

BAX 442 Advanced Statistics: Homework 1
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Introduction

Conjoint analysis is the simultaneous analysis of multiple attributes of a product. It is a statistical marketing research technique that helps us quantify how different customers value different attributes of a product and how these preferences drive their purchasing behavior. Its benefits lie in being able to simulate real world purchasing patterns. Conjoint analysis has many applications, some of which are:

- Estimating the optimal price of a new product given its attributes and customer preferences
- Determining a new product's market share given the attributes of current competing products
- Understanding how a new competitor's product will impact existing products market share
- Understanding overall attribute importance
- Tradeoff analysis to understand what the market is willing to pay for each feature that is added or removed
- Estimate the profile with the best product design
- Understand how brands can charge price premiums
- Understand product cannibalization rates

Data collection process and methodology

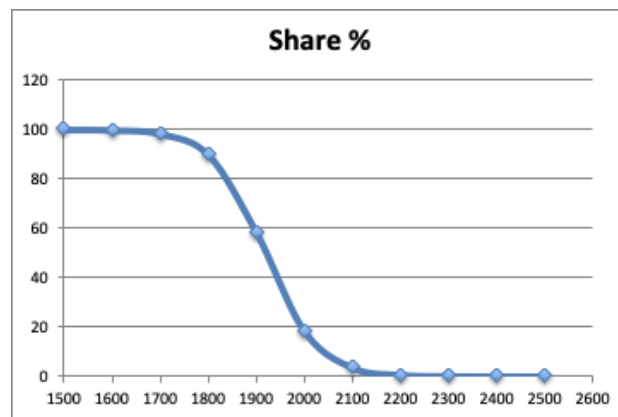
In order to conduct a conjoint analysis of customer preferences for television features, we first identified the product's important attributes as screen size, price, technology, and brand name. We then defined the various attributes levels for each feature. We then created 24 separate profiles that listed all the possible combinations of all the features. Then for each person in our group, we proceeded to use binary sort to rank all the profiles based on their underlying attributes and collected it on a spreadsheet. Here, a rank of 24 signifies the highest rank and 1 signifies the lowest rank possible. The last step was building a regression model that regressed the product ranks on the design matrix containing all the product features.

Part-worth estimates

The part-worth estimates are the regression's estimated coefficients. These represent the utility of that specific feature. We can use the part-worths to calculate the range of utils that a feature can provide given a specific individual's preferences. For the given design matrix, the intercept is what the util is when your screen size is 46 inches, the technology is 2D, the brand is Sharp and the price is low. For example, in our group, if we take Nandini's part-worths, we find that her intercept is 8.5, which is her derived utility for the aforementioned base levels of features. Additionally for screen size, the range of her utils is 10.25 ($10.25 - 0$), the range for technology is 1.5 ($1.5 - 0$), the range for brand is 5.17 ($5.17 - 0$) and the range for price is 9.17 ($0 - (-9.17)$). We can use these estimates to arrive at the total utility an individual derives from a certain set of features and use that information to decide the final price and the consequent market share.

Optimal price and market share determination

Using the part-worth estimates we calculate the overall utility for the new product. This can then be used to calculate the attractiveness of the product in the market. The attractiveness and likability of a product help predict that product's market share and eventual profit that the product would earn. In this assignment, we calculate the optimal price as the price that maximizes profit. However, to decide on a price, a firm may not depend only on the cost of production but also take into consideration the profit and market share that they wish to achieve. In the graphs below, we are trying to determine the optimal price of a product for a new design. We assume that Nandini's preferences are representative of that of the population and use her part-worths for our estimation. In the first graph, we can see the product's market share drops as the price increases beyond \$1800.



The second graph shows the profits for the different price points. We can see that this peaks around \$2100. Hence, setting the price is a trade-off between profit and market share. Here, keeping in mind the end goal of profit maximization, we can set the price to \$2100.

