Changes in Soy Based Food Consumption, 2001 and 2007

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Abstract

The study evaluated the change in the consumption pattern for soyfood products between 2001 and 2007 using nationwide household surveys. Two-stage regression models were used to estimate the effects of each of the perceived attributes of soy food and socio-economic variables on first, participation decision, and second, consumption frequency decision for soy products. While households consuming soy products increased from 2001 to 2007 by nearly two percentage points, the frequency of consumption declined considerably.

The usage of whole soybean for human food such as tofu, soymilk, and other soy based food products has been increasing in recent years. Henkel (2000) reported that $2.5 billion worth of soy based foods were sold in 2000 at the retail level. Soytech Inc. (2004) estimated the sales of soy food products including tofu, soymilk, soy cheese, energy bars, and meat alternatives to be at nearly $4 billion in 2003. Previous researches have reported changing attitude and acceptance of soy based food by consumers in the United States and Canada (Wansink et al., 2005; Endres et al., 2000). An important structural shift in the consumption of soy based foods may have occurred due to the use of FDA allowed health claims by the manufacturers of soy based foods and a wider choice of soy based products available in the market in recent years.

Moon et al. (2005) reported positive effects of perceived health benefits of soy products on consumption frequency of soy products. Rimal et al. (2007) reported a positive impact of Food and Drug Administration allowed health claims on the consumption of soy-food among those who are currently consuming soy products. Our study extends their research by examining whether there have been changes in the consumption pattern for soy products between 2001 and 2007. In addition, the factors influencing the change including convenience of preparation and consumption, tastefulness, perceived health benefits, nutritional knowledge, and socio-economic characteristics are analyzed.

Intake of soy food products has been shown to have beneficial effects on cardiovascular disease (CHD) risk factors. Zhang et al. (2002) reported a clear monotonic dose-response relationship between soyfood intake and risk of total CHD. Using published data and new research, Messina et al. (2000) suggested that the consumption of even 10 gram (typical of Asian intake) of isoflavone-rich soy protein per day may be associated with health benefits. Recognizing the health benefits from soyfoods, Food and Drug Administration (FDA) has

allowed food companies to claim health benefits from soyfood products (FDA, 1999). The American Heart Association has also recommended consumption of soy protein to patients with elevated cholesterol level (Erdman, 2000). There are, however, few studies assessing whether such health benefits and health claims have translated into increased consumption of soyfood products.

Previous studies have related consumer health concern to the consumption habit of foods derived from dairy (Jenson, 1995; Heien and Wessells, 1988) and meat sources (Ward and Moon, 1996). Capps and Schmitz (1991) and Rimal et al. (2001) in discussing health and nutritional factors in food analysis and Yen and Chern (1992) in investigating the impact of nutritional information on demand for dairy products have indicated that consumer health and nutritional concern have a significant effect on food demand. Jenson (1995) analyzed consumers' health concerns and decisions to participate in the market for whole-fat milk and found that promotion using nutritional benefits of milk can be a useful tool for the dairy industry to attract market participation. Many studies evaluating meat demand (Brown and Schrader, 1990; Capps and Schmitz, 1991) have concentrated on shifts in demand caused by consumers' view of the health implications of eating meat. However, little is known about the relationship between the U.S. consumer's perceived benefits of soyfoods and soyfood product consumption patterns.

Conceptual and Empirical Models

Conceptual Model

The traditional demand equation derived from the utility maximization framework does not explain the role of product attributes in influencing the market demand for the products. The theory of consumer demand by Lancaster (1971) was the first attempt in explaining the role of

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product attributes. According to Lancaster, attributes of goods and services combined with activities give rise to characteristics that are directly related with consumers' demand (Pendleton and Shonkwiler, 2001) Therefore, Lancaster established at least an indirect relationship between attributes and consumption behavior. Ladd and Suvannunt (1976) identified two properties from Lancaster's model (Moon et al., 2005): a) the price of the product is the sum of the marginal implicit value of its attributes, and b) household income, and level of attributes and price of a product influence consumer demand. The second property was applied by Van Ravenswaay and Hoehn (1991) and Baker and Crosbie (1993) to analyze consumer preferences for food safety. Following them, our study specifies the demand equation for a soyfood, Y, for consumer, i:

$$(1) \qquad Y_i = Y_i \, (P_1, \mathbf{P}, m, \mathbf{T}).$$

Where P_1 is the price of a soyfood, $\mathbf{P}$ is the vector of prices of related goods, m is consumer's income, and $\mathbf{T}$ is a vector of non-price attributes of a soyfood.

Moon et al (2005) indicate that two issues need to be addressed when including attributes of soyfoods in a demand model. First, whether consumers are knowledgeable about attributes of soyfood. There will not be any impact of beneficial attributes of soyfood on the demand for soyfood, if consumers are unaware of the link between soyfood consumption and positive health effects. Second, even if consumers have the knowledge of the attributes, credence attributes such as nutrition and food safety have always posed a challenge in terms of objectively measuring them. Consumers often fail to evaluate these attributes even after consuming the products. These issues are addressed by replacing objectively measured attributes by consumers' perceived attributes of soyfood. Fishbein's multiattribute model (Fishbein, 1963) represents a valuable approach in examining the relationship between consumers' product knowledge in terms of their

perceived attributes of soyfood and their attitude toward consuming soyfood. Symbolically, Fishbein's multiattribute model can be written as

(2)
$$A = \sum_{t}^{n} \beta_t X_t$$

where A is the attitude toward a soyfood; X_t is the strength of the belief that the soyfood possesses an attribute t; β_t is the evaluation of attribute t; and n is the number of salient attributes of a soyfood. The model therefore proposes that attitudes toward a soyfood product are based on the summed set of beliefs about the soyfood product's attributes weighted by the evaluation of these attributes. The evaluations (β_t) and the belief (X_t) are obtained from survey responses, and used for the calculation of the overall attitude toward a product. Assuming that the beliefs about the existence of expected attributes of soyfood products influence consumers' attitude about the products, hence, their consumption, we can replace T in (1) by A to obtain a soyfood demand model:

(3)
$$Y_i = Y_i (P_1, \mathbf{P}, m, A).$$

Consumers' perceived attributes of soyfood products can have twofold effects. The first effect is on the probability of the participation in the soyfood market. The second effect is on the intensity of consumption (e.g., quantity or frequency) among those who are already market participants. Following the two effects of soyfood attributes, a two-step empirical demand model for a soyfood product is postulated:

(4)
$$\Pr(Y_i > 0) = g(P_1, \mathbf{P}, m, A, \varepsilon_1)$$

(5)
$$(Y_i | Y_i > 0) = \zeta(P_1, \mathbf{P}, m, A, \varepsilon_2)$$

where Y_i is the frequency of soyfood product consumed during a specific time by consumer *i* and ε_1 and ε_2 are the disturbance terms. Equation (4) represents a probability of participation in soyfood product markets, while equation (5) represents the level of consumption given the participation.

Empirical Models

Two-stage regression models were specified and estimated to differentiate soy-food consuming from non-consuming households. It is postulated that attributes of soy-food and socio-economic variables have varying effect on the participation and consumption frequency decisions for soy products. In order to compare whether and how the soy food consumption has changed, data for two time periods were considered. A Chow-type test was applied. This was accomplished in two stages. In the first stage, the models were estimated separately using 2001 and 2007 data. In the second stage, data for two periods were pooled. Restricted and unrestricted log likelihood values were estimated. Following Greene (2000, p. 826), the chi-square statistics were calculated.

Survey Design and Data Collection

A nationwide on-line survey of 3,000 households was conducted in 2001. In 2007, a national on-line survey among 3,458 US households was conducted using the survey instrument largely identical to those used in 2001 survey. Households were randomly selected from the database of 400,000 households who make up Ipsos-NPD marketing research panel. The selection process was appropriately stratified to ensure that the demographic characteristics of

the sample households that corresponded with the 2000 U.S. census.   Sample households were sent e-mails soliciting information regarding their soy-consumption pattern and household characteristics. Each e-mail included a unique URL (keyed to the respondent's ID) to direct the respondent to the survey website.

Results and Discussion

Consumption Frequency of Soyfood Products

Sample households reported consumption frequency of six soyfood products per month. Table 1 presents the proportion of households reporting non-zero consumption, mean frequency of consumption per month among all households and among the subset of households reporting non-zero consumption. As shown in the table, 36.37 percent of the households in the sample consumed at least one type of soyfood product per month in 2001. In 2007, the percentage increased to slightly more than 38 percent. The survey results, therefore, show that there has been a slight increase in the level of participation in soy food market. Most of this increase has come from increased participation in the soymilk market. The consumption frequency per month for all six types of soy products, however, has considerably declined over the last six years. Consumption frequency for total as well as across products has declined to nearly half of what was in 2001. While soymilk has remained the most popular soy product in terms of participation as well as consumption per month, Tofu, vegetable burgers, and meat substitutes were other popular types of soyfood products. Average consumption frequency across all types of soyfood products was nearly six times in a month among all households, and nearly 16 times among the subset of the households with only positive (greater than zero) consumption frequency in 2001. These numbers declined to nearly three and seven, respectively in 2007.

Perceived attributes of soyfood

Health benefits, convenience in preparation and consumption, tastefulness, and inexpensiveness were the four major perceived attributes of soyfood considered in the study (Table 2). These attributes were measured using a five-point rating scale (1=strongly disagree, 5= strongly agree). Tests were conducted to evaluate the internal consistency of statements under each category.

Beneficial health attributes were measured using four independent statements relating to soyfood's ability to a) reduce cholesterol level in blood; b) act as an antioxidant; c) retain bone mass; and d) help women during menopause. A test was conducted to evaluate the internal consistency of the four statements. The computed test statistic showed that the four statements had a high level of consistency (Cronbach's $\alpha = 0.85$ and 0.90 for 2001 and 2007 respectively) in measuring the health benefits of soyfood (Table 3). A composite health benefits index was created by summing up the reported scores for each statement and dividing by four. The results show that consumers had slightly more favorable perception of health attribute of soyfood in 2001 compared to 2007.

Perceived convenience attributes were measured using three different statements relating to convenience in preparation and consumption of soyfood. These statements also showed a high level of consistency (Cronbach's $\alpha = 0.74$ and 0.73 for 2001 and 2007 respectively) in measuring perceived convenience of soyfood. A composite convenience index was created by summing up the reported scores for each of the statements and dividing by three. The results showed that soyfoods were generally perceived to be more convenient in 2007 compared to 2001.

Perceived taste of soyfood was measured using a statement, "I like the taste of soy-base foods." Households generally disagreed that soyfoods were tasteful. Although slightly more favorable in 2007 compared to 2001, the soyfoods are generally perceived to be lacking in taste.

The mean values for taste were less than 3 (neither agree nor disagree) in both the survey periods.

Finally, the price effects on the consumption frequency for soyfood products were measured using a statement, "Soyfoods are inexpensive." Households in both survey periods have disagreed that soyfoods were inexpensive (mean = 2.38 and 2.95 for 2001 and 2007, respectively), which is consistent with the prevailing retail prices of soyfoods. Dahr and Foltz (2004) reported that the mean price of soy milk per gallon was more than $8 compared to the $3 for skim/low fat milk. Prices of soyfood products may have been an obstacle in increasing participation in soyfood market.

Consumers' knowledge of health is likely to be associated with their food consumption habit. Krebs-Smith et al., (1995), concluded a strong association between health knowledge and increased intakes of fruit and vegetable. In our study, a health knowledge variable was computed using respondents' reported health knowledge regarding nutrients intakes and health consequences. Respondents were asked to match 11 nutrients (i.e., sodium, calcium, vitamin A, protein, vitamin C, iron, vitamin D, carbohydrates, saturated fat, potassium, and dietary fiber) with appropriate health consequences (i.e., high blood pressure, strong bones, healthy eyes, amino acids, development of anticancer mechanism in the body, oxygen, absorb calcium, conversion to sugar and fueling the body, cardiovascular disease, and balancing sodium). Each correct match was given a score of 1. Correct matches were added for each respondent to calculate a dietary knowledge index. There was a small difference in the mean values for dietary knowledge indices for the toe periods.

Socio-economic characteristics and soyfood consumption

Socio-economic characteristics included respondent's age, gender, education, household income, household size, number of children in the household, ethnic background of the household. The socio-economic characteristics of the sample households were largely similar between 2001 and 2007. The average age of respondents was 48 years in 2007 compared to 45 in 2001. Nearly half of the respondents were female in both the survey periods. The average household income was $67 thousand in 2007 compare to $61 thousand in 2001. The difference in household income may account for the inflation. More of the respondents in 2001 had college education in 2001 compared to those in 2007. Although the household size between 2001 and 2007 was nearly the same, the average number of children in 2007 was higher than in 2001. The sample households were more racially diverse in 2007 than in 2001.

Regression Results

Two-stage ordinary least square (OLS) models were specified and estimated to differentiate soy-food consuming from non-consuming households. It is postulated that attributes of soy-food and socio-economic variables had varying effect on the market participation and consumption frequency decisions for soy products. In order to compare whether and how the soy food consumption changed during the two time periods considered, Chow-type tests were applied. This was accomplished in two stages. In the first stage, the models were estimated separately using 2001 and 2007 data. In the second stage, data for two periods were pooled. Restricted and unrestricted log likelihood values were estimated. Following Greene (2000, p. 826), the chi-square statistics for these tests were calculated as:

$\chi^2 = 2*$(Unrestricted log likelihood – restricted log likelihood)

From the Chi-square statistic results reported in Table 4, the hypothesis that the parameters of the independent variables for each of the two years, 2001 and 2007 in terms of participation and consumption frequency decisions for soyfoods, are the same is rejected at the 99 percent confidence level. The research hypothesis that there has been a structural shift in soyfood consumption is also supported by the statistical significance of a dummy variable with the value 1 representing 2007 and zero representing 2001 in the pooled model (not reported).

Tables 5a and 5b report the results from the regression models using the data collected in 2001 and 2007. Results are also reported for the pooled data from the two periods. The statistical significance of Mills Ratio for all three regression estimates suggests that the decision to participate in the soy product market is different from the decision to consume soy products so many times in a month. Perceived attributed of soyfood including health benefits, convenience of preparation and consumption, and taste had statistically significant effects on market participation as well as consumption frequency decisions in 2001 and 2007.

Consumers who agreed that soyfood products were healthy, convenient and tasteful were likely to consume more frequently than those who disagreed. However, a comparison of the sizes of the estimated parameters indicated that perceived attributes such as health benefits and convenience had greater effects on the participation decisions in 2007 compared to that in 2001. Interestingly, perceived attributes were of lesser importance among consumers while making purchase frequency decisions in 2007 compared to 2001

Tastefulness of soyfoods had greater effects on market participation as well as consumption frequency than the health attributes. Similar results were found in relation to the impact of taste on food consumption in previous studies. For example, acceptance of soy yogurt was found to be significantly lower than traditional milk yogurt primarily due to taste factor

among college students in northern Louisiana (Wu et al., 2005). Rimal and Fletcher (2000) reported that attitudes toward in-shell peanuts was influenced by attributes such as fat, taste, and healthiness and that taste were the only attribute influencing consumer purchase decisions. According to Glanz, et al. (1998), taste and costs are of more importance to American consumers while selecting food than nutritional concerns. Although most soyfood products are expensive, the results of this study show that prices were not very important for soyfood buyers. It is, therefore, important to promote soyfood products as being tasty and convenient in addition to being nutritious.

Consumers with greater knowledge of the links between food nutrition and health were more likely to consume soyfood products than those without such knowledge. The regression results show that while knowledge of links between nutrition and health had positive and significant influence on participation decisions in both periods of survey, dietary knowledge was positively related with purchase frequency decisions in 2007 only.

Socio-economic characteristics of households including household income, household size and number of children in the household had varying effects on participation and consumption frequency decisions for soy foods. It is interesting to note that income was positively related with participation decisions but was not important for purchase frequency decision. Higher income households are likely to become soyfood buyers compared to lower income households. However, once they are in the market their household income did not influence their consumption frequency of soyfood . Although household income did not play significant role for the soyfood consumption frequency, some of the income effects may have been captured in the results relating household size. The regression results with pooled data show that the consumption frequency decreased with the increase in household size. That is, household

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food budget is further constrained with additional member in a household, thus reducing the expenditures on soyfood products. Results using the pooled data also show that households with children were more likely to be participants in the soyfood market compared to those without or few children. In addition to household characteristics, respondents' characteristics played significant role in participation and consumption frequency decisions for soyfood products.

Regression results with 2007 data show that older respondents were less likely to be market participant as well as frequent consumer of soy products than younger consumers. Similarly, women respondents were less likely to be a soyfood buyer than their male counterparts. Respondents' education level had positive effect on participation and consumption frequency. Previous studies have reported the role of education on food choices. Grossman and Kaestner (1997) reported a positive relationship between education and health. A person with more education is better able to maintain a healthy life than a person with less education. Better education enhances the access to nutrition information, thus increase the likelihood of nutritional considerations while making food selections. Nayga (1997) also found a significant positive relationship between education and a main meal planner's perceived importance of nutrition in food shopping. Race may be another individual characteristic associated with the variation in soyfood consumption. A white respondent is less likely to be a soyfood consumer compared to non-white consumer. However, in this study the effect of ethnic background on participation and consumption frequency decisions for soyfood products were statistically significant only for 2007 and the pooled data.

Summary and Implications

The study evaluated the change in the consumption pattern for soyfood products between 2001 and 2007 using nationwide household surveys. Effects of perceived attributes of soyfoods

and socio-economic characteristics of the respondents on market participation and consumption decisions were analyzed. The perceived attributes included health benefits of soy products, convenience in consumption and preparation and tastefulness. Lancaster's characteristics model was combined with Fishbein's multi-attribute model to develop a soybean demand function that included perceived attributes of soyfood. Two-stage regression models were used to estimate the effects of each of the independent variables on first, participation decision, and second, consumption frequency decision for soy products.   It was postulated that consumers' soyfood consumption decisions included first, whether or not to consume, and second, how often to consume. The results of the study have important implications for soyfood industry.

Size of the market in terms of number of households consuming soy products increased from 2001 to 2007 by nearly two percentage points. However, the frequency of consumption declined considerably. There may be several explanations for such decline. In 1999, FDA first allowed the soyfood companies to use the health claims on soy products. The 2001 survey may have captured the positive effects of such FDA allowance on consumption frequency. Over the following six years, the effects may have eroded leading to a considerable decline in the consumption frequency of the soy consuming population. The results, therefore, suggest that soy food companies need to reemphasize the FDA allowed health claims in their promotional efforts.

In recent years, many new functional foods that utilize soy ingredients have been introduced in the market. Consumption frequency of six different types of soy products while adequate to measure total consumption in 2001, may not have captured total consumption in 2007.

Although there has been a slight increase in the market participation, overwhelmingly large percentage of Americans avoid soyfood due to unfavorable perceptions about taste and

convenience. In this study, consumers who agreed that soyfood products were convenient and tasteful were likely to consume more frequently than those who disagreed. This was true for both the periods. It is, therefore, important to promote soyfood products as being tasty and convenient in addition to being nutritious.

The study demonstrated that soyfood market can be segmented based on consumers' socio-economic characteristics including age, gender, education, ethnic background, household income, household size and children in the household. For example, soy products are more likely to be preferred by young non-white consumers who are not knowledgeable about the health benefits of soy proteins.

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Table 1. Soy Food Consumption Behavior of Surveyed Households, 2001 and 2007

Soy Food Products	Respondents Reporting Non-Zero Consumption (%)		Mean Consumption Frequency, All Observations (Times/month)		Mean Consumption Frequency, Non-Zero Consumption (Times/month)	
	Base Year (2001)	Year 2007	Base Year (2001)	Year 2007	Base Year (2001)	Year 2007
Tofu	18.64	18.00	0.78	0.48	4.18	2.64
Veggie Burger	18.49	16.23	0.70	0.38	3.77	2.34
Soy Milk	12.54	20.54	1.30	0.90	10.36	4.38
Soy Supplements	7.98	7.84	1.13	0.28	14.09	3.62
Meat Substitutes	18.86	16.32	1.13	0.46	5.98	2.80
Soy Cheese	6.33	6.08	0.53	0.18	8.36	2.96
All	36.37	38.05	5.57	2.68	15.32	7.03

Table 2. Description of variables included in the study

Variable	Description
Soy product consumption	Consumption frequency of soy products including tofu, veggie burger, soy milk, soy supplements, meat substitute and soy cheese per month
Perceived Attributes of Soy Products	"Please indicate your agreement with each of these statements (select one for each statements): *Disagree strongly*, *Disagree somewhat*, *Neither agree nor disagree*, *Agree somewhat*, *Agree strongly*"
Health Benefits	
Lowering Cholesterol	Soy foods lower cholesterol level in blood
Antioxidant	Soy foods act as an antioxidant
Bone mass (Osteoporosis)	Soy foods retain bone mass
Menopause	Soy foods are good for women during menopause
Convenience	
Convenient	Soyfoods are convenient
Recipes	Recipes that use soy-based foods are readily available
Preparation	I know how to prepare soy-based food items
Taste	I like the taste of soy-based foods
Inexpensive	Soy-based foods are inexpensive
Health Knowledge	Total number of dietary questions answered correctly out of eleven questions.
Socio-Economic	
Age	Respondents' age in years
Gender	1 = female; 0 = male
Income	Household income in '000 dollars
Education	1 = some college or above; 0 otherwise
Household Size	Number of household member
Children	Number of children in the household
Ethnic background	1 if white; 0 otherwise

Table 3. Summary statistics of variables representing soyfood attributes and socio-economic characteristics of respondents.

Variable	Base Year (2001)		Year 2007	
	Mean	Std. Dev.	Mean	Std. Dev.
Perceived Attributes Soy Products				
Health Benefits (α=0.83;0.89)	3.51	0.88	3.34	0.86
Lowering Cholesterol	3.66	1.09	3.48	0.88
Antioxidant	3.48	1.04	3.31	0.86
Bone mass (Osteoporosis)	3.31	1.11	3.20	0.87
Menopause	3.60	1.37	3.29	0.87
Convenience (α=0.72;0.77)	2.48	1.05	2.79	0.79
Convenient	2.67	1.23	2.90	0.87
Recipes	2.78	1.35	2.95	0.97
Preparation	2.00	1.36	2.33	1.18
Taste	2.33	1.37	2.61	1.09
Inexpensive	2.38	1.24	2.95	0.93
Dietary Knowledge	7.75	2.38	6.08	3.14
Socio-Economic				
Age	45.09	12.69	49.72	13.75
Gender	0.51	0.50	0.50	0.50
Income	61.18	40.78	67.38	48.29
Education	0.80	0.40	0.65	0.48
Household Size	2.53	1.25	2.61	1.39
Children	0.63	0.97	1.52	0.95
Ethnic background	0.93	0.26	0.76	0.42

Table 4: Log Likelihood Ratio Tests for Change in Soyfood Consumption Pattern between 2001 and 2007

	Participation Decision	Consumption Frequency Decision
Unrestricted Log Likelihood (estimated using pooled data)	-2458.260	-7251.349
Restricted Log Likelihood (estimated separately for 2001 and 2007 then summed)	-2438.798	-6822.478
Degrees of freedom	12	12
Ch-square	38.924*	857.742*
Critical value at 0.01	26.217	26.217

Note: * = Significance at α<0.01

Table 5a. Soy Food Consumption: Results from the Two-Stage model (Stage 1: Market Participation Decisions)

Variables	Base Year: 2001		Year 2007		Combined Data	
	Param. Estimates	Std. Error	Param. Estimates	Std. Error	Param. Estimates	Std. Error
Constant	-3.049*	0.317	-3.270*	0.188	-3.038*	0.151
Health Benefits	0.172*	0.047	0.311*	0.041	0.271*	0.030
Convenience	0.249*	0.048	0.277*	0.044	0.210*	0.028
Taste	0.432*	0.034	0.351*	0.030	0.400*	0.022
Inexpensive Health	-0.010	0.034	0.033	0.047	0.021	0.027
Knowledge	0.039*	0.018	0.045*	0.008	0.049*	0.007
Age	0.001	0.003	-0.004*	0.002	-0.004*	0.002
Gender	-0.003	0.082	-0.156*	0.053	-0.085*	0.042
Income	0.003*	0.001	0.001*	0.001	0.001*	0.000
Education	0.227*	0.113	0.258*	0.059	0.307*	0.050
Household Size	0.010	0.059	-0.027	0.028	0.024	0.023
Children Ethnic	-0.083	0.075	-0.020	0.041	-0.125*	0.031
Background	-0.248	0.157	-0.477*	0.057	-0.413*	0.052
Log Likelihood Restricted Log	-695.407		-1739.519		-2458.260	
Likelihood	-960.374		-2295.846		-3255.795	
Chi-squared	529.934*		1112.653*		1595.071*	

Note: * = Significance at $\alpha < 0.05$

Table 5b. Soy Product Consumption: Results from the Two-Stage model (Stage 2: Consumption Frequency Decisions)

Variables	Base Year: 2001		Year 2007		Combined Data	
	Param. Estimates	Std. Error	Param. Estimates	Std. Error	Param. Estimates	Std. Error
Constant	-65.744*	24.303	-48.384*	8.294	-63.428*	10.271
Health Benefits	4.001*	1.383	2.929*	0.743	4.858*	0.801
Convenience	8.634*	1.545	3.908*	0.704	4.012*	0.668
Taste	7.915*	2.333	4.841*	0.745	7.708*	0.996
Inexpensive Health	-1.088	0.770	0.549	0.630	-0.702	0.501
Knowledge	-0.070	0.472	0.390*	0.142	0.658*	0.182
Age	0.021	0.077	-0.069*	0.027	-0.102*	0.032
Gender	-2.177	1.902	-1.197	0.773	-1.962*	0.841
Income	0.005	0.025	0.012	0.007	0.000	0.009
Education	3.081	3.193	3.450*	0.964	5.340*	1.240
Household Size	-1.487	1.362	-0.071	0.380	1.419*	0.446
Children Ethnic	0.702	1.796	-0.419	0.556	-3.724*	0.637
Background	-1.563	3.394	-4.063*	1.079	-3.145*	1.294
Mills Ratio	24.246*	8.518	15.763*	2.921	21.633*	3.726
F-Statistic	9.99*		26.31*		27.62*	
R squared	0.197		0.213		0.163	

Note: * = Significance at $\alpha<0.05$