Can the Superior's Choice of an Information System Diminish its Behavioral Benefit?
A Further Examination of Information System Effects on Budgetary Reporting Honesty

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Abstract: Researchers have documented a behavioral benefit of an information system in that reducing information asymmetry regarding the level of honesty in the budget increases reporting honesty (Hannan, Rankin, & Towry, 2006; Abdel-Rahim & Stevens, 2018). We extend this literature by examining whether the superior's choice to implement an information system diminishes this behavioral benefit. Consistent with prior results, we observe an increase in reporting honesty when the information system is randomly assigned. When the information system is chosen by the superior, however, we find that this behavioral benefit is significantly reduced. This reduction is attributable to the behavior of subordinates who score high in social norm sensitivity as measured by the Responsibility scale of the JPI-R (Jackson 1994). Exit questionnaire responses reveal that while both high and low norm sensitivity subordinates viewed the superior's choice of an information system as a signal of distrust, only high norm sensitivity subordinates felt less obligated to report honestly as a result. A path analysis provides further evidence that the superior's implementation choice reduced reporting honesty in high norm sensitivity subordinates by reducing their obligation for reporting honestly in the budget. This study documents a crowding-out effect for information systems and provides evidence regarding the underlying factors behind that effect.

1. Introduction

One of the most widely studied agency problems in accounting is how to induce subordinates to report honestly in the budget when they possess private information that is needed for resource allocation, planning, and control purposes. Hannan et al. (2006) and Abdel-Rahim and Stevens (2018) document that reporting honesty can be increased by an information system that reduces information asymmetry between the subordinate and the superior regarding the level of honesty in the budget.[1] These two experimental studies rely fully on social sanctions generated by the direct presentation of the budget to the superior by the subordinate. Thus, they document a behavioral benefit of an information system based on reductions in information asymmetry alone. In their study, Abdel-Rahim and Stevens (2018) develop a behavioral theory of information asymmetry effects on reporting honesty based on Bicchieri's (2006) theory of social norm activation. Consistent with Bicchieri's theory and Koford and Penno's (1992) "norm sensitivity assumption," Abdel-Rahim and Stevens argue that subordinates are heterogeneous in their sensitivity to social norms and subordinates with low norm sensitivity will require social sanctions to report honestly in the budget. Thus, they base their behavioral theory on the ability of an information system to increase the activation of an honesty norm in low norm sensitivity subordinates. However, Abdel-Rahim and Stevens do not attempt to measure norm sensitivity in their study.

This study examines whether the superior's choice to implement an information system diminishes its behavioral benefit and how distrust interacts with norm sensitivity in that crowding-out effect. Superiors often use their authority to implement control systems within the organization (Christ, Sedatole, & Towry, 2012). Previous experimental studies have documented that the superior's choice to implement a formal control reduces its benefits by signaling distrust or leaking information about low behavioral norms observed in other subordinates (Christ, 2013; Cardinaels & Ying, 2015). However, previous studies have not examined the role of norm sensitivity in this crowding-out effect. Further, researchers have not

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[1] These two experimental studies incorporate a slack-inducing pay scheme where the economic prediction is for the subordinate to build maximum budgetary slack regardless of whether the information system is present or absent. We discuss both studies more fully below.

examined whether a similar crowding-out effect exists with informal controls such as an information system that only reduces information asymmetry regarding the level of honesty in the subordinate's budget.[2] This examination is particularly important given the ongoing focus on information asymmetry in experimental accounting research (e.g., Young, 1985; Kren, 1993; Webb, 2002; Stevens, 2002; Hannan et al., 2006; Cardinaels, 2016; Abdel-Rahim & Stevens, 2018).

We use insights from social norm activation theory (Bicchieri, 2006) and prior experimental studies to develop our hypotheses. Fundamental to our theory is the assumption that the superior's choice of a non-constraining information system signals distrust to subordinates by increasing the superior's ability to detect and monitor the level of honesty in the budget. We test this assumption first because it has not been demonstrated in the literature and prior evidence suggests that non-constraining controls are less likely to signal distrust than constraining controls (Christ, Sedatole, Towry, & Thomas, 2008). Next, we test the differential effect of an information system when it is chosen by the superior rather than randomly assigned as in previous studies. Based on the theory and experimental results in Abdel-Rahim and Stevens (2018), we expect that a precise information system will increase reporting honesty when it is randomly assigned. When the superior chooses to implement the information system, however, we expect the signal of distrust to be resented by subordinates who have high norm sensitivity and feel obligated to report honestly without social sanctions. Given these expectations, we predict that the superior's choice of an information system will reduce its behavioral benefit, and that this effect will be driven by the reporting behavior of subordinates with high norm sensitivity.

We test our theory and predictions using the experimental setting in Hannan et al. (2006) and Abdel-Rahim and Stevens (2018). In this setting, we manipulate within-subjects the presence of a highly precise and accurate information system (absent versus present) and manipulate between-subjects the source of the information system (random assignment versus superior's choice). We categorize subordinates as either *high* or *low* norm sensitivity based on their score on the JPI-R Responsibility scale

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[2] We define informal controls broadly as controls that do not involve formal contracting and do not directly affect subordinates' monetary payoffs, at least in the short run (Koford & Penno, 1992; Hannan 2016; Stevens 2019).

(Jackson, 1994), which has been validated and utilized by accounting researchers as a measure of norm sensitivity in auditing settings (Blay, Gooden, Mellon, & Stevens, 2019a; 2019b). Under the random assignment treatment, we find that the information system increases the reporting honesty of both subordinate types. Under the superior's choice treatment, however, the behavioral benefit of the information system is significantly reduced. We find that this reduction is attributable to the behavior of subordinates who measure high in norm sensitivity. Exit questionnaire responses reveal that while both high and low norm sensitivity subordinates viewed the superior's choice of an information system as a signal of distrust, only high norm sensitivity subordinates felt less obligated to report honestly as a result. A path analysis provides further evidence that the superior's implementation choice reduced reporting honesty in high norm sensitivity subordinates by reducing their obligation for reporting honestly in the budget.

Our study contributes to the growing literature examining the role of social norms in agency settings (Kunz & Pfaff, 2002; Cardinaels & Yin, 2015; Douthit & Stevens, 2015; Abdel-Rahim & Stevens, 2018; Blay et al., 2019a; 2019b). This research documents that situational cues can affect subordinates' behavior by activating social norms such as honesty, fairness, and reciprocity (Stevens 2019). Koford and Penno (1992, 137) emphasize the usefulness of information systems in reinforcing an honesty norm in subordinates by making "clear to them and to others what is true or false." Experimental researchers have documented this behavioral benefit by demonstrating that a randomly assigned information system that reduces information asymmetry regarding the level of honesty in the budget increases reporting honesty (Hannan et al., 2006; Abdel-Rahim & Stevens 2018). We replicate the ability of an information system to reinforce an honesty norm, but document that this behavioral benefit is diminished when the superior chooses to implement the information system. We also provide evidence that this crowding-out effect is attributable to the reduced feeling of obligation for reporting honesty in subordinates with high social norm sensitivity as a reaction to the signal of distrust generated by the superior's implementation choice.

Our study also contributes important theory and experimental evidence regarding unintended effects of the choice to implement managerial controls in the organization. The ability of such choices to

crowd out intrinsic motivation for goal-congruent behavior is considered one of the most important anomalies in economics (Frey, 1994; Frey & Jegen, 2001). Experimental researchers in accounting have documented a similar crowding-out effect for formal controls that utilize financial incentives (e.g., Kuang & Moser, 2009; Christ, 2013; Cardinaels & Yin, 2015; Davis, Schwartz, & Young, 2017). In a participative budgeting setting similar to ours, for example, Cardinaels and Yin (2015) find that the superior's choice to implement a contract that imposes a financial penalty for budgetary slack crowds out reporting honesty due to distrust and the leakage of information regarding low honesty norms observed in other subordinates. We extend Cardinaels and Yin's (2015) theory and experimental evidence by demonstrating a similar crowding-out effect for an informal control that only reduces information asymmetry regarding the level of honesty in the budget. While their two-stage experiment relies on Sliwka's (2007) signaling model, our repeating single-period experiment relies on Bicchieri's (2006) model of social norm activation which assumes differential norm sensitivity across subordinates.

Finally, our study contributes important insights to practice. While we replicate prior evidence that an information system can increase reporting honesty by simply reducing information asymmetry (Hannan et al., 2006; Abdel-Rahim & Stevens, 2018), we condition this evidence by documenting that the superior's choice to implement the information system can diminish this behavioral benefit in subordinates with high preference for responsibility. This suggests that firms may benefit by reducing the saliency of the superior's intentionality in implementing information systems. Alternatively, firms may consider taking measures to reduce the signal of distrust that such implementation choices engender. As such, we extend Cardinaels & Yin's (2015) warning for practitioners to reduce the saliency of formal financial control decisions to include informal control decisions. Furthermore, our study provides supporting evidence on how differential sensitivity to social norms interact with informal controls in affecting honest reporting. Firms devote significant resources to personnel selection based on personality traits during the pre-hiring process.[3] Our evidence suggests that firms should consider subordinates' norm sensitivity when

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[3] Pre-employment testing software applications are utilized by organizations for job candidate evaluation during the selection procedures and are becoming a popular tool for organizations (Moretti 2018).

designing organizational controls. Imposing strong controls upon subordinates with high norm sensitivity may be inefficient not only because it is unnecessary, but because it may cause resentment and reduce the obligation these subordinates feel to act in the best interest of the firm.

The remainder of this paper is organized as follows: In section two, we present our theory and develop the hypotheses we test. In section three, we describe the experimental methodology we use to test our hypotheses. In section four, we report our experimental results. In section five, we conclude by discussing the implications of our study for theory and practice.

2. Theory and Hypothesis Development

2.1 The Experimental Budgeting Setting with an Information System

Similar to Hannan et al. (2006) and Abdel-Rahim and Stevens (2018), we base our experimental budgeting setting on the agency models of capital budgeting in Antle and Eppen (1985) and Antle and Fellingham (1995). In these agency models, a capital project is being considered by the firm and there is information asymmetry between a subordinate and a superior regarding actual project cost. Both parties know the project revenue and the probability distribution of the project cost, but only the subordinate learns the actual project cost prior to submitting a cost budget to the superior. The superior receives the profit above the budget and the subordinate receives the difference between the budget and actual cost (i.e., the budgetary slack). Under traditional agency assumptions, including narrow self-interest and preferences only for wealth and leisure, the subordinate is predicted to always report a cost at the top of the cost distribution. Based on this prediction, some agency theorists have questioned the efficiency of participative budgeting as an organizational control (Jensen, 2001).

Antle and Eppen (1985) show that the optimal contract solution to this agency problem requires the superior to commit to rejecting budgets that surpass a given cost hurdle. This cost hurdle is toward the middle of the cost distribution and trades off the inefficiency of budgetary slack with the inefficiency of capital rationing (i.e., rejecting some profitable projects). Antle and Fellingham (1995) extend the model in Antle and Eppen by introducing an information system that reduces the informational advantage of the

subordinate by providing a public signal of actual production cost. This public signal reveals a subpartition of the distribution of possible production costs that contains the actual cost, where all possible subpartitions contain a cost range of equal length. Antle and Fellingham show that the information system is able to increase the efficiency of the optimal hurdle contract by reducing the range of the cost distribution to the superior, which reduces the two inefficiencies represented by budgetary slack and capital rationing.

Hannan et al. (2006) use the agency model in Antle and Fellingham (1995) to develop a behavioral theory regarding the effect of an information system on reporting honesty. Hannan et al.'s behavioral theory adds two assumptions to the model: 1) the signal from the information system is not contracted on, and 2) both the superior and the subordinate have a constant preference for honesty. The first assumption requires a non-contractual solution to the agency problem and the second assumption requires the subordinate to trade-off the cost of appearing honest with the financial benefit of misreporting. Given the constant preference for honesty, incorporating a coarse information system initially increases reporting honesty. As the cost range provided by the system narrows, however, the cost of appearing honest increases and eventually tilts the trade-off towards misreporting in the budget. Consistent with their behavioral theory, Hannan et al. find that a coarse information system with a relatively wide cost range *increases* reporting honesty relative to no information system. Hannan et al. also report evidence that a precise information system with a relatively narrow cost range *decreases* reporting honesty relative to the coarse information system.

Abdel-Rahim and Stevens (2018) extend Hannan et al.'s (2006) behavioral theory by incorporating insights from Bicchieri's (2006) model of social norm activation that assumes individuals have conditional preferences for honesty that can be activated given sufficient contextual cues. According to the model, the subordinate's preference to be honest in the budget is conditional upon the belief that an honesty norm exists and applies to the budgeting setting (*contingency* condition), the belief that a sufficiently large subset of individuals conforms to the honesty norm in similar budgeting settings (*empirical expectations* condition), and the belief that a sufficiently large subset of individuals expects conformance to the honesty norm in similar budgeting settings (*normative expectations* condition). Abdel-

Rahim and Stevens argue that a precise information system increases the activation of an honesty norm by increasing these beliefs. Thus, they use Bicchieri's model to predict that a precise information system increases reporting honesty relative to a coarse information system. They find robust evidence consistent with their prediction.[4]

In their behavioral theory, Abdel-Rahim and Stevens (2018, 35) incorporate Bicchieri's assumption that individuals have differential norm sensitivity. This assumption implies that the contextual cues needed to activate an honesty norm differ across subordinates.[5] Abdel-Rahim and Stevens argue that an honesty norm can be activated in subordinates with high norm sensitivity by the mere belief that there are sufficient expectations to be honest in their cost report, whereas subordinates with low norm sensitivity require the belief that dishonesty in their cost report will be detected and sanctioned. To support their prediction that reporting honesty is higher with a precise than a coarse information system, Abdel-Rahim and Stevens argue that a precise information system has greater potential to increase the activation of an honesty norm in low norm sensitivity subordinates and thereby make their reporting honesty similar to high norm sensitivity subordinates. Despite the important role of norm sensitivity in their theory, however, they do not attempt to measure norm sensitivity in their study.

In our experimental study, we use Abdel-Rahim and Stevens' (2018) precise information system with high accuracy.[6] When the information system is present, therefore, the superior has a relatively narrow cost range with which to infer the level of honesty in the subordinate's budget and apply social sanctions. As in Hannan et al. (2006) and Abdel-Rahim and Stevens (2018), we incorporate the manual delivery of the budget report to the superior by the subordinate but do not allow any other form of

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[4] Abdel-Rahim and Stevens analyze Hannan et al.'s original data and find that their reported negative effect of information system precision on honest reporting is attributable to an unusual period effect. In particular, participants in their coarse information system condition exhibited unusually high levels of honesty in later decision periods. This explains why an ANOVA test on their data finds no effect for information system precision on reporting honesty while a MANCOVA test finds a negative effect (both tests are reported by Hannan et al.).

[5] Although Bicchieri assumes differential norm sensitivity across individuals and different social norms, she assumes an individual's sensitivity to a particular social norm is fairly stable (Bicchieri, 2016, p. 116)

[6] A fully accurate information system is mostly non-existent in practice. Abdel-Rahim and Stevens emphasize that information system inaccuracy is another source of information asymmetry, and find that higher levels of accuracy (90% accuracy) increases honest reporting relative to the lower levels of accuracy used by Hannan et al. (70% accuracy).

communication between the superior and subordinate and all other experimental procedures are computerized. Thus, the social sanctions present in our experimental setting are limited to social disapproval that may be expressed in the superior's body language or facial expression (Noussair & Tucker, 2005). Given this limited form of social disapproval, we join Hannan et al. and Abdel-Rahim and Stevens in providing a powerful test of our behavioral theory.

2.2 The Effect of The Superior's Choice to Implement an Information System

2.2.1 The Superior's Implementation Choice as a Signal of Distrust

Experimental studies have documented a hidden cost of implementing management controls to align the interests of subordinates with the superior (Falk & Kosfield, 2006). In particular, researchers have found that the effectiveness of such controls is reduced when they are implemented through an intentional choice of the superior (Tenbrunsel & Messick, 1999; Falk, Fehr, & Fischbacher, 2008; Kuang & Moser, 2009; Christ et al., 2012; Christ, 2013; Cardinaels & Yin, 2015). This crowding-out effect is considered one of the most important anomalies in economics (Frey, 1994; Frey & Jegen, 2001). There are two theoretical rationales that have been proposed to explain the negative effect of the superior's choice to implement a management control. First, the implementation choice signals distrust which creates resentment and diminishes the subordinate's intrinsic motivation for goal congruent behavior (Chris, 2013; Cardinaels & Yin, 2015). Second, the implementation choice leaks information regarding low behavioral norms observed in other subordinates (Sliwka, 2007; Cardinaels & Yin, 2015; Danilov & Sliwka, 2016).

As in Hannan et al. (2006) and Abdel-Rahim and Stevens (2018), we focus on the behavioral benefit of an informal information system whose only function is to reduce information asymmetry regarding the level of honesty in the budget. A noticeable feature of prior experimental studies of crowding-out effects of management controls is that they rely on formal financial controls that constrain the actions of the subordinate. The ability of non-constraining controls to signal distrust has not been demonstrated in the literature. In fact, what little evidence exists suggests that non-constraining controls are less likely to signal distrust to subordinates than constraining controls (Christ et al., 2008). The information system we examine provides a limited form of social sanctions and imposes no constraints on

subordinates' reporting choices. Thus, we begin our study by testing the ability of the superior's implementation choice of the information system to signal distrust to the subordinate.

Without the information system, the superior only knows the range of project costs that are possible. Since all costs within this range have the same probability of occurring, high cost budgets submitted by the subordinate can be attributed to random probability rather than dishonest reporting. The information system, however, increases the monitoring power of the superior by giving her the ability to determine the level of honesty in the budget with high precision. When the superior can choose whether or not to implement the information system, therefore, the choice to implement the information system communicates her desire to closely monitor subordinates' reporting honesty and impose social sanctions for misreporting. Thus, we expect the superior's implementation choice to be perceived as a signal of distrust by subordinates. We test this expectation in our first hypothesis:

> **HYPOTHESIS 1**: *The superior's choice to implement an information system will be perceived as a signal of distrust by subordinates.*

2.2.2 The Effect of the Superior's Implementation Choice on Reporting Honesty

Next, we develop predictions regarding the effect of the superior's implementation choice on reporting honesty. Koford and Penno (1992, 127-128) argue that informal controls that reinforce behavioral norms and ethical standards may be valid alternatives to formal controls that rely on financial incentives. Experimental researchers have found participative budgeting a useful setting to examine the effectiveness of such informal controls.[7] For example, the participative budgeting setting has been used to demonstrate the activation of social norms for honesty, fairness, and reciprocity (Douthit & Stevens, 2015). This setting has also been used to demonstrate the effect of psychological contracts generated by the formation of behavioral expectations such as responsibility and trust (Gallani, Krishnan, Marinich, & Shields, 2019). Consistent with prior experimental studies, we expect the participative budgeting setting to activate an honesty norm that makes some subordinates feel obligated to report honestly in the budget. Further, consistent with Abdel-Rahim and Stevens' (2018) behavioral theory, we expect the reduction of

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[7] For reviews of this literature see Blay et al. (2018) and Stevens (2019).

information asymmetry regarding the level of honesty in the budget to increase the activation of an honesty norm.

Our second hypothesis tests the incremental effect of having the information system implemented by the superior rather than randomly assigned as in previous studies. Consistent with the documented crowding-out effect with formal controls, we expect the signal of distrust generated by the superior's implementation choice to create resentment and diminish the subordinate's intrinsic motivation for goal-congruent behavior. In particular, we expect the signal of distrust to alleviate the subordinate's obligation for reporting honestly in the budget. Despite the paucity of evidence regarding crowding-out effects for informal controls, early studies suggest that norm-based behavior is reduced when individuals feel less responsible for their behavior (Schwartz, 1968; Maclagan, 1983). This "responsibility-alleviation" effect has been demonstrated more recently by giving individuals the opportunity to shift responsibility for their behavior to an external party (Fehr & Schmidts, 1999; Charness, 2004; Barsky, 2008). Similarly, we expect the superior's implementation choice to generate an "obligation-alleviation" effect in subordinates.

Given the above theory and experimental evidence, we predict that the positive behavioral effect of an information system on reporting honesty will be reduced when superiors choose to implement the information system. Because this prediction involves the incremental effect of the superior's implementation choice, and evidence prior to Abdel-Rahim and Stevens (2018) was mixed, we first test the baseline prediction of a positive behavioral effect of an information system on subordinates' reporting honesty:

> **BASELINE PREDICTION:** *There will be a positive behavioral effect of an information system on subordinates' reporting honesty.*

> **HYPOTHESIS 2:** *The positive behavioral effect of an information system on subordinates' reporting honesty will be reduced when superiors choose to implement the information system.*

2.2.3 The Role of Differential Norm Sensitivity

Our third hypothesis tests the role of differential norm sensitivity in our predicted crowding-out effect of an information system. Koford and Penno (1992) examine how the predictions of the principal-agent model change under two alternative assumptions: (1) some individuals are motivated by social norms

and others are motivated purely by opportunistic self-interest, and (2) all individuals can be motivated by social norms in some situations. Abdel-Rahim and Stevens (2018) call the first assumption the "types assumption" and the second assumption the "norm sensitivity assumption." Koford and Penno find that either assumption generates new results that expand the descriptive power of the principal-agent model. Consistent with Koford and Penno's norm sensitivity assumption, Bicchieri's (2006) model suggests that contextual cues can activate a behavioral norm and norm sensitivity determines the contextual cues needed to activate that norm. Abdel-Rahim and Stevens use Bicchieri's model to argue that an honesty norm can be activated in subordinates with high norm sensitivity by the mere belief that there are sufficient expectations to be honest in their budget, whereas subordinates with low norm sensitivity require the belief that misreporting in the budget will be detected and sanctioned.

Experimental researchers have found evidence that differential norm sensitivity affects the activation of an honesty norm in auditing settings where misreporting in the audit report transfers wealth from investors to firm managers and their auditor. Blay et al. (2019a) document that auditors who score high in norm sensitivity are more likely to increase reporting honesty when the investor role is played by another participant rather than automated in the computer program. Further, Blay et al. (2019b) document that auditors who score high in norm sensitivity increase their reporting honesty in response to an identity disclosure requirement and signature requirement.[8] We expect that differential norm sensitivity will affect the subordinate's response to the signal of distrust generated by the superior's choice to implement the information system. In particular, we expect subordinates with high norm sensitivity to feel greater resentment because they already feel obligated to report honestly in the budget and have high behavioral expectations for others to report honestly. Thus, the superior's implementation of the information system will alleviate the obligation for reporting honesty primarily in subordinates with high norm sensitivity.

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[8] As we discuss more fully below, these experimental studies use the Responsibility Scale of the JPI-R (Jackson 1994) to measure differential norm sensitivity in the auditor.

Given the above theory and experimental evidence, we predict that the reduced behavioral benefit of an information system due to the superior's implementation choice will occur primarily in subordinates with high norm sensitivity.

HYPOTHESIS 3: *The reduced behavioral benefit of an information system due to the superior's implementation choice will occur primarily in subordinates with high norm sensitivity.*

3. Methodology

3.1 Experimental Setting

To test our three hypotheses, we utilize the experimental setting in Hannan et al. (2006) and Abdel-Rahim and Stevens (2018). The firm produces 1,000 units each period which are sold for 6.50 lira, an experimental currency. Production costs fall within the range of 4.00 lira to 6.00 lira per unit with a uniform distribution of (4.00, 4.05, 4.10, ... , 6.00). This cost distribution is common knowledge to both the subordinate and the superior.[9] The actual cost of production, however, is revealed only to the subordinate prior to submitting the cost budget to the superior. Furthermore, the subordinate receives whatever is in his cost budget from the superior. This simplification allows us to abstract from strategic rejection effects and focus on the behavioral theory behind our hypothesized effects. The subordinate receives a salary of 1,000 lira each period and keeps for himself any difference between the reported cost (i.e., resources received) and actual cost. Thus, the subordinate's payoff function each period is

$$\gamma = [(\text{reported unit cost - actual unit cost}) \times 1{,}000] + 1{,}000 \tag{1}.$$

The superior receives an initial endowment of 500 lira each period and there is no cost associated with the information system when it is present. Again, this simplification allows us to focus on the behavioral theory behind our hypothesized effects. While the subordinate knows that the superior receives the same fixed endowment in every period, only the superior knows her exact endowment. This design choice obscures relative pay and thereby diminishes the salience of distributional fairness concerns (Douthit & Stevens 2015). In addition to the initial endowment each period, the superior keeps the net

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[9] The labels "manager" and "employee" were used in our instructions to refer to the roles of the superior and the subordinate.

profits after paying the cost of production and the subordinate's salary. Thus, the superior's payoff function per period is

$$\Pi = 500 + [(6.50 - \text{reported unit cost}) \times 1{,}000] - 1{,}000 \qquad (2).$$

3.2 Participants and Experimental Manipulations

We recruited 150 participants (75 superiors and 75 subordinates) from business school students at a western university in the United States. The participants were primarily undergraduate business majors (97 percent) in the final two years of their program (58 percent juniors and 42 percent seniors). Ninety-one percent of participants had at least one year of full-time work experience with a mean of 2.9 years. Forty-nine percent of participants were males.

We manipulated within-subjects the presence of a highly precise and accurate information system (absent versus present) and manipulated between-subjects the superior's intentional choice of the information system (*random assignment* versus *superior's intentional choice*). When present, the information system provided a relatively narrow cost range that contained the actual cost with 90% probability. There were eight possible cost ranges, 4.00-4.25 lira, 4.30-4.50 lira, ... , 5.80-6.00 lira, and the remaining 10 percent probability was distributed evenly across the other seven cost ranges. These probabilities were common knowledge to both the subordinate and the superior. Under *random assignment*, the presence or absence of the information system was determined randomly by an automated coin flip. Under *superior's choice*, the presence or absence of the information system was determined by an intentional choice of the superior.

In order to obtain sufficient data for statistical analysis and increase the salience of the intentionality of the information system, we used the strategy method to elicit subordinates' budget decisions (Brandts & Charness 2011). This method of elicitation has been used in experimental studies in accounting (e.g., Balakrishnan, Sprinkle, & Williamson, 2011; Kachelmeier & Van Landuyt, 2017) and management (Danilov & Sliwka, 2016). Thus, the subordinate prepared a pair of budget requests each period after learning the cost range the information system would provide to the superior: one assuming

there was no information system and one assuming there was an information system present. After preparing both budgets, the subordinate learned whether or not there was an information system and then submitted the budget prepared earlier for that condition to the superior by hand. The timeline of our experiment is presented in Figure 1.[10]

[Insert Figure 1 about here]

3.3 Subordinates' Norm Sensitivity

We categorize subordinates as either *high* or *low* norm sensitivity based on their score on the Responsibility scale of the Jackson Personality Inventory-Revised (JPI-R, Jackson, 1994). The JPI-R Responsibility scale has been validated by earlier research in social psychology (e.g., Ashton, 1998; Ashton, Paunonen, & Lee, 2014; Roberts, Chernyshenko, Stark, & Goldberg, 2005) and utilized by accounting researchers as a measure of norm sensitivity (Blay et al., 2019a, 2019b).[11] The Responsibility scale uses the responses to 20 statements designed to capture the degree to which a person feels an abstract moral obligation to other people and to society at large. Each statement required a binary response of True or False, with a True response consistent with high responsibility in 10 statements and a False response consistent with high responsibility in 10 statements. Thus, this measure ranges from 0 to 20 with higher scores reflecting higher norm sensitivity. We gathered this measure of subordinates' norm sensitivity at the end of each experimental session following the exit questionnaire.[12]

Table 1 presents subordinates' scores by condition. Both the average and median score for the JPI-R Responsibility scale is around 13 for subordinates in both experimental conditions, and there is no

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[10] Brandts and Charness (2011) surveyed 29 existing studies and concluded that behavioral differences between a strategy method and a direct response method are less likely when people make fewer contingent choices. In our study, the subordinates only make two contingent responses so we believe using a strategy method is unlikely to bias our results.

[11] The JPI-R is a 300-item instrument that measures 15 personality scales that are relevant to the functioning of a person in a wide range of social settings including organizational and work settings. The validity of self-reported personality questionnaires has been well-documented in the personality literature (e.g., McCrae & Costa, 1987). More broadly, using a tested and validated questionnaire to assess individual-level differences is common in the accounting literature (e.g., Wang, 2017; Blay et al., 2019a, 2019b; Hobson, Stern, & Zimbelman, 2019).

[12] The JPI-R measures a stable personality trait that should not be affected by the timing of measurement (pre versus post experiment). To confirm, we conducted a pilot in which 30 participants provided their responses to the JPI-R responsibility measure in a registration form about a week prior to, and again in an exit questionnaire following a budget reporting experimental task. Using a paired-sample t-test, we find no statistical difference between pre and post measurement of norm sensitivity.

significant difference in this measure across the two experimental conditions (t = -0.42, p = 0.67). Therefore, we conclude that levels of norm sensitivity were successfully randomized across the two experimental conditions. Consistent with Blay et al. (2019a), we classify subordinates as *high norm sensitivity* if their score is greater than the median of 13 and *low norm sensitivity* if their score is lower than or equal to the median. This median split results in 15 subordinates (15 subordinates) with *high* norm sensitivity and 18 subordinates (23 subordinates) with *low* norm sensitivity in the *random assignment* (*superior's choice*) condition, respectively. The median split method is consistent with recent accounting research (Wang, 2017; Murphy, Wynes, Hahn, & Devine, 2020), and creates differences in the Responsibility scale that should reflect differences in norm sensitivity across subordinates.[13]

[Insert Table 1 about here]

3.4 Experimental Procedures

Four experimental sessions were administered for each of the two experimental conditions (random assignment and superiors' choice). Upon arriving at the laboratory, each participant was randomly seated at a computer terminal to decrease the potential for participants to sit next to someone they knew. Superiors sat in two rows at the front of the room and subordinates sat in two rows immediately behind them, all facing the front of the room. Although participants sat next to each other, it was impossible for them to view each other's computer screen due to divider walls and flaps covering computer screens. Privacy was further assured by not allowing participants to communicate to each other during the experiment.

At the beginning of each experimental session, the experimenter read the instructions aloud and answered participants' questions in private. To assure that participants understood the experimental instructions, they then answered a short quiz. After the experimenter reviewed the answers to the quiz and resolved misunderstandings, participants started the experiment on their computer terminals. The experiment was computerized using JAVA. At the beginning of each period, the software program

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[13] One participant did not provide responses for the JPI-R scale in the exit questionnaire and thus is excluded in our test of H3.

randomly paired superiors and subordinates together. Thus, the roles remained constant throughout the experiment but participants were re-matched with a new partner at the beginning of each period.

Figure 1 presents the timeline for each period in the experiment. Each period proceeded as follows: First, each subordinate received the actual cost of production on their computer screen. Next, the superiors and subordinates viewed a 10-second waiting screen informing them that a cost range was being generated. This screen listed the eight possible cost ranges and the probability that the cost range generated contained the actual cost (90%).[14] Each subordinate then viewed the cost range for the period and prepared a pair of cost budgets: one assuming there was no information system and one assuming there was an information system. After submitting the two cost budgets on the computer, the next screen showed the subordinate whether an information system was present or absent and provided a reminder of the cost budget that corresponded with the information system outcome. Finally, the subordinate was instructed to complete a paper-based budget form and walk over and hand it directly to the superior with the ID they were paired with for the period. To facilitate this face-to-face interaction, each computer terminal had a large visible card that indicated the numerical ID of the superior or the subordinate. The budget form was the only means of communication permitted during the experiment. Thus, we replicated the face-to-face budget submission process used by Hannan et al. (2006) and Abdel-Rahim and Stevens (2018).

[Insert Figure 1 about here]

Participants interacted for ten periods in each experimental session. To facilitate comparisons across conditions, the actual production costs each period were randomly generated in advance along with the cost ranges generated by the information system. Reflecting the 90% accuracy of the information system, the actual cost was below the cost range generated by the information system in the ninth period. After the ten decision periods, participants completed an exit questionnaire. Participant earnings were based on one decision period selected randomly by the computer program using a conversion rate of 75 lira = $1.00. To assure anonymity, the lab coordinator distributed the cash payments privately to

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[14] The appendix includes screenshots of the user interface for the two between-subject conditions.

participants based on their ID number after the exit questionnaire was completed. Each experimental session lasted approximately 1.5 hours and the average earnings per participant was $13.5 in addition to the show up fee of $7.

3.5 Dependent Variable

We test our hypotheses by focusing on the following two dependent variables: the subordinates' perception of trust after superiors have made their choice (H1) and the subordinates' mean level of reporting honesty (H2 and H3). Similar to prior research (Evans et al., 2001), we measure reporting honesty as "(1 – *slack claimed*) / *slack available*", where *slack claimed* is the amount of slack the subordinate earned based on the difference between the subordinate's actual and reported cost, and *slack available* is the amount that the subordinate could have earned by reporting the highest possible cost. Contrary to Cardinaels and Yin's (2015) two-stage experiment designed mainly to capture the informational leakage effect of the superiors' choice, our design implements a single-stage experiment in which superiors do not learn history information about their subordinates' honesty prior to making their information system choice. To examine potential learnings effects across periods, however, in our analysis we average subordinates' reporting honesty across the first two periods and across all ten periods.

4. Results

4.1 Manipulation Check

We gathered subordinates' responses to statements on the exit questionnaire on a 7-point scale from 1 indicating "Strongly Disagree" to 7 indicating "Strongly Agree." In the *random assignment* condition we examine subordinates' responses to the following statement: "Whether your superior had an information system or not was determined randomly by an automated coin flip." In the *superior's choice* condition we examine subordinates' responses to the following statement: "Whether your superior had an information system or not was determined intentionally by the superior." We also considered subordinates responses to an open-ended question: "Please describe the strategy you used when making your decisions today." In untabulated results, we find that the average response to both manipulation check items is in the correct direction and significantly greater than the neutral response of 4, suggesting that we successfully

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manipulated the intentionality of the information system in our experimental study. However, we find that one participant in the random assignment condition and two participants in the superior's choice condition inaccurately responded "disagree" and reflected a lack of understanding of the procedures in their open ended response. Therefore, we exclude these three participants from our analysis.

4.2 Descriptive Statistics

Table 2 presents descriptive statistics for average reporting honesty across each of the experimental conditions. Panel A shows that the effect of the information system on reporting honesty is less positive when the information system is chosen by the superior rather than randomly assigned. Over all ten periods in the random assignment condition, average reporting honesty increased from approximately 20% under no information system to 56% under the information system. In the superior's choice condition, however, average reporting honesty increased from approximately 18% under no information system to only 41% under the information system. A similar pattern of behavior is present over the first 2 periods, although reporting honesty is consistently higher in these early periods. Unless noted otherwise, we focus on average reporting honesty over all ten periods.

Panels B and C of Table 2 present average reporting honesty across experimental condition by subordinates' norm sensitivity. Panel B shows that subordinates with *low* norm sensitivity increased their reporting honesty from approximately 14% to 51% when the information system was randomly assigned, whereas subordinates with *high* norm sensitivity increased their reporting honesty from approximately 27% to 63% on average. Consistent with expectations, *low* norm sensitivity subordinates in the random assignment treatment had a directionally lower level of reporting honesty under no information system (14%) than high norm sensitivity subordinates (27%), which approaches significance at the 10% level (p = 0.105 one-tailed). Abdel-Rahim and Stevens (2018) assert that the behavioral benefit of an information system is due primarily to the increased activation of an honesty norm in *low* norm sensitivity subordinates, which brings their reporting honesty closer to the level of *high* norm sensitivity subordinates. We find some evidence consistent with their assertion. In particular, the level of reporting honesty for *low* norm

sensitivity subordinates (51%) is no longer significantly different from high norm sensitivity subordinates (63%) under the information system at traditional levels of significance (p = 0.37, two-tailed).

Panel C reveals a dramatic change in reporting behavior under the superior's choice condition. In particular, subordinates with *low* norm sensitivity increased their reporting honesty from 20% to 45% when the superior chose the information system whereas subordinates with *high* norm sensitivity increased their reporting honesty from 15% to 34% on average. While the presence of the superior's choice had a minimal effect on the reporting behavior of *low* norm sensitivity subordinates, therefore, it had a dramatic effect on the reporting behavior of *high* norm sensitivity subordinate. Reporting honesty is now directionally lower on average for *high* norm sensitivity subordinates relative to *low* norm sensitivity, although this difference is not significant. The pattern of results in Table 2 suggests that subordinates who already felt obligated to report honestly in their budget resented the distrust conveyed by superiors over the ten decision periods.

Insert Table 2 about here]

4.3 Tests of Hypotheses

Hypothesis 1 (H1) predicts that the superior's choice to implement an information system will be perceived as a signal of distrust by subordinates. To test this prediction, we examine subordinate responses to two items on the exit questionnaire under the *superior's choice* condition: "When the manager chose to have (not to have) an information system, to what extent did you believe the manager trusted you?" Subordinates responded to these two items on an 11-point Likert scale in increments of 10 ranging from 0 (Not at All) to 100 (A Great Deal). As presented in Table 3, we find that the subordinate's perceived trust is significantly lower when the superior chose to implement the information system than when the superior chose not to implement the information system (28.16 versus 57.89, respectively, t = 5.03, p < 0.01 one-tailed). We also find that this reduction in perceived trust is not significantly different between subordinates with *low* norm sensitivity and *high* norm sensitivity (23.19 versus 34.67, respectively, t = 1.49, p = 0.15 two-tailed). These results provide strong and consistent support for H1. Thus, while the information system did not impose a financial control or directly constrain reporting behavior, the

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superior's choice to implement the information system was still perceived as a signal of distrust by subordinates.

[Insert Table 3 about here]

Hypothesis 2 (H2) predicts that the positive effect of an information system on subordinates' reporting honest reporting will be reduced when superiors choose to implement the information system. Because this prediction involves the incremental effect of the superior's implementation choice, we first test the baseline prediction that there will be a positive behavioral effect of an information system on subordinates' reporting honesty. Table 4 presents results related to the interactive effect of information system and superior's choice on subordinates' reporting honesty, and Figure 2 presents this interactive effect graphically. Panel A of Table 4 tests our baseline prediction using a repeated-measures ANOVA in the random assignment condition, and finds that the effect of the information system is highly significant ($p < 0.01$). This result confirms the previously documented behavioral benefit of an information system whose only function is to reduce information asymmetry regarding the level of honesty in the budget (Hannan et al., 2006; Abdel-Rahim & Stevens 2018). Panel B presents a repeated-measures ANOVA in the superior's choice condition, and finds that the behavioral benefit of the information system is robust to the superior's choice to implement the information system.

Panel C of Table 4 tests the interactive effect of the presence of the information system and the superior's choice to implement the information system. Using a two-way mixed ANOVA where the information system is a within-subject variable and the superior's choice is a between-subject variable, we find that the interactive effect of the two variables is significant ($F = 4.14$, $p = 0.02$, one-tailed). We also investigate the simple main effects of the superior's choice in Panel D. This analysis provides further evidence that the behavioral benefit of the information system depends on its source. We find that when the information system is present, reporting honesty is significantly lower under the superior's choice condition than under the random assignment condition ($t = -1.71$, $p = 0.04$, one-tailed). When the information system is absent, however, reporting honesty is not statistically different under the two

conditions (t = -0.32, p = 0.75, two-tailed). Collectively, the results in Table 4 provide consistent support for H2.

[Insert Figure 2 and Table 4 about here]

Hypothesis 3 (H3) predicts that the reduced behavioral benefit of an information due to the superior's implementation choice will occur primarily in subordinates with high norm sensitivity. Table 5 presents results related to the interactive effect of the superior's choice and subordinates' norm sensitivity, and Figure 3 presents this interactive effect in two graphs. Panel A of Table 5 presents a three-way mixed ANOVA which reveals a marginally significant interactive effect of the superior's choice and subordinates' norm sensitivity on reporting honesty (F = 2.14, p = 0.07). To examine this interactive effect further, Panel B presents two sets of two-way mixed ANOVAs testing the previously demonstrated two-way interactive effect of information system and superior's choice by subordinates' norm sensitivity. For subordinates with *low* norm sensitivity, we find that the interactive effect of information system and superior's choice on reporting honesty is not significant (F = 1.64, p = 0.21). For subordinates with *high* norm sensitivity, however, we find that the interactive effect of information system and superior's choice on reporting honesty is significant at the 10% level (F = 2.99, p = 0.095). Collectively, these results provide support for H3.

In Panel C of Table 5, we follow up these tests with an analysis of the simple main effects of superior choice across information system by subordinate norm sensitivity. Panel C suggests that the superior's choice did not affect reporting honesty for either *low* or *high* norm sensitivity subordinates when the choice was not to have the information system (p = 0.43 and 0.28, two-tailed, respectively). The superior's choice also did not affect reporting honesty for *low* norm sensitivity subordinates when the choice was to implement the information system (p = 0.67, two-tailed). For *high* norm sensitivity subordinates, however, the superior's choice to implement the information system decreased honest reporting relative to random assignment of the information system (p =0.038, two-tailed). Figure 3

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graphically presents the differential interactive effect when an information system is *absent* (panel A), and when it is *present* (panel B). These results provide further support for H3.[15]

[Insert Figure 3 and Table 5 about here]

4.4 Supplemental Tests of Underlying Theory

Fundamental to our theory is the assumption that the superior's choice of a non-constraining information system signals distrust to subordinates by increasing the superior's ability to detect and monitor the level of honesty in the budget. We find strong and consistent evidence for this underlying assumption (See Table 3 and related discussions above). Our theory also relies on the ability of this signal of distrust to create resentment and alleviate the subordinate's obligation for reporting honestly in the budget. Finally, our theory implies that this obligation-alleviation effect will be most pronounced in *high* norm sensitivity subordinates who already feel obligated to report honestly in the budget absent the social sanctions imposed by the information system.

We provide supplemental tests of our underlying theory using items on the exit questionnaire which were measured on an 11-point Likert scale in increments of 10 where 0 = "Not at all" and 100 = "A great deal." First, we use three items designed to examine subordinates' motivation to report honestly: whether they felt obligated to report honestly, had a desire to appear honest, and whether the presence of the information system reduced the opportunity for misreporting. Under the random assignment condition, we find that *high* norm sensitivity subordinates reported higher responses for the three items (65, 62, and 59 respectively) than *low* norm sensitivity subordinates (46, 48, and 40 respectively), which is marginally significant ($F = 2.10$, $p = 0.07$, two-tailed). Under the superior's choice condition, however, the responses of *high* norm sensitivity subordinates (49, 47, and 41 respectively) are not significantly different from the responses of *low* norm sensitivity subordinates (50, 48, and 52 respectively), ($F = 0.20$, $p = 0.65$ two-tailed). This evidence suggests that the distrust communicated by the superior's choice of the information

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[15] We test for period effects and the interaction of period effects with all our variables (norm sensitivity, information system presence, and superior's intentional choice). We find that our main results are robust to period effects. In particular, while there is a general drop in reporting honesty over time, all of our results are robust with a non-significant interaction effect between period and all other variables.

system reduced the obligation to report honestly for *high* norm sensitivity subordinates (p = 0.08, two-tailed) but not for *low* norm sensitivity subordinates (p = 0.76, two-tailed).

Second, we test our underlying theory using a path analysis of the mediating effect of perceived trust and the feeling of obligation for subordinates with high norm sensitivity when an information system is present. This analysis, which is presented in Figure 4, uses the exit questionnaire items designed to capture perceived trust and the subordinate's feeling of obligation to report honestly in the budget. We find that perceived distrust mediates the effect of the superior's choice of an information system on the reduced feeling of obligation, consistent with our theory. Further, we further find that the reduced feeling of obligation mediates the effect of the superior's choice of an information system on the reporting honesty of subordinates with high norm sensitivity. A similar path analysis for subordinates with *low* norm sensitivity (not reported) finds that distrust and the feeling of obligations did not mediate the effect of the superior's choice of information system on their reporting honesty. Collectively, these supplemental tests provide consistent support for our underlying theory.

[Insert Figure 4 about here]

5. Conclusion

Experimental researchers have documented that budgetary reporting honesty can be increased by an information system that reduces information asymmetry between the subordinate and the superior regarding the level of honesty in the budget (Hannan et al. 2006; Abdel-Rahim and Stevens 2018). We contribute to the literature by documenting a crowding-out effect of this behavioral benefit of an information system. Similar to earlier studies, we observe a strong positive effect of the information system on reporting honesty when it is randomly assigned. When the information system is present due to the implementation choice of the superior, however, this positive effect is significantly weakened. We find that this crowding-out effect is driven by the reporting behavior of subordinates with high norm sensitivity as measured by the Responsibility Scale of the JPI-R (Jackson 1994). An analysis of exit questionnaire responses suggests that both high and low norm sensitivity subordinates viewed the superior's choice of

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an information system as a signal of distrust, but only high norm sensitivity subordinates felt less obligated to report honestly as a result.

We also contribute to the literature by documenting the role of social norm sensitivity in this crowding-out effect. In the previously examined condition where the information system is randomly assigned, we find support for Abdel-Rahim and Stevens' (2018) theoretical argument that subordinates with high norm sensitivity have higher motivation for honest reporting than subordinates with low norm sensitivity. In our new condition where the information system is implemented by the superior, however, we document an obligation-alleviation effect. In particular, we find support for our theoretical argument that the superior's implementation choice signals distrust to the subordinate, and that the resentment caused by this signal of distrust alleviates the subordinate's obligation to report honestly in the budget. Finally, we find that this obligation-alleviation effect is present primarily in high norm sensitivity subordinates who already feel obligated to report honestly in the budget absent the social sanctions imposed by the information system. This explains why the crowding-out effect we document is driven by the reporting behavior of high norm sensitivity subordinates.

Our study contributes to the motivational crowding literature by extending the study of crowding-out effects to an informal control that only incorporates social sanctions driven by the activation of an honesty norm. In particular, the information system we examine does not include financial penalties for misreporting and does not directly restrict the subordinate's reporting behavior. We also control for any information leakage regarding the behavioral norms of other subordinates, which has been shown to contribute to crowding-out effects for financial controls (Cardinaels & Ying, 2015). Thus, we document a new crowding out effect for an informal control and demonstrate the role of distrust and norm sensitivity in that effect. While accounting researchers have begun to examine the role of differential norm sensitivity in audit settings (Blay et al. 2019a, 2019b), researchers have not examined norm sensitivity effects in participative budgeting settings. Thus, we have progressed in participative budgeting experiments to demonstrating an honesty norm (Evans et al., 2001), to demonstrating situational cues that activate an

honesty norm (Douthit & Stevens, 2015), to demonstrating the role of norm sensitivity in such activation (and deactivation). Further research appears warranted in this area.

Our study has potential implications for organizational control in practice. For example, our results suggest that firms may benefit by reducing the saliency of the superior's intentionality in implementing information systems. Alternatively, firms may consider taking measures to reduce the signal of distrust that such implementation choices engender. As such, we extend Cardinaels & Yin's (2015) warning for practitioners to reduce the saliency of formal financial control decisions to include informal control decisions. Furthermore, our results suggest that firms should consider subordinates' norm sensitivity when designing organizational controls. Imposing strong controls upon subordinates with high norm sensitivity may be inefficient not only because it is unnecessary, but because it may cause resentment and reduce the obligation these subordinates feel to act in the best interest of the firm. Such generalizations must be made with care, however, as our study contains an abstract participative budgeting setting that has been used in the literature to provide a strong test of relevant theory. Although this experimental setting was designed to capture important aspects of real-world budget reporting settings, it abstracts considerably from such settings.

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Figure 1 Timeline for Each Period in the Experiment

0	1	2	3	4	5
Superior and subordinate learn the payoff formulas before the first period. *Subordinate doesn't learn superior's endowment.*	Subordinate observes the actual cost and the information system's signal for the period.	The information system presence is determined on the superior's screen. If present, the superior observes the information system's signal.	Subordinate prepares a pair of budget requests: one assuming no information system and one assuming an information system.	Subordinate is informed whether there was an information system or not, and submits the corresponding budget to the superior by hand.	Project is funded based on budget and payoffs are determined for the period.

- If randomly assigned, the computer randomly determines whether an information system is present or not.
- If intentionally chosen, the superior chooses whether to have an information system or not.

Figure 2 Reporting Honesty across Experimental Condition (Random Assignment vs. Superior's Choice) and Information System Presence
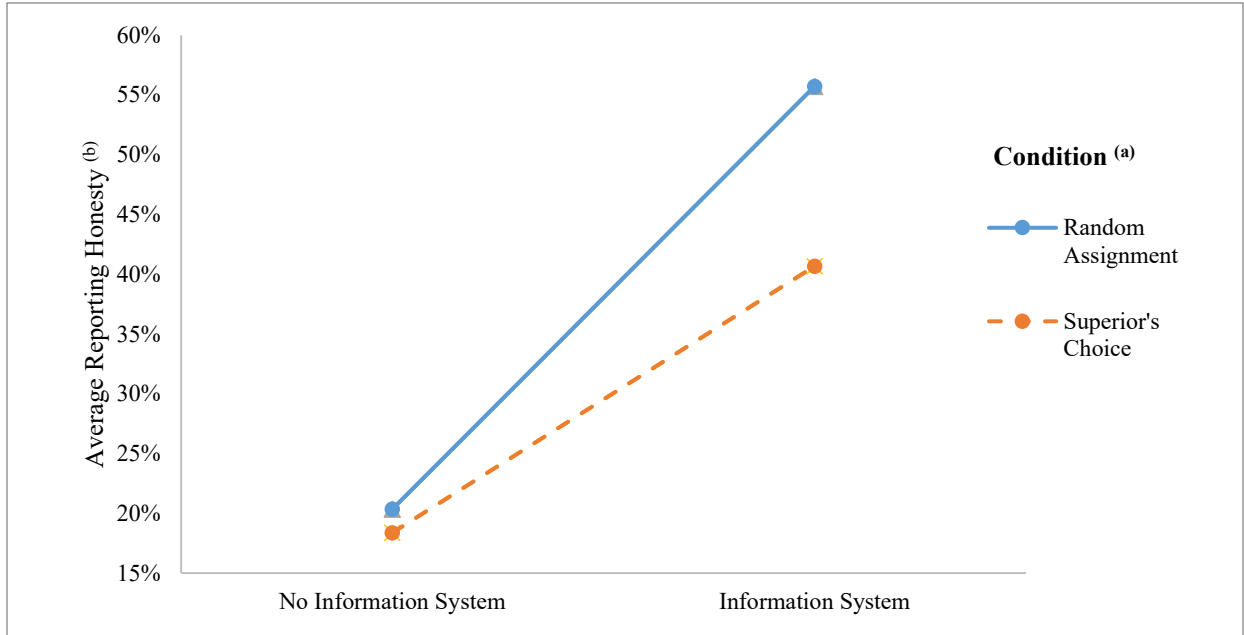
Notes:

[a] Random assignment and superior's choice of information system is a between-subjects manipulation. Under the random assignment condition, the information system presence was manipulated within-subjects as either present or absent with a computerized random determination. Under the superior's choice condition, the information system presence was manipulated within-subjects as either present or absent depending on the superior's choice.

[b] *Average Reporting Honesty* is calculated as 1 *minus* the percentage of slack claimed divided by the available slack averaged for the 10 periods.

Figure 3 Reporting Honesty by Experimental Condition and Subordinate Norm Sensitivity

Panel A: Reporting Honesty across Experimental Condition (Random Assignment vs. Superior's Choice) and Subordinate Norm Sensitivity when an Information System is *Absent*
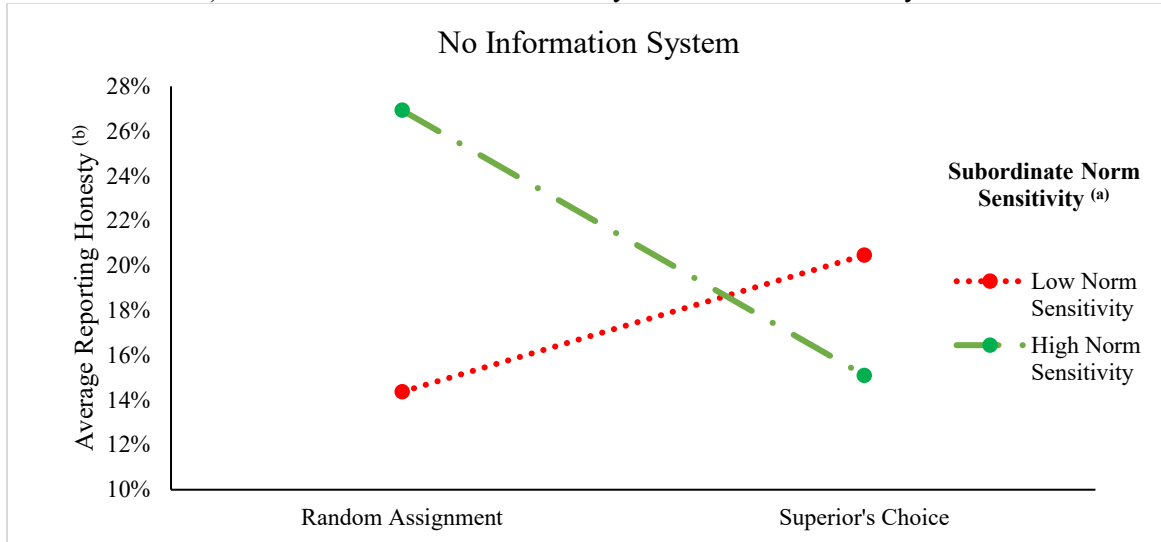
Panel B: Reporting Honesty across Experimental Condition (Random Assignment vs. Superior's Choice) and Subordinate Norm Sensitivity when an Information System is *Present*
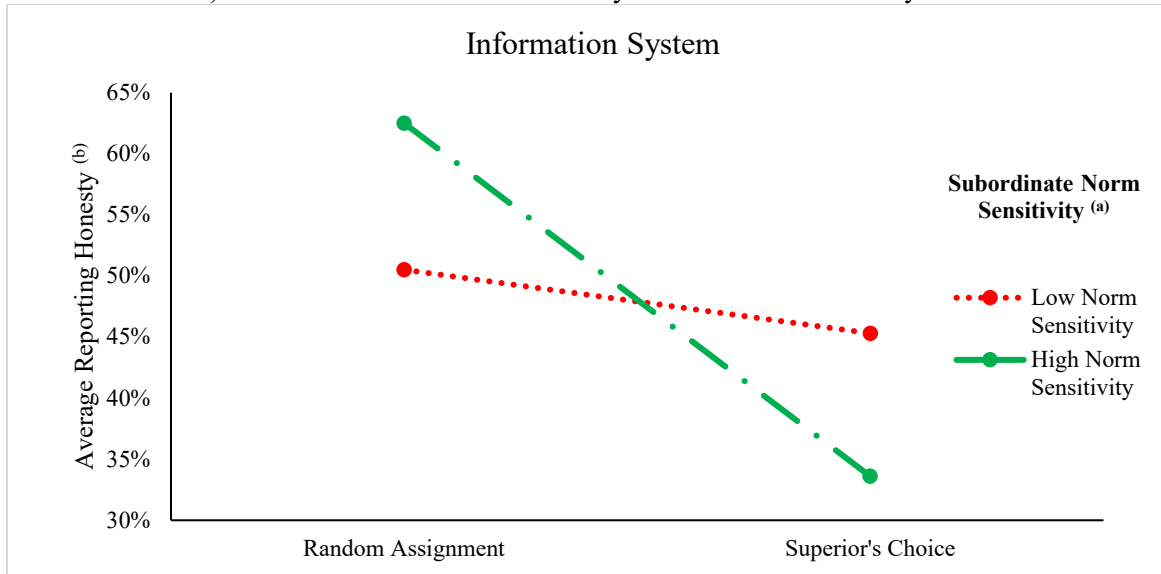
Notes:

[a] Subordinate norm sensitivity is measured using the JPI-R Responsibility scale, which captures the degree to which an individual feels an abstract moral obligation to other people and to society at large (Jackson 1994). The Responsibility scale score ranges from 0-20 with a higher score reflecting higher norm sensitivity. The median score for 71 subordinate participants equals 13. Subordinates with Low Norm Sensitivity are those subordinates whose score is lower than or equal to the median score, and subordinates with High Norm Sensitivity are those subordinates whose score is higher than the median score.

[b] *Average Reporting Honesty* is calculated as 1 *minus* the percentage of slack claimed divided by the available slack averaged for the 10 periods.

Figure 4 Path Analysis of the Mediating Effects of Perceived Trust and the Subordinates' Feeling of Obligation for Subordinates with *High* Norm Sensitivity when an Information System is *Present*
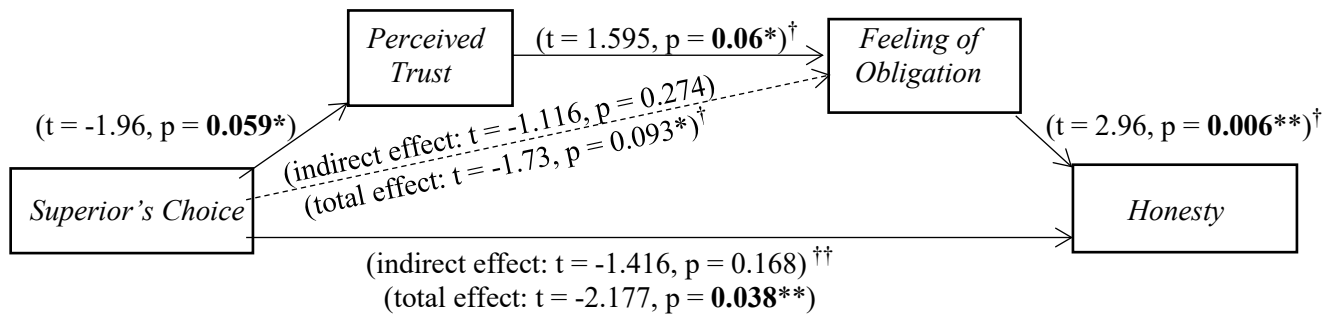
Superior's Choice is equal to 0 when the information system was present due to random assignment and 1 if the information system was present due to the superior's choice.

Perceived Trust is the subordinate's response to the exit questionnaire item, "When there was (the manager chose to have) an information system, to what extent did you feel the manager trusted you?" on an 11-point Likert scale in increments of 10 ranging from 0 (Not at All) to 100 (A Great Deal). The average response was 52.66 under Random Assignment and 34.67 under Superior's Choice.

Feeling of Obligation to Report Honestly is the subordinate's response to the exit questionnaire item, "When there was (the manager chose to have) an information system, to what extent did you feel obligated to submit a budget request closer to the actual cost?" on an 11-point Likert scale in increments of 10 ranging from 0 (Not at All) to 100 (A Great Deal). The average response was 68.66 under Random Assignment and 49.33 under Superior's Choice.

Honesty is average Percent honesty measured as 1- [(Budgeted Cost- Actual Cost)/6].

†Result when both factors Superior's Choice and Perceived Trust are jointly included.

††Result when the three factors (Superior's Choice, Feeling of Obligation, and Perceived Trust) are jointly included.

P-values with **(***) are significant at the 0.05 (0.01) level, respectively, and are presented in bold. Reported P-values are one-tailed for directional predictions.

Table 1   Measure of Subordinate Norm Sensitivity across Experimental Condition

Experimental Condition			Norm Sensitivity [a]	
			Subordinates with *Low* Norm Sensitivity	Subordinates with *High* Norm Sensitivity
Random Assignment	***n***	*n=33*	*n=18*	*n=15*
	Mean	12.91	11.06	15.13
	(s.d.)	*(2.75)*	*(2.23)*	*(1.25)*
	(Lowest-Highest)	(7-18)	(7-13)	(14-18)
Superior's Choice	***n***	*n=38*	*n=23*	*n=15*
	Mean	13.18	11.39	15.93
	(s.d.)	*(2.72)*	*(1.67)*	*(1.33)*
	(Lowest-Highest)	(7-18)	(7-13)	(14-18)
Difference *(Random Assignment – Superior's Choice)*		df = 69 $t = -0.42$ $p = 0.67$		

[a] Subordinate norm sensitivity is measured using the JPI-R Responsibility scale, which captures the degree to which an individual feels an abstract moral obligation to other people and to society at large (Jackson 1994). The Responsibility scale score ranges from 0-20 with a higher score reflecting higher norm sensitivity. The median score for 71 subordinate participants equals 13. Subordinates with Low Norm Sensitivity are those subordinates whose score is lower than or equal to the median score, and subordinates with High Norm Sensitivity are those subordinates whose score is higher than the median score.

Table 2 Descriptive Statistics for Average Reporting Honesty

Panel A: Average Reporting Honesty by Experimental Condition [a], [b]

Experimental Condition		First 2 Periods		All 10 Periods	
		No Info. System	Info. System	No Info. System	Info. System
Random Assignment	Mean	25.02%	66.31%	20.34%	55.73%
(n = 34)	*(s.d.)*	*(0.37)*	*(0.38)*	*(0.28)*	*(0.37)*
Superior's Choice	Mean	28.00%	54.30%	18.37%	40.68%
(n = 38)	*(s.d.)*	*(0.36)*	*(0.41)*	*(0.25)*	*(0.37)*
Total	Mean	26.59%	59.97%	19.30%	47.78%
n = 72	*(s.d.)*	*(0.36)*	*(0.40)*	*(0.26)*	*(0.378)*

Panel B: Average Reporting Honesty by Subordinate Norm Sensitivity under *Random Assignment Condition* [a], [b], [c]

Random Assignment		First 2 Periods		All 10 Periods	
		No Info. System	Info. System	No Info. System	Info. System
Subordinates with *Low Norm Sensitivity* (n = 18)	Mean	21.95%	65.55%	14.37%	50.50%
	(s.d.)	*(0.32)*	*(0.38)*	*(0.22)*	*(0.378)*
Subordinates with *High Norm Sensitivity* (n = 15)	Mean	28.46%	67.19%	26.92%	62.54%
	(s.d.)	*(0.44)*	*(0.41)*	*(0.35)*	*(0.380)*
Total (n = 33)	Mean	24.91%	66.29%	20.08%	55.97%
	(s.d.)	*(0.37)*	*(0.39)*	*(0.29)*	*(0.378)*

Panel C: Average Reporting Honesty by Subordinate Norm Sensitivity under *Superior's Choice Condition* [a], [b], [c]

Superior's Choice		First 2 Periods		All 10 Periods	
		No Info. System	Info. System	No Info. System	Info. System
Subordinates with *Low Norm Sensitivity* (n = 23)	Mean	30.23%	56.17	20.47%	45.30%
	(s.d.)	*(0.40)*	*(0.43)*	*(0.263)*	*(0.391)*
Subordinates with *High Norm Sensitivity* (n = 15)	Mean	24.59%	51.43%	15.15%	33.59%
	(s.d.)	*(0.28)*	*(0.39)*	*(0.220)*	*(0.348)*
Total (n = 38)	Mean	28.00%	54.30%	18.37%	40.68%
	(s.d.)	*(0.36)*	*(0.41)*	*(0.245)*	*(0.374)*

[a] Random assignment and superior's choice of information system is a between-subjects manipulation. Under the random assignment condition, the information system presence was manipulated within-subjects as either present or absent with a computerized random determination. Under the superior's choice condition, the information system presence was manipulated within-subjects as either present or absent depending on the superior's choice.

[b] *Average Reporting Honesty* is calculated as 1 *minus* the percentage of slack claimed divided by the available slack averaged for the respective number of periods stated in the panel (i.e., first two or all ten periods).

[c] Subordinate norm sensitivity is measured using the JPI-R Responsibility scale, which captures the degree to which an individual feels an abstract moral obligation to other people and to society at large (Jackson 1994). The Responsibility scale score ranges from 0-20 with a higher score reflecting higher norm sensitivity. The median score for 71 subordinate participants equals 13. Subordinates with Low Norm Sensitivity are those subordinates whose score is lower than or equal to the median score, and subordinates with High Norm Sensitivity are those subordinates whose score is higher than the median score.

Table 3 Subordinates' Perceived Trust from the Superior's Choice (Test of H1) [a]

Subordinate Norm Sensitivity [b]		Superior's Choice		Paired Sample t-test		
		No Info. System	Info. System	t	df	p
All Subordinates in the Superior's Choice Condition (n = 38)	Mean	57.89	28.16	5.03	37	**<0.01****
	(s.d.)	*(29.97)*	*(22.16)*			
Subordinates with *Low Norm* Sensitivity (n = 23)	Mean	48.26	23.19	2.84	22	**<0.01****
	(s.d.)	*(29.80)*	*(22.51)*			
Subordinates with *High Norm* Sensitivity (n = 15)	Mean	72.67	34.67	5.44	14	**<0.01****
	(s.d.)	*(24.33)*	*(20.65)*			
Difference (High_Norm Sensitivity – Low Sensitivity Subordinates)		df = 36, t = 2.65 p = 0.012**	df = 36, t = 1.49 p = 0.146			

[a] Perceived Trust is the subordinate's response to one of two items on the exit questionnaire designed to capture the perceived trust of the subordinate: "When the manager chose to have (not to have) an information system, to what extent did you believe the manager trusted you?" The subordinate's response was measured on an 11-point Likert scale in increments of 10 ranging from 0 (Not at All) to 100 (A Great Deal).

[b] Subordinate norm sensitivity is measured using the JPI-R Responsibility scale, which captures the degree to which an individual feels an abstract moral obligation to other people and to society at large (Jackson 1994). The Responsibility scale score ranges from 0-20 with a higher score reflecting higher norm sensitivity. The median score for 71 subordinate participants equals 13. Subordinates with Low Norm Sensitivity are those subordinates whose score is lower than or equal to the median score, and subordinates with High Norm Sensitivity are those subordinates whose score is higher than the median score.

Table 4 The Interactive Effect of Information System and Superior's Choice on Reporting Honesty (Test of H2)

Panel A: *Random Assignment Condition* - Repeated-Measures ANOVA of Information System on Average Reporting Honesty

Source	First 2 Periods				All 10 Periods			
	df	MS	F-stat	p-value	df	MS	F-stat	p-value
Information System Effect	1	2.90	42.90	**<0.01****	1	2.13	46.59	**< 0.01****
Error	33	0.07			33	0.05		

Panel B: *Superior's Choice Condition* - Repeated-Measures ANOVA of Information System on Average Reporting Honesty

Source	First 2 Periods				All 10 Periods			
	df	MS	F-stat	p-value	df	MS	F-stat	p-value
Information System Effect	1	1.31	27.54	**<0.01****	1	0.95	32.04	**< 0.01****
Error	37	0.05			37	0.03		

Panel C: Two-Way Mixed ANOVA of Information System and Superior's Choice on Average Reporting Honesty

Source	First 2 Periods				All 10 Periods			
	df	MS	F-stat	p-value	df	MS	F-stat	p-value
Between-Subjects Effect								
Intercept	1	27.05	116.23	<0.01	1	16.38	95.19	<0.01
Superior's Choice	1	0.07	0.314	0.577	1	0.26	1.51	0.22
Error	70	0.23			70			
Within-Subjects Effect								
Information System	1	4.10	71.92	<0.01	1	2.99	80.41	<0.01
Inf. System x Superior's Choice	1	0.21	5.88	**0.032****	1	0.15	4.14	**0.023****
Error	70	0.057			70			

Panel D: Simple Main Effects of Superior's Choice across Information System

Source	First 2 Periods			All 10 Periods		
	df	t	p-value	df	t	p-value
No Information System $Honesty_{Superior\_Choice} - Honesty_{Random}$	70	0.35	0.73	70	-0.32	0.75
Information System $Honesty_{Superior\_Choice} - Honesty_{Random}$	70	-1.28	**0.10***	70	-1.71	**0.045****

Average Reporting Honesty is calculated as 1 *minus* the percentage of slack claimed divided by the available slack averaged for the respective number of periods stated in the panel (i.e., first two or all ten periods).
p-values with (**,*) are significant at 0.05, and 0.10 levels respectively, and are in bold. P-values are one-tailed for directional predictions.

Table 5 The Interactive Effect of Superior's Choice and Subordinates' Norm Sensitivity on Reporting Honesty (Test of H3)

Panel A: Three-Way ANOVA of Subordinates' Norm Sensitivity, Information System, and Superior's Choice on Average Reporting Honesty

Source	df	MS	F	p-value
Between-Subjects Effect				
Intercept	1	15.55	89.32	<0.01
Superior's Choice	1	0.34	1.959	0.166
Subordinates' Norm Sensitivity	1	0.012	0.071	0.791
Superior's Choice x Subordinates' Norm Sensitivity	1	0.373	2.14	**0.074***
Error	67			
Within-Subjects Effect				
Information System	1	2.85	74.28	< 0.01
Inf. System x Superior's Choice	1	0.17	4.55	**0.037****
Inf. System x Subordinates' Norm Sensitivity	1	0.01	0.268	0.61
Inf. System x Superior's Choice x Subordinates' Norm Sensitivity	1	0.007	0.194	0.66
Error	67	0.038		

Panel B: Two-Way ANOVA of Information System and Superior's Choice on Average Reporting Honesty across Subordinates' Norm Sensitivity

	Subordinates with *Low Norm Sensitivity*			Subordinates with *High Norm Sensitivity*		
Source	df	F	p-value	df	F	p-value
Between-Subjects Effect						
Intercept	1	51.01	<0.01	1	39.49	<0.01
Superior's Choice	1	0.002	0.96	1	3.43	**0.07***
Error	39			28		
Within-Subjects Effect						
Information System	1	47.78	<0.01	1	29.61	<0.01
Inf. System x Superior's Choice	1	1.64	0.21	1	2.99	**0.095***
Error	39			28		

Panel C: Simple main effects of Superior Choice across Information System by Subordinates' Norm Sensitivity

	Subordinates with *Low Norm Sensitivity*			Subordinates with *High Norm Sensitivity*		
	df	F	p-value	df	F	p-value
No Information System $Honesty_{Superior\_Choice} - Honesty_{Random}$	39	0.63	0.43	28	1.21	0.28
Information System $Honesty_{Superior\_Choice} - Honesty_{Random}$	39	0.18	0.67	28	4.74	**0.038****

Average Reporting Honesty is calculated as 1 *minus* the percentage of slack claimed divided by the available slack averaged for all ten periods.

***,**,*p-values in bold are significant at the 0.01, 0.05, and 0.10 levels respectively.

Appendix A: Screenshots of JAVA Program

Instructions	Quiz	**Experiment**	Questionnaire	Submission	Finish

Manager	**Employee**

General

Period: 1
Your Assigned Role: Employee
Your Id: 1
Your Matched Manager's Id: 4

Payoff Function

1000+[budget request-actual cost]*1000

Your Information

The **actual cost** is

4.25

* Please note this information is
randomly generated by the computer

Information Part 1	Information Part 2	**Submission**

Please declare your Budget Request for the following two possibilities

Your manager **chose not to have** an information system. This would
indicate your manager knows the actual cost is within the range of
[4.00 - 6.00].

Your Budget Request = `4` Lira

Your manager **chose to have** an information system. This information
system indicates your manager knows the actual cost is within the
range of [**4.00-4.25**].

Your Budget Request = `6` Lira

Submit

Please wait for your partner and remain seated…

Instructions	Quiz	**Experiment**	Questionnaire	Submission	Finish

Manager	Employee

General

Period: 1
Your Assigned Role: Manager
Your Id: 4
Your Matched Employee's Id: 1

Payoff Function

Endowment+[6.5-budget request]*1000-1000

Information	*	*

I choose to

Not have an information system	Have an information system