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Relationship Organization and Price Delegation: An Experimental Study

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Price delegation to the salesforce is a practice widely adopted by firms. This paper examines the relationship between price delegation and managerial profits using a laboratory economics experiment. A novel feature of our experiment is that we study how varying the relationship organization of the sales manager and salesperson to allow for (1) requests by the salesperson for the manager to choose price delegation, and for (2) the manager to award a small bonus after observing the salesperson's decisions, can affect behavior. The results show that, contrary to the theoretical prediction, managers choose price delegation frequently and salespeople respond reciprocally, leading to higher manager profits under price delegation. Moreover, this behavior increases when requests and bonuses are allowed. We show that a behavioral economics model that incorporates positive reciprocity can explain these results well.

Data, as supplemental material, are available at http://dx.doi.org/10.1287/mnsc.2013.1778.

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1. Introduction

In many industries, sales managers can let salespeople determine the prices of the products they sell to customers. This practice is known as price delegation.[1] In an early survey of the incidence of price delegation, Stephenson et al. (1979) find that 71% of medical supply firms adopt this practice. More recently, Hansen et al. (2008) survey firms in the financial services, pharmaceutical, consumer goods, and industrial goods industries and report that 72% of firms delegate pricing decisions to salespeople. In another study, Frenzen et al. (2010) find that 69% of firms in the industrial machinery and electrical engineering sectors practice price delegation. They also report that the practice of price delegation is associated with greater profitability.

Because price delegation is so widespread, marketing theorists have examined whether this practice indeed leads to greater profits for the firm. Weinberg (1975) illustrates how setting sales commissions based on gross margins rather than sales revenues could allow price delegation to be optimal for the firm. Lal (1986) and Joseph (2001) show that price delegation can yield higher profits when the salesperson has superior information about customer demand. Bhardwaj (2001) shows that price delegation can be optimal for firms that compete in markets with intense price competition. On the other hand, Mishra and Prasad (2004, 2005) counter that price delegation may not be necessary. They demonstrate that if the firm can design compensation contracts to induce salespeople to reveal their private information about customer demand, its profits under no price delegation are always at least as high as those under delegation, both in monopolistic and competitive settings. Empirically, the extant research on price delegation is scant and limited to the aforementioned surveys. Given the challenges associated with drawing causal inferences from survey data, these studies are unable to offer conclusive insights about the empirical relationship between price delegation and firm profits.

This paper contributes to the marketing literature in two ways. First, we employ an incentive-aligned laboratory experiment (Amaldoss et al. 2000, Ding et al. 2005) to design the first causal empirical test of whether firms should adopt price delegation. A novel feature of our experiment is that we investigate whether the decision to adopt price

[1] This practice includes both cases where the salespeople have complete autonomy to set prices, and where salespeople can decide on prices from a preapproved price range. The alternative is for the manager to make the pricing decision.

delegation is robust to the relationship organization of the manager (representing the firm) and the salesperson—specifically, in addition to the benchmark price delegation model, we examine behavior when (1) the manager can award a small fixed bonus upon observing the salesperson's decisions, and when (2) the salesperson can submit a request to the manager to choose price delegation along with the decisions he intends to make if the manager approves the request. We incorporate these additional moves into the price delegation game in such a way so that the equilibrium prediction remains the same as in the benchmark model.

The experimental results are quite surprising. Even though the model in our experiment predicts that the manager should never choose price delegation, we find that the incidence of delegation is high, and this incidence varies systematically with the type of relationship organized between the manager and salesperson: Managers choose price delegation 21% of the time in our benchmark treatment without bonus awards and salesperson requests; this incidence rises to 48% when managers can award the bonus and to 52% when the salespeople can make requests, and all the way to 77% when both bonuses and requests are allowed. Moreover, when managers choose to delegate, salespeople respond by choosing a decision option that yields higher payoffs for both players relative to the Nash equilibrium outcome instead of the option that maximizes their own pecuniary payoff. We also find that the frequency of this type of response by salespeople is greater when managers can award the bonus and increases even more when salespeople can make requests. Consequently, our experiment shows that managers can earn higher profits when they choose price delegation.

The second contribution of our paper is to provide a formal explanation for the behavior observed in the experiment, which cannot be explained by the existing price delegation model. Our results also cannot be explained by other extant models that potentially favor price delegation, such as information asymmetry (where the salesperson has superior information about customer demand than the manager; Lal 1986, Joseph 2001) because we utilize an experimental setting with complete information. Consequently, we develop a behavioral economics model that captures the salesperson's positive reciprocity toward the manager—the salesperson cares about the manager's earnings if the manager makes a decision where she gives up a certain guaranteed minimum payoff. We also allow the extent to which the salesperson cares about the manager's payoffs to vary depending on (1) whether the manager chooses price delegation and (2) whether the salesperson had requested price delegation. It is also worth noting that our reciprocity model formalizes an idea that Mishra and Prasad (2005, p. 493) had alluded to when they stated that "price delegation may provide some intangible benefits, such as increased morale of the salesforce." Our proposed model also allows for "stochastic best-response" by the salesperson (McKelvey and Palfrey 1995, Lim and Ho 2007, Ho and Zhang 2008), so that although all decision options are selected with positive probability, those options that carry higher utility are selected more often (in other words, the salesperson "better responds" instead of "best responds"). The manager incorporates this knowledge about the salesperson's reciprocity and choice rule into her decision calculus when deciding whether to choose price delegation.

We use the experimental data to estimate the reciprocity parameters in our model and confirm that the salesperson cares about the manager's payoffs, and that a model that merely allows for stochastic best response without modeling salesperson reciprocity cannot explain the major empirical regularities of the experimental data. The results also show that the salesperson's reciprocity is stronger (1) when the manager chooses price delegation and (2) when the salesperson submits a request for price delegation and the manager accedes to the request. In addition, the estimates provide further insights to how the reciprocal preferences of the salesperson vary with the relationship organization between managers and salespeople: When managers can award bonuses, salespeople exhibit greater reciprocity. The degree of reciprocity is even stronger when managers allow salespeople to request price delegation. We also show that our reciprocity model tracks the major empirical regularities of the experiment well, and explains the data better than alternative behavioral models.

Relation to Existing Literature. Besides the literature on salesforce price delegation, our paper is also related to two separate streams of research in marketing. First, Srivastava and Chakravarti (2009) study the effect of relationship organization on buyer–seller negotiations in a multistage bargaining game with information asymmetry. They examine how allowing the players to communicate and how the nature of the messages players can send affect bargaining outcomes. Second, our paper adds to an emerging stream of work that shows that social preferences can explain competitive market behavior (Lehmann 2001), firm pricing strategies and consumer behavior in luxury goods markets (Amaldoss and Jain 2005, 2010), the prevalent use of linear wholesale price contracts in channels (Cui et al. 2007), and why firms design sales contests with more winners than losers (Lim 2010, Chen et al. 2011). Our paper bridges these two streams of research by studying how social preferences may vary with the way relationships between strategic actors are organized.

This paper is also related to seminal work in behavioral economics by Fehr et al. (1997, 2007), which shows experimentally that when manager–worker relationships are organized so that managers can request workers to exert a certain effort level and when they can award bonuses after observing the workers' effort, both managers and workers payoffs are higher compared to when the managers invest in costly technology to monitor workers' behavior. The authors explain this finding using social preferences. There are two main differences between our paper and these papers. First, in our experiments, it is the salesperson (worker), and not the manager, who can choose to make requests. We do this because we are interested in studying how the salesperson's reciprocal preferences may be influenced by his decision to make a request. Second, we test the validity of our proposed behavioral economics model by estimating the reciprocity parameters implied by the experimental data. Our econometric specification also allows us to examine how the salesperson's reciprocity varies with the manager's price delegation decision and the type of relationship organization.

2. Experimental Test

We begin by using a simple model of price delegation where a monopolistic firm commissions a salesperson on revenues and where both the firm and salesperson have the same information about customer demand. In this case, price delegation does not generate higher profits for the firm. To avoid showing the theory twice, we present only the parameterized version of the model (which is also the one used in our experiment). We will discuss the reasons for choosing the specific parameter values in §2.2.

The firm (represented by the manager, which we denote as "she") produces a product at a unit cost of $c = 16$ and sells the product to customers through a salesperson (which we denote as "he"). To simplify the model, we assume that there are three price levels that can be charged to customers (*Low*, *Medium*, and *High*) and that the salesperson can choose to expend either *Low* or *High* effort. The customer demand for the product is given by $Q(p, e) = 42 - p_{i=L,M,H} + e_{j=L,H}$, where $p_L = 27$, $p_M = 29$, $p_H = 34$, $e_L = 2$, and $e_H = 8$. Note that customer demand increases with a lower price and higher salesperson effort. The salesperson receives a commission of 27% of the revenues generated on the product, and his cost of effort is given by $c(e) = e^2_{j=L,H}$. The salesperson's payoffs are given by $\pi_S = 0.27 \times p_{i=L,M,H} \times Q - e^2_{j=L,H}$, and the manager profits are given by $\pi_M = (p_{i=L,M,H} - 16)Q - 0.27 \times p_{i=L,M,H} \times Q$. The moves of the game are as follows:

(1) The manager decides whether to choose *Delegation* $\{D\}$ or *No Delegation* $\{ND\}$. If she chooses $\{ND\}$, she determines the price: *Low Price*—$\{LP\}$, *Medium Price*—$\{MP\}$, or *High Price*—$\{HP\}$.

(2) The salesperson's decision depends on the manager's choice of $\{D\}$ or $\{ND\}$:

(a) If the manager chooses $\{ND\}$, he chooses either *Low Effort*—$\{LE\}$ or *High Effort*—$\{HE\}$.

(b) If the manager chooses $\{D\}$, he chooses both the price level and the effort level to expend.

(3) Payoffs for both players are realized.

The decision tree and the payoffs for the price delegation game described above are shown in Figure 1. The payoffs were presented as cent-earnings in the experiment.

The subgame-perfect Nash equilibrium (NE) of the game is that the manager will choose *No Delegation* with the *High Price*, with the salesperson responding with *Low Effort* (that is, $\{ND, HP, LE\}$).[2] The intuition is as follows: First, if the manager chooses $\{D\}$, the salesperson will maximize his payoffs by choosing $\{LP, LE\}$. This yields the manager 63.1¢, which is the lowest payoff among all the possible outcomes. Alternatively, if the manager chooses $\{ND\}$, she knows that no matter which price level she selects, the salesperson will always respond with *Low Effort* to maximize his payout. Given this, the price level that yields the manager the highest profits is $\{HP\}$. In this case, she earns 88.2¢, which is 25.1¢ more than her payoff when she chooses $\{D\}$.

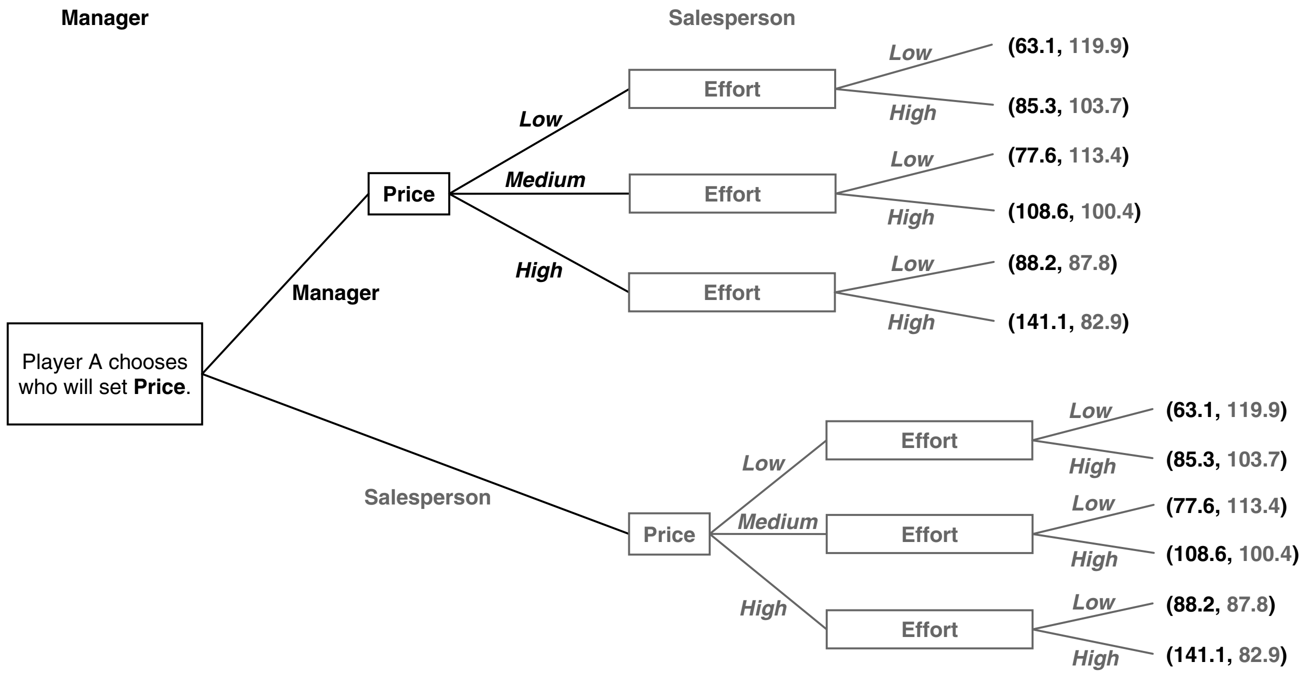
2.1. Treatments

Our experiment consists of four treatments: standard (ST), bonus (B), request (R), and bonus-request (BR). These treatments vary in how the relationships between the manager and salesperson are organized. We proceed to detail the distinct features of each treatment.

Standard Treatment. In this treatment, subjects acting as managers and salespeople play the price delegation game described above and shown in Figure 1. We note that the price delegation game is different from the "trust game" (e.g., Berg et al. 1995) in that choosing *Delegation* (which may be perceived to be an act of trust) does not necessarily expand the economic pie—in our model, the set of possible outcomes remains unchanged whether the manager chooses $\{D\}$ or $\{ND\}$. In addition, the game in this paper differs from the

[2] It can be shown that for the more general case of $Q(p, e) = h - p + e$, $c(e) = ke^2$ and a commission rate of w, the firm would always retain the right to move first by determining the price (i.e., *No Delegation*).

Figure 1 **Standard Treatment Price Delegation Game Tree**



aforementioned theoretical models on price delegation in the following ways: (1) we do not allow the manager to offer nonlinear compensation contracts or set commission levels, (2) we assume no information asymmetry between the manager and salesperson, and (3) we do not incorporate interfirm competition into the model. Because this paper is the first experimental study on price delegation, our goal is to design an experiment that is as simple as possible for the participants to understand and to make decisions. For example, we fix the compensation contract so that the manager can focus solely on choosing whether to price delegate. Unlike the theoretical models, we also allow salesperson effort to be observable in the experiment so that payoffs are deterministic and therefore transparent to all participants, to reduce the chance that the NE is not selected due to risk preferences or misunderstandings of the payoffs. Finally, as mentioned before, the NE prediction in this treatment is that managers will choose *No Delegation* with the *High Price* and salespeople will respond with the *Low Effort* (that is, $\{ND, HP, LE\}$).

Bonus Treatment. This treatment is identical to the ST treatment with one exception: If the manager chooses to delegate, she has the option of awarding a 3¢ bonus to the salesperson upon observing the latter's price and effort decisions. Awarding the bonus reduces the manager's payoff by 3¢. Unlike the experiments in Fehr et al. (1997, 2007), the amount of bonus the manager can award in our experiment is exogenously predetermined and not a decision made by the manager. We selected this feature because (1) it simplifies the decision space of the manager and (2) our focus is not to examine how much managers would reward salespeople after observing their behavior. It is straightforward to see that the equilibrium prediction in the B treatment is identical to that of the ST treatment. This is because the decision to award the bonus is made in the last stage of the game. In this last stage (assuming that the manager chooses *Delegation*), the manager will not have any incentive to award the bonus. Note that even if the salesperson believes that the manager will do so, the small size of the bonus is not sufficient to induce the salesperson to deviate from choosing $\{LP, LE\}$ under $\{D\}$.

Request Treatment. This treatment is identical to the ST treatment with one exception: At the start of the game, before the manager makes her delegation decision of $\{D\}$ or $\{ND\}$, we allow the salesperson to submit a request to the manager to select $\{D\}$. If the salesperson chooses to send this request, he also has to communicate the price and effort he intends to select if the manager accedes to his request. These stated intentions are nonbinding (i.e., cheap talk), and as such, the equilibrium prediction remains $\{ND, HP, LE\}$. Note that whereas in Fehr et al. (1997, 2007), it is the principal (manager) who sends a message to the agent (salesperson) along with the contract she offers; in this paper, it is the salesperson who communicates to the manager before she makes her decision.

Bonus-Request Treatment. The BR treatment combines the features of the B and R treatments and completes our 2×2 experimental design (bonus versus no bonus, requests versus no requests): The salesperson can request the manager to choose *Delegation* (and also communicate his intended price and effort selection to the manager), and the manager can award a 3¢ bonus after observing the salesperson's decision, if she chooses $\{D\}$. Again, this combination does not alter the equilibrium prediction of $\{ND, HP, LE\}$ for the reasons outlined above.

2.2. Parameter Selection

In our experiment, we adopt a discrete version of the price delegation model to simplify the decision space faced by subjects in the experiment, so that decisions due to cognitive errors can be minimized. As stated earlier, the payoffs in Figure 1 were presented to the subjects in cents-earnings in every decision round. The parameter values of the model that generated these payoffs were carefully selected to ensure that deviations from the Nash prediction carry significant pecuniary ramifications in the experiment—we elaborate on this by discussing the following payoff features in the price delegation game:

High Price and Low Effort Outcome. This is also the Nash outcome (given that the manager chooses $\{ND\}$) and yields the manager and salesperson 88.2¢ and 87.8¢, respectively. We also designed this outcome to be the most equitable one to reduce the chance that the Nash outcome is not selected by subjects due to equity concerns.

Low Price and Low Effort Outcome. This is the predicted outcome if the manager chooses $\{D\}$ because it yields the highest payout for the salesperson (a 32.1¢ improvement over the Nash outcome). This is also the outcome that gives the lowest payout to the manager, with a decline of 25.1¢ compared with the Nash outcome. Note also that if the manager ever chooses $\{D\}$, the salesperson stands to lose at least 6.5¢ if he deviates from choosing $\{LP, LE\}$. This loss is greater than the 3¢ gain even if the manager awards the bonus. We designed these significant payoff differences so that the manager faces a strong incentive not to choose *Delegation*.

Medium Price and High Effort Outcome. This outcome is the only one that yields both the manager and the salesperson higher payoffs relative to the Nash outcome, with a payoff improvement of 20.4¢ and 12.6¢, respectively. However, theory predicts that this outcome will not be reached because if the manager chooses $\{ND, MP\}$, the salesperson will choose $\{LE\}$ *over* $\{HE\}$ because he gains an additional 13¢ by doing so.

2.3. Hypotheses

Based on the above discussion, the predictions of the price delegation model can be summarized into two testable hypotheses. Hypothesis 1 states that the manager will never choose price delegation and specifies the behavior of the manager and salesperson. Hypothesis 2 states that changing the way relationships are organized between the manager and the salesperson (through allowing for requests and bonuses) should not affect behavior. Formally, we have the following hypotheses:

Hypothesis 1 (Nash Equilibrium Behavior). *The manager will choose* No Delegation *and set a* High Price, *and the salesperson will respond by choosing* Low Effort. *Choosing* Delegation *will lead to lower profits for the manager*.

Hypothesis 2 (Effect of Relationship Organization). *Organizing the manager–salesperson relationship so that* (1) *the manager can award a bonus after observing the salesperson's decisions and/or so that* (2) *the salesperson can request the manager to choose* Delegation *will not affect behavior.*

2.4. Experimental Procedure

A total of 146 undergraduate business students at a large public research university participated in the experiment. We conducted two or three experimental sessions for each of the four treatments, with each session having 12 to 18 participants. Each experimental session consists of 16 decision rounds. There were a total of 36 subjects in each of the ST, R, and BR treatments, and a total of 38 subjects in the B treatment. The subjects received course credit for showing up for the experimental session on time and earned cash based on the outcomes of the price delegation game. Subjects earned \$15 on average, with a range of \$13 to \$17. The experiment was implemented using *z*-Tree software (Fischbacher 2007). Upon entering the laboratory, subjects were seated at separate computer terminals and were handed the instructions. The instructions were then read aloud by the experimenter. Subjects were either assigned to be player A (the manager) or player B (the salesperson), and their role was fixed throughout the 16 decision rounds. Subjects were told that they would be randomly and anonymously matched with another subject that was assigned to a different role (that is, player A will be matched with player B) in every round. At the end of each round, the decisions and payoffs were shown to subjects. To familiarize them with the experimental procedure, we included three practice rounds that carried no monetary consequences. The full instructions for the BR treatment are given in the appendix.

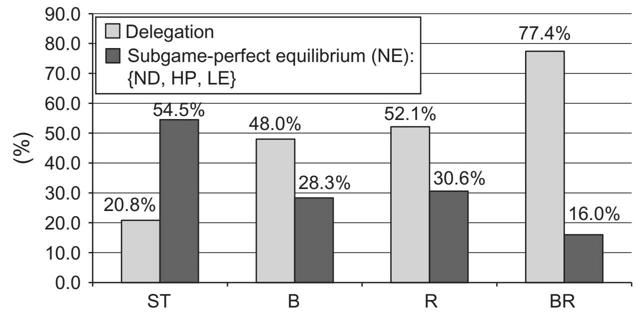
3. Experimental Results

In the price delegation game shown in Figure 1, there are 12 possible decision outcomes (*Delegation* (Yes or No) × 3 *Price Levels* × 2 *Effort Levels*). Table 1 shows the relative frequencies of the major decision outcomes (as a percentage of all possible outcomes) for the four treatments.[3] As can be seen in Table 1, the subject's decisions appear quite stable across the two halves of the 16 decision rounds.[4] Hence, we pool the data across all the decision rounds in the following analysis of experimental results.

Incidence of Delegation and Nash Equilibrium (NE) Outcome. Figure 2 displays the percentage frequencies in which managers chose {*D*} and the incidence of the NE outcome of {*ND*, *HP*, *LE*} across the ST, B, R, and BR treatments. To begin, although the price delegation model predicts that managers would not choose {*D*} at all, the data show that the incidences of *Delegation* across the four treatments were 20.8% (ST), 48.0% (B), 52.1% (R), and 77.4% (BR). Correspondingly, the incidences of the NE outcome in the four treatments were 54.5% (ST), 28.3% (B), 30.6% (R), and 16.0% (BR). A formal comparison (using a logistic regression with treatment dummies) indicates that the incidence of the NE outcome is highest in the ST treatment, followed by the B and R treatments, and lowest in the BR treatment.[5] Next, we note that in the B, R, and BR treatments, the modal outcome is {*D*, *MP*, *HE*}, with observed frequencies of 33.6%, 42.4%, and 66.3%, respectively (see Table 1). Clearly, the experimental results show that Hypothesis 1, which states that {*ND*, *HP*, *LE*} will be observed, is not supported. Moreover, these results suggest that contrary to Hypothesis 2, the incidence of the NE outcome vary with the different ways relationships between the manager and salesperson are organized across the treatments.

Salesperson Behavior Under Delegation. The price delegation model predicts that if the manager chooses {*D*}, the salesperson will choose {*LP*, *LE*} because this option yields the highest monetary payoff for him.

Figure 2 **Comparing the Percentage of *Delegation* and NE Outcomes Across the Treatments**



Although choosing {*MP*, *HE*} yields both the manager and the salesperson higher payoffs relative to the NE outcome, the salesperson should prefer {*LP*, *LE*} over {*MP*, *HE*} as he earns 19.5¢ more. In our experiment, however, we find that when managers chose {*D*}, salespeople chose {*MP*, *HE*} more often than {*LP*, *LE*} across all treatments: Conditional on managers choosing {*D*}, the relative frequencies were 60.0% versus 28.3% in the ST treatment ($z = 3.49$, $p = 0.000$); 69.9% versus 12.3% in the B treatment ($z = 9.99$, $p = 0.000$), 81.3% versus 11.3% in the R treatment ($z = 12.16$, $p = 0.000$), and 85.7% versus 8.5% in the BR treatment ($z = 16.32$, $p = 0.000$). These results are also plotted in Figure 3. Next, comparing across treatments, we find that salespeople chose {*LP*, *LE*} more frequently in the ST treatment than in the other treatments ($z = 4.01$, $p = 0.000$). Salespeople also chose {*MP*, *HE*} more frequently when they could request the manager to choose {*D*} (in the R and BR treatments) and have their requests granted, compared with when they could not do so in the B and ST treatments ($z = 4.70$, $p = 0.000$). Note that even when salespeople could not make requests, they chose {*MP*, *HE*} at least 60% of the time conditional on {*D*}.

Managers' Decisions Leading to the {MP, HE} Outcome. In the price delegation game, the {*MP*, *HE*} outcome may be achieved whether the manager chooses {*D*} or {*ND*}. If the manager chooses *No Delegation*, the outcome can be reached if she chooses *Medium Price* and the salesperson responds with *High Effort*. Figure 4 reports the incidences of {*MP*, *HE*} under {*D*} and {*ND*} (as a percentage of all the 12 possible decision outcomes) across the four treatments. The data show that the {*MP*, *HE*} outcome was reached more often when managers chose {*D*} compared with when managers chose {*ND*} and selected the *Medium Price*. This result holds across all treatments: 12.5% versus 7.3% in the ST treatment ($z = 2.09$, $p = 0.036$); 33.6% versus 7.2% in the B treatment ($z = 8.05$, $p = 0.000$); 42.4% versus 5.2% in the R treatment ($z = 10.47$, $p = 0.000$); and 66.3% versus 1.4% in the BR treatment ($z = 16.47$, $p = 0.000$).

[3] To economize on space, we report only the decision outcomes of theoretical interest and those that occurred most frequently. The entire set of results can be obtained from the authors upon request.

[4] We also used logistic regressions to check for differences in the incidences of delegation, the NE outcome, and the {*D*, *MP*, *HE*} outcome across decision rounds. Specifically, we divided the data into four blocks—block 1 (rounds 1–4), block 2 (rounds 5–8), block 3 (rounds 9–12), and block 4 (rounds 13–16)—and tested for differences across blocks. There were no significant differences across blocks in the ST and R treatments for all three outcomes. In the B treatment, there was an increase in the incidences of delegation and {*D*, *MP*, *HE*} from block 2 to block 3 and a decrease in the NE outcome from block 2 to block 3, but there were no differences among blocks 1, 2, and 4. In the BR treatment, there was an increase in the incidence of delegation from block 3 to block 4, but again there were no differences among blocks 1, 2, and 4. Overall, we did not detect any significant learning trends.

[5] The incidence of the NE outcome was not different between the B and R treatments ($z = 0.60$, $p = 0.545$). The incidence of the NE outcome in the ST treatment is higher than in the B and R treatments (p-value $= 0.000$ in both conditions). The incidence of the NE outcome in the BR treatment is lower compared with the other three treatments (with p-values of less than 0.000 in all cases).

Table 1 Relative Frequencies of the Major Decision Outcomes

	Price	Effort	Percentage frequency (rounds 1–8)	Percentage frequency (rounds 9–16)	Percentage frequency (all rounds)[a]	Percentage frequency conditional on requests made (all rounds)[b]
ST treatment						
No delegation	*High*	*Low*	59.7	49.3	54.5	
	Medium	*Low*	13.2	14.6	13.9	
	Medium	*High*	6.3	8.3	7.3	
Delegation	*Medium*	*High*	12.5	12.5	12.5	
	Low	*Low*	4.9	6.9	5.9	
B treatment						
No delegation	*High*	*Low*	31.6	25.0	28.3	
	Medium	*Low*	15.1	7.9	11.5	
	Medium	*High*	7.2	7.2	7.2	
Delegation	*Medium*	*High*	27.6	39.5	33.6	
	Low	*Low*	5.3	6.6	5.9	
R treatment (requests made with medium price and high effort intentions)						
No delegation	*High*	*Low*	11.1	19.4	15.3	21.8
	Medium	*Low*	3.5	4.9	4.2	5.9
	Medium	*High*	0.7	2.1	1.4	2.0
Delegation	*Medium*	*High*	38.9	44.4	41.7	59.4
	Low	*Low*	6.3	4.2	5.2	7.4
R treatment (no requests and requests made without medium price and high effort intentions)						
No delegation	*High*	*Low*	17.4	13.2	15.3	51.2
	Medium	*Low*	6.3	3.5	4.9	16.3
	Medium	*High*	5.6	2.1	3.8	12.8
Delegation	*Medium*	*High*	1.4	0.0	0.7	2.3
	Low	*Low*	0.7	0.7	0.7	2.3
BR treatment (requests made with medium price and high effort intentions)						
No delegation	*High*	*Low*	6.3	4.9	5.6	6.9
	Medium	*Low*	0.7	0.7	0.7	0.9
	Medium	*High*	0.0	0.7	0.3	0.4
Delegation	*Medium*	*High*	66.7	65.3	66.0	81.5
	Low	*Low*	4.2	7.6	5.9	7.3
BR treatment (no requests and requests made without medium price and high effort intentions)						
No delegation	*High*	*Low*	9.7	11.1	10.4	54.5
	Medium	*Low*	3.5	4.2	3.8	20.0
	Medium	*High*	2.1	0.0	1.0	5.5
Delegation	*Medium*	*High*	0.7	0.0	0.3	1.8
	Low	*Low*	1.4	0.0	0.7	3.6

Note. There are 288 observations each in the ST, R, and BR treatments and 304 observations in the B treatment.
[a]Unconditional percentage frequencies within each treatment.
[b]For the R and BR treatments, the percentage frequencies are conditional on requests made equal to $\{D, MP, HE\}$.

Incidence of Bonus Award, Requests, and Request Approvals. In the B treatment, if the manager chooses $\{D\}$, she may award a 3¢ bonus to the salesperson after observing his behavior. This occurs 72% of the time when the manager chooses to delegate. If the salesperson responds to the manager's choice of $\{D\}$ by choosing $\{MP, HE\}$, the manager awards the bonus with near certainty—97% of the time. In the R treatment, salespeople requested managers to choose *Delegation* 88% of the time and 58% of the submitted requests were approved. The overall proportion of requests that come with the stated intention of $\{MP, HE\}$ is 70% (see Figure 4). Conditional on making a request, salespeople indicated that they intend to choose $\{MP, HE\}$ 80% of the time, and when managers observed this type of request, they chose $\{D\}$ 70% of the time. This

Figure 3 Comparing the Percentage of the {*Medium Price, High Effort*} Outcome to the {*Low Price, Low Effort*} Outcome Conditional on *Delegation*

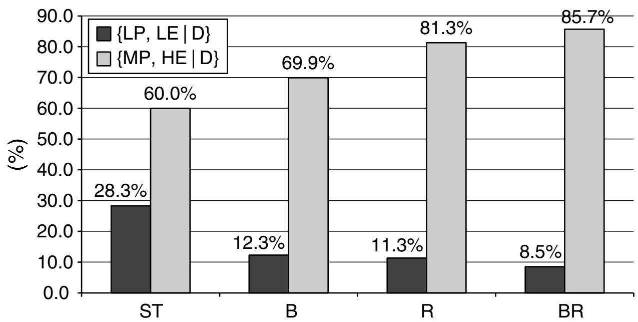
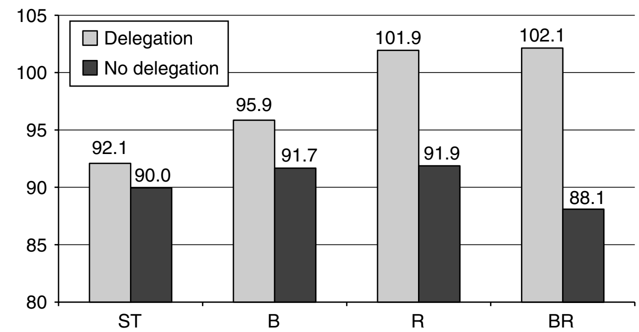
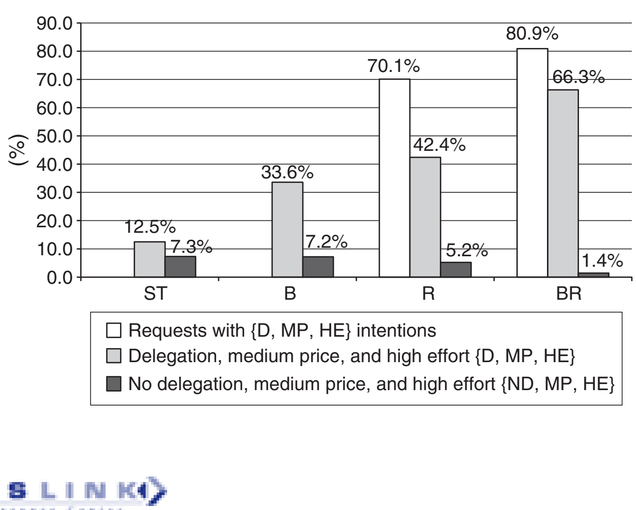


Figure 5 Comparing Manager Profits Under *Delegation* vs. *No Delegation*



result suggests that when the salesperson communicates his intention to select $\{MP, HE\}$, the option that yields payoffs that are higher for *both players* compared to the NE outcome, the manager acts as if she believes that the salesperson will carry out his stated intention. Note that if the salesperson communicates an intention to choose $\{MP, HE\}$, the manager may reach the same outcome by choosing *No Delegation* followed by the *Medium Price*, and hope for the salesperson to respond by choosing *High Effort*. The data show that the manager chooses to delegate instead (70% compared with 8%). This suggests that the manager's belief about the salesperson's commitment to carry out his stated intention is contingent only on the manager choosing *Delegation*. Indeed, the data show that when salespeople stated an intention to choose $\{MP, HE\}$ and the request was approved, they selected that option 85% of the time. Finally, in the BR treatment, salespeople submitted requests for delegation 93% of the time, and 82% of the submitted requests were approved. Conditional on making a request, salespeople indicated that they intend to select $\{MP, HE\}$ 87% of the time (so that the overall proportion of requests that come with the stated intention of $\{MP, HE\}$ is 81%, as shown in Figure 4). When the managers observed this type of request, they chose to delegate 91% of the time. Moreover, when salespeople stated an intention to choose $\{MP, HE\}$ and the request was approved, they carried out their stated intentions 89% of the time. Managers awarded bonuses 78% of the time under *Delegation*—this incidence increases to 88% if the salespeople chose $\{MP, HE\}$.

Figure 4 Comparing the Percentage of the {*Delegation, Medium Price, High Effort*} Outcome to the {*No Delegation, Medium Price, High Effort*} Outcome



Manager Profits. Figure 5 shows the profits the manager obtained depending on whether she chose $\{D\}$ or $\{ND\}$. The price delegation model predicts that manager profits should be lower by 25.1¢ (88.2 − 63.1) if she chooses to delegate. This prediction is not supported in the data. In the ST treatment, manager profits were no different under $\{D\}$ and $\{ND\}$ ($t = 1.33$, $p = 0.203$). More strikingly, in the B, R, and BR treatments, manager profits were higher under $\{D\}$ than under $\{ND\}$, with respective p-values of 0.013, 0.000, and 0.000. Next, we compare manager profits obtained under *Delegation* across treatments using t-tests. The results are shown in Table 2 and indicate the following: (1) Manager profits in the ST treatment are lower than in the other three treatments. (2) Allowing salespeople to request the managers to delegate (in the R and BR treatments) leads to higher manager profits compared to simply allowing the managers to award a bonus ex post (in the B treatment). These results

Table 2 The t-Tests Comparing Manager Profits Under Delegation Across Treatments

	Mean difference	t-stat.	p-value
B treatment vs. ST treatment	3.76*	2.06	0.048
R treatment vs. ST treatment	9.85*	5.14	0.000
BR treatment vs. ST treatment	10.05*	6.36	0.000
R treatment vs. B treatment	6.09*	3.71	0.001
BR treatment vs. B treatment	6.28*	5.08	0.000
BR treatment vs. R treatment	0.20	0.14	0.886

Note. Standard errors are clustered at the manager level.
*Significant at the 5% level.

suggest that the relationship organization of the manager and salesperson can exert a significant impact on manager profits in the price delegation game.

Summary. The experimental results show that the predictions of the price delegation model does not explain behavior well: (1) Managers chose *Delegation* much more often than predicted (in fact, more often than *No Delegation* in the R and BR treatments) and accede to salespeople's requests for delegation most of the time. (2) When managers chose $\{D\}$, salespeople respond by overwhelmingly choosing $\{MP, HE\}$ instead of $\{LP, LE\}$. (3) In the B and BR treatments, managers awarded bonuses almost all the time when salespeople chose $\{MP, HE\}$. As shown in Figures 2–4, the degree to which these behavioral "anomalies" occur also varies systematically with the way the relationship between the manager and salesperson is organized across treatments. In the next section, we develop a formal explanation for these behavioral patterns.

4. Explaining the Behavioral Regularities

The price delegation model that generated Hypotheses 1 and 2 (which are strongly rejected by the experimental data) is based on the assumption that the utility of the manager and salesperson depends solely on their respective pecuniary payoffs. In this section, we show that generalizing the salesperson's utility function to incorporate social preferences—more specifically, positive reciprocity by the salesperson toward the manager—can provide a better explanation of the experimental results. Our proposed model adapts and extends the modeling framework of Charness and Rabin (2002) to the price delegation context. We begin by specifying the salesperson's reciprocal preferences and show how they may vary when there are requests and bonuses, and then econometrically estimate the reciprocity parameters as implied by the experimental data.

4.1. A Model of Reciprocal Preferences: Utility Specification

Standard Treatment. We start by specifying the manager's action toward which the salesperson reciprocates. By inspection of the payoffs in the price delegation game, note that no matter what the salesperson does, the manager can always guarantee herself a minimum payoff of 88.2¢ by choosing $\{ND, HP\}$. If the manager takes this action, the salesperson's corresponding payoff will be 87.8¢. In our model, we assume that the salesperson responds reciprocally whenever the manager chooses *not* to take the action that guarantees herself this minimum payout of 88.2¢. Whenever this occurs, the salesperson cares about the manager's payoffs, and the degree to which the salesperson does so is captured by a reciprocity parameter, θ. We also incorporate the reasonable assumption that the salesperson cares about the manager's payoff only when he earns more than 87.8¢. The salesperson's generalized utility function is given by

$$U_S^{ST} = (1-I_D)[\pi_S + I_N\theta_{ND}(\pi_M - \hat{\pi}_M)] + I_D[\pi_S + I_N\theta_D(\pi_M - \hat{\pi}_M)], \quad (1)$$

where I_D is an indicator that equals 1 when the manager chooses $\{D\}$, and 0 otherwise; π_M and π_S are the payoffs of the manager and the salesperson, respectively; $\hat{\pi}_M$ is the minimum payoff of 88.2¢ that the manager can guarantee herself by choosing $\{ND, HP\}$; I_N is an indicator that equals 1 when the manager does not choose $\{ND, HP\}$ and the salesperson earns more than 87.8¢; and $\theta_{ND} > 0$ and $\theta_D > 0$ are the salesperson's reciprocity parameters under *No Delegation* and *Delegation*, respectively.

The first term in Equation (1) represents the utility of the salesperson when the manager chooses *No Delegation*. If the manager chooses $\{MP\}$ or $\{LP\}$ under $\{ND\}$, the salesperson's payoffs will be greater than what he would have earned if the manager had chosen to guarantee herself a minimum payoff of 88.2¢ by choosing $\{HP\}$. In this scenario (which also means that $I_N = 1$), we assume that the salesperson cares about how much the manager earns because the manager had taken a "nice" action. The degree to which he cares about the manager's payoffs is captured by the reciprocity parameter, θ_{ND}, which we assume to be positive. Hence, the salesperson suffers disutility if he makes a decision that leads to the manager earning less than the guaranteed minimum payoff of 88.2¢ (i.e., when $\pi_M - \hat{\pi}_M$ is negative). Conversely, the salesperson derives additional utility if the manager earns more than his guaranteed minimum payoff (i.e., when $\pi_M - \hat{\pi}_M$ is positive). For example, if the manager chooses *No Delegation* and *Medium Price*, the salesperson's utility if he responds with *High Effort* is $U_S^{ST} = 100.4 + \theta_{ND}(108.6 - 88.2)$.

The second term in Equation (1) specifies the salesperson's utility if the manager chooses *Delegation*. Again, we assume that when the salesperson evaluates options that yield him a payoff greater than 87.8¢, which is what he would have earned if the manager had chosen $\{ND, HP\}$ to guarantee herself at least 88.2¢ (i.e., when $I_N = 1$), he also cares about how much the manager earns relative to the latter's guaranteed minimum payout. To allow for the possibility that the salesperson may care about the manager's payoffs to different extents depending on whether the manager chooses $\{D\}$ or $\{ND\}$, we introduce another parameter, $\theta_D > 0$, to capture the salesperson's reciprocal preferences when the manager delegates.

Table 3 Salesperson's Utility Specifications Across Treatments

Game outcomes	ST	B	R[a]	BR[a]
No Delegation				
High Price and Low Effort	87.8			
High Price and High Effort	82.9			
Medium Price and Low Effort	$113.4+\theta_{ND}(77.6–88.2)$			
Medium Price and High Effort	$100.4+\theta_{ND}(108.6–88.2)$			
Low Price and Low Effort	$119.9+\theta_{ND}(63.1–88.2)$			
Low Price and High Effort	$103.7+\theta_{ND}(85.3–88.2)$			
Delegation				
High Price and Low Effort	87.8			
High Price and High Effort	82.9			
Medium Price and Low Effort	$113.4+\theta_D(77.6–88.2)$		$113.4+\theta_{DR}(77.6–108.6)$	
Medium Price and High Effort	$100.4+\theta_D(108.6–88.2)$		100.4	
Low Price and Low Effort	$119.9+\theta_D(63.1–88.2)$		$119.9+\theta_{DR}(63.1–108.6)$	
Low Price and High Effort	$103.7+\theta_D(85.3–88.2)$		$103.7+\theta_{DR}(85.3–108.6)$	

[a]This the request treatment when a request is made and is equal to the *Medium Price* and *High Effort* payout.

Note that our model is one that captures positive reciprocity by the salesperson—if the salesperson does not earn more than 87.8¢, which is his payoff if the manager guarantees herself a minimum payoff (i.e., when $I_N = 0$), then the salesperson does not care about the manager's payoffs. Note also that if $\theta_{ND} = \theta_D = 0$, our model reduces to the price delegation model as assumed in §2. Given the specification in Equation (1), the actual utilities for the salesperson for each of the 12 decision outcomes in the price delegation game are shown in Table 3.

Bonus Treatment. The utility function of the salesperson in the B treatment is identical to that of the ST treatment. We do, however, allow for the reciprocity parameters in the B treatment to be estimated separately. There is some empirical evidence that introducing an additional stage to the game so that players can communicate approval leads to increased prosocial behavior (Fehr et al. 1997, 2007; Dugar 2010). In our game, the pecuniary gain from the bonus is very small (at 3¢), so if the salesperson responds differently in the B treatment relative to the ST treatment, it is more likely that he is also motivated by nonpecuniary rewards. Specifically, the bonus award may be interpreted as a sign of approval, and the salesperson may care more about the manager's payoffs if he seeks this approval. Hence, the behavioral parameter θ_D (and θ_{DR} in the BR treatment) can be interpreted to capture the amplification of prosocial behavior because the salesperson knows that the manager can communicate approval (by awarding the bonus) after observing his price and effort decisions under delegation.

Request Treatment. In the R treatment, we incorporate the salesperson's request behavior into his utility function. The utility specification of the salesperson is given by

$$\begin{aligned} U_S^R = {} & (1-I_D)[\pi_S + I_N\theta_{ND}(\pi_M - \hat{\pi}_M)] \\ & + I_D\{(1-I_R)[\pi_S + I_N\theta_D(\pi_M - \hat{\pi}_M)] \\ & + I_R[\pi_S + I_N\theta_{DR}(\pi_M - \bar{\pi}_M)]\}, \end{aligned} \quad (2)$$

where I_D, I_N, π_M, π_S, $\hat{\pi}_M$, θ_{ND}, and θ_D are as defined in Equation (1); I_R is an indicator function that equals 1 if the salesperson submits a request and states an intention to choose $\{MP, HE\}$, and 0 otherwise; $\bar{\pi}_M = 108.6$, the manager's payout under $\{MP, HE\}$; and $\theta_{DR} > 0$ is the salesperson's reciprocity parameter when the salesperson submits a request and states an intention to choose $\{MP, HE\}$, and the manager approves the request.

The first term in Equation (2) is the utility of the salesperson when the manager chooses *No Delegation* and is identical to that in the ST treatment (see the first term of Equation (1)). The second term in Equation (2) specifies the salesperson's utility if the manager chooses *Delegation* and can be further separated into two components: If the salesperson does not submit a request for the manager to choose $\{D\}$, or if he submits a requests and stated an intention other than $\{MP, HE\}$, the salesperson's utility is given by $[\pi_S + I_N\theta_D(\pi_M - \hat{\pi}_M)]$. This component is identical to the specification in the ST treatment (see the second term of Equation (1)). However, if the salesperson submits a request and states an intention to choose $\{MP, HE\}$ (in which case $I_R = 1$), the salesperson's utility under $\{D\}$ is $[\pi_S + I_N\theta_{DR}(\pi_M - \bar{\pi}_M)]$. In this second scenario, the salesperson cares about how much the manager earns relative to $\bar{\pi}_M = 108.6$, which is the amount the manager earns if the salesperson acts according to his stated intentions. In other words, the salesperson's reference payout with respect to how much he cares about the manager's payoffs is no longer the manager's guaranteed minimum payout, but rather the payout level that corresponds to the salesperson's stated intentions.[6] We allow the salesperson's reciprocal preference parameter in this case to be captured by $\theta_{DR} > 0$. This specification allows us to examine

[6] Charness and Dufwenberg (2006) and Vanberg (2008) study the effect of pregame communication of intentions and find that players are likely to honor their stated intentions. Model A3 in §4.3 examines a model where the salesperson's reference payout for the manager remains the latter's guaranteed minimum payout of 88.2¢.

to what extent requests may affect the salesperson's utility in the price delegation game. The actual utilities for the salesperson for each of the 12 decision outcomes in the price delegation game are shown in Table 3.

Bonus-Request Treatment. The salesperson's utility function in the BR treatment is identical to that in the R treatment (Equation (2)).

Manager's Utility. The manager's utility across the four treatments is $U_M = \pi_M$. In this paper, the focal behavioral construct we model is reciprocity, which pertains to the second mover rather than the first mover of the game. We assume that the manager knows the salesperson's utility function, and she makes decisions that rationally anticipate the salesperson's reciprocal response to her actions.

4.2. Estimating the Reciprocity Parameters

Given the above utility specifications, we estimate the salesperson's social preferences parameters using both the decisions of the manager and the salesperson in the experiment. We assume that when the salesperson evaluates his decision options following the manager's choice, he follows a logit choice rule with a "rationality" parameter $\lambda^S \geq 0$ (if $\lambda^S = 0$, the salesperson chooses randomly; if λ^S approaches ∞, he always chooses the option with the highest utility). Because the salesperson faces a different number of decision options depending on whether the manager chooses $\{D\}$ or $\{ND\}$ (six versus two options, respectively), we estimate separate λ^Ss for each scenario.

At the start of the price delegation game, the manager has to communicate one of the following four decisions to the salesperson: $\{ND, HP\}$, $\{ND, MP\}$, $\{ND, LP\}$, or $\{D\}$. We assume that when the manager formulates the expected utilities for each of these options, she knows both the salesperson's utility functions and choice rule. Hence, our model has a quantal-response equilibrium (QRE) feature in that the manager accounts for "stochastic best response" by the salesperson.[7] As in the case of the salesperson, we assume that the manager selects her decision option following a logit choice rule, with a rationality parameter $\lambda^M \geq 0$. Table A.1 in the appendix shows the decision choice probabilities for the manager and the salesperson in the ST treatment.[8]

Given the above setup and taking the unit of observation to be each manager–salesperson pair (which we denote by k), and denoting each treatment by T, the log-likelihood function is

$$\begin{aligned} &\mathrm{LL}(\theta^T_{ND}, \theta^T_D, \theta^B_{DR}, \theta^{BR}_{DR}, \lambda^M, \lambda^S_{ND}, \lambda^S_D) \\ &= \sum_T \sum_k \log\big[\Pr(\textit{Manager's Choice}^T_k) \\ &\quad \times \Pr(\textit{Salesperson's Choice}^T_k \mid \textit{Manager's Choice}^T_k)\big]. \quad (3) \end{aligned}$$

Note from Equation (3) that the estimates of θ reflect both the salesperson's preferences and the manager's beliefs about the salesperson's preferences and choice probabilities (which we assume to be accurate).[9] We also allow the θ's to be treatment specific to assess whether the reciprocal preference parameters of the salesperson depend on how the relationship between the manager and the salesperson is organized. Next, because the set of delegation, price, and effort decision options does not vary across treatments, the "rationality" parameters in the choice probabilities of the manager and salesperson (i.e., the λ's) are fixed to be common across treatments.

Results. The maximum-likelihood parameter estimates of the model described above (which we denote as the full model) is shown in column 3 of Table 4. We also estimated a series of nested models that enable us to examine potential differences in the values of θ's both within and across treatments. The results of these constrained models are also reported in Table 4.

Column 3 of Table 4 shows that all the reciprocity parameters θ are positive and statistically significant at the 5% level, indicating that the salesperson indeed cares about the manager's payouts if the manager makes decisions that allow the salesperson to earn more than the NE payout. Note, however, that all the estimated θ's are less than one, which implies that the salesperson cares about his own payoff more than the manager's payoff. The QRE model without reciprocal preferences (nested model 1, where $\theta = 0$) is also strongly rejected by the data ($p = 0.000$). The intuition behind this is that the QRE model without reciprocity does not capture the possibility that options with the highest monetary payout can be chosen less

[7] The QRE model was first introduced by McKelvey and Palfrey (1995) and has the feature that players choose among strategies probabilistically, but those strategies that yield higher utilities are chosen more frequently. This concept was first applied to marketing by Lim and Ho (2007) and Ho and Zhang (2008).

[8] If we use the NE outcome of $\{ND, HP, LE\}$ as an example, the salesperson's probability of responding with $\{LE\}$ to the manager's choice of $\{ND, HP\}$, is shown in row 1 of Table A.1 as $\Pr(LE \mid ND\&HP)$. The manager rationally anticipates the salesperson's (probabilistic) response to $\{ND, HP\}$ and forms her expected utility for the decision option $\{ND, HP\}$. This expected utility is shown in row 10 of Table A.1 as $U(ND\&HP)$. The probability of choosing $\{ND, HP\}$ is shown in row 14 of Table A.1 as $\Pr(ND\&HP)$. The remaining probabilities for the ST treatment are also shown in Table A.1. The choice probability formulations for the B, R, and BR treatments are constructed in the same manner, with the only difference being the specifications of the salesperson's utility in the other treatments.

[9] We also estimated a model where this assumption is relaxed and find that it does not track the empirical regularities of the experiment better.

Table 4 **Estimation Results for the Reciprocity Model**

Treatment	Parameter	Full model	Nested model 1: QRE model without θ	Nested model 2: Common θ within each treatment	Nested model 3: $\theta_D = \theta_{DR}$ in the R and BR treatments	Nested model 4: Common θ_N, θ_D and θ_{DR} across treatments
ST	θ_{ND}^{ST}	0.367* (0.009)[a]		0.494* (0.004)	0.362* (0.011)	0.376* (0.008)
	θ_{D}^{ST}	0.495* (0.017)			0.495* (0.017)	0.552* (0.036)
B	θ_{ND}^{B}	0.393* (0.009)		0.482* (0.005)	0.392* (0.011)	
	θ_{D}^{B}	0.635* (0.025)			0.653* (0.025)	
R	θ_{ND}^{R}	0.377* (0.010)		0.536* (0.006)	0.378* (0.013)	
	θ_{D}^{R}	0.418* (0.038)			0.689* (0.028)	
	θ_{DR}^{R}	0.755* (0.039)				0.844* (0.029)
BR	θ_{ND}^{BR}	0.346* (0.019)		0.572* (0.009)	0.341* (0.023)	
	θ_{D}^{BR}	0.460* (0.042)			0.837* (0.042)	
	θ_{DR}^{BR}	0.910* (0.054)				
	λ^M	0.167* (0.010)	0.040* (0.004)	0.265* (0.010)	0.138* (0.010)	0.162* (0.008)
	λ_{ND}^S	0.468* (0.029)	0.202* (0.010)	0.233* (0.006)	0.424* (0.024)	0.450* (0.021)
	λ_D^S	0.181* (0.017)	0.000 (0.004)	0.550* (0.013)	0.186* (0.014)	0.185* (0.010)
	LL	−1,707.5	−2,693.8	−2,017.7	−1,821.9	−1,769.8
	Wald test (W)		4,828.38*	205.01*	107.91*	51.69*

Notes. Nested model 1 constraints: $\theta_{ND}^{ST} = \theta_{ND}^{B} = \theta_{ND}^{R} = \theta_{ND}^{BR} = \theta_{D}^{ST} = \theta_{D}^{B} = \theta_{D}^{R} = \theta_{D}^{BR} = \theta_{DR}^{R} = \theta_{DR}^{BR} = 0$. Nested model 2 constraints: $\theta_{ND}^{ST} = \theta_{D}^{ST}$; $\theta_{ND}^{B} = \theta_{D}^{B}$; $\theta_{ND}^{R} = \theta_{D}^{R} = \theta_{DR}^{R}$; $\theta_{ND}^{BR} = \theta_{D}^{BR} = \theta_{DR}^{BR}$. Nested model 3 constraints: $\theta_{D}^{R} = \theta_{DR}^{R}$; $\theta_{D}^{BR} = \theta_{DR}^{BR}$. Nested model 4 constraints: $\theta_{ND}^{ST} = \theta_{ND}^{B} = \theta_{ND}^{R} = \theta_{ND}^{BR}$; $\theta_{D}^{ST} = \theta_{D}^{B} = \theta_{D}^{R} = \theta_{D}^{BR}$; $\theta_{DR}^{R} = \theta_{DR}^{BR}$.

*Significant at the 5% level.

[a]The standard errors are shown in parentheses.

often than if decision choices had been made randomly. For example, if the manager had chosen $\{D\}$, the QRE model without reciprocity cannot explain why the $\{LP, LE\}$ was chosen less than 1/6 of the time (as is the case in the B, R, and BR treatments).

We proceed to examine if there are differences in θ within each treatment. Table 4 shows that the model, which assumes a common θ within each treatment (nested model 2), does not explain the data well ($W = 205.0$, $p = 0.000$). Specifically, we find that $\theta_D > \theta_{ND}$ in the ST ($W = 64.7$, $p = 0.000$), B ($W = 95.0$, $p = 0.000$) and BR ($W = 7.6$, $p = 0.006$) treatments. In the R treatment, the estimates of θ_D^R and θ_{ND}^R are not statistically different (0.418 versus 0.377, $W = 1.2$, $p = 0.266$), but the former is directionally higher. These findings suggest that the salesperson's reciprocal preferences are greater when the manager chooses $\{D\}$ instead of $\{ND\}$, even though any of the payoff outcomes in the price delegation game can be achieved whether $\{D\}$ or $\{ND\}$ is chosen. The manager factors this into her decision calculus and increases her incidence of choosing *Delegation*.

Next, we examine the role of requests and stated intentions on the salesperson's reciprocal preferences by comparing the estimates of θ_{DR} with θ_{ND} and θ_D within each of the R and BR treatments. First, we find that $\theta_{DR} > \theta_{ND}$ in both the R ($W = 89.9$, $p = 0.000$) and BR ($W = 95.2$, $p = 0.000$) treatments, which again supports the finding that the salesperson cares more about the manager's payoffs if the manager chooses to delegate. More importantly, we find that $\theta_{DR} > \theta_D$ in both the R ($W = 30.2$, $p = 0.000$) and BR ($W = 30.4$, $p = 0.000$) treatments. We confirm these results by showing that the model that assumes $\theta_{DR} = \theta_D$ (nested model 3) does not fit the data as well as the full model ($W = 107.9$, $p = 0.000$). These findings show that the salesperson cares more about the manager's payoffs if he submits a request and can explain why the manager chooses to delegate more often in these treatments.

To shed light on the effect of relationship organization on preferences and behavior, we now compare θ_{ND}, θ_D, and θ_{DR} across treatments. To begin, we note that the estimates of θ_{ND}, the degree to which the salesperson cares about the manager's payoffs under $\{ND\}$ when he earns more than the NE payout, is relatively stable across the four treatments, with a range of 0.346 to 0.393. Next, we focus on the salesperson's reciprocal preference parameters when the manager chooses to delegate. We observe the following: (1) We find that $\theta_D^B > \theta_D^{ST}$ ($W = 35.6$, $p = 0.000$), which indicates that allowing the manager to award a small bonus increases the likelihood of reciprocal behavior by the salesperson. (2) When the salesperson makes a request, he cares more about the manager's payoff than when he does not do so ($\theta_{DR}^R > \theta_D^{ST}$, $W = 50.5$, $p = 0.000$). (3) Perhaps most importantly, we find that the salesperson's reciprocal preferences are stronger when he is allowed to make requests and when he does so, compared to the case where the manager can award a small bonus. Specifically, we find that $\theta_{DR}^R > \theta_D^B$ ($W = 20.5$, p-value $= 0.000$). (4) Finally, the extent to which the salesperson cares about the manager's payoffs is strongest with the combination of requests and the expectation of a small bonus ($\theta_{DR}^{BR} > \theta_{DR}^R$; $W = 17.5$, p-value $= 0.000$).

We further assess the validity of the reciprocity model by examining if it tracks the major empirical regularities of the experiment well. Table 5 shows that it not only does, but it predicts the major outcomes in the experiment better than the nested models, which do not account for how θ may vary with whether the manager chooses to delegate or with the relationship organization of the manager and salesperson.

4.3. Alternative Behavioral Models

We next consider three alternative utility specifications and assess whether they can explain the major empirical regularities better than the proposed model of salesperson reciprocity. To facilitate comparison and interpretation of the behavioral parameters, we specify the number of behavioral parameters across the three alternative models and our reciprocity model to be identical, and also allow the salesperson preferences to vary depending on whether the manager delegates and whether he submits a request. To economize on space, we present the utility functions in these alternative specifications for the R and BR treatments only.

Model A1: *Inequality Aversion Model Without Reciprocity*. Model A1 assumes that instead of reciprocal preferences, the salesperson has inequality-averse preferences. The salesperson suffers disutility whenever (1) his monetary payoffs are higher than the manager's and conversely, (2) when the manager's payoffs are higher than his. We specify the parameter θ to capture the degree of disutility the salesperson experiences for every dollar difference in his monetary payoffs relative to the manager. With inequality aversion, the salesperson's utility for the R and BR treatments is given by

$$\begin{aligned} U_S = {} & (1 - I_D)\big[\pi_S - \theta_{ND}\max\{\pi_M - \pi_S, 0\} \\ & \qquad - \theta_{ND}\max\{\pi_S - \pi_M, 0\}\big] \\ & + I_D(1 - \tilde{I}_R)\big[\pi_S - \theta_D\max\{\pi_M - \pi_S, 0\} \\ & \qquad - \theta_D\max\{\pi_S - \pi_M, 0\}\big] \\ & + I_D\tilde{I}_R\big[\pi_S - \theta_{DR}\max\{\pi_M - \pi_S, 0\} \\ & \qquad - \theta_{DR}\max\{\pi_S - \pi_M, 0\}\big], \end{aligned} \tag{4}$$

where I_D, π_M, and π_S are as defined in Equation (1); $\tilde{I}_R$ is an indicator function that equals 1 if the salesperson submits a request and 0 otherwise; θ_{ND} andθ_D are the salesperson's inequality aversion parameters under $\{ND\}$ and $\{D\}$, respectively; and $\theta_{DR} > 0$ is the salesperson's inequality aversion parameter when the salesperson submits a request and the manager approves the request.

Note that in Model A1, although we still allow θ_{DR} to be different from θ_D to capture the effect of the salesperson making a request, there is a subtle difference from the formulation of our reciprocity model. In our reciprocity model, we capture the effect of a request submission (i.e., whenever $I_R = 1$) only when the salesperson accompanies his request with an intention to choose $\{MP, HE\}$. It is natural to define requests this way because we specify the salesperson's reference payout to be the manager's payout under $\{MP, HE\}$. In Model A1, however, because the salesperson's reference payout is no longer based on the $\{MP, HE\}$ outcome, we capture the salesperson's request more generally by specifying $\tilde{I}_R$ to be an indicator that equals 1 whenever the salesperson submits a request (and 0 otherwise), irrespective of what the salesperson's stated intentions are.[10]

Model A2: *Reciprocity Model with Social Comparisons*. In our reciprocity model, we assume that whenever the salesperson has reciprocal preferences toward the manager (i.e., $I_N = 1$), he cares about the manager's payoffs with respect to the manager's guaranteed minimum payoff of 88.2¢. In other words, the salesperson reciprocates through evaluating the manager's payoff against $\hat{\pi}_M = 88.2$. Model A2 assumes that instead of using $\hat{\pi}_M$ as a reference point, the salesperson compares the manager's payoff π_M against his own payoff π_S. Hence, when $I_N = 1$, that is, when the manager gives up the action of $\{ND, HP\}$, the salesperson reciprocates in the following way: he suffers

[10] We also estimated the models with I_R rather than $\tilde{I}_R$ and confirmed that the alternative models do not fit better than the reciprocity model.

Table 5 **Reciprocity Model Predictions in Percentage Deviations from the Data**

	Price	Effort	Data	Full model	Nested model 2: Common θ within each treatment	Nested model 3: $\theta_D = \theta_{DR}$ in the R and BR treatments	Nested model 4: Common θ_N, θ_D and θ_{DR} across treatments
ST treatment							
No delegation	*High*	*Low*	54.5	−4.3	−9.3	−6.1	**−13.0**
	Medium	*Low*	13.9	1.0	−5.9	1.1	−0.4
	Medium	*High*	7.3	−0.3	6.4	−0.3	0.1
Delegation	*Medium*	*High*	12.5	−3.5	0.1	−3.2	3.8
	Low	*Low*	5.9	−0.7	−3.5	−0.6	−0.1
B treatment							
No delegation	*High*	*Low*	28.3	−0.3	**22.8**	−0.0	**13.2**
	Medium	*Low*	11.5	−0.2	−3.5	−0.3	2.0
	Medium	*High*	7.2	0.5	5.4	0.6	0.1
Delegation	*Medium*	*High*	33.6	−2.8	**−26.2**	−1.7	**−17.2**
	Low	*Low*	5.9	−0.3	−1.4	−1.2	−0.2
R treatment (requests made with medium price and high effort intentions)							
No delegation	*High*	*Low*	21.8	−4.9	2.8	4.0	−9.1
	Medium	*Low*	5.9	−0.3	0.2	3.1	−1.8
	Medium	*High*	2.0	1.1	**12.3**	3.3	0.3
Delegation	*Medium*	*High*	59.4	−3.3	**−20.5**	**−19.7**	8.7
	Low	*Low*	7.4	−3.6	−4.8	−3.0	−5.4
R treatment (no requests and requests made without medium price and high effort intentions)							
No delegation	*High*	*Low*	51.2	3.6	**−26.6**	**−25.5**	−9.7
	Medium	*Low*	16.3	2.0	**−10.1**	−7.2	−2.8
	Medium	*High*	12.8	−2.9	1.5	−7.5	−5.4
Delegation	*Medium*	*High*	2.3	0.9	**36.6**	**37.2**	**14.0**
	Low	*Low*	2.3	1.2	0.3	2.0	3.5
BR treatment (requests made with medium price and high effort intentions)							
No delegation	*High*	*Low*	6.9	3.3	8.0	**10.0**	5.8
	Medium	*Low*	0.9	1.5	3.9	3.6	3.3
	Medium	*High*	0.4	0.4	**13.8**	1.2	1.8
Delegation	*Medium*	*High*	81.6	−5.3	**−26.0**	**−17.7**	**−13.5**
	Low	*Low*	7.3	−5.9	−5.8	−5.3	−5.2
BR treatment (no requests and requests made without medium price and high effort intentions)							
No delegation	*High*	*Low*	54.6	3.1	**−39.7**	**−37.7**	**−13.1**
	Medium	*Low*	20.0	−6.5	**−15.3**	**−15.6**	−6.5
	Medium	*High*	5.5	−0.8	8.8	−3.9	1.9
Delegation	*Medium*	*High*	1.8	4.5	**53.7**	**61.7**	**14.5**
	Low	*Low*	3.6	1.2	−2.1	−1.6	2.1

Note. Deviations greater than 10% are indicated in bold.

psychological loss when he earns more than the manager, but experiences psychological gain when the manager earns more than him. The salesperson's utility in Model A2 for the B and BR treatments is represented by

$$U_S = (1-I_D)[\pi_S + I_N\theta_{ND}(\pi_M - \pi_S)] + I_D\{(1-\tilde{I}_R)[\pi_S + I_N\theta_D(\pi_M - \pi_S)] + \tilde{I}_R[\pi_S + I_N\theta_{DR}(\pi_M - \pi_S)]\}, \quad (5)$$

where I_D, I_N, π_M, π_S, θ_{ND}, θ_D, and θ_{DR} are as defined in Equation (1); and $\tilde{I}_R$ is as defined in Equation (4).

Model A3: Reciprocity Model with $\hat{\pi}_M$ Instead of $\bar{\pi}_M$ for Requests. In Model A3, we consider the alternative where the salesperson reciprocates by evaluating the manager's payoff with respect to $\hat{\pi}_M = 88.2$ whenever his request is approved, instead of $\bar{\pi}_M = 108.6$ as in our proposed model. Hence, this alternative model assumes that the salesperson uses the same reference point to evaluate the manager's payoff regardless of whether he makes a request. The salesperson's utility

Table 6 Estimation Results for Alternative Behavioral Models

Treatment	Parameter	Reciprocity model (Full model)	Model A1: Inequality aversion model without reciprocity	Model A2: Reciprocity model with social comparisons	Model A3: Reciprocity model with $\hat{\pi}_M$ instead of $\bar{\pi}_M$ for requests
ST	θ_{ND}^{ST}	0.367*	0.269*	0.257*	0.364*
		(0.009)[a]	(0.017)	(0.007)	(0.010)
	θ_{D}^{ST}	0.495*	0.468*	0.327*	0.491*
		(0.017)	(0.011)	(0.007)	(0.016)
B	θ_{ND}^{B}	0.393*	0.307*	0.277*	0.393*
		(0.009)	(0.018)	(0.007)	(0.010)
	θ_{D}^{B}	0.635*	0.552*	0.388*	0.631*
		(0.025)	(0.011)	(0.008)	(0.021)
R	θ_{ND}^{R}	0.377*	0.265*	0.266*	0.377*
		(0.010)	(0.018)	(0.008)	(0.012)
	θ_{D}^{R}	0.418*	0.402*	0.283*	0.389*
		(0.038)	(0.032)	(0.022)	(0.052)
	θ_{DR}^{R}	0.755*	0.603*	0.413*	0.688*
		(0.039)	(0.014)	(0.010)	(0.026)
BR	θ_{ND}^{BR}	0.346*	0.284*	0.244*	0.344*
		(0.019)	(0.027)	(0.015)	(0.022)
	θ_{D}^{BR}	0.460*	0.438*	0.304*	0.434*
		(0.042)	(0.036)	(0.025)	(0.059)
	θ_{DR}^{BR}	0.910*	0.699*	0.477*	0.827*
		(0.054)	(0.022)	(0.015)	(0.039)
	λ^{M}	0.167*	0.226*	0.151*	0.150*
		(0.010)	(0.015)	(0.010)	(0.010)
	λ_{ND}^{S}	0.468*	0.126*	0.445*	0.441*
		(0.029)	(0.010)	(0.028)	(0.027)
	λ_{D}^{S}	0.181*	0.292*	0.315*	0.196*
		(0.017)	(0.009)	(0.017)	(0.012)
	LL	−1,707.5	−2,014.3	−1,785.3	−1,787.2
	AIC	3,441.0	4,054.6	3,596.6	3,600.4
	BIC	3,506.8	4,120.4	3,662.4	3,666.2

*Significant at the 5% level.
[a]The standard errors are shown in parentheses.

in the R and BR treatments is given by

$$\begin{aligned} U_S = {} & (1-I_D)[\pi_S + I_N\theta_{ND}(\pi_M - \hat{\pi}_M)] \\ & + I_D\{(1-\tilde{I}_R)[\pi_S + I_N\theta_D(\pi_M - \hat{\pi}_M)] \\ & + \tilde{I}_R[\pi_S + I_N\theta_{DR}(\pi_M - \hat{\pi}_M)]\}, \end{aligned} \quad (6)$$

where I_D, I_N, π_M, π_S, $\hat{\pi}_M$, θ_{ND}, θ_D, and θ_{DR} are as defined in Equation (1); and $\tilde{I}_R$ is as defined in Equation (4).

Results. The estimation results for Models A1, A2, and A3 are shown in Table 6. The in-sample predictions of the alternative models are also shown in Table 7. First, note from Table 6 that the fit statistics of our reciprocity model is superior to all three alternative specifications. Second, we observe that the estimates of the inequality-aversion parameters are positive and within the psychologically plausible range of 0 to 1. The fact that the inequality-aversion model explains the data better than the standard economic model is not surprising, because both the $\{D, MP, HE\}$ outcome and the NE prediction of $\{ND, HP, LE\}$, which are the two most frequently occurring outcomes in the experimental data, happen also to be the most equitable payoff outcomes. Third, note that Models A2 and A3, which are variants of our reciprocity model, fit the data better than Model A1. This (together with the first result) suggests that a model based on salesperson reciprocity has greater explanatory power relative to a model of distributional social preferences.[11] Finally, Table 7 shows that all three alternative models underpredict the incidence of $\{D, MP, HE\}$ in the R and BR treatments compared to our reciprocity model. This demonstrates that a reciprocity model that captures (1) the idea that the salesperson cares about how much the manager would have earned (had the manager not taken the "nice action") and (2) the salesperson's use of his own stated intentions as a reference point when he can

[11] This result (that reciprocity models fit better than inequality aversion) must be accompanied by the caveat that our experiments were not specifically designed to test for inequality aversion, or to distinguish between inequality aversion and reciprocity in general.

Table 7 Alternative Behavioral Models—Predictions in Percentage Deviations from the Data

	Price	Effort	Data	Reciprocity model	Model A1: Inequality aversion model without reciprocity	Model A2: Reciprocity model with social comparisons	Model A3: Reciprocity model with $\hat{\pi}_M$ instead of $\bar{\pi}_M$ for requests
ST treatment							
No delegation	*High*	*Low*	54.5	−4.3	−2.2	−5.2	−5.3
	Medium	*Low*	13.9	1.0	1.1	1.1	1.0
	Medium	*High*	7.3	−0.3	0.1	−0.2	−0.3
Delegation	*Medium*	*High*	12.5	−3.5	−5.9	−3.2	−3.2
	Low	*Low*	5.9	−0.7	−3.3	−0.6	−0.6
B treatment							
No delegation	*High*	*Low*	28.3	−0.3	2.1	−0.2	1.1
	Medium	*Low*	11.5	−0.2	0.7	−0.2	−1.5
	Medium	*High*	7.2	0.5	−0.3	0.6	−1.6
Delegation	*Medium*	*High*	33.6	−2.8	**−11.9**	−2.0	−0.7
	Low	*Low*	5.9	−0.3	−3.4	−0.7	−0.5
R treatment (requests made with medium price and high effort intentions)							
No delegation	*High*	*Low*	21.8	−4.9	4.3	1.1	1.2
	Medium	*Low*	5.9	−0.3	1.3	1.9	2.0
	Medium	*High*	2.0	1.1	1.5	2.5	2.4
Delegation	*Medium*	*High*	59.4	−3.3	**−28.0**	**−14.9**	**−14.8**
	Low	*Low*	7.4	−3.6	−5.6	−3.0	−3.0
R treatment (no requests and requests made without medium price and high effort intentions)							
No delegation	*High*	*Low*	51.2	3.6	**10.3**	3.5	3.5
	Medium	*Low*	16.3	2.0	0.7	2.6	2.5
	Medium	*High*	12.8	−2.9	−4.5	−2.2	−2.3
Delegation	*Medium*	*High*	2.3	0.9	−0.6	−0.0	−0.0
	Low	*Low*	2.3	1.2	−0.6	0.9	1.0
BR treatment (requests made with medium price and high effort intentions)							
No delegation	*High*	*Low*	6.9	3.3	7.1	7.2	7.6
	Medium	*Low*	0.9	1.5	3.7	2.7	2.8
	Medium	*High*	0.4	0.4	2.0	0.9	0.9
Delegation	*Medium*	*High*	81.6	−5.3	**−33.5**	**−13.6**	**−13.7**
	Low	*Low*	7.3	−5.9	−6.6	−5.5	−5.4
BR treatment (no requests and requests made without medium price and high effort intentions)							
No delegation	*High*	*Low*	54.6	3.1	−0.3	3.0	3.3
	Medium	*Low*	20.0	−6.5	−2.1	−5.3	−5.4
	Medium	*High*	5.5	−0.8	3.9	−0.1	−0.2
Delegation	*Medium*	*High*	1.8	4.5	2.1	3.2	2.9
	Low	*Low*	3.6	1.2	−1.3	1.0	0.9

Note. Deviations greater than 10% are indicated in bold.

make requests for $\{D\}$ and the manager approves his request (both of which are captured in our reciprocity model, but not by Models A1–A3) provides a better explanation of the decisions in the price delegation game.

5. Discussion and Conclusion

This paper conducts the first experimental test that examines the relationship between price delegation and manager profits. The results show that, contrary to the standard economic prediction of the price delegation model we study, managers choose price delegation frequently and salespeople reciprocate with higher sales effort, leading to greater profitability for managers. We also find that the incidence of this behavior increases when managers can award a bonus to salespeople after observing their decisions and when salespeople can request managers to select price delegation. We show that a behavioral economics model that incorporates positive reciprocity by the salesperson toward the manager can explain these results well. We also empirically examine how the degree to which the salesperson cares about the manager's profits can vary depending on whether the manager chooses to delegate and whether the salesperson makes a request.

Our paper complements the extant marketing theory by showing when price delegation can be optimal. In particular, our paper suggests that the way relationships between the sales managers and their salespeople are organized is a critical factor in determining whether price delegation can be successful. Specifically, sales managers can create systems that allow salespeople to request for authority to negotiate prices directly with customers and link their performance to bonus awards. Even if there are no budgets for bonuses, a system that allows salespeople to request for pricing authority along with setting more ambitious sales targets may enhance firm performance—in fact, our paper finds that social commitment mechanisms such as stating that one would achieve a higher goal if he were to be empowered by the other party, may be a greater driver of salesperson effort than the expectation of receiving a bonus.[12]

We conclude with several limitations and directions for future research. First, we have only examined a few of the many ways that the manager–salesperson relationship could be organized. For example, instead of letting the salesperson request the manager to choose price delegation, one could study how behavior might be different if it were the manager who can send a request to the salesperson to choose a certain price-effort option whenever she selects price delegation. Second, one can also vary the amount of bonus that can be awarded by the manager and whether the bonus size is known to the salesperson before he makes his decision, or even the type of base compensation plan (see Coughlan and Sen 1989) under price delegation. Third, future research can extend price delegation by studying how much authority the sales manager should delegate to the salesperson. For instance, one could examine limited price delegation, that is, when the salesperson can only choose from a preapproved list of prices (Joseph 2001) or price lobbying, where the manager retains the right to set the price, but allows the salesperson to lobby management for price discounts (Simester and Zhang 2013). Fourth, there is very little study on the customer ramifications of price delegation. In particular, one could examine how customers might strategically respond if they know that the salesperson has pricing authority (Kalra et al. 2003) or if they think that the firm is practicing price discrimination (Besanko et al. 2003) when salesforce price delegation is adopted. Finally, it may be fruitful to examine how the effectiveness of price delegation could depend on the differential abilities of salespeople (Chen et al. 2011, Ridlon and Shin 2013).

[12] We must qualify this finding with the caveat that the bonus amount in our experiment is limited to a small fixed amount. Awarding a larger bonus may elicit higher sales effort, but will also lower firm profits.

Supplemental Material

Supplemental material to this paper is available at http://dx.doi.org/10.1287/mnsc.2013.1778.

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Appendix. BR Treatment Instructions

A.1. Introduction

This is an experiment in decision making. The instructions are simple—if you follow them carefully and make good decisions, you could earn a considerable amount of money which will be paid to you immediately following this experiment. What you earn partly depends on your decisions and partly on the decisions of others. Do not look at the decisions of others. Do not talk during the experiment. You will be warned if you violate this rule. If you violate this rule twice, we will cancel the experiment immediately and your earnings will be $0.

The participants in this experiment will participate in a total of 16 decision rounds. At the start of the experiment, you will be assigned to be either player A or player B. This assignment will be your player role for all of the decision rounds. The computer will also *randomly and anonymously* match the participants into pairs such that there is one player A and one player B in each pair. This matching procedure will be repeated every round. That is, you will be rematched with another player each round until all 16 rounds are complete. As will be described in detail below, player A's decisions affect the earnings of player B and vice versa. The experiment begins with player B's move, which is followed by player A's move and then by player B's move. The experiment ends with either player B or player A's move. We will use a computer program to coordinate the experiment. The specific moves and decisions for each player are described below and are shown in Figures A.1 and A.2.

A.2. Moves and Decisions

Step 1: *Player B's move*

- *Decide whether to request player A to allow you to set the Price (Yes or No)*:
    - If player B requests (*Yes*): *State to player A the Price* (*Low*, *Medium*, *or High*) *and the Decision Number* (*Low or High*) *that you intend to select*.
    - If player B does not request (*No*): *Wait for player A's move*.

Table A.1 Choice Probability Formulations for the Standard Treatment

	Formulations		
Salesperson's choice probabilities			
$Pr(LE \mid ND\&HP)$	$\frac{e^{\lambda^S_{ND}(87.8)}}{e^{\lambda^S_{ND}(87.8)}+e^{\lambda^S_{ND}(82.9)}}$	$Pr(HE \mid ND\&HP)$	$1-\text{Prob}(LE \mid ND\&HP)$
$Pr(LE \mid ND\&MP)$	$\frac{e^{\lambda^S_{ND}[113.4+\theta_{ND}(77.6-88.2)]}}{e^{\lambda^S_{ND}[113.4+\theta_{ND}(77.6-88.2)]}+e^{\lambda^S_{ND}[100.4+\theta_{ND}(108.6-88.2)]}}$	$Pr(HE \mid ND\&MP)$	$1-\text{Prob}(LE \mid ND\&MP)$
$Pr(LE \mid ND\&LP)$	$\frac{e^{\lambda^S_{ND}[119.9+\theta_{ND}(63.1-88.2)]}}{e^{\lambda^S_{ND}[119.9+\theta_{ND}(63.1-88.2)]}+e^{\lambda^S_{ND}[103.7+\theta_{ND}(85.3-88.2)]}}$	$Pr(HE \mid ND\&LP)$	$1-\text{Prob}(LE \mid ND\&LP)$
$Pr(HP\&LE \mid D)$	$\frac{e^{\lambda^S_D(87.8)}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
$Pr(HP\&HE \mid D)$	$\frac{e^{\lambda^S_D(82.9)}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
$Pr(MP\&LE \mid D)$	$\frac{e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
$Pr(MP\&HE \mid D)$	$\frac{e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
$Pr(LP\&LE \mid D)$	$\frac{e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
$Pr(LP\&HE \mid D)$	$\frac{e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}{e^{\lambda^S_D(87.8)}+e^{\lambda^S_D(82.9)}+e^{\lambda^S_D[113.4+\theta_D(77.6-88.2)]}+e^{\lambda^S_D[100.4+\theta_D(108.6-88.2)]}+e^{\lambda^S_D[119.9+\theta_D(63.1-88.2)]}+e^{\lambda^S_D[103.7+\theta_D(85.3-88.2)]}}$		
Manager's expected utilities			
$U(ND\&HP)$	$88.2 \times Pr(LE \mid ND\&HP) + 141.1 \times Pr(HE \mid ND\&HP)$		
$U(ND\&MP)$	$77.6 \times Pr(LE \mid ND\&MP) + 108.6 \times Pr(HE \mid ND\&MP)$		
$U(ND\&LP)$	$63.1 \times Pr(LE \mid ND\&LP) + 85.3 \times Pr(HE \mid ND\&LP)$		
$U(D)$	$88.2 \times Pr(HP\&LE \mid D) + 141.1 \times Pr(HP\&HE \mid D) + 77.6 \times Pr(MP\&LE \mid D) + 108.6 \times Pr(MP\&HE \mid D) + 63.1 \times Pr(LP\&LE \mid D) + 85.3 \times Pr(LP\&HE \mid D)$		
Manager's choice probabilities			
$Pr(ND\&HP)$	$\frac{e^{\lambda^M \times U(ND\&HP)}}{e^{\lambda^M \times U(ND\&HP)}+e^{\lambda^M \times U(ND\&MP)}+e^{\lambda^M \times U(ND\&LP)}+e^{\lambda^M \times U(D)}}$		
$Pr(ND\&MP)$	$\frac{e^{\lambda^M \times U(ND\&MP)}}{e^{\lambda^M \times U(ND\&HP)}+e^{\lambda^M \times U(ND\&MP)}+e^{\lambda^M \times U(ND\&LP)}+e^{\lambda^M \times U(D)}}$		
$Pr(ND\&LP)$	$\frac{e^{\lambda^M \times U(ND\&LP)}}{e^{\lambda^M \times U(ND\&HP)}+e^{\lambda^M \times U(ND\&MP)}+e^{\lambda^M \times U(ND\&LP)}+e^{\lambda^M \times U(D)}}$		
$Pr(D)$	$\frac{e^{\lambda^M \times U(D)}}{e^{\lambda^M \times U(ND\&HP)}+e^{\lambda^M \times U(ND\&MP)}+e^{\lambda^M \times U(ND\&LP)}+e^{\lambda^M \times U(D)}}$		

Step 2: *Player A's move*
- If player B requests to set the Price: *Decide whether to Agree or Do Not Agree*:
  - If you agree to allow player B to set the Price: *Your move ends*.
  - If you do not agree to allow player B to set the Price: *Set the Price* (*Low, Medium, or High*).
- If player B does not request to set the Price: *Choose whether you want to set the Price yourself or allow player B to set the Price* (*yourself or player B*):
  - If player A decides to set the Price himself: *Set the Price* (*Low, Medium, or High*) *player B will be shown the Price you select*.
  - If player A allows player B to set the Price: *Wait till next move*.

Step 3: *Player B's move*
- If player B requests to set the Price and player A agrees: *Choose the Price* (*Low, Medium, or High*) *and the Decision Number (Low or High)*.
- If player B requests to set the Price and player A does not agree: *Choose the Decision Number* (*Low or High*) *only*.
- If player B does not request to set the Price but player A allows player B to set the Price: *Choose the Price* (*Low, Medium, or High*) *and the Decision Number* (*Low or High*).
- If player B does not request to set the Price and player A decides to set the Price: *Choose the Decision Number* (*Low or High*) *only*.

Figure A.1 Move Sequence

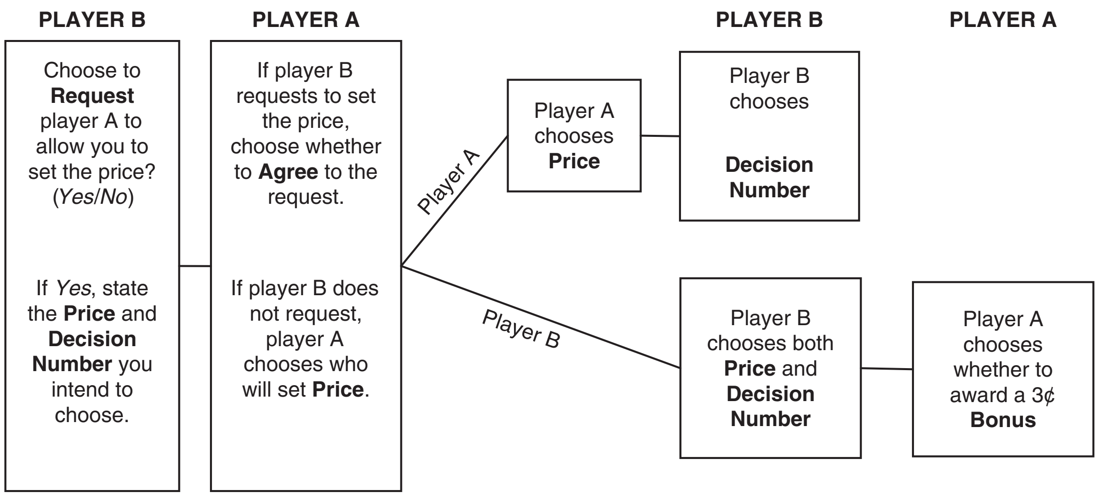
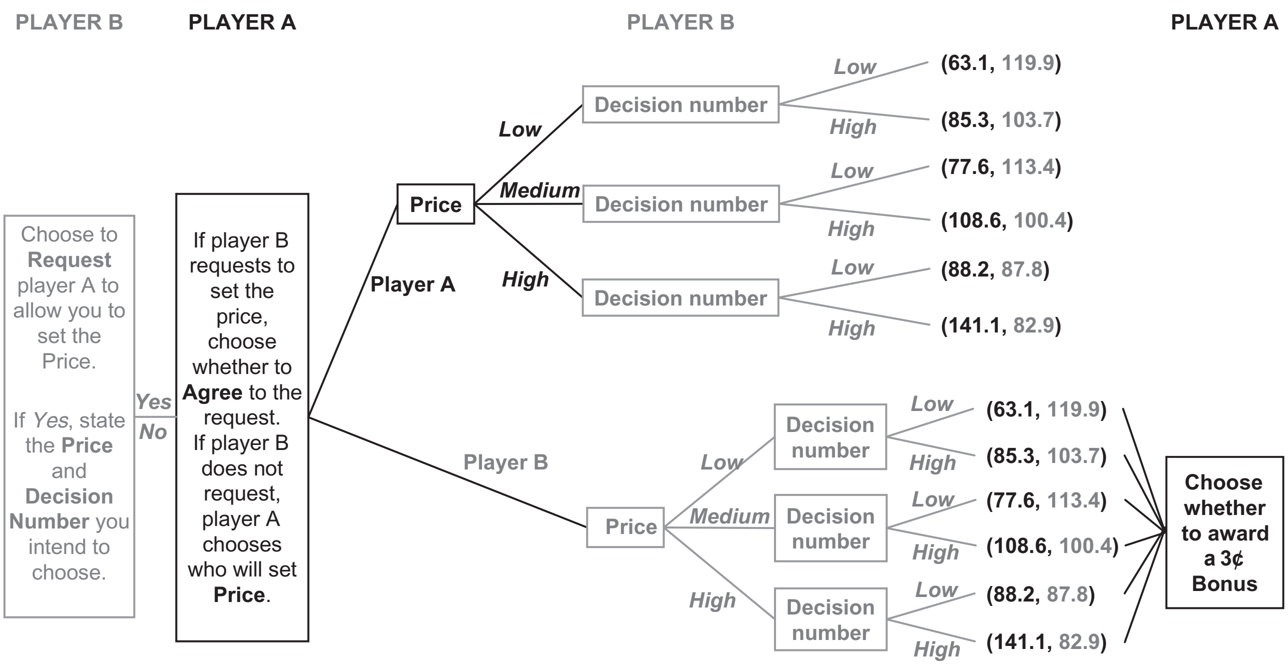


Figure A.2 Move Sequence and Payouts



Step 4: *Player A's move*

- If you allowed player B to set the Price: *Choose to award a 3¢ Bonus* (*Bonus or No Bonus*). *The Bonus reduces your payout by 3¢ and increases player B's payout by 3¢.*
- If you chose to set the Price yourself: *Your move ends.*

Payout for Each Round (in cents)

Price (A or B's decision)	Decision number (B's decision)	A's payout	B's payout	Total payout (A + B)
Low	Low	63.1	119.9	183
Low	High	85.3	103.7	189
Medium	Low	77.6	113.4	191
Medium	High	108.6	100.4	209
High	Low	88.2	87.8	176
High	High	141.1	82.9	224

A.3. Cash Earnings

Your final earnings will be the sum of your cash earnings for the 16 decision rounds.

Are there any questions?

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