

# Determining the Relationship Between Consumption and Household Income

Case History

Category: *Utilities*

Methods: *Advanced Analytics, Predictive Modeling*

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## Summary

A major utility company wished to understand the relationship between consumption of their product and their clients' household income in order to address pricing issues raised by the regulatory authority. Specifically, the hypothesis was promulgated that lower-income households used more of the client's product. A formal test of this hypothesis was needed.

## Strategic Issues

The utility company hypothesized that lower-income households would consume more product than higher-income households due to the energy inefficiency of the older structures in which most of these lower-income customers lived. In addition, lower-income households were also less likely to have invested in energy-efficiency measures.

The utility company needed to determine the usage of their product among lower-income consumers in order to address pricing issues raised by the regulatory authority. In particular, scientific evidence that lower-income households consume more product would provide a rationale for desired price changes. Evidence for the lack of a relationship between income and product consumption would be useful to understanding what price changes might be tenable to the regulatory body.

## Research Objectives

The primary objective of the project was to produce a valid mathematical model that would explain the relationship between income and product consumption. The model development would enable an empirical hypothesis test based on accurate application of statistical procedures.

## Research Design and Methods

The client provided approximately **1.5 million records** to Decision Analyst, reporting product usage by the entire customer base over a 4-year time period. Demographic data, including income, was appended to the transactional data using standard geocoding and matching procedures. The compiled data was examined for outliers and prepared for statistical modeling and hypothesis testing.

## Results

The client's hypothesis about the relationship between product consumption and household income was not supported. However, deep-dive exploratory analysis of the data, which included variables in addition to income, uncovered useful relationships between the additional variables and product consumption.

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