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An Economic Analysis of Increasing Competition in

Retail Liquor Sales in Ontario

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Part I

Of a Two-Part Study Conducted for the Ontario Convenience Store Association

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[1] The author assumes responsibility for any errors. The opinions expressed in this study are exclusively those of the author's and do not reflect any official opinion of the Department of Economics at the University of Waterloo or the University of Waterloo.

Executive Summary

This objective of this study is to examine the effect that the possible expansion of private retail delivery of alcohol in Ontario may have on revenues that the provincial government collects from alcohol sales. There has been considerable debate on the likely impacts of expansion of private retailing on government revenues. There is a dearth of comprehensive academic research in this area, and the objective of this report is to offer some clarity through the use of contemporary theoretical and empirical methods employed by economists.

Key Findings:

- The vast majority of the 'profit' that the LCBO returns to the provincial government is from the mark-up on products, which is generated in the LCBO's role as an alcohol *wholesaler*, which is distinctly different from its role as a retailer.

- Compared to the amount of revenue that the LCBO earns from wholesaling, sales taxes on alcohol generate a comparatively smaller amount of revenue for the provincial government. An example provided by the LCBO for a representative bottle of whisky suggests that approximately a quarter of the final price paid by consumers consists of federal and provincial taxes, while the markup charged by the LCBO is over 50% of the final retail price.

- In 2002 British Columbia implemented legislation allowing licensed private retailers to sell alcohol alongside and compete with that province's equivalent of the LCBO. My empirical analysis, which is partially based on this significant change in retail access, actually suggests

that an increase in competition is significantly correlated with an increase in per capita gross income, net income, and government revenue generated by provincial liquor authorities. Specifically, the econometric analyses reveals that increased competition is significantly associated with roughly a 5% and 9% increase in net and gross per capita income relative to liquor authorities in provinces with primarily government delivery of retail alcohol products. These results are robust to the use of other factors that might plausibly impact per capita gross and net income reported by liquor authorities, and are based on publicly available data from Statistics Canada.

- Although these results may be contrary to common belief – that expanding retailing would decrease government revenues from alcohol sales – they are consistent with standard economic models, which predict that an increase in competition results in <u>an increase in revenue collected by the provincial government from retail alcohol sales.</u>

I.   Objective

The structure of retail delivery of alcohol in Canada has witnessed limited changes over the past thirty years. One exception is the complete privatization of government owned liquor retail stores conducted by Alberta in 1993 and 1994. In this case, the provincial government did not retain ownership of any retail stores. In another case, British Columbia began a different path towards privatization in 2002, allowing privately owned retail outlets to co-exist with government owned stores. In late 2012 Saskatchewan indicated it would no longer build any new government owned liquor stores and in early 2013 announced that it had approved new private stand-alone liquor stores in Saskatoon and Regina. Otherwise, liquor stores are government owned and managed in other provinces, with many privately owned convenience and grocery stores in Quebec also permitted to sell beer and wine. Ontario is another deviation from the standard model, as a group of private sector breweries are allowed – by provincial legislation – to operate as a monopoly and sell beer through their own network of retail outlets.

This study contributes to the current policy debate on the possible expansion of private retail delivery of alcohol in Ontario, by assessing the potential effects of permitting alcohol sales through convenience stores. The model of societal welfare that is used in this paper is that of consumer surplus, which reflects the benefits to consumers from enhanced competition and lower prices, and the possible effects that such a policy might have on provincial government revenue.

II.   Retail Prices and Government Revenue

A key concern regarding the expansion of liquor sales is the perceived loss of government tax revenue, as well as a perceived reduction in government revenue from lower LCBO profits. Before discussing this possibility, it is important to understand the components of the final retail price for an alcoholic beverage in Ontario. As documented in the Auditor General's report (available at http://www.auditor.on.ca/en/reports_en/en11/308en11.pdf), the first component of a retail price is the manufacturing cost, which is reflected in the supplier's quote to the Liquor Control Board of Ontario. Federal excise taxes and import duties and freight charges are added to the supplier's cost, which together comprises the landing cost. A cost of service is then added for beer products.[2] The next charges are a LCBO markup (at a variable rate, depending on the product), a bottle levy, an environmental charge, and a specific levy for wines (at a fixed rate per litre), that in tandem constitute the base price. The final retail price is obtained by adding the 13% HST to the base price, and a container deposit that is conditional on the volume of the container (up to 20 cents).

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[2] As noted in the Auditor General's report, the LCBO sets the price of beer products that are exclusively sold by the LCBO. In accordance with the Liquor Control Act, retail prices for beer products that are sold by The Beer Store are set by the manufacturer.

Table 1. Breakup of Retail Price (in $) – LCBO Example

PRICE COMPONENTS	US Imported Whisky	Other Imported Whisky	Domestic Whisky
Payment to Supplier	5.7372	5.6951	6.134
Federal Excise Tax	3.5088	3.5088	3.5088
Federal Import Duty			
Freight	0.1583	0.2042	0.04
Total Landed Cost	9.4	9.41	9.68
LCBO Mark-up	13.8055	13.8017	13.5269
LCBO Bottle Levy $0.38 per litre	0.285	0.285	0.285
LCBO Environment Fee $0.0893 per container	0.0893	0.0893	0.0893
LCBO Rounding Revenue			
Basic Price	23.58	23.58	23.58
H.S.T. 13% of Basic Price	3.07	3.07	3.07
Container Deposit	0.2	0.2	0.2
CONSUMER PRICE	$26.85	$26.85	$26.85
REVENUE DISTRIBUTION			
Supplier (including freight)	5.9	5.9	6.17
Government of Ontario	16.07	16.06	15.79
Government of Canada	4.69	4.69	4.69
Container Deposit	0.2	0.2	0.2
CONSUMER PRICE	26.85	26.85	26.85

Of obvious interest are the magnitudes of these different charges. The above table reproduces a pricing example by the LCBO for a 750 ml bottle of whisky in Canadian dollars (available at http://hellolcbo.com/app/answers/detail/a_id/570/~/canadian-versus-imported---lcbo-pricing-structure). The first point of interest is that the manufacturer margin is only $5.7 to $6.1, which is 21-23% of the final retail price. Second, provincial and federal taxes are roughly $6.7, which is approximately a quarter of the final price paid by consumers. Third, the largest component of retail price is the LCBO markup of $13.5 to $13.8, which is over 50% of the final retail price.

Of course, markups will vary, depending on the alcoholic beverage in question. Further, this markup does not consist of the pure transfer to the provincial government, as the operating costs of the LCBO must also be accounted for. Nonetheless, the example does illustrate the significant markup that consumers pay for alcohol in a regulated market, and offers a relevant benchmark for evaluating the possible effects of more competition on alcohol-related revenue earned by the LCBO and associated tax revenue for the province.

The structure of retail prices is, in general terms, similar across other provinces. For example, in Alberta – the only province with a completely deregulated system – the retail price can be similarly decomposed into the manufacturer's cost, federal customs and excise duties (where applicable), the liquor authority's (the Alberta Gaming and Liquor Corporation) flat mark-up, recycling costs, bottle deposit, profit margin of the private retailer, and the GST, as the province does not have a PST. Therefore, the liquor authority essentially gives up some of the revenue it would have otherwise been earning in a completely public system of delivery, to private retailers. In this respect, it is interesting to note that the flat markup of a litre of spirits in Alberta, ranges from approximately \$10 to \$18, depending on the alcohol content.[3] Broadly speaking, these figures are not that different from the above example offered by the LCBO.

III. Economic Theory

A simple economic model would be useful in order to further understand the relationship between privatization and provincial revenue through markups. I base my theoretical model on the concept of product differentiation, which is a core concept in Industrial Organization theory. In other words, it is possible for the LCBO to co-exist with other independent retailers, even if

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[3] Please see http://aglc.ca/pdf/quickfacts/markup_rates_schedule.pdf for further details.

there are similarities in the products, which are offered for sale. This is because of differences in consumer preferences. Some consumers may enjoy spending time and browsing the wide product diversity offered in LCBO stores. On the other hand, other consumers might prefer the convenience of shopping at a closer and smaller retailer that stocks the exact product, which the customer desires. The key question is how overall industry profit and therefore, revenue transferred to the province, will change given the presence of other independent retailers.

Previous studies suggest that alcohol demand is responsive to corresponding price. Hence it is reasonable to assume a downward sloping demand curve. For simplicity, I assume a constant marginal cost of production, implying a horizontal supply curve.[4] Further, I ignore federal and provincial taxes. The equilibrium price (P_1) and quantity (Q_1) in a competitive market would be given at the intersection between the demand (D_1) and supply curves (MC_1). This is shown in Figure 1.

Figure 1. Current LCBO Pricing

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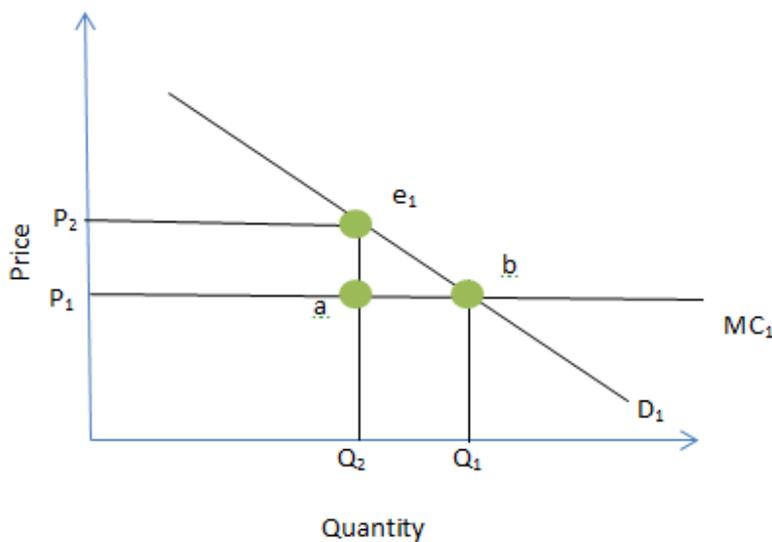
[4] It is quite possible that the LCBO experiences considerable economies of scale and its supply curve may be downward sloping. However, broadly speaking, this should not alter the robustness of our findings.

However, given that the market in Ontario is basically a monopoly (duopoly) with respect to wine and spirits (beer), the equilibrium price will be higher at P_2, along with a lower demand (Q_2).[5] The rectangle $P_1 P_2 e_1 a$ represents profits from the markup charged by the firm, while the triangle $e_1 ab$ is the deadweight loss from markup. In other words, it represents the lost surplus to consumers who would have purchased alcohol at the competitive price P_1– but are priced out of the market at the higher price P_2. On the other hand, society may be thought to *benefit* from the profits earned by the liquor authority, which are transferred to the provincial government, who then may spend it on various competing needs. The province, of course, also earns revenue from any provincial specific taxes it may impose on liquor.

Some further discussion of the welfare and competition is in order. Welfare gains to market participants (consumers and producers) are based on consumer and producer surplus. Consumer surplus is computed as the difference between the maximum consumers are willing to pay for a product, and the market price they actually end up paying. This is the difference between the demand curve and the market equilibrium price. Analogously, producer surplus is the difference between the minimum producers are willing to accept and what they actually receive in terms of the market determined price. Competitive markets are efficient because they maximize the sum of consumer and producer surplus. These measures of welfare are routinely used in policy analysis. In fact, they are used by the Competition Bureau of Canada in order to evaluate welfare impacts resulting from mergers and other types of firm specific conduct.

Now let us assume that the province decides to increase retail competition by allowing the sale of certain alcoholic beverages at convenience stores. In order to make the model simple,

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[5] Standard economic theory demonstrates that the price charged by a monopolist is given by the point where the vertical line defined at the intersection of the Marginal Revenue (MR) and Marginal Cost (MC) curves, hits the demand curve. Hence, the profit maximizing price charged by the monopolist is higher than marginal cost.

assume that the marginal cost of selling alcohol – which consists of the costs of alcoholic beverages, delivery costs, and operational costs – are similar between LCBO and convenience stores. [6] Assume that convenience stores decide to charge a lower price by accepting a *lower markup*, relative to the LCBO.[7] A portion of these markups is transferred to the LCBO (and ultimately to the province) through licensing fees, as convenience stores can only obtain alcohol from the LCBO, which retains its position as a monopoly with respect to wholesaling.

As a result of the availability of alcohol from convenience stores, some consumers decide to buy their consumption needs from convenience stores. This would result in a downward shift in the demand curve for alcohol sold at LCBO stores. In Figure 2, this new demand curve is given by D_2. In most cases, this would mean that the LCBO is forced to charge a lower price for its products.[8] Hence, the margin enjoyed by it also shrinks to rectangle P_1 P_3 e_2c. However, the price charged by the provincial liquor store is still higher than convenience stores.

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[6] This is of course, quite unlikely. The marginal costs of operation are likely to be higher at government run liquor stores, because the retail sale of alcohol is the only source of revenue. Hence, all marginal costs relating to business activity must be attributed to retail liquor sales. On the other hand, the relevant marginal costs of business for liquor sold by convenience stores are only incremental costs that are directly connected to the sale of alcohol, and not to overall business operations.

[7] This is an acceptable assumption as our understanding from industry sources is that convenience stores acting as LCBO Agency Stores receive a 10% lower price from which they must cover the cost of goods sold – including delivery.

[8] The magnitude of the downward shift in the demand curve is a function of the cross price elasticity of demand, which in this case is the change in demand of liquor purchased from the LCBO in response to changes in price charged by convenience stores for similar products.

Figure 2. The Effect of independent retailers on LCBO profits
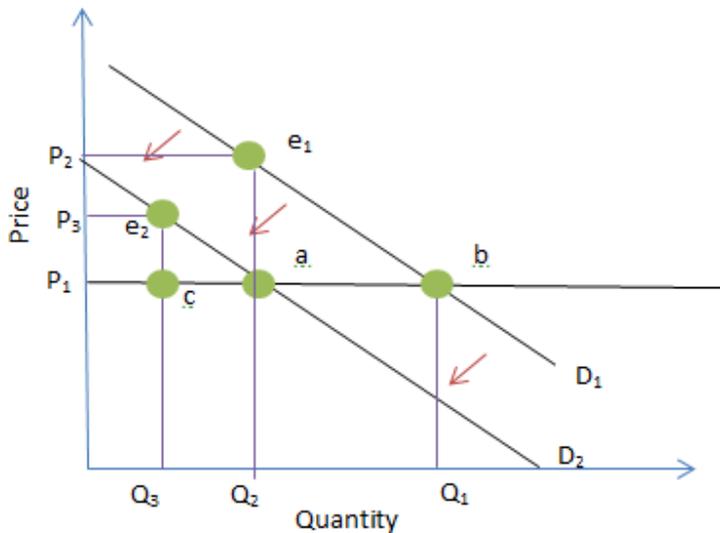
The obvious question is – how can provincial liquor stores still maintain a higher price relative to convenience stores for the same product? This is under the assumption that consumers are willing to pay for what economists term as 'product differentiation'. As noted, some consumers may be willing to pay a higher price and purchase alcohol from provincial liquor stores because of other product attributes that are not available at convenience stores. They may like the 'feel' of a large specialized store, the availability of staff, and a wide selection, that due space limitations, will not be offered by convenience stores. On the other hand, other consumers may be happy to pay a lower price and will purchase their products from convenience stores. This assumption is consistent with observed price differences between vertically integrated and independent gasoline retail outlets.

Is there a significant reduction in government revenues? This can be answered by understanding the impacts of permitting liquor sales through convenience stores, on all economic agents. First, consumers who still continue to purchase at government stores are better off

because they continue to buy the same products, but at lower price. Second, consumers who also prefer to purchase alcohol from convenience stores are, by assumption, also paying lower prices and therefore, experience welfare gains. These consumers are those: (1) who had previously purchased from the LCBO; and (2) individuals who did not purchase at the higher prices exclusively charged by the LCBO, and therefore a part of the deadweight loss in figure 1. Convenience stores are experiencing enhanced profits, and are obviously better off. The LCBO in the short run is worse off, because of lowered sales and profits generated by its own stores.

However, it is quite possible that overall LCBO net revenue and transfers to the province will actually increase. Recall that in this model, convenience stores must also transfer their markup revenue to the province. Since they charge a lower price (compared to the LCBO), the total amount of liquor sold is obviously more than the quantity sold by the LCBO as a monopoly retailer. It must be the case that lower prices will result in profits earned by the LCBO and convenience stores being lower than what the LCBO earned a monopoly retailer. Otherwise, the LCBO would have earned these higher profits, as a monopoly retailer, by setting a lower price. Based on this, one may infer that a more competitive market in the short run may result in lower transfer revenue to the province.

On the other hand, this inference is based on an extremely short run perspective. Competition forces firms to aggressively seek efficiencies. If the LCBO succeeds in reducing its marginal costs, it is quite possible that its profits will be comparable to what it earned prior to increased competition. Although the price is lower, and it is selling less of the product, per unit price-marginal cost margins are higher. This is in addition to the markup revenue that the province still extracts from convenience store sales.

Perhaps of more importance is that the net revenue earned by convenience stores is *not only* from consumers who would have purchased from the LCBO if it had simply charged a lower price. It is possible that the availability of liquor at convenience stores reduces travel distance and time for consumers, associated with purchases. If the increase in sales generated from this customer segment is non-trivial, it is quite possible that, in tandem, the total markup revenue extracted from convenience stores and revenue generated by efficiency seeking LCBO stores will be higher in a more competitive market, relative to corresponding net revenues earned by the LCBO as a monopoly retailer.

The next question is – what are the effects of expansion of alcohol retailing on federal and provincial tax revenue? The amount of revenue from federal excise tax and duties will increase if the total quantity of alcohol consumed, also increases, as long as they are simply in dollars or cents per litre. On the other hand, the effects of provincial tax revenue from the PST or HST, which are ad valorem taxes, are ambiguous. If total consumer spending increases – then correspondingly, tax revenue will also rise. However, it is again, important to emphasize that province revenue from taxes are much lower than corresponding markup revenue.

Empirical Analysis

In order to explore these issues more rigorously, I extracted data on gross sales and net income or profits reported from 1993-2011 by the Liquor Authorities and provincial governments of Alberta, British Columbia, Saskatchewan, and Manitoba that are available from CANSIM Table 183-0017. The table specifically contains the following information reported by

the liquor authority of each province: gross sales (including Goods and Services Tax (GST);

Goods and Services Tax (GST) received; net sales (after the deduction of the GST); cost of

goods sold; gross profit on sales; administrative and general expenses less miscellaneous income;

and net income from sales by liquor authorities.[9] Data on government revenue includes revenue

from liquor specific taxes, but excludes revenue from any general provincial sales tax.

The objective of specifically using data for Alberta, British Columbia, Saskatchewan, and

Manitoba, is to compare trends in gross income, net income, and GST revenue between:

provinces that do not allow the private sale of alcohol (Saskatchewan and Manitoba); a province

that over the sample period (1993-2011) moved from a system of exclusive government retailing

to a hybrid public-private model (British Columbia); and a province that has always permitted

the private sale of alcohol (Alberta) over the sample period.[10] In other words, employing data

from these provinces enables an empirical analysis of the financial impacts of more competition

across jurisdictions and over time.

Perhaps more important, pooling data across provinces and over time allows me to

control for the potentially confounding effects of unobserved jurisdiction or time specific shocks

that might otherwise confound the true relationship between increasing competition and

government revenue from liquor control. Employing data from Quebec and Ontario is not

possible, as Statistics Canada data on financial statistics for liquor authorities does not reflect

most beer sales, which is mostly through grocery, superstores, and convenience stores in Quebec,

and The Beer Store in Ontario. On the other hand, Statistics Canada data on income and revenue

for liquor authorities for Alberta, British Columbia, Saskatchewan, and Manitoba, are with

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[9] Net income = Gross sales (including GST) - Goods and Services Tax (GST) - cost of goods sold- administrative and general expenses less miscellaneous income.

[10] Saskatchewan decided to allow private alcohol retailing in 2013, which is outside of my sample.

respect to all types of alcohol. Finally, employing data from the western provinces ensures some homogeneity across jurisdictions.

Before I discuss the results of the econometric estimation, studying the time-series trends of gross income, net income, and GST revenue, and total government revenue generated by provincial liquor control boards would be useful. Figures 1 and 2 presents trends in per capita gross income and net income (real dollars) over time for the four provinces.[11]

Figure 1: Per Capita Gross Income of Liquor Control Authorities

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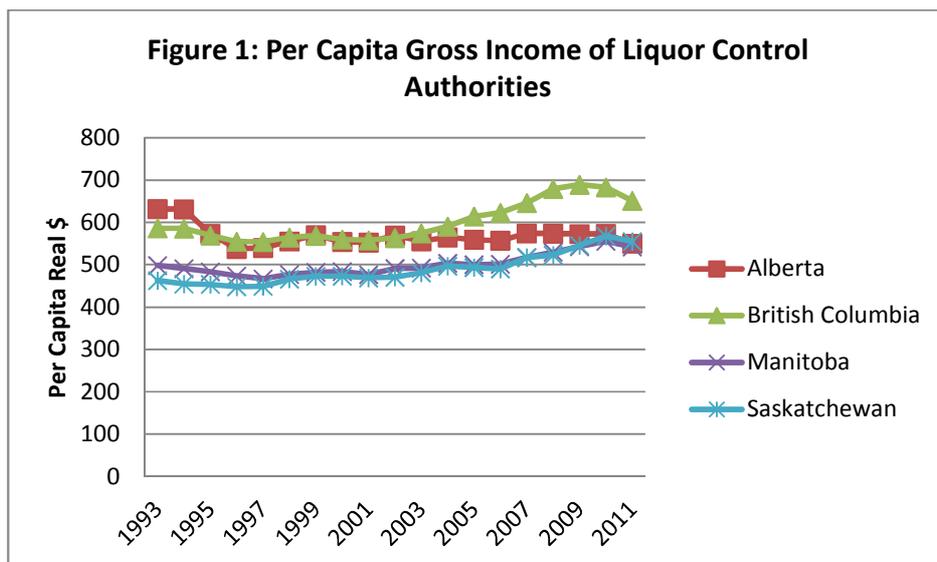
[11] These per capita figures were calculated by taking gross and net income, and dividing it by the province specific consumer price index and by population aged 15 and over. Population was obtained from CANSIM table 282-0002 and consumer price index from CANSIM Table 326-0021.

Figure 2: Per Capita Net Income of Liquor Control Authorities
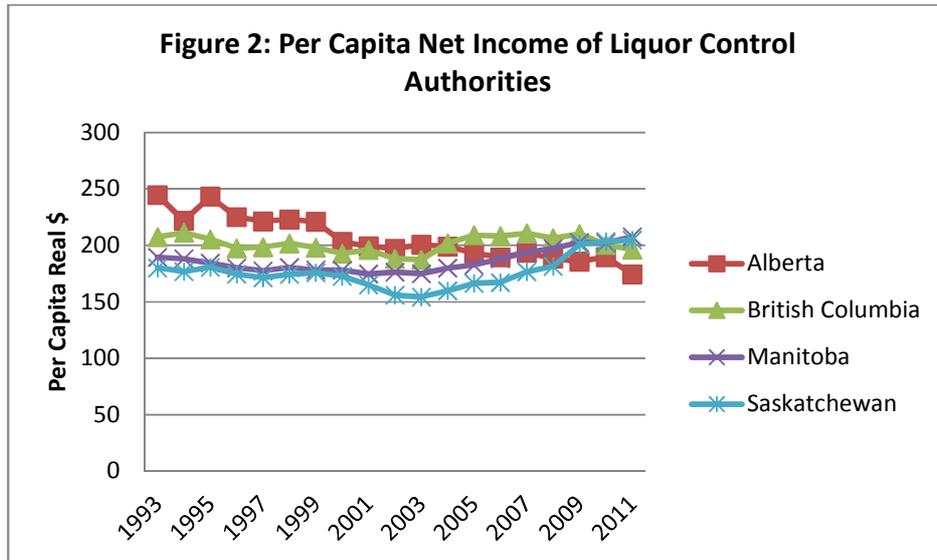
Broadly speaking, there are similarities between the two figures. The first observation is that for most years, per capita gross income (Figure 1) and per capita net income (Figure 2) generated by liquor authorities are higher in Alberta and British Columbia than in Saskatchewan and Manitoba. Perhaps more interesting, is the fact that there appears to be a slight spike up after 2003 in British Columbia, when retail competition in the market was partially privatized. The important point is that per capita gross and per capita income is in most years, higher in Alberta, which has no government-owned liquor stores, and in British Columbia, where government-owned stores compete with privately-owned retail outlets.

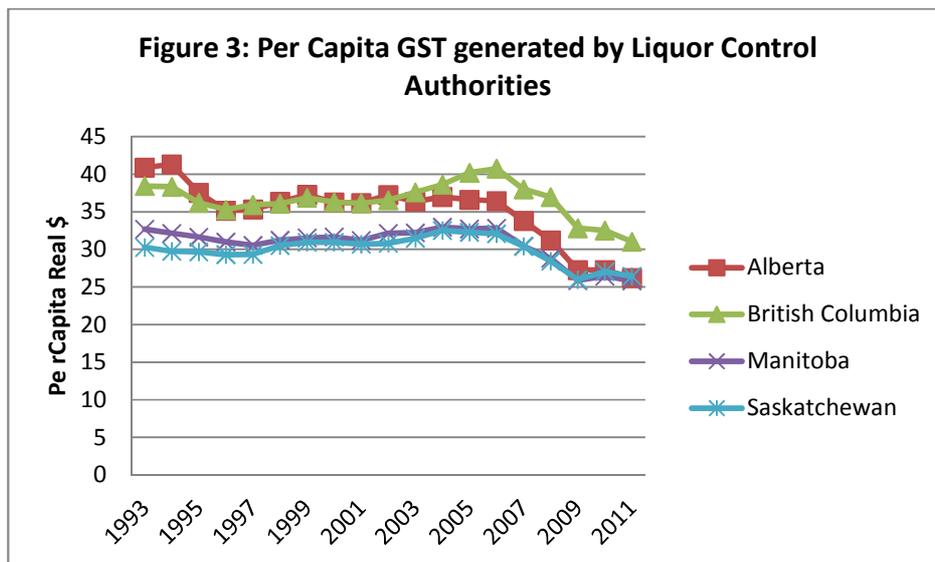**Figure 3: Per Capita GST generated by Liquor Control Authorities**

Figure 3 graphs movements in GST revenue reported by liquor authorities. The movements across time are similar. However, consistent with the other figures, GST revenues are higher in British Columbia and Alberta for most years, than the other provinces. There is a dip in the GST revenue across all provinces after 2007, which is coincident with the period where the federal government cut the GST rate by two percentage points from 7% to 5%. In contrast, figure 4 suggests more variation in per capita government revenues across provinces. For most years, per capita government revenues are higher in Alberta, relative to other jurisdictions. Similarly, per capita government revenue during most years, is quite high in Manitoba. However, per capita government revenues fell in both Alberta and Manitoba over the sample period. On the other hand, there is an observable increase in British Columbia, after partial privatization. However, it is important to emphasize that this revenue is specifically generated by licenses, fees, and permits and is much smaller in magnitude relative to the net

income of liquor control authorities, which is essentially the total revenue transferred to the provincial government.

Figure 4: Per Capita Government Revenue generated by Liquor Control Authorities
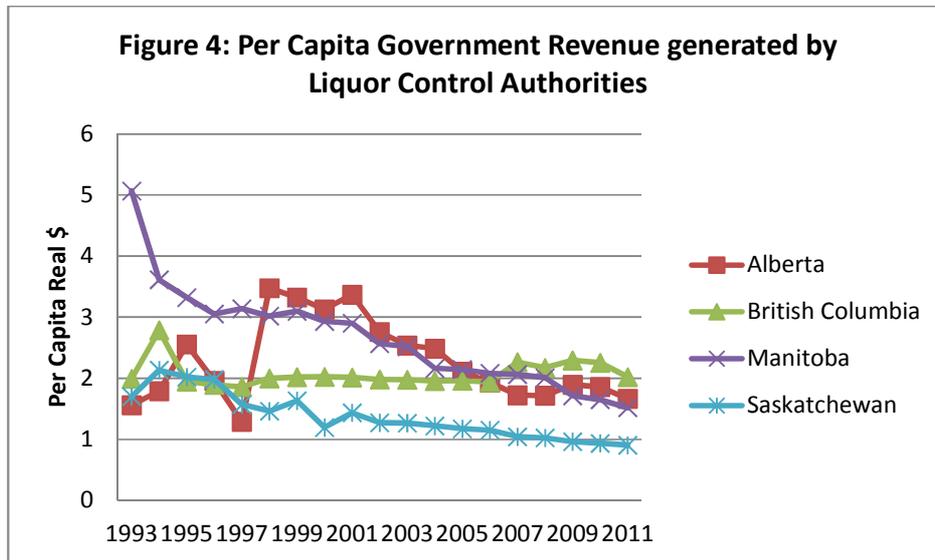
Of course, it is difficult to assess the overall effects of increasing competition, based on simple graphical analysis. As a further sensitivity test, I employ a multivariate regression model in order to estimate the effects of increased competition on revenue from gross sales ($GSALE_{it}$), net income ($NINC_{it}$), GST tax revenue (GST_{it}) and government revenue ($GOVREV_{it}$ - from licenses, fees, and permits) earned by provincial liquor control authorities. The model takes the following form;

$$GSALE_{it} \text{ or } NINC_{it} \text{ or } GST_{it} \text{ or } GOVREV_{it} = \beta_0 + \beta_1 COMP_{it} + Z_{it} + P_i + Y_t + \varepsilon_{ijt}$$

The objective of the above multivariate regression model is to estimate the effects of increased competition on a variety of dependent variables. $COMP_{it}$ is a dummy variable that takes a value of 1 if the province has some increased competition (with respect to liquor sales) and is 0 otherwise. Therefore, the variable takes a value of 1 for all observations for all observations in Alberta and from 2003 onwards for observations from British Columbia. All observations for Saskatchewan and Manitoba, and for British Columbia from 1993 to 2002, take a value of 0.

The different dependent variables are financial statistics reported by the liquor authority in each province. Specifically, per capita gross sales ($GSALE_{it}$), per capita net income ($NINC_{it}$), per capita GST (GST_{it}), and per capita government revenue (from licenses, permits, and fees) ($GOVREV_{it}$). Of course, other factors may be responsible for trends in these variables, aside from increasing competition. Z_{it} is a vector representing such factors. Specifically, I include per capita alcohol sales (in litres) as well as the unemployment rate for prime aged adults.[12] Gross sales and net income are obviously going to be higher in provinces with higher alcohol sales. An increase in the unemployment rate might be correlated with lower alcohol revenue, if consumers drink less because of lower income. I also include the provincial consumer price index as a covariate, in order to control for trends in inflation.

P_i represents province specific dummies that are meant to control for the potentially confounding effects of other unobserved province specific determinants of revenue and sales reported by liquor authorities. Y_t is a dummy variable that takes a value of 1 for all years from 2003 onwards, and is 0 otherwise. The objective of this dummy variable is to control for the impacts of other time-specific shocks, which might have occurred at the same time as British

[12] The information used to calculate these variables are publicly available from CANSIM.

Columbia enacted enhanced competition, and therefore ensure that coefficient estimates of $COMP_{it}$ are not biased. ε_{it} is the error term. The model is estimated using data for Alberta, British Columbia, Saskatchewan, and Manitoba from 1993 to 2011. Therefore, I am exploiting time-series variation across a panel of provinces. The model is estimated using Ordinary Least Squares (OLS) with standard errors Newey-West and White corrected for unknown heteroskedasticity and second order auto-correlation, and Generalized Least Squares (GLS) that correct standard errors for second order auto-correlation. We restrict our focus to levels models, based on Box-Cox regressions, which do not reject the use of a levels specification.

Empirical estimates with respect to per capita gross income (upper panel) and net income (lower panel) are reported in Table 2 and results for per capita net GST (upper panel) and government revenue (lower panel) are documented in Table 3. The tables are organized similarly, in that columns (1) and (3) contain OLS and GLS estimates of the effects of increased competition while column (2) contains OLS estimates based on a comparable log-log specification.

Table 2. OLS and GLS estimates of increased competition with respect to Per Capita Gross Income and Net Income reported by Liquor Authorities

	OLS – levels (1)	OLS – log-log (2)	GLS – levels (3)
Dependent Variable – Per Capita Gross Income reported by Liquor Authority			
Increased Competition	78.222 (19.31)***	0.0889 (0.0279)***	38.840 (15.58)**
Per Capita Alcohol Consumption (Aged 15 and over)	54.998 (11.27)***	0.89608 (0.1584)***	52.314 (7.104)***
Unemployment Rate	7.5645 (3.349)**	0.0703 (0.038)*	5.806 (1.919)***
Adjusted R Square	0.9638	0.8178	0.9559
Obs	76	76	76
Dependent Variable – Per Capita Net Income			
Increased Competition	10.172 (5.396)*	0.0568 (0.0255)**	6.0193 (4.352)*
Per Capita Alcohol Consumption (Aged 15 and over)	21.606 (6.754)***	1.0067 (0.2576) ***	12.505 (3.434)***
Unemployment Rate	1.2518 (1.695)	0.0394 (0.0542)	0.0964 (0.964)
Adjusted R Square	0.8012	0.8178	0.7467
Obs	76	76	7657

Notes: The above regressions are based on data for Alberta, British Columbia, Manitoba, and Saskatchewan from 1993-2011. Columns (1) and (2), contain OLS estimates with standard errors corrected for unknown heteroskedasticity and second order autocorrelation. Column (1) contains estimates from a levels specification, while column (2) consists of results from a comparable log-log model. Column (3) contains GLS estimates. The Increased Competition dummy variable takes a value of 1 for all observations for Alberta and for British Columbia from 2003 onwards and is otherwise 0 for all other observations. All regressions are also based on the use of province dummies and a year dummy that takes a value of 1 from 2003 onwards and is otherwise 0. Standard errors of coefficient estimates are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels.

OLS and GLS estimates suggest that, on average, increasing competition is significantly associated with an increase in per capita gross and net revenue reported by liquor authorities. Coefficient estimates of increased competition are statistically significant at various levels, across all columns. Specifically, results in the upper panel imply that increasing competition is significantly associated with a roughly $39-78 rise in per capita gross revenue reported by liquor authorities. The corresponding estimate in column 2 suggests that provinces with increased competition are significantly associated with a 9% increase in gross per capita income. In all regressions, the adjusted R Square is quite high, ranging from 0.82 to 0.96. In terms of other covariates, per capita alcohol consumption is significantly and positively correlated (at the 1% level) with higher per capita revenue reported by liquor authorities. The coefficient estimates of the unemployment rate are positive and statistically significant across columns.

The lower panel contains estimates with respect to per capita net income. Broadly speaking, the results are comparable to estimates with respect to gross per capita income. Coefficient estimates of the increased competition variable are positive and statistically significant (at the 5% or 10% levels) across all columns, and suggest that increasing competition is associated with a $6-$10 increase in per capita net income. The OLS estimate from column implies that liquor authorities in provinces with some competition report a roughly 5.7% higher per capita net income than provinces with mostly government delivery of retail alcohol. Per capita alcohol consumption is statistically significant across columns and is positively correlated with an increase in per capita net income. Coefficient estimates of the unemployment rate are positive but statistically insignificant across all columns. In tandem, these results suggest that per capita gross and net income reported by liquor authorities are higher in Alberta and British Columbia (after increased competition) relative to Manitoba and Saskatchewan.

Table 3. OLS and GLS estimates of increased competition with respect to Per Capita GST and Government Revenue reported by Liquor Authorities

	OLS – levels (1)	OLS – log-log (2)	GLS – levels (3)
Dependent Variable – Per Capita GST reported by Liquor Authority			
Increased Competition	-0.169 (0.911)	-0.0121 (0.0261)	0.860 (1.030)
Per Capita Alcohol Consumption (Aged 15 and over)	0.8276 (0.8076)	0.08092 (0.1933)	1.0699 (0.7677)
Unemployment Rate	-1.3698 (0.2021)***	-0.24808 (0.0329)***	-1.1695 (0.1923)***
Adjusted R Square	0.8576	0.8670	0.7633
Obs	76	76	76
Dependent Variable – Per Capita Government Revenue			
Increased Competition	0.73393 (0.2131)***	0.3269 (0.086)***	0.62340 (0.1597)***
Per Capita Alcohol Consumption (Aged 15 and over)	0.1871 (0.1762)	-0.1281 (0.7053)	-0.0038 (0.1255)
Unemployment Rate	-0.0415 (0.0805)	-0.1363 (0.1759)	0.0217 (0.0392)
Adjusted R Square	0.5729	0.6231	0.6511
Obs	76	76	76

Notes: The above regressions are based on data for Alberta, British Columbia, Manitoba, and Saskatchewan from 1993-2011. Columns (1) and (2), contain OLS estimates with standard errors corrected for unknown heteroskedasticity and second order autocorrelation. Column (1) contains estimates from a levels specification, while column (2) consists of results from a comparable log-log model. Column (3) contains GLS estimates. The Increased Competition dummy variable takes a value of 1 for all observations for Alberta and for British Columbia from 2003 onwards and is otherwise 0 for all other observations. All regressions are also based on the use of province dummies and a year dummy that takes a value of 1 from 2003 onwards and is otherwise 0. Standard errors of coefficient estimates are in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels.

Estimates in Table 3 demonstrate that increased competition is insignificantly correlated with

higher per capita GST reported by liquor authorities. Coefficient estimates of per capita alcohol

consumption are also statistically insignificant, but the unemployment rate is negatively and significantly associated with per capita GST revenue. The adjusted R square is between 0.76 and 0.87 across all columns. On the other hand, increased competition shares a positive and robust relationship with per capita government revenue from fees, licenses, and permits. The coefficient estimates reveal that liquor authorities in provinces with increased competition report a $0.62-$0.73 increase in per capita government revenue relative to liquor authorities in other provinces. The corresponding estimate from the log-log model suggests that increased competition is associated with a roughly 33% increase in per capita government revenue. The adjusted R square lies between 0.57-0.65 for these specifications. The other covariates are not statistically significant.

IV.   Conclusion

The focus of this study is on evaluating the likely effects of increased competition on the revenue earned by the government from retail liquor sales. Contrary to common belief, standard economic models actually predict that increased competition may lead to an increase in gross and net income earned by the provincial government from retail sales. Theoretically speaking, it is possible that an increase in access is correlated with reduced travelling time, resulting in purchases that would otherwise not have occurred. This could offset the loss in revenue experienced by the former government monopoly, as consumers purchase their needs from other competing retailers. Second, competition usually results in efficiencies. If the incentives are strong enough, it is possible that the net income transferred from the liquor authority to the province, remains comparable to pre-regulation levels. The total amount of provincial revenue from markups would then be higher post-regulation, with the additional sales generated by market entrants.

Our empirical results offer strong evidence on the potential benefits from increased competition that are consistent with the above theoretical models. Specifically, using province

level data over time, I find that increasing competition in the retail alcohol market is significantly correlated with an increase in per capita gross revenue, net income, and government revenue reported by liquor authorities. In summary, government and consumers in Ontario should strongly benefit from some increased competition in the retail sale of alcohol.