables

The firms were categorized according to whether the entrepreneur started it or became owner/manager through some other means such as purchase or inheritance (START). Firms that had single owners were differentiated from firms in which there were full-time partners as a measure of the public versus private nature of the entrepreneur's decisions (PARTNR). Utilization of skills (SKILLS) was operationalized as the degree to which the entrepreneur went into business in order to use his/her skills and knowledge. START, PARTNR, and SKILLS are variables from the first survey. Overconfidence was measured by the difference between the entrepreneur's perception of the probability that his/her venture would succeed versus the perception he/she had of the probability of ventures in the same business succeeding. OVERCONF2 and OVERCONF3 reflect the measures of overconfidence in years two and three, respectively.

Financial feedback (FEEDBACK2) in year two of the survey was operationalized as the change in sales from year one to year two. This is a direct measure of the feedback from the marketplace. It has advantages over reported profits for very young firms because profits are subject to the entrepreneur's decisions about executive compensation, executive perquisites such as company cars, and the timing of expenditures. There is often a strong desire to minimize profits in order to diminish corporate taxes. Therefore, growth in sales from

²The decision was made to focus on businesses which, on average, were nearing the completion of their first year of operation. Such firms were sufficiently well-established to be well represented in NFIB membership lists, but were young enough that founding characteristics would be fresh in the minds of the founders.

³The sample was compared with a special tabulation run by the Bureau of the Census using data from the *1982 Characteristics of Business Owners*. The tabulation included only those firms formed in 1980 through 1982 and eliminated those whose owners worked in the business 20 hours per week or less and grossed less than \$25,000 annually. The sample was also compared with the data from the *Statistics of Income, 1985*. As many of these tax-paying entities are part-time activities, the sample data were compared with all corporations, partnerships, and proprietorships annually grossing more than \$25,000. Lastly, the sample was also compared with data from *Dun's Business Starts, 1984*, which measures establishment openings, regardless of whether or not they are independent businesses. The detailed results of these comparisons are reported in Cooper et al. (1990, p. 64-67). Based upon these comparisons, this sample appears to have a slight western geographic bias and may also over-represent retail firms. However, overall the sample seems to be broadly representative of new businesses in the United States.

one year to the next gives a more accurate representation of how the firm is doing, particularly for very small firms just getting started.

Reinvestment of new capital (NEWCAP2) was operationalized as the percentage increase or decrease in total assets from year one to year two. NEWCAP3 is the percentage increase or decrease from year two to year three. Thus, we are measuring additional investment in terms of changes in the firm's asset base. The sources of additional funds could be retained earnings, additional investment by owners, increases in trade credit, or increases in debt levels. The addition of debt, even if supplied by outside creditors, often represents further commitment or risk exposure for the entrepreneur. For those businesses organized as partnerships or proprietorships, the entrepreneur is liable for debts of the business. The same is true for corporations if debt is guaranteed by the entrepreneur, a not-uncommon occurrence for young firms.

Because of the accounting relationships between sales and assets, we would expect a positive correlation between financial feedback (change in sales) and changes in the asset base. (A growing firm presumably would require additional investment in facilities and working capital to support that growth.) Our models therefore might be viewed as rather stringent tests of the escalation bias hypothesis. If negative feedback (sales decline) is recorded, then the accounting relationships would lead us to expect a decline in asset base. If this does not occur in any systematic manner, then there is evidence that psychological factors (e.g., escalation of commitment) may be influencing investment decisions.

RESULTS

We tested our hypotheses through the use of five regression models. In the first model the dependent variable was NEWCAP2 and the independent variables were the escalation predictors (START, PARTNR, SKILLS, and OVERCONF2) and financial feedback (FEEDBACK2). This model allowed us to test hypotheses 1 through 4 and hypothesis 7. Models 2 (positive feedback) and 3 (negative feedback) were used to test hypothesis 5. The results of these analyses are presented in Table 1.

The results show strong support for hypotheses 1 and 4, indicating that when entrepreneurs start the business (rather than purchase it) ($t = 4.02, p < .001$), and when they express greater overconfidence in the probability of success ($t = 4.85, p < .001$), they are more likely to expand the asset base of their firms, regardless of the sales growth. Hypothesis 2 predicted that the entrepreneurs who had partners would be more likely to expand the asset base of their firms than would sole owners. Although in the regression analysis this variable is not statistically significant, the direction of the effect is in the predicted direction. We should also note that the zero-order correlation between PARTNR and NEWCAP 2 (Table 2) is statistically significant in a directional (one-tailed) t test. Hypothesis 3 predicted that entrepreneurs who entered the business in order to use their skills were more likely to exhibit the escalation bias. The results of the regression analysis show that SKILLS is not a statistically significant predictor of the percentage of new capital invested. Once again it is worth noting that the relationship between these variables is in the predicted direction.

In order to test hypothesis 5, the escalation predictors were examined using subgroups divided on the basis of whether the financial feedback (FEEDBACK2) they received was positive or negative.⁴ These analyses are presented in Table 1 as model 2 (positive feedback—

⁴A subgroups analysis was chosen to test this hypothesis rather than the testing of separate interaction terms because it was consistent with the distinction proposed by escalation theory, and because it made the results more intuitive.

TABLE 1 Results of Multiple Regression Analyses

Independent variable	Estimated Coefficients (Standard Error)				
	Model 1 NEWCAP2	Model 2 positive feedback	Model 3 negative feedback	Model 4 NEWCAP2	Model 5 NEWCAP3
START	16.947 ^c (4.56)	16.094 ^b (6.08)	16.803 ^a (7.24)	14.39 ^c (3.84)	4.99 (0.99)
PARTNR	4.372 (4.72)	0.385 (6.14)	16.978 ^a (7.79)		
SKILLS	0.626 (2.28)	0.581 (3.02)	2.182 (3.60)		
OVERCONF2	4.419 ^c (0.89)	5.173 ^c (1.19)	3.432 ^a (1.43)	4.39 ^c (.75)	.99 ^a (.45)
FEEDBACK2	-0.004 (0.01)				
Multiple R	.22	.21	.29	.21	.14
Adjusted R square	.04	.04	.07	.04	.02
F statistic	8.632 ^c	6.986 ^c	4.509 ^b	25.79 ^c	5.69 ^b

^ap < .05 level.^bp < .01 level.^cp < .001 level.

growth in sales) and model 3 (negative feedback—decline in sales). Although the difference is not large, the results show that under negative feedback the escalation variables account for more variance (higher multiple R) in NEWCAP2 than under positive feedback. Although there is no statistical test for the significance of the difference between multiple Rs, this result is in the direction predicted, indicating that a self-justification process may also be contributing to the escalation bias.

The escalation variables that accounted for statistically significant variance in model 1 (START and OVERCONF2) were used in the fourth and fifth models to test whether a learning effect exists as stated in hypothesis 6. START and OVERCONF2 were regressed on NEWCAP2 and NEWCAP3 (Table 1). Although the escalation variables account for a

TABLE 2 Correlation Matrix

	START	PARTNR	SKILLS	OVERCONF2	FEEDBACK2	NEWCAP2	NEWCAP3	OVERCONF3
PARTNR	.029							
SKILLS	-.098 ^b	-.015						
OVERCONF2	.071 ^a	.086 ^b	.061 ^a					
FEEDBACK2	.003	.082 ^a	-.004	.048				
NEWCAP2	.127 ^b	.057	.023	.183 ^b	.035			
NEWCAP3	.094 ^b	.030	.015	.102 ^a	.171 ^b	.267 ^b		
OVERCONF3	.042	.016	.072 ^a	.529 ^b	.025	.081	.041	
MEAN	1.36	1.30	1.63	2.54	48.75	23.05	12.23	2.59
SD	.48	.46	.95	2.44	365.99	60.94	29.56	2.52

^ap < .05 (two-tailed) level.^bp < .01 (two-tailed) level.

significant proportion of the variance in new capital investment during both the second and third years, the proportion is smaller during year three, as expected. The significance levels of both variables decrease from the second to the third year.

Hypothesis 7 suggested that the escalation variables would account for significant variance in the percentage of new capital invested in the business over and above the variance accounted for by a financial indicator of performance (sales growth) in the first year. Surprisingly, financial feedback (FEEDBACK2) was not significantly related to the percentage of new capital invested (NEWCAP2), indicating that sales growth did not play a role in the entrepreneurs' decision to expand the asset base of their firms. This result, indicating that the escalation variables did account for significant variance in the decision to invest new capital, provides support for hypothesis 7.

The literature on escalation bias suggests that the type of overconfidence expressed by entrepreneurs and measured in this study is a typical outcome of the cognitive process of self-justification. According to escalation theory, the initial decision by the entrepreneur to embark on a new venture would induce the initial commitment. As noted earlier, we expected that those who started a business would exhibit a higher level of commitment than those who did not. The self-justification mechanism is triggered by the receipt of negative feedback about that initial decision. This self-justification process would lead to higher levels of overconfidence.

The results presented thus far show that the entrepreneur who starts a business, and expresses overconfidence about its chance for success, will exhibit an escalation bias in subsequent decisions regarding the expansion of the asset base of the business. They further show that when the financial feedback in the first year is negative, this tendency to escalate is greater. An interesting question relevant to understanding the entrepreneur's decision process over time concerns the expressed levels of confidence in subsequent years. For example, a rational model of decision-making would suggest that an entrepreneur would express more overconfidence following positive financial feedback than he or she would following negative financial feedback. On the other hand, the self-justification hypothesis in escalation theory would predict that when an entrepreneur is responsible for starting the business and receives negative financial feedback he or she would express more overconfidence.

In order to examine these predictions, the data were coded in a 2×2 (START by FEEDBACK2) matrix with feedback being coded as either positive or negative. The overconfidence levels (OVERCONF3) of the entrepreneurs in year three is used as the dependent variable of interest. FEEDBACK2 is used in this analysis to establish a time lag between the receipt of feedback and the expression of overconfidence in year three. The means for each of the cells and a two-way ANOVA are presented in Figure 2. The results indicate that neither of the main effects was significant, but that the interaction term was statistically significant ($F = 5.81, p < .05$). The lack of a significant main effect for FEEDBACK2 suggests that the prediction of a rational model (described above) was not supported. The significance of the interaction term is consistent with the predictions of escalation theory, and are further verified by an examination of the specific cell means. A planned contrast between cells 1 and 4 indicates a statistically significant difference in mean levels of overconfidence ($t = 2.91, df = 140, p < .01$). Specifically, entrepreneurs who started a business and received negative financial feedback in the second year expressed significantly higher levels of overconfidence in year three than did entrepreneurs who purchased a business and received negative financial feedback. It is interesting to note that entrepreneurs who started a business and received negative financial feedback expressed higher levels of ov-

	Negative Feedback	Positive Feedback
Started	M = 3.27 SD = 2.09 N = 77 1	M = 2.85 SD = 2.48 N = 247 2
Purchased	M = 2.11 SD = 2.67 N = 65 4	M = 2.87 SD = 2.56 N = 139 3

Analysis of Variance: Overconfidence3 by Start and Feedback2

Source of Variation	Sum of Squares	DF	Mean Square	F	Sig.
Feedback2	0.78	1	0.78	0.13	.72
Started	12.41	1	12.41	2.03	.16
Interaction	35.47	1	35.47	5.81	.02
Residual	3200.65	524	6.108		

T-Test: Overconfidence3 by Start versus Purchase with Negative Feedback2

cell 1 vs cell 4

t	df	p
2.91	140	.004

FIGURE 2. Overconfidence3 by Start and Feedback2.

erconfidence ($M = 3.27$) in the subsequent year than entrepreneurs who received positive feedback ($M = 2.85, 2.87$).

DISCUSSION

In developing the hypotheses of the study, we argued that four escalation variables would account for the new capital invested in the business during the second year. The results provide strong support for two of the predictors. The extent of overconfidence of the entrepreneur is consistently the strongest predictor of new capital invested. This finding suggests that when entrepreneurs express a level of confidence that exceeds their own beliefs about the norms for success, it may be the clearest signal that a significant level of psychological commitment has been made and that the individual may be at risk of escalation bias in future decisions.

The variable START was also consistently related to new capital invested across each of the models. The literature on escalation provides clear evidence that the behavior of starting a business is much more likely to induce psychological commitment than acquiring the business by other means, principally because the act of choosing the specific nature of the business is much more salient in a start-up. The initial choice is a significant antecedent of the escalation bias (Staw 1976; Staw and Ross 1987; Schoorman 1988; Schoorman and Holahan 1988). The significance of the START variable has different practical implications for entrepreneurship than does the overconfidence variable. While overconfidence is a psychological variable that we could train (or at least advise) entrepreneurs to avoid or guard

against, the act of starting a business is an inherent part of the entrepreneurial process. It is interesting to note that those who started a business were marginally more overconfident than their counterparts who acquired a business through other means. This correlation is statistically significant (Table 2), but is small in this sample and therefore should not be overstated. However, future research should investigate the causal relationship between these two variables.

The hypotheses regarding SKILLS and PARTNR were not supported. One possible explanation of the lack of significant findings regarding the SKILLS variable may be the restriction in range of this variable generally observed in an entrepreneurial sample. In the present sample, 60% of the respondents indicated that the use of their skills and abilities was a "very important" factor (the highest category) in determining whether or not they went into business.

Although the hypothesis regarding PARTNR was not supported, as noted, the zero-order correlation between PARTNR and NEWCAP2 is in the predicted direction ($r = .06$, $p < .05$, one-tailed). Thus, entrepreneurs with partners may be more likely to expand the asset base of their firms than they would be if they were sole owners. This has significant implications for entrepreneurial teams, in that the presence of partners does not inhibit the tendency to escalate, but in fact increases that tendency. This means that having partners is not insurance against the tendency to escalate. This is consistent with the research on escalation (Bazerman et al. 1984).

Hypothesis 5 of the study examined an issue that has more theoretical interest to researchers than practical significance to entrepreneurs. The literature on escalation argues that when negative feedback follows the initial decision, the self-justification process activated increases the magnitude of the escalation bias. This is counter to rational decision theory, which would argue that positive feedback would reinforce the commitment more than negative feedback. The results support the escalation prediction in that the model accounts for more variance under negative feedback. It should be emphasized that the research on escalation does not suggest that reinvestment in courses of action following negative feedback is necessarily non-rational. In the escalation paradigm, the definition of the escalation bias is the difference in allocation behavior between decision-makers responsible for the initial investment decision (experimental group) and those who are not (control group). In both cases the decision-makers would have received the same feedback and the difference in behavior is attributable to the psychological commitment rather than the feedback. The research does suggest that the differences between groups are larger when the feedback is negative.

A puzzling finding was the lack of any relationship between financial indicators from the previous year and new capital invested in the business. In other words, there was no systematic relationship between sales growth and expansion of the asset base for these young firms. This may mean that many of these firms started with some excess capacity so that it was not necessary to add to facilities to support their early growth. It may also mean that management of working capital was erratic. On the other hand, the psychological factors predicted by escalation theory did, in two of four cases, show systematic relationships to additional investment.

A limitation of the study that should be noted is the relative lack of control that a field study of this nature provides. In addition, the data available through a broad survey of this nature do not often provide the best measures of the psychological variables of interest. Future research should attempt to focus more specifically on the escalation predictors and

measure these variables using multiple approaches. The use of a more restrictive sample in which many of the exogenous variables are common to all organizations would also provide more control than is possible in the present context.

One final issue worth comment is the relatively small amount of variance accounted for by the models described in this study. The variance accounted for in this research is in line with the findings in similar studies of escalation. In a recent field study of the escalation bias, Schoorman (1988) reported that the escalation bias accounted for 6% of the variance in performance ratings. Schoorman (1988) noted in this article that the escalation variables were more powerful predictors of performance (at 6%) than a measure of ability used in a validated selection test for these same employees. One implication of the small amount of variance in reinvestment decisions that was predicted by the escalation variables in this study is that it is likely that other variables not included in the present study contribute to the entrepreneur's decision to reinvest. These variables include those relating to financial management (terms of purchase and terms of sale, control of accounts receivable and inventory, lease versus buy decisions, etc.) as well as other variables bearing upon expansion decisions (market opportunities, interest rates, etc.). As the escalation predictors included in this research were those that would lead a psychological commitment to a course of action (and are uncorrelated with the omitted variables), it is unlikely that any of the omitted variables would have changed the predictive validity of the escalation variables.

Taken together these findings provide support for the view that escalation bias is a significant and common problem in decision-making among entrepreneurs. The characteristics of entrepreneurs and the nature of the decisions they are required to make leave them particularly vulnerable to escalation bias. Efforts to train entrepreneurs to guard against this bias may be very valuable.

CONCLUSIONS

Reinvestment in the business is not necessarily good or bad even in the face of disappointing financial feedback. In many cases, new businesses take time to get off the ground and so are likely to experience a period of negative feedback. The purpose of this article was not to say that reinvestment following negative feedback is a wise or unwise decision by entrepreneurs. Rather, there are certain factors that predispose entrepreneurs to reinvest that may not be relevant to the success or failure of the business.

The presence of escalation bias means that the entrepreneur is affected by psychological factors in addition to (or perhaps more than) objective or economic factors. Further, it would be reasonable to suspect that individual entrepreneurs as well as teams are affected by the tendency to escalate. Entrepreneurs should recognize that this tendency is natural and deal with its potential negative consequences by seeking independent opinions in major decisions. Outsiders will neither feel as much personal responsibility for the original decision to enter the business, nor will they feel the need to justify their decisions in light of negative feedback. Advisors to entrepreneurs should also realize that the tendency to escalate exists and is natural. With this knowledge, they will be less likely to be swept along by the entrepreneur's enthusiasm and tendency to escalate. Thus, they may be able to help the entrepreneur reach more well-balanced decisions. Finally, the implication of this study for researchers of the entrepreneurial process is that entrepreneurial decisions are affected by psychological as well as economic factors. Models and theories will continue to be incomplete until the psychological factors are incorporated and explored.

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APPENDIX 1 Survey Questions

First Year Questions:

1. What do you estimate that your gross sales or revenues were/will be in your first year of business?
\$ _____ ?
2. How did you become owner or principle manager of your present business?

[1] Started it	[4] Promoted by other owners
[2] Purchased it (not from family)	[5] Brought in by other owners
[3] Inherited it or purchased it from family	[6] Other _____
3. What percent of this business do you (including your spouse and children) own?

[1] Prefer Not Answer	[3] 75%-99%	[5] 25%-49%
[2] 100%	[4] 50%-74%	[6] under 25%
4. How important was using your skills and abilities in your decision to go into your own business? (Indicate the degree of importance on a scale of 1 for "Very Important" to 5 for "Not Important")

Very Important					Not Important
1	2	3	4	5	
5. What are the odds of any business like yours succeeding, e.g., 1 chance in 10, 2 chances in 10, etc?

No chance of success									Certain chance of success	
0	1	2	3	4	5	6	7	8	9	10

Second Year Questions:

6. About what were your firm's gross sales or revenues during the last twelve months or during the last fiscal year? \$ _____ ?
7. What are the odds of your business succeeding, e.g. 1 chance in 10, 2 chances in 10, etc?

No chance of success									Certain chance of success	
0	1	2	3	4	5	6	7	8	9	10
8. Comparing the total assets of the firm today to the assets of the firm twelve months ago, about how much have total firm assets changed during the last twelve months? (Total assets include the value of all equipment, buildings, vehicles and land owned by the firm as well as cash, inventories and supplies and accounts receivable.)

[1] Increased	[2] Stayed about the same	[3] Decreased
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9. If "increased" or "decreased," by approximately what percentage? _____%

Third Year Questions:

10. About what were your firm's gross sales or revenues during the last twelve months or during the last fiscal year? \$ _____ ?
11. What are the odds of your business succeeding, e.g. 1 chance in 10, 2 chances in 10, etc?

No chance of success									Certain chance of success	
0	1	2	3	4	5	6	7	8	9	10
12. Comparing the total assets of the firm today to the assets of the firm twelve months ago, about how much have total firm assets changed during the last twelve months? (Total assets include the value of all equipment, buildings, vehicles and land owned by the firm as well as cash, inventories and supplies and accounts receivable.)

[1] Increased	[2] Stayed about the same	[3] Decreased
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13. If "increased" or "decreased," by approximately what percentage? _____%

Note: All variables were recoded such that a positive correlation is consistent with the hypothesis.