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Demographic and Economic Factors Affecting Demand for Brand-Level Milk in Texas

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Selected poster prepared for presentation at the Agricultural and Applied Economics Association's 2014 AAEA Annual Meetings, Minneapolis, MN, July 27-29, 2014

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Background & Justification

- Consumer demand studies centering attention to milk in the United States are numerous
- Demand for milk as aggregated market segment; demand delineated by milk fat types; flavored milk; milk advertising, organic and conventional milk
 - Kinnucan (1986)
 - Capps & Schmitz (1991)
 - Kaiser & Reberte (1996)
 - Gould (1996)
 - Dharmasena (2010)
 - Alviola & Capps (2010)
 - Dharmasena and Capps (2012)
 - Gvillo, Dharmasena and Capps (2014)

Background & Justification

- Once a consumer identifies his/her preference such as organic, low-fat, conventional, whole milk, he/she has to still decide what brand to purchase.
- Our goal: to investigate demographic and economic factors affecting demand for milk at brand level.

Objectives

- Specific objectives
 - To estimate economic and demographic drivers of demand for Promised Land white and chocolate milk
 - To estimate own-price and cross-price elasticities for Promised Land white and chocolate milk

Data

- Nielsen Homescan data 2008
 - 5,000 Texas households
- Texas
 - 78% households that purchased Promised Land brand
- Transactions of quantity (oz/household/year), Price (\$/oz)
- Milk brands
 - Promised Land, Borden, Oak Farms, Horizon Organic, Poinsettia, Schepps, Private Label
- Demographic information
 - Household size, income, race and ethnicity, age and presence of children, location within Texas

Tobit Model

Censoring problem in data

$$y_i = \begin{cases} X_i\beta + u_i, & X_i\beta + u_i > 0 \\ 0, & X_i\beta + u_i \leq 0 \end{cases} \quad z = \frac{X\beta}{\sigma}$$

$$E(y) = X\beta F(z) + \sigma f(z) \quad \text{Unconditional Expected Value} \quad \frac{\partial E(y)}{\partial X} = \beta F(z) \quad \text{Unconditional Marginal Effect}$$

$$E(y^*) = X\beta + \sigma \frac{f(z)}{F(z)} \quad \text{Conditional Expected Value}$$

$$\frac{\partial E(y^*)}{\partial X} = \beta \left(1 - z \frac{f(z)}{F(z)} - \frac{f(z)^2}{F(z)^2} \right) \quad \text{Conditional Marginal Effect}$$

$$\frac{\partial E(y)}{\partial X} = F(z) \left(\frac{\partial E(y^*)}{\partial X} \right) + E(y^*) \left(\frac{\partial F(z)}{\partial X} \right) \quad \text{McDonald and Moffitt (1980)}$$

Empirical Estimation

- Missing prices are imputed
 - Auxiliary regression
 - observed price = $f(\text{HH income, HH size, region})$
- ML procedure, Proc QLIM in SAS
- Use tobit model (Tobin, 1958) to estimate conditional and unconditional marginal effects and to obtain elasticity estimates, and choice probabilities
- linear-log model to capture nonlinearity

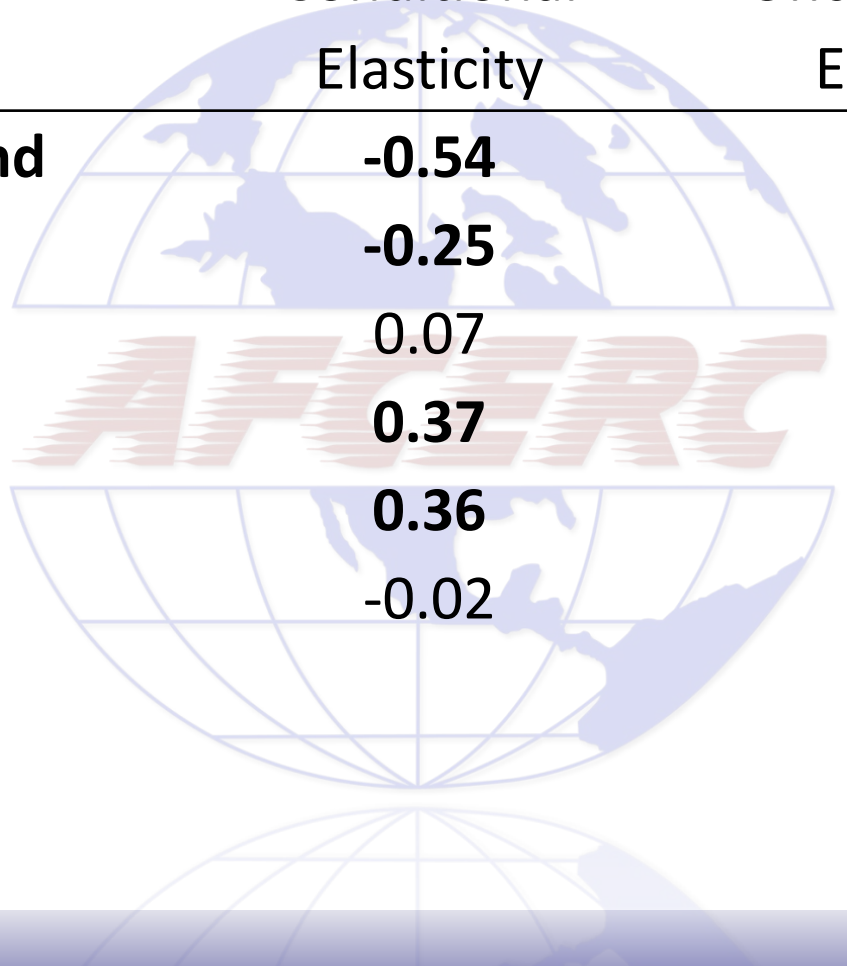
Results:

Price & Income Elasticities: Promise Land White Milk

Variable	Conditional Elasticity	Unconditional Elasticity
Promised Land	-0.23	-1.65
Borden	-0.10	-0.68
Horizon Organic	-0.18	-1.31
Schepps	-0.13	-0.92
Oak Farms	0.09	0.61
Private Label	0.45	3.19
Poinsettia	0.07	0.52
Income	0.14	0.22

Results:

Price & Income Elasticities: Promise Land Chocolate Milk



Variable	Conditional Elasticity	Unconditional Elasticity
Promised Land	-0.54	-3.30
Nesquick	-0.25	-1.57
Borden	0.07	0.44
Oak Farms	0.37	2.23
Private Label	0.36	2.28
Income	-0.02	-0.09

Results:

Demographic factors affecting Promised Land white and Chocolate milk

- Promised Land white milk
 - Age of shopper <30, age of children (6-12 consumed less), White shoppers more, Houston more
- Promised Land chocolate milk
 - Age of shopper <45 consume more, households without children purchase more, Black shoppers less, San Antonio more

Conclusions

- Conditional own-price elasticity of demand for Promised Land white milk is -0.23 and that of chocolate milk is -0.54
- White households buy more of both PL white and chocolate milk
- Private label brand is a substitute for both Promised Land white and chocolate milk
- Households with children <6 and >13 buy more of Promised Land brand
- Households in Houston buy more Promised Land white milk; San Antonio buy more Promised Land chocolate milk

Implications

- Target marketing of Promised Land white and Chocolate milk (age, income, children, region)
 - Producer-level (LALA USA) pricing strategies; lower the price of Promised Land brand to increase customer base
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