Economic and Demographic Factors Affecting the Demand for Fluid Milk Alternative Beverages in the United States

Jing Li, Department of Agricultural Economics, Texas A&M University, kellyseraphic@tamu.edu;
Senarath Dharmasena, Department of Agricultural Economics, Texas A&M University, sdharmasena@tamu.edu

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Jing Li and Senarath Dharmasena
Department of Agricultural Economics, Texas A&M University

Background

Fluid milk alternative beverages are plant-based products extracted through grains, nuts and seeds. Unlike the regular fluid milk, they have low cholesterol and fat content. With the increase in awareness, rising health concerns, and the increasing vegan population, in the United States, the demand for fluid milk alternative beverages has been increasing over the past decade. Currently, calcium and vitamin fortified fluid milk alternative beverages are entering the market to compete with fluid milk, providing consumers an alternative, specifically for those who are lactose intolerant (Dharmasena and Capps, 2014; Copeland and Dharmasena, 2015). The fluid milk alternative beverage market can be segmented into four divisions: soymilk, almond milk, coconut milk, and others (rice milk, hazelnut milk, hemp milk, and oat milk). In the past, soymilk used to dominate the fluid milk alternative beverage market. However, in recent years, consumer migrated from soymilk to other fluid milk alternatives such as almond milk and coconut milk, probably due to taste, health concerns and calories counts. It is estimated that sales of soymilk in U.S. declined 5.8% from $981 million in 2009 to $924 million in 2010, and another 8.5% in 2010 reaching $846 million in 2011. In 2012, almond milk consumption passed soymilk and become America's most popular plant-based milk alternative accounting for 4.1% of total milk sales (KCT.org, 2014). In 2014, almond milk took the top spot of U.S. fluid milk alternative beverages market with 65.5% of the market share, which puts soymilk in the second spot with a 30% share. Other fluid milk alternative beverages like coconut milk also show great potential for growth. According to data from Information Resources Inc. (IRI), Chicago, refrigerated coconut milk dollar sales grew by 9.2% in the 52 weeks ending May 2015. Coconut milk took the fourth-largest part of the fluid milk alternatives segment, with 3% market share in 2015. While the fluid milk alternative beverage market is growing in the United States, the traditional fluid milk market has been decreasing during past two decades. Per capita fluid milk consumption has been falling for years: it dropped 25% from 1975 through 2012. Fluid milk's rate of decline in 2011 and 2012 was the highest in more than a decade (Star Tribune reports, 2014). Consumers want variety and convenience in their beverages, as well as healthier refreshment. As a result, most traditional beverage categories continue to struggle and lose ground to newer niche products, such as fluid milk alternative beverages.

Objectives

The general objective of this study is to determine demand interrelationships between fluid milk and fluid milk alternative beverages using C-QUAIDS estimated using semiparametric procedure suggested by Sam and Zheng (2010).

Specific objectives are to:

(1) estimate compensated and uncompensated own-price and cross-price elasticities, and expenditure elasticities for fluid milk alternative beverages (soymilk, almond milk, coconut milk, rice milk), lactose free fluid milk, flavored fluid milk and unflavored fluid milk;

(2) determine demographic factors affecting the purchase of aforementioned fluid milk and fluid milk alternative beverages.

Data and Methodology

We use quantity, expenditure and household demographic characteristics with respect to purchase of fluid milk and fluid milk alternative beverages obtained from 2015 Nielsen Homescan scanner panel. This panel consists of approximately 65,000 representative households from across the United States. Given the censoring nature of data, this paper uses a two-step semi-parametric approach suggested by Sam and Zheng (2010) for the estimation of censored demand system. This is exempt from distributional misspecification (does not assume a normally distributed error in the first-stage equation) and accommodates a certain form of heteroskedasticity. We use the Klein and Spady (1993) semi-parametric single-index model instead of the conventional probit model used in alternative two-step estimators such as Shonkwiler and Yen (1999) in the first-stage equation to model the decision to purchase any beverage. The advantage of the Klein and Spady (1993) model is that, without relying on distributional assumptions, this method generates consistent and efficient estimates and furthermore accommodates heteroskedasticity of a certain form in the error term. In the second stage, the QUAIDS (Banks *et al*, 1997) is used to model the conditional demand for fluid milk and fluid milk alternative beverages.

Preliminary Results/Discussion/Conclusions

We will be in position to estimate own-price, cross-price and expenditure elasticities for the separable group of goods, namely fluid milk and fluid milk alternative beverages. Also, we will be profiling demographic characteristics of consumers with regards to these beverage groups. Preliminary analysis of data reveal that the own-price elasiticity of demand for almond milk, soymilk, coconut milk, fluid milk and lactose free milk in the United States is -0.50, -0.41, -0.46, -0.63, and -0.50 respectively. Fluid milk is found to be a substitute for coconut milk, while almond milk and soy milk are substitutes for fluid milk. Income, age, employment status, education level, race, ethnicity, region and presence of children in a household are significant drivers of demand for soymilk, almond milk, coconut milk, and fluid milk.

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