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Abstract

This paper estimates the pass-through between diesel fuel and retail milk prices at the product brand level, based on a random coefficient logit demand model along with a market channel marginal cost function in order to estimate energy price pass-through rates to the consumer. It takes into account the partial and net impact of energy prices through the multi-market effects on other inputs. It also exploits a natural experiment of energy hyperinflation and the great recession in 2008. Empirical results show that energy prices (e.g., diesel price) significantly impact the retail prices of milk products and are, therefore, an important determinant of food price inflation. Pass-through rates are estimated to be in the range from 0.15 to approximately 0.50 before March 2008 and from 0.09 to 0.19 after March 2009, with an average of 0.26. This indicates that a \$1.00 per gallon increase in diesel prices would on average result in a 26¢ per gallon increase in the retail price of milk. Statistical test indicates pass-through rates before March 2008 are significantly higher than that after March 2008. Interestingly, private label brands have the lowest energy (diesel) pass-through rates, implying that compared to manufacturer brands, private label prices are more insulated from energy price shocks.

Keywords: food, milk, energy, pricing, pass-through

JEL: D22, L66, Q13, Q41

Introduction

In the last few years, U.S. food and energy prices have both experienced dramatic increases, resulting in a dual food and energy price inflation that has had a significant negative impact on consumers. Much of the previous literature sheds light on the relation between oil prices and agricultural commodity or food prices. Generally speaking, the causal link between oil and food prices is explained by two mechanisms (Reboredo, 2012). First, oil prices affect production costs directly, given that agriculture is an energy-intensive sector. For example, Hanson, Robinson and Schluter (1993) and Nazlioglu (2011) find that an increase in oil prices causes a rise in input costs and a corresponding rise in agricultural commodity prices. The strength of this effect depends on several factors, such as the relative importance of oil in the production costs and the degree of market power to pass forward increased costs. Second, on the demand side, increased oil prices have significantly raised demand for corn- and soybean-based biofuels resulting in an indirect increase in the prices of these commodities due to increased demand. Chen, Kuo and Chen (2010) and Ignaciuk and Dellink (2006) show that higher crude oil prices have induced a higher derived demand for corn and soybeans and greater competition with other grains for the planting areas, resulting in increased grain prices for wheat as well as corn and soybeans. Higher grain prices increase the cost of feed used in animal agriculture such as milk production.

Yet some studies have found no statistically significant evidence regarding an oil-food price nexus. For example, Zhang et al. (2010) find that agricultural commodity prices are neutral to oil price changes in the long run. Gilbert (2010) explains the recent upward trend in agricultural prices by distinguishing between common and market-specific factors, reporting evidence of the neutrality of market factors like oil prices and biofuel demand.

The preponderant evidence in previous studies links oil and agricultural commodity price indexes at the aggregate farm level. However, previous studies linking food and energy prices at the retail product brand level are lacking, although this is the level more relevant to consumers. Retail milk provides a good case study for examining the relation between energy and retail food prices. First, energy plays an important role in milk production as well as transportation and marketing (Brush, Masanet and Worrell, 2011). Second, given the prevalence of obesity and over-consumption of sugar-sweetened beverages (SSBs), milk is considered a lower-calorie and more nutritious substitute for SSBs (Runge, Johnson and Runge, 2011). Third, the price of milk as a staple food is closely connected with consumers' welfare and social well-being, particularly children's.

Using a random coefficient logit model at the product brand level, this paper estimates the retail demand

for fluid milk in Boston and related energy pass-through rates before March 2008 and after March 2008. Empirical results indicate that, overall, consumers prefer milk products with lower prices and larger sizes and favor private labels, resulting in lower price elasticities and higher oligopoly Lerner indexes. Finally, energy prices (i.e., diesel and electricity) significantly impact the cost of milk products. The pass-through rate for diesel averages approximately 0.26 across brands and time periods, with a range from 0.15 to 0.50 before March 2008 and 0.09 to 0.19 after March 2008. Statistical test indicates pre-period pass-through rates are significantly higher than that of post-period. In general, private labels have lower energy (diesel) pass-through rates, indicating less vulnerability to energy price shocks and more stable prices.

Empirical Strategy

Cost pass-through rates measure the proportion of a change in input costs that is transmitted to the output price. In this paper, a structural model is applied with consideration of firms' competitive interaction,¹ using a random coefficient logit demand model to capture product and consumer heterogeneity. The supply side (i.e., margins or marginal costs) is derived in a post-demand estimation stage.

The indirect utility of consumer i from purchasing milk brand j in market m is given by

$$u_{ijm} = \delta_{jm} + \mu_{ijm} + \epsilon_{ijm}, \quad (1)$$

where the indirect utility u_{ijm} can be decomposed into three parts: a mean utility term δ_{jm} , which is common to all consumers; a brand-specific and consumer-specific deviation from that mean μ_{ijm} ; and idiosyncratic tastes ϵ_{ijm} , where ϵ_{ijm} is a mean zero stochastic term distributed independently and identically as a type I extreme value distribution. The mean utility $\delta_{jm} = X_j' \beta + \xi_{jm}$ includes a vector X_j of key product characteristics of relevance to consumers; ξ_{jm} is unobserved product characteristics. The utility deviations are $\mu_{ijm} = X_j' \Sigma V_i$, where Σ is a scaling matrix and random part V_i is assumed to have a standard multivariate normal distribution. Then the probability that consumer i purchases a unit of brand j in market m is given by

$$s_{ijm} = \frac{\exp(\delta_{jm} + \mu_{ijm})}{1 + \sum_{r=1}^J \exp(\delta_{rm} + \mu_{irm})}. \quad (2)$$

The market share of the j^{th} brand corresponds to the probability that the j^{th} brand is chosen in market m , given by

$$s_{jm}(p, x, \theta) = \int I\{(v_i, \epsilon_{ijm}): U_{ijm} \geq U_{ikm} \forall k = 0, \dots, J\} dG(v) dF(\epsilon), \quad (3)$$

where θ is a vector of consumer taste parameters; $k=0$ denotes the outside good; and G and F are

¹A reduced-form analysis is simple, but disadvantageous for inferring the degree of market competitiveness without knowing the benchmark pass-through rate (Kim and Cotterill, 2008).

cumulative density functions for v and ϵ , respectively, assumed to be independent of each other.

The price elasticities of brand j in market m can be expressed as:

$$\eta_{jm} = \frac{\partial s_{jm}}{\partial p_{km}} \cdot \frac{p_{km}}{s_{jm}} = \begin{cases} \frac{p_{jm}}{s_{jm} \int \alpha_i s_{ijm} (1-s_{ijm}) dG(v)}, & \text{for } j = k, \\ \frac{-p_{km}}{s_{jm} \int \alpha_i s_{ijm} s_{ikm} d(v)}, & \text{otherwise,} \end{cases} \quad (4)$$

where α_i denotes the price coefficient of individual i .

Since the pass-through rate depends on the demand and cost structures, a suitable model of a firm's behavior is of great importance for properly estimating a pass-through rate. We follow Berry, Levinsohn and Pakes (1995) (hereafter BLP), and Nevo (2001) who assume that firms follow a Bertrand-Nash pricing strategy. Assume that constant marginal costs vary across markets. Firm f 's profit in market m is then given by

$$\pi_f^m = \sum_{j \in J_f} (p_{jm} - mc_{jm}) M s_{jm}(p), \quad (5)$$

where mc_{jm} is the marginal cost of brand j in market m , J_f is the set of brands produced by firm f , M is market size, and $s_{jm}(p)$ is the market share of brand j in market m . The first order condition for profit maximization is:

$$\frac{\partial \pi_f^m}{\partial p_{km}} = M \left[s_{jm}(p) + \sum_{j \in J_f} (p_{jm} - mc_{jm}) \frac{\partial s_{jm}}{\partial p_{km}} \right] = 0. \quad (6)$$

In vector notation, the pricing equation can be written as

$$p - mc = \left[\Theta^{own} * \left(-\frac{\partial s(p)}{\partial p} \right) \right]^{-1} s(p), \quad (7)$$

where

$$\Theta_{i,j}^{own} = \begin{cases} 1, & \text{if } i, j \text{ are produced by same firm,} \\ 0, & \text{otherwise,} \end{cases}$$

Following Chidmi, Lopez and Cotterill (2005) as well as Richards, Allender and Hamilton (2012), the marginal cost is assumed as a function of the raw milk price P_f , the diesel price P_d , the electricity price P_e , package size S , fat content F , and time dummies (year and month) D . The most common form for the marginal cost function in the previous literature is the log-linear form used by Berry et al. (1995) and Sudhir (2001). A log-linear version of (3.2.8) results in the following empirical equation:

$$\ln mc = \alpha_0 + \alpha_1 \ln P_f + \alpha_2 \ln P_d + \alpha_3 \ln P_e + \alpha_4 \ln S + \alpha_5 \ln F + \alpha_6 \ln D + \varepsilon_1, \quad (8)$$

where $\varepsilon_1 \sim N(0, \sigma_{\varepsilon_1}^2)$ are the unobservable factors.

As energy prices are also likely to affect input costs such as raw milk, the indirect effects of energy prices have to be taken into account in the marginal cost function. To this end, the raw milk price is simply modeled as a function of feed prices (P_{fd}) as well as energy prices, and is assumed to be given by

$$\ln P_f = \beta_0 + \beta_1 \ln P_{fd} + \beta_2 \ln P_d + \beta_3 \ln P_e + \beta_4 \ln D + \varepsilon_2, \quad (9)$$

where ε_2 are the unobservable factors that affect the raw milk price and $\varepsilon_2 \sim N(0, \sigma_{\varepsilon_2}^2)$. The total change in marginal cost from a change in the price of diesel is given by the sum of direct effect through (8) and the indirect effect through changes in (9). Substituting equation (9) into equation (8) yields

$$\ln mc = \lambda_0 + \lambda_1 \ln P_{fd} + \lambda_2 \ln P_d + \lambda_3 \ln P_e + \alpha_4 \ln S + \alpha_5 \ln F + \lambda_4 \ln D + v, \quad (10)$$

where $\lambda_0 = \alpha_1 \beta_0 + \alpha_0$; $\lambda_1 = \alpha_1 \beta_1$; $\lambda_2 = \alpha_1 \beta_2 + \alpha_2$; $\lambda_3 = \alpha_1 \beta_3 + \alpha_3$; $\lambda_4 = \alpha_1 \beta_4 + \alpha_6$; and $v = \varepsilon_1 + \alpha_1 \varepsilon_2$. ε_1 and ε_2 are random shocks, which are assumed independent from each other, and $v \sim N(0, \sigma_{\varepsilon_1}^2 + \alpha_1^2 \sigma_{\varepsilon_2}^2)$.

Using (7) and (10), a diesel price shock from $\overline{P_d}$ to $\widehat{P_d}$ will induce a new set of equilibrium milk prices, depicted by \widehat{P} . The total diesel price pass-through rate (Γ) is then defined as the ratio of the milk price change to a change in diesel price, given by

$$\Gamma = \frac{\Delta p}{\Delta P_d} \times 100, \quad (11)$$

where Δp denotes differences between the new equilibrium prices and the old ones, and the change in diesel prices is given by $\Delta P_d = \widehat{P_d} - \overline{P_d}$.

Data and Estimation

The main dataset used, milk sales data, came from the Information Resources Incorporated (IRI) Academic Data database, available online to academic researchers.² The milk data set contains brand-level information in the greater Boston area aggregated to four-week periods from January 2009 through December 2011. Product characteristics include brand name,³ fat content (0, 1%, 2% and 3.25%), lactose content (free or not) and package size. Following Lopez and Lopez (2009), all milk types with less than 0.1% share of the IRI sample were dropped, which generated 60 products defined by these four product characteristics.

Retail prices of milk were computed by dividing the dollar sales by volume sold. Market shares for each product were computed with respect to the potential market for milk, which was calculated by multiplying the total population of the Boston area by the average U.S. per capita milk consumption (USDA, 2012). The outside good is defined as the part of the potential market that is not considered in the sample, i.e., the total amount of fluid milk sold in the Boston area that is either not part of the 60 milk products in the sample or that is sold in other retail outlets.⁴ As a result, the volume of milk included in the dataset used in this

² See Bronnenberg, Kruger and Mela (2008).

³ Garelick Farms, Garelick Farms over the Moon, Hood, Hood Lactaid, Hood Simply Smart, Private Labels, Stonyfield Farm, and the Organic Cow of Vermont. Private Labels (store brands) were aggregated as a single brand. These are shown in Table 1.

⁴ The sample includes sales at grocery stores and drugstores. Among other things, all outlets include milk purchased at superstores, restaurants, gas stations, and convenience stores.

study represents approximately 65% of the potential market. Each time period was treated as a market consisting of 60 products and 200 consumers, which generated 4320 markets (60 products x 72 months = 4,320) and 864,000 (4320 x200) consumer observations. In this research, the sample is segmented according to pre-March 2008 and post-March 2008, including 27 markets and 45 markets, respectively.

Monthly averages of retail diesel prices were collected from the Mid-Atlantic Information Office of the Bureau of Labor Statistics (BLS, 2013), from 2006 through 2011 to match milk sales. Electricity prices were collected from the U.S Energy Information Administration (EIA, 2006-2011).

Instrumental variables are used to address potential endogeneity of milk prices, chosen so that demand shocks ϵ are independent of a set of exogenous instruments ω (i.e., $E[\epsilon|\omega] = 0$) but correlated with prices. Following BLP (1999) and Nevo (2001), the instrumental variables used include cost shifters (diesel price, electricity rate, wage rate, interest rate), the average price in other markets (Hausman and Taylor, 1981) and brand and month dummies as well as non-price product characteristics. The demand model specified can be estimated with the complete set of instrumental variables, including cost shifters, Hausman-type instruments, using a non-linear Generalized Methods of Moments (GMM) estimator. Following Dubé et al. (2012), we apply a mathematical program with equilibrium constraints (MPEC).

The estimated demand parameters are used to calculate product-specific price elasticities and the retailer price-cost margins. Based on the estimates, the pass-through rate is calculated by simulation. All the results are presented in the following section.

Results

Table 2 (a) and Table 2 (b) presents the estimation results of demand function. Overall, the results seem plausible in terms of signs and expected coefficients. On average, consumers have a negative and strong valuation of price and size in the two time periods. Compared with other brands, consumers prefer private labels, which is consistent with the finding of Lopez and Lopez (2009). Table 2(a) and Table 2(b) also show consumers' significant heterogeneous preference for milk product characteristics such as price, which confirms heterogeneity in consumers' preferences in the Boston fluid milk market.

Table 3(a) and Table 3(b) illustrate that all the own-price elasticities of demand are negative and all cross-price elasticities are positive for the milk products pre-March 2008 and post-March 2008. For the private labels, the own-price elasticities are comparatively lower than those of other brands, which indicate that private labels are exerting more market power. Totally speaking, the values of the estimated own-price elasticities range from -7.961 to -25.415 during 2006-2011. These estimates of elasticities are within the range of conclusions given in previous studies focusing on fluid milk. For instance, Cotterill and Dhar (2003) provide own-price elasticities estimates as high as -35 for Hood milk and -3.62 for private label milk, while Lopez and Lopez (2009) find that the elasticities for milk in Boston range from -1.98 for 1% low fat

private label milk to -8.52 for 1% lactose free Morningstar milk. Kinoshita, Suzuki, and Kaiser (2002), with scanner brand-level data in Japan, find price elasticities in the range of -6.67 to -9.19. It is not surprising that the elasticities estimates in this research are relatively higher compared to those brand-level studies. A possible explanation is that this paper focuses on product level, which is smaller and defined by specific product characteristics, as opposed to brand level. In this research consumers have more substitutes to switch to, resulting higher price elasticities.

Table 4(a) and Table 4(b) both show that private label milk has the highest Lerner Index, i.e., the highest percent markup. This result is consistent with the finding of Lopez and Lopez (2009). One explanation is that although the prices of private labels are relatively lower than those of other products, the marginal costs are also lower so that markups are higher. Comparison between Lerner Indexes pre-March 2008 and post-March 2008 indicate that markets powers of most of these popular brands/products significantly increase.

Table 5 reports the estimation results for marginal cost function for pre-period sample and post-period sample. With the pre-period sample, estimation results show that a 1% diesel price increase will lead to a 0.363% increase in marginal cost, while a 1% feed price increase leads to a 0.135% increase in marginal cost. The results also show that a 1% package size leads to a 0.439% decrease in marginal cost as the cost of an additional gallon of milk decreases if produced and marketed in a bigger container. Similarly, in the post-period, results show that 1% diesel price increase will lead to a 0.147% increase in marginal cost, and a 1% electricity price increase leads to a 0.673% increase in marginal cost.

Table 6 illustrates the estimated energy (diesel) pass-through rate for 60 products in pre-period and post-period. Overall, the pass-through rates during 2006-2011 range from 0.089 to 0.506, with a mean of 0.26, which indicates that, on average, a dollar per gallon increase in diesel price will lead to a 26 cents per gallon increase in retail milk price. In addition, the results show that the pass-through rates of private label products, generally speaking, are lower than those of other brands. These findings indicate that the private labels are less vulnerable to energy price shocks compared to manufacturer brands. One possible reason is the higher price-cost markups of private labels. When energy price shocks increase marginal cost, it is still profitable for private labels to increase price by a smaller amount when compared to manufacturer brands. The estimated pass-through rates in two periods are compared in term of means with two-sample t test. With t-stat value of 14.06, the pass-through rates are statistically higher pre-March 2008, implying that the pass-through might be asymmetric.

Conclusions

This paper investigates the demand for a differentiated product market (Boston fluid milk) and estimates pass-through rates for energy price shocks pre- and post-March 2008. The demand is estimated with a

random coefficient logit model, which allows for a more flexible curvature of demand, hence flexible pass-through rates that are not driven solely by the functional form assumption.

Empirical results indicate that fluid milk products with lower prices and smaller sizes are more popular. Empirical results also show that the private labels have lower price elasticities as well as the highest degrees of market power. This finding lends support to previous studies that have similarly found that more basic products (in this case, private label milk) benefit from greater price-cost margins (Chidmi and Lopez, 2009). In addition, this research also finds that energy prices (e.g., diesel and electricity) significantly impact the prices of milk products. The pass-through rates average 0.26. Interestingly, most private labels are found to have the lowest energy (diesel) pass-through rates, which is consistent with the relatively stable price of private label products. This finding also implies that compared to manufacturer brands, private labels are less vulnerable to energy price shocks. Taking into account the lower prices of private label retail milk, greater price stability amount to added benefits to consumers from private label milk consumption. Besides, pass-through rates pre-March 2008 are statistically significantly higher compared to that of post-March 2008, via a two-sample t test, implying the existence of asymmetric energy pass-through.

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Table 1. Summary of Milk Product Characteristics.

| <i>Company/Brand</i> | Price | Mark. Share | Fat | Lactose-Free | Size/Gallon |
|--------------------------------------|-------|-------------|--------|--------------|-------------|
| Dean Food/Garelick | | | | | |
| Garelick Farms 1 | 5.804 | 0.002 | 0 | 0 | 0.25 |
| Garelick Farms 2 | 5.862 | 0.003 | 0.01 | 0 | 0.25 |
| Garelick Farms 3 | 5.820 | 0.002 | 0.02 | 0 | 0.25 |
| Garelick Farms 4 | 5.772 | 0.003 | 0.0325 | 0 | 0.25 |
| Garelick Farms 5 | 4.726 | 0.007 | 0 | 0 | 0.5 |
| Garelick Farms 6 | 4.727 | 0.009 | 0.01 | 0 | 0.5 |
| Garelick Farms 7 | 4.730 | 0.008 | 0.02 | 0 | 0.5 |
| Garelick Farms 8 | 4.711 | 0.008 | 0.0325 | 0 | 0.5 |
| Garelick Farms 9 | 3.687 | 0.007 | 0 | 0 | 1 |
| Garelick Farms 10 | 3.663 | 0.013 | 0.01 | 0 | 1 |
| Garelick Farms 11 | 3.685 | 0.012 | 0.02 | 0 | 1 |
| Garelick Farms 12 | 3.661 | 0.012 | 0.0325 | 0 | 1 |
| Dean Food/Garelick F. o.t. M. | | | | | |
| Garelick Farms over the Moon 1 | 5.710 | 0.002 | 0 | 0 | 0.5 |
| Garelick Farms over the Moon 2 | 5.713 | 0.001 | 0.01 | 0 | 0.5 |
| Hood/Hood | | | | | |
| Hood 1 | 6.010 | 0.001 | 0 | 0 | 0.25 |
| Hood 2 | 5.847 | 0.001 | 0.01 | 0 | 0.25 |
| Hood 3 | 6.156 | 0.001 | 0.02 | 0 | 0.25 |
| Hood 4 | 5.872 | 0.001 | 0.0325 | 0 | 0.25 |
| Hood 5 | 4.615 | 0.006 | 0 | 0 | 0.5 |
| Hood 6 | 4.663 | 0.008 | 0.01 | 0 | 0.5 |
| Hood 7 | 4.688 | 0.007 | 0.02 | 0 | 0.5 |
| Hood 8 | 4.713 | 0.008 | 0.0325 | 0 | 0.5 |
| Hood 9 | 3.556 | 0.010 | 0 | 0 | 1 |
| Hood 10 | 3.585 | 0.015 | 0.01 | 0 | 1 |
| Hood 11 | 3.655 | 0.011 | 0.02 | 0 | 1 |
| Hood 12 | 3.686 | 0.013 | 0.0325 | 0 | 1 |
| Hood/ Hood Lactaid | | | | | |
| Hood Lactaid 1 | 9.229 | 0.001 | 0 | 1 | 0.25 |
| Hood Lactaid 2 | 9.296 | 0.0003 | 0.02 | 1 | 0.25 |
| Hood Lactaid 3 | 7.535 | 0.003 | 0 | 1 | 0.5 |
| Hood Lactaid 4 | 7.490 | 0.002 | 0.01 | 1 | 0.5 |
| Hood Lactaid 5 | 7.501 | 0.002 | 0.02 | 1 | 0.5 |
| Hood Lactaid 6 | 7.419 | 0.001 | 0.0325 | 1 | 0.5 |
| Hood/ Hood Simply Smart | | | | | |
| Hood Simply Smart 1 | 5.948 | 0.008 | 0 | 0 | 0.5 |
| Hood Simply Smart 2 | 5.969 | 0.005 | 0.01 | 0 | 0.5 |
| Private Label | | | | | |
| Private Label 1 | 5.347 | 0.001 | 0 | 0 | 0.25 |
| Private Label 2 | 5.164 | 0.0004 | 0.01 | 0 | 0.25 |
| Private Label 3 | 5.148 | 0.0002 | 0.02 | 0 | 0.25 |
| Private Label 4 | 5.360 | 0.002 | 0.0325 | 0 | 0.25 |
| Private Label 5 | 3.928 | 0.017 | 0 | 0 | 0.5 |
| Private Label 6 | 3.840 | 0.019 | 0.01 | 0 | 0.5 |
| Private Label 7 | 3.832 | 0.014 | 0.02 | 0 | 0.5 |
| Private Label 8 | 3.842 | 0.018 | 0.0325 | 0 | 0.5 |
| Private Label 9 | 6.663 | 0.001 | 0 | 1 | 0.5 |
| Private Label 10 | 6.605 | 0.0003 | 0.02 | 1 | 0.5 |
| Private Label 11 | 6.855 | 0.0002 | 0.0325 | 1 | 0.5 |
| Private Label 12 | 2.932 | 0.060 | 0 | 0 | 1 |
| Private Label 13 | 2.915 | 0.105 | 0.01 | 0 | 1 |
| Private Label 14 | 2.929 | 0.073 | 0.02 | 0 | 1 |

| | | | | | |
|--|-------|-------|--------|---|-----|
| Private Label 15 | 2.933 | 0.093 | 0.0325 | 0 | 1 |
| Stonyfield Farm/Stonyfield Farm | | | | | |
| Stonyfield Farm 1 | 7.266 | 0.002 | 0 | 0 | 0.5 |
| Stonyfield Farm 2 | 7.233 | 0.002 | 0.01 | 0 | 0.5 |
| Stonyfield Farm 3 | 7.245 | 0.002 | 0.02 | 0 | 0.5 |
| Stonyfield Farm 4 | 7.245 | 0.002 | 0.0325 | 0 | 0.5 |
| Dean Foods/ The Org Cow of VT | | | | | |
| The Organic Cow of VT1 | 7.578 | 0.002 | 0 | 0 | 0.5 |
| The Organic Cow of VT2 | 7.496 | 0.002 | 0.01 | 0 | 0.5 |
| The Organic Cow of VT3 | 7.552 | 0.002 | 0.02 | 0 | 0.5 |
| The Organic Cow of VT4 | 7.531 | 0.002 | 0.0325 | 0 | 0.5 |
| The Organic Cow of VT5 | 6.327 | 0.001 | 0 | 0 | 1 |
| The Organic Cow of VT6 | 6.328 | 0.001 | 0.01 | 0 | 1 |
| The Organic Cow of VT7 | 6.366 | 0.001 | 0.0325 | 0 | 1 |

Table 2 (a). Demand Estimation Results before March, 2008

| Variable | Mean Utility | | Unobservables | |
|---------------------------|--------------|-----------------|---------------|-----------------|
| | Mean | Standard Errors | Mean | Standard Errors |
| Price | -3.687* | (2.105) | -1.717* | (0.955) |
| Fat | -4.517 | (5.557) | -10.865 | (50.761) |
| Lactose-Free | -5.565*** | (1.129) | 2.333* | (1.969) |
| Size | 2.221* | (1.216) | -2.113 | (2.014) |
| Garelick Farms | 2.035 | (1.225) | -1.825 | (1.924) |
| Garelick Farms o. t. Moon | -6.122 | (9.256) | -7.024 | (6.808) |
| Hood | 1.669 | (1.050) | -0.895 | (1.345) |
| Hood Lactaid | -6.358 | (13.986) | -11.901 | (12.276) |
| Hood Simply Smart | 2.818*** | (0.830) | -0.794 | (1.793) |
| PLs | 2.725*** | (0.878) | -0.385 | (0.888) |
| Smart Balance | -1.949 | (4.469) | 3.514 | (3.920) |
| Constant | -7.432*** | (1.830) | -0.563 | (4.345) |
| Month Fixed Effect | Yes | | | |

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 2 (b). Demand Estimation Results after March, 2008

| Variable | Mean Utility | | Unobservables | |
|---------------------------|--------------|-----------------|---------------|-----------------|
| | Mean | Standard Errors | Mean | Standard Errors |
| Price | -1.724* | (0.945) | -0.970** | (0.457) |
| Fat | -0.195 | (5.994) | 1.549 | (12.063) |
| Lactose-Free | -4.809 | (8.019) | 2.319 | (2.150) |
| Size | 3.936* | (2.370) | -0.755 | (1.847) |
| Garelick Farms | 0.373 | (2.264) | 2.464 | (2.022) |
| Garelick Farms o. t. Moon | -1.747 | (5.404) | -4.505 | (4.470) |
| Hood | 2.360** | (0.949) | -1.674 | (1.545) |
| Hood Lactaid | 3.008 | (39.018) | 3.085 | (20.375) |
| Hood Simply Smart | 2.381 | (5.919) | -2.323 | (4.871) |
| PLs | -0.208 | (4.994) | -4.720 | (3.941) |
| Stonyfield Farm | 2.107* | (1.060) | -1.706 | (1.734) |
| Constant | -11.158*** | (2.864) | -0.755 | (1.847) |
| Month Fixed Effect | Yes | | | |

Note: Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3 (a). Sample of Price Elasticities of Demand for Milk Products (before March, 2008)

| Product | GF 11 | GF 12 | Hood 10 | Hood 12 | Hood L. 3 | PL 13 | PL 14 | PL 15 | Sf Farm 1 | The Org. C. 1 |
|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Garelick Farms 11 | -17.429 | 0.067 | 0.097 | 0.001 | 0.005 | 0.080 | 0.065 | 0.081 | 0.115 | 0.212 |
| Garelick Farms 12 | 0.004 | -25.415 | 0.058 | 0.001 | 0.001 | 0.038 | 0.046 | 0.067 | 0.099 | 0.172 |
| Hood 10 | 0.027 | 0.068 | -16.473 | 0.001 | 0.003 | 0.073 | 0.083 | 0.053 | 0.070 | 0.193 |
| Hood 12 | 0.033 | 0.081 | 0.090 | -17.980 | 0.001 | 0.061 | 0.074 | 0.078 | 0.106 | 0.209 |
| Hood Lactaid 3 | 0.029 | 0.084 | 0.066 | 0.001 | -23.651 | 0.053 | 0.065 | 0.044 | 0.061 | 0.085 |
| Private Label 13 | 0.034 | 0.075 | 0.081 | 0.001 | 0.001 | -15.964 | 0.116 | 0.046 | 0.058 | 0.143 |
| Private Label 14 | 0.035 | 0.077 | 0.075 | 0.001 | 0.001 | 0.060 | -14.508 | 0.046 | 0.051 | 0.125 |
| Private Label 15 | 0.027 | 0.060 | 0.053 | 0.001 | 0.002 | 0.042 | 0.048 | -22.606 | 0.054 | 0.098 |
| Stonyfield Farm 1 | 0.033 | 0.071 | 0.054 | 0.001 | 0.001 | 0.054 | 0.054 | 0.048 | -23.140 | 0.096 |
| The Org. Cow 1 | 0.027 | 0.074 | 0.044 | 0.001 | 0.008 | 0.049 | 0.065 | 0.025 | 0.031 | -14.755 |

Table 3 (b). Sample of Price Elasticities of Demand for Milk Products (after March, 2008)

| Product | GF 11 | GF 12 | Hood 10 | Hood 12 | Hood L. 3 | PL 13 | PL 14 | PL 15 | Sf Farm 1 | The Org. C. 1 |
|-------------------|----------------|---------------|----------------|----------------|---------------|---------------|---------------|----------------|---------------|----------------|
| Garelick Farms 11 | -10.020 | 0.008 | 0.052 | 0.021 | 0.028 | 0.025 | 0.025 | 0.021 | 0.039 | 0.081 |
| Garelick Farms 12 | 0.014 | -7.961 | 0.042 | 0.016 | 0.032 | 0.012 | 0.012 | 0.018 | 0.024 | 0.056 |
| Hood 10 | 0.009 | 0.006 | -10.773 | 0.008 | 0.019 | 0.031 | 0.031 | 0.011 | 0.020 | 0.054 |
| Hood 12 | 0.011 | 0.008 | 0.037 | -11.238 | 0.016 | 0.010 | 0.010 | 0.016 | 0.026 | 0.053 |
| Hood Lactaid 3 | 0.038 | 0.040 | 0.074 | 0.008 | -8.099 | 0.023 | 0.024 | 0.008 | 0.012 | 0.036 |
| Private Label 13 | 0.012 | 0.008 | 0.031 | 0.010 | 0.017 | -9.713 | 0.018 | 0.016 | 0.022 | 0.049 |
| Private Label 14 | 0.009 | 0.007 | 0.030 | 0.014 | 0.016 | 0.018 | -9.626 | 0.019 | 0.024 | 0.055 |
| Private Label 15 | 0.011 | 0.007 | 0.033 | 0.018 | 0.018 | 0.008 | 0.009 | -11.015 | 0.029 | 0.057 |
| Stonyfield Farm 1 | 0.015 | 0.008 | 0.036 | 0.016 | 0.017 | 0.012 | 0.011 | 0.020 | -9.878 | 0.054 |
| The Org. Cow 1 | 0.017 | 0.015 | 0.062 | 0.020 | 0.044 | 0.024 | 0.024 | 0.022 | 0.042 | -10.555 |

Table 4 (a). Price, Marginal Cost and Lerner Index (before March 2008)

| <i>Company/Brand</i> | Price | Price-MC | MC | Own-price Ela. | Lerner Index |
|--------------------------------------|-------|----------|-------|----------------|--------------|
| Dean Food/Garelick | | | | | |
| Garelick Farms 1 | 5.117 | 0.294 | 5.239 | -17.651 | 0.057 |
| Garelick Farms 2 | 5.138 | 0.289 | 5.233 | -17.968 | 0.056 |
| Garelick Farms 3 | 5.012 | 0.283 | 5.073 | -17.829 | 0.057 |
| Garelick Farms 4 | 5.345 | 0.257 | 5.009 | -22.161 | 0.048 |
| Garelick Farms 5 | 5.100 | 0.257 | 3.995 | -20.264 | 0.050 |
| Garelick Farms 6 | 5.124 | 0.255 | 3.940 | -20.182 | 0.050 |
| Garelick Farms 7 | 5.603 | 0.255 | 4.785 | -22.983 | 0.045 |
| Garelick Farms 8 | 5.275 | 0.259 | 4.737 | -19.974 | 0.049 |
| Garelick Farms 9 | 5.666 | 0.257 | 5.042 | -21.213 | 0.045 |
| Garelick Farms 10 | 5.686 | 0.254 | 4.749 | -21.934 | 0.045 |
| Garelick Farms 11 | 4.441 | 0.260 | 4.778 | -17.429 | 0.059 |
| Garelick Farms 12 | 6.212 | 0.255 | 3.617 | -25.415 | 0.041 |
| Dean Food/Garelick F. o.t. M. | | | | | |
| Garelick Farms o. t. Moon 1 | 6.175 | 0.260 | 4.861 | -25.199 | 0.042 |
| Garelick Farms o. t. Moon 2 | 6.656 | 0.258 | 4.878 | -27.210 | 0.039 |
| Hood/Hood | | | | | |
| Hood 1 | 5.089 | 0.293 | 4.663 | -18.855 | 0.058 |
| Hood 2 | 5.030 | 0.337 | 4.576 | -18.125 | 0.067 |
| Hood 3 | 4.306 | 0.320 | 3.441 | -16.067 | 0.074 |
| Hood 4 | 4.363 | 0.319 | 3.430 | -14.866 | 0.073 |
| Hood 5 | 5.563 | 0.294 | 3.389 | -22.534 | 0.053 |
| Hood 6 | 5.211 | 0.289 | 3.374 | -22.483 | 0.055 |
| Hood 7 | 5.290 | 0.285 | 2.859 | -22.610 | 0.054 |
| Hood 8 | 5.679 | 0.285 | 2.863 | -23.513 | 0.050 |
| Hood 9 | 4.154 | 0.296 | 2.851 | -16.868 | 0.071 |
| Hood 10 | 4.111 | 0.292 | 2.820 | -16.473 | 0.071 |
| Hood 11 | 5.087 | 0.274 | 4.570 | -18.279 | 0.054 |
| Hood 12 | 5.139 | 0.278 | 4.625 | -17.980 | 0.054 |
| Hood/ Hood Lactaid | | | | | |
| Hood Lactaid 1 | 6.259 | 0.243 | 7.950 | -24.401 | 0.039 |
| Hood Lactaid 2 | 6.091 | 0.253 | 7.565 | -23.613 | 0.042 |
| Hood Lactaid 3 | 6.394 | 0.261 | 6.056 | -23.651 | 0.041 |
| Hood Lactaid 4 | 4.142 | 0.277 | 5.955 | -12.221 | 0.067 |
| Hood Lactaid 5 | 5.195 | 0.274 | 5.640 | -20.968 | 0.053 |
| Hood Lactaid 6 | 5.182 | 0.266 | 5.503 | -20.810 | 0.051 |
| Hood/ Hood Simply Smart | | | | | |
| Hood Simply Smart 1 | 5.292 | 0.257 | 2.922 | -21.365 | 0.049 |
| Hood Simply Smart 2 | 5.654 | 0.253 | 2.844 | -22.373 | 0.045 |
| Private Label | | | | | |
| Private Label 1 | 4.985 | 0.287 | 2.540 | -19.079 | 0.058 |
| Private Label 2 | 5.011 | 0.282 | 2.417 | -18.720 | 0.056 |
| Private Label 3 | 5.184 | 0.286 | 4.348 | -20.581 | 0.055 |
| Private Label 4 | 5.122 | 0.309 | 4.437 | -17.991 | 0.060 |
| Private Label 5 | 5.015 | 0.282 | 4.417 | -18.379 | 0.056 |
| Private Label 6 | 4.833 | 0.274 | 4.337 | -17.917 | 0.057 |
| Private Label 7 | 4.189 | 0.278 | 3.220 | -15.258 | 0.066 |
| Private Label 8 | 6.224 | 0.272 | 3.171 | -21.062 | 0.044 |
| Private Label 9 | 6.111 | 0.271 | 3.122 | -24.829 | 0.044 |

| | | | | | |
|--|-------|-------|-------|---------|-------|
| Private Label 10 | 6.954 | 0.265 | 3.139 | -27.642 | 0.038 |
| Private Label 11 | 5.273 | 0.296 | 2.491 | -24.334 | 0.056 |
| Private Label 12 | 5.226 | 0.330 | 2.481 | -23.132 | 0.063 |
| Private Label 13 | 4.172 | 0.313 | 2.478 | -15.964 | 0.075 |
| Private Label 14 | 4.167 | 0.303 | 2.447 | -14.508 | 0.073 |
| Private Label 15 | 5.423 | 0.291 | 4.533 | -22.606 | 0.054 |
| Stonyfield Farm/Stonyfield Farm | | | | | |
| Stonyfield Farm 1 | 5.322 | 0.265 | 4.893 | -23.140 | 0.050 |
| Stonyfield Farm 2 | 5.321 | 0.254 | 4.882 | -21.402 | 0.048 |
| Stonyfield Farm 3 | 5.416 | 0.263 | 4.787 | -22.120 | 0.049 |
| Stonyfield Farm 4 | 4.528 | 0.279 | 3.701 | -15.739 | 0.062 |
| Dean Food/The Org. Cow of VT | | | | | |
| The Organic Cow of VT 1 | 4.505 | 0.282 | 3.562 | -14.755 | 0.063 |
| The Organic Cow of VT 1 | 5.302 | 0.280 | 3.433 | -20.974 | 0.053 |
| The Organic Cow of VT 1 | 5.281 | 0.283 | 3.413 | -20.843 | 0.054 |
| The Organic Cow of VT 1 | 6.264 | 0.260 | 2.754 | -26.740 | 0.042 |
| The Organic Cow of VT 1 | 6.147 | 0.257 | 2.695 | -26.537 | 0.042 |
| The Organic Cow of VT 1 | 6.544 | 0.258 | 2.681 | -24.989 | 0.039 |
| The Organic Cow of VT 1 | 4.171 | 0.302 | 2.681 | -14.890 | 0.072 |

Table 4(b) Price, Marginal Cost and Lerner Index (after March 2008)

| <i>Company/Brand</i> | Price | Price-MC | MC | Own-price Ela. | Lerner Index |
|--------------------------------------|-------|----------|-------|----------------|--------------|
| Dean Food/Garelick | | | | | |
| Garelick Farms 1 | 5.831 | 0.619 | 5.273 | -10.506 | 0.106 |
| Garelick Farms 2 | 5.702 | 0.604 | 5.293 | -10.467 | 0.106 |
| Garelick Farms 3 | 5.727 | 0.603 | 5.246 | -10.348 | 0.105 |
| Garelick Farms 4 | 5.869 | 0.612 | 5.194 | -10.221 | 0.104 |
| Garelick Farms 5 | 4.603 | 0.628 | 4.133 | -8.408 | 0.137 |
| Garelick Farms 6 | 4.614 | 0.635 | 4.156 | -8.197 | 0.138 |
| Garelick Farms 7 | 5.597 | 0.625 | 4.150 | -9.981 | 0.112 |
| Garelick Farms 8 | 5.471 | 0.619 | 4.105 | -9.835 | 0.113 |
| Garelick Farms 9 | 6.435 | 0.599 | 3.011 | -11.126 | 0.093 |
| Garelick Farms 10 | 6.286 | 0.616 | 2.982 | -11.057 | 0.098 |
| Garelick Farms 11 | 6.202 | 0.606 | 2.986 | -10.020 | 0.098 |
| Garelick Farms 12 | 4.526 | 0.622 | 2.929 | -7.961 | 0.137 |
| Dean Food/Garelick F. o.t. M. | | | | | |
| Garelick Farms o. t. Moon 1 | 5.606 | 0.617 | 5.474 | -9.230 | 0.110 |
| Garelick Farms o. t. Moon 2 | 5.699 | 0.596 | 5.530 | -9.254 | 0.105 |
| Hood/Hood | | | | | |
| Hood 1 | 5.661 | 0.679 | 5.349 | -7.917 | 0.120 |
| Hood 2 | 5.852 | 0.597 | 5.139 | -10.620 | 0.102 |
| Hood 3 | 5.257 | 0.598 | 4.257 | -10.273 | 0.114 |
| Hood 4 | 5.246 | 0.578 | 4.255 | -10.717 | 0.110 |
| Hood 5 | 5.908 | 0.572 | 4.272 | -12.475 | 0.097 |
| Hood 6 | 5.521 | 0.608 | 4.261 | -9.663 | 0.110 |
| Hood 7 | 5.894 | 0.586 | 3.383 | -8.501 | 0.099 |
| Hood 8 | 5.485 | 0.597 | 3.350 | -8.732 | 0.109 |
| Hood 9 | 4.473 | 0.599 | 3.370 | -8.414 | 0.134 |
| Hood 10 | 6.269 | 0.581 | 3.331 | -10.773 | 0.093 |
| Hood 11 | 6.443 | 0.585 | 5.345 | -11.377 | 0.091 |
| Hood 12 | 6.329 | 0.592 | 5.403 | -11.238 | 0.094 |
| Hood/ Hood Lactaid | | | | | |
| Hood Lactaid 1 | 5.682 | 0.592 | 5.494 | -8.257 | 0.104 |
| Hood Lactaid 2 | 5.704 | 0.628 | 5.477 | -8.010 | 0.110 |
| Hood Lactaid 3 | 4.588 | 0.584 | 4.441 | -8.099 | 0.127 |
| Hood Lactaid 4 | 4.592 | 0.601 | 4.469 | -7.444 | 0.131 |
| Hood Lactaid 5 | 5.837 | 0.521 | 4.422 | -11.529 | 0.089 |
| Hood Lactaid 6 | 5.675 | 0.528 | 4.401 | -11.109 | 0.093 |
| Hood/ Hood Simply Smart | | | | | |
| Hood Simply Smart 1 | 5.813 | 0.514 | 3.243 | -11.145 | 0.088 |
| Hood Simply Smart 2 | 5.736 | 0.506 | 3.215 | -10.866 | 0.088 |
| Private Label | | | | | |
| Private Label 1 | 4.486 | 0.645 | 3.095 | -8.265 | 0.144 |
| Private Label 2 | 4.521 | 0.658 | 3.076 | -8.315 | 0.146 |
| Private Label 3 | 5.426 | 0.653 | 5.421 | -9.265 | 0.120 |
| Private Label 4 | 5.485 | 0.647 | 5.454 | -9.044 | 0.118 |
| Private Label 5 | 6.498 | 0.558 | 5.418 | -11.310 | 0.086 |
| Private Label 6 | 6.452 | 0.556 | 5.370 | -11.241 | 0.086 |
| Private Label 7 | 6.227 | 0.587 | 4.297 | -10.357 | 0.094 |
| Private Label 8 | 4.523 | 0.586 | 4.228 | -7.996 | 0.130 |
| Private Label 9 | 5.691 | 0.604 | 4.301 | -9.544 | 0.106 |
| Private Label 10 | 5.472 | 0.585 | 4.180 | -9.259 | 0.107 |
| Private Label 11 | 5.666 | 0.596 | 2.840 | -7.686 | 0.105 |

| | | | | | |
|--|-------|-------|-------|---------|-------|
| Private Label 12 | 5.720 | 0.557 | 2.962 | -10.615 | 0.097 |
| Private Label 13 | 5.197 | 0.578 | 2.977 | -9.713 | 0.111 |
| Private Label 14 | 5.241 | 0.571 | 2.967 | -9.626 | 0.109 |
| Private Label 15 | 5.866 | 0.589 | 5.539 | -11.015 | 0.100 |
| Stonyfield Farm/Stonyfield Farm | | | | | |
| Stonyfield Farm 1 | 5.877 | 0.619 | 5.584 | -9.878 | 0.105 |
| Stonyfield Farm 2 | 5.852 | 0.621 | 5.532 | -8.039 | 0.106 |
| Stonyfield Farm 3 | 5.847 | 0.599 | 5.472 | -8.342 | 0.102 |
| Stonyfield Farm 4 | 4.600 | 0.587 | 4.628 | -8.298 | 0.128 |
| Dean Food/The Org. Cow of VT | | | | | |
| The Organic Cow of VT 1 | 6.465 | 0.546 | 4.455 | -10.555 | 0.085 |
| The Organic Cow of VT 1 | 6.516 | 0.541 | 4.460 | -11.829 | 0.083 |
| The Organic Cow of VT 1 | 6.307 | 0.564 | 4.416 | -11.496 | 0.089 |
| The Organic Cow of VT 1 | 5.844 | 0.600 | 3.177 | -8.237 | 0.103 |
| The Organic Cow of VT 1 | 5.462 | 0.669 | 3.086 | -8.171 | 0.122 |
| The Organic Cow of VT 1 | 4.531 | 0.622 | 3.130 | -7.500 | 0.137 |
| The Organic Cow of VT 1 | 4.560 | 0.652 | 3.114 | -7.255 | 0.143 |

Table 5. Estimated Parameter of the Milk Cost Function

| Independent Variables | Before March 08 | After March 08 |
|---------------------------|----------------------|----------------------|
| Log(marginal cost) | | |
| Log(diesel) | 0.363*** (0.130) | 0.147*** (0.016) |
| Log(electricity) | -0.183 (0.292) | 0.673*** (0.056) |
| Log(feed) | 0.135*** (0.024) | 0.088*** (0.019) |
| Log(Size) | -0.439*** (0.011) | -0.227*** (0.008) |
| Fat | 0.427 (0.660) | 0.402 (0.279) |
| Constant | 0.429 (0.779) | -0.689*** (0.169) |
| Manufacturer Brand (Hood) | 0.173*** (0.013) | -0.148*** (0.013) |
| PLs | -0.058** (0.027) | -0.677*** (0.018) |
| Organic | 0.525*** (0.015) | -0.072*** (0.025) |
| Month Dummy | Yes | Yes |
| Year Dummy | Yes | Yes |
| R2 | 0.5 | 0.79 |

Table 6. Estimated Pass-through Rates

| <i>Company/Brand</i> | Pass-through Rate before March 08 | Pass-through Rate after March 08 |
|--------------------------------------|--------------------------------------|-------------------------------------|
| Dean Food/Garelick | | |
| Garelick Farms 1 | 0.340 | 0.191 |
| Garelick Farms 2 | 0.340 | 0.192 |
| Garelick Farms 3 | 0.330 | 0.190 |
| Garelick Farms 4 | 0.326 | 0.189 |
| Garelick Farms 5 | 0.260 | 0.150 |
| Garelick Farms 6 | 0.256 | 0.151 |
| Garelick Farms 7 | 0.311 | 0.151 |
| Garelick Farms 8 | 0.308 | 0.149 |
| Garelick Farms 9 | 0.328 | 0.109 |
| Garelick Farms 10 | 0.309 | 0.108 |
| Garelick Farms 11 | 0.310 | 0.108 |
| Garelick Farms 12 | 0.235 | 0.106 |
| Dean Food/Garelick F. o.t. M. | | |
| Garelick Farms o. t. Moon 1 | 0.317 | 0.185 |
| Garelick Farms o. t. Moon 2 | 0.318 | 0.187 |
| Hood/Hood | | |
| Hood 1 | 0.304 | 0.180 |
| Hood 2 | 0.299 | 0.173 |
| Hood 3 | 0.225 | 0.144 |
| Hood 4 | 0.224 | 0.144 |
| Hood 5 | 0.221 | 0.144 |
| Hood 6 | 0.220 | 0.144 |
| Hood 7 | 0.187 | 0.114 |
| Hood 8 | 0.187 | 0.113 |
| Hood 9 | 0.186 | 0.114 |
| Hood 10 | 0.184 | 0.112 |
| Hood 11 | 0.291 | 0.167 |
| Hood 12 | 0.294 | 0.169 |
| Hood/ Hood Lactaid | | |
| Hood Lactaid 1 | 0.506 | 0.172 |
| Hood Lactaid 2 | 0.481 | 0.172 |
| Hood Lactaid 3 | 0.385 | 0.139 |
| Hood Lactaid 4 | 0.379 | 0.140 |
| Hood Lactaid 5 | 0.359 | 0.139 |
| Hood Lactaid 6 | 0.350 | 0.138 |
| Hood/ Hood Simply Smart | | |
| Hood Simply Smart 1 | 0.186 | 0.102 |
| Hood Simply Smart 2 | 0.181 | 0.101 |
| Private Label | | |
| Private Label 1 | 0.162 | 0.097 |
| Private Label 2 | 0.154 | 0.096 |
| Private Label 3 | 0.261 | 0.170 |
| Private Label 4 | 0.266 | 0.171 |
| Private Label 5 | 0.265 | 0.170 |
| Private Label 6 | 0.260 | 0.168 |
| Private Label 7 | 0.193 | 0.134 |
| Private Label 8 | 0.190 | 0.132 |

| | | |
|--|-------|-------|
| Private Label 9 | 0.187 | 0.135 |
| Private Label 10 | 0.188 | 0.131 |
| Private Label 11 | 0.149 | 0.089 |
| Private Label 12 | 0.149 | 0.093 |
| Private Label 13 | 0.149 | 0.093 |
| Private Label 14 | 0.147 | 0.093 |
| Private Label 15 | 0.257 | 0.186 |
| Stonyfield Farm/Stonyfield Farm | | |
| Stonyfield Farm 1 | 0.277 | 0.187 |
| Stonyfield Farm 2 | 0.276 | 0.186 |
| Stonyfield Farm 3 | 0.271 | 0.184 |
| Stonyfield Farm 4 | 0.209 | 0.155 |
| Dean Food/The Org. Cow of VT | | |
| The Organic Cow of VT1 | 0.202 | 0.150 |
| The Organic Cow of VT1 | 0.194 | 0.150 |
| The Organic Cow of VT1 | 0.193 | 0.148 |
| The Organic Cow of VT1 | 0.156 | 0.107 |
| The Organic Cow of VT1 | 0.153 | 0.104 |
| The Organic Cow of VT1 | 0.152 | 0.105 |
| The Organic Cow of VT1 | 0.152 | 0.104 |
| Two sample t-test | | 14.06 |