THE EFFECTS OF SUPPLIER CLOSENESS AND SUPPLIER COST MODELING ON MANAGERIAL DECISIONMAKING AND RETAIL FIRM PROFITS IN MARKETS FOR EXPERIENTIAL GOODS

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ABSTRACT

The successful introduction of a product into the market is a complex process that requires effective procurement and marketing activities. This experimental research investigates the effects of supplier closeness and supplier cost modeling on managerial decision making, retail pricing, and firm profit, with a focus on procurement outcomes. To address this research question, we designed an incentivized laboratory experiment that captures a firm's procurement and marketing decisions, including wholesale and retail pricing. The experiment was conducted under three different procurement regimes: (i) a regime that allowed managers to test procurement prices to gain information about the supplier's cost structure before making one procurement offer to the supplier (i.e., supplier cost modeling); (ii) a regime that allowed managers to make up to three consecutive procurement bids to the supplier if an offer was rejected (i.e., procurement negotiation); and (iii) a regime that combined both of these features. The research findings demonstrate the importance of supplier closeness and cost modeling in the pricing determination and decision-making process. With these tools, managers can secure more accurate and reasonable procurement prices, establish retail prices that generate higher profits, and boost firm performance. The results of this study provide valuable insights into decision-making and organizational structure in retail enterprises.

BIOGRAPHICAL SKETCH

Wendan Song was born and raised in Shandong, a coastal province located in the eastern part of China. In 2017, she completed her secondary education at Shandong Province Shiyan High School, where she developed a strong interest in economics and agricultural studies. Wendan then pursued her undergraduate studies at China Agriculture University. In June 2021, she graduated with a Bachelor of Art degree in Economics. Following her undergraduate studies, Wendan decided to pursue her graduate studies at Cornell University. She enrolled in the Applied Economics and Management Master's of Science program in August 2021, with a focus on food and agricultural economics.

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INTRODUCTION

1.1 Management of retail companies

Establishing a stable and sustainable cooperative relationship between suppliers and retailers has gained increasing significance in creating a sustainable and profitable procurement operation mechanism. A good reputation and close relationships are key variables for satisfaction in a "high trust and commitment relationship" for retail companies (Jesper, David, and Mogens, 2007). Close supplier-retailer interactions through the procurement and marketing management process hold the potential for increased value creation and strategies explicitly linked to retailers' value systems. Further, the perceived necessity of trust in these relationships meshes with retailers' perceived sacrifices regarding negotiation power, thus establishing a trade-off for retailers between benefits and sacrifices (Patrik and Mosad, 2003). A reasonable pricing mechanism and system can help retail enterprises to set reasonable prices based on the demands of suppliers and consumers and improve the efficient and high-quality management of the entire process from procurement to sales.

1.2 Research objective

The principal objective of this work is to evaluate the individual efficacy of supplier closeness and supplier cost modeling in identifying the most profitable procurement and retail prices that can be achieved for retail firms relative to a scenario in which both mechanisms are available to firm managers. The results are important as we provide valuable insights into the formulation of procurement and marketing management.

1.3 Procurement and retail price setting

The procurement process is a critical aspect of business operations that encompasses several stages, including supplier identification, evaluation, negotiation, and selection. Measures of procurement efficiency and effectiveness are key indicators for assessing procurement performance. Effective management of procurement processes is vital for achieving business success. A comprehensive understanding of the procurement process and its requisite activities can enable firms to efficiently manage procurement with the aim of customer satisfaction, enhanced efficiency, and profitability (Novack and Simco, 1991).

Procurement willingness to pay (WTP) refers to the maximum price that companies are willing to pay a supplier for a product or service, while marketing willingness to accept (WTA) is the minimum price that marketing managers are willing to accept for retailing for the same product or service to consumers. Retail companies strive to achieve a reasonable procurement price and retail price to ensure profitability (Coursey, Hovis and Schulze, 1987). Sun, Wang, and Zhang (2017) highlighted the role of supply chain transparency in increasing consumer trust and willingness to pay higher prices for sustainable and ethical products. Enhancing the efficiency, effectiveness, and transparency of the procurement process plays a significant role in managing firms' performance and attaining profitability.

1.4 Supplier closeness and supplier cost modeling

Supplier management is gradually shifting from a transaction-based arm's-length approach to a relationship-based cooperative approach to procure component supply. Managing relationships with key suppliers is successful when closeness is said to have been established in the relationship

(Vibhava and Tripti, 2013). Close relationships with selected suppliers allow manufacturers to reduce costs, improve quality and enhance new product development. Many academic studies have pointed to the advantages gained from working with suppliers (e.g., Carr and Pearson, 1999, Monczka et al., 1993). The relative bargaining power of the supplier and the retailer can influence the pricing dynamics. If a supplier has a dominant position or offers unique products, they may have more leverage in negotiations, potentially leading to higher prices.

Conversely, if the retailer has multiple alternative suppliers or can easily switch to substitutes, they may have more power to negotiate lower prices (Inderst and Wey, 2007). Moreover, if the supplier can offer preferential terms after negotiation, such as volume discounts or cooperative advertising allowances, the retailer's costs may be reduced. These cost savings can translate into lower consumer prices as well as higher sales. In addition, cooperative and efficient relationships between suppliers and retailers can lead to streamlined supply chain operations. When both parties work closely together, they can reduce costs associated with inventory management, transportation, and warehousing. These efficiency gains can positively impact pricing by reducing costs and potentially lowering prices. But in reality, our understanding of the nature of the supplier-retailer relationship is still limited (Goffin, Lemke and Szwejczewski, 2006). Therefore, our study aims to explore the impact of supplier closeness and supplier cost modeling on pricing and profit of retail companies, so as to establish a reasonable supplier-retailer relationship and improve the efficiency of procurement operations.

1.5 Research Significance

The existing literature has primarily examined the effectiveness of supplier closeness and specific pricing models based on market demand, cost structures, and competition. Efficiency requires bureaucracy and bureaucracy impedes flexibility, so organizations face a trade-off between efficiency and flexibility. The organizational structure can be adjusted accordingly to change the efficiency and flexibility trade-off (Jørgensen and Messner, 2009). Through an in-depth case study of Toyota Motor Corporation, Aoki and Willhelm (2017) illustrated how buying companies can reap both short - and long-term benefits from long-term suppliers. Instead of trying to squeeze margins from suppliers, Toyota is working with all its partners to find cost-cutting opportunities and implement cuts throughout the production process, which fully demonstrates the close supply-demand relationship between Toyota and its suppliers for profit sharing. Moreover, an increasing number of cost modelling tools have been used to assist the company in making purchasing decisions. Electricity production cost simulation models are used to set prices for certain nonutility generators in California (Kahn, 1995). Western Advanced Technologies' Operations Research Modeling Group has developed a service process cost simulation model to improve customer loyalty, cost-effectiveness, and efficiency for communications companies (Lee and Elcan, 1996). However, less attention has been given to the role of supplier closeness in combination with supplier cost modeling in decision-making processes. This lack of research leaves a substantial knowledge gap, preventing businesses from fully harnessing the potential benefits of these variables in optimizing pricing strategies and ultimately enhancing their profitability. By addressing this research gap, our study aims to shed light on the effects of supplier closeness and supplier cost modeling on management decision-making and retail firm profits in markets for experimental goods. Uncovering the significance of these variables will provide valuable insights to practitioners and contribute to the existing body of knowledge in the field of pricing strategies and supplier negotiations.

Furthermore, understanding how supplier closeness and supplier cost modeling impact decision-making processes and firm profitability in experimental markets holds practical implications for businesses operating in similar contexts. By examining the interplay between these factors, our research will enable managers and decision-makers to make more informed choices, optimize pricing strategies, and navigate the complexities of experimental markets effectively.

HYPOTHESES

The study puts forth four hypotheses regarding the procurement and retail price setting:

H1: Supplier cost modeling provides managers with greater insight into the supplier's true cost structure, which in turn can facilitate the establishment of a more rational procurement price, leading to an increase in retail firm profits.

To establish an optimal procurement price, computer-based tools are increasingly being used to model procurement processes and analyze the effects of numerous factors on procurement outcomes (Keskin, Melouk, Meyer, 2009). Mathematical optimization models have been employed to replicate the decision problem and achieve optimality in price setting (Gansterer, Almeder and Hartl, 2014). Leu, Hong Son, and Hong Nhung (2015) have developed a Bayesian Fuzzy Game Model for construction procurement negotiations to assist contractors in predicting suppliers' bidding strategies and support them in determining appropriate bid prices.

H2: Lack of supplier closeness may lead to non-optimal procurement decisions, ultimately resulting in increased financial outflows upstream and reduced profits.

The concept of closeness is an important element in the partnering process (Nielson, 1998). Hence, building a successful relationship with a supplier involves a joint effort by the purchasing team and suppliers to arrive at a mutually agreed solution (Moon, Yao, Park, 2011). Among the factors that influence supplier closeness, negotiation is an essential aspect of managing the relationship between suppliers and retailers. Both parties engage in negotiations to establish mutually beneficial agreements on various aspects of their business relationship, such as pricing, terms and conditions, delivery schedules, product quality, and marketing support. A significant body of research investigates the effectiveness of procurement negotiations in achieving cost savings and improving supplier performance. The COVID-19 pandemic has presented numerous economic challenges that have made budget management difficult for retail companies. To mitigate financial pressures and enhance financial performance, retail firms always prioritize cost reduction in their procurement operations. Effective negotiation processes serve as a critical means of ensuring that suppliers offer competitive pricing terms, which are essential to achieve this objective (Agua and Frias, 2022). Schneider and Clegg (2019) have examined the value of negotiations in procurement price setting for the Australian public sector and have concluded that negotiations help procurement managers optimize procurement outcomes, improve procurement effectiveness, and reduce risks.

H3: There exists a potential substitutability between supplier closeness and supplier cost modeling; however, they cannot be entirely substituted but exhibit functional similarities that jointly facilitate a comprehensive negotiation and pricing process.

Recent developments in supply chain management in retail companies have highlighted the need for collaboration and integration between suppliers and customers, emphasizing the critical role that suppliers play in driving overall buyer performance. This also explains why supplier closeness is becoming an increasingly important consideration for retail companies to establish a sound business model (Masella and Rangone, 2000). Negotiation is one of the most important forms of supplier closeness. Procurement negotiation involves soliciting bids from multiple suppliers and then testing those bids against each other to determine the optimal price. Multi-attribute auctions are procurement mechanisms supported by information technology that enable bidding on multiple dimensions of a product, not solely limited to price. In comparison to auctions that solely consider price, the utilization of technology-based methods can enhance the efficiency of sourcing for configurable goods and services (Gediminas et al., 2014). Hence, the present study aims to investigate the potential interplay between bid variation and computer-based modeling, and to determine which factor exerts a more significant impact on enhancing the profitability of the retail firm and the performance of its managers.

H4: The variations in demographic profiles, behavioral tendencies, and psychographic inclinations among groups can potentially result in differential outcomes, underscoring the importance of considering these factors in the managerial decision-making of retail firms.

Understanding the factors that contribute to group differences is critical in selecting suitable managers and designing appropriate organizational structures. The implication of this hypothesis is that effective management of these factors could enhance the performance and productivity of an organization. In the US retail market, the constantly evolving competitive landscape and changing demographic characteristics of retail organizations necessitate the retail company to have a comprehensive understanding of the various retailer preferences and choices, which is important for enhancing retailer performance and company's profit (Gehrt and Yan, 2004). For example, the pricing behavior of procurement managers may be influenced by their risk preferences in that risk-averse retailers are likely to offer lower prices to manufacturers compared to their risk-neutral counterparts (Huynh and Pan, 2015).

EXPERIMENTAL DESIGN AND PROCEDURE

The study employs a multi-faceted experimental design comprising of preliminary decision-making tasks, a principal procurement and retail price setting experiment, and a post-experimental survey. Each segment of the design is rooted in established methodologies from the experimental and behavioral sciences literature. In what follows, we would provide a comprehensive account of our design and the experimental procedure.

3.1 Proxies for supplier closeness and cost modeling

Successful negotiation plays a significant role in building the supplier-retailer relationship and closeness. Nonetheless, there exist alternative approaches to achieving an equitable price, including the use of multiple bids, which is considered as a modification of the negotiation process, enabling the buyer to capitalize on supplier competition to obtain the most favorable price (Fiala 2018). It allows participants to engage in a back-and-forth exchange of offers and counteroffers, which is a fundamental aspect of negotiation. What's more, using multiple bids can provide researchers with quantitative data that can be analyzed to identify patterns and trends in negotiation outcomes. For example, researchers can examine the number of bids made, the size of the initial bid, and the final price agreed upon to identify factors that influence negotiation success. Fiala (2018) investigated the impact of auction-based procurement on negotiation and found that it can serve as a viable substitute for negotiation by promoting supplier competition, resulting in cost savings. Bajari et al. (2008) suggest that for more complex projects, negotiations are more appropriate, while simpler projects are better served by competitive bidding. Bajari and Tadelis

(2001) argue that since the only pertinent information in a fixed-price contract is the price, it is easier to employ an auction mechanism rather than negotiation.

In order to emulate the computer-based supplier cost modeling scenario commonly encountered in real-world retail procurement, a "testing" button was incorporated into the experiment's procurement process. The inclusion of this button enabled managers to simulate the effect of different bids on potential procurement outcomes before making their final decisions. This functionality in the experimental platform allows participants to test multiple bids and see the potential outcomes, profits, and acceptance rates for each bid.

The application of the test button has numerous potential benefits. First, it enables procurement managers to make more informed decisions by offering them a better understanding of the potential outcomes of different bid scenarios, leading to more cost-effective procurement decisions and more efficient procurement objectives. It can also be easily integrated into an online platform and requires minimal technical expertise to set up and use. This can make it a more practical option for researchers and organizations with limited resources. Furthermore, the test button may be more familiar and intuitive for participants compared to computer-based modeling. The test button can also be a more flexible and customizable option for simulating negotiation scenarios compared to computer-based modeling. The implementation of multiple bids and a testing button in the experiment aims to offer a straightforward and data-driven strategy for procurement decision-making. These two approaches proxy both supplier closeness and supplier cost modeling in a real-world setting.

3.2 Two preliminary decision-making tasks

Prior to our main experiment, we conducted two control tasks to assess the reciprocity preference and risk preferences of participants. The study of the consumer's reciprocity preference is significant as it is linked to cooperative and investment behavior (Stephen, Jeffrey, and Eric, 2003). We also assess participants' risk preferences since an individual's attitude towards risk could influence their decision-making process when the decision's implications on the payoffs of others are uncertain (Chakravarty et al., 2011; Andersson et al., 2016).

To gauge the reciprocity preference of the participants, we adopt the trust game, a widely recognized experimental and incentivized measure of trust and reciprocity in economics. Each participant is randomly assigned to either Role A or Role B and subsequently paired with an anonymous participant occupying the opposing role. Role A, denoted as the trustor, is endowed with a monetary sum of 100 points and is given the liberty to allocate some or all the 100 points to participant B, referred to as the trustee. The amount allocated by Role A is tripled prior to being bestowed upon Role B. Role B then has the autonomy to decide the extent to which they wish to return some of their points to Role A. The final payment accrued by participant A is determined by subtracting the amount sent from the initial 100 points plus the amount returned to them from participant B, while participant B's final payment is calculated by deducting the amount returned from the tripled amount originally sent by participant A. The final payment points are converted to US Dollars at a rate of 1 point = $0.02. The magnitude of the send amount and the send back amount is indicative of the participant's willingness to enhance the recipient's payoff at their own expense, thereby enabling a measure of trust and reciprocity. The trust metric is determined by the amount of money sent by the trustor, while the reciprocity measure is determined by the amount of money returned by the trustee. Trusting behavior is typically characterized by a larger allocation of funds, while reciprocal behavior entails returning a larger proportion of the allocated funds. Here we account for factors that may influence the procurement WTP and marketing WTA decisions of participants possessing varying levels of reciprocity.

To evaluate the participants' risk preference, we employed a certainty equivalent game, a widely used method to measure risk attitudes. The game comprised of 19 paired choices between "Option A" and "Option B" presented on the screen. The participants were required to choose between a lottery with a 50% chance of winning 300 points and a guaranteed payoff with a 100% probability. The expected value of Option A remained constant across all choices, but Option B (guaranteed payoff) increased as the list progressed, with Option A having a higher expected value in pairs 1-9 and Option B in pairs 10-19. The compensation for their choice was based on the participant's selection in one randomly selected option set, and the final payment points were converted into US Dollars at a rate of 1 point=$0.02. Risk-averse participants, who prioritize stability and minimal risk, switched to "Option B" before pair 10, while risk-neutral participants, who aim to maximize expected payoffs, switched at pair 10. Risk-seeking participants, who are willing to accept greater economic uncertainty for the potential of higher returns, switched from "Option A" to "Option B" after pair 10.

3.3 Main coffee price setting experiment design

The coffee price setting experiment includes three experimental treatments to reflect three different procurement regimes.

1. "Combined": A regime that included both the features of "Cost Modeling" and "Closeness" treatments.
2. "Cost Modeling": A regime that allowed managers to test procurement prices to gain information about the supplier's cost structure before making *one* procurement offer to the supplier (i.e., supplier cost modeling).
3. "Closeness": A regime that allowed managers to make up to *three* consecutive procurement bids to the supplier if an offer was rejected (i.e., supplier closeness).

In all variations, participants take on the role of General Manager (GM) for a coffee shop chain, responsible for both coffee sourcing and marketing decisions. Each experimental session included one of the three treatments enumerated above. Multiple bids are used in the first and third treatments to simulate supplier closeness in the negotiation process involved in choosing the procurement price for a retail company, while in the second treatment, only one bid is used. Testing functions are provided in the first and second treatments to allow the GM to assess the impact of different prices on procurement and retail prices, mimicking the sophisticated cost modeling involved in a real-world procurement process. All the GMs are given the sourcing budget of $10 and tasked with sourcing one pound of roasted coffee from a supplier of their choice. In the experiment, if the specific supplier accepts their offers, one pound of coffee would be processed into 28 standard 8-oz servings of brewed coffee and offered for sale in the coffee shop chain. Subsequently, the GM is also responsible for setting the retail price (R) for a cup of coffee.

All the GMs would go through three stages to complete the main experiment. In the first stage, known as the Coffee Selection Stage, the GM is presented with a choice of five different coffees and is asked to assess certain quality-related questions after selecting their preferred coffee. In the second stage called the Coffee Sourcing Stage, the GM is required to make procurement price offers (W) to source their chosen coffee from the designated supplier. Each GM is randomly assigned a unique supplier production cost C at the beginning of the experiment, which is not known to them. They can make up to three consecutive wholesale price bids (W) in treatment 1 and 3, and one bid in treatment 2, for one pound of their selected coffee. If the offered price is lower than the supplier's production cost, the supplier will reject the offer, and sourcing will not occur. In the final Coffee Marketing stage, the GM reviews their coffee quality assessment and is asked to set the retail price (R) for their firm's chain of locations. Across the three treatments, the GM was also provided with a retail 'test' button to simulate consumer demand at different retail prices but only had one chance to set their retail price (R).

3.3.1 Procurement price setting

Each GM is randomly assigned with a unique, private supplier production cost denoted as C, which follows a normal distribution with a mean (μ) of 6 and a standard deviation (σ) of 0.5. An accepted procurement offer also entitles the GM to a cost-savings bonus payment from their employer.

In this study, three treatments were compared: Combined, Cost Modeling, and Closeness. Combined and Cost Modeling treatments allowed the GM to test their current choice of W by using the 'test' button on the procurement price setting page. The test provided information on the probability of W_i being accepted and the cost-savings bonus, along with the projected revenue-sharing bonus, the firm's projected profit, and the projected total payment under the assumption that the marketing department makes an optimal retail pricing decision. On the other hand, the Closeness treatment only presented static formulas for the cost-savings bonus, the firm's projected profit, and the total payment, without providing the probability of W_i being accepted. In all three treatments, the acceptance or rejection of the procurement price offer depended on the value of W_i in relation to C, with an offer being accepted if $W_i \geq C$ and rejected if $W_i < C$.

To display the probability that W_i could be accepted, we utilize the following function:

$$F_C(w) = F_Z\left(\frac{w - \mu}{\sigma}\right)$$

where Z represents the standard normal distribution.

Bid 1: W_1

$$Prob(W_1\ Accepted) = F_C(W_1)$$

Bid 2: W_2

$$Prob(W_2\ Accepted | W_1\ Rejected) = \begin{cases} 0, & if\ W_2 \leq W_1 \\ \dfrac{F_C(W_2) - F_C(W_1)}{1 - F_C(W_1)}, & if\ W_2 > W_1 \end{cases}$$

Bid 3: W_3

$$Prob(W_3\ Accepted | W_1\ \&\ W_2\ \ Rejected)$$
$$= \begin{cases} 0, & if\ W_3 \leq \max\{W_1, W_2\} \\ \dfrac{F_C(W_3) - F_C(\max\{W_1, W_2\})}{1 - F_C(\max\{W_1, W_2\})}, & if\ W_3 > \max\{W_1, W_2\} \end{cases}$$

An ***accepted*** offer entitles the GM to a cost-savings bonus payment from their employer. The cost-savings bonus is equal to a portion of the difference between the sourcing budget ($10) and the wholesale price (W) offered by the GM:

$$0.2 * (10 - W_i) * 20$$

We assume that customers' willingness to pay follows a uniform distribution between 1 and 7 dollars per cup, represented as $WTP \sim U[WTP_L, WTP_U]$. The players receive a percentage (S) of the profit from retail sales, where S is initialized at 0.20, with $0 \leq S \leq 1$. Given a retail price R, the GM receives a revenue-sharing bonus (RSB) expressed as:

$$RSB(R) = S * R * \left(1 - \frac{R - WTP_L}{WTP_U - WTP_L}\right) * 28$$

This equation represents the subject's revenue-sharing bonus, provided that they set the retail price R contingent upon the supplier accepting the wholesale offer in the prior stage. The subject's optimal revenue-sharing bonus R* can be obtained by solving the following equation:

$$\frac{d}{dr} RSB(R) = 0 \; iff$$

$$\frac{d}{dr}\left[S * R * \left(1 - \frac{R - WTP_L}{WTP_U - WTP_L}\right) * 28\right] = 0 \; iff$$

$$\frac{d}{dr}\left[S * \left(R - \frac{R^2 - R * WTP_L}{WTP_U - WTP_L}\right) * 28\right] = 0 \; iff$$

$$\frac{d}{dr}\left[\left(R - \frac{R^2 - R * WTP_L}{WTP_U - WTP_L}\right)\right] = 0 \; iff$$

$$1 - \frac{2R - WTP_L}{WTP_U - WTP_L} = 0 \; iff$$

$$\frac{2R - WTP_L}{WTP_U - WTP_L} = 1 \; iff$$

$$2R - WTP_L = WTP_U - WTP_L \; iff$$

$$2R = WTP_U \; iff$$

$$R = \frac{WTP_U}{2}$$

Hence, we can derive the optimal retail price as:

$$R^* = \frac{WTP_U}{2}$$

Given this optimal retail price, the GM's expected revenue-sharing bonus if W_i is accepted can be calculated using the expression:

$$0.2 * R^* * \left(1 - \frac{R^* - 1}{6}\right) * 28$$

The firm's optimal profit can be obtained using the equation:

$$R^* * \left(1 - \frac{R^* - 1}{6}\right) * 28 - W$$

The GM's coffee experiment optimal payment would be the fixed wage of $5 plus the *cost-savings bonus* and optimal *revenue-sharing bonus*:

$$5 + 0.2 * (10 - W_i) * 20 + 0.2 * R^* * \left(1 - \frac{R^* - 1}{6}\right) * 28$$

3.3.2 Retail price setting

The experimental platform provides the GM in all three sessions with the 'test' button to show the percentage of the market demand that would be satisfied and how many pounds of coffee would be unsold, along with the final value of the revenue-sharing bonus, the firm's profit, and the total payment for the experiment if they choose a specific retail price.

Market demand served is calculated as:

$$\left[1 - \frac{R - 1}{6}\right] * 100\%$$

Pounds of coffee not used is calculated as:

$$\frac{R - 1}{6}$$

The *revenue-sharing bonus* is equal to a portion of the revenue earned from sales at the retail price (R) set by the GM. In words, revenue-sharing bonus from sales equals the revenue earned on each cup of coffee (R) times the number of cups sold:

$$0.2 * R * \left(1 - \frac{R-1}{6}\right) * 28 - W$$

Firm's profit (Π) would be:

$$R * \left(1 - \frac{R-1}{6}\right) * 28 - W$$

GM total payment in dollars would be:

$$5 + 0.2 * (10 - W_i) * 20 + 0.2 * R * \left(1 - \frac{R-1}{6}\right) * 28$$

3.4 The post-experimental survey

Upon completion of two incentivized economic decision-making games and the main coffee experiment, participants are asked to take a post-experimental survey. The survey comprises three parts: (i) questions about participants' coffee consumption habits, which will help shed light on their decision-making behaviors in the experiment; (ii) an attitudinal survey consisting of binary-choice and Likert-scale questions designed to gain insight into participants' everyday purchase decisions, thus enabling measurement of their pro-sociality, generosity, and social attributes; and (iii) a demographic survey that collects pertinent information about participants for use as control variables in subsequent analyses.

3.5 Experimental procedure

3.5.1 Data collection criteria

The study's primary data was collected through a computer-based lab experiment conducted in a classroom at Cornell University during February and March 2023. Prior to the study, the Cornell University Institutional Review Board reviewed the research protocol and granted an exemption under protocol IRB0147153, as detailed in Appendix 1. Subjects were recruited through the

Business Simulation Lab at the Cornell SC Johnson College of Business, which maintains a pool of 5,000 participants consisting of mostly current students but also staff and many Cornell alumni. The study was advertised to take approximately 60 minutes to complete with average expected earnings of $33. To ensure the participants had a sufficient understanding of the coffee selection, purchase, and pricing mechanism, we required participants to be at least 18 years old and willing and able to drink black coffee.

3.5.2 Pre-experimental presentation

The oTree behavioral research platform was utilized to implement experimental tasks in a controlled environment (Chen, Schonger and Wickens, 2016). Upon arrival, all participants were instructed to maintain silence, stow their mobile devices, and avoid communication with one another during the duration of the experiment. A random seating arrangement was employed, facilitated through a blind selection process using poker chips, and empty seats were intentionally reserved between participants to prevent any potential interference. Informed consent documentation was provided to all participants prior to beginning each session, accompanied by a comprehensive 15-minute presentation of the experimental procedures using a PowerPoint slideshow. Once instructions were thoroughly reviewed, participants proceeded to execute the experiment via the oTree platform, with a total of 111 participants taking on the role of a GM for a chain of coffee shops. The majority of participants were students, with 67.57% being undergraduate students and 15.32% being graduate students, 15.31% being working individuals, and 65.77% of participants identifying as female. The average participant age was 23 years old, and each session lasted an average of 60 minutes. The number of participants across the three sessions was 48, 34, and 29 for the Combined, Closeness, and Cost Modeling treatments, respectively.

While providing the instructions in PowerPoint, we clarified the overall objectives for the study and presented the participants with the supplier cost information and consumer information to better help them make the pricing decisions. We explained that the average production cost of all roasted coffee suppliers is 6 dollars per pound, but any supplier's actual production cost is private information; and it is normally distributed with an average cost of $6 per pound and standard deviation of $0.5. This is similar to the procurement auction experiment conducted by Dimitris, Damian and Izak (2009) in which suppliers know only their own true production cost and their own cost adjustment, and the buyer does not know the suppliers' true production costs but does know all suppliers' cost adjustments. Similarly, we assume that on average a retail customer is willing to pay 4 dollars per cup of high-quality coffee. Based on the market price of a cup of coffee, we assume the retail customers are willing to pay anywhere between 1 and 7 dollars per cup with equal possibility. We then summarized the experimental steps for the participants and provided them with the password to complete the two initial economic decision-making games prior to beginning the main experiment.

3.5.3 Coffee selection stage

In the coffee selection stage, five different coffee samples of similar quality were presented to the participants. They were then asked to select their most preferred coffee to attempt to procure and market in the subsequent stages of the experiment. In order to facilitate their evaluation process, a comprehensive description of each coffee sample was provided to the participants (Figure 1). After making their selection, participants are then asked a series of questions to assess their perception of multiple quality-related aspects of their chosen coffee before moving on to the sourcing stage.

Figure 1: Information provided for the coffee samples

Coffee -->	W7	T3	E6	R0	D5
REGION	Central America	Central America	Central America	Central America	Central America
VARIETY	Bourbon, Typica	Caturra	Pacas	Caturra, Bourbon	Catuaí
HARVEST SEASON	Spring 2022	Winter 2022	Summer 2022	Winter 2022	Winter 2022
PROCESSING METHOD	Washed	Partially Washed	Washed	Washed	Washed
INTENDED PREPARATION	Drip / French press	Drip / French press	Drip / French press	Drip / French press	Drip / French press
ROAST LEVEL	Medium-light	Medium-light	Medium-light	Medium-light	Medium-light
ROAST DATE	Feb 8, 2023	Feb 8, 2023	Feb 8, 2023	Feb 8, 2023	Feb 8, 2023
TASTING NOTES	green apple, pear, marzipan	fuji apple, citrus, green tea	peach, grapefruit, toffee	dried cherries, lime, orange blossom	blackberry, red apple, green tea

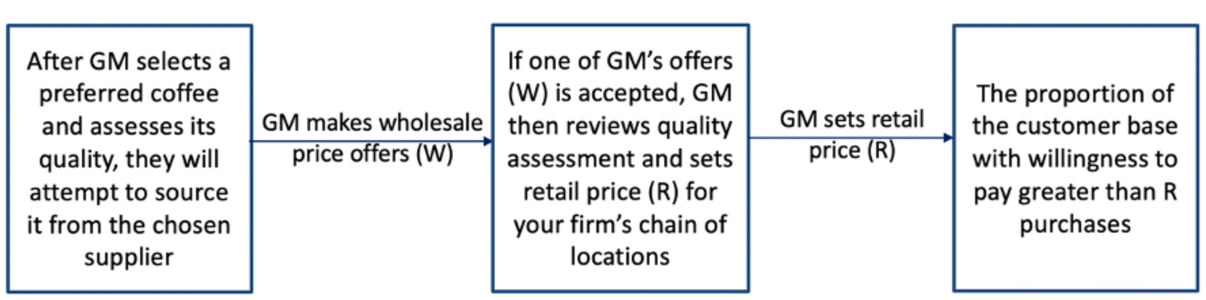
3.5.4 Coffee sourcing stage

During the Coffee Sourcing Stage of the experiment, GMs were asked to make offers to the supplier. In the Combined and Closeness treatments, GMs could make up to three sequential bids, while in the Cost Modeling treatment, they could only make one. If all the offers made by the GM were less than the cost to produce coffee for the supplier ®, the supplier would reject the orders and the GM would receive a fixed wage of $5 and be required to complete a post-experimental survey. If one of the GM's offers was higher than the cost to produce coffee for the supplier, the supplier would accept the order, and a pound of the GM's selected coffee would be delivered for processing and retail sale.

3.5.5 Coffee selling stage

During the coffee selling stage, if the supplier accepts one of the GM's offers, they are granted the authority to set the retail price ® for their firm's chain of locations (Figure 2). The retail locations will only sell the coffee to customers who are willing to pay greater than or equal to R, and any unsold coffee has no residual value. The GM is provided with a summary of their coffee quality assessment from the selection stage to assist them in setting a retail price. They are also reminded that one pound of coffee beans produces 28 cups of retail-ready brewed coffee, and retail customers are willing to pay anywhere between 1 and 7 dollars per cup, with an equal likelihood of paying any price within this range. The GM in all three treatments could use the retail 'test' button to test the demand response for a potential retail price before finalizing their choice. Furthermore, the frequency of testing conducted by participants for procurement price and retail price was meticulously recorded for each session.

Figure 2: Overview of the experimental flow



3.5.6 Post-experimental survey

Participants were finally asked to complete a voluntary demographics survey at the conclusion of the experiment. The survey includes questions designed to evaluate their attitudes towards various topics, with assurances provided that their responses will remain anonymous and not be disclosed to others. Upon completion of the survey, participants are invited to form a queue to receive final payment for their participation.

DATA ANALYSIS

4.1 Analysis of variance

Analysis of variance (ANOVA) was used to compare the means of the different demographic, behavioral, and psychographic characteristics to test for significant differences in the sample across treatments. The ANOVA analysis for demographic characteristics and behavioral and psychographic factors are presented in Table 1 and Table 2, respectively.

Table 1: Demographic statistics of the sample and treatment groups

Demographic / Behavioral Variable	Combined (mean)	Cost Modeling (mean)	Closeness (mean)	ANOVA p-value
Age	24	22	22	0.3877
Gender-Female	24%	28.1%	32.4%	0.7058
Gender-Male	68%	53.1%	64.7%	0.3903
Ethnicity - White	28%	18.8%	32.4%	0.4494
Ethnicity - Asian	52%	53.1%	58.8%	0.8208
Ethnicity – Black/African American	4%	9.4%	2.9%	0.4479
Ethnicity-Hispanic/Latino	6%	6.3%	0%	0.3441
Income (Level)	6.46	6.26	6.83	0.8871
Education - College	28%	37.5%	41.2%	0.4271
Education - Bachelor	34%	18.8%	35.3%	0.2575
Education - Graduate	14%	21.9%	8.8%	0.3265
Employment-Full-time	6%	0%	5.9%	0.3760
Employment-Part-time	12%	6.3%	11.8%	0.6763
Employment-Student	72%	78.1%	79.4%	0.6997
Marital Status-Never married	78%	78.1%	94.1%	0.1154

To investigate differences in the means of outcome variables between any two groups within the three treatment groups, we ran a series of Student's t-tests for each pairwise combination of treatments (Table 3, Table 4, Table 5). As a robustness check, we also conducted Welch's t-tests to remove the equal variance assumption between samples and Mann-Whitney U tests to eliminate distributional assumptions. The dependent variables under analysis included procurement price

(W_{final}), retail price (R), retail price testing times (R Test Freq), first procurement price (W_1), probability of acceptance for 1st procurement price(W_1 Probability), differences between the final and first procurement price ($W_{final} – W_1$), second procurement price (W_2), third procurement price (W_3), probability of acceptance for final procurement price (W_{final} Probability), accepted price round (W Accepted Round), cost-saving bonus(Cost Bonus), revenue-sharing bonus (Revenue Bonus), earnings for the firms (Firm Profit), market demand for the coffee product (Market Demand), coffee quality score (Coffee Quality), and coffee recommendation score (Coffee NPS).

Table 2: Behavioral, psychographic, and risk summary statistics

Behavioral / Psychographic / Risk Var	Combined (mean)	Cost Modeling (mean)	Closeness (mean)	ANOVA p-value
CE game – Switching Row	8.13	8.24	8.25	0.9723
Trust game - % of allocation sent to another	44%	48%	39%	0.6304
Trust game - % of allocation sent back to another player	31%	34%	24%	0.4221
Coffee Drinking Frequency --Multiple daily	18%	15.6%	8.8%	0.5046
Coffee Drinking Frequency -- Daily	36%	21.9%	35.3%	0.3656
Coffee Drinking Frequency- Weekly	18%	31.3%	23.5%	0.3895
Coffee Drinking Frequency- Never	10%	6.3%	11.8%	0.7418
Place of getting coffee-Home	40%	21.9%	38.2%	0.2125
Place of getting coffee-Take out from coffee shop	32%	43.8%	38.2%	0.5604
Leave the door unlock frequency-Never	22%	40.6%	26.5%	0.1846
Pay more for Fair Trade coffee – 1 dollar	10%	6.25%	11.8%	0.7418
Pay more for Fair Trade coffee – 2 dollars	24%	6.25%	14.7%	0.1023
Pay more for Fair Trade coffee – 3 dollars	26%	43.8%	38.2%	0.2252
Pay more for Fair Trade coffee – 4 dollars	20%	25%	20.6%	0.8576
Lend money -once a year	52%	56.3%	52.9%	0.9310
Lie to parents - rarely	46%	37.5%	64.7%	0.0739*
Most people would take advantage if they got a chance -Yes	38%	46.9%	44.1%	0.7106
People try to be helpful- Yes	42%	56.3%	44.1%	0.4327
People can be trusted - Yes	36%	25%	38.2%	0.4754
Count on strangers -Yes	44%	25%	47.1%	0.1346
Using caution before trusting the strangers -Yes	82%	90.6%	94.1%	0.2162
Recycle Frequency- often	34%	28.1%	32.4%	0.8577
Recycle Frequency-sometimes	24%	37.5%	29.4%	0.4307

*** $P \leq 0.01$; ** $P \leq 0.05$; * $P \leq 0.1$

Table 3: Closeness vs Combined treatment group statistical analysis

Dependent Variable	Student's t-statistic	t-statistic p-value	Welch's t-statistic	Welch's p-value	MW U-statistic	MW p-value
W_{final}	0.903993	0.368713	0.920397	0.3603	960.5	0.17355
R	-0.555542	0.580075	-0.579972	0.563578	823.5	0.945481
R Test Freq	2.122613	0.036879**	2.081477	0.041273**	1039.5	0.035712**
W_1	-2.078454	0.040873**	-1.963312	0.0546*	621.5	0.067201*
W_1 Probability	-1.910026	0.059714*	-1.868578	0.066165*	622	0.067891*
$W_{final} – W_1$	2.229572	0.028579**	2.180068	0.032868**	1083.5	0.006248***
W_2	1.084579	0.285318	1.127568	0.269966	208.5	0.408942
W_3	-0.912512	0.381063	-0.975117	0.359693	20	0.941428
W_{final} Probability	1.104543	0.272669	1.099487	0.275321	990	0.101964
W Accepted Round	1.465404	0.14673	1.466262	0.14697	974	0.10022
Cost Bonus	-1.369953	0.174534	-1.346301	0.182771	639.5	0.096251*
Revenue Bonus	0.52885	0.598374	0.523618	0.602232	1143	0.000638***
Firm Profit	0.568048	0.571593	0.576291	0.566152	862.5	0.664947
Market Demand	-0.130823	0.896248	-0.156779	0.87605	766	0.798605
Coffee Quality	-0.930033	0.355152	-0.873447	0.386265	759.5	0.503167
Coffee NPS	0.443594	0.658534	0.453324	0.651605	850.5	0.740361

*** $P \leq 0.01$; ** $P \leq 0.05$; * $P \leq 0.1$

Table 4: Cost Modeling vs Combined treatment group statistical analysis

Dependent Variable	Student's t-statistic	t-statistic p-value	Welch's t-statistic	Welch's p-value	MW U-statistic	MW p-value
W_{final}	0.799109	0.426751	0.91076	0.365351	890.5	0.040682**
R	-2.270451	0.026052**	-2.02957	0.048901**	634.5	0.513875
W Test Freq	1.365577	0.176153	1.398339	0.166866	851.5	0.102132
R Test Freq	0.455393	0.650142	0.428962	0.669844	727.5	0.744318
W_1	4.383999	0.000037***	4.896831	0.000005***	1128.5	0.000005***
W_1 Probability	5.151155	0.000002***	6.110851	0.000000***	1129	0.000005***
W_{final} Probability	2.671914	0.009247***	3.008605	0.003572***	942	0.009718***
Cost Bonus	-2.800205	0.006491***	-2.584293	0.013034**	387	0.001129***
Revenue Bonus	-1.736459	0.086589*	-1.473827	0.149384	733	0.686391
Firm Profit	-1.645926	0.103964	-1.429552	0.161073	564.5	0.168357
Market Demand	0.353152	0.725021	0.414301	0.679919	575	0.770202
Coffee Quality	-0.670096	0.504855	-0.647212	0.520296	651	0.534207
Coffee NPS	0.594866	0.553724	0.64636	0.520074	702.5	0.948025

*** $P \leq 0.01$; ** $P \leq 0.05$; * $P \leq 0.1$

Table 5: Cost Modeling vs Closeness treatment group statistical analysis

Dependent Variable	Student's t-statistic	t-statistic p-value	Welch's t-statistic	Welch's p-value	MW U-statistic	MW p-value
W_{final}	0.168083	0.867074	0.174166	0.862361	483.5	0.900617
R	1.800897	0.076663*	1.71214	0.094851*	516	0.737315
R Test Freq	1.263047	0.211379	1.249972	0.216481	581.5	0.22427
W_1	-5.158942	0.000003***	-5.446647	0.000002***	129.5	0.000001***
W_1 Probability	-6.538355	0.000000***	-6.941346	0.000000***	129.5	0.000001***
W_{final} Probability	-1.373381	0.174661	-1.429151	0.158685	457.5	0.628367
Cost Bonus	1.411412	0.163204	1.385852	0.171577	570.5	0.284767
Revenue Bonus	1.788907	0.078595*	1.702323	0.096613*	645.5	0.012419**
Firm Profit	1.819333	0.073769*	1.731323	0.091256*	600.5	0.139644
Market Demand	-0.949879	0.346255	-0.839084	0.408958	432.5	0.73175
Coffee Quality	-0.255766	0.798992	-0.260667	0.795232	488.5	0.946429
Coffee NPS	-0.154406	0.877799	-0.157107	0.875681	512	0.790813

*** $P \leq 0.01$; ** $P \leq 0.05$; * $P \leq 0.1$

4.1 Heterogeneous treatment effects

We examine heterogeneous treatment effects using multiple regression analysis for each of the dependent variables with two-way interaction terms. The aim was to investigate the impact of demographic and behavioral factors on dependent variables across three distinct treatment groups. Ordinary Least Squares (OLS) regression was employed, and the model includes several independent variables, including indicator variables for treatment group (Treatment), female gender (Female), Asian ethnicity (Asian), income greater than $100,000 (Inc100K), business major (Bus_major), daily coffee drinker (Coffee_daily), and coffee shop patron (Coffee_shop). The model also included numerical variables measured from the two preliminary decision-making tasks for risk premium (Risk_prem) and trust levels (Trust_pct). The interaction terms between the Treatment and each personal attribute variable are also included in the model, representing the conditional treatment effects for different subgroups of participants. Using the pooled sample of all treatment groups, we estimate four distinct specifications, with the Combined treatment group serving as the reference level. This approach allows us to group interactions into broad categories to look for trends and then combine them into a fully saturated specification to check for robustness and control for confounding factors. The first specification examines demographic interactions and includes four variables: Female, Asian, Inc100k, and Bus_major. The second specification explores behavior preferences and includes two variables: Risk_prem and Trust_pct. The third specification analyzes coffee consumption habits and includes Coffee_daily and Coffee_shop. Lastly, the fourth specification integrates all eight interaction variables into one model.

For individual participant *j*, the marginal effects of personal attributes and treatment group affiliations are estimated by the corresponding β values, while the constant term α represents the intercept of the regression. The results of this analysis provide insights into the factors that shape individuals' decision-making and behavior and contribute to the broader literature on the psychology of human decision-making.

The four specifications consisted of the following.

（1） $$DV_j = \alpha + \beta_1 Female_j + \beta_2 Asian_j + \beta_3 Inc100K_j + \beta_4 Bus_{major_j} + \beta_5 Treatment_j + \beta_6 (Female_j * Treatment_j) + \beta_7 (Asian_j * Treatment_j) + \beta_8 (Inc100K_j * Treatment_j) + \beta_9 (Bus_{major_j} * Treatment_j) + \varepsilon_j$$

（2） $$DV_j = \alpha + \beta_1 Risk_{prem_j} + \beta_2 Trust_{pct_j} + \beta_3 Treatment_j + \beta_4 (Risk_{prem_j} * Treatment_j) + \beta_5 (Trust_{pct_j} * Treatment_j) + \varepsilon_j$$

（3） $$DV_j = \alpha + \beta_1 Coffee_{daily_j} + \beta_2 Coffee_{shop_j} + \beta_3 Treatment_j + \beta_4 (Coffee_{daily_j} * Treatment_j) + \beta_5 (Coffee_{shop_j} * Treatment_j) + \varepsilon_j$$

（4） $$DV_j = \alpha + \beta_1 Female_j + \beta_2 Asian_j + \beta_3 Inc100K_j + \beta_4 Bus_{major_j} + \beta_5 Risk_{prem_j} + \beta_6 Trust_{pct_j} + \beta_7 Coffee_{daily_j} + \beta_8 Coffee_{shop_j} + \beta_9 Treatment_j +$$

$$\beta_{10}(Female_j * Treatment_j) + \beta_{11}(Asian_j * Treatment_j) + \beta_{12}(Inc100K_j * Treatment_j) + \beta_{13}(Bus_{major_j} * Treatment_j) + \beta_{14}(Risk_{prem_j} * Treatment_j) + \beta_{15}(Trust_{pct_j} * Treatment_j) + \beta_{16}(Coffee_{daily_j} * Treatment_j) + \beta_{17}(Coffee_{shop_j} * Treatment_j) + \varepsilon_j$$

The dependent variables in this study were identified and denoted as DV, including W, R, R Test Freq, W_1, W_1 Probability, W_{final} Probability, Cost Bonus, and Revenue Bonus. The full tables containing interaction terms have been included in **Appendix B**, with a summarized version of the statistically significant interaction terms presented below (Table 6).

Table 6: Interaction analysis in multiple linear regression

DVs	Explanatory Variable	(1)	(2)	(3)	(4)
R	Cost Modeling	-1.490*	-0.038	-0.677	-1.434
		(0.633)	(0.681)	(0.612)	(0.815)
	Asian*Cost Modeling	1.292*			1.702*
		(0.559)			(0.655)
	Inc100K*Cost Modeling	-1.395*			-1.634*
		(0.625)			(0.652)
	Bus_major*Cost Modeling	0.885			1.143*
		(0.481)			(0.536)
R Test Freq	Female*Cost Modeling	10.446			12.676*
		(5.984)			(5.568)
	Asian*Cost Modeling	9.420			11.140*
		(5.159)			(5.349)
	Coffee_daily*Closeness			-10.737*	-10.276
				(5.183)	(5.696)
W_1	Cost Modeling	1.181**	0.502	0.698*	0.980*
		(0.360)	(0.269)	(0.284)	(0.475)
W_1 Probability	Cost Modeling	0.499***	0.354**	0.327***	0.495**
		(0.109)	(0.118)	(0.096)	(0.162)
W_{final} Probability	Cost Modeling	0.284**	0.141	0.163*	0.285*
		(0.094)	(0.102)	(0.075)	(0.136)
Cost Bonus	Cost Modeling	-7.384**	-0.369	-4.050	-7.772**
		(2.219)	(2.568)	(2.070)	(2.522)
	Asian*Closeness	3.211*			3.551*
		(1.462)			(1.615)
	Asian*Cost Modeling	7.034***			8.608***
		(1.909)			(2.024)
	Inc100K*Cost Modeling	-4.112			-4.851*
		(2.193)			(2.275)
	Trust_pct*Cost Modeling	-3.238			-8.000*
		(4.881)			(3.379)
	Coffee_daily* Cost Modeling			2.382	3.990*
				(2.035)	(1.562)
	Coffee_shop* Cost Modeling			1.080	4.466*
				(2.145)	(2.106)
Revenue Bonus	Asian*Cost Modeling	4.498*			5.765**
		(1.725)			(1.902)
	Inc100K*Cost Modeling	-4.636*			-5.658**
		(1.850)			(1.831)

*** P ≤ 0.01; ** P ≤ 0.05; * P ≤ 0.1，Baseline: Combined group

RESULTS AND DISCUSSION

5.1 Differences in means

Table 3 employs a series of statistical tests to analyze the impact of supplier cost modeling on price setting and firm profits. We compare the Closeness group and Combined group and, based on the Student's t-test, we find statistically significant differences between the group means for the number of tests conducted on retail price (R Test Freq, p=0.037), first procurement price setting (W_1, p=0.041), acceptance rate of the first procurement price (W_1 Probability, p=0.060), and difference between the final and first procurement price (W_{final} - W_1, p=0.029). The first procurement price is lower and the difference between prices is larger for the Closeness group. Additionally, the Mann-Whitney U tests demonstrate significant differences in the cost-saving bonus (Cost Bonus, p=0.096) and revenue-sharing bonus (Revenue Bonus, p=0.001).

Table 4 presents a comparison of the Cost Modeling group and Combined group to investigate the impact of supplier closeness on each of the dependent variables. Based on the Student's t-test and Mann Whitney U test, the Cost Modeling group exhibits statistically significant differences in final procurement price (W_{final}, p=0.041) and retail price (R, p=0.026) compared to the Combined group. Moreover, the first procurement price, the probability of the supplier accepting the first procurement price, the probability of the supplier accepting the final procurement price, and the cost-saving bonus also show statistically significant differences. Specifically, the Cost Modeling group shows higher final procurement price (W_{final}, p=0.041), lower retail price (R, p=0.026), higher first-time (and only) procurement price (W_1, p=0.000), higher probability of the first procurement price being accepted (W_1 Probability, p=0.000), and higher probability of the final procurement price being accepted (W_{final} Probability, p=0.010) compared with Combined group. Lastly, the Cost Modeling group obtains lower cost-saving bonuses (Cost Bonus, p=0.010) compared to the Combined group.

In **Table 5,** the statistical tests examine the substitutability of supplier closeness and cost modeling. The Closeness group and Cost Modeling group exhibit statistically significant differences for retail price (R, p=0.077), revenue-sharing bonus (Revenue Bonus, p=0.079), and firm profit (Firm Profit, p=0.074). Moreover, the first procurement price and the probability of the first procurement price being accepted by suppliers are also significantly difference between treatments. The Closeness group shows higher retail price (R, p=0.077), lower first procurement price (W_1, p=0.000), lower probability of acceptance by suppliers for the first procurement price (W_1 Probability, p=0.000) and receives higher revenue-sharing (Revenue Bonus, p=0.079) and cost-saving bonus (Cost Bonus, p=0.163) compared to the Cost Modeling group.

5.2 Interaction effects

Based on **Table 6,** for retail price (R), the Cost Modeling group exhibits a statistically significant negative effect at the 10% level, with retail prices that are on average $1.49 lower than the Combined group. This finding suggests that Asian participants in the Cost Modeling group are more likely to set higher retail prices relative to non-Asian participants. In addition, the interaction term between Inc100K and Cost Modeling exhibits a statistically significant negative effect at the 10% level, with a coefficient of -1.395. This indicates that when individuals with annual incomes of larger or equal to $100,000 in the Cost Modeling group, their retail prices on average decrease by $1.395 compared to the Combined group. Finally, the interaction term between business major and Cost Modeling is statistically significant at the 10% level, with individuals majoring in business setting higher retail prices in the Cost Modeling group compared to the Combined group.

With regard to the testing frequency of retail price (R Test Freq), the interaction effect between the group of individuals who consume coffee daily and the Closeness group (Column 3) has a significant negative impact on the number of retail price tests conducted relative to the Combined group. Furthermore, the interaction effect between the female gender group and the Cost Modeling group (Column 4) is significantly positive at the 10% level, with a coefficient of 12.676. Similarly, the interaction effect between the Asian group and the Cost Modeling group (Column 4) is significantly positive at the 10% level, with a coefficient of 11.140. These findings suggest that both female and Asian groups are more willing to conduct testing on retail pricing when they are also able to test bids during the procurement stage.

As for the first procurement price (W_1), the first specification demonstrated a statistically significant positive effect of the Cost Modeling treatment at the 5% level. This indicates that after controlling for other variables, the mean first procurement price was $1.181 higher in the Cost Modeling group than in the Combined group. As each GM in the Cost Modeling group could only make one procurement offer, while each participant in the Combined group could make three consecutive bids, the former group might have been more cautious and conservative due to the lack of opportunities to adjust their prices. The positive value of the Cost Modeling coefficient regarding the acceptance rate for the first procurement price (W_1 Probability) also suggests that the procurement price was more likely to be accepted in Cost Modeling group than that of the Combined group.

The regression analyses reveal a significant negative relationship between the Cost Modeling group and the cost-saving bonus (Cost Bonus), suggesting that this group received a lower bonus compared to the Combined group at the 5% significance level. Additionally, the interaction term between the Asian and Closeness group is significantly positive at a 10% significance level, indicating that the cost-saving bonus of the Asian in Closeness group was $3.211 higher than that of the Combined group. Furthermore, the interaction term between the Asian and Cost Modeling groups is significantly positive at a 1% significance level, suggesting that the cost-saving bonus of the Asian in Cost Modeling group was $7.034 higher than that of the Combined group, which suggests that less dilution of mental budget and lower cognitive load in Closeness and Cost Modeling group compared to Combined leads to better procurement performance. The interaction term between the trust level (Trust_pct) and Cost Modeling group is significantly negative at a 10% significance level, indicating that higher levels of trust in others are associated with a lower cost-saving bonus in Cost Modeling group compared with the Combined group. On the other hand, the interaction terms between Coffee_daily and Cost Modeling group and between Coffee_shop and Cost Modeling group are significantly positive at the 10% significance level, which means that higher daily coffee consumption and the preference for purchasing coffee in coffee shops leads to larger differences in cost-saving bonus in the Cost Modeling group.

The regression results for revenue-sharing bonus (Revenue Bonus) also reveals that the interaction term between the Asian and Cost Modeling group is significantly positive at 10% and 5% significance levels for the first and fourth specifications, respectively. These results suggest that the Asian group tends to widen the revenue-sharing bonus gap between the Combined and Cost

Modeling groups. Additionally, the analysis indicates that the interaction term between individuals with an annual income of $100,000 or more and the Cost Modeling group is significantly negative at 5% significance level. These findings imply that individuals with an annual income of $100,000 or more tends to have lower revenue-sharing bonus in Cost Modeling group compared with the Combined group.

5.3 Discussion

The statistical results presented in **Table 3** reveal that the Closeness group demonstrated a more cautious and conservative approach than the Combined group in several aspects. Specifically, participants in the Closeness group showed higher levels of uncertainty in their procurement price setting, resulting in lower initial procurement prices on average. To increase the acceptance rate of procurement price, they have to make multiple adjustments, resulting in a significant difference between their final procurement price and their first one. As the GMs in the Closeness group were unable to optimize their procurement price setting through testing, they may pay more attention to optimize revenue-sharing bonus, resulting in gaining more revenue payment in the experiment.

Moreover, the Closeness group's conservative approach to price setting may also have influenced their performance in retail pricing. GMs in the Combined group were able to test the potential outcomes of different procurement prices, enabling them to better evaluate whether their bids were reasonable and make optimal decisions. In contrast, participants in the Closeness group had no such testing functionality and relied more on their experience and intuition to set procurement prices, which may lead to more uncertainty and error in their price setting. As a result, the Closeness group tends to conduct more tests when setting retail prices since no testing for procurement frees up more mental capacity for GM in Closeness group to test during retail price setting process. We therefore find that our results only partially support our first hypothesis: Supplier cost modeling *does* facilitate the establishment of a more rational procurement price, but it *does not* lead to an increase in retail firm profit.

According to the results presented in **Table 4**, the Cost Modeling group was restricted to setting a single procurement price, potentially leading participants to take a more careful and deliberate approach when determining an optimal and acceptable procurement bid. In contrast, with the ability to set multiple bids, participants in the Combined group have been more impulsive in their decision-making, relying on the opportunity to make changes later. This difference is reflected in the higher procurement prices observed in the Cost Modeling group. The lower retail prices observed in Cost Modeling group might also be attributed to a limited understanding of the market by the GM, who had limited bidding experience. Additionally, participants in the Cost Modeling group struggled to obtain cost-saving bonuses, likely due to the higher procurement price offers, resulting in lower cost savings for their company. These results fully support our second hypothesis: The inability to negotiate procurement prices leads to sub-optimal procurement decisions that result in greater financial outflows upstream and reduced retail firm profits.

Regarding the substitutability between supplier cost modeling and supplier closeness, **Table 5** indicate that GMs in the Closeness group tend to adopt a more aggressive strategy by attempting to set lower prices during the initial bid, which could result in greater cost-savings and profit-sharing rewards. However, this approach may lead to subsequent price increases for the next two bids to ensure supplier acceptance. Consequently, the final procurement price for the Closeness group is higher on average but not statistically significantly different from the Cost Modeling group. Conversely, the Cost Modeling group had fewer opportunities for setting procurement prices and received fewer bonuses, potentially due to their limited flexibility in strategy. At a significant level of 10%, the average profit was higher in the Closeness group, indicating that the three bids resulted in greater profits for the retail company compared to the Cost Modeling group. The reasons for the profit difference might be partially driven by differences in behavior for retail price setting. On average, the Closeness group tested the retail price more frequently, perhaps because the GM in Closeness group did not have the opportunity to test their choices in the procurement process, so they might have more motivation and mental capacity to test the results in the retail price setting process. These results provide partial support our third hypothesis: Supplier cost modeling and supplier closeness are partially substitutable in the procurement process, *but* closeness tends to result in greater profitability for the retail firm compared to supplier cost modeling.

The results in **Table 6** for heterogeneous treatment effects indicate that the Asian participants in the Cost Modeling group tend to set higher retail prices. Furthermore, individuals with higher incomes tend to set lower retail prices to increase sales, and the retail prices set by participants with business majors in the Cost Modeling group are higher than those in the Combined group. These findings suggest that individuals with business majors possess better decision-making skills in limited opportunities and tend to increase the retail price to maximize profits. Regarding the testing frequency for the retail price, the potential reason for more testing times experienced by the Asian and female groups in the Cost Modeling group in comparison to the Combined group is that the Cost Modeling treatment created additional pressure or motivation for individuals to participate in the testing of retail price results, since they have more limited opportunity to set procurement prices. Females and Asians may possess a greater inclination towards exploring and experimenting with new business opportunities. In terms of the first and final procurement price and the probability of being accepted by the supplier, the results indicate that there are no statistically significant differences in the interaction terms among the groups.

In terms of the cost-saving bonus, the first specification in **Table 6** reveals that the Cost Modeling group's cost-saving bonus is significantly lower than the Combined group at the 5% level. The process of making three procurement offers in the Combined group can guide GMs to set reasonable prices and obtain more cost savings. Given their heightened sensitivity towards cost changes, the Asian group may leverage various experimental variations to maximize their economic gains. Individuals that are more familiar with coffee have a better understanding of daily pricing and consumption choices and are able to make better procurement decisions without the ability to negotiate with suppliers. Regarding the revenue-sharing bonus, the interaction term between individuals with an annual income of $100,000 or higher and the Cost Modeling group shows a significant negative effect at the 5% level. This finding suggests that individuals with higher income levels are less concerned about the welfare benefits that can be obtained from pricing. Taken together, our analysis of heterogeneous treatment effects supports our fourth hypothesis: To a certain extent, demographics, behavioral preferences, and psychographic attributes moderate the effect that different procurement regimes have on procurement and marketing decisions in retail firms.

MANAGERIAL IMPLICATIONS

The study indicates that multiple bids can simulate the supplier closeness in real-world procurement, while bid testing functionality can simulate supplier cost modeling in retail firms. Compared to the Closeness group, the Combined group results in larger fluctuations in procurement prices, with lower initial procurement prices and higher final procurement prices, which leads to increased upstream costs and reduced employee welfare. Moreover, compared to the Combined group, Cost Modeling group sets higher procurement prices and lower retail prices, leading to lower cost-savings. Closeness group selects higher retail prices and lower procurement prices, while enjoying higher cost-saving bonuses and revenue-sharing bonuses compared with Cost Modeling group. However, the p-value of the statistical analysis among the Combined, Closeness and Cost Modeling groups show that different procurement regimes do not significantly affect the overall profitability of the company.

To further explore the differences in profit between treatment groups, consider a hypothetical Baseline procurement scenario in which neither the features of the Cost Modeling (i.e., testing) nor the Closeness (i.e., multiple bids) treatments exists. Since the supplier production cost C follows a normal distribution with a mean (μ) of 6 and a standard deviation (σ) of 0.5, we can assume that an unsophisticated GM would simply bid the average cost (i.e., W = 6). For simplicity, we can also assume GMs in the Baseline scenario would choose the optimal retail price R* = \$3.50. We can assume that the bid will be accepted 50% of the time when W = 6. Based on the firm's optimal profit equation, $R^* \times \left(1 - \frac{R^*-1}{6}\right) \times 28 - W$, we can compare the expected firm profit in each of the hypothetical Baseline scenarios to the experimental results for firm profit from the other three procurement regimes to shed light on the value of supplier cost modeling and supplier closeness (Table 7).

Table 7: Expected firm profit in each procurement regime

		Multiple Bids (Closeness)	
		No	Yes
Testing (Cost Modeling)	No	*Baseline Treatment* $E(\Pi; W = 6) = \$25.58$	*Closeness Treatment* $\bar{\Pi} = \$48.75$
	Yes	*Cost Modeling Treatment* $\bar{\Pi} = \$42.52$	*Combined Treatment* $\bar{\Pi} = \$47.59$

From Table 7 we can see that the Baseline treatment where neither the features of the Cost Modeling (i.e., testing) nor the Closeness (i.e., multiple bids) treatments exists results in substantially lower expected profits ($25.58) compared to the other procurement regimes. This simple example suggests that firms could increase profits by 66%, 91%, or 86%, respectively, by implementing a procurement regime with supplier cost modeling, supplier closeness, or both. In other words, Baseline firms could invest a considerable portion of their profits in capital expenses aimed at improving their procurement function and still be better off than the status quo. Of course, this example must be considered in the proper context: The result is partly driven by the fact that an unsophisticated GM that bids W=6 will only have product to market half of the time.

The findings for heterogeneity analysis on personal attributes show important implications for managers and marketers, including the need to consider cultural differences in employee rewards and preferences, as well as the importance of understanding customer preferences and behavior when setting prices for certain products.

These results have several managerial implications for firms. First, retail firms can benefit from adopting a comprehensive and scientific approach to help managers determine optimal procurement prices and establish reasonable retail prices based on market analysis. Procurement managers can enhance their understanding of product information by engaging in back-and-forth communication with suppliers during negotiation processes, including aspects such as variety, texture, origin, and price factors, thereby facilitating the establishment of a more appropriate pricing scheme. Furthermore, conducting testing functions to assess the viability of pricing strategies with regards to profits and employee welfare is crucial. Employees are able to evaluate the feasibility of various procurement prices by analyzing acceptance rates, cost, and profit data. Setting retail prices based on procurement prices necessitates an understanding of the potential sales volume and profits that could be generated under different procurement regimes. The absence of any of these critical components may result in significant pricing discrepancies, potentially impeding sales and profits in both procurement and retail divisions. As such, the implementation of comprehensive procurement strategies is of paramount importance for retail firms seeking to optimize their decision-making and increase their competitive edge in the marketplace.

What's more, to select a suitable individual to fill the position of GM in a retail firm, it is essential to consider certain characteristics. Our conclusions suggest that individuals with a business background and a neutral level of trust in others, as well as those with a passion for coffee, may be better equipped to set reasonable prices. Furthermore, female candidates may exhibit greater caution during the negotiation and testing process, which could potentially benefit the company's sales and profits. In summary, this study's significance lies in its contribution to the academic literature on management decision-making and its practical implications for retail firms. By investigating the effects of supplier closeness and supplier cost modeling in markets for experiential goods, this research provides valuable insights for both theoretical and practical domains. The findings of this study can help advance our understanding of decision-making processes and assist retail managers in making informed strategic choices to enhance firm profitability.

CONCLUSION

This study assesses the impacts of supplier closeness and supplier cost modeling on the firm profitability and the employee welfare across three experimental treatments. Specifically, procurement bids and testing functions are defined to simulate supplier closeness and supplier cost modeling. An innovative online experiment is conducted with 111 participants, incentivizing them to make optimal procurement and retail pricing decisions as the GM of a retail firm.

This study has several limitations worth noting that present promising opportunities for future research. First, despite some similarities between auctions and negotiation, auctions may not be effective in complex projects and can hinder communication between buyers and sellers, limiting the contractor's involvement in project design (Bajari, McMillan, and Tadelis, 2008). It is imperative to acknowledge that the process of negotiation is multifaceted and involves numerous factors such as power dynamics, communication, and emotions that prove to be challenging to simulate in an experimental setting. While the use of multiple bids is advantageous in certain contexts to represent negotiation, it is essential to complement them with other methodologies, including qualitative analysis of participant interviews or nonverbal communication observation during negotiation. To partially address the limitations of multiple bids as a substitute of negotiation, we incorporated pre-experiment behavioral games and post-experiment surveys to use as controls in our subsequent statistical analyses.

In addition, the majority of our sample consisted of students from an academic institution who were tasked with playing the role of managers in a retail firm. Students may not have enough professional management and marketing knowledge to make sensible decisions, so there exists a certain bias in using a convenience sample to study the production decisions of retail companies. The sample size was relatively small as well, which limits the types of analyses we can conduct with sufficient statistical power. In the future, we plan to recruit more specialized procurement and retail professionals to carry out a more comprehensive analysis. Moreover, the notion of having one GM that performs both procurement and marketing functions may not be realistic, since most retail companies have separate procurement and marketing departments. Therefore, future studies could use a two-person platform to separate the roles for procurement and marketing decisions. Future studies may also benefit from introducing more uncertainty (e.g., larger variance, etc.) into the supplier cost structure, as it was relatively easy for participants to bid high enough to guarantee successful procurement in our setting. Furthermore, in the retail pricing stage, we derived consumer demand deterministically based on a uniform distribution, which also made it easy for participants to find optimal retail prices and mitigate the effects of suboptimal decisions in procurement. Introducing a stochastic element to consumer demand and incorporating quality perception into the demand function would add a layer of complexity that more closely reflects real market conditions.

APPENDIX

Appendix A: Cornell IRB exemption letter

Cornell University
Office of
Research Integrity and Assurance

Institutional Review Board for Human Participants
Cornell University
395 Pine Tree Road, Suite 320
Ithaca, NY 14850
https://researchservices.cornell.edu/offices/IRB

Institutional Review Board for Human Participants

NOTICE OF EXEMPTION

To:	Jacob Chestnut (jpc355)
Protocol Number:	IRB0147153
Protocol Title:	The Impact of Specialist Versus Generalist Employee Roles on Supplier Welfare, Retail Pricing, and Firm Profit in Experiential Goods
Approval Date:	01/20/2023
Expiration Date:	None

Your protocol has been granted exemption from IRB review according to Cornell IRB policy and under the Department of Health and Human Services Code of Federal Regulations 45CFR46.104(d).

Please note the following:

- Investigators are responsible for ensuring that the welfare of research subjects is protected and that methods used and information provided to gain participant consent are appropriate to the activity. Please familiarize yourself with and conduct the research in accordance with the ethical standards of the Belmont Report.
- Investigators are responsible for notifying the IRB office of change or amendments to the protocol and acquiring approval or concurrence **BEFORE** their implementation.
- Progress reports, requests for personnel or other administrative changes, or requests for continuation of approval are not required for the study. However, upon conclusion of the study, please submit a Project Closure request through RASS-IRB.

For questions related to this application or for IRB review procedures, please contact the IRB office at irbhp@cornell.edu or 607-255-6182. Visit the IRB website for policies, procedures, FAQs, forms, and other helpful information about Cornell's Human Participant Research Program.

Appendix B: Treatment Effect Heterogeneity

Table B1: Final Procurement Bid (W_{final})

	(1)	(2)	(3)	(4)
Closeness	0.109	0.014	-0.114	-0.190
	(0.314)	(0.323)	(0.324)	(0.499)
Cost Modeling	0.638	-0.233	0.204	0.431
	(0.347)	(0.319)	(0.270)	(0.466)
Female*Closeness	0.437			0.411
	(0.354)			(0.402)
Female*Cost Modeling	-0.131			-0.198
	(0.342)			(0.397)
Asian*Closeness	-0.500			-0.590
	(0.319)			(0.334)
Asian*Cost Modeling	-0.554			-0.473
	(0.317)			(0.320)
Inc100K*Closeness	0.227			0.187
	(0.422)			(0.464)
Inc100K*Cost Modeling	-0.533			-0.691
	(0.374)			(0.416)
Bus_major*Closeness	0.025			-0.081
	(0.335)			(0.327)
Bus_major*Cost Modeling	0.393			0.507
	(0.289)			(0.292)
Risk_prem*Closeness		0.004		0.005
		(0.004)		(0.005)
Risk_prem*Cost Modeling		0.005		0.007
		(0.003)		(0.005)
Trust_pct*Closeness		0.125		0.439
		(0.594)		(0.613)
Trust_pct*Cost Modeling		0.594		0.411
		(0.548)		(0.627)
Coffee_daily* Closeness			0.147	-0.083
			(0.351)	(0.356)
Coffee_daily* Cost Modeling			-0.189	-0.259
			(0.300)	(0.321)
Coffee_shop* Closeness			0.439	0.334
			(0.385)	(0.427)
Coffee_shop* Cost Modeling			0.003	-0.069
			(0.322)	(0.425)
Constant	6.376***	6.830***	6.593***	6.354***
	(0.223)	(0.271)	(0.238)	(0.394)
R-squared	0.181	0.048	0.064	0.253
Observations	111	111	111	111

Table B2: Retail Price (R)

	(1)	(2)	(3)	(4)
Closeness	-0.300	-0.146	-0.036	-0.377
	(0.294)	(0.295)	(0.311)	(0.438)
Cost Modeling	-1.490*	-0.038	-0.677	-1.434
	(0.633)	(0.681)	(0.612)	(0.815)
Female*Closeness	0.113			0.169
	(0.382)			(0.383)
Female*Cost Modeling	0.799			0.786
	(0.641)			(0.640)
Asian*Closeness	0.465			0.486
	(0.359)			(0.357)
Asian*Cost Modeling	1.292*			1.702*
	(0.559)			(0.655)
Inc100K*Closeness	-0.290			-0.303
	(0.430)			(0.445)
Inc100K*Cost Modeling	-1.395*			-1.634*
	(0.625)			(0.652)
Bus_major*Closeness	-0.351			-0.362
	(0.484)			(0.508)
Bus_major*Cost Modeling	0.885			1.143*
	(0.481)			(0.536)
Risk_prem*Closeness		-0.002		-0.002
		(0.004)		(0.004)
Risk_prem*Cost Modeling		-0.009		-0.005
		(0.006)		(0.005)
Trust_pct*Closeness		0.382		-0.049
		(0.468)		(0.320)
Trust_pct*Cost Modeling		-0.636		-1.803
		(1.334)		(0.955)
Coffee_daily* Closeness			-0.101	0.139
			(0.329)	(0.253)
Coffee_daily* Cost Modeling			0.539	0.749
			(0.566)	(0.457)
Coffee_shop* Closeness			-0.104	0.032
			(0.273)	(0.305)
Coffee_shop* Cost Modeling			-0.262	0.444
			(0.574)	(0.595)
Constant	6.679***	3.440***	3.480***	6.637***
	(0.280)	(0.176)	(0.293)	(0.380)
R-squared	0.278	0.089	0.089	0.356
Observations	111	111	111	111

Table B3: Retail Price Testing (R Test Freq)

	(1)	(2)	(3)	(4)
Closeness	1.846	2.902	8.590	3.645
	(6.438)	(3.688)	(5.382)	(9.151)
Cost Modeling	-9.628	4.607	0.951	-6.768
	(5.330)	(7.573)	(7.051)	(10.611)
Female*Closeness	0.239			3.844
	(5.345)			(5.214)
Female*Cost Modeling	10.446			12.676*
	(5.984)			(5.568)
Asian*Closeness	4.858			2.496
	(4.960)			(5.543)
Asian*Cost Modeling	9.420			11.140*
	(5.159)			(5.349)
Inc100K*Closeness	-4.036			-2.891
	(5.327)			(5.340)
Inc100K*Cost Modeling	-8.674			-9.240
	(5.259)			(5.286)
Bus_major*Closeness	5.405			7.422
	(5.585)			(5.756)
Bus_major*Cost Modeling	9.483			10.358
	(6.445)			(8.162)
Risk_prem*Closeness		-0.024		-0.089
		(0.075)		(0.079)
Risk_prem*Cost Modeling		-0.058		-0.108
		(0.086)		(0.093)
Trust_pct*Closeness		7.631		3.163
		(7.438)		(7.218)
Trust_pct*Cost Modeling		-4.435		-12.263
		(13.713)		(14.255)
Coffee_daily* Closeness			-10.737*	-10.276
			(5.183)	(5.696)
Coffee_daily* Cost Modeling			-1.141	-1.526
			(7.194)	(6.403)
Coffee_shop* Closeness			3.985	6.650
			(5.302)	(5.126)
Coffee_shop* Cost Modeling			3.299	9.108
			(7.192)	(6.705)
Constant	20.438***	17.749***	16.362***	22.215***
	(3.316)	(2.534)	(2.936)	(4.890)
R-squared	0.161	0.061	0.098	0.252
Observations	111	111	111	111

Table B4: First Procurement Bid (W_1)

	(1)	(2)	(3)	(4)
Closeness	-0.697	-0.512	-0.062	-0.532
	(0.386)	(0.407)	(0.410)	(0.607)
Cost Modeling	1.181**	0.502	0.698*	0.980*
	(0.360)	(0.269)	(0.284)	(0.475)
Female*Closeness	0.419			0.409
	(0.438)			(0.472)
Female*Cost Modeling	-0.303			-0.44
	(0.375)			(0.396)
Asian*Closeness	0.267			0.339
	(0.435)			(0.430)
Asian*Cost Modeling	-0.444			-0.333
	(0.318)			(0.309)
Inc100K*Closeness	-0.071			0.041
	(0.556)			(0.601)
Inc100K*Cost Modeling	-0.026			-0.117
	(0.329)			(0.330)
Bus_major*Closeness	-0.715			-0.667
	(0.572)			(0.540)
Bus_major*Cost Modeling	-0.133			0.096
	(0.281)			(0.296)
Risk_prem*Closeness		0.003		0.004
		(0.005)		(0.005)
Risk_prem*Cost Modeling		0.003		0.004
		(0.004)		(0.004)
Trust_pct*Closeness		0.153		0.022
		(0.691)		(0.704)
Trust_pct*Cost Modeling		0.255		0.177
		(0.486)		(0.624)
Coffee_daily* Closeness			-0.433	-0.354
			(0.530)	(0.443)
Coffee_daily* Cost Modeling			-0.261	-0.206
			(0.286)	(0.294)
Coffee_shop* Closeness			-0.264	-0.265
			(0.524)	(0.472)
Coffee_shop* Cost Modeling			0.249	0.309
			(0.270)	(0.348)
Constant	5.833***	6.095***	6.099***	5.806***
	(0.243)	(0.209)	(0.255)	(0.405)
R-squared	0.339	0.246	0.237	0.397
Observations	111	111	111	111

Table B5: Probability of Acceptance of First Procurement Bid (W_1 Probability)

	(1)	(2)	(3)	(4)
Closeness	-0.243	-0.086	-0.117	-0.176
	(0.159)	(0.138)	(0.148)	(0.235)
Cost Modeling	0.499***	0.354**	0.327***	0.495**
	(0.109)	(0.118)	(0.096)	(0.162)
Female*Closeness	0.167			0.121
	(0.159)			(0.176)
Female*Cost Modeling	-0.103			-0.136
	(0.123)			(0.136)
Asian*Closeness	0.068			0.095
	(0.146)			(0.145)
Asian*Cost Modeling	-0.109			-0.079
	(0.110)			(0.118)
Inc100K*Closeness	-0.070			-0.040
	(0.178)			(0.192)
Inc100K*Cost Modeling	-0.089			-0.098
	(0.140)			(0.141)
Bus_major*Closeness	-0.143			-0.129
	(0.164)			(0.169)
Bus_major*Cost Modeling	-0.063			0.010
	(0.128)			(0.140)
Risk_prem*Closeness		0.001		0.001
		(0.002)		(0.002)
Risk_prem*Cost Modeling		-0.001		-0.000
		(0.002)		(0.002)
Trust_pct*Closeness		-0.207		-0.136
		(0.268)		(0.290)
Trust_pct*Cost Modeling		-0.053		-0.088
		(0.223)		(0.253)
Coffee_daily* Closeness			-0.102	-0.114
			(0.166)	(0.162)
Coffee_daily* Cost Modeling			-0.114	-0.085
			(0.105)	(0.109)
Coffee_shop* Closeness			0.091	0.082
			(0.164)	(0.160)
Coffee_shop* Cost Modeling			0.134	0.198
			(0.103)	(0.130)
Constant	0.384***	0.513***	0.555***	0.371***
	(0.096)	(0.093)	(0.087)	(0.140)
R-squared	0.397	0.301	0.288	0.445
Observations	111	111	111	111

Table B6: Probability of Acceptance of Final Procurement Bid (W_{final} Probability)

	(1)	(2)	(3)	(4)
Closeness	0.110	0.110	-0.032	0.022
	(0.137)	(0.087)	(0.117)	(0.180)
Cost Modeling	0.284**	0.141	0.163*	0.285*
	(0.094)	(0.102)	(0.075)	(0.136)
Female*Closeness	0.018			-0.017
	(0.121)			(0.135)
Female*Cost Modeling	-0.099			-0.092
	(0.098)			(0.126)
Asian*Closeness	-0.122			-0.104
	(0.108)			(0.111)
Asian*Cost Modeling	-0.062			-0.033
	(0.088)			(0.094)
Inc100K*Closeness	0.080			0.070
	(0.096)			(0.111)
Inc100K*Cost Modeling	-0.168			-0.192
	(0.110)			(0.118)
Bus_major*Closeness	-0.027			-0.043
	(0.096)			(0.123)
Bus_major*Cost Modeling	0.040			0.097
	(0.096)			(0.116)
Risk_prem*Closeness		-0.000		0.000
		(0.001)		(0.001)
Risk_prem*Cost Modeling		-0.001		-0.000
		(0.001)		(0.001)
Trust_pct*Closeness		-0.118		0.021
		(0.220)		(0.229)
Trust_pct*Cost Modeling		0.034		-0.053
		(0.211)		(0.227)
Coffee_daily* Closeness			0.081	0.068
			(0.114)	(0.114)
Coffee_daily* Cost Modeling			-0.099	-0.076
			(0.084)	(0.081)
Coffee_shop* Closeness			0.137	0.171
			(0.116)	(0.115)
Coffee_shop* Cost Modeling			0.032	0.096
			(0.083)	(0.096)
Constant	0.599***	0.726***	0.720***	0.581***
	(0.078)	(0.071)	(0.063)	(0.109)
R-squared	0.222	0.109	0.122	0.284
Observations	111	111	111	111

Table B7: Cost-saving Bonus (Cost Bonus)

	(1)	(2)	(3)	(4)
Closeness	-0.747	-0.988	0.127	-0.136
	(1.315)	(1.553)	(1.354)	(2.159)
Cost Modeling	-7.384**	-0.369	-4.050	-7.772**
	(2.219)	(2.568)	(2.070)	(2.522)
Female*Closeness	-1.922			-2.08
	(1.474)			(1.639)
Female*Cost Modeling	3.075			1.90
	(2.069)			(2.072)
Asian*Closeness	3.211*			3.551*
	(1.462)			(1.615)
Asian*Cost Modeling	7.034***			8.608***
	(1.909)			(2.024)
Inc100K*Closeness	-2.388			-2.257
	(1.892)			(2.126)
Inc100K*Cost Modeling	-4.112			-4.851*
	(2.193)			(2.275)
Bus_major*Closeness	-1.874			-1.585
	(1.684)			(1.825)
Bus_major*Cost Modeling	1.203			2.517
	(1.579)			(1.594)
Risk_prem*Closeness		-0.014		-0.013
		(0.015)		(0.020)
Risk_prem*Cost Modeling		-0.033		-0.024
		(0.020)		(0.022)
Trust_pct*Closeness		1.023		-1.531
		(2.825)		(2.437)
Trust_pct*Cost Modeling		-3.238		-8.000*
		(4.881)		(3.379)
Coffee_daily* Closeness			-1.345	0.626
			(1.584)	(1.477)
Coffee_daily* Cost Modeling			2.382	3.990*
			(2.035)	(1.562)
Coffee_shop* Closeness			-1.237	-0.409
			(1.635)	(1.868)
Coffee_shop* Cost Modeling			1.080	4.466*
			(2.145)	(2.106)
Constant	14.495***	12.678***	13.628***	14.584***
	(0.893)	(1.084)	(0.953)	(1.576)
R-squared	0.378	0.117	0.107	0.455
Observations	111	111	111	111

Table B8: Revenue-sharing Bonus (Revenue Bonus)

	(1)	(2)	(3)	(4)
Closeness	0.684	-0.386	0.912	0.263
	(0.802)	(0.844)	(0.800)	(1.199)
Cost Modeling	-3.132	-0.332	-1.478	-3.618
	(2.044)	(2.137)	(1.785)	(2.348)
Female*Closeness	-1.181			-1.226
	(0.967)			(0.971)
Female*Cost Modeling	1.056			0.328
	(1.924)			(1.839)
Asian*Closeness	1.750			1.608
	(1.017)			(1.026)
Asian*Cost Modeling	4.498*			5.765**
	(1.725)			(1.902)
Inc100K*Closeness	-1.103			-1.215
	(1.175)			(1.196)
Inc100K*Cost Modeling	-4.636*			-5.658**
	(1.850)			(1.831)
Bus_major*Closeness	-1.880			-2.137
	(1.417)			(1.536)
Bus_major*Cost Modeling	1.859			2.832
	(1.370)			(1.453)
Risk_prem*Closeness		-0.000		0.011
		(0.008)		(0.008)
Risk_prem*Cost Modeling		-0.017		0.003
		(0.018)		(0.016)
Trust_pct*Closeness		1.900		0.755
		(1.368)		(0.925)
Trust_pct*Cost Modeling		-0.885		-5.000
		(4.239)		(3.191)
Coffee_daily* Closeness			-1.513	-0.396
			(0.878)	(0.621)
Coffee_daily* Cost Modeling			0.615	1.806
			(1.641)	(1.268)
Coffee_shop* Closeness			0.121	0.622
			(0.636)	(0.844)
Coffee_shop* Cost Modeling			0.284	2.875
			(1.662)	(1.530)
Constant	10.502***	11.056***	10.230***	10.434***
	(0.755)	(0.363)	(0.750)	(0.978)
R-squared	0.332	0.071	0.084	0.433
Observations	111	111	111	111

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