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Investigating the Link between Beer Consumption and Economic Conditions in Canada: A Panel Data Analysis

Danny I Cho[1*] and Tomson Ogwang[2]

[1]Goodman School of Business, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario, L2S 3A1, Canada
[2]Department of Economics, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario, L2S 3A1, Canada

Abstract

In this paper we examine the link between beer sales, unemployment and other economic variables in Canada using provincial level panel data at monthly frequencies for the period from January 2000 to December 2010. Our panel cointegration test results indicate a stable long-run relationship between beer sales per-capita and the economic variables considered. When we account for this cointegration by specifying panel error correction models we find strong evidence that beer sales in Canada are pro-cyclical with per-capita sales increasing during good economic times as indicated by the levels of unemployment and average hourly earnings. We also find strong evidence of habit persistence in Canadian beer sales as would be expected for an addictive product. The policy implications of these results are discussed.

Introduction

As evidenced by a spate of recent papers on the subject, the link between socioeconomic factors and alcoholic beverage consumption is an issue of significant public policy interest in several countries. This interest is partially ascribed to concerns about the potential negative health effects of excessive alcohol consumption.

Beer is perceived by some to be recession-proof implying that in general beer drinkers will continue to indulge in this practice regardless of the prevailing economic conditions. The fact that beer is generally cheaper by volume than competing alcoholic beverages such as wines and spirits raises strong possibilities of beer substitution for the more expensive alcoholic beverages during bad economic times. These substitution possibilities imply that beer consumption could be counter-cyclical with per-capita consumption increasing during bad economic times. Also assuming that beer is a normal good with high income elasticity then beer consumption could increase during good economic times in which case the consumption would be pro-cyclical with per-capita consumption increasing during good economic times. In light of these possibilities, a determination as to whether beer consumption is non-cyclical, pro-cyclical or counter-cyclical becomes an empirical issue.

One of the main variables of interest in the theoretical and empirical investigations of the link between economic conditions and beer consumption is unemployment. With respect to the link between unemployment and beer consumption, two competing views can be found in the literature. One view contends that beer consumption rises with rising unemployment owing to the psychological problems arising from stress and reduced social interaction opportunities[1]. An opposing view, contends that beer consumption falls with rising unemployment owing to tight budget constraints associated with job losses. It is apparent from these competing views that the net effect of unemployment on beer consumption is ambiguous. More specifically, beer consumption could be pro-cyclical (i.e., per-capita consumption increases with falling unemployment in good economic times) if the economic factors outweigh the psychological factors and could be counter-cyclical (i.e., per-capita consumption decreases with falling

unemployment in good economic times) if the psychological factors outweigh economic factors.

The public health, tax revenue generation, and tourism boosting benefits of alcoholic beverage consumption and the public health, safety, and productivity costs of excessive consumption are widely documented in the literature [1-8] (e.g., Richman and Warren, Rimm et al., Yu and Chen, Plummer et al., Mann et al., Sen and Luong, Ogwang and Cho, World Health Organization 2011). In light of these beneficial or detrimental effects, the consumption of beer and other alcoholic beverages continues to be an issue of extensive public policy debate. This debate centers on the best way to control the consumption while striking a balance between the benefits and the costs of such consumption. The fact that most of the costs of excessive alcohol consumption are not suffered by the abusers themselves heightens the need for consumption control. For purposes of consumption control, it is important to know the extent to which beer consumption responds to changes in the socioeconomic and policy variables.

A careful review of the literature on the link between socioeconomic conditions and alcoholic beverage consumption in Canada reveals differential impact by type of alcoholic beverage (i.e., wine, beer and spirits). For example, Richman and Warren (1985) [1] uncovered inter-beverage differences in the impact of alcohol consumption on morbidity in Canada. Also, Mann et al. [5] found that beer drinkers in one Canadian province are more likely to be involved in drinking-driver related deaths than wine drinkers or spirits drinkers. Hence, it makes sense for public policy towards the control of alcoholic beverage consumption to take into account the differential impacts by beverage type.

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*Corresponding author: Danny I. Cho, Goodman School of Business, Brock University, 1812 Sir Isaac Brock Way, St. Catharines, Ontario, L2S 3A1, Canada, Tel: (905) 688-5550; ext: 4447; Fax: (905) 378-5723; E-mail: dcho@brocku.ca

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[1]Krüger and Svensson (2010) note that beer consumption could also increase in an economic downturn owing to an increase in leisure time.

According to some recent international classifications, Canada is placed in the "predominantly beer country" category. In light of this classification, it is not surprising that the effect of socioeconomic factors on beer consumption in Canada has been investigated by Johnson and Oksanen [9,10], Adrian and Ferguson [11], Alley, Ferguson and Stewart [12] and Johnson et al. [13], among others. However, these papers do not examine the effect of unemployment. The few studies that have so far examined the effect of unemployment on beer consumption in Canada have used either survey data (e.g., D'Arcy and Siddique) [14] or pure time series data at annual frequencies (e.g., Yu and Chen) [3]. D'Arcy and Siddique found that employed individuals in their sample reported significantly greater alcohol consumption than do their unemployed counterparts although the effect of unemployment on alcoholic beverage consumption was not as pronounced as the effects of other socioeconomic and demographic variables. Yu and Chen did not report their findings with respect to the effect of unemployment on beer consumption in the Canadian province of New Brunswick even though they also included an unemployment variable as a predictor in their study. Although there are certain empirical questions with respect to the triggers and effects of beer consumption that may be best answered by using survey data, such data may be prone to reporting errors or to sample selection biases. As will be seen below, the use of lower frequency (e.g., annual) time series data for modeling alcoholic beverage demand also creates some empirical problems if variables capturing business cycle fluctuations are included among the predictors.

It is now widely recognized that one of the best ways to examine the link between alcoholic beverage consumption and socioeconomic factors is by using panel data, which is a hybrid of cross section data and time series data. The use of panel data in this context can be rationalized on several grounds. First, as noted by Ogwang and Cho [7], panel data enables empirical researchers to control for some variables that influence the consumption of a particular alcoholic beverage but which may not be observable or measurable. Second, there are efficiency gains from the increased number of observations that panel data provides. Third, the additional variability in the predictors due to pooling may alleviate multicollinearity problems that might arise in the estimation of demand functions for alcoholic beverages owing to the inclusion of social/demographic variables that do not change (or change very little) over short periods. Freeman [15] notes that the legal, regulatory, safety and health concerns that affect consumer perceptions of alcohol over time can be captured using panel data. Hsiao [16] and Baltagi [17] articulate the salient benefits of panel data analysis in general.

Recently, Ogwang and Cho [7] employed panel data for 10 Canadian provinces at annual frequencies covering the period from 1981 to 2004 to examine the effect of unemployment and several other socioeconomic variables on the consumption of beer and other alcoholic beverages. Ogwang and Cho found that unemployment has a significant negative effect on per-adult (15 years and over) beer consumption. More recently, Nelson 2010 investigated the effect of unemployment on aggregate (i.e. beer, wine and spirits) per-adult (15 years and over) alcoholic beverage consumption using an international level panel for Canada and 16 other OECD countries at annual frequencies and covering the period from 1975 to 2000. Nelson also found a significant negative relationship between unemployment and aggregate alcoholic beverage consumption per-adult. However, Nelson did not run separate regressions for the different types of alcoholic beverages even though differential responses to changes in socioeconomic variables would be expected for the different types of alcoholic beverages as already alluded to above.

As noted by Freeman [15,18] and Ogwang and Cho [7], among others, the use of annual frequencies as the time dimension for panel data may not be the most appropriate since annual data smoothens rather than captures within year fluctuations in alcoholic beverage consumption. This smoothening may result in the underestimation of the extent to which alcoholic beverage consumption responds to business cycle fluctuations. Thus, the best way to capture the within-year fluctuations in beer consumption is to use higher frequency (i.e., monthly rather than annual) panel data.

Another potential problem which should be avoided in the panel data analysis of the link between beer consumption and economic/cyclical variables is that of spurious (or nonsense) regression. This problem pertains to the possibly of getting flawed and meaningless results by using non-stationary panel data in the analysis without proper accounting for the non-stationarity. To circumvent the spurious regression problem, it is important to first test for panel cointegration among the relevant variables provided that the number of observations is sufficiently large for meaningful analysis as is the case with the present study. Should panel cointegration be established, which turns out to be the case in the present paper, then the link between beer consumption and economic/cyclical variables should be investigated, and the spurious regression problem avoided, by specifying a panel error correction model (PECM). Baltagi and Kao [19] and Baltagi [17], among others, provide comprehensive discussions of the problem of spurious regressions in panel data.

Beer Canada, the association of major Canadian beer producers, currently provides monthly provincial level panel data on Canadian beer sales which is naturally highly correlated with beer consumption. The purpose of this paper therefore is to exploit these higher frequency panel data to re-examine the impact of unemployment and other economic/cyclical variables on Canadian beer sales per-adult (18 years and over). To this end, a balanced panel for 10 Canadian provinces at monthly frequencies covering the period from January 2000 to December 2010 is used. The choice of this period is dictated by the availability of the necessary data.

The present study makes three major improvements over Ogwang and Cho's 2009 study. First, we use more recent provincial level panel data at higher (i.e., monthly as opposed to annual) frequencies. To the best of our knowledge, this is the first Canadian study to employ monthly frequency panel data in order to better capture the impact of economic conditions on beer consumption. Second, we account for beer's potential addictiveness by including variables representing lagged beer sales in some panel regressions in order to capture the habit persistence effects. Third, we fully exploit the larger number of observations provided by monthly as opposed to annual frequencies to first test for panel cointegration between beer sales, unemployment and other economic variables to determine the existence of common long-run stochastic trends among these variables even though they may drift apart in the short-run. As will be seen below, we find evidence of panel cointegration between beer sales and these variables indicating the existence of a stable long-run relationship between beer consumption and the economic variables considered. Accordingly, we take this cointegration into account and avoid the problem of spurious regression by estimating PECMs, the results of which are discussed below.

The format of the rest of the paper is as follows. Section 2 provides a brief description of the variables constituting the panel dataset employed in this study. Section 3 provides highlights of the results of the tests for panel cointegration between beer sales, unemployment

and the other economic/cyclical variables, which form the basis for constructing fixed effects PECMs. The PECM estimation results are presented and discussed in Section 4. The final section summarizes the major conclusions, policy implications and possible extensions of the paper.

Data Description and Summary Statistics

In this study, we use monthly beer sales in hectoliters per adult population (18 years and over) for each of the ten Canadian provinces observed over the entire period from January 2000 to December 2010 as a proxy for beer consumption per adult since the two variables are naturally highly correlated. The sales data, which are obtained from Beer Canada's website http://www.brewers.ca/, include the sales of both domestic and imported beers as reported by Beer Canada's member breweries whose sales represent approximately 97 percent of the domestic beer sales in Canada, provincial associations, provincial distributors and/or liquor commissions. The choice of adult population (18 years and over) for calculating per-adult sales is influenced by the fact that during the period under consideration the minimum legal drinking age was either 18 or 19 years depending on the province[2]. The data on population 18 years and over are obtained from Statistics Canada's CANSIM database.

Monthly data on the consumer price indexes for beer, wine and spirits purchased from stores (2002=100) are also obtained from the CANSIM database. Monthly data on the unemployment rate (15 years and over), the key variable of interest in this study, are also obtained from the CANSIM database[3].

Some previous studies analyzing beer demand (e.g., Freeman 2001 for the United States) [15] also included personal disposable income among the beer consumption predictors in order to capture the income effect. In the absence of consistent monthly Canadian provincial level data on personal disposable income, we employ the data on the index of average hourly earnings (2002=100), obtained from the CANSIM database, as its proxy. Hence, the present study incorporates two core cyclical variables (i.e., the unemployment rate and the average hourly earnings) that could potentially capture changes in Canadian economic conditions.

One variable which is also potentially relevant in the analysis of the economic determinants of beer sales is beer taxes. Unfortunately, the convoluted nature of the Canadian beer tax structure made it impossible for us to construct consistent provincial level panel data at monthly frequencies to capture the beer tax structure. Hence, we do not directly consider the impact of beer taxes in the present study. However, we note that its impact is reflected indirectly in the consumer price index for beer[4].

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[2]In contrast, virtually all other Canadian studies use beer consumption per-adult population (15 years and over). The current minimum legal drinking age is 18 years in three of the ten Canadian provinces (i.e., Québec, Manitoba and Alberta) and 19 years in the other seven provinces (i.e., British Columbia, Ontario, Saskatchewan, Ontario, Prince Edward Island, New Brunswick, and Newfoundland). Historically, there have hardly been any changes in the minimum drinking ages in the various provinces.

[3]We also considered including both the unemployment rate and the participation rate as predictors but owing to multicolliearity concerns we opted not to include both variables in the same PECMs. However, the conclusions remain virtually unchanged if the participation rate is used in place of the unemployment rate.

[4]In fact, some empirical papers (e.g., Freeman, 2000, 2001) used beer taxes and proxies for beer prices.

Table 1 shows some descriptive statistics pertaining to beer sales per-adult for each of the 10 Canadian provinces and for Canada as a whole for the period from January 2000 to December 2010. To conserve space, the descriptive statistics for all other variables are not reported but are available from the authors on request. It is apparent from the entries in the table that the provinces of Newfoundland and Quebec occupy the top two positions in the ranking by average beer per-adult (18 years and over) sales for this period. A similar top two ranking of the 10 Canadian provinces by average per-adult consumption was observed by Ogwang and Cho (2009) using panel data at annual frequencies for the period from 1981 to 2004. Another notable feature of Table 1 is the relatively low variability in the average per-adult sales among the provinces, ranging from 0.0581 hectolitres in the province of British Columbia to 0.0818 hectolitres in the province of Newfoundland.

Panel Cointegration between Beer Sales and Economic/Cyclical Variables

An important step in the analysis of the link between beer consumption and economic/cyclical variables is to examine whether or not these variables are cointegrated, where cointegration implies that the existence of a stable long-run equilibrium relationship among the variables under consideration.

To test for panel cointegration, we first applied the widely popular Im Peasaran and Shin (IPS) (2003) [20] panel unit root test and found that the first difference of the logarithmic transformation of each variable is stationary (i.e., each variable is integrated of order one), in which case all the relevant variables pass this necessary condition for cointegration. Having established that all the relevant variables passed the necessary condition for cointegration we proceeded to test for panel cointegration between the variables representing beer sales per-adult, the unemployment rate, beer price, spirits price, wine price, and the index of average hourly earnings using several variants of the Pedroni [21-23] test and found evidence of cointegration at the conventional 5 percent level of significance. Hence, the cointegration

Province	Mean*	Standard deviation	Minimum	Maximum
Alberta	0.0700 (0.0011)	0.0122	0.0436	0.1007
British Columbia	0.0581 (0.0009)	0.0105	0.0361	0.0854
Manitoba	0.0643 (0.0011)	0.0125	0.0258	0.0946
New Brunswick	0.0691 (0.0013)	0.0153	0.0398	0.0973
Newfoundland	0.0818 (0.0016)	0.0183	0.0423	0.1246
Nova Scotia	0.0678 (0.0014)	0.0155	0.0326	0.1002
Ontario	0.0599 (0.0009)	0.0109	0.0403	0.0853
Prince Edward Island	0.0691 (0.0019)	0.0223	0.0329	0.1247
Quebec	0.0751 (0.0015)	0.0175	0.0395	0.1118
Saskatchewan	0.0661 (0.0012)	0.0143	0.0385	0.1028
CANADA	0.0651 (0.0011)	0.0123	0.0397	0.0908

Table 1: Descriptive statistics of beer sales per-adult (18 years and over) in hectolitres: January 2000 to December 2010. *The numbers in parentheses are the standard errors of the mean.

test results provide strong evidence of the existence of a stable long-run relationship between beer consumption, unemployment and the set of other economic/cyclical variables we considered. To conserve space, the unit root and cointegration test results are also not reported but are available from the authors on request.

Fixed Effects PECM Estimation Results

On the basis of the evidence of panel cointegration between beer sales, unemployment and the other variables considered that we uncovered, as explained in Section 3, we proceeded to capture this long-run relationship, and avoid spurious regression, by estimating the parameters of the relevant fixed effects PECMs. To this end, we initially considered three possible fixed effects PECM specifications, namely, the individual fixed effects, time fixed effects and two-way fixed effects. However, the battery of diagnostic tests we performed, including the F-tests for the relevant fixed effects and the conventional R-squared goodness-of-fit statistics resulted in our choice of the following dynamic two-way fixed effects PECM as the best model for further analysis[5]:

$$\Delta lnC_{it}=\alpha_i+\delta_t+\beta_1\Delta lnBP_{it}+\beta_2\Delta lnSP_{it}+\beta_3\Delta lnWP_{it}+\beta_4\Delta lnAHE_{it}+\beta_5\Delta ln UN_{it}+\beta_6\Delta lnC_{i,t-1}+\beta_6ECT_{ii}+u_{it}\rightarrow(1)$$

where Δ is the usual first difference operator; C_{it} is the total monthly beer sales in hectoliters per adult population (18 years and over) in the i-th Canadian province in month t (i=1,2,…,10; t=1,2,…,132); BP_{it} is the consumer price indexes for beer purchased from stores (2002=100) in the i-th Canadian province in month t; SP_{it} and WP_{it} are the consumer price indexes for spirits and wine, respectively, purchased from stores (2002=100) in the i-th Canadian province in month t; AHE_{it} is the index of average hourly earnings (2002=100) for the i-th Canadian province in month t; UN_{it} is the unemployment rate (%) in the i-th Canadian province in month t; and ECT_{it} is the so-called error correction term, which comprises of the one-period lagged residuals obtained using the estimated parameters of the following corresponding fixed effects regression in the levels of the variables:

$$lnC_{it}=\alpha_i+\delta_t+\beta_1lnBP_{it}+\beta_2lnSP_{it}+\beta_3lnWP_{it}+\beta_4lnAHE_{it}+\beta_5lnUN_{it}+\beta_6ln C_{i,t-1}+u_{it}\rightarrow(2)$$

Equation (1) conforms to the usual practice of modeling the demand for alcoholic beverages in Canada (e.g., Yu and Chen, Ogwang and Cho) by incorporating variables representing own (beer) price, the price of potential beer substitutes or complements (wine and spirits), and income (peroxided by average hourly earnings), among the predictors. We estimate the fixed effects model rather than its random effects counterpart since the full population of 10 Canadian provinces is studied as suggested in the literature[6].

The parameter α_i in Equation (1) represents the unobserved province specific fixed effects. This parameter seeks to capture the demographic, socio-cultural, location, legal and climatic factors, among others, that affect per-adult beer sales that vary among the provinces but are time invariant (or vary very little) in each province. The parameter δ_t represents the time fixed effects. This parameter seeks

to capture the factors that affect all Canadian provinces uniformly at any given time but which may vary over time. Examples of such factors include changes in drinking and driving laws and health warnings about the adverse effects of excessive alcohol consumption, among others.

Another notable feature of Equation (1) is the inclusion of a lagged dependent variable to capture possible habit persistence effects with respect to beer consumption given that beer is potentially addictive. Hence, Equation (1) is in conformity with the idea of myopic addiction in beer consumption. For purposes of comparison, we also estimate the static version of Equation (1) for which $\Delta lnC_{i,t-1}$ and $lnC_{i,t-1}$ are excluded from Equations (1) and (2), respectively.

The PECM results corresponding to both the static and dynamic cases are reported in Table 2[7]. Before focusing on the individual predictors in Equation (1) we note that the reported F-statistics for two-way fixed effects lead to rejection of the null hypotheses of the absence of two-way fixed effects in both cases, thereby validating our specification. Also, the resulting fits are highly satisfactory with R^2=0.86 in both cases. Furthermore, the coefficient of the error correction variable ECT, which represents the speed of adjustment to long-run equilibrium following deviations from it, is negative and significant at 5 percent level of significance in both the static and dynamic models. The significance of the coefficient of the ECT indicates the existence of an error correction and confirms that beer sales is cointegrated with the other variables considered, meaning that beer sales in Canada will eventually adjust to long-run equilibrium over time following deviations from this equilibrium. Another notable feature of Table 2 is that the sign and significance of the coefficients of each of the common predictors in the static and dynamic models are the same.

Unemployment rate

It is apparent from the entries in Table 2 that the coefficient of the variable representing the unemployment rate is negative and significant at 5 percent level regardless of the inclusion or exclusion of the variable representing lagged beer sales in Equation (1). The negative and significant coefficient indicates that beer sales in Canada are pro-cyclical.

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[5]As in several previous Canadian studies we treat beer prices as exogenous. This treatment is rationalized on the grounds that the pricing of beer is influenced to a great extent by the relevant authorities in each Canadian province.

[6]As noted by Greene (2012, pp. 410-411) [23], the use of fixed effects rather than random effects is justified if the full population of cross-section units is considered which is the case in the present study for which all the 10 Canadian provinces are included in the panel dataset.

[7]The complications brought by the fact that the time dimension of our data set (132) far exceeds the cross-section dimension (10), precluded us from using the Arellano and Bond (1991) [28] approach or its refinements to estimate the parameters of the dynamic panel. We also note that the Arellano-Bond approach is best suited for panel datasets for which the time dimension is less than the cross-section dimension.

Explanatory variables	Static model	Dynamic model
Beer price	-0.5988 (0.0069)*	-0.6046 (0.0065)*
Spirits price	0.2226 (0.5042)	0.2563 (0.4452)
Wine price	0.1010 (0.7527)	0.0846 (0.7921)
Average hourly earnings	0.6428 (0.0053)*	0.6688 (0.0038)*
Unemployment rate	-0.1020 (0.0404)*	-0.1019 (0.0412)*
Lagged beer sales	n/a	0.0885 (0.0060)*
Error correction term	-0.8935 (0.0000)*	-0.9905 (0.0000)*
F-test for two-way fixed effects	42.36 (0.0000)*	47.75 (0.0000)
R-squared	0.86	0.86
No. of observations	1310	1300

Table 2: PECM estimation results (p-values in parentheses)** .*Significant at the 5 percent level of significance. **All the variables, with the exception of the error correction term and the dummy variables representing the relevant fixed effects, are first differences of the logarithmic transformations.

As already mentioned above, Ogwang and Cho and Nelson [24] used annual frequency panel data and uncovered a significant negative impact of unemployment on Canadian beer consumption indicating a strong pro-cyclical relationship[8]. The pro-cyclical behavior in beer sales is also observed using data for other countries such as the United States (e.g., Ruhm) [25] and Sweden (e.g., Krüger and Svensson)[9] [26]. In this regard, Canadian beer drinkers behave in the similar ways as do beer drinkers in these countries. In contrast, Blake and Nied [27] found that beer consumption in the United Kingdom is counter-cyclical.

Average hourly earnings

As noted above, we use the index of average hourly earnings (2002=100) as a proxy for personal disposable incomes in Canada. It is apparent from the entries in Table 2 also shows that the coefficient of the variable representing average hourly earnings is positive and significant at 10 percent level of significance indicating that beer sales in Canada responds positively to changes in average hourly earnings. These results also confirm the procyclicality of beer sales, with per capita sales increasing during good economic times as indicated by rising average hourly earnings.

Own-price and cross-price responses

The entries in Table 2 indicate that beer sales are negatively related to changes in beer prices as would be expected. Furthermore, the negative coefficient of the variable representing beer prices is significant at 5 percent level of significance. These results corroborate those of Johnson et al. who found that the demand for beer in Canada is negatively related to its price (with the demand being price inelastic). The entries in Table 2 indicate that the beer sales are positively related to both spirit price and wine prices. However, neither the coefficient of the variable representing wine prices nor of that representing spirits prices turns out to be significant in the PECM. These results indicate the existence of very weak or no substitutability between beer and wine or spirits in Canada[10].

Habit persistence effects

As noted above, we include the variable representing lagged beer sales to capture possible habit persistence effects. It is apparent from the entries in Table 2 that strong habit persistence effects are present in Canadian per-adult beer consumption since the coefficient of the lagged dependent variable is significant at 5 percent level of significance. These results are in conformity with our expectations given beer's potential addictiveness.

Conclusions, Policy Implications and Possible Extensions

In this paper, we used higher frequency (i.e., monthly) provincial level panel data on beer sales per adult in Canada as reported by Beer Canada to examine the link between beer sales per-adult and several economic/cyclical variables, with a focus on its link with unemployment. To this end, we employed the panel fixed effects, panel cointegration and panel error correction frameworks.

We found that there is evidence of panel cointegration between beer sales, unemployment and other economic variables considered. These indicate the existence of a stable long-run relationship between these variables. When we accounted for the cointegration by estimating fixed effects PECMs, we found find strong evidence that beer sales is pro-cyclical with per capita sales increasing during good economic times as indicated by falling unemployment or rising average hourly earnings.

Two policy implications of our findings are apparent. First, the effect of government unemployment-reduction policies on beer consumption appears to be strong as the coefficient of the unemployment variable is significant in both the static and dynamic fixed effects specifications. Second, the lack of significance of the coefficients of the variables representing both wine prices and spirits prices in the estimated PECMs indicate that measures to increase wine prices or spirits prices may not have significant impacts on beer consumption.

The present paper could be extended in three directions. First, it would be interesting to examine the impact of the Canadian beer tax structure on beer consumption should consistent and reliable monthly provincial level tax data become available in the future. Second, it would be interesting to examine the effect of personal disposable on Canadian beer sales per-adult should monthly provincial level panel data on personal disposable income become available in the future. Third, given that Beer Canada also provides a breakdown of the aggregate beer sales into domestic beer sales and imported beer sales, it would be interesting to examine if there are differences in cyclicality between domestic and imported beers.

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[8]Strictly speaking, Nelson's results are not directly comparable to ours since he combined all the three types of alcoholic beverages (i.e., wine, beer and spirits) therefore failing to account for the differential responses among the different types of alcoholic beverages.

[9]Using more recent and higher frequency time series (i.e., monthly) data, Freeman (2001) found that beer consumption in the United States is non-cyclical.

[10]A review of the literature reveals widely divergent results with respects to the magnitudes, signs and significance of the beer cross-price elasticity estimates for various countries.

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