Consumer-Level Determinants of Beer Purchases in Canadian Restaurants[⋆] [†] [‡]

Jason Hartell[a,*], Leigh Maynard[a]

[a] *Department of Agricultural Economics, University of Kentucky, Lexington, KY USA*

Abstract

Logistic regressions identified determinants of beer purchases in formal and casual restaurants in two Canadian provinces during 2000–2005, using a detailed dataset of over 23,000 consumer-level food away-from-home purchases. Prior beer consumption behavior associated mainly with unobserved heterogeneity in casual restaurants, and mixed habit persistence and unobserved heterogeneity in formal restaurants, contributed most of the explanatory power, with observable demographic regressors playing an important role in formal restaurant ordering behavior. The main strategic recommendation is to focus beer marketing resources on targeting specific audiences, with less emphasis on the restaurant environment.

Key words: beer, food away-from-home, Canada, CREST data

Objectives and Background

Much of the economic literature on beer consumption and alcoholic beverages focuses on estimating key demand parameters, usually in the context of public policy considerations of revenue generation and tax incidence

[⋆] Contributed paper prepared for *Beeronomics: The Economics of Beer and Brewing*, Leuven, Belgium, 27–29 May 2009.

[†] This study of away-from-home beer consumption should be considered a companion piece to a recent analysis of wine consumption behavior in Canada (see Maynard and Davidson, 2009) which uses a common dataset and similar econometric techniques.

[‡] The authors wish to thank the Consumer and Market Demand Agricultural Policy Research Network, hosted at the University of Alberta Department of Rural Economy, for providing the data used in this study.

[*] Corresponding author

Email addresses: j.hartell@uky.edu (Jason Hartell), leigh.maynard@uky.edu (Leigh Maynard)

or for the purpose of influencing aggregate consumption in the interest of public health and safety. Alcoholic beverage sales have also become an increasingly important revenue share for many restaurants (Crecca, 2007). As such, market research emphasizing consumer-level determinants of alcohol purchasing decisions away-from-home should be of interest both to the hospitality industry as well as public planners. The objective of this research is to identify important economic and demographic correlates of beer purchases in formal and casual restaurants in the Canadian provinces of Ontario and Quebec. As these provinces represent the nation's Anglophone and Francophone regions it opens the possibility of identifying potentially interesting cultural effects on beer purchasing decisions. Finally, this research contributes to the literature through the use of an exceptionally rich and large food away-from-home dataset that, in addition to the distinctions mentioned above, enables the investigation of numerous interesting variables on beer consumption. Analysis of the economic determinants of beer consumption in most previous studies is performed in conjunction with that of wine and spirits, and often as a subset of general alcohol consumption. Of interest in most studies is the price elasticity of beer and whether beer can be considered a necessity or luxury good. Some examine the magnitude of various elasticities relative to similar types of analysis and make an effort to draw general 'stylized facts' of beer demand characteristics. Other studies have included a number of demographic and environmental variables in their analysis of beer consumption patterns. By far, the majority of studies have used datasets from the US, Western Europe, and Commonwealth countries.

Among country level analysis of price and income effects, Gao, Wailes and Cramer (1995) utilize a two-stage budgeting consumer demand system of U.S. alcohol consumption using survey data from 1987–1988. In estimating elasticities, they convert consumption to total ethanol content to more readily examine taxation issues. They find beer to be price-inelastic and the least sensitive compared to wine and spirits. Blake and Nied (1997) employ a three-stage AIDS model to estimate U.K. alcoholic beverage demand using consumption data from 1952–1991. Their long-run estimates find that beer is a normal good and slightly price-inelastic. They note that the inclusion of more recent data relative to earlier time series analysis has resulted in a sometimes substantial increase in the estimated price elasticity of beer while earlier cross-sectional studies indicated much more elastic demand. A panel data study evaluating Canadian consumption of alcohol (Ogwang

and Cho, 2006) from ten Canadian provinces during 1980-2003 also found beer demand to be price inelastic in a fixed effects model but insignificant in a time and 2-way fixed effects model. They question whether factors other than price are more important to beer drinkers. Inconclusive income elasticity results also indicate that beer could be either a normal or inferior good.

Several studies investigate comparisons in alcohol consumption using cross-country data sets. Results from a Rotterdam demand system for each of nine countries separately found beer to be price inelastic and a necessity in all but Japan (Selvanathan, 1991). These results appear consistent with a review of previous work conducted for Australia, the UK, and the US. Even while test statistics rejected the possibility of pooling data in favor of individual country effect models, the results for beer remained unchanged. In another look at the issue of cross-country pooling, Selvanathan and Selvanathan (2007) used alcohol consumption data from ten industrial countries and found beer to be a necessity in all but Japan where the income elasticity indicates it is a luxury. Beer demand is also found to be price inelastic in all countries and less elastic than either wine or spirits. Similarly, they also rejected a pooled cross-country model.

A variety of non-price and income variables are frequently included in demand analysis models including those of Gao, Wailes, and Cramer (1995), Blake and Nied (1997), Nayga (1996), and Kerr et al. (2004). Nayga (1996) is most closely rated to the present study in that it analyzes away-from-home expenditures on alcohol consumption. Using data from the 1992 US Bureau of Labor Statistics Consumer Expenditure Survey and the generalized Heckman procedure, Nayga (1996) shows that away-from-home beer consumption is higher among white households without children. Increasing age is shown to decrease beer consumption while regional affects show those in the West and Midwest have higher away-from-home beer consumption than other regions. Kerr et al. (2004) also find that age decreases beer consumption as does educational attainment and being female. Divorced men and never-married women consume more beer relative to their married counterparts. White men drink more beer relative to other ethnicities while regional affects were not significant. Disaggregating the sample into age cohorts revealed that beer consumption has increased in men among more recent cohorts while decreasing in women. Regional and seasonal affects were found to be important in Gao, Wailes, and Cramer (1995) with beer consumption higher in the South and during the summer. Being male and

living in an urban environment conferred higher beer consumption. The authors also found that prior behavior is related to current behavior in general alcohol consumption-recent, frequent or heavy consumption indicated a greater possibility of current consumption relative to those who have not drunk, drink infrequently or lightly. Blake and Nied (1997) tested climatic factors and found that beer consumption is reduced in the presence of rain. The declining share of employment in the manufacturing sectors was found to reduce beer consumption while beer advertizing contributed to higher beer consumption. They also show that overall beer consumption, after climbing steadily since the 1950s has declined somewhat from its high in the late 1970s.

Data

This analysis used data from the Consumer Report on Eating Share Trends (CREST), collected for Canada by The NPD Group, Inc., a market research company. The data were purchased by the Consumer and Market Demand Agricultural Policy Research Network, hosted at the University of Alberta's Department of Rural Economy. Each quarter from May, 2000 to May, 2005, a demographically representative panel of 4,000 households recorded their food away-from-home purchases during a two week period. Many households participated in multiple quarters, but few participated in every quarter of the study period.

Analysis focused on the provinces of Ontario and Quebec, because they are populous, adjacent, and represent Anglophone and Francophone Canadians, each with potentially distinct cultural attributes, respectively. The data were filtered for dinning occasions by formal and casual restaurants thus excluding observations from fast food restaurants and coffee shops where beer is unlikely to be served. Diners under the legal drinking age were excluded from the analysis (18 in Quebec, 19 in Ontario). Anticipating the importance of individuals' prior behavior in explaining current behavior, only data from diners reporting multiple meals were used in the analysis and adjusted such that each observation represents a single meal eaten by an individual diner. Ultimately, there were 3,577 observations pertaining to meals in formal restaurants, and 23,058 observations pertaining to meals in casual restaurants.

Up to eight food and beverage item codes were recorded for each meal, allowing identification of beer purchases. Other alcoholic beverage codes included red and white wine, cocktails, and wine coolers. An exceptionally

rich dataset, dozens of variables described the diner, the diner's household, and the dining occasion. Demographic variables included age, gender, education, occupation category, income, first language, marital status, number and age of children, city size, dwelling type and home ownership, and even pet ownership. Variables describing the meal included the restaurant category, its specialty or ethnicity, the meal date, day of the week, time, the size of the party, meal context (e.g., business travel, vacation, etc.), and location prior to eating (e.g., work, home).

The mean values for meal-specific observations in formal and casual restaurants are shown in table 1. As might be expected, beer was more frequently purchased at casual restaurants than at formal restaurants. A majority (69%) of formal dining meals occurred in the evening, with almost a quarter occurring on Saturday. Quebec residents were more heavily represented among the formal restaurant sample.

Empirical Methods

Two binary logistic regressions were estimated to explain the likelihood of beer purchase in formal vs. casual restaurants. While the theory of consumer choice can certainly be invoked to guide selection of independent variables, the large number of observations and variables allows the analysis to be primarily an inductive data mining exercise, including many independent variables for which theory provides no a priori expectations. Independent variables included those common in other studies such as income, age, gender, education, marital and employment status, presence of children month for seasonal effects, and province for regional effects. Additional less commonly available variables included in the analysis are day of the week, time of day, first language, city size, residence type and home ownership status, number of food items purchased, party size, home ownership, restaurant specialty, and percent of previous meals in which each of five types of alcoholic beverages were purchased, and even pet ownership. Prior behavior was expected to play a strong role in restaurant food and beverage choices, but this required a series of manipulations of the data to be able to monitor individuals' behavior over time. The CREST data include a household ID number, the age and gender of each diner at each meal, and the date of each meal. In many cases, such as households with one member or two members of the opposite gender, it is straightforward to append an individual identifier to the household ID number. However, in cases where the household contains multiple members of the same gender

with similar ages, who may not be present at every meal recorded by the household, accurate identification over a five-year period is problematic.

Diners were first segregated by gender, and each meal's date and time was expressed as the fractional number of days elapsed since the beginning of the study period. The data were sorted by household ID and days elapsed, allowing identification of each household's gender-specific "eater 1." Given the individual's age on the meal date, minimum and maximum birthdates were calculated. In subsequent meals, the birth date range attributable to the diner's age and the meal date were also calculated. If the range was inconsistent with "eater 1's" range, then "eater 2" was established. A similar approach was used to identify additional individuals, up to four of each gender in each household. When individuals' ages were similar, the presence of multiple diners at the same time and place was useful in identifying additional household members.

After appending individual identifiers to all household ID numbers, the data were sorted by individual and by date, and running sums were calculated of meals and alcoholic beverage purchases. This allowed the construction of variables indicating the running percentage of previous meals at which each type of alcoholic beverage was ordered by a given individual.

The measures of prior behavior, while not lagged endogenous variables *per se*, certainly shared many of their (problematic) features, including potential simultaneity bias in the presence of serial correlation. Pearson residuals from all initial logit regressions displayed significant evidence of serial correlation when regressed against their lagged values and all exogenous regressors (often called the Durbin m test; see, e.g., Davidson and MacKinnon, 1993, p. 358). As the prior behavior variables can be expressed as a function of lagged residuals, which are themselves a component of the current residual in an autoregressive model, simultaneity bias can result. Accordingly, the prior behavior variables were replaced with instruments to eliminate any correlation with the residuals. The instruments were fitted tobit estimates of the prior behavior variables, estimated from twice-lagged exogenous variables.

If the instruments of prior behavior variables are important predictors of current behavior, the relationship can stem from either habit persistence or unobserved heterogeneity, or some combination of both. Unobserved heterogeneity refers to stable individual characteristics that are uncorrelated with available demographic regressors. Habit persistence, however, should be detectable via dynamic patterns of behavior. Following Anderson and

Hsiao (1981), if the baseline models in levels indicate important prior behavior effects, re-estimating the models in first differences should control for unobserved heterogeneity, allowing any remaining dynamic effects to be attributed to habit persistence.

Results

Results from the baseline set of two logit regressions are presented in table 2 in the form of odds ratios. The odds ratio, a way of comparing whether the probability of an outcome is the same between two groups, is interpreted here as percent higher/lower odds when compared to the reference category. Likelihood ratio indices (LRI), a measure of explanatory power sometimes called McFadden's pseudo-R^2, were 0.24 and 0.35 in the formal and casual restaurant models, respectively. The many statistically significant results were generally consistent with expectations based either on economic theory or conventional wisdsom. For example, the estimated odds of ordering beer were 16% and 26% lower for consumers with annual household income below $30,000 for formal and casual restaurant settings, respectively. Meanwhile, the odds of ordering beer in formal restaurants were also 26% lower for those with incomes exceeding $60,000. High-income consumers may be better able to afford beer, but may prefer substitutes such as wine in formal settings. Consumers in younger age groups were 20% and 31% more likely to order beer than those over age 65 in casual restaurants. Compared to residents of Ontario, the odds of beer purchases were 44% (formal) and 10% (casual) higher for residents of Quebec. The odds of a beer purchase in either formal or casual restaurants were about 67% lower for consumers with an Asian first language, relative to English or French speakers.

The odds of beer purchases by urbanites (city size exceeding 250,000) were 45% lower in formal restaurants. Beer is often portrayed as a less sophisticated beverage than wine, with fewer gastronomic associations suitable for formal occasions. Maynard and Davidson (2009) found pronounced preferences for wine in urban, formal dining settings. Gender patterns in beer consumption were highly significant; odds for women were 71% lower than men in formal restaurants, and 52% lower in casual restaurants. University-educated and professional workers were more likely to order beer, relative to blue collar workers, retirees, homemakers, and others. Apartment dwellers were considerably less likely to order beer in both types of restaurants, while homeowners' odds of a beer purchase were 59% higher versus

renters in formal restaurants. Dog owners were significantly more likely to order beer in formal restaurants, raising a host of questions about causality. Weak evidence suggested higher likelihood of beer purchases in formal restaurants among currently and formerly married consumers, relative to never-married consumers.

The presence of children in a party substantially depressed the odds of beer purchases in casual restaurants, but strongly enhanced the odds in formal restaurants, where meals are more likely to be motivated by special family occasions. Unsurprisingly, beer purchases in casual restaurants were twice as likely at evening meals, relative to other times of day. The results suggest 36% lower odds of beer purchases when the consumer was previously at work. While this result would likely be surprising in a U.S. context, it might be explained partially by Ontario's 1984 ban on special happy hour pricing. During business travel, beer was much more likely to be ordered at formal restaurants, but oddly, it was less likely to be ordered in hotel restaurants. Beer purchases were more likely on Friday in casual restaurants, more likely on Saturday in formal restaurants, and less likely on Sunday in both types of restaurants. The warmer months induced the highest likelihood of beer orders in formal restaurants, but little seasonality was observed in casual restaurants.

Beer purchases were strongly associated with restaurant specialties. Relative to undesignated restaurants, the odds of beer purchases were significantly lower in steak, seafood, Chinese, Italian, and French restaurants, several of which feature cuisine associated with wine pairings rather than beer. Only in formal Greek, Indian, and Japanese restaurants were the odds of beer purchases higher than in undesignated restaurants.

In terms of economic and statistical significance, the dominant factor affecting a consumer's current beer purchasing behavior was the previous portion of meals at which beer was ordered. Recall that this variable is an instrumental variable equal to the predicted portion of previous beer orders, to avoid endogeneity bias. As the percentage of predicted beer orders at former meals rose by 10%, the odds of a current beer purchase rose by a factor of 2.6 in formal restaurants and 10.3 in casual restaurants. Prior purchases of red wine and cocktails were associated with higher likelihood of a current beer order, suggesting that, over time, consumers substitute readily across most alcoholic beverages. White wine and wine coolers, however, did not appear to belong in the same substitution set.

For the purpose of marketing strategy, it would be useful to know whether prior behavior is important due to habit persistence or unobserved heterogeneity. If it is due mainly to habit persistence, then restaurants might increase profitable beer sales by using "foot in the door" techniques such as temporary price reductions, free beer tastings, etc. If, on the other hand, unobserved heterogeneity drives behavior, then fewer options are available, as consumers have stable preferences that cannot be easily tied to measurable factors. For the 66% of diners who never ordered beer during the study period, no behavioral variation exists with which to distinguish between habits and unobserved heterogeneity. For those consumers who sometimes (but not always) ordered beer, regressions were estimated in first differences to control for unobserved heterogeneity, as outlined previously. Habit persistence would be signaled by significant positive parameters on lagged, instrumented endogenous variables. Significant but negative lagged endogenous parameters would be consistent with variety-seeking behavior, and a lack of significant parameters would indicate that prior behavior effects are caused primarily by unobserved heterogeneity.

The strongest possible evidence of habit persistence would appear if a consumer once behaved differently than at the preceding meal, and then never changed his or her behavior henceforth. However, this behavior was rarely, if ever, observed. A more realistic indicator would be evolution of the tendency to order beer over time, and thus the dependent variable in the first-differenced regressions was not the difference between current and lagged binary beer choices. Rather, the dependent variable was the difference between the current and lagged prior behavior variables, i.e., the change in the running percentage of meals at which beer was ordered.

One might hypothesize that habit effects differ systematically with age, because younger diners' preferences are more likely to be in flux as they gain experience. To test this hypothesis, interaction variables equal to the product of the age category and lagged change in behavior were added to each first-differenced regression.

The results from the differenced regressions are not presented since we are only interested in the magnitude and significance of the parameters on the lagged, instrumented dependent variables. Habit effects were statistically significant in both formal and casual settings, with economically significant effects in formal restaurants. A previous 10% increase in the likelihood of beer consumption in formal restaurants was associated with current likelihood increases of 8.2% for diners under 30, 4.4% for diners

aged 30–44, 5.6% for diners aged 45–64, and 4.4% for diners age 65 and over. In casual restaurants, a previous 10% increase in the likelihood of ordering beer only induced a 0.8% increase in the subsequent likelihood of beer consumption for diners under 30, and a 0.3% increase for diners age 30 and over. Thus, the strong prior behavior effects observed in the baseline regressions appear to be attributable to unobserved heterogeneity in casual settings, and combined impacts of habit persistence and unobserved heterogeneity in formal settings. Identifying the relative importance of habits versus unobserved heterogeneity would require alternative methods that are a topic for further research.

To explore model stability, table 3 illustrates how explanatory power varied as each of three categories of regressors (demographic, meal context, and prior behavior) was eliminated from the model. In each of the two regressions, removing the meal context variables caused relatively little reduction in explanatory power, with the LRI falling by 0.04 at most. Likewise, explanatory power suffered only slightly when demographic regressors were removed from the casual restaurant regression. Removing the prior behavior variables, however, substantially reduced both models' explanatory power. For example, in the absence of prior behavior regressors, the LRI for beer purchases at casual restaurants was more than halved. Demographic regressors also proved important in the formal restaurant regression.

Conclusions

Beer is a high-value item that is not demanding of servers' time, so it can be a profitable component of restaurant revenue. The results suggested that effective marketing strategies may differ between formal and casual settings. In formal restaurants, beer purchases could be better predicted with knowledge of diners' observable demographic variables. Recognizing that great variation exists across individuals, a profile of the most typical beer purchaser in formal restaurants would be a married, male non-Asian professional who is not low-income but rents a house. In casual restaurants, the strategic value of trying to identify such a profile appears limited. Individual demographic variables were statistically significant, and even economically significant, but as a group they failed to contribute much to explanatory power. Likewise, in both types of settings, the meal environment played a modest role in overall explanatory power, although individual factors such as evening meals, the day of the week, and the presence of children affected beer purchases. The tendency toward low beer sales in restaurants offer-

ing specialty cuisine suggests potential marketing opportunities if different varieties or specialty beer can be credibly paired with specific cuisines.

The differences between consumer behavior in formal and casual restaurants extended to the strong link between prior and current beer purchases. Habit persistence appeared to be an important factor in formal restaurants, suggesting that restaurants that enjoy a high percentage of repeat clientele might benefit from attempts to accustom diners to ordering beer. Customers who frequently ordered other types of alcoholic beverages appeared prone to beer purchases, but managers may be reluctant to cannibalize wine or cocktail sales as they are also highly profitable. This position is supported by Blake and Nied (1997) who find that advertizing has only a small effect on overall alcohol demand and that advertizing which increases demand for one type of drink comes at the expense of others. An alternative marketing strategy for formal restaurants, if it does not violate public health and safety regulation, would involve special pricing or other promotions designed to encourage substitution of beer for nonalcoholic beverages. Such a strategy appears unlikely to be successful in casual restaurants, however, where consumers displayed stable patterns of beer consumption or nonconsumption, with little evidence of the dynamic effects associated with habit persistence. About two-thirds of diners never ordered beer during the study period. One would expect latent demand within this group to be highly inelastic, and it would be interesting to test how price elasticity of demand for beer varies with purchase frequency, especially in a food-away-from-home setting. Unfortunately, the CREST dataset used in this study does not provide item-specific prices or the quantity of beer purchased per diner, thus precluding reliable price elasticity estimation.

This study was intended to serve multiple potential audiences. In most cases, owners or managers of individual restaurants are well aware of purchasing patterns at their own restaurant. For this audience, the best use of such academic studies may be to compare observed behavior in a given restaurant with average aggregate behavior. Where there are large deviations, understanding how and why local conditions are idiosyncratic might suggest profitable opportunities. For academic audiences, this study offers detailed empirical evidence from restaurants, for which data are rarely available. It also encourages discussion about empirical techniques needed to address some the special challenges of using CREST data. It can even provide entertainment as economists attempt to explain the link between beer purchases and dog ownership.

References

Anderson, T.W. and Hsiao, C. (1981). Estimation of dynamic models with error components. *Journal of the American Statistical Association*, 76, 598–606.

Blake, D. and Nied, A. (1997). The demand for alcohol in the United Kingdom. *Applied Economics*, 29, 1655–1672.

Clements, K.W. and Selvanathan, S. (1991). The economic determinants of alcohol consumption. *Australian Journal of Agricultural Economics*, 35, 209-231.

Crecca, D.H. (2007). Adding value: Beverage alcohol's contribution to restaurant sales is significant and growing in importance. *Cheers*, October 1.

Davidson, R. and MacKinnon, J.G. (1993). *Estimation and Inference in Econometrics*, New York: Oxford University Press.

Gao, X.M., Wailes, E.J., and Cramer, G.L. (1995). A microeconometric model analysis of US consumer demand for alcoholic beverages. *Applied Economics*, 27, 59–69.

Kerr, W.C., Greenfield, T.K, Bond, J., Ye, Y., and Rehm, J. (2004). Age, period and cohort influences on beer, wine and spirits consumption trends in the US national alcohol surveys. *Addiction*, 99, 1111–1120.

Maynard, L.J. and Davidson, K. (2009 forthcoming. Consumer-level determinants of wine purchases in Canadian restaurants. *Journal of Wine Economics*.

Nayga, R.M., Jr. (1996). Sample selectivity models for away from home expenditures on wine and beer. *Applied Economics*, 28, 1421–1425.

Ogwang, T. and Cho, D.I. (2006). Economic determinants of the consumption of alcoholic beverages in Canada: A panel data analysis. Proceedings of the 33rd ASAC Annual Conference, Banff, Alberta, June 2006.

Selvanathan, E.A. (1991). Cross-country alcohol consumption comparison: An application of the Rotterdam demand system. *Applied Economics*, 23,1613–1622.

Selvanathan, S. and Slevanathan, E.A. (2007). Another look at the identical tastes hypothesis on the analysis of cross-country alcohol data. *Empirical Economics*, 32:185–215.

Table 1: Mean values of dependent and independent variables for meals at formal and casual restaurants

	Formal	Casual
Dependent variable		
Ordered beer	9%	20%
Independent variables		
Income $< \$30,000$	8%	12%
Income $> \$60,000$	61%	56%
Age < 30	4%	7%
Age 30–44	21%	27%
Age 45–64	50%	44%
Age > 65	24%	22%
Quebec	41%	26%
Asian first language	2%	2%
Female	61%	60%
City size $< 30,000$	4%	4%
City size $> 250,000$	80%	78%
Reside in house	66%	68%
Reside in apartment	18%	19%
Own residence	84%	81%
Number of cats	0.41	0.49
Number of dogs	0.20	0.24
Married	74%	75%
Divorced or widowed	11%	11%
Some college [a]	40%	47%
College degree	63%	49%
Professional employment	49%	48%
Blue collar employment	13%	18%
Retired	36%	35%
Homemaker	12%	13%
Student	1%	1%
Prior meal white wine orders	7%	5%
Prior meal wine cooler orders	1%	1%
Prior meal red wine orders	9%	5%
Prior meal cocktail orders	2%	2%
Number of meal items	4.96	3.64
Child in party	5%	10%

Table 1 – continued from previous page

	Formal	Casual
Evening meal	69%	56%
Friday	19%	20%
Saturday	23%	18%
Sunday	11%	13%
Party size	2.24	2.06
Steak restaurant	2%	2%
Seafood restaurant	3%	5%
Chinese restaurant	4%	8%
Italian restaurant	15%	11%
Greek restaurant	2%	4%
Indian restaurant	1%	1%
Japanese restaurant	2%	1%
French restaurant	8%	0%
Restaurant in hotel	20%	5%
Arrived from work	14%	16%
Business travel	4%	2%

N = 3,577 meals at formal restaurants
N = 23,058 meals at casual restaurants
[a] Education and occupation variables = 1 if either the female or male household head satisfies the criterion

Table 2: Logit odds ratios of beer purchases in formal and casual restaurants

	Formal	Casual
Income $< \$30,000$	$0.84 * **$	$0.74 * **$
Income $> \$60,000$	$0.74*$	1.06
Age < 30	0.28	$1.31 * *$
Age 30–44	0.66	$1.31 * **$
Age 45–64	0.98	$1.20 * *$
Quebec	$1.44*$	$1.10*$
Asian first language	$0.32 * **$	$0.33 * **$
Female	$0.29 * **$	$0.48 * **$
City size $< 30,000$	$1.27*$	1.10
City size $> 250,000$	$0.55 * **$	1.00
Reside in house	$1.59 * **$	0.94
Reside in apartment	$0.62 * **$	$0.80 * *$
Own residence	$0.22 * **$	0.96
Number of cats	$0.99 * **$	$0.96*$
Number of dogs	$1.23 * **$	0.93
Married	$1.09 * **$	0.91
Divorced or widowed	$1.03 * **$	0.92
Some college	0.93	$1.15 * **$
College degree	1.10	$1.12*$
Professional employment	$1.29 * **$	0.92
Blue collar employment	$0.97 * **$	0.96
Retired	$0.98 * **$	0.94
Homemaker	$0.91 * **$	0.99
Student	4.13	1.14
Prior meal beer orders (predicted)	26.35	$102.79 * **$
Prior meal white wine orders	0.37	1.23
Prior meal wine cooler orders	$0.69 * **$	$0.43*$
Prior meal red wine orders	0.51	$1.95 * **$
Prior meal cocktail orders	$1.20 * **$	0.87
Number of meal items	$1.01 * **$	$0.94 * **$
Child in party	$1.66 * **$	$0.74 * **$
Evening meal	1.20	$2.16 * **$
Friday	1.26	$1.18 * **$
Saturday	$1.24 * **$	$0.88*$

Table 2 – continued from previous page

	Formal	Casual
Sunday	0.81 ∗ ∗∗	0.88∗
February	0.79	1.11
March	0.68 ∗ ∗∗	0.98
April	1.05∗	1.08
May	1.33 ∗ ∗∗	0.98
June	1.69 ∗ ∗∗	0.91
July	1.36 ∗ ∗	1.03
August	0.85∗	1.09
September	1.32 ∗ ∗	1.05
October	1.03 ∗ ∗∗	0.81∗
November	1.22 ∗ ∗∗	0.91
December	1.29	1.11
Time trend (day)	1.00 ∗ ∗∗	1.00 ∗ ∗∗
Party size	1.04 ∗ ∗	1.03
Steak restaurant	0.92 ∗ ∗∗	0.69 ∗ ∗
Seafood restaurant	0.71 ∗ ∗∗	0.73 ∗ ∗∗
Chinese restaurant	0.81 ∗ ∗∗	0.14 ∗ ∗∗
Italian restaurant	0.93 ∗ ∗∗	0.45 ∗ ∗∗
Greek restaurant	1.21 ∗ ∗∗	0.28 ∗ ∗∗
Indian restaurant	1.95 ∗ ∗∗	0.46 ∗ ∗∗
Japanese restaurant	1.98 ∗ ∗∗	0.28 ∗ ∗∗
French restaurant	0.63 ∗ ∗∗	0.39 ∗ ∗
Restaurant in hotel	0.79 ∗ ∗∗	0.83∗
Arrived from work	0.64 ∗ ∗∗	0.93
Business travel	1.63 ∗ ∗∗	0.99
Likelihood ratio index	0.24	0.35

*, **, *** denote statistical significance of the underlying parameteres at the .10, .05, and .01 levels, respectively.

Table 3: Likelihood ratio index values under alternative model specifications

	All Regressors	No prior behavior regressors	No meal context regressors	No demographic regressors
Formal restaurants	0.25	0.15	0.22	0.17
Casual restaurants	0.35	0.16	0.31	0.33