An Analysis of the Specialty Egg Market: Hedonic Price with Fixed Brand Effects vs. Random Coefficient Discrete Choice Model

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The Specialty Egg Market in the U.S.

Grocery Stores in the U.S offer eggs **differentiated by methods of production, brand, packaging, size, color, and other attributes**.

There is still not enough information on **price differentials, consumer willingness to pay for animal health and welfare, or on the demand parameters for eggs with these attributes**.

We analyze the whole U.S. specialty egg market, using **IRI supermarket scanner data for the period of 2008-2012, obtaining consumer valuations of specialty egg attributes as well consumer demand parameters**.

A simple statistical analysis reveals that over the analyzed twenty quarter period the **private label** quantity share increased from 32% to 54% and the **branded eggs** share decreased from 68% to 46%.

The average price of branded eggs rose from $0.34 to $0.41 per egg and the average price for private label eggs rose from $0.29 to $0.34. Consequently, there was either a substantial cost or quality difference between branded and private label specialty eggs or branded egg sellers were able to exercise more market power.

Organic eggs share increased from 84% to 94% in the specialty egg market.

Theoretical and Empirical Framework

We adopt the **theoretical models** developed by Nevo, 2003, Berry, et al. 1995, and Rosen, 1974 to frame our empirical analysis.

We then estimate a **hedonic price model** to obtain consumer valuations of specialty egg attributes and evaluate how prices vary based on the attributes. We utilize panel data estimation techniques with fixed brand effects.

We also estimate **a random coefficient discrete choice demand** model to obtain consumer valuations of specialty egg attributes as well as **parameters of consumer demand for specialty eggs (demand elasticities)**. We obtain **demand elasticities for organic, free range and cage free conventional eggs**.

In our analysis, we include (as one of the independent variables) the value of the Cornucopia Institute **"Organic Egg Score Card," as an objective and scientific measure of animal welfare care** utilized by organic egg producers in organic egg production. The higher the score, the better animal welfare standards applied (e.g., free access to outdoors, etc.)

We **compare** the hedonic analysis results (estimated with fixed brand effects) with the random coefficient discrete choice demand analysis results.

Estimated Model Results

The overall results, from the hedonic price model with fixed brand effects and the random coefficient discrete choice demand model, suggest that **consumers highly value organic attributes of eggs**. They also value brown, omega-3 enhanced, and branded eggs. Consumers somewhat less value the free range attribute in conventional eggs. In addition, **consumers place a positive but somewhat lower value on the enhanced animal welfare standard attribute in organic eggs**. This could be related to consumer misperceptions of animal welfare issues in organic egg production.

We then use, the estimated coefficient on the price variable in the random coefficient choice demand model, to calculate **price elasticities for organic, free range and cage free conventional eggs.** The absolute values of own-price elasticities for organic eggs are mostly in the lower ranges (**from -0.65 to -1.1**) for lower priced private label and branded organic eggs produced with lower animal welfare standards, suggesting relatively inelastic demand. On the other hand, the absolute values of own-price elasticities for organic eggs are higher (**from -1.01 to -2.34**) for the higher priced organic eggs produced with enhanced animal welfare standards, suggesting relatively more elastic demand for these types of organic eggs.

Final Results and Conclusions

The calculated **cross-price elasticities** suggest that free range conventional eggs are week **substitutes** for organic eggs and cage free conventional eggs are **complements** to organic eggs. Consumers of organic eggs substitute among various private label and branded organic eggs with similar attributes.

The estimated coefficient on the price in the random coefficient choice demand model can also be used to calculate measures and evaluate whether the top egg sellers are able to exercise market power over other smaller competitors. **The calculated measures suggest a possibility of market power**, especially among sellers of branded organic eggs produced with minimum animal welfare standards. Welfare losses could be significant.

Bibliography

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