

# Financial Budgets and Escalation Effects

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**Escalation effects are instances in which a decision maker continues to commit resources to a losing course of action, solely because prior resource allocations have been made. The research described in this article examined the potential influence of financial budgets on such escalation effects. Determining such influences is important for a variety of reasons, including the prevalence of budgets in almost all real-world organizations where escalation effects would, in principle, significantly compromise the organizations' welfare. The results of five studies employing undergraduates and part-time master's degree students with working experience demonstrated the following: (a) the mere existence of financial budgets does not in and of itself affect the incidence of escalation effects; (b) escalation effects occur among experienced participants even when explicit future costs and benefits are provided; (c) the prospect that making additional investments to escalate commitment to a project would overspend a budget tends to reduce significantly decision makers' tendencies to exhibit escalation effects; (d) even when investment expenditures would not exceed overall budget limits, the prospect of overspending the budget for a substage of a multistage investment project has the same suppressive influence on escalation effects as the prospect of overspending an**

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**entire budget; and (e) a side effect of the use of budgets is that they can induce decision makers to eschew investment opportunities that generate net benefits. There is also evidence that the prospect of exceeding a budget introduces two mechanisms into participants' decision-making processes—more marginal cost-benefit reasoning and greater sensitivity to proscriptive consequences of exceeding a budget. Implications are discussed.**

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According to commonly accepted normative principles, decisions should be predicated on their prospective future consequences; everything else should be irrelevant. Nevertheless, there are numerous well-documented instances in which people's actual decision behavior appears to violate such principles systematically (cf. Baron, 1994). Escalation effects provide an important example. These are cases of the phenomenon in which the decision maker decides to invest additional resources to a losing course of action simply because prior investments have been made in the past. This effect, along with closely related phenomena, has been referred to in the literature as escalating commitment (Staw, 1976), the sunk cost effect (Arkes & Blumer, 1985), entrapment (Brockner & Rubin, 1985), or persistence (Northcraft & Neale, 1986). Escalation effects have been explained using prospect theory (Thaler, 1980; Kahneman & Tversky, 1979), self-justification concerns (Staw, 1976), reputation considerations (Fox & Staw, 1979; Kanodia, Bushman, & Dickhaut, 1989), and the desire to avoid wasting resources (Arkes & Blumer, 1985; see also Arkes, 1996).

The focus of the present research was on financial budgets and their impact on escalation effects. Specifically, we examined how the prospect of exceeding a financial budget may moderate the incidence of escalation effects. Escalation effects generally entail investment of financial resources, and such investments typically involve the use of financial budgets that are designed to control and monitor resource expenditures. By one estimate, financial budgets are employed in over 90% of American companies (cited by Horngren, Foster, & Datar, 1997). Yet, the psychological effects of financial budgets on escalation effects are not well understood.

A financial budget has been defined as "a quantitative expression for a set time period of a proposed future plan of action by management" (Horngren, Foster, & Datar, 1997, p. 176). The budgeted amount is the amount of funds planned for a project or expenditure. The budget has been viewed as a control device to govern expenditures, or as a precommitment device to expend resources on desirable activities (Thaler, 1980). In organizations, budgets are set for investment projects for the express purpose of controlling costs, inducing vigilance in the use of resources, and enabling investigations into deviations from plans (Horngren et al., 1997).

Investments that are made within the context of financial budgets have two

primary distinctive features. The first feature is that there is a need to justify budget overruns. The budgetary process is highly formalized within organizations, and organizational protocol requires that requests for additional funding beyond that already included in a budget must be accompanied by appropriate justifications citing the merits of the investment. The second feature is that sanctions (e.g., poor performance evaluations) are likely to be imposed by a manager's superiors should the manager exceed a budget without valid reasons (e.g., see Hopwood, 1976; Kanodia, 1993).

These two organizational practices associated with the use of financial budgets are likely to influence the thought processes of managers when they contemplate making additional investments that entail exceeding a budget. One cognitive mechanism that can be invoked is increased marginal cost–benefit thinking (Larrick, Nisbett, & Morgan, 1993). Both the need to justify budget overruns and the sanctions associated with exceeding the budget without good reasons require that the manager provide justifications that are defensible and suggest heightened marginal cost–benefit thinking. Another mechanism that can be invoked is a proscription concern about exceeding a budget, even if there are valid marginal cost–benefit reasons for undertaking the investment. Despite the best intentions, there is a risk that the planned investment (made from funds beyond those budgeted for) may turn out to be unfavorable or may be assessed by a superior as failing to meet expectations (e.g., see Baron & Hershey, 1988; Lipshitz, 1989). A decision maker with proscription concerns is loathe to face the sanctions associated with exceeding the budget and therefore gives strong consideration to a decision rule which says “avoid any investment that causes a budget to be exceeded.”

These organizational features and associated mechanisms related to the use of financial budgets provide guidance on how financial budgets can influence the incidence of escalation effects that have been documented in prior research. Consider a typical escalating commitment setting used in past studies where the decision maker continues to commit resources to a failing project with inferior prospects, merely because prior resources have been invested in that project (e.g., Arkes & Blumer, 1985). These settings have generally not incorporated the presence of a financial budget. Suppose the decision maker is now made aware that the investment decision *is* to be made within the context of a financial budget, as is the case in a typical business setting. We anticipate that the two mechanisms associated with the use of a financial budget—marginal cost–benefit thinking and proscription concerns—would lead to appropriate project termination, but under specific circumstances. In the case where additional investments do not entail exceeding the budget, we do not expect heightened marginal cost–benefit thinking and/or proscription concerns. As a result, escalation effects are not likely to be attenuated in this case. In contrast, where the additional investment threatens to exceed the budget, these two mechanisms are likely to be invoked. Marginal cost–benefit analysis would reveal to the decision maker that the additional investment should not be made because the project is unprofitable. Likewise, proscription concerns about

exceeding the budget would also lead to the decision to halt additional investments. Under such circumstances, escalation effects should be reduced. What if the additional investment exceeds the budget (as in the above situation) but the marginal benefit exceeds the marginal cost? Marginal cost–benefit thinking would lead to continued investment in the project, while proscriptive concerns would lead to project termination (regardless of the merit of the project). Because marginal cost–benefit thinking and proscriptive concerns suggest opposite courses of action here, premature termination of a project is a possibility if proscriptive concerns dominate. In a series of five related experiments, we test whether financial budgets do indeed act as constraints on escalation (and de-escalation) effects, and we provide evidence on the incidence of these two mechanisms in the context of financial budgets.

Financial budgets are related to but qualitatively different from other factors that have been examined in prior literature. For example, financial budgets can be viewed as limits in that they represent bounds on *planned* funds for a project. However, they are not strict monetary limits, and earlier studies that examine such monetary limits may not be fully informative about how budgets work (e.g., Brockner & Rubin, 1985; Brockner, Shaw, & Rubin, 1979). For instance, in the studies by Brockner and Rubin (1985), participants were typically provided with fixed monetary amounts to bid for an object—they could not make bids that exceeded the funds they had, and they had no choice but to terminate their escalation should they exhaust those funds. Further, participants kept any unspent funds, so there were added incentives for these individuals to de-escalate and keep the money for themselves. Real-life financial budgets in major corporations are not used this way. Project managers do not keep funds from unspent budgets (and new budgets are generally set for new projects). Financial budgets are, therefore, not irrevocable limits that cannot be exceeded. Investments beyond those originally budgeted are possible, with valid justifications.

Financial budgets are also likely to be related to the notion of personal, self-set limits (Brockner & Rubin, 1985) and mental budgets (Heath, 1995). Brockner and Rubin's (1985) experiments demonstrated that decision makers adhere to limits that they generate themselves. Similarly, Heath (1995) proposed that decision makers spontaneously set mental budgets, monitor their expenditures against these budgets, and stop investments when these mental budgets are exceeded. Because mental budgets are, by definition, unobservable and their magnitudes cannot be directly manipulated, Heath (1995) provided an indirect test of the effects of exceeding a mental budget by showing that people stopped investing later on projects with higher break-even points. An important feature distinguishes financial budgets from self-limits and mental budgets: as a control mechanism within the organization, the decision maker's superior has the final say in the budget-setting process, even in instances where the decision maker negotiates or participates in creating the budget. Absent this feature, agents may not spontaneously self-generate prudent or tight mental (financial) budgets or limits to control their spending. This argument also applies to the "goal setting" condition in Simonson and Staw's (1992)

study, where they found that the requirement for participants to self-generate future sales estimates reduced escalation effects.

Is there prior empirical evidence about the possible influence of financial budgets on decision makers' investment decisions? Several studies have included budgets in the scenarios participants were asked to consider. For instance, investment expenditures on failing projects have been found to be related to the proportion of the financial budget that has been expended (e.g., see Garland & Newport, 1991). It is worth noting that all the conditions in these studies involved situations where the budget was not exceeded. The scenario employed by Northcraft and Neale (1986) also involved financial budgets. However, all the conditions of their experiment entailed exceeding the budget. In summary, it seems difficult to draw conclusions about the possible impact of exceeding a budget on escalation effects because no previous study has actually manipulated the factor whereby additional investment exceeds or does not exceed financial budgets.

The studies reported in this paper sought to close gaps in our knowledge about budget influences on escalation effects by pursuing the following questions: (a) Does the use of financial budgets affect the incidence of escalation effects, suggesting that such effects are in some real-life circumstances more (or less) of a problem than in others?; and (b) what might be the negative side effects or risks of using budgets for such purposes? Altogether, we conducted five related studies. Studies 1 and 2 were conducted using undergraduate students as participants, while the remaining three studies used part-time master's degree students with fairly substantial working experience. Studies 1 and 2 examined how financial budgets, which naturally come in the form of single and multiple stages within organizations, can reduce escalation effects. Specifically, Study 1 showed that escalation effects were reduced when additional investments entailed exceeding a single-stage budget. Study 2 demonstrated that the prospect of exceeding a substage of a multistage budget achieved the same effect as in Study 1. Studies 3 and 4 were replications of Studies 1 and 2 with two exceptions: part-time MBA students (with a good amount of working experience) were used as participants, and they were provided with explicit future sales benefits. Finally, Study 5 identified a side effect of using budgets as a control device—premature de-escalation can occur. These studies also provided evidence on mechanisms responsible for these effects—that the prospect of exceeding a budget encourages the use of marginal cost–benefit thinking and increases sensitivity to proscription concerns about overspending a budget.

We first describe Studies 1 and 2. Participants for Studies 1 and 2 were from the same undergraduate student population in two major universities in Singapore, and they were randomly assigned to the experimental conditions at the same time to enable comparisons across studies. Consistent with prior studies that have documented escalation effects (e.g., Arkes & Blumer, 1985; Northcraft & Neale, 1986), we employed an experimental approach wherein participants considered hypothetical investment scenarios. Participants responded to settings where a budget had been set for the investment, prior investments had been either committed or not, and additional investments

would either be within or exceed the budgeted amount. The experimental conditions are summarized in Panel A of Table 1, and they will be described in detail as each study is presented.

### STUDY 1

The primary purpose of Study 1 was to provide a direct test of the effects of prospective budget overruns on escalation effects. Participants in all conditions envisioned themselves in investment situations for which, as is typically the case in reality, there was a financial budget. Consistent with prior studies (e.g., Arkes & Blumer, 1985; Heath, 1995), we attempted to induce escalation effects by varying whether the decision maker had made prior investments in the project. As shown in Panel A of Table 1, in one condition, the decision maker had made no prior investment and the prospective investment would not force costs to exceed the budget (Problem 1A). In Problem 1A, the cost to start and complete the project was \$3 million, which was equal to the available budgeted funds. A second condition was identical except that a previous investment (the usual prerequisite for escalation effects) amounting to \$7 million had been made (Problem 1B).<sup>1</sup> The cost to complete the project was \$3 million, as was the case in Problem 1A. In Problem 1B, the total budgeted funds amounted to \$10 million; however, because \$7 million had already been invested, the budgeted funds available for future investment was \$3 million (the same amount as that in Problem 1A). The third and fourth conditions involved the key manipulations, manipulations that have not, to our knowledge, been examined in previous related studies. These conditions also entailed a prior investment, but the prospective additional investment would cause total costs to exceed the budget by either \$2 million (Problem 1C) or \$5 million (Problem 1D). In Problem 1C, the budget had not been exceeded at the point when additional investments were required, but it would be exceeded with the additional investment. We anticipated that the specter of exceeding a budget would reduce participants' inclinations to make the investment. Problem 1D featured a situation where, at the point when additional investments were to be decided upon, the budget had already been exceeded. Given that the budget had been exceeded, organizational norms suggest that the entire project would be under scrutiny and justifications would be required; this prospect of having to make justifications should heighten marginal cost-benefit thinking and dampen escalation. Note that in Problems 1B, 1C, and 1D involving prior investments (and related problems in the ensuing studies), the magnitudes of the prior investment and additional investments needed to complete the project were always held constant at \$7 million and \$3 million, respectively. Budgeted funds available for future investments were varied across problems to manipulate

<sup>1</sup> It is also possible to manipulate escalation effects by varying the amount of personal responsibility of the decision maker (e.g., Staw, 1981) or the extent to which the project is close to completion (Conlon & Garland, 1993). The common feature among these manipulations is that the decision maker has made some prior investment of resources in the project.

**TABLE 1**  
**Summary of Problems Used and Results**

Problem	Study 1				Study 2		Study 3			Study 4.1		Study 4.2		Study 5		
	1A	1B	1C	1D	2A	2B	3A	3B	3C	4A	4B	3B	4A	5A	5B	5C
<i>Panel A: Problem features</i>																
Magnitude of prior investment (\$ millions)	0	7	7	7	7	7	0	7	7	7	7	7	7	0	7	7
Costs needed to complete project (\$ millions)	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Future sales	—	—	—	—	—	—	2	2	2	2	2	2	2	5	5	5
Budgeted funds—Stage 1 (\$ millions)	3	10	8	5	5	9	3	10	8	5	9	10	5	3	10	8
Budgeted funds—Stage 2 (\$ millions)	—	—	—	—	5	1	—	—	—	5	1		5	—	—	—
<i>Panel B: Results</i>	<i>Undergraduate participants</i>						<i>Part-time master's participants (average working experience = 7 years)</i>									
Percentage accepting (%)	20.0	88.0	48.4	50.0	47.0	57.1	18.5	63.0	25.9	32.1	40.7	71.4	38.1	21.7	72.0	44.4
Total sample size	30	25	33	28	34	35	27	27	27	28	27	21	21	23	25	27

the extent to which the budget was exceeded. This design enabled us to keep the total (as well as marginal) costs and benefits constant, while varying the extent of budget overruns.

## Method

### *Participants*

Participants were 116 undergraduates with backgrounds in arts, science, and engineering from two universities in Singapore. They were randomly assigned to answer one of the four problems described below, involving variations in the nature of the budget and the existence of prior investments.

### *Problems*

*Problem 1A.* In this condition, participants read the following problem.

Your company is about to embark on a new project—a mobile phone that allows communication to be made within 500 miles. No costs have been incurred to date.

Below is a summary of the financial data for the project:

Total funds budgeted for project \$3,000,000

Costs to start and complete project \$3,000,000.

As indicated above, you would require \$3,000,000 to start and complete the project. At this point in time, one of your competitors has come out with a superior mobile phone that is lighter, can communicate within 1000 miles, and has a selling price that is not significantly different from your own model.

*Problem 1B.* Problem 1B was similar to Problem 1A, except that the project had already started and the following financial data were presented:

Total funds budgeted for project \$10,000,000

Total costs incurred to date \$7,000,000

Costs to complete the project \$3,000,000.

*Problem 1C.* In this condition, participants read the same information as in Problem 1B except that they were told that the total funds budgeted for the project were \$8 million.

*Problem 1D.* In this condition, participants read the same information as in Problem 1B except that they were told that the total funds budgeted for the project were \$5 million.

## Results

Table 1, Panel B, summarizes the participants' responses in the various conditions. Significantly more participants decided to continue with the project when there was a prior investment and the additional investment would not



entail exceeding the budgeted funds (Problem 1B) than when no prior investments had been made (Problem 1A);  $\chi^2(1) = 25.23$ ,  $p = .001$ . These results replicated the findings of prior studies on escalation effects, and they suggest that when budgets are not mentioned (as in the study by Arkes & Blumer, 1985), participants assume that the budget will not be exceeded (as in our Problems 1A and 1B, where the scenario indicates that the budget will not be exceeded). Our results also suggest that the mere presence of a budget does not reduce escalation effects. On the other hand, even when there were prior investments, the proportion of participants proceeding with the project was lower in Problem 1C (when the additional investment would exceed the financial budget) than in Problem 1B (when the budget would not be exceeded);  $\chi^2(1) = 9.83$ ,  $p = .002$ . This analysis shows that the prospect of exceeding a budget is successful in constraining escalation effects. There was also a significantly higher proportion of participants who continued with the investment project in Problem 1C than in Problem 1A ( $\chi^2(1) = 5.61$ ,  $p = .02$ ), suggesting that the prospect of exceeding a budget can reduce but not eliminate escalation effects.

Similar results were obtained in Problem 1D, where, at the point when additional investments were to be decided upon, the budget had already been exceeded. Under these circumstances, the percentage of participants continuing with the investment was virtually identical with that obtained in Problem 1C, where the budget was \$8 million. These results suggest that the point when the budget is exceeded does not matter.

## STUDY 2

Study 1 reconfirmed that the mere existence of a budget is insufficient for eliminating escalation effects. More importantly, it also demonstrated that the prospect of exceeding a budget actually can reduce the kinds of escalation effects that otherwise would be observed. In Study 1, participants were presented with single-stage budgets for the entire life of the given project. In real-life business practice, budgets are often broken into two or more stages, e.g., with a budget for each quarter of a given fiscal year. Thus, in the interests of establishing generality, it is important to consider whether the conclusions indicated in Study 1 would apply to situations involving multiple-stage budgets as well.

The impact of multiple-stage budgets has considerable significance. The results of Study 1 suggest that a manager might be able to control subordinates' escalation effects by presenting them with a total budget whose size is, perhaps, smaller than what is actually required for project completion (e.g., \$8 million rather than \$10 million). Such a duplicitous approach has obvious hazards. But given the dampening influence of prospective budget overruns on escalation effects in Study 1, we expect dampening influences with respect to an overall budget that is partitioned into multiple segments. We consider two types of two-stage budgets. The first type involves a situation where the budget has been exceeded in Stage 1, but additional future investments would not exceed the budget allocated for Stage 2. Given that the budget had been exceeded at

Stage 1, it is likely that the entire project could be under scrutiny throughout the rest of the project. This could induce more vigilant cost–benefit thinking among decision makers when they consider further investments in Stage 2 and reduce escalation effects. The second type of two-stage budget involves a situation where the budget has not been exceeded in Stage 1, but additional future investments would entail exceeding the budget allocated for Stage 2. Here, both the marginal cost–benefit thinking and the proscription concerns discussed earlier would suggest that escalation effects be curtailed. Study 2 was designed to test these predictions.

### Method

The problems used in this study were similar to Problem 1B in that they involved a prior investment of \$7 million and the total budget was \$10 million in all instances. The difference was that the total budget of \$10 million was split into two parts. For Problem 2A, the budget was \$5 million in each stage; here, the budget was exceeded in Stage 1 but not in Stage 2. For Problem 2B, the budgets for Stages 1 and 2 were \$9 million and \$1 million, respectively; here, the budget was not exceeded in Stage 1 but would be exceeded in Stage 2 with the additional investment. Sixty-nine undergraduates from the same population used in the other two studies participated in this study.

### Results

We first compared the results obtained for Problem 1B and Problem 2A. Notice that whereas 88.0% of the participants continued with the investment in Problem 1B (involving a single-stage budget which was not exceeded), only 47.0% did so in the two-stage budget problem ( $\chi^2(1) = 10.59, p = .001$ ). The results are striking in that the two problems are literally identical except that Problem 2A has a two-stage budget. Yet, the sunk cost was obviously dominant in the single-stage budget situation and reduced in the two-stage budget situation.

We also compared responses to Problem 2A with those to Problem 1C, which involved a single-stage budget, and where additional investments entailed exceeding the budget. The percentage of the participants continuing with the investment in Problem 1C (48.4%) was not different from that in Problem 2A (47.0%),  $\chi^2(1) = 0.01, ns$ . Finally, the percentage of participants continuing with the investment in Problem 2A was significantly higher than that in Problem 1A (where no sunk cost was involved);  $\chi^2(1) = 5.17, p = .03$ . These results suggest that a two-stage budget can reduce but not eliminate escalation effects.

The previous analyses clearly demonstrate that, when an initial budget stage in a two stage budget has already been exceeded, this can reduce escalation effects in further investment decisions. But suppose that, at the time such a decision is being contemplated, no stage budget has been overspent yet the required further investment would exceed such a budget. Would this prospect of exceeding a stage budget have the same suppressive influence on escalation

effects? Participants' responses to Problem 2B permit an answer to this question. In Problem 2B, the budget was not exceeded in Stage 1 but would be in Stage 2 (even though the entire budget of \$10 million would not be overspent). Results showed no significant difference in the responses for Problems 2A and 2B,  $\chi^2(1) = 0.70$ , *ns*. This result suggests that, with respect to reducing escalation effects using a two-stage budget, *when* the budget is exceeded does not matter; what matters is that the budget is exceeded during one of the stages.

### Discussion

Studies 1 and 2 demonstrated that insights on the operation and control of escalation effects can be obtained by incorporating a real-world feature—financial budgets—into experimental designs. Our results showed that the mere existence of a budget does not reduce escalation effects. Rather, when further investments involve exceeding a budget, escalation effects are constrained but not eliminated. Furthermore, projects that have multiple stages (with associated budgets at each stage) are effective in reducing escalation effects.

The studies described above employed undergraduate students as participants, and it is unclear whether the results obtained would generalize to people with working experience. Certainly, experienced professionals should be more cognizant of organization norms (e.g., sanctions involved and/or justifications needed when budgets are exceeded) and should recall relevant organizational experiences in responding to our scenarios. Should the results in Studies 1 and 2 be replicated using participants with working experience, we would be more confident in their generalizability. In addition, although the project was described as an unfavorable one, information on the specific future benefits of the project was not provided and controlled for. Heath (1995) has shown that provision of explicit estimates of future benefits can reduce escalation effects among undergraduates. Also, because participants' explanations for their decisions were not collected in Studies 1 and 2, we do not have insights on their decision rationales.

To address the issues discussed above, we conducted additional studies, Studies 3 and 4 (comprising Study 4.1 and Study 4.2), that used scenarios similar to those used in Studies 1 and 2, with the following modifications. First, we used part-time master's degree students who had fairly substantial business experience. Second, we provided participants with explicit estimates of future benefits and opportunity cost information to provide a stronger test of the existence of escalation effects (and the moderating role of financial budgets). Specifically, future benefits information suggested that the existing project was unattractive, and opportunity cost information indicated that an alternative project would provide superior returns. Third, we asked participants to describe the rationales for their decisions. Besides Studies 3 and 4, we also conducted Study 5 to identify any potential "side effects" of using financial budgets as a control mechanism.

In total, 232 part-time master's degree students with an average of 7.95

years of work experience (standard deviation of 5.28 years) participated in Studies 3, 4, and 5. For Studies 3, 4.1, and 5, participants were recruited from part-time MBA students enrolled in a major university in Singapore, and they were randomly assigned at the same time to enable comparison across studies. Study 4.2 was conducted using a different participant group (part-time Master of Construction Management students). The experimental conditions are summarized in Table 1, Panel A, and will be described in detail as each study is presented.

### STUDY 3

Study 3 was designed as a partial replication of Study 1. Table 1 highlights the key features of the problems used in Study 3. Problems 3A, 3B, and 3C were similar to Problems 1A, 1B, and 1C, respectively, except that they included information on future sales (\$2 million) and opportunity costs of investing in the project (20% return on an unspecified alternative opportunity that was available). Note that in terms of expected returns using a marginal (i.e., future-oriented) cost-benefit analysis, the project is clearly nonviable: the net projected loss is \$1 million (\$2 million sales less \$3 million costs).

Eighty-one participants (mean professional experience = 8.19 years) recruited from part-time MBA students in a major university in Singapore served in this study. Participants decided whether to invest (Problem 3A) or continue investing (Problems 3B and 3C) in the mobile telephone project. After the participants had recorded their decisions, they were asked, "Please explain your answer in the space below."

### Results and Discussion

#### *Decisions*

Results are summarized in Table 1 (last two rows). The proportion of participants who continued with the additional investment in Problem 3B was significantly higher than that in Problem 3A ( $\chi^2(1) = 11.05, p = .00$ ) and in Problem 3C ( $\chi^2(1) = 7.50, p = .01$ ). There was no statistically significant difference in the responses to Problems 3A and 3C ( $\chi^2(1) = 0.43, p = .51$ ). These results replicated the pattern of results observed earlier using undergraduate participants.<sup>2</sup>

<sup>2</sup> We found no differences in responses between Problems 1A and 3A ( $\chi^2(1) = 0.02, p = .89$ ). However, the percentage of participants rejecting the project was significantly higher in Problem 3B than in Problem 1B ( $\chi^2(1) = 4.34, p = .04$ ), and it was marginally higher in Problem 3C than in Problem 1C ( $\chi^2(1) = 3.20, p = .07$ ). These results show that there were smaller escalation effects in Study 3 than in Study 1. However, the existence of escalation effects in the presence of explicit future costs and benefits (Problem 3B) is a striking demonstration of the possible strength of escalation effects even among participants with fair amounts of business experience, given prior evidence demonstrating that escalation effects are reduced among undergraduate students when future benefits are made explicit (Heath, 1995; Tan & Yates, 1995).

### *Rationales*

Two trained judges read the participants' explanations for their decisions in all the studies reported here. Then they encoded them in the following categories, which capture the considerations commonly thought to be relevant to normatively appropriate investment decisions, the bases for escalation effects proposed in previous literature, and the participants' own miscellaneous accounts:

- (a) sunk costs—where reference is made to the prior investments that had already been made;
- (b) project completion—where comments are made about the need to complete the project;
- (c) marginal costs—where comparisons of the marginal (i.e., future) costs and benefits of the project are indicated;
- (d) opportunity costs—where returns that could be made from alternative projects are mentioned;
- (e) optimism—where the positive features of the current project are cited;
- (f) strategic risk—where reference is made primarily to the strategic risk and competition faced in the current project;
- (g) budgets—where the need to keep within the budget is emphasized; and
- (h) others—where explanations that cannot be classified in any of the above categories are offered (e.g., an explanation with the words "by intuition").

With only rare exceptions, each participant provided only a single explanation for his or her decision. In the few cases where two explanations were rendered, coders categorized the complete rationale according to its main thrust. The proportion of agreement between the two coders was 90%, and the inter-rater reliability was 0.83 using the Kappa coefficient (Cohen, 1960). Disagreements were resolved via discussion between the coders. A summary of the rationales is provided in Table 2.

As noted earlier, when no prior investment had been made (Problem 3A), the majority of participants declined to pursue the project. Common rationales for this decision, as summarized in Panel A of Table 2, centered on opportunity costs (45.5%) and the strategic risks of the current project (36.4%). Examples of comments by participants who made this choice included:

- "No cost incurred as yet. If we invest, \$1 million will be lost; if we were to invest in the other project, we will reap 20%, which implies that it is more profitable to invest in the other project than to complete the phone project." (opportunity costs)
- "Why should we continue with the project if we have another investment project with better rate of return?" (opportunity costs)
- "No point carrying on project as competitor has a superior product and yet, the product is not much more expensive." (strategic risk)
- "Mobile phone project is not current and can easily be made obsolete, particularly since the competitor has a superior product." (strategic risk)

In the few cases where participants chose to pursue the project as described in Problem 3A, the typical rationale was optimism about the future of the

**TABLE 2**  
**Categorization of Decision Rationales Provided by Participants**

	Number (percentage) of participants providing the following types of rationales when they decided to proceed with project							Number (percentage) of participants providing the following types of rationales when they decided to forego/abandon project					
	Sunk costs	Project completion	Optimism	Marginal costs	Budgets	Others	Total	Marginal costs	Opportunity costs	Budgets	Strategic risk	Others	Total
Panel A: <i>Study 3</i>													
Problem 3A (no sunk cost, within budget, loss)			4 (80%)			1 (20%)	5 (100%)	1 (4.6%)	10 (45.5%)		8 (36.4%)	2 (9.1%)	22 (100%)
Problem 3B (sunk cost, within budget, loss)	10 (58.8%)	1 (5.9%)	5 (29.4%)			1 (5.9%)	17 (100%)	4 (40.0%)	3 (30.0%)		2 (20.0%)	1 (10%)	10 (100%)
Problem 3C (sunk cost, exceed budget, loss)	3 (42.9%)	1 (14.3%)	3 (42.9%)				7 (100%)	10 (50.0%)	6 (30.0%)	1 (5.0%)	3 (15.0%)		20 (100%)
Panel B: <i>Study 4.1</i>													
Problem 4A (Stage 1 budget = \$5 m; Stage 2 budget = \$5 m)	6 (55.5%)		2 (33.3%)				9 (100%)	11 (57.9%)	4 (21.1%)	2 (10.5%)	1 (5.3%)	1 (5.3%)	19 (100%)
Problem 4B (Stage 1 budget = \$9 m; Stage 2 budget = \$1 m)	1 (9.1%)		7 (63.6%)		3 (27.3%)		11 (100%)	9 (56.3%)	4 (25.0%)	1 (6.3%)	3 (18.8%)		16 (100%)
Panel C: <i>Study 4.2</i>													
Problem 3B (sunk cost, within budget, loss)	12 (80.0%)		2 (13.3%)			1 (6.7%)	15 (100%)	3 (50.0%)	1 (16.7%)		2 (33.3%)		6 (100%)
Problem 4A (Stage 1 budget = \$5 m; Stage 2 budget = \$5 m)	6 (75.0%)		2 (25.0%)				8 (100%)	4 (30.8%)	2 (15.4%)	2 (15.4%)	4 (30.8%)	1 (7.6%)	13 (100%)
Panel D: <i>Study 5</i>													
Problem 5A (no sunk cost, profit)			4 (80.0%)			1 (20.0%)	5 (100%)		2 (10.5%)		16 (84.2%)	1 (0.05%)	19 (100%)
Problem 5B (sunk cost, within budget, profit)	6 (33.3%)	2 (11.1%)	4 (22.2%)	5 (27.8%)		1 (5.6%)	18 (100%)		1 (14.4%)		6 (85.7%)		7 (100%)
Problem 5C (sunk cost, exceed budget, profit)	4 (33.3%)			8 (66.7%)			12 (100%)		2 (13.3%)		14 (86.7%)		15 (100%)

product (e.g., “The company could think of some strategies to differentiate its product from its competitor’s product.”)

When a prior investment had been made and additional investment would have been within budget (Problem 3B), the majority decision was to continue with the project, with rationales referring to sunk cost explanations (58.8%), optimism about the project (29.4%), or project completion considerations (5.9%). Some of these explanations included:

“Waste of economic resources if we dropped the project. Immediate write-off of \$7 m.” (sunk costs)

“Expected sales might be better than \$2 m as the competitor’s price is higher, if only slightly. Assumption that their phone is better in quality is debatable.” (optimism)

“If the project is not completed, the \$7 m spent will not be recovered.” (project completion)

Common reasons for not continuing with the project under these circumstances related to either marginal cost–benefit analysis (40.0%) or the opportunity costs of continuing with the project (30.0%). Some examples of these comments were:

“Incremental cost > incremental revenue expected.” (marginal costs)

“The expected sales upon completion is only \$2 m but the expected cost that has to be put in is another \$3 m.” (marginal costs)

“The other investment gives a higher return than the mobile phone project.” (opportunity costs)

“Better to save the \$3 m for more attractive projects.” (opportunity costs)

In Problem 3C, where additional investment would exceed the budget, the majority of participants (64.1%) chose to discontinue the project. In the aggregate, more than twice as many participants in Problem 3C (16 out of 27 participants) than in Problem 3B (7 out of 27 participants) engaged in either marginal or opportunity cost reasoning;  $\chi^2(1) = 6.13$ ,  $p = .013$ . Among participants who decided to terminate the project, the arguments mainly concerned marginal costs (50%) and opportunity costs (30%); this proportion of participants who used marginal and opportunity cost arguments (80%) was not different from that of participants who decided to terminate the project in Problem 3B (70%),  $\chi^2(1) = 0.05$ ,  $p = .822$ . Budget or proscription considerations were almost never cited.

## STUDY 4.1

Study 4.1 was a partial replication of Study 2, which was designed to assess the effects of multiple-stage budgets. Problems 4A and 4B were similar to Problems 2A and 2B, respectively, except that additional information was provided—projected sales of \$2 million and a 20% return on an alternative investment opportunity. Participants were also asked to record their explanations for their decisions. Another 55 participants (mean professional experience = 7.62 years) from the same population used in Study 3 were randomly assigned to the conditions of this study.

## Results

### *Decisions*

Participants' decisions are summarized in Table 1, Panel B. The proportion of participants who continued with the investment in Problem 4A was significantly lower than that in Problem 3B ( $\chi^2(1) = 5.24, p = .02$ ), and it was not statistically different from that in Problem 3C ( $\chi^2(1) = 0.26, p = .62$ ) and Problem 3A ( $\chi^2(1) = 1.35, p = .25$ ). The responses to Problem 4A were also not statistically different from those for Problem 4B ( $\chi^2(1) = 0.44, p = .51$ ). Also, in a more direct comparison, a smaller proportion of the participants continued with the project in Problem 4B than in Problem 3B; this difference was marginally significant statistically,  $\chi^2(1) = 2.70, p = .10$  ( $p = .05$  for a test of the pertinent directional hypothesis that was proposed). We also found no statistically significant difference between the responses for Problems 2A and 4A ( $\chi^2(1) = 1.42, p = .23$ ) or between the responses for Problems 2B and 4B ( $\chi^2(1) = 1.64, p = .20$ ). Overall, these findings are similar to those in Study 2, and they suggest that prospective stage budget overruns are indeed effective in reducing escalation effects.

### *Rationales*

The choice rationales of participants who considered Problems 4A and 4B were largely similar to those of participants who had contemplated Problem 3C in Study 3 (see Table 2, Panel B). The majority of those individuals decided to abandon the project (67.9 and 59.3% for Problems 4A and 4B, respectively), and as in Problem 3B, about twice as many participants used marginal or opportunity cost reasoning in Problems 4A (15 out of 28 participants) and 4B (13 out of 27 participants) than in Problem 3B (7 out of 27 participants);  $\chi^2(1) = 4.38, p = .036$ ;  $\chi^2(1) = 2.86, p = .091$ , respectively. Among the participants who decided to continue with the project, the majority identified sunk cost considerations and optimism about the future of the project as reasons for doing so.

## STUDY 4.2

A striking feature of Studies 3 and 4 is that although Problems 3B and 4A (and Problem 4B) were identical in terms of total costs, total budget, and future sales, a significantly larger proportion of participants chose to discontinue the project in Problem 4A than in Problem 3B. The only difference between the two problems was that a two-stage budget was used in Problem 4A and a single-stage budget was used in Problem 3B. To test the robustness of these results, we collected additional data for Problems 3B and 4A with the following modifications. First, we presented participants with both Problems 3B and 4A (appropriately counterbalanced). This within-participant manipulation effectively held constant individual differences among decision makers and also enabled them to compare the salient similarities and differences between Problems 3B and 4A. Second, these participants were part-time students in a Master



of Construction Management program. All of them were from the construction industry, where the use of budgets in long-term projects is very common. Participants had an average of 6.5 years of work experience. Finally, we made the participants highly accountable by making the completion of the problems part of a class assignment. The responses of these participants were similar to those obtained in the between-participants manipulations (see Table 1, panel B). Of these 21 participants, 15 (71.4%) decided to continue with the project in Problem 3B while only 8 (38.1%) decided to do so in Problem 4A ( $\chi^2(1) = 4.71, p = .03$ ). Panel C of Table 2 shows that for Problem 3B, the rationales of the majority of those who chose to continue the project were related to sunk cost considerations (80.0%). For Problem 4A, the rationales of those who decided to terminate the project were related to marginal cost (30.8%), opportunity cost (15.4%), and strategic risk (30.8%) considerations. These results are similar to those obtained in the between-participant comparisons in the earlier studies, and they suggest the robustness of the findings across participant group, accountability level, and salience of the budgetary constraints.

### Discussion

Overall, the results of Studies 3 and 4 were similar to those found in Studies 1 and 2, respectively. In particular, the responses and explanations provided by the master's degree students were very informative. A large percentage of these participants decided to abandon the project when it entailed exceeding the budget, and they invoked marginal cost and opportunity cost arguments for doing so. It should be noted that in these scenarios, both marginal cost–benefit analysis and proscription concerns about exceeding the budget would suggest that they stop the additional investments. What if marginal cost–benefit analysis suggests that additional investments be made, but these additional investments entailed exceeding a budget? This question was addressed in Study 5.

### STUDY 5

The above studies demonstrated a benefit to the use of financial budgets as a dampener of escalation effects. A related, but unanswered, question is whether there are significant drawbacks (or at least risks) that should concern managers who contemplate using budgets to control escalation effects. Study 5 was designed to address this question.

### Method

Three new problems were used in Study 5. As indicated in the Table 1 summary, Problems 5A, 5B, and 5C were identical to Problems 3A, 3B, and 3C used in Study 3, respectively, except that the future sales were \$5 million rather than \$3 million. Applying a marginal cost–benefit analysis to Problems 5A, 5B, and 5C, therefore, the net prospective result of continuing with the project was an incremental benefit of \$2 million (expected sales of \$5 million less expected costs of \$3 million).

Seventy-five part-time MBA students (mean professional experience = 8.37 years) were randomly assigned to the problems used in this study. As before, participants were asked to assume the role of the decision maker in each problem, to decide whether to make the required \$3 million investment, and to then explain their choices.

## Results and Discussion

### *Decisions*

Results for Study 5 (shown in Table 1, Panel B) contain particularly interesting and perhaps surprising demonstrations of the weakness of marginal cost–benefit reasoning and the strength of proscription concerns. Observe that, although in Problem 5A the project promised a better return (future benefits of \$5 million minus future costs of \$3 million; return = 67%) than the alternative opportunity (20% return), only 21.7% of the participants who considered that problem chose to proceed with the project. There are two possible explanations. First, participants may not be particularly good at performing marginal cost–benefit analysis in the context of Problem 5A. Second, it could be that participants were cognizant of the marginal cost–benefit considerations, but they were particularly risk averse in this context.<sup>3</sup> The vivid depiction of the competitor's strong market position may have been particularly salient in participants' minds (e.g., arguments like "Why enter into a new venture when there is serious threat of strong competition?" may have been prominent). Yet, the sunk cost considerations induced by Problem 5B essentially obliterated this concern, as revealed in the difference in choice percentages for the two problems;  $\chi^2(1) = 12.13$ ,  $p = .00$ . The low proportion of participants who accepted the opportunity to invest in the project in Problem 5A suggests that the higher acceptance proportion in Problem 5B is due to escalation effects rather than marginal cost–benefit considerations.

The key comparison is between the choices of participants who considered Problems 5B and 5C. In both of those problems, the decision maker had made a prior investment of \$7 million. Thus, sunk cost considerations would encourage the decision maker to commit the additional \$3 million needed to complete the project. And so would a marginal cost–benefit analysis, since such an investment would yield a \$2 million profit, a return of 67%. If, indeed, budget considerations induced higher marginal cost thinking in this setting among participants, we would expect the proportion of participants who continued with the project to be *higher* in Problem 5C (escalation effects plus budget

<sup>3</sup> To assess whether the low proportion of participants opting to undertake the project was a robust finding, we administered Problem 5A to another group of 20 part-time students in a Master of Construction Management program. These participants had an average of 7.2 years experience in the construction industry. To induce accountability, the problem was given to them as part of a course assignment. Only 5 of these participants (25%) opted to undertake the project. Among those who decided to turn down the project, 11 (73%) were concerned about the strategic risk of the project given the competition, and the remaining 4 were concerned about opportunity costs.

considerations) than that in Problem 5B (escalation effects). The additional \$3 million required to finish the project was within Problem 5B's budget of \$10 million but would push total costs beyond Problem 5C's \$8 million budget. Hence, proscription considerations would suggest that the proportion of participants who continued with the project would be *lower* in Problem 5C than in Problem 5B. Results showed that fewer participants made the additional investment in Problem 5C than in Problem 5B;  $\chi^2(1) = 4.04$ ,  $p = .04$ . This lends support to the strength of the proscription mechanism here. In this instance, this implied that it encouraged participants to forego a project that made economic sense to pursue (from a marginal cost–benefit perspective).<sup>4</sup>

### *Rationales*

Three features are noteworthy about the rationales reported by participants in Study 5, as shown in Panel D of Table 2. The first concerns the reasoning of participants who declined to pursue the project offered to them in Problem 5A. Although that project promised a higher return than the alternative opportunity, the participants appeared to shy away from it mainly because it seemed to harbor significant strategic risks relative to the other opportunity available to them. Representative comments included these:

“Difficult to compete without significant advantages over other competitor. Better to concentrate on other project.” (strategic risk)

“Competitor's product is superior. We do not have a competitive edge.” (strategic risk)

The second outstanding feature of the rationales is that there was no mention of budgets or proscription concerns. The third feature relates to the use of marginal cost–benefit reasoning. Although comparison of the investment decisions of participants in Problems 5B and 5C above suggests the dominance of the proscription account, analysis of the decision rationales by participants indicate that marginal cost–benefit reasoning occurs. Table 2 shows that a larger proportion of participants in Problem 5C (where the budget would be exceeded) who decided to continue with the project did so from a marginal cost–benefit analysis than in Problem 5B;  $\chi^2(1) = 4.43$ ,  $p = .035$ . This finding suggests that among participants who decided to continue with the project, the prospect of exceeding a budget induced marginal cost–benefit thinking.

<sup>4</sup> An alternative perspective is to use the responses in Problem 5A as the benchmark. That is, for whatever reasons, few participants in Problem 5A decided to invest in the project. Escalation effects (Problem 5B) moved participants away from the decisions that would have been made by participants without sunk cost considerations (Problem 5A); i.e., more participants invested in the project when prior investments were present. The results above showed that budget considerations (Problem 5C) reduced this sunk cost tendency and moved the decisions of these participants closer to those of participants making investments on projects without prior investments (although the proportion of participants in Problem 5C who decided to continue investing in the project was still marginally higher than that in Problem 5A  $\chi^2(1) = 2.85$ ,  $p = .091$ ).

## GENERAL DISCUSSION

Our results indicate that escalation effects within a budgetary environment might sometimes be a serious managerial problem, but sometimes they are not. The mere existence of financial budgets—which almost all formal organizations actually have—is immaterial to escalation effects as long as those effects do not threaten to push costs beyond budget limits. Under those circumstances, escalation effects are likely to be as substantial as if no budget existed in the first place. Our demonstration of escalation effects among participants with quite substantial working experience, even when explicit future costs and benefits are provided, provides some evidence of the strength of escalation effects. But if additional expenditures do promise to “break” budgets, then escalation effects are likely to be attenuated markedly. Thus, whether a manager should be concerned about escalation effects in, say, the investment behavior of his or her subordinates should depend on the relationship between the additional investments those subordinates are likely to contemplate and the constraints defined by the budget. We doubt that anyone knows what kinds of circumstances are most common in real life. If the typical organization has “loose” budgets, then we can expect escalation effects to be a problem that hurts those organizations dearly. But suppose those budgets tend to be “tight.” Then escalation effects are probably less of a practical issue than an uncritical reading of previous research would have led us to believe. Our results also indicate that the prospect of overspending any budget, even for a sub-budget within an overall budget that is itself unthreatened, has essentially the same suppressive influence on escalation effects. This suggests that one reasonable strategy for managing escalation effects is to partition projects into stages that have reasonable, realistic stage budgets.

We also highlight potential negative side effects of using budgets as a device for controlling escalation effects. The results of our studies showed that budgets could be effective in halting additional investments when these investments yield negative returns (Studies 1, 2, 3, and 4) *and* when they yield positive returns (Study 5). The immediate hazard highlighted by our studies was that the threat of exceeding a budget can do more than reduce escalation effects. It is also likely to encourage decision makers to reject investment opportunities that, on marginal cost–benefit grounds, ought to be pursued. There are other downsides to budgetary control of escalation effects as well. One is that, as suggested above, considerable care must be exercised in designing stagewise project plans and budgets so that they are realistic, a task that can entail significant time, effort, and expense. Another problem with budgetary control is that someone (typically the supervising manager) must monitor adherence to detailed plans and stage budgets and respond to petitions for variances, e.g., requests for expenditures beyond stated limits. Related to this requirement, there is the risk that bottlenecks will be created and subordinates will rebel against their loss of autonomy and opportunity to learn, even if from their inevitable mistakes.

The results suggest that the prospect of exceeding a budget induces two

somewhat bipolar mechanisms into participants' decision making processes. The first mechanism relates to increased marginal cost–benefit reasoning. Evidence of this comes from participants' decision rationales in Studies 3 and 4; even in Study 5, we found increased marginal cost–benefit thinking among those who decided to proceed with the project. The second mechanism relates to participants' heightened sensitivity to the proscription implications of exceeding a budget. This proscription concern is consistent with participants' choices in Study 5 (and could potentially have played a part in their choices in Studies 1 to 4) although, interestingly, this was not reflected in participants' decision rationales. At the moment, we do not understand enough about the drivers of these two mechanisms, and future research is needed to identify conditions under which one mechanism will dominate the other. Certainly, it is conceivable that proscription concerns drive marginal cost–benefit reasoning under some conditions, and heighten risk-sensitivity in others (e.g., in Study 5). Understanding people's self-insight into their own decision processes should also be a priority for future research (e.g., see Wilson & Schooler, 1991).

One limitation of the present research is that the scenarios we used were set in relatively simple settings and did not contain many of the rich institutional details that might be expected in real-world budgetary contexts. It would be fruitful to determine whether the effects documented here persist in other scenarios and settings. Assessing the generalizability of these findings via field methods would also be an important avenue for future research.

Our studies were conducted using participants from Singapore, and there is evidence to suggest that the behavior of participants from Singapore is no different than those from the United States, where most previous escalation studies have been conducted. For example, in a prior study (Tan & Yates, 1995), Singaporean participants exhibited remarkably similar responses to sunk costs as those documented in earlier studies performed in the United States (e.g., Arkes & Blumer, 1985). In other cross-cultural studies, Singaporean participants have also stood out as the Asian group whose judgment behavior has been most similar to that of Americans (e.g., see Lee, Yates, Shinotsuka, Singh, Onglatco, Yen, Gupta, & Bhatnagar, 1995). Business organizational norms in Singapore are similar to those in the West, too, given Singapore's status as a major center of international commerce and the world's busiest port. It is possible that the effects examined here may be culturally dependent, and it is important for future research to determine whether these budget-related effects are generalizable to settings with different cultural, business, and organizational norms.

Recent studies have provided evidence of the dominance of project completion effects over sunk cost effects as drivers of escalation effects when both project completion and sunk costs are systematically varied (e.g., Conlon & Garland, 1993; Garland & Conlon, 1998; Boehne & Paese, 2000). Staw and Hoang (1995) noted that the Conlon and Garland (1993) study related to project completion decisions, whereas escalation studies have examined both project completion and resource utilization decisions (e.g., decisions on which of two commodities or resources to use). They also noted that in actual business settings, project

completion and prior investments (sunk costs) are naturally confounded (Staw & Hoang, 1995); in fact, Staw and Hoang (1995, p. 490) have cautioned that “experiments that try to hold constant the perceived progress on a project . . . may be missing a key element of what binds actors to losing courses of actions.” The focus of our studies was on escalation effects, and consistent with Staw and Hoang’s (1995) suggestion, we varied prior investments but did not hold constant the progress of the project. Our key manipulations and comparisons related to conditions where prior investments had been made (e.g., Problems 1B and 1C), which were more akin to project completion decisions. It is unclear what results would be obtained if our key manipulations were applied to resource utilization decisions. Certainly, determinants of project completion versus resource utilization decisions are not well understood, and this is an issue that future research can look into.

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