

# **Deceptive Superiors and Budgetary Reporting: An Experimental Investigation**

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## **ABSTRACT**

We explore a budget setting where the superior has private information regarding the accuracy of the firm's cost system and she may misrepresent the system's accuracy in an effort to elicit more truthful budget proposals from subordinates. We manipulate two features of this budgeting setting. First, the signal type regarding the accuracy of the firm's cost system is either public and verifiable or private information of the superior. We also compare the cases where either the subordinate or the superior has final budget authority. Results indicate that superiors strategically misrepresent the accuracy of the cost system. In particular, they over-state the accuracy of the cost system when it reports low cost-ranges and under-state the accuracy when it reports high cost-ranges. We also find that having a private accuracy signal reduces slack when subordinates unilaterally set their budgets, but not when superiors have final budget authority. In fact, the two methods of control appear to act as substitutes.

**Keywords:** *Participative Budgeting; Budgetary Slack, Cost System, Experiment.*

**Data Availability:** Contact the authors.

## **I. INTRODUCTION**

Budgets are valuable tools for planning, motivating and evaluating subordinate performance and for allocating resources. Because subordinates frequently are better informed than superiors regarding environmental factors and their abilities, having subordinates participate in the budgeting process can be beneficial when the process induces them to share information that reduces uncertainty, coordinates planning and production, and increases profitability. However, possessing valuable private information may allow subordinates to benefit at the expense of the firm. For instance, having private information about environmental variables and about their capabilities allows subordinates to distort the budgeting system to consume slack or receive more favorable evaluations.

Since subordinates have incentives to misrepresent valuable information, there is a large amount of research that explores various control mechanisms that may facilitate the elicitation of more truthful information. These include truth-inducing contracts (Groves 1973; Weitzman 1976), the installation of coarser information systems (Arya et al. 1997), the installation of finer information systems (Antle and Fellingham 1995; Hannan et al. 2006), various forms of communication and budget negotiations (Fisher et al. 2000; Fisher et al. 2002a; Fisher et al. 2002b; Kachelmeier et al. 1994; Rankin et al. 2003), and intentionally limiting productive capacity (Balakrishnan 1995). Note, these studies assume that the only source of asymmetric information is some parameter(s) of the budget known only by the subordinate.

Unlike prior research, we consider a scenario where the superior has private information regarding the accuracy of the firm's cost system and she may misrepresent the system's accuracy in an effort to elicit more truthful budget proposals from subordinates. In particular, we study a cost system that reports a range of costs that contains the actual cost with a variable degree of

accuracy. The cost-range reported by the cost system is always public information known by subordinates and superiors, but in some cases its accuracy is known only by the superior. In these instances, the subordinates receive a signal from the superior about the system's accuracy, but the superior may distort the signal in an attempt to encourage more truthful reporting from the subordinates. We compare this case to one where the firm's cost system accuracy is public and verifiable information. We investigate the superior's tendency to misrepresent the cost system's accuracy. We also study the impact of the superiors' reported signals on the reporting behavior of the subordinates. We further explore behavior by comparing a setting where the subordinate unilaterally sets the budget to a setting where the superior has "final authority" over budget approval, where final authority refers to a binary choice of approve/reject, without the ability to make a counter-offer.

Results indicate that superiors misrepresent the accuracy of the cost system and that they do so in a strategic manner. For instance, they over-state the accuracy of the cost system when it reports low cost-ranges and under-state the accuracy when it reports high cost-ranges. We also find that having a private accuracy signal reduces slack when subordinates unilaterally set their budgets, but not when superiors have final budget authority. In fact, the two methods of control appear to act as substitutes.

Our results have several implications for research and practice. First, our results contribute to research that expands and studies the role that superiors play in the budgeting process. In particular, the presence of a superior, the information she has and the actions available to her are critical components of the budgeting process. Our results have implications for the design of cost and information systems. In particular, designs need to consider not only what information is produced, but how various parties use that information. Also, our results

imply that in lieu of the superior having final budget authority, the firm is better off having a cost system that produces private information.

The remainder of the paper is organized as follows. The next section reviews the relevant literature and develops the hypotheses. Section 3 describes the experimental design and methodology. The results and analysis are reported in section 4. The final section concludes the paper, and discusses implications for practice and research.

## **II. HYPOTHESES DEVELOPMENT**

### ***Setting***

Adapted from prior participative budgeting studies (e.g. Evans et al. 2001; Hannan et al. 2006; Rankin et al. 2003), the setting requires the implementation of a capital project by a superior when a subordinate has private information about the project's cost. The probability distribution of the project's cost and revenue are known by the subordinate and superior. The subordinate learns the actual cost of the project and submits a budget to the superior. The superior never learns the actual cost of the project. Any overstatement of cost increases the subordinate's earnings via slack and decreases the superior's profit by the same amount.<sup>1</sup>

In our setting the firm has a cost system that produces information about the estimated cost-range. The cost-range produced by the cost system is always public information. The probability with which the reported sub-range contains the actual cost is the accuracy of the cost system. The details and parameters of the cost system are discussed in the experimental design section.

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<sup>1</sup> In our setting, profit is defined as the difference between revenue and cost for funded projects. Slack is defined as that portion of the profit that the subordinates attempt to capture for themselves via their budget choices.

We manipulate and study two features of this budgeting setting. First, we manipulate whether the cost system accuracy signal is public and verifiable or private information of the superior. In the former case, both the subordinate and the superior have access to the signal produced by the cost system. In the latter case, only the superior has access to the cost system's accuracy signal which she then reports to the subordinate. When the signal is the superior's private information, she may misrepresent the system's accuracy. We also manipulate whether subordinates or superiors have final authority regarding budget approval. This manipulation is motivated by the fact that some firms choose to allow subordinates to have considerable control over their budgets, while in others the superiors retain these rights (Anthony and Govindarajan 2007). When the subordinate has final authority, his budget proposal is automatically accepted. When the superior has final authority, the subordinate submits a budget that is either accepted or rejected by the superior. In the next section we discuss the potential behavioral effects of whether the cost-range accuracy signal is public or private, which party has final authority, and their interaction.

### ***Hypotheses***

Our first two hypotheses are based on the idea that superiors may strategically misrepresent their private information in an attempt to limit slack and increase profit. Next, we develop a hypothesis about the main effect of final budget authority. Finally, we predict that the effectiveness of misrepresentation may depend on whether subordinates or superiors have final budget authority.

The case where the cost system's signal is privately observed by the superior is broadly related to the stream of literature where superiors have some private information about the subordinates' operational environment or productivity. In such cases, the superior can withhold

or misrepresent her information to her potential advantage. For instance, Demski and Sappington (1993) explore a make-or-buy decision where a buyer with private information about the quality of an input may choose to not reveal product quality to avoid paying a higher price. Penno (1990) demonstrates a situation where superiors are better off by withholding pre-decision information from subordinates because the subordinates can use the information to shirk without detection.

Gibbs (1991) argues that superiors can manipulate feedback to influence the subordinate's beliefs about his abilities and performance. For instance, superiors can use performance evaluations to increase their knowledge of subordinates' abilities. In many cases it is possible that the superior knows the subordinate's abilities better than the subordinate and can use this information to her advantage (Lazear 1995). In an experimental study, Rosaz (2012) finds that better informed superiors intentionally provide subordinates with biased information regarding their abilities which causes subordinates to increase their effort.

More closely related to this study, Merchant and Shields (1993) discuss firms that strategically bias their cost systems to motivate certain behaviors from employees. They provide examples of firms that upwardly bias their cost systems in an attempt to keep salespeople from excessively shaving margins. They also provide examples of firms that downwardly bias their cost systems to motivate employees to innovate and reduce costs. There are also firms that downwardly bias their cost systems to encourage the consumption of services by making the desired services less costly at the expense of undesired services. Their study demonstrates that firms are willing to strategically misrepresent cost information to influence the behavior of subordinates. To date, there is no research exploring the budgeting process where superiors have private information.

Our first hypothesis focuses on the superior's misrepresentation of the cost system accuracy signal. We hypothesize that superiors will strategically misrepresent their private information regarding cost system accuracy in an attempt to reduce slack and increase profit. We define strategic misrepresentation as overstating the system's accuracy when a low cost-range is reported and understating the system's accuracy when the system reports a high cost-range. This hypothesis is based on the typical economic prediction that when an individual possesses private information she will attempt to use it to her advantage.

*H1: Superiors strategically misrepresent the accuracy of the cost system in an attempt to reduce the creation of slack.*

Prior participative budgeting studies provide compelling evidence that subordinates are willing to sacrifice wealth in order to report more honestly (e.g., Evans et al. 2001; Hannan et al. 2006; Hobson et al. 2010; Stevens 2002). In a study of a cost system that reports the correct cost-range with 70 percent accuracy, Hannan et al. (2006) find strong evidence that subordinates have preferences to appear honest by submitting budgets that are within the reported cost-range. For subordinates who have a preference to appear honest, we conjecture that the likelihood of them submitting a budget within the reported cost-range increases as the accuracy of the cost system increases. As superiors have the ability to strategically misrepresent the accuracy of the cost system they may be able to exploit subordinates' references to appear honest to elicit more accurate budget reports. Therefore, we predict that superiors' ability to strategically misrepresent cost system accuracy will lead to lower slack when information is private as compared to when cost system accuracy information is public.

*H2: When cost system information is private, slack will be less than when cost system information is public.*



The theory of decision framing (Cialdini 1996; Fehr and Gächter 2002; Tenbrunsel and Messick 1999) suggests that whether subordinates or superiors have final budget authority should affect how individuals mentally frame the budgeting process. In participative budgeting studies, Rankin et al. (2008) and Schatzberg and Stevens (2008) provide evidence that when subordinates have final authority they view the budgeting process as an ethical dilemma and this triggers non-pecuniary motivations such as preferences for honesty, that reduce slack. When superiors have final authority, subordinates frame the budgeting process as one of strategic interaction. Rankin et al. (2008) and Schatzberg and Stevens (2008) find that strategic concerns, such as subordinates' fear of having their budget proposals rejected, lead to lower budgetary slack than preferences for honesty when strategic concerns are absent. Hence, we expect authority type to have a main effect such that superior authority leads to less slack than subordinate authority.

*H3: When superiors have final budget authority, slack will be less than when subordinates have final budget authority.*

Finally, we predict that final authority and the availability of the cost information accuracy signal will interact to influence the creation of slack by subordinates. We present two arguments that suggest that superiors' ability to misrepresent the cost system's accuracy in the private accuracy signal treatment may be more effective when subordinates have final authority. First, recall that one reason strategic misrepresentation may be effective in reducing slack is due to the exploitation of subordinates' desires to appear honest. As discussed above, honesty preferences are triggered by the ethical dilemma framing of subordinate authority to a greater extent than when the superior has final authority. Thus, to the extent that superiors are able to

exploit honesty preferences through strategic misrepresentation, such misrepresentation will be most effective when subordinates have final authority.

Second, Rankin et al. (2008) and Schatzberg and Stevens (2008) demonstrate that when superiors have final budget authority, slack is significantly reduced because subordinates fear budget rejection. Thus, superior authority on its own serves as an effective means of reducing slack. Subordinates' strategic concerns are likely to dominate their focus, overwhelming their tendency to respond to the superiors' reported accuracy when information is private.

Misrepresentation of the accuracy signal may, therefore, have a lower incremental effect when superiors have final authority and a greater incremental effect when subordinates have final authority. That is, the ability to misrepresent the cost system's accuracy may act as a substitute for superiors having final authority. Taken together, these arguments lead to the following interaction hypothesis:

*H4: The incremental impact of private information on slack creation will be lower when superiors have final authority than when subordinates have final authority.*

### **III. EXPERIMENTAL DESIGN**

#### ***Overview***

The participatory budgeting setting is adapted from several related studies (Evans et al. 2001; Rankin et al. 2008; Hannan et al. 2006). The experimental design employed a 2 x 2 factorial design obtained by crossing two types of accuracy signals (public vs. private) with two forms of budget authority (subordinate vs. superior). Both factors were manipulated between participants. At the start of the experiment, participants were randomly assigned the role of superior or subordinate and kept the same role throughout the experiment.<sup>2</sup> Participants

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<sup>2</sup> In the experiment, the terms *manager* and *owner* were used. For consistent exposition, we will continue to use the labels subordinate and superior.

interacted for 10 periods. Superiors and subordinates were randomly re-matched after each period. This simulates a one-shot setting, while providing participants with significant experience. Participants were 160 undergraduate students (40 participants per treatment) from a large university. Participants were separated by partitions and interacted anonymously through a computer network. Experimental sessions lasted approximately 90 minutes.

### ***Experimental Task***

Figure 1 illustrates the progression of the decisions participants made during an experimental period. The task involved a capital project that, if funded, produced revenue of \$80.00. The cost of the project was uniformly distributed on {\$1, \$2, . . . , \$80}. These facts were common information to all participants. The subordinate learns the actual cost of the project at the beginning of the period, but the superior never learns the actual cost.

(Please insert Figure 1 here)

### ***Cost System and Accuracy Signal Manipulation***

At the beginning of each period a cost system reports one of four estimated cost-ranges: [{\$1,\$20}, {\$21,40}, {41, 60}, {61,80}]. Thus, the precision of the cost system, defined as the number of partitions or cost-ranges of the cost distribution that the cost system produces, is held constant. Each subordinate-superior pair has its own cost-range estimate each period, and the computer displays the cost-range to the subordinate and superior. However, this estimate may or may not be correct. That is, the actual cost may not be in the reported cost-range. The probability that the actual cost is in the cost-range is called the accuracy of the estimate. The accuracy is a random variable and it is uniformly distributed on {50%, 51%, 52%, . . . , 98%, 99%, 100% }.<sup>3</sup>

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<sup>3</sup> Prior to the experimental sessions, we randomly generated 20 sequences of cost, cost-range, and accuracy signal sequences. To facilitate comparisons across treatments, the same 20 sequences were used in each experimental treatment. The mean cost across all 20 periods was \$40.7 in each treatment and mean cost system accuracy was 75.4 percent.

We manipulate whether the accuracy signal is either public and verifiable or private information of the superior. When the cost system produces a public signal, the computer simultaneously displays the actual accuracy on the subordinates' and superiors' screens. When the signal is private, the actual accuracy is displayed only on the superior's screen. The superior then sends a message of the accuracy signal to the subordinate. The message can be any value from 50% to 100%.

### ***Budget Proposals and Final Authority Manipulation***

The subordinate submits a budget after receiving information about the actual cost, the publicly reported estimated cost-range, and the accuracy of the cost-range (either publicly reported or via the superior's report based on her private information). The subordinate is free to report however he wishes, but the computer program only allows reports that are equal to or greater than the actual cost. This restriction prevents the subordinate from understating the cost and, therefore, from receiving negative income from the project. Any overstatement of cost increases the subordinate's earnings via slack and decreases the superior's profit by the same amount.<sup>4</sup>

We manipulate which party has final authority regarding budget approval. In the subordinate authority treatments, the superior funds all budgets.<sup>5</sup> In the superior authority treatments, the superior accepted or rejected the budget. If the budget is rejected, the project is not funded, and both parties receive a zero payout from the project and earned only the base wage. If the budget is accepted, superiors earn the \$80 project revenue less the reported cost, and subordinates earn reported cost less actual costs.

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<sup>4</sup> In our setting, profit is defined as the difference between revenue and cost for funded projects. Slack is defined as that portion of the profit that the subordinates attempt to capture for themselves via their budget choices.

<sup>5</sup> This is similar to the trust contract used in Evans et al. (2001). However, in that paper the superiors were hypothetical. We have participant-superiors in all of our treatments.

Participants were remunerated with \$0.01 U.S. dollars for every \$0.01 experimental dollar earned. In addition, in all treatments the subordinate received a base wage of \$10 each period regardless of whether the project was implemented. This payment allowed the subordinate to receive compensation without having to misrepresent the project's cost.<sup>6</sup> To avoid wealth effects participants were compensated for one, randomly determined period. The average pay was approximately \$27.

## IV. RESULTS

### *Summary Analysis*

Table 1 reports summary statistics for all experimental treatments over all 10 periods. Slack is measured as the amount of slack implied by the subordinate's budget communication regardless of whether the superior accepted the project. The average potential slack across all 10 periods was \$39 for each of our four treatments.<sup>7</sup> Both subordinate and superior mean per period earnings include all periods regardless of whether the project was accepted or rejected.

The data displayed in Table 1 show a wide variation in responses, but some behavioral trends are apparent. First, in the subordinate authority treatments, while the subordinates are able to extract all of the surplus, they leave a substantial percentage to the superiors. In the subordinate authority treatments, we see that subordinates take about nine percent less of the surplus when the superiors have private information regarding the accuracy signal as compared with when the accuracy signal is public. As expected, under the superior authority treatments, slack decreases and reflects a nearly even split of the surplus.

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<sup>6</sup> A similar payment was also used in Evans et al. (2001) and Stevens (2002) for the same reason. Note that the wage has no effect on the economic predictions.

<sup>7</sup> Recall, that we used the same cost sequences in each treatment. Hence, each treatment has the same mean actual cost and same mean actual maximum slack

(Please insert Table 1 here)

Table 1 also demonstrates that superiors reject about a quarter of budget reports under both accuracy signal treatments. However, subordinates create less slack in their budgets under the public accuracy signal treatments than in the private accuracy signal treatments, and still encounter about the same amount of rejection. We examine this outcome in more detail in the following sections.

Table 2 presents data on the accuracy of the superiors' reports in the private signal treatments. Mean absolute misrepresentation of cost system accuracy is fairly substantial across all 10 periods of the study. Across all 10 periods, there are 101 accurate reports and 299 inaccurate reports. Thus, superiors chose to misrepresent the accuracy of the information signal in 75 percent of their reports. As we demonstrate in more detail below, misrepresentation varies in a way that is consistent with superiors being strategic in their reporting of private information.

(Please insert Table 2 here)

### ***Tests of Hypotheses***

For all hypothesis tests, rather than treating multiple responses by the same participant as independent, we calculated means for the relevant data for each participant over all periods so that each participant serves as an independent observation.

### ***Strategic Misrepresentation of the Accuracy Signal***

Our first hypothesis predicts that superiors will strategically misrepresent the accuracy of the cost system. We define strategic misrepresentation as overstating the system's accuracy for the lowest two cost-ranges (one and two) and understating the system's accuracy for the highest two cost-ranges (three and four). We calculated superiors' directional misrepresentation by taking the difference between the actual accuracy signal and the superiors' reported accuracy

signal in the private signal treatments. Therefore, overstating cost system accuracy will result in a negative value and understating it results in a positive value. We test whether directional misrepresentation is less than zero in the two lowest cost-ranges and greater than zero in the highest two-cost ranges. As reported in Table 3 and illustrated in Figure 2, we find strong evidence that superiors strategically misrepresent the cost system's accuracy signal. Directional misrepresentation is -10.76 and -5.10, respectively, for cost-ranges one and two. These are both significantly less than zero ( $p < 0.01$ ). For cost-ranges three and four, directional misrepresentation is 2.85 and 8.60, respectively. These are both significantly greater than zero ( $p < 0.05$ ).

(Please insert Table 3 here)

(Please insert Figure 2 here)

### ***Effect of Information***

Our next hypothesis maintains that when cost system information is private, slack will be less than when cost system information is public. This hypothesis is based on the idea that subordinates with a preference to appear honest, will be more likely to submit a budget in the reported cost-range as the accuracy of the cost system increases. When superiors have the ability to strategically misrepresent the accuracy of the cost system, they may be able to exploit subordinates' preferences to appear honest to elicit more accurate budget reports. We test this hypothesis across both authority types. As seen in Table 4, ANOVA results do not indicate a significant main effect of accuracy signal on subordinates' mean slack ( $p = 0.7885$ ). However, there is a significant interaction between authority and accuracy signal ( $p = 0.0744$ ), the results underlying this interaction as they relate to H2 are discussed below.

From Table 1 we see that when subordinates have budget authority, mean slack with a public accuracy signal is \$26.95 and decreases to \$22.67 when the accuracy signal is private. Hence, we reject the null hypothesis of equal slack in favor of less slack when the signal is private ( $t = -1.35$ ,  $p = 0.0932$ ). This is consistent with our prediction and provides evidence that even when subordinates have final say over the budget, superiors are able to misreport cost system accuracy in such a way as to reduce slack. This is consistent with private information being a substitute for rejection authority.

When superiors have final budget authority, mean slack with a private information signal is \$19.87 and decreases to \$16.71 with a public accuracy signal. This difference is not significant nor is it directionally consistent with our hypothesis ( $t = 1.21$ ,  $p = 0.1167$ ). However, this result is consistent with the notion that information and authority appear to be substitutes for one another.

### ***Effect of Authority Type***

In our third hypothesis, we argue that slack will be less when superiors have final budget authority compared to when subordinates unilaterally set their budgets. We test this hypothesis across both information types. As seen in Table 4, ANOVA results indicate a significant main effect of authority on subordinates' mean slack ( $p = 0.0021$ ). However, as mentioned above the significant interaction between authority and accuracy signal ( $p = 0.0744$ ) is also important to consider when interpreting the results as they relate to this hypothesis.

As seen in Table 1, when cost system accuracy is public information, mean slack is \$26.95 when subordinates unilaterally set their budgets and \$16.70 when superiors can reject budget proposals. This represents nearly a 40 percent decrease in slack. The null hypothesis of equal mean slack under both authority treatments is rejected in favor of less slack when superiors



have final authority ( $t=5.78, p = 0.0001$ ). Hence, when the cost system's accuracy is public information, slack is significantly less when superiors have final budget authority. This is consistent with past results (Rankin et al. 2008; Schatzberg and Stevens 2008).

As reported in Table 1, when the cost system's accuracy is the private information of the superiors, mean slack is \$22.67 when subordinates have final authority and \$19.87 when superiors can reject budgets. We are unable to reject the null hypothesis of equal mean slack under both authority treatments ( $t = 0.76, p = 0.2255$ ). Again, these mixed results regarding the role of who has final budget authority suggests that information type and authority act as substitutes in reducing slack.

### ***Interaction of Authority and Signal***

Our final hypothesis maintains that slack will decrease less under the superior authority treatments, than under the subordinate authority treatments. Support for this hypothesis would provide evidence that it is more beneficial to have a cost system that produces private information when subordinates have final budget authority. Under subordinate authority, slack decreases 16 percent, from \$26.95 when cost system accuracy is public to \$22.67 when accuracy is the private information of the superior. With superior authority, slack increases 19 percent, from \$16.71 when cost system accuracy is public to \$19.87 when accuracy is the private information of the superior. As discussed in previously, the ANOVA results in Table 4 indicate a significant interaction between Authority and Accuracy Signal ( $p = 0.0744$ ); however, this is not a directional test. Therefore, the  $F$ -statistic is converted to a  $t$ -statistic to make directional inferences. The null hypothesis of no difference is rejected in favor of a greater difference under Subordinate Authority ( $t = 1.81, p = 0.0372$ ).<sup>8</sup> This finding supports H4 and is consistent with

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<sup>8</sup> See McNeil, Newman and Kelly (1996) and Kachelmeier and Towry (2002) with regard to extending the usual logic of a one-sided hypothesis test to directional tests of interactions between two factors.

the idea that as a mechanism for controlling slack, having private information regarding cost system accuracy can be a substitute for the superior having final budget authority.

### ***Analyses of Superiors' Earnings***

While not formally addressed by the hypotheses, the effect of the treatment manipulations on the earnings of the superior is clearly of interest. Table 1 reports mean superior earnings and Table 5 presents an ANOVA analysis with mean superior earnings as the dependent variable. Both authority type and the interaction of authority type and accuracy signal are significant. The results are similar to the analysis of slack. When subordinates have final budget authority, superiors' average earnings are \$22.32 when accuracy information is public and \$26.59 when accuracy information is private. This difference is statistically significant ( $t = 2.91$ ,  $p = 0.0064$ ) and represents a 19 percent increase. When superiors have final budget authority, superiors' average earnings are \$30.65 when accuracy information is public and \$27.49 when accuracy information is private. This difference is significant ( $t = -1.86$ ,  $p = 0.0704$ ). Hence, the effect on slack of authority type and whether accuracy information is public or private, results in similar effects on superior earnings.

## **V. CONCLUSIONS**

This paper presents the results of an experiment designed to study participative budgeting in a setting with a cost system that varies in its degree of accuracy. In particular, we manipulate and study two features of the budgeting process. First, the signal type regarding the accuracy of the firm's cost system is either public and verifiable or private information of the superior. We also compare the cases where either the subordinate or the superior has final budget authority.

Results indicate that superiors strategically misrepresent the accuracy of the cost system. In particular, they over-state the accuracy of the cost system when it reports low cost-ranges and under-state the accuracy when it reports high cost-ranges. We also find that having a private accuracy signal reduces slack when subordinates unilaterally set their budgets, but not when superiors have final budget authority. In fact the two methods of control appear to act as substitutes.

We demonstrate that superiors are willing to strategically misrepresent private information regarding the cost systems accuracy in an attempt to elect more favorable budget proposals from subordinates. Our results contribute to research that expands and studies the role that superiors play in the budgeting process. This makes it possible to gain a more complete understanding of the budgeting process. Our results also imply that the value of the type of signal produced by the cost system depends on whether subordinates or superiors have final authority.

## REFERENCES

- Anthony, R., & Govindarajan, V. (2007). *Management Control Systems*. New York: Irwin.
- Antle, R., & Eppen, G. (1985). Capital rationing and organizational slack in capital budgeting. *Management Science*, 31, 163-174.
- Antle, R., & Fellingham, J. (1990). Resource rationing and organizational slack in a two-period model. *Journal of Accounting Research*, 28, 1-24.
- Antle, R., & Fellingham, J. (1995). Information rents and preferences among information systems in a model of resource allocation. *Journal of Accounting Research*, 33, 41-58.
- Antle, R., & Fellingham, J. (1997). Models of capital investments with private information and incentives: a selective review. *Journal of Business Finance & Accounting*, 24, 887-908.
- Arya, A. Glover, J., & Sivaramakrishnan, K. (1997). Commitment issues in budgeting. *Journal of Accounting Research*, 35, 273-278.
- Arya, A. Glover, J., & Young, R. (1996). Capital budgeting in a multidivisional firm. *Journal of Accounting, Auditing, and Finance*, 11, 519-533.
- Baiman, S. (1975). The evaluation and choice of internal information systems within a multiperson world. *Journal of Accounting Research*, 13, 1-15.
- Baiman, S. (1990). Agency research in managerial accounting: A second look. *Accounting, Organizations and Society*, 15 (4), 399-411.
- Balakrishnan, R. (1995). Rationing resources among multiple divisions. *Journal of Accounting, Auditing, and Finance*, 1, 263-292.
- Binmore, K. (1992). *Fun and games, a text on game theory*. Lexington, MA: D.C. Heath and Company.
- Bogardus, E. S. (1959). *Social Distance*. Yellow Springs, Ohio: The Antioch Press.
- Bohnet, I., & Frey, B. S. (1999). Social distance and other-regarding behavior in dictator games: Comment. *American Economic Review*, 8, 335-339.
- Brandenburger, A. (1996). Strategic and structural uncertainty in games. In R. Zeckhauser, R. Keeney, & J. Sibenius (Eds.), *Wise Choices: Games, Decisions, and Negotiations* (pp. 221-232). Boston: Harvard Business School Press.
- Brink, A., Coats, J., & Rankin, F. W. (2013). Who's the boss? The economic and behavioral implications of various characterizations of the superior in participative budgeting experiments, Working Paper, Colorado State University.
- Brown, J. L., Evans, J. H., & Moser, D.V. (2009). Agency theory and participative budgeting experiments. *Journal of Management Accounting Research*, 21, 317-345.

- Brüggen, A., & Luft, J. (2011). Capital rationing, competition, and misrepresentation in budget forecasts. *Accounting, Organizations and Society*, 36, 399-411.
- Chow, C., Cooper, J., & Haddad, K. (1991). The effects of pay schemes and ratchets on budgetary slack and performance: A multiperiod experiment. *Accounting, Organizations and Society*, 16 (1), 47-60.
- Chow, C., Cooper, J., & Waller, W. (1988). Participative budgeting: Effects of a truth-inducing pay scheme and information asymmetry on slack and performance. *The Accounting Review*, 63, 111-122.
- Church, B. K., Hannan, R. L., & Kuang, X. (2012). Shared interest and honesty in budget reporting. *Accounting, Organizations and Society*, 37 (3), 156-167.
- Cialdini, R. 1996. The triple tumor structure of organizational behavior. In *Codes of Conduct: Behavioral Research into Business Ethics*. Edited by D. Messick and A.E. Tenbrunsel. New York: Russell Sage Foundation.
- Dana, J., Weber, R. A., & Kuang, J. X. (2007). Exploiting moral wiggle room: Experiments demonstrating an illusory for fairness. *Economic Theory*, 1 (1), 67-80.
- Demski, J. S., and Frimor, H. (1999). Performance measure garbling under renegotiation in multi-period agencies. *Journal of Accounting Research*, 37 (Supplement), 187-214.
- Demski, J. S., and D.E.M. Sappington, (1993), Sourcing with unverifiable performance information. *Journal of Accounting Research*, 31 (1), 1-20.
- Evans, J., Hannan, R. L., Krishnan, R., & Moser, D. (2001). Honesty in managerial reporting. *The Accounting Review*, 76 (4), 537-559.
- Farrell, J. (1987). Cheap talk, coordination, and entry. *Rand Journal of Economics*, 18, 34-39.
- Fehr, E., and S. Gächter. 2002. Do incentive contracts undermine voluntary cooperation? Working Paper, EU-TMR Research Network ENDEAR(FMRX-CT98-0238).
- Fisher, J., Frederickson, J., & Pfeffer, S. (2000). Budgeting: An experimental investigation of the effects of negotiation. *The Accounting Review*, 75, 93-114.
- Fisher, J., Frederickson, J., & Pfeffer, S. (2002a). The effect of information asymmetry on negotiated budgets: An empirical investigation. *Accounting, Organizations and Society*, 27, 27-43.
- Fisher, J., Frederickson, J., & Pfeffer, S. (2006). Budget negotiations in multiperiod settings. *Accounting, Organizations and Society*, 31, 511-528.
- Fisher, J., Maines, L., Pfeffer, S., & Sprinkle, G. (2002b). Using budgets for performance evaluation: Effects of resource allocation and horizontal information asymmetry on budget proposals, budget slack and performance. *The Accounting Review*, 77, 847-865.

- Gibbs, M. J. (1991). An economic approach to process in pay and performance appraisals. Working paper, Harvard Business School.
- Groves, T. (1973). Incentives in teams, *Econometrica*, 41, 617-633.
- Hannan, R. L., Rankin, F. W., & Towry, K. L. (2006). The effect of information systems on honesty in managerial reporting: A behavioral perspective. *Contemporary Accounting Research*, 23 (4), 885-918.
- Hannan, R. L., Rankin, F. W., & Towry, K. L. (2010). Flattening the organization: The effect of organizational reporting structure on budgeting effectiveness. *Review of Accounting Studies*, 15 (3), 503-536.
- Hobson, J. L., Mellon, M. J., & Stevens, D. E. (2010). Determinants of moral judgments regarding budgetary slack: An experimental examination of pay scheme and personal values. *Behavioral Research in Accounting*, 23 (1), 87-107.
- Hoffman, E., McCabe, K., & Smith, V. L. (1996). Social distance and other-regarding behavior in dictator games. *American Economic Review*, 86 (3), 653-660.
- Horngren, C. T., Foster, G., & Datar, S. M. (2003). *Cost Accounting: A Managerial Emphasis*. Upper Saddle River, NJ: McGraw-Hill.
- Howell, R. A., & Sakurai, M. (1992). Management accounting (and other) lessons from the Japanese. *Management Accounting*, December, 28-34.
- Jensen, M. C. (2003). Paying people to lie: the truth about the budgeting process. *European Financial Management*, 9, 379-406.
- Kachelmeier, S., Smith, J., & Yancey, W. (1994). Budgets as a credible threat: An experimental study of cheap talk and forward induction. *Journal of Management Accounting Research*, 6 (Fall), 144-174.
- Lazear, E. *Personnel Economics*, Cambridge, MA: MIT Press, 1995.
- Matuszewski, L. J. (2010). Honesty in managerial reporting: Is it affected by perceptions of horizontal equity? *Journal of Management Accounting Research*, 22, 233-250.
- Merchant, K., & Shields, M. (1993). When and why to measure costs less accurately to improve decision making. *Accounting Horizons*, 7 (2), 76-81.
- Mill, J. S. (1836). On the definition of political economy, and on the method of investigation proper to it. In *Essays on Some Unsettled Questions of Political Economy*, 2nd edition (Essay 5, p. 38 & 48). London: Longmans, Green, Reader & Dyer.
- Mittendorf, B. (2006). Capital budgeting when managers value both honesty and perquisites. *Journal of Management Accounting Research*, 18, 77-95.
- Penno, M. (1990). Accounting systems, participation in budgeting, and performance evaluation. *The Accounting Review*, 65 (2), 303-314.

- Persky, J. (1995). The ethology of homo economicus. *The Journal of Economic Perspectives*, 9 (2), 221-231.
- Rankin, F. W., Schwartz, S., & Young, R. (2003). Management control using nonbinding budgetary announcements. *Journal of Management Accounting Research*, 15, 75-93.
- Rankin, F. W., Schwartz, S., & Young, R. (2008). The effect of honesty and superior authority on budget proposals. *The Accounting Review*, 83 (4), 1083-1099.
- Roth, A. E. (1995). Bargaining experiments. In J. H. Kagel, & A. E. Roth (Eds.), *The Handbook of Experimental Economics* (pp. 253-348). Princeton: Princeton University Press.
- Rosaz, J. (2012). Biased information and effort. *Economic Inquiry* 50(2): 484-501.
- Schatzberg, J., & Stevens, D. E. (2008). Public and private forms of opportunism within the organization: A joint examination of budget and effort behavior. *Journal of Management Accounting Research*, 20, 59-81.
- Schwartz, S. T., Spires, E. E., Wallin, D. E., & Young, R. A. (2012). Aggregation in budgeting: An experiment. *Journal of Management Accounting Research*, 24, 177-199.
- Schweitzer, M. E., & Hsee, C. K. (2002). Stretching the truth: Elastic justification and motivated communication of uncertain information. *Journal of Risk and Uncertainty*, 25 (2), 185-201.
- Smith, A. (1986). On the division of labour. In *The Wealth of Nations* (pp. 119). New York: Penguin Classics.
- Stevens, D. E. (2002). The effects of reputation and ethics on budgetary slack. *Journal of Management Accounting Research*, 14, 153-171.
- Tenbrunsel, A. T., & Messick, D. M. (1999). Sanctioning systems, decision frames, and cooperation. *Administrative Science Quarterly*, 44, 684-707.
- Webb, R. A. (2002). The impact of reputation and variance investigations on the creation of budget slack. *Accounting, Organizations, and Society*, 27, 361-378.
- Weitzman, M. L. (1976): "The new soviet incentive model," *Bell Journal of Economics*, 7, 251-257
- Young, M. (1985). Participative budgeting: The effects of risk aversion and asymmetric information on budgetary slack. *Journal of Accounting Research*, 23 (2), 829-842.
- Zetterberg, H. L. (1957). Compliant actions. *Acta Sociologica*, 2, 188-192.
- Zhang, M. (2008). The effects of perceived fairness and communication on honesty and collusion in a multi-agent setting. *The Accounting Review*, 83, 1125-1146.

**TABLE 1**  
**Summary of Mean (Std. Dev.) Results**

Treatment	Slack per period (absolute)	Slack per period (as portion of potential slack)	Subordinate earnings per period from project <sup>a</sup>	Superior earnings per period from project <sup>a</sup>	Superior rejection rate
Subordinate Authority/private accuracy signal	\$22.67 (18.08)	0.59 (0.32)	\$32.69 (18.08)	\$26.59 (15.58)	N/A
Subordinate Authority/ public accuracy signal	\$26.95 (19.92)	0.68 (0.30)	\$36.95 (19.92)	\$22.32 (13.92)	N/A
Superior Authority/private accuracy signal	\$19.87 (16.52)	0.49 (0.25)	\$25.64 (16.29)	\$27.49 (16.32)	24%
Superior Authority/public accuracy signal	\$16.71 (13.10)	0.44 (0.24)	\$23.26 (13.65)	\$30.65 (18.45)	25%

<sup>a</sup> Both subordinate and superior mean per period earnings include all periods regardless of whether the project was accepted or rejected.



**TABLE 2****Superiors' Misrepresentation of Accuracy**

Period	Absolute Misrepresentation of Accuracy <sup>a</sup>		Frequency of Accurate and Inaccurate Accuracy Reports	
	Mean <sup>a</sup>	Std. Dev	Accurate Accuracy Reports	Inaccurate Accuracy Reports
1	8.43	8.20	11	29
2	10.95	11.64	9	31
3	11.83	11.80	6	34
4	12.03	12.20	10	30
5	11.53	14.25	12	28
6	13.00	14.50	13	27
7	14.00	12.41	6	34
8	11.20	13.54	17	23
9	16.23	13.31	6	34
10	12.48	14.54	11	29
Overall	12.17	12.77	101	299

<sup>a</sup>The absolute value of actual accuracy minus reported accuracy.

**TABLE 3**  
**Superiors' Mean Accuracy Misrepresentation by Information Signal**  
**Accuracy Sub-range**

Cost Sub-range	Directional Mean Misrepresentation <sup>a</sup>		Tests for Strategic Misrepresentation <sup>b</sup>	
	Mean	Std. Dev	<i>t-test</i>	<i>p-value</i>
Sub-range 1: 0 to 20	-10.76	11.83	-5.75	0.0001
Sub-range 2: 21 to 40	-5.10	10.10	-3.19	0.0014
Sub-range 3: 41 to 60	2.85	9.88	1.80	0.0399
Sub-range 4: 61 to 80	8.60	13.99	3.54	0.0007

<sup>a</sup> Directional mean misrepresentation was calculated by taking the difference between the actual accuracy signal and the superiors' reported accuracy signals in the private information system signal treatments for each participant by four sub-ranges. Negative values represent over reporting and positive values represent under reporting.

<sup>b</sup> For sub-ranges one and two, we test whether the mean is less than zero and for cost-ranges three and four we test whether the mean is greater than zero.

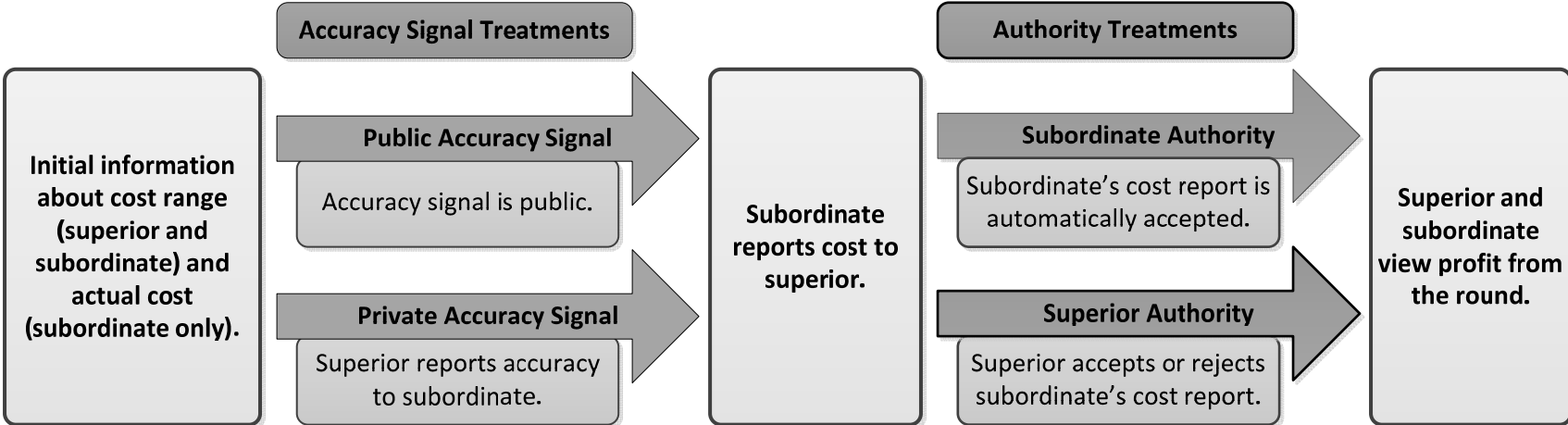
**TABLE 4**  
**ANOVA Analysis of Subordinates' Mean Slack**

	<i>F-statistic</i>	<i>p-value</i>
Authority	10.13	0.0021
Accuracy Signal	0.07	0.7885
Authority*Accuracy Signal	3.27	0.0744

**TABLE 5**  
**ANOVA Analysis of Superiors' Mean Earnings**

	<i>F-statistic</i>	<i>p-value</i>
Authority	16.89	0.0001
Accuracy Signal	0.25	0.6187
Authority*Accuracy Signal	10.96	0.0014

## Progression of an Experimental Period



**FIGURE 2**  
**Mean Directional Misrepresentaion By Cost-range**

