Rational Addiction in U.S. Demand for Wine

by

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Abstract

Rational addiction in wine is modeled using a new model, the Intertemporal Translog Simple Nonadditive Preferences (ITLSNAP) model. The model is derived directly from the consumer profit function and the unobservable price of utility is eliminated using total expenditures to obtain a model that is linear in parameters. The model is applied to U.S. demand for wine, beer, and spirits using pseudo panel data for four regions over the time period 1984-2006. The results are consistent with theory and rational addiction is found present in wine. The results also indicate that all three beverages are complements, which has significant implications for tax policy.

1. Introduction

The rational addiction hypothesis has become popular in recent years. Beginning with Becker and Murphy (1988) and Becker, Grossman, and Murphy (1994), economists have sought to quantify the significance of forward looking behavior of consumers from different degrees of habit formation. The basic modeling approach has been to assume that the consumer chooses consumption in the current time period by maximizing a non-separable intertemporal utility function subject to an intertemporal budget constraint. Most studies have utilized the Becker et al framework based on the single equation methodology, which amounts to specifying and regressing current consumption on lagged consumption, future consumption, price, and other demographic and lifecycle variables. Such a model is not easily extended to the multiple commodity case, although some attempts have been made (e.g., Bask and Melkerson 2004; Pierani and Tiezzi 2009).

Intertemporal approaches to specifying dynamic demand systems have followed one of two approaches. The first is to re-parameterize the intertemporal utility maximization problem to convert it to a static problem (Spinnewyn 1981; Paschardes 1986; Chen et al 2011). The second approach uses the profit function to specify Frisch demand functions that depend upon lagged, current, and future prices, and the (unobservable) price of utility (Browning 1991). These functions can then transformed into observable Marshallian demand functions by relating the price of utility to "normal" total expenditures (Browning 1991). Browning (1991) further shows that the demand functions with only one period lagged prices and one period future prices, generated from simple non-additive preferences (SNAP), are equivalent to the Pollack-Spinnewyn habits-as-durables general model of intertemporal consumer behavior.

The purpose of this paper is to apply the SNAP methodology of Browning (1991) to estimation of U.S. demand for wine incorporating rational habit formation. Because wine, beer, and spirits are believed to be interrelated in consumption, demand for wine is modeled as part of a system of demand equations for alcoholic beverages. Browning's (1991) SNAP model is extended to a model that offers more flexibility in price response while delivering estimating equations linear in parameters making it easier to apply to panel data. The model is applied to a new data set derived from U.S. Consumer Expenditure Survey data (CEX data). The data set is a pseudo panel data set consisting of U.S. regional wine, beer, and spirits consumption over the time period 1984-2006. The results are consistent with theory and support the rational addiction hypothesis in wine.

2. SNAP Modeling Approach

The profit function for the consumer intertemporal utility maximization problem can be represented as follows:

$$\pi(\boldsymbol{P}^1, \boldsymbol{P}^2, \boldsymbol{P}^T, r) = \max_q [rU - \sum_t \boldsymbol{P}^t \cdot \boldsymbol{q}^t] \tag{1}$$

where $\boldsymbol{P^t}$ is the vector of prices of goods in period t, $\boldsymbol{q^t}$ is the vector of quantities of goods in period t, U is the intertemporal utility function, and r is the price of utility or inverse of the marginal utility of wealth, which is assumed to be constant over the individual's planning horizon (Browning 1991). The profit function is linear homogeneous in all goods prices and the price of utility, r.

The demand functions for goods at time t are obtained by applying the Envelope Theorem (Hotelling's Theorem) to obtain:

$$\boldsymbol{q^t} = -\frac{\partial \pi(\boldsymbol{P^1}, \boldsymbol{P^2}, \boldsymbol{P^T}, r)}{\partial \boldsymbol{P^t}} \tag{2}$$

These are marginal utility of wealth constant or intertemporal Frisch demand functions. They are homogeneous of degree zero in all prices and the price of utility, r; symmetric with respect to goods prices; and (c) negative semi-definite with respect to goods prices.

Browning (1991) introduced the simplified form of the profit function that makes preferences almost additive but within each period depending upon prices in the previous period:

$$\boldsymbol{\pi}(\boldsymbol{P^1}, \boldsymbol{P^2}, \boldsymbol{P^T}, \boldsymbol{r}) = -\sum_{t=1}^{T-1} \Phi^t(\boldsymbol{P^t}, \boldsymbol{P^{t-1}}, r) \tag{3}$$

Applying Hotelling's Theorem gives the Frisch demand functions which have the simplified form:

$$\boldsymbol{q^t} = \frac{\partial \Phi^{t-1}(\boldsymbol{P^{t-1}}, \boldsymbol{P^t}, r)}{\partial \boldsymbol{P^t}} + \frac{\partial \Phi^{t}(\boldsymbol{P^{t}}, \boldsymbol{P^{t+1}}, r)}{\partial \boldsymbol{P^t}} = \boldsymbol{f^t}(\boldsymbol{P^{t-1}}, \boldsymbol{P^t}, \boldsymbol{P^{t+1}}, r) \tag{4}$$

With a SNAP structure, total expenditure on all goods at time t is:

$$x_t = \sum_{i=1}^{n} p_{it} q_{it} = \sum_{i=1}^{n} f_{it}\,(\boldsymbol{P}^{t-1}, \boldsymbol{P}^{t},\ \boldsymbol{P}^{t+1}, r) \tag{5}$$

If the marginal utility of wealth is strictly decreasing in wealth (i.e., intertemporal utility is strictly concave in wealth), then x_t is strictly monotonically increasing in r and we can invert equation (5) to obtain r as a function of $\boldsymbol{P}^{t-1}, \boldsymbol{P}^{t}, \boldsymbol{P}^{t+1},$ and r. In turn, this function can be substituted for r in equation (4) to obtain Marshallian demand functions (Browning 1991, Corollary 2):

$$q_{it} = g_{it}(\boldsymbol{P}^{t-1}, \boldsymbol{P}^{t}, \boldsymbol{P}^{t+1}, x_t) \tag{6}$$

These Marshallian demand functions are functions of observable variables and, as shown below, can take on suitable forms for econometric estimation.

Browning (1991) has used the above SNAP framework to generate a forward-looking demand system by starting with the PIGLOG expenditure function given utility U_t for period *t*:

$$lnC(U_t, \boldsymbol{P}^{t-1}, \boldsymbol{P}^{t}) = [a(\boldsymbol{P}^{t}) - \mathrm{d}(\boldsymbol{P}^{t-1})]/b(\boldsymbol{P}^{t}) \tag{7}$$

He first obtains the profit function from this specification and then uses the parameterization of the Almost Ideal Demand System to obtain Marshallian demand functions in expenditure share form:

$$w_{it} = \alpha_i + \sum_j \gamma_{ij} \ln p_{jt} + \beta_i \ln\left[\frac{x_t}{P_t}\right] + \beta_i \sum_j \theta_j \ln p_{jt-1} - \theta_i \left[\frac{b(\mathbf{p}_t)}{b(\mathbf{p}_{t+1}^{e})}\right] \tag{8}$$

While this model can be readily applied to time series and panel data, with appropriate modifications, futures prices influence behavior only in a highly nonlinear manner and intertemporal substitution effects in the model (both through lagged prices and future prices) seem quite restrictive.

3. ITLSNAP Model

The approach taken by Browning (1991) to obtain observable systems of demand functions that are forward-looking is to start with a modified expenditure function, derive the profit function, obtain Frisch demand functions, and invert these functions to obtain observable Marshallian demand functions. This approach is quite limited in its applicability because only a small number of likely restrictive expenditure functions would yield tractable Marshallin demand functions. In some sense, the problem is analogous to the choice between choosing models based on maximizing the direct utility function versus starting with a specified function and using duality theory to derive estimating systems of static demand functions.

In this case, it seems as reasonable to start with a specification of the SNAP profit function, equation (3), and then derive first Frisch demand equations, and then through inversion observable Marshallian demand functions. In this context, I introduce a new model called the Intertemporal Translog Simple Non-additive Preferences (ITLSNAP) model:

$$\pi(\mathbf{lnP^{t}},\mathbf{lnP^{t-1}},\mathbf{lnP^{t+1}},\ln r)=$$
$$-\sum_{t=1}^{T-1}\left\{\begin{bmatrix}\mathbf{lnP^{t}} & \mathbf{lnP^{t-1}} & \ln r\end{bmatrix}'\begin{bmatrix}\mathbf{A}_{11} & \mathbf{A}_{12} & \mathbf{a}_{1}\\ \mathbf{A}'_{12} & \mathbf{A}_{22} & \mathbf{a}_{2}\\ \mathbf{a}'_{1} & \mathbf{a}'_{2} & a_{0}\end{bmatrix}\begin{bmatrix}\mathbf{lnP^{t}}\\ \mathbf{lnP^{t-1}}\\ \ln r\end{bmatrix}+\begin{bmatrix}\mathbf{lnP^{t}} & \mathbf{lnP^{t-1}} & \ln r\end{bmatrix}'\begin{bmatrix}\mathbf{b}_{1}\\ \mathbf{b}_{2}\\ b\end{bmatrix}\right\} \quad (9)$$

The Frisch demand functions are obtained by applying the Envelope Theorem:

$$p_{it}q_{it} = -\frac{\partial \pi(\mathbf{lnP^t}, \mathbf{lnP^{t-1}}, \mathbf{lnP^{t+1}}, \ln r)}{\partial \ln p_{it}} = p_{it}q_{it} = \sum_{j=1}^{n}(a_{ij}^{11} + a_{ij}^{22}) \ln p_{ijt} + \sum_{j=1}^{n} a_{ij}^{12} \ln p_{jt-1} + \sum_{j=1}^{n} a_{ij}^{12} \ln p_{jt+1} + (a_i^1 + a_i^2)\ln r + b_i^1 + b_i^2 \qquad (10)$$

Application of Corollary 2 of Browning (1991) gives the corresponding Marshallian demand functions:

$$p_{it}q_{it} = \pi_{i0} + \sum_{j=1}^{n}\pi_{ij}^{t} \ln p_{ijt} + \sum_{j=1}^{n}\pi_{ij}^{t-1} \ln p_{jt-1} + \sum_{j=1}^{n}\pi_{ij}^{t+1} \ln p_{jt+1} + \pi_i x_t \qquad (11)$$

In this specification, two important modifications to Browning's formulation are made. First, all prices are assumed to be *real* prices, i.e., all prices including the price of utlity are deflated by a general price index like the Consumer Price Index. It is assumed implicitly, then, that consumers are not subject to money illusion, at least in an anticipatory sense[1]. Second, an outside good, a composite of all other goods, has implicitly been introduced into the model. This is important to do for two reasons: (a) to ensure zero homogeneity can be imposed on the model, and (b) so that the model does not impose the undesirable restriction of requiring at least one good to be a durable good which is implicit in formulations of this type[2]. While we should introduce *real* prices of the composite good to be completely consistent with the above specification, this specification is ignored here because of the small fraction of consumer expenditure spent on alcoholic beverages by the typical consumer[3].

Note the simplicity of the form. The model is linear in parameters yet satisfies the restrictions of consumer theory. The model is homogeneous of degree 0 in all prices and total

[1] One might allow for money illusion in the short run by relating the expected prices to nominal variables, but this is not pursued in this paper.
[2] See, for example, the Gorman Polar Form of this model in equation (8). This specification imposes the restrictions that both the betas and the thetas sum to zero. It is not hard to see that at least one of each of the betas and thetas has to be positive, which means at least one of the goods must exhibit autosubstitutability in the sense discussed by Browning (1991). This means at least one of the goods must be a durable good.
[3] The average budget share of alcoholic beverages per capita per year is approximately 0.9%.

expenditures because of deflation by a general price index of all prices. Cross price effects are also approximately symmetric because the cross-price effects of the Frisch demand model in (10) are symmetric and converting to the Marshallian demand model introduces an adjustment analogous to the income effect in static demand theory so that cross-price effects are approximately equal when expenditure shares are small as in the static case[4].

The ITLSNAP model needs to be modified to account for the fact that the futures prices are really expected prices by consumers. Let $E_t(\ln p_{jt+1})$ be the expectation of the log of next period's price given information at time *t*. Equation (11) may then be rewritten as

$$p_{it}q_{it} = \pi_{i0} + \sum_{j=1}^{n}\pi_{ij}^{t}\ln p_{ijt} + \sum_{j=1}^{n}\pi_{ij}^{t-1}\ln p_{jt-1} + \sum_{j=1}^{n}\pi_{ij}^{t+1}E_t(\ln p_{jt+1}) + \pi_i x_t + \varepsilon_t \tag{12}$$

where ε_t is a random error term. With rational expectations, $\ln p_{jt+1} = E_t(\ln p_{jt+1}) + \upsilon_{jt+1}$, we can substitute out for expected price in equation (12) to obtain

$$p_{it}q_{it} = \alpha_i + \sum_{j=1}^{n}\pi_{ij}^{t}\ln p_{ijt} + \sum_{j=1}^{n}\pi_{ij}^{t-1}\ln p_{jt-1} + \sum_{j=1}^{n}\pi_{ij}^{t+1}\ln p_{jt+1} + \pi_i x_t + \tilde{\varepsilon}_{it} \tag{13}$$

where the new error term is $\tilde{\varepsilon}_{it} = \left(\varepsilon_{it} + \sum_{j=1}^{n}\pi_{ij}^{t+1}\upsilon_{jt+1}\right)$, showing that the error term will likely be correlated with each $\ln p_{jt+1}$. In the empirical analysis, two different sets of instrumental variables will be used: (a) current, one-year, and two-year lagged prices; and (b) futures prices as own instruments. The reason for case (b) is due to Becker, Grossman, and Murphy's (1994) finding that futures prices performed much better as their own instruments despite the fact that some bias may be introduced through errors-in-variables. Their reasoning for using futures prices as own instruments was that the main source of change in prices is due to taxes which are

[4] The common term in each price variable can be shown to equal $1-(a_i^1+a_i^2)/\sum_i(a_i^1+a_i^2)$. The coefficient of per capia total expenditures for good *i* can be shown to equal $(a_i^1+a_i^2)/\sum_i(a_i^1+a_i^2)$. In turn this coefficient can be shown to equal its expenditure share times the income elasticity of the *i*th good, i.e., $w_i e_i$. Because each expenditure share is tiny and assuming the income elasticities are not too large we have the same result as with static demand theory that uncompensated elasticities are approximately compensated elasticities when income effects are small.

announced well in advance. A similar case would be expected for alcoholic beverages in the United States. Taxes account for significant proportion of price and prices change mainly from changes in state and federal excise taxes.

4. Empirical Specification

Data

The data are a pseudo panel consisting of annual data from1984-2006 over the four major regions of the United States: Northeast, Midwest, South, and West. The data source is US Department of Labor, Bureau of Labor Statistics for expenditure data and average price data. Per capita quantity data obtained from National Institutes of Health, National Institute on Alcohol Abuse and Alcoholism. Per capita total expenditures by region are also obtained from the USDL, BLS. The general price deflator used is the consumer price index for all items, available from USDL, BLS by region

Average price data are only available from 1995 and later so prices for earlier years for each region were imputed by the following procedure: (i) The percentage of beer, wine, spirits by region for each type of alcohol for 1995 were calculated; (ii) The percentages obtained in (i) were assumed fixed for 1984-1994; (iii) the fixed percentages were multiplied by total expenditure for each year by type of alcoholic beverage to obtain estimated expenditure for each type of beverage for each region; and (iv) the values in (ii) divided by per capita quantities in each region by type of beverage were then used to estimate prices (quantities and prices in liters).

Econometric Specification

With data available both by region and by year it is natural to think of it as pseudo panel data where the group variable is region, denoted *s*. Each equation in (13) can then be written as

$$\bar{x}_{ist} = \bar{\alpha}_{is} + \delta_{is} + \gamma_{it} t + \sum_{j=1}^{n} \pi_{ij}^{t} \bar{\rho}_{jst} + \sum_{j=1}^{n} \pi_{ij}^{t-1} \bar{\rho}_{jst-1} + \sum_{j=1}^{n} \pi_{ij}^{t+1} \bar{\rho}_{jst+1} + \pi_i \bar{x}_{st} + \tilde{\bar{\varepsilon}}_{ist} \qquad (14)$$

for $i=1,2,3; s=1,2,3,4; t = 1,\ldots,n.$ The variable $\bar{x}_{ist}$ is average expenditure over all consumers of good *i*, in region *s*, at time *t*; $\bar{\alpha}_{is}$ is the average over all consumer's individual effects for good *i* in region s, assumed to be time invariant; δ_{is} is the time invariant regional effect variable associated with the *ith* good; $\bar{\rho}_{jst}$ represents the average of all log prices over consumers in region *s* for commodity *j* at time *t;* $\bar{x}_{st}$ is average per capita total expenditure over all consumers in region *s* at time *t*; and $\bar{\bar{\varepsilon}}_{ist}$ is the average error term over all consumers in region *s* for good *i* at time *t*. I have also added a linear trend variable, *t*, to the model.

Inoue (2008) shows that if each group is small relative to number of individuals in the group, consistent results can be achieved and the GMM estimator using transformed data for fixed effects (FE) specification will yield more efficient results than standard FE estimators. I estimate the model by first removing regional effects from all variables and then estimate full model using these transformed variables as their own instruments. The GMM estimator is used with the Newey-West kernel corresponding to the Bartlett kernel with lag length equal to 1. All computations were performed using SAS version 9.1.

5. Econometric Results

Because the model is a four equation system, all three equations of the ITLSNAP model (14) were estimated. As indicated previously, two sets of instrumental variables were used: (a) current, one-period lagged, and two-period lagged prices; and (b) futures prices as own instruments.

Two hypotheses of interest were tested. First, the model was tested to see if dynamics overall were present. The null hypothesis for this test is the exclusion test of all lagged and futures prices. Second, the model was tested to see if consumers are myopic versus rational. The null hypothesis for this test is the exclusion of all future prices. The results of these two tests for the Wald test are shown in Table 1. We find that the static model is strongly rejected in favor of the dynamic model for both sets of instruments. The results for myopic behavior versus rational behavior are mixed. For case (a), using past prices as instruments, we fail to reject the null hypothesis of myopic behavior. However, for case (b), using futures prices as instruments, we reject myopic behavior in favor of rational, forward-looking, behavior at a p-value less than 0.01.

To save space, the parameter estimates for the models are not presented here. One can get some notion of how well the model fits the data by looking at the R-squared statistics equation by equation which are reported in Table 2[5]. Overall, both models fit the data well, considering this is a pseudo panel data set. Version b of the model using own futures prices as instruments seems to fit the data best.

Table 3 and 4 present elasticities (with Gaussian standard errors) for both short-run and long-run elasticities of both versions of the ITLSNAP model. The presence of dynamics in wine is quite evident in both models, with long-run own price elasticity estimated more precisely than the short-run elasticity. Dynamics are also clearly present in spirits but the beer elasticities are not very precisely estimated so it is hard to determine the nature of price response for beer with these data.

What is also apparent from the elasticities reported in Tables 3 and 4 are how strong and complementary cross-price effects are. It seems clear that all three beverages should be estimated jointly. Also, it would appear that rational addiction has as much strength through cross-price relationships as through own-price relationships. Moreover, the relative magnitudes of these effects differ by alcohol beverage. This suggests that models like Browning's PIGLOG specification of the SNAP model would be too restrictive for a set of goods like these.

Finally, the expenditure elasticities indicate that wine is a superior good. The elasticity is very high and may suggest it is correlated with trend. However, inclusion of trend squared in the model indicated little or no change in the results.

6. Concluding Remarks

In this paper, I present a new model, the Inertemporal Translog Simple Non-additive Preference Model (ITLSNAP) to estimate a system of alcoholic beverages using a pseudo-panel data set of regional data on U.S alcohol consumption. The focus is on wine but a priori considerations, supported by the econometric results, suggest that the three beverages (wine, beer, and spirits) are interrelated in consumption.

Overall the results support rational addiction in wine. The long-run elasticity of -0.7 seems quite consistent with previous results. Strong complementarity with other beverages

[5] The R-squared is computed as $1 - SSE/(SSA - \bar{y}^2 \times n)$, where SSA is the sum of squares of actual *y's* and $\bar{y}$ is the mean.

suggests that taxation policies on separate beverages would have similar effects on all three goods. Thus, increasing the tax on spirits, for example, would not only reduce consumption on spirits but also beer and wine. While increasing tax may achieve an objective of reducing ethanol consumption it may have the unintended effect of reducing tax revenue, more so in the long run than the short run.

The results seem encouraging and suggest that simple dynamic models with forward-looking consumer behavior can be derived and successfully applied to pseudo panel data. Future work may profitably look at other functional forms in the context of the profit function.

Two areas that may merit further investigation with U.S. demand for wine are: (i) extending the model to panel data and incorporating demographic variables; and (ii) evaluation of the influence of quality changes in prices. Information on demographic variables would help identify those individuals with the strongest habits/addictions for wine, beer, and spirits. With regional data, information on demographics could be helpful in predicting alcohol consumption by type for different locations within each region. With regard to (ii), the data collected by the BLS for the most part ignore quality differences. For example, the wine data are collected as average prices for red table wine without regard to variety or brand.

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Table 1. Hypothesis Test Results of Intertemporal Behavior and Myopic Behavior

Hypothesis Test	Wald Statistic	Model Version
Ho: $\pi_{ij}^{t-1} = 0$, $\pi_{ij}^{t+1} = 0, \forall i, j$	27.42 (p-value <0.0067)	*Version A instruments:* $\overline{\rho}_{jst}$, $\overline{\rho}_{jst-1}$, $\overline{\rho}_{jst-2}\ \forall j$
Ho: $\pi_{ij}^{t-1} = 0$, $\pi_{ij}^{t+1} = 0, \ \forall i, j$	44.58 (p-value <0.0001)	*Version B instruments:* $\overline{\rho}_{jst+1}\forall j$
Ho: $\pi_{ij}^{t+1} = 0, \ \forall i, j$	6.1 (p-value < 0.4117)	*Version A instruments:* $\overline{\rho}_{jst}$, $\overline{\rho}_{jst-1}$, $\overline{\rho}_{jst-2}\ \forall j$
Ho: $\pi_{ij}^{t+1} = 0, \ \forall i, j$	18.72 (p-value <0.0047)	*Version B instruments:* $\overline{\rho}_{jst+1}\forall j$

Note: Hypothesis tests of econometric results of equation (14) estimated using GMM.

Table 2. Goodness of Fit Statistics for ITLSNAP Model by Equation and Model Version

Equation	R-Squared	Model Version
Wine	0.6243	*Version A instruments:* $\bar{\rho}_{jst}$, $\bar{\rho}_{jst-1}$, $\bar{\rho}_{jst-2}$ $\forall j$
Beer	0.6626	
Spirits	0.8165	
Wine	0.6467	*Version B instruments:* $\bar{\rho}_{jst+1}$ $\forall j$
Beer	0.8741	
Spirits	0.8599	

Note: R-Squared statistic is $1 - SSE/(SSA - \bar{y}^2 \times n)$, where SSA is the sum of squares of actual y's and $\bar{y}$ is the mean; R-Squared computed on residual values after removing regional variation.

Table 3. Short-Run and Long-Run Elasticities of ITLSNAP Model, using Instruments $\bar{\rho}_{jst}$, $\bar{\rho}_{jst-1}$, $\bar{\rho}_{jst-2}$ $\forall j$

Commodity	Elasticity with Respect To Price of:	Elasticity Short Run	Elasticity Long Run
Wine	Wine	0.66 (1.05)	-0.83 (0.22)
	Beer	-0.21 (0.83)	-1.11 (0.29)
	Spirits	-1.32 (0.23)	-1.46 (0.19)
Beer	Wine	-0.59 (0.43)	-1.06 (0.15)
	Beer	0.62 (0.90)	-0.53 (0.41)
	Spirits	-0.96 (0.21)	-1.20 (0.15)
Spirits	Wine	-1.08 (0.06)	-1.11 (0.05)
	Beer	-0.98 (0.10)	-1.09 (0.07)
	Spirits	-0.30 (0.11)	-0.33 (0.05)
Expenditure Elasticity	Wine		7.79 (0.75)
	Beer		0.83 (0.33)
	Spirits		1.42 (0.30)

Note: Elasticities computed at sample means; values in parentheses are standard errors

Table 4. Short-Run and Long-Run Elasticities of ITLSNAP Model, using Instruments $\bar{\rho}_{jst+1}\,\forall j$

Commodity	Elasticity with Respect To Price of:	Elasticity Short Run	Long Run
Wine	Wine	-0.15 (0.24)	-0.66 (0.11)
	Beer	-0.94 (0.12)	-1.12 (0.06)
	Spirits	-1.24 (0.12)	-1.33 (0.14)
Beer	Wine	-0.97 (0.06)	-1.06 (0.03)
	Beer	0.02 (0.12)	-0.14 (0.13)
	Spirits	0.13 (0.03)	-1.15 (0.04)
Spirits	Wine	-1.06 (0.03)	-1.08 (0.03)
	Beer	-1.04 (0.01)	-1.08 (0.02)
	Spirits	-0.19 (0.07)	-0.35 (0.03)
Expenditure Elasticity	Wine		7.57 (0.78)
	Beer		0.85 (0.21)
	Spirits		1.52 (0.27)

Note: Elasticities computed at sample means; values in parentheses are standard errors.