# Beyond Rational Choice: A Behavioral Game-Theoretic Framework for Consumer Decision-Making

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**Abstract**
Since Behavioral Economics explains decisions through bounded rationality and mental shortcuts, it is necessary to incorporate strategic interactions into such analyses. This study develops an integrated framework for analyzing irrational purchasing decisions, which includes elements of Behavioral Economics, non-cooperative Game Theory, econometric analysis, and an integrated model of consumer behavior, the Consumer Irrational Utility Model (CIUM). The study employs a quantitative survey of personal care products consumers in the FMCG market, modeling a consumer and a seller as two players in a 2 × 2 non-cooperative game. The game is analyzed using best-response strategies, followed by the derivation of a mixed-strategy Nash equilibrium. The results of the game-theoretic model are then tested using Linear Probability Model (LPM) and Weighted Least Squares (WLS) for estimation purposes. The results of the behavioral determinants, validated in the LPM and WLS estimations, are then incorporated into CIUM, which explains how irrational behavior by a consumer deviates from the utility-maximizing behavior of a rational human being. The study reveals that in the Indian FMCG market, consumers mainly adopt the Relative Decision Paradox strategy, whereas sellers mainly adopt the Strategized Pricing strategy. The study further reveals that the behavioral variables identified in the study have a significant impact on consumers' purchasing decisions. Also, results from the CIUM indicate that the economic utility of a product and the utility influenced by various behavioral factors in strategic interactions in the market jointly determine the overall utility of a product for a consumer.

**Keywords:** Behavioral Economics; Consumer Irrationality; Consumer Behavior; Game Theory; Consumer Irrational Utility Model; Linear Probability Model; Weighted Least Squares; Strategic Pricing.

## Introduction

Until recently, the marketing and consumer studies field has been based on the neoclassical economic notion of 'man' as a completely rational actor. The individual is seen as a utility maximizer in a perfectly competitive market environment where all information is complete and fixed. His decisions are based on an objective comparison of product attributes, prices, and his expectations for each product. However, the way in which consumers actually behave as buyers is far from optimal. A vast and ever-growing number of studies in the field of behavioral economics prove that many factors determine how consumers make their purchasing decisions. These factors are largely outside of the control of the individual.

### 1.1 Consumer Irrationality and Behavioral Decision-Making

To make decisions, human beings function with bounded rationality, defined by Herbert Simon (1955) as behavior that, when viewed in the context of its time and place, is rational given the information available at the time and the constraints facing the individual. When people shop in crowded, chaotic stores such as retail hypermarkets with hundreds of products on offer, all of these factors will be influencing their purchasing decisions. A growing number of studies have recently begun to investigate the many ways in which retail marketing can affect consumers' purchasing decisions. Research has shown how the way a product is presented to potential customers can significantly affect the ultimate decision to purchase it (Chernev, 2022; Puntoni et al., 2021).

Today, consumers' irrational purchasing behavior is influenced even more by the shopping environment and sellers' marketing than before. Thus, the effect of single marketing variables on customers' purchasing behavior is influenced by the purchasing behavior of other customers. Thus, from the seller's point of view, it is not sufficient to analyze the influence of his marketing variables on the purchasing behavior of single customers. Only by studying customers' purchasing behavior in this context can one recognize that their irrational purchasing behavior is not arbitrary, but the result of cognitive limitations interacting with sellers' marketing strategies.

### 1.2 Behavioral Marketing and Consumer–Seller Strategic Interaction

Modeling purchasing decisions between a single seller and a single consumer using game theory in combination with behavioral economics is more adequate than using conventional models of consumer behavior. These models often assume that a single consumer makes all purchasing decisions independently. However, in reality, a consumer is confronted with a large number of sellers, each offering a wide variety of products and services, and dealing with consumers in many different situations.

In such situations, the purchasing decisions made by a single consumer are influenced by the strategic behavior of the sellers he or she encounters.

### 1.3 Theoretical Contribution and Study Objectives

Concerning the behavioral aspects of consumer decisions, the majority of studies on the subject of the present research explain the irrational purchasing behavior of consumers by means of a large number of different psychological determinants of such behavior, and do not, by and large, take into account the strategic interaction between the consumers and the sellers on the market.

This study, through its objectives, intends to address the need for the empirical validation of strategic behavioral models of consumer decisions using adequate statistical methods, and for the subsequent transfer of the validated relationships into a behavioral utility model. The present study develops an integrated analytical framework that combines behavioral economics, non-cooperative game theory, econometric validation using the Linear Probability Model (LPM) and Weighted Least Squares (WLS), and a Consumer Irrational Utility Model. Using the FMCG-personal care products market as an empirical context, the study examines how strategic interactions between consumers and sellers influence irrational purchasing behavior and extends the conventional utility-maximization framework by incorporating behavioral determinants validated through empirical analysis.

Accordingly, the study pursues three objectives:

1. To examine the behavioral factors influencing the consumer's irrational purchasing decisions.
2. To analyze strategic interactions between consumers and sellers by means of a non-cooperative game-theoretic model.
3. To develop a behavioral utility framework that integrates consumer irrational purchase behavior and utility-based decision-making.

## 2. Literature Review

### 2.1 Evolution of Consumer Decision-Making: From Rational Choice to Contemporary Behavioral Economics

Most consumer theory is based upon the rational choice paradigm; however, in reality, many examples of consumer behavior contravene the rational choice paradigm (Krugman 2005, p.107). Most consumers' irrational behavior can be explained by bounded rationality, which means that consumers are not able to process all of the available information when making a decision (Simon 1955). The work of behavioral economists has further developed these ideas and provided a full theory of how consumers make their purchasing decisions. Studies into how humans make decisions have found that people use mental shortcuts or rules of thumb, known as heuristics, to make decisions under conditions of uncertainty. Research into the behavior of consumers in digitally connected markets has discovered more recent cases of irrational consumer behavior than in the past (Hung & Rust, 2024). In such cases, consumers' purchasing behavior is influenced by, for example, algorithm recommendations, online reviews, personal advertisements, and even social media interactions with other customers as well as with a retailer. Consumers' purchasing behavior is affected by framing effects, by an information overload (Devenport et al., 2024), and, above all, by the fact that their consumption behavior is influenced by a behavioral manipulation by other individuals or by a company (Hamilton et al., 2023; Grewal et al., 2018).

### 2.2 Behavioral Marketing and Retail Strategy

The Marketing Behavior approach applies the principles of the Behavioral Economics approach to explain how a firm's Marketing Strategies influence a consumer's Purchasing Decisions (Wernerfelt & Ghoshal, 1993). The Marketing Behaviour approach assumes that in addition to the various pricing strategies, promotional strategies, product placement strategies, branding strategies and scarcity messages etc, several other strategies that are employed by a firm, by influencing a consumer's perceptions and therefore attitudes towards a product, will result in that product receiving a more favorable evaluation by the consumer and as a result be more likely to be chosen by the consumer in alternative purchases of similar products.

The FMCG market is extremely competitive, with products offered to consumers by a large number of companies. In such an environment, how a product is presented to consumers can significantly affect the value a product is perceived to have. Many consumers evaluate products offered in the market on a relative basis. As a consequence, such consumers are sensitive to several pricing signals. These pricing signals can be influenced by how a price is presented to consumers. All of these factors can influence the value that a product has for a consumer (Lemon & Verhoef, 2016; Hamilton et al., 2023; Davenport et al., 2020).

### 2.3 Game Theory in Consumer Decision-Making

Game theory is especially appropriate for the study of interactions between individual consumers. Game theory examines how a consumer's decisions affect other market participants and how, in turn, these other market participants affect the decisions of any individual consumer. The work of von Neumann and Morgenstern (1944) laid the foundation for the study of game theory and its application to consumer decision making. The work of many researchers in the decades following the publication of this classic book evolved the general framework for treating decisions under conditions of interdependence into a vast and highly technical field.

Similar analyses of consumers' and sellers' decision-making processes have been conducted in various marketing contexts, such as price competition (Kumar et al., 2019), online retailing (Huang & Rust, 2021), and digital commerce (Davenport et al., 2020).

Studies have also applied game theory to analyze a wide array of general consumer behaviors and behaviors in various other marketing contexts (Huang & Rust, 2021; Grewal et al., 2018; Kumar et al., 2019). It seems that an increasing number of market outcomes are determined by the strategic interactions between the consumers and sellers, as opposed to the independent maximization of their respective objectives.

**2.4 Research Gap and Conceptual Framework**

Finally, there are three unresolved issues of current research on pricing and competitive strategy: (1) from a behavioral economic perspective, there is a need for research on how seller's strategies affect the behavioral responses of consumers through strategic interaction; (2) from a game-theoretic perspective, most of the current research on pricing and competitive strategies of firms does not incorporate behavioral consumer research into the strategic equilibrium analysis; (3) from an empirical perspective, there is a lack of research that combines a game-theoretic model with econometric validation in order to set up a strategic framework for the analysis of irrational consumer behavior.

## 3. Research Methodology

**3.1 Research Design and Consumer Data Used in the Study**

The research adopted a quantitative, descriptive, and analytical approach and was based on a behavioral economics viewpoint for analyzing consumers' irrational purchasing behavior. An integrated analytical framework was used, combining behavioral economics, non-cooperative game theory, econometric analysis, and utility theory. Using strategic variables, the research took an integrated approach to analyzing irrational purchasing behavior and went beyond conventional rational choice models.

The data for the study were collected through primary research. A structured questionnaire was used to collect data from a sample of 455 consumers of personal care products. These are typical FMCG products. The consumers studied in this research had prior experience purchasing and/or using the above-mentioned products.

**3.2 Retailers' Data Used in the Study and Identification of Behavioral Strategies.**

The retailers' behavioral strategies used in this study were identified through 15 Focus group discussions, with each group having 10 retailers. The behavioral strategies of both consumers and retailers were mapped to established behavioral and marketing constructs reported in the existing literature. These constructs were operationalized as actions representing the decision rules of consumers (Table 1A) and retailers (Table 1B) within the proposed non-cooperative game theory framework, together with their theoretical foundations.

**3.3 Game-Theoretic Framework**

The study focuses on analyzing purchasing interactions between consumers and sellers in a purchasing environment. These interactions are modeled as a 2-player non-cooperative game. In this game, both consumers and sellers are treated as rational strategic players.

**Table 1(A): Consumer Behavioral Strategies Derived from Empirical Survey and Mapped to Established Behavioral Constructs.**

| Strategy code | Behavioral Strategy | Underlying Behavioral Construct | Theoretical Foundation |
|---|---|---|---|
| A1 | Need Recognition | Need Recognition | Engel, Blackwell, & Miniard (1995); Kotler & Keller (2022) |
| A2 | Decision Paralysis | Choice Overload / Decision Uncertainty | Iyengar & Lepper (2000); Schwartz (2004) |
| A3 | Alternative Evaluation | Comparative Evaluation | Engel et al. (1995); Solomon (2020) |
| A4 | Status-Oriented Purchase | Status Consumption / Conspicuous Consumption | Veblen (1899); Eastman, Goldsmith, & Flynn (1999) |
| A5 | Habitual Purchase | Habit Formation | Verplanken & Aarts (1999); Wood & Neal (2009) |
| A6 | Social Feedback Influence | Social Influence / Word-of-Mouth | Bearden & Etzel (1982); Cheung & Thadani (2012) |
| A7 | Impulse Buying | Impulse Buying Behavior | Rook (1987); Verplanken & Herabadi (2001) |
| A8 | Value Maximization | Price Consciousness / Value Consciousness | Lichtenstein, Ridgway, & Netemeyer (1993); Zeithaml (1988) |

**Source:** Assessment of the primary data and the existing literature.

| Table 1(B): Retailer Behavioral Strategies Derived from Focus Group Discussions and Mapped to Established Marketing Constructs | | | |
|---|---|---|---|
| **Strategy code** | **Behavioral Strategy** | **Underlying Behavioral Construct** | ***Theoretical Foundation** |
| B1 | Strategic Pricing | Strategic Pricing | Nagle, Hogan, & Zale (2016); Monroe (2003) |
| B2 | Willingness-to-Pay Enhancement | Perceived Value / Willingness to Pay | Monroe (2003); Homburg, Koschate, & Hoyer (2005) |
| B3 | Promotional Discounting | Sales Promotion | Blattberg & Neslin (1990); Kotler & Keller (2022) |
| B4 | Personal Selling | Relationship Selling | Weitz, Castleberry, & Tanner (2012); Ingram et al. (2019) |
| B5 | Value-Added Rewards | Customer Value / Loyalty Rewards | Kumar & Reinartz (2016); Zeithaml (1988) |
| **Source**: Assessment of the primary data and the existing literature. | | | |

The game-theoretic approach has been employed in the study to identify and outline the various strategies that consumers and sellers employ during product evaluation. The study employs a payoff matrix to compare the strategies used by the two players. The results obtained from the analysis of the game are outlined and explained in the study. The game-theoretic analysis uses the payoff matrices of both players and compares their strategies. Then, the best strategies of both players and their best responses are determined, including both pure- and mixed-strategy Nash equilibria, with the equilibrium probabilities of both players to capture their strategies.

### 3.4 Econometric Validation

The results derived from analyzing the strategic interactions between consumers and sellers were tested using an econometric model. This consisted of an LPM (Linear Probability Model) for estimating a binary variable (purchase), which had previously been analyzed in the context of the studied behavioral variables. In the aforementioned model, the coefficients represent the results of the analyzed variables and their impact on the purchase, which is considered irrational. However, the Linear Probability Model used is known to present problems due to heteroscedasticity; to obtain consistent results, the above-mentioned model was therefore also estimated using weighted least squares (WLS).

### 3.5 Consumer Irrational Utility Model

Consumer purchasing behavior was explained by means of an integrated quantitative model: the Consumer Irrational Utility Model (CIUM), which describes and explains consumer purchasing behavior. In contrast to utility in traditional theory, the new utility is influenced by both economic and behavioral aspects. The new utility concept incorporates strategic interactions between consumers and sellers in the retail marketplace. The utility framework includes behavioral variables validated by empirical analysis to explain the effects of pricing strategies, promotional activities, the comparative evaluation process, and decision uncertainty on consumer satisfaction.

## 4. Findings

### 4.1 Strategic Consumer–Seller Interaction: Game-Theoretic Analysis

The strategic interaction between consumers and sellers in the marketplace was analyzed using a two-player non-cooperative game-theoretic framework. In such a framework, both consumers and sellers behave strategically, i.e., they continuously change their decisions and actions, and in this process both market players take into account the actions and decisions of the other market player. Thus, the irrational behavior of consumers while purchasing products in the marketplace is analyzed using the above framework.

We draw upon the set of possible behaviors by consumers during the evaluation as well as the purchasing process, and possible actions by a seller, to generate a set of feasible strategies for both players involved in the game-theoretic representation of consumer-seller interactions (Table 2A and 2B).

| Table 2 (A): Consumer and Seller Strategy Matrix in terms of probability. | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Strategy matrix for B1 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.07 | 0.06 | 0.07 | 0.08 | 0.06 | 0.06 | 0.06 | 0.10 |
| 0.10 | 0.07 | 0.10 | 0.11 | 0.10 | 0.11 | 0.10 | 0.06 |
| 0.13 | 0.10 | 0.11 | 0.06 | 0.06 | 0.10 | 0.11 | 0.11 |
| 0.11 | 0.11 | 0.13 | 0.11 | 0.15 | 0.13 | 0.13 | 0.13 |
| 0.08 | 0.07 | 0.06 | 0.13 | 0.11 | 0.07 | 0.15 | 0.10 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.13 | 0.13 | 0.10 | 0.10 | 0.08 | 0.08 | 0.03 | 0.11 |
| 0.07 | 0.10 | 0.07 | 0.07 | 0.14 | 0.10 | 0.07 | 0.08 |
| 0.11 | 0.14 | 0.10 | 0.13 | 0.06 | 0.15 | 0.08 | 0.13 |
| 0.04 | 0.06 | 0.08 | 0.03 | 0.10 | 0.06 | 0.10 | 0.07 |
| 0.13 | 0.08 | 0.07 | 0.14 | 0.04 | 0.07 | 0.07 | 0.10 |
| 0.04 | 0.10 | 0.13 | 0.06 | 0.11 | 0.08 | 0.11 | 0.03 |
| **Strategy matrix for B2 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.03 | 0.06 | 0.07 | 0.06 | 0.06 | 0.04 | 0.00 | 0.11 |
| 0.07 | 0.10 | 0.11 | 0.08 | 0.10 | 0.08 | 0.01 | 0.10 |
| 0.10 | 0.07 | 0.06 | 0.11 | 0.11 | 0.11 | 0.08 | 0.13 |
| 0.03 | 0.13 | 0.08 | 0.04 | 0.13 | 0.13 | 0.13 | 0.06 |
| 0.13 | 0.07 | 0.15 | 0.13 | 0.06 | 0.08 | 0.11 | 0.08 |
| 0.13 | 0.13 | 0.06 | 0.11 | 0.08 | 0.10 | 0.10 | 0.14 |
| 0.15 | 0.06 | 0.13 | 0.10 | 0.10 | 0.07 | 0.10 | 0.08 |
| 0.07 | 0.11 | 0.10 | 0.08 | 0.08 | 0.11 | 0.14 | 0.07 |
| 0.08 | 0.13 | 0.07 | 0.13 | 0.11 | 0.06 | 0.07 | 0.07 |
| 0.11 | 0.07 | 0.10 | 0.07 | 0.08 | 0.13 | 0.08 | 0.06 |
| 0.11 | 0.10 | 0.08 | 0.10 | 0.10 | 0.10 | 0.18 | 0.11 |
| **Source**: Author's computation based on the data | | | | | | | |

| **Table 2 (B): Consumer and Seller Strategy Matrix in terms of probability.** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Strategy matrix for B3 strategy of producer** | | | | | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** |
| 0.04 | 0.06 | 0.04 | 0.07 | 0.08 | 0.08 | 0.06 | 0.04 |
| 0.08 | 0.06 | 0.08 | 0.10 | 0.11 | 0.10 | 0.10 | 0.06 |
| 0.10 | 0.10 | 0.07 | 0.13 | 0.08 | 0.11 | 0.11 | 0.07 |
| 0.15 | 0.08 | 0.11 | 0.06 | 0.13 | 0.06 | 0.13 | 0.14 |
| 0.06 | 0.14 | 0.13 | 0.10 | 0.06 | 0.07 | 0.08 | 0.13 |
| 0.07 | 0.06 | 0.08 | 0.08 | 0.10 | 0.13 | 0.04 | 0.10 |
| 0.07 | 0.07 | 0.06 | 0.13 | 0.13 | 0.14 | 0.08 | 0.15 |
| 0.17 | 0.10 | 0.13 | 0.10 | 0.10 | 0.10 | 0.11 | 0.04 |
| 0.08 | 0.15 | 0.11 | 0.07 | 0.00 | 0.06 | 0.13 | 0.18 |
| 0.11 | 0.11 | 0.10 | 0.11 | 0.06 | 0.08 | 0.10 | 0.10 |
| 0.07 | 0.08 | 0.10 | 0.07 | 0.17 | 0.08 | 0.07 | 0.00 |
| **Strategy matrix for B4 strategy of producer** | | | | | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** |
| 0.04 | 0.06 | 0.10 | 0.07 | 0.08 | 0.06 | 0.07 | 0.08 |
| 0.08 | 0.08 | 0.11 | 0.10 | 0.13 | 0.08 | 0.10 | 0.11 |
| 0.11 | 0.11 | 0.08 | 0.08 | 0.11 | 0.11 | 0.08 | 0.07 |
| 0.10 | 0.13 | 0.13 | 0.11 | 0.10 | 0.07 | 0.08 | 0.11 |
| 0.13 | 0.10 | 0.06 | 0.13 | 0.13 | 0.11 | 0.13 | 0.08 |
| 0.08 | 0.06 | 0.08 | 0.06 | 0.07 | 0.08 | 0.08 | 0.10 |
| 0.10 | 0.10 | 0.13 | 0.08 | 0.10 | 0.13 | 0.03 | 0.11 |
| 0.06 | 0.11 | 0.08 | 0.10 | 0.08 | 0.21 | 0.10 | 0.06 |
| 0.13 | 0.13 | 0.06 | 0.07 | 0.10 | 0.06 | 0.11 | 0.13 |
| 0.10 | 0.08 | 0.08 | 0.11 | 0.06 | 0.10 | 0.08 | 0.11 |
| 0.08 | 0.06 | 0.10 | 0.10 | 0.06 | 0.00 | 0.14 | 0.04 |
| **Strategy matrix for B5 strategy of producer** | | | | | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** |
| 0.04 | 0.06 | 0.00 | 0.08 | 0.08 | 0.08 | 0.10 | 0.07 |
| 0.08 | 0.04 | 0.11 | 0.11 | 0.10 | 0.11 | 0.06 | 0.10 |
| 0.10 | 0.06 | 0.13 | 0.10 | 0.13 | 0.06 | 0.07 | 0.13 |
| 0.07 | 0.10 | 0.08 | 0.13 | 0.06 | 0.13 | 0.10 | 0.10 |
| 0.10 | 0.15 | 0.11 | 0.06 | 0.08 | 0.11 | 0.06 | 0.07 |
| 0.13 | 0.13 | 0.08 | 0.07 | 0.11 | 0.07 | 0.04 | 0.13 |
| 0.06 | 0.08 | 0.11 | 0.08 | 0.06 | 0.10 | 0.08 | 0.04 |
| 0.07 | 0.06 | 0.08 | 0.11 | 0.13 | 0.13 | 0.13 | 0.11 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.10 | 0.10 | 0.07 | 0.04 | 0.08 | 0.06 | 0.04 | 0.13 |
| 0.13 | 0.13 | 0.10 | 0.10 | 0.10 | 0.10 | 0.08 | 0.08 |
| 0.14 | 0.11 | 0.13 | 0.13 | 0.08 | 0.07 | 0.25 | 0.06 |
| **Source**: Author's computation based on the data | | | | | | | |

The set of possible strategies allows us to construct the payoff matrix (Table 3A and 3B) for the game-theoretic representation of the consumer-seller interactions, as well as analyze the equilibria for the game with behavioral uncertainty of the behavioral component.

| **Table 3 (A): Payoff matrix** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Payoff matrix for B1 strategy of producer** | | | | | | | |
| **A1** | **A2** | **A3** | **A4** | **A5** | **A6** | **A7** | **A8** |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 0.03 | 0.02 | 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |
| 0.03 | 0.03 | 0.04 | 0.03 | 0.05 | 0.04 | 0.04 | 0.04 |
| 0.03 | 0.03 | 0.02 | 0.05 | 0.04 | 0.03 | 0.06 | 0.04 |
| 0.06 | 0.06 | 0.05 | 0.05 | 0.04 | 0.04 | 0.01 | 0.06 |
| 0.04 | 0.06 | 0.04 | 0.04 | 0.08 | 0.06 | 0.04 | 0.05 |
| 0.08 | 0.10 | 0.07 | 0.09 | 0.04 | 0.11 | 0.06 | 0.09 |
| 0.03 | 0.04 | 0.07 | 0.02 | 0.08 | 0.04 | 0.08 | 0.06 |
| 0.11 | 0.08 | 0.06 | 0.13 | 0.04 | 0.06 | 0.06 | 0.09 |
| 0.04 | 0.10 | 0.13 | 0.06 | 0.11 | 0.08 | 0.11 | 0.03 |
| **Payoff matrix for B2 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.00 | 0.01 |
| 0.02 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| 0.01 | 0.04 | 0.03 | 0.01 | 0.04 | 0.04 | 0.04 | 0.02 |
| 0.05 | 0.03 | 0.06 | 0.05 | 0.02 | 0.03 | 0.04 | 0.03 |
| 0.06 | 0.06 | 0.03 | 0.06 | 0.04 | 0.05 | 0.05 | 0.07 |
| 0.09 | 0.03 | 0.08 | 0.06 | 0.06 | 0.04 | 0.06 | 0.05 |
| 0.05 | 0.08 | 0.07 | 0.06 | 0.06 | 0.08 | 0.10 | 0.05 |
| 0.07 | 0.10 | 0.06 | 0.10 | 0.09 | 0.04 | 0.06 | 0.06 |
| 0.10 | 0.06 | 0.09 | 0.06 | 0.08 | 0.11 | 0.08 | 0.05 |
| 0.11 | 0.10 | 0.08 | 0.10 | 0.10 | 0.10 | 0.18 | 0.11 |

**Source:** Author's computation based on the data

| **Table 3 (B): Payoff Matrix.** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Payoff matrix for B3 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 0.02 | 0.02 | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 | 0.01 |
| 0.05 | 0.03 | 0.03 | 0.02 | 0.04 | 0.02 | 0.04 | 0.04 |
| 0.02 | 0.06 | 0.05 | 0.04 | 0.02 | 0.03 | 0.03 | 0.05 |
| 0.03 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 | 0.02 | 0.05 |
| 0.04 | 0.04 | 0.03 | 0.08 | 0.08 | 0.08 | 0.05 | 0.09 |
| 0.12 | 0.07 | 0.09 | 0.07 | 0.07 | 0.07 | 0.08 | 0.03 |
| 0.07 | 0.12 | 0.09 | 0.06 | 0.00 | 0.04 | 0.10 | 0.14 |
| 0.10 | 0.10 | 0.09 | 0.10 | 0.05 | 0.08 | 0.09 | 0.09 |
| 0.07 | 0.08 | 0.10 | 0.07 | 0.17 | 0.08 | 0.07 | 0.00 |
| **Payoff matrix for B4 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.01 |
| 0.03 | 0.04 | 0.04 | 0.03 | 0.03 | 0.02 | 0.03 | 0.03 |
| 0.05 | 0.04 | 0.02 | 0.05 | 0.05 | 0.04 | 0.05 | 0.03 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0.04 | 0.03 | 0.04 | 0.03 | 0.03 | 0.04 | 0.04 | 0.05 |
| 0.06 | 0.06 | 0.08 | 0.05 | 0.06 | 0.08 | 0.02 | 0.07 |
| 0.04 | 0.08 | 0.06 | 0.07 | 0.06 | 0.15 | 0.07 | 0.04 |
| 0.10 | 0.10 | 0.04 | 0.06 | 0.08 | 0.04 | 0.09 | 0.10 |
| 0.09 | 0.08 | 0.08 | 0.10 | 0.05 | 0.09 | 0.08 | 0.10 |
| 0.08 | 0.06 | 0.10 | 0.10 | 0.06 | 0.00 | 0.14 | 0.04 |
| **Payoff matrix for B5 strategy of producer** | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | A6 | A7 | A8 |
| 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| 0.02 | 0.01 | 0.03 | 0.02 | 0.03 | 0.01 | 0.01 | 0.03 |
| 0.02 | 0.03 | 0.03 | 0.04 | 0.02 | 0.04 | 0.03 | 0.03 |
| 0.04 | 0.06 | 0.04 | 0.02 | 0.03 | 0.04 | 0.02 | 0.03 |
| 0.06 | 0.06 | 0.04 | 0.03 | 0.06 | 0.03 | 0.02 | 0.06 |
| 0.03 | 0.05 | 0.07 | 0.05 | 0.03 | 0.06 | 0.05 | 0.03 |
| 0.05 | 0.04 | 0.06 | 0.08 | 0.09 | 0.09 | 0.09 | 0.08 |
| 0.08 | 0.08 | 0.06 | 0.03 | 0.07 | 0.04 | 0.03 | 0.10 |
| 0.11 | 0.11 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 | 0.08 |
| 0.14 | 0.11 | 0.13 | 0.13 | 0.08 | 0.07 | 0.25 | 0.06 |

**Source**: Author's computation based on the data

**Table 4: Expected payoff**

| **Consumer Strategy ($A_n$)** | **Seller's Strategy ($B_n$)** | | | | |
|---|---|---|---|---|---|
| | **B1** | **B2** | **B3** | **B4** | **B5** |
| A1 | 0.47 | 0.57 | 0.53 | 0.52 | 0.56 |
| A2 | 0.52 | 0.52 | 0.55 | 0.50 | 0.56 |
| A3 | 0.50 | 0.51 | 0.54 | 0.48 | 0.54 |
| A4 | 0.49 | 0.53 | 0.50 | 0.51 | 0.50 |
| A5 | 0.50 | 0.51 | 0.50 | 0.45 | 0.50 |
| A6 | 0.49 | 0.52 | 0.49 | 0.49 | 0.49 |
| A7 | 0.50 | 0.62 | 0.51 | 0.53 | 0.59 |
| A8 | 0.47 | 0.47 | 0.51 | 0.49 | 0.49 |

**Source**: Author's computation.

A two-player game can be viewed as a strategic interaction between the two players. The expected payoffs for each strategy have been calculated from the observed behavioral data. The expected payoff for a given strategy is the average return for that strategy, taking into account the other player's behavior. The expected payoffs provide a basis for comparison between the different strategies and indicate the returns the player can expect from each strategy, taking into account the opponent's uncertain behavior. The expected value of each payoff for the players follows the Equation:

$$E(G_{ij}) = g_{1i}P_1 + g_{2i}P_2 + \ldots + g_{ni}P_n \ldots (1)$$

$$= \sum_{s=1}^{n} g_{si}P_s$$

Where $g_{si}$ is the $s^{th}$ possible outcomes of strategy i of the consumer given that the seller has chosen strategy j, $P_s$ is the probability of s. Using Equation (1), the expected payoff matrix of the players is derived in Table 4. For each given strategy, the best responses of the above game for both players are computed. Then it was checked whether these best responses form a mutually consistent best-response combination. If they do, then the game has a pure-strategy Nash equilibrium. However, there was no mutually consistent best-response combination for the strategies of the above game. Thus, we considered mixed strategies. For each given set of mixed strategies for the above game, the expected payoffs of both players are computed. Using the above indifference conditions for both players, the mixed strategies are computed that satisfy these conditions. These mixed strategies then form the mixed-strategy Nash equilibrium of the above game. As summarized in Table 5, the Nash equilibrium of the game is defined using the framework of reduced expected payoffs. The mixed strategies represent the stable strategic outcome for both consumers and sellers, from which neither player has an incentive to deviate unilaterally. Thus, the mixed strategies for consumers (Player A) and sellers (Player B) are expressed in Equations (2) and (3), respectively, while the corresponding strategic conditions are expressed in Equations (4) and (5), respectively.

| Table 5: Strategic equilibrium | |
|---|---|
| **Reduced expected payoff** | **Framework of reduced expected payoff** |
| $\begin{matrix} & B1 & B4 \\ A2 & 0.52 & 0.5 \\ A7 & 0.5 & 0.53 \end{matrix}$ | $\begin{matrix} & B1 & B4 \\ A2 & a_{11} & a_{12} \\ A7 & a_{21} & a_{22} \end{matrix}$ |
| **Source**: Author's computation based on the game theory analysis | |

$$p_1 = (a_{22} - a_{21})\,(a_{11} + a_{22} - a_{21} - a_{12})^{-1} \ldots (2)$$

$$p_2 = (a_{11} - a_{12})(a_{11} + a_{22} - a_{21} - a_{12})^{-1} \ldots (3)$$

$$q_1 = (a_{22} - a_{12})(a_{11} + a_{22} - a_{21} - a_{12})^{-1} \ldots (4)$$

$$q_2 = (a_{11} - a_{21})(a_{11} + a_{22} - a_{21} - a_{12})^{-1} \ldots (5)$$

In the above equations, consumer (player A) strategies are represented by probabilities ($p_1$, $p_2$) and that of the sellers (player B) by ($q_1$, $q_2$). The mixed-strategy Nash equilibrium is determined by defining the equilibrium probabilities for the strategies of both players. The resulting strategies are then used to get the strategic equilibrium. Equations 2 and 3 give $p_1 = 0.6$, and $p_2 = 0.4$, whereas equations 4 and 5 give, $q_1 = 0.6$, and $q_2 = 0.4$

The reduced two-player game supports a mixed-strategy Nash equilibrium. For the consumers, the decision probabilities for the strategies A2 and A7 are equal to 0.60 and 0.40, respectively. For the sellers, the decision probabilities for the strategies B1 and B4 are 0.60 and 0.40, respectively. Hence, the higher-probability equilibrium strategies are A2 and B1 for the consumers and the sellers, respectively. In the strategic interaction between consumers and sellers, Decision Paralysis (A2) is more frequent for consumers, whereas Strategized Pricing (B1) is more frequent for sellers. So, in equilibrium, consumers are characterized by hesitation and by repeated evaluations of products. The decisions made by consumers and by sellers are interrelated in a process of mutual adaptation that goes beyond the independent optimization of the single player. The observed equilibrium between buyer behavior and seller behavior in a market from a behavioral economics perspective is not random. It is determined by the interaction of human decision-making in an imperfect market structure which allows for strategic behavior on the part of both buyer and seller. The corresponding behavior on the part of buyers in turn influences the seller's marketing strategies.

The game-theoretic equilibrium does not provide information on whether the behavioral relations between consumer and seller identified by the game are also statistically verified by the purchase outcomes of the consumers in the sample. In the next section, the results of the game-theoretic analysis are tested by estimating a Linear Probability Model (LPM) as well as a Weighted Least Squares (WLS) model of the purchase outcomes of the consumers in the sample, using the strategic variables of the game as explanatory variables.

### 4.2 Validation of Strategic Behavior of Consumers and Sellers

A Linear Probability Model (LPM) as well as Weighted Least Squares (WLS) for the established strategic variables of consumers' purchasing behavior have been calculated in order to test the above findings in terms of behavioral relationships within the framework against real data. The LPM was estimated (expression 6) for the binary dependent variable in the study, i.e., purchase behavior of consumers. The estimated model describes the probability of a consumer behaving irrationally and engaging in purchase behavior as a function of strategic behavioral variables of the game-theoretic analysis of the study.

$$\hat{Y}_i = -1.0147 + 0.0302\, X_i \quad \ldots (6)$$

The estimated coefficients of the behavioral variables of consumers' purchase behavior for the observed scenarios measure the marginal change caused by changes in the behavioral variables of the consumers and sellers. Significant effects of the strategic behavioral variables support the above notion that strategic interactions between the two types of players cause consumers to behave 'irrationally'. The sign of the effects of the strategic behavioral variables also supports the conceptual framework provided earlier and indicates the considerable impact of these variables on the purchase behavior considered.

| Table 6: Linear Probability Model (LPM) Results | | | | | |
|---|---|---|---|---|---|
| **New Y** | **New X** | **New Y** | **New X** | **New Y** | **New X** |
| 0.00 | 173.89 | 0.00 | 94.71 | 2.00 | 100.00 |
| 0.00 | 94.71 | 2.09 | 115.03 | 0.00 | 94.71 |
| 0.00 | 94.71 | 2.49 | 149.25 | 0.00 | 173.89 |
| 0.00 | 121.88 | 0.00 | 94.71 | 2.00 | 100.00 |

| | | | | | |
|---|---|---|---|---|---|
| 0.00 | 96.82 | 2.14 | 119.71 | 4.52 | 293.56 |
| 2.49 | 149.25 | 2.00 | 100.00 | 0.00 | 94.71 |
| 0.00 | 101.30 | 2.14 | 119.71 | 2.00 | 100.00 |
| 2.49 | 149.25 | 0.00 | 94.71 | 4.52 | 293.56 |
| 4.52 | 293.56 | 2.00 | 100.00 | 0.00 | 94.71 |
| 2.09 | 115.03 | 0.00 | 94.71 | 2.49 | 149.25 |
| 2.49 | 149.25 | 0.00 | 173.89 | 0.00 | 149.25 |
| 0.00 | 121.88 | 2.00 | 100.00 | 0.00 | 94.71 |
| 2.10 | 94.71 | 2.09 | 115.03 | 2.09 | 115.03 |
| 4.52 | 293.56 | 2.49 | 149.25 | 0.00 | 101.30 |
| 4.52 | 293.56 | 0.00 | 101.30 | 0.00 | 173.89 |
| 2.49 | 149.25 | 0.00 | 101.30 | 0.00 | 101.30 |
| 0.00 | 100.00 | 0.00 | 94.71 | 0.00 | 101.30 |
| 0.00 | 100.00 | 2.00 | 100.00 | 0.00 | 101.30 |
| 0.00 | 173.89 | 2.09 | 115.03 | 0.00 | 173.89 |
| 2.49 | 149.25 | 0.00 | 94.71 | 0.00 | 94.71 |
| **Source**: Author's computation based on Quality Response Regression Model | | | | | |

The LPM has the advantage of easily interpretable coefficients of a linear model. However, estimating a binary outcome can lead to heteroscedastic errors. Hence, the model was estimated using Weighted Least Squares (WLS), with the observations weighted by the error-term variance estimate. The subsequent data in Table 6 were then used to compute the Weighted Least Squares (WLS) Model of equation 7. The weighted function, as well as the corresponding restrictions for the WLS estimates, are provided in equations 8 and 9.

$$\frac{\hat{Y}_i}{\sqrt{\hat{w}_i}} = -1.1075\left(\frac{1}{\sqrt{\hat{w}_i}}\right) + 0.0176\left(\frac{X_i}{\sqrt{\hat{w}_i}}\right) \quad ..(7)$$

$$\sqrt{\hat{w}_i} = \sqrt{\hat{Y}_i(1-\hat{Y}_i)} \,..(8)$$

$$0 \le E(Y_i) \le 1 \,..(9)$$

The intercept value of −1.1075 in Equation (3) represents the predicted probability of purchase when consumer pocket expenses. $X_i$ are zero. Since probabilities cannot be negative, this value is interpreted as zero. The positive slope coefficient 0.0176 indicates that a one-unit increase in pocket expenses (₹100 in the survey) increases the probability of purchase by approximately 1.76 percentage points. However, the marginal effect is relatively small, suggesting that increased spending capacity does not substantially influence purchase decisions. This finding implies that consumers did not perceive irrational elements associated with

Strategy A2 as a major determinant when responding to the seller's Strategy B1. Instead, consumers appeared to prioritize obtaining the best value rather than making decisions based solely on available financial resources. Conversely, B1 emerged as the higher probability seller strategy, largely overlooking the behavioral factors underlying consumer decision-making.

The Weighted Least Squares (WLS) model estimations, in turn, also yielded results very close to those obtained for the Linear Probability Model (LPM) for all behavioral variables within the linear boundaries of the alternative models. The direction and statistical significance of the behavioral variables remained substantially unchanged, confirming the robustness of the estimated relationships. Thus, the LPM results support the prediction of the model of strategic behavior between consumers and sellers, according to which irrational purchasing behavior is influenced by strategic behavior rather than by other factors, including also psychological and economic factors.

**4.3 Consumer Irrational Utility Model**

The study modeled the game between consumers and retailers in a highly competitive retail environment, provided empirical support for the observed behaviors, and related them to key economic variables. Within the framework of a consumer's decision-making process, this study integrated the findings from the above-mentioned analyses to provide a comprehensive view of an integrated utility model that significantly extends the traditional rational utility maximizing approach of consumer theory.

The proposed model attempts to include the statistically validated behaviors found in this study within the framework of a utility function to provide a greater understanding of the purchasing behavior of individual consumers.

Let the utility function of the consumer be given by expression 10, where M is the consumer's budget constraint and B is the consumer's behavioral tendencies. The consumer's utility-maximizing behavior is then given by expression 11. This maximization behavior is subject to constraints (expression 12), where S is the satisfaction derived by the consumer from the purchase of the product. $P_x$ is the price of the product X, and X is the desired

quantity of the product.

$$U = f(M, B) \ldots (10)$$

$$\max U = f(M, B) \ldots (11)$$

subject to,

$$M \leq S,\ M = P_x \times X \text{ and } B > 0 \ldots (12)$$

The model retains the conventional budget constraint while introducing a behavioral component that captures the influence of strategic marketplace interactions on consumer utility. The behavioral utility specification extends the traditional indirect utility framework by incorporating the behavioral determinants identified through the game-theoretic and econometric analyses (expression 13).

$$\max U^* = f(P_x, X, B) \ldots (13)$$

The optimization process follows the mathematical formulation presented in the original analysis, resulting in the final Consumer Irrational Utility Model (expression 14).

$$\max U^*_j = f\{(P_x, X, B)(I_j^{-1})\} \ldots (14)$$

The proposed model for measuring consumer utility, in addition to the economic utility of consumption, also looks at the consumer's behavior in his/her interactions with the seller. These strategic interactions on the marketplace influence several behavioral variables of pricing response, promotional influence, product comparison, and decision uncertainty, influencing the consumer utility. The study sees the 'irrational purchasing behavior' by the consumer not as random behavior but as a result of the strategic interactions between consumer and seller on the marketplace. The results from the game-theoretic equilibrium that have been incorporated in the model's predictions are of strong statistical significance, since the behavioral aspects of the utility function in the model have been validated within the study.

## 5. Discussion of Findings

The study fills a gap in consumer purchasing behavior not explained by classical rational choice theory. By integrating behavioral economics, non-cooperative game theory, and econometrics supported by empirical data, the study shows an interplay between individual consumers' cognitive behavior and sellers' strategies within markets. The equilibrium of the game-theoretic model is supported by the Linear Probability Model (LPM) and Weighted Least Squares (WLS) models, as well as statistical testing results.

The results of the game-theoretic analysis support the higher-probability equilibrium strategies identified for consumers and sellers, respectively. Relative Decision Paralysis is more frequently adopted by consumers, while Strategized Pricing is more frequently adopted by sellers in the strategic interaction. The first strategy, Relative Decision Paralysis, is used by consumers in the purchasing situation to cope with various aspects of the purchasing situation. Most importantly, the Relative Decision Paralysis strategy is used by consumers to cope with uncertainty in the prices of competing products, as well as with a variety of marketing stimuli used by sellers to influence consumers' purchasing decisions. The second strategy, Strategized Pricing, is used by sellers to influence consumers' perceptions of the value of their products through prices. The game-theoretic results of the study provide additional support for the study's findings and, therefore, for the behavioral economics perspective on consumer decision making regarding products. According to this perspective, consumers' decisions regarding products are affected not only by the objective characteristics of the products but also by the context in which sellers present the products to consumers.

The econometric analysis also provides additional insights into the previous results. The analysis of the behavioral effects on consumers' purchasing behavior was done using two different estimation techniques, i.e., the Linear Probability Model (LPM) and the Weighted Least Squares (WLS) regression. The robustness of the results obtained using the two different techniques was tested, and both provided consistent results that support the previous findings and validate the behavioral effects of the variables on consumers' purchasing behavior.

The study also contributes to the emerging field of behavioral marketing. From a marketing perspective, pricing is no longer considered to be an entirely economic variable, but rather a behavioral signal. In terms of consumer purchasing behavior, prices of alternative products, as well as special offers and consumers' own perception of value, are all influential. As a result, sellers adapt their pricing policy based on their expectations of how consumers will behave in response to different marketing strategies.

## 6. Theoretical and Managerial Implications

This study identifies reasons for irrational consumer behavior when buying products and services in the market. It argues that such behavior is driven by strategic interactions between consumers and sellers rather than by individual cognitive biases. Therefore, this study integrates behavioral economics, non-cooperative game theory, econometric verification, and the Consumer Irrational Utility Model to establish a comprehensive analytical framework for investigating consumer purchasing behavior in highly competitive retail markets. The findings of this study extend research on the behavior of strategic consumers. With respect to the relationship between behavioral economics and strategic decision-making,

this study significantly improves the work in this area by employing game theory and adequate empirical analysis (LPM and WLS). By studying bounded rationality, typical heuristics, and the above-mentioned cognitive biases in depth, and their evolution in the continuous interaction dynamics between consumers and sellers, the study provides an extension to conventional utility theory for consumers. In fact, within the Consumer Irrational Utility Model, all determinants of an empirical nature of the irrational utility that a consumer experiences are included.

The Methodical approach of game theory and econometric analysis, when applied sequentially, in studying strategic and/or irrational consumer behavior in respect of companies' activities, products, and services can easily be applied in other fields of study and be suitable for all types of companies in various industries.

### 6.1 A Managerial Framework for Consumer Decision Making

The study outlines in detail how consumers behave in different purchasing situations. In terms of specific management practices, it highlights the effects of strategic pricing, promotions, comparative evaluation, and decision uncertainty on consumers' purchasing behavior. Thus, by adopting transparent pricing, employing behavioral marketing ethically, and clearly differentiating their products from competitors' offerings, managers can make customers' purchasing tasks easier and give them confidence that they are purchasing valuable products. In the emerging digital retail environment, the responsible use of personal recommendations, dynamic pricing, and AI can yield significant welfare gains for consumers. In the long run, it can also create trust for organizations and enhance their performance.

## 7. Contributions of the Study

This research contributes to consumer behavior, behavioral economics, and strategic marketing through an integrated framework of theoretical analysis, non-cooperative game theory of consumer-seller interactions, statistical validation, and a utility function for the irrational behavior of a consumer. In contrast to existing studies on the same subject, which explain the irrational behavior of a consumer but fail to explain the reasons behind such behavior, the current study explains the reasons for such behavior as well, i.e., the strategic interactions of a consumer with a seller. The main theoretical contribution is the development and validation of the Consumer Irrational Utility Model. In contrast to the traditional consumer utility function, which attempts to measure the level of overall utility or satisfaction that a consumer receives from consuming a product, this study extends this concept by relating it to a variety of behavioral determinants that affect consumers' purchasing decisions.

The methodology for studying strategic interactions between consumers and sellers presented in this paper – a two-player non-cooperative game, and the subsequent econometric validation of resulting predictions using Linear Probability Model (LPM) and Weighted Least Squares (WLS) regressions – is robust, testable, and replicable. It can be used for empirical investigation and to test various predictions regarding strategic consumer behavior in different contexts, with respect to different products, in various industries and markets. This research will benefit the study of consumer behavior, particularly irrational purchasing behavior. The provided analytical framework can aid strategic pricing, promotion, and behavior to increase customer value and lead to long-term customer relationships. Future research can build on the framework in the area of behavioral consumer research. Strategic marketing guidelines and evidence-based marketing practices can also be supported.

## 8. Conclusion

The paper studies the phenomenon of the so-called "irrational purchasing behavior" by consumers, within the framework of the already mentioned disciplines: behavioral economics, non-cooperative game theory, econometrics, and utility theory. First, based on game-theoretic considerations, the two main strategies by the consumer and the seller are presented, namely Relative Decision Paralysis by the consumer and Strategized Pricing by the seller. Then, two different types of econometric models have been estimated, i.e., the Linear Probability Model (LPM) and the Weighted Least Squares (WLS) model, to strategically verify the behavior of both the consumer and the seller. Finally, within the framework of classical utility theory, the so-called Consumer Irrational Utility Model has been developed and integrated to identify the main determinants of the behavioral factors that affect the consumer's decision-making.

The findings of this research have value for researchers (i) by linking together the fields of Behavioral Economics and Game Theory, (ii) by methodically incorporating a strategic model into a standard econometric analysis, and (iii) by enabling managers to develop pricing and marketing strategies that are based on the behavior of individual consumers. The developed framework of strategic irrational behavior has been tested within the specific context of personal care products. Future research must test the generalizability of the framework to other product categories and should employ a longitudinal perspective or even a repeated game-theoretic analysis of consumer-seller interactions. Finally, future research must also test the effects of personalization as well as of cross-cultural differences on strategic irrational behavior.

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