ASSESSING PURCHASE QUANTITY DECISIONS IN A RETAIL BUYING SCENARIO

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ABSTRACT

This research examines the purchase quantity or "How much should I buy?" decision with a focus on why decision makers overbuy or underbuy. The purchase quantity decision is relevant to consumer purchase decisions and to retail inventory replenishment decisions. The purpose of this research is to examine two specific types of biases to determine whether these biases are influential in the context of purchase quantity decisions that have normative or "correct" solutions.

Assessing the degree to which a consumer's quantity decision departs from an optimal solution is difficult. The difficulty lies in not having a metric for assessing optimality. For example, suppose we define the optimal purchase quantity as the quantity which confers the greatest utility to the consumer. An economic perspective would lead one to assess *whatever* quantity the consumer actually buys as utility maximizing, because the theory of utility maximization holds that "If someone does something, no matter how odd it may seem, it must be utility maximizing" (Thaler 1992, in discussing the circular nature of the definition economists use for utility).

Identifying an optimal solution is less problematic when examining retail buying because one may assume that a retail buyer is an agent for the firm, and the firm's utility is maximized with the purchase quantity that yields the greatest expected profit (or some variant of greatest expected profit to address the firm's attitude toward risk). Retail buyers may use sophisticated algorithms to help them make quantity decisions, but a buyer's judgment is important because the buyer must decide how to account for factors not considered by the algorithm. Thus, to investigate purchase quantity decisions, the present research examines retail buying. The research aims at understanding basic decision making skills, while realizing that many factors play additional roles in determining whether people make optimal quantity decisions.

A computer simulation was developed to present decision makers with retail buying scenarios. The simulation is designed so that participants, after progressing through warm up or practice rounds, face eight-period scenarios. The scenarios provide information such as inventory holding costs and marginal revenue. In addition, scenarios provide four periods of demand forecast information. Including cost, revenue, and forecast information allows a profit maximizing solution to be calculated using a linear program. Subjects consider the information provided and then enter purchase decisions and progress through the eight simulated periods. Subjects' decisions were compared to corresponding linear program solutions to indicate whether subjects overbought or underbought.

Manipulations in the scenarios were made by adjusting demand forecast information. First, forecasted demands in the simulations were manipulated to reflect a linear growth trend component. Research by Wansink, Kent, and Hoch (1998) suggests that decision makers may underbuy or overbuy due to using an anchoring and adjustment process. If an anchoring and adjustment bias is present, then decision makers should inadequately adjust to the rising demand trend manipulation. Second, standard deviations of the forecasted demands in the simulations were manipulated. Research by Friedmand and Kelley (1998) suggests that decision makers fail to change decisions to reflect changes in forecast variability. If an insensitivity to variability bias is present, then decision makers should inadequately adjust to the changing forecast standard deviations manipulation.

Forty nine undergraduate operations management and MIS business students participated in the simulation. A main result was that overbuying occurred more frequently than underbuying, and that subjects performed remarkably well overall. To assess whether order quantity decisions are affected by anchoring and adjustment, a regression equation was used to determine how well subjects kept up with the increasing demand trend. As expected, based on an anchoring and adjustment rationale, subjects responded to the increasing trend, but their responses failed to reach the trend amount. Because the trend reflected increasing demand, the failure to keep pace with the trend means that subjects were more likely to underbuy as the simulation progressed. Thus, the average overall tendency among subjects to overbuy may have been larger had the trend not been included.

Bivariate correlation coefficients were used to determine whether purchase quantity decisions were related to forecast amounts and standard deviations. Purchase quantity decisions were significantly related to forecast amounts but were virtually unrelated to forecast standard deviations. In contrast, coefficients that relate the *optimal* order quantity to the forecasted amounts and stan-

dard deviations clearly show that subject orders *should have been* related to forecast amounts and to forecast standard deviations. Thus, as expected, insensitivity to forecast variability also accounts for subject non-optimal ordering.

The results of these initial tests add credibility to the notion that quantity decisions deviate from optimal due to an anchoring and adjustment process and to people's insensitivity to probabilities. The results also illustrate that under appropriate conditions, individuals may be quite likely to overbuy, rather than underbuy as suggested by research reported by Cripps and Meyer (1994). Results are important from the view of understanding quantity decisions, the generalizability of process phenomenon such as anchoring and adjustment, and in terms of practical issues such as when and why retail buyers may intuitively make incorrect quantity judgments.

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