What’s a Cup Worth?: A Hedonic Analysis of U.S. Retail Coffees Prices

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What are coffee attributes worth to coffee consumers? What opportunities exist for new, value-enhancing attribute combinations? Previous hedonic research is data-limited to farm-level prices from Cup of Excellence (CoE) auctions in select Central and South American countries. Previous valuations are derived from a small number of specialty buyers and roasters. As such, they represent a tiny market segment. Such values are not representative of the broad U.S. market, nor are they linearly related to consumer demand. Such estimates may also be confounded by the distinct imprimatur of CoE qualifying coffees.

The marginal retail value of coffee attributes are estimated for the U.S. market using a fixed-effects, hedonic analysis. The retail price and quality data are for 1,350 distinct coffees sold in U.S. markets from 1997 through 2014. Attributes include label indications of production practices, market channel, origin country and origin region; cupping (taste) attributes include flavor, aroma, body and acidity; bean and ground coffee color; and U.S. market region.

Data
Nominal retail price and quality data are derived from 1,350 cupping evaluations posted online by Coffee Review (CR). CR is the most widely read buying guide for coffees sold by local, national and international retailers. CR’s data include full attribute information and expert cupping evaluations for almost 4,000 coffees sold across the globe.

The present analysis is based on price, attribute and cupping evaluations for coffees offered by U.S. retailers from 1997 to 2014. Mean and median coffee prices were, respectively, $20 and $22 when adjusted to the 2014 price level using the U.S. Consumer Price Index.

Estimation
The dependent variable, \( p \), is the natural logarithm of retail coffee price per pound as the independent variable \( p \). The dependent variable is a linear function of a vector of \( N \) independent variables, \( x \):

\[
p_j = \alpha + \sum_{i=1}^{N} \beta_i x_{ij} + \eta_j + \varepsilon_i
\]

where \( \alpha \) is the intercept and the \( \beta_i \) (\( i = 1, \ldots, N \)) are marginal value coefficients to be estimated, \( \eta_j \) is a fixed or random panel effect and \( \varepsilon_i \) is an independent normal stochastic term. A Hausman test rejected a random panel error at the 1% level. Jamaica and Hawaii stand out with very large values. Other origins with long-standing, high quality reputations have values that are smaller, but statistically different from zero.

Conclusions
Hedonic implicit prices identify the marginal market values of alternative products and market strategies. Results indicate that:

- Estate and Fair Trade designations detract, rather than add, value to coffees sold in U.S. retail markets.
- Organic certification offers no net value-added relative to natural production.
- Market premiums for origin labeling are limited to coffee exporting areas with long-standing reputations for high quality coffee.
- There are positive and economically significant rewards to flavor characteristics, roast type and recent innovations in single-serve packaging.

Overall, the greatest value opportunity for coffee supplier is in the cup, not in ancillary, non-flavor characteristics.

Problem
What are coffee attributes worth to coffee consumers? What opportunities exist for new, value-enhancing attribute combinations? Previous hedonic research is data-limited to farm-level prices from Cup of Excellence (CoE) auctions in select Central and South American countries. Previous valuations are derived from a small number of specialty buyers and roasters. As such, they represent a tiny market segment. Such values are not representative of the broad U.S. market, nor are they linearly related to consumer demand. Such estimates may also be confounded by the distinct imprimatur of CoE qualifying coffees.

Contribution
The marginal retail value of coffee attributes are estimated for the U.S. market using a fixed-effects, hedonic analysis. The retail price and quality data are for 1,350 distinct coffees sold in U.S. markets from 1997 through 2014. Attributes include label indications of production practices, market channel, origin country and origin region; cupping (taste) attributes include flavor, aroma, body and acidity; bean and ground coffee color; and U.S. market region.

Costly supply chain practices do not lead major retail price increases. Organic certification is costly, but it’s not worth than a uncertified claim of natural production. Origin labeling may open shelf-space to a new producing region, but it increases prices only for countries with long-standing reputations for high quality coffee. Origin values are large only for Jamaica and Hawaii, two very small, highly recognized and high cost growing areas. Origin labels are much less valuable to larger growing regions in Central America, South America and Africa.

Roaster and retailer choices have larger impacts on retail prices. A one-unit increase in roasted bean darkness decreases coffee price by 17%, but an increase in ground coffee darkness increase price by 8%. Single serve coffee prices are higher by 46%. Prices within the U.S. are statistically uniform once accounting for other attributes. There is no regional price advantage to retailers on the East and West coasts of the United States relative to other U.S. locations.

Variables and Results
The Figure reports coefficient estimates in terms of the percentage change in US retail prices (2014 price level) for a one unit change in a labeled coffee attribute. Production process dummy variables include Estate grown, Natural and Organic Certification. Natural and Organic Certification have identical marginal values and are therefore listed together in the Figure.

Market dummy attributes included two label designations: purchase in a Cup of Excellence (CoE) Auction and Fair Trade Certification. As suspected, the CoE itself lends value to a coffee-- apart from flavor and other measured attributes.

Flavor attributes include Aroma and Acidity cupping ratings, measured on a zero to 1 scale, each with means of 0.8 and standard deviations of .09 and .88, respectively.

Roast attributes are measured on an Agtron scale and converted to ratings from 1 to 10 for both beans and ground coffee. Mean ratings are 4.75 and 6.33, respectively, with standard deviations each of about 1.45. An increase in the rating indicates a darker roast.

All coffee origins were included in the hedonic regression, but the Figure lists the origin dummy variables are statistically different from zero at the 90% level. Jamaica and Hawaii stand out with very large values. Other origins with long-standing, high quality reputations have values that are smaller, but statistically different from zero.

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