

*If Retail Alcohol Sales in
Sweden were Privatized,
what would be the
Potential Consequences?*

Editor: Harold Holder

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Executive Summary

Study Goal: This study examines the future effects of possible changes in the Swedish alcohol retail system which might result from the establishment of a private licensing system for alcohol sales. Two possible scenarios were analyzed: 1) replacing the current alcohol retail monopoly with private licensed alcohol stores, which specialize in alcohol sales, or 2) making all alcohol available in grocery stores. This report was not stimulated by an existing public or parliamentary policy discussion concerning replacement of the existing retail monopoly with a private licensing system. Currently there are no active discussions in Swedish media or in the political parties in the Swedish parliament on privatisation of the retail alcohol monopoly at present.

Introduction. Systembolaget is a monopoly for off-premise retail sale of all alcoholic beverages containing over 2.25 per cent alcohol by volume with the exception of beer with an alcohol content of at most 3.5 per cent by volume. The legal age limit for selling alcoholic beverages in Systembolaget stores is 20 years. The legal age limit for selling people's beer in general stores is 18 years. The legal age limit for on-premise sale of alcoholic beverages is 18 years for all alcoholic beverage categories. The most common opening hours for Systembolaget stores are from 10.00 am. to 6.00 pm. on Monday to Friday, except for Thursdays when the most common opening hours are from 10.00 am. to 7.00 pm., and from 10.00 am. to 2.00 pm on Saturdays. On Sundays Systembolaget stores are closed. The annual value of total Swedish per capita alcohol consumption is based on recorded alcohol consumption plus estimates of unrecorded alcohol consumption. In 2006, overall consumption of alcoholic beverages in Sweden was estimated to be 9.7 litres 100 per cent alcohol per inhabitant 15 years and older. This most likely results from increased traveller's imports and the fact that Swedish alcohol taxes are not adjusted according to inflation. Recorded alcohol consumption which includes sales at Systembolaget, peoples' beer sold in general stores and alcohol sales in restaurants accounted for 69 per cent of the total and the rest consists of various unrecorded sources foremost travellers' imports, smuggling and homemade alcohol. Overall alcohol consumption increased from 9.1 to 10.5 litres per inhabitant 15 years and older between 2001 and 2004 and has then declined in 2005 and 2006.

Previous Studies of Privatization of Alcohol Retail Monopolies. There have been previous studies of actual changes in alcohol retail monopolies which examined effects of replacement of a retail monopoly with a private licensing system. While every study has not reported an increase in total consumption as a result of establishing a private licensing system for alcohol sales, the majority of studies have found increases in consumption. There appear to be inherent characteristics of monopolies which have protective features. Any monopoly by definition eliminates competition in the alcohol marketplace. In a monopolistic environment, demand is not able to stimulate increased availability and convenience. As demand increases, in a free market condition, alcohol outlets or supply will naturally increase.

Scenario 1: Speciality Alcohol Shops. The first scenario the study analyzed concerned speciality alcohol stores. Such shops would be licensed to sell alcohol and operate under special restrictions as a speciality shop. The following elements could be expected and became the foundation for the assumptions on which the estimates from the study were derived.

- The number of alcohol stores would increase from the current 400 Systembolaget stores to over 1200 outlets.
- Total alcohol assortment in Sweden would be greater but the assortment in an average alcohol store would be smaller than the assortment in an average Systembolaget store and also include some lower price beverages not currently sold.
- Average prices of alcoholic beverages are not expected to increase IF current Swedish alcohol excise taxes were maintained. Alcoholic beverages could be special offer products but different stores could have quite different pricing systems. Prices would be higher in more remote places than in large cities. It is possible that specialty shops could use lower price for alcohol to attract customers which could result in approximately 5% lower prices.
- As a result of radio commercials and other general advertising, the promotion effect on alcohol is expected to increase consumption by 5% in addition to other price promotions.
- Opening hours would be longer than today, estimated to be an additional 10 hours weekly.
- Age limits control could be as effective as in Systembolaget if staff training is similar to Systembolaget's and enforcement is vigorous. However, based upon studies from other countries and specifically Nordic countries, it appears that monopoly outlets may be more effective in enforcing the minimum legal purchase age, and moreover that the Swedish monopoly outlets appear to be particularly effective in enforcing the minimum legal purchase age as compared to monopoly outlets in Norway and Finland.

Scenario 2: All alcoholic beverages to grocery stores. The other feasible alternative is to allow grocery stores to sell all alcoholic beverages. The following assumptions were established for this scenario:

- A high percentage of Swedish grocery stores would sell alcoholic beverages, potentially up to 8,000 stores.
- Total alcohol assortment in an average grocery store would be much smaller than the assortment in an average Systembolaget store.
- Opening hours would mirror grocery store hours expected to be up to 84 hours weekly including Sunday.
- If current Swedish excise taxes are maintained, average prices in general are not expected to decrease. However, grocery stores would stock cheap products that Systembolaget presently does not sell, e.g. big food chains offering low-priced alcoholic beverages with own brands and products of lower quality than the cheapest wines and spirits currently at Systembolaget. The effect of this product selection is expected to result in a 5% lower average price.
- Grocery stores would subsidize the price of selected alcoholic beverages with profit on other products in order to generate store traffic. Alcoholic beverages could naturally be used as special offer products to entice customers into the store to buy other products than alcohol. Point of sale promotions are expected to increase consumption by 3% in addition to the expected 5% increase resulting from radio advertising and other general advertising to increase total consumption by 8% under the grocery store scenario.
- Age limit control would likely be less effective than in Systembolaget.

General Forecasting Model. We modelled the effects on alcohol consumption and associated harm of replacing the current retail monopoly with private licenses that allow alcohol sales either (a) in specialty stores only or (b) in grocery stores. The general forecasting model used in this project was based on three steps. Step 1 is to identify the key variables which influence or affect total per capita consumption. Step 2 is to construct a model which estimates the total per capita consumption based upon (a) the elasticity of each factor and (b) the estimated change in that factor which is associated with each of the

scenarios described above. Step 3 is to estimate potential alcohol-related harms which are likely to result from the changes in total per capita consumption.

Summary of results — consumption and harms. Obviously any forecasting of the future is challenging and uncertain. And this study has made considerable effort to undertake conservative estimates. Our best estimates are that privatization of all retail sales of alcohol in Sweden would raise consumption by 14% (approximately 1.4 liters/capita) if sales were restricted to specialty stores or by 29% (approximately 2.8 liters/capita which would be added to the current estimates of 9.7 liters/capita. These estimates are, at best conservative, and it is certainly possible that if all alcohol retail sales in Sweden were transferred to private licensing, the increase in total consumption could be even higher. However, the conservative results presented here are quite important and reflect a significant public health consequence from privatization of all alcohol-retail sales in Sweden.

Estimates of alcohol-related harm associated with each defined scenario. The public health concern associated with increases in total alcohol consumption is that such increases are most always linked to increases in harm. First, the project elected to estimate alcohol-related mortality based upon changes in per capita total consumption using two different methods, neither of which yields a precise figure of total mortality. The first approach utilized was based upon attributable fractions, i.e., total mortality expected from a number of causes of death (each with a relative risk or probability of being alcohol-involved and thus associated with changes in total consumption and drinking patterns. A second modeling approach was based upon time series analyses which has established the historical relationships between total consumption and harm as a means to estimate likely percentage changes in specific alcohol-related problems associated with changes in total consumption. Since both methods yielded similar estimated increased percentages in alcohol-related mortality and there already existed unique time series parameters for the Nordic Countries as well as specifically for Sweden, it was decided to utilize the time-series method and to expand the list of possible outcomes. All of these indicators were included in a previous study that aimed at assessing the consequences of a scenario with decreased alcohol taxes in Sweden. Estimates of projected increase in alcohol related harms, shown in Table 1 are: Privately licensed specialty shops annually would result in an estimated 700 additional deaths, 6,700 additional assaults, and 7.3 million additional sick days. Both deaths from alcohol-related causes and sickness absence days in Sweden would rise by 18%. With grocery stores, the estimated additional annual toll would be 1,580 deaths, 14,200 assaults, and 16.1 million days of sick leave, a 40% increase.

Table 1. Annual harm from the alcohol consumption increases resulting from privatization, estimated using Swedish time series data.

Nature of Harm	Specialty Shops	% Increase	Grocery Stores	% Increase
Alcohol-related Illness Deaths	430	26%	1,000	61%
Fatal Accident	120	10%	250	22%
Suicides	130	14%	290	30%
Homicides	20	18%	40	40%
Total Deaths from Stated Causes	700	18%	1,580	41%
Nonfatal Assaults	6,700	10%	14,200	22%
Sickness Absence Days	7,300,000	18%	16,100,000	40%

The effect of policy changes for vulnerable groups: Alcohol policy is not only concerned with the overall effects on health and social consequences of drinking in the population, it is often also concerned with consequences for particularly vulnerable groups. Consequently, a number of policy levers are directed at limiting consumption and harms in young people; such as minimum legal purchase age and restrictions on advertising directed at young people, whereas some levers are directed at limiting consumption and harms in heavy drinkers; such as regulations of over-serving and sales to intoxicated persons. The Swedish monopoly system is quite effective in enforcing the minimum legal age for purchase compared to other retail sales, and it is likely that privatization will imply a less effective enforcement of minimum legal age, and thereby increased availability of alcohol among young people. Young people are particularly sensitive to promotion and marketing of alcohol, and it is likely that privatization will imply increased promotion and marketing, in which case young people's consumption is likely to increase relatively more. We do not know whether regulations of sales to intoxicated persons is better enforced under a monopoly system compared to privatized sales, but it seems probable that this may be the case.

In addition to policy levers directed specifically at vulnerable groups, there is also evidence that some policy levers that are directed towards all consumers, still seem to affect vulnerable groups more strongly than other groups of drinkers. Compared to other drinkers both young people as well as heavy drinkers are more sensitive to price changes and to increased density of outlets. Thus, if a privatization of retail alcohol sales implies that low-price products are introduced to the market and/or that outlet density increases, it is likely that this will lead to increased consumption among young people and heavy drinkers. Moreover, it is also observed that when total consumption increases, heavy drinkers tend to increase their consumption relatively more than other consumers.

This study did not specifically analyze the magnitude of effects of alcohol policy changes in vulnerable groups, but based upon our review of existing scientific research, it is possible to observe the following: Given the projected changes in availability, low price products, enforcement of minimum legal age and promotion and marketing, it seems very likely that a privatization of the Swedish alcohol retail market will contribute to a significant increase in alcohol consumption and thereby also to alcohol-related harms among particularly vulnerable groups as young people and heavy drinkers.

Summary and Implications. As a member of the European Union, Sweden since its early entry has been questioned about its alcohol retail monopoly and there exist rather constant pressures from the EU to eliminate aspects of national alcohol policy which have historically be established for Sweden in the interest of protecting public health and safety. While the EU Court has upheld the legality of an alcohol retail system in Sweden, there are other pressures to reduce or eliminate the provisions of the retail monopoly. The recent European Court decision to overturn the Swedish law which bans internet sales of alcohol is just such an example. A private licensing system is based upon profit through greater sales of a product. For most products, such competition stimulates lower prices and greater availability for the customer. Thus a product like milk or clothing or shoes becomes typically of lower cost and more easily obtained. Under a private licensing system, no matter how the system is created and regulated, there are no examples in which private systems result in lower levels of total consumption nor alcohol-related harms when compared with public retail monopolies.

The attraction of new participants into the retail sale of alcohol will, based upon the experiences in the United States and Canada, bring more pressure on any regulations which

have been or might be proposed for a private licensing system. Such regulations which might be challenged or modified via political pressure include alcohol taxes, legal ages of alcohol sales and enforcement of such sales, enforcement of sales to obviously intoxicated persons, days and hours of sale of alcohol, and concentration or density of alcohol retail outlets. Any laws or regulations established at the time of creating a private licensing system are always subject to future modification to accommodate the economic interests of producers, wholesalers, and retailers.

Alcohol is a product which has well defined negative public health and safety consequences and any increase in sales and consumption of alcohol will have associated increases in alcohol-related harm, just as this study has demonstrated. In the end, based upon our review of the international research literature on the number of harms associated with alcohol, the risk of increased sales and consumption of alcohol, especially by youth and heavy drinkers, and the conservative estimates of increased per capita consumption of alcohol associated with a private licensing system, the judgment of the authors on the balance of the evidence that the consequences of establishing a private licensing system would be detrimental to Swedish public health and safety.

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I. Introduction and Background

A. Current selling system of alcoholic beverages in Sweden

Systembolaget has in Sweden a monopoly for off-premise retail sale of all alcoholic beverages containing over 2.25 per cent alcohol by volume with the exception of beer with an alcohol content of at most 3.5 per cent by volume. Beer with an alcohol content between 2.8 and 3.5 per cent by volume called in Sweden folköl (people's beer) is taxed in Sweden on the same general rules than stronger beer whereas beer containing less than 2.8 per cent alcohol by volume is exempted from alcohol taxation. See Appendix A for a detailed history of the development of the Swedish alcohol retail monopoly.

Beer at most 3.5 per cent alcohol by volume can be sold in ordinary grocery stores, kiosks and gasoline stations also selling food. Off-premise sale of beer at most 3.5 per cent by volume does not need a special license. In Sweden on-premise sale of alcoholic beverages takes place in privately owned restaurants, bars and cafés. There is a special licence for on-premise sales of alcoholic beverages stronger than 3.5 per cent alcohol by volume. On-premise sale of beer at most 3.5 per cent alcohol by volume needs no license.

There are at the moment 410 Systembolaget stores in Sweden. Alcoholic beverages can also be acquired through 552 agent stores or delivery places, i.e. stores where customers can order alcoholic beverages from Systembolaget. Those beverages will then be transported to this delivery place by Systembolaget without extra costs and the customers can collect and pay them in this store at the latest next day. The agent stores account for 1.1 per cent of Systembolaget's net sales and they do not keep any alcoholic beverages in stock.

There are about 10,000 general stores selling food in Sweden from which about 4,000 are ordinary grocery stores. Retailing people's beer off the premise needs no license but the store has to report if it is selling people's beer. The number of general stores selling people's beer is about 8,600 including ordinary grocery stores, kiosks and gasoline stations. There are about 9,200 restaurants and bars retailing all alcoholic beverages in Sweden and about 1,000 places licensed to sell wine and beer, and less than 50 places to sell only strong beer.

The legal age limit for selling alcoholic beverages in Systembolaget stores is 20 years. The legal age limit for selling people's beer in general stores is 18 years. The legal age limit for on-premise sale of alcoholic beverages is 18 years for all alcoholic beverage categories.

The longest opening hours for Systembolaget stores are from 10.00 am. to 8.00 pm. on Monday to Friday and from 10.00 am. to 3.00 pm on Saturdays. The most common opening hours for Systembolaget stores are from 10.00 am. to 6.00 pm. on Monday to Friday, except for Thursdays when the most common opening hours are from 10.00 am. to 7.00 pm., and from 10.00 am. to 2.00 pm on Saturdays. On Sundays Systembolaget stores are closed.

People's beer may be sold during the hours when ordinary grocery stores, kiosks and gasoline stations are open. Some general selling people's beer open as early as 7 am. and close as late as 1 am. Also Sunday sale of people's beer is allowed.

Pricing in Systembolaget is based on purchase prices for Systembolaget plus a basic fixed surcharge per unit (SEK 0.85 for beer, SEK 3.50 for wine and 2.70 for distilled spirits and other beverages) and packaging related correction factor per unit plus a 19 per cent surcharge

on purchase price excluding alcohol tax.¹ Systembolaget's selling price for a certain alcoholic beverage is the same in all of its stores.

There are no special rules how people's beer are or should be priced in general stores. Therefore, while a certain label of strong beer costs exactly same in all Systembolaget stores throughout Sweden a certain label of people's beer may have very different prices in different parts of Sweden.

On its pricing list Systembolaget has about 2,100 different items, about 250 beers, 1,400 wines, 380 distilled spirits, 85 ciders or mixed drinks and 15 alcohol free beverages.

B. Changes in Systembolaget's role and activities (in 1980-2007)

Over the past 27 years, Systembolaget has undergone a number of changes including increasing number of stores nation-wide and hours and days of sale, and replacing counter sales with self service. The number of Systembolaget stores was 314 in 215 communities in 1980. The number of stores increased in the later half of the 1980's and through the 1990's to reach 426 stores in 322 communities in 2003. The number of stores has since then decreased slightly and was 410 in 322 communities in 2006.

Opening hours in 1980 were 9 – 18 Monday to Friday and 9 – 13 Saturdays. After a trial period in 1981 the stores were permanently closed on Saturdays from July 1, 1982. The opening hours continued to be 9 – 18 Monday – Friday until 1986 when opening hours for several stores were extended to 19.00 on Thursdays. At the same time the morning opening hour was changed to 9.30. An evaluation of Saturday opening in three experimental areas in 2000 demonstrated increased sales by 3 per cent (pure alcohol) compared with control areas. Opinion polls showed 68 percent in favour of Saturday opening before the trial with 76 percent in favour after 10 months of the trial. All stores opened on Saturdays from July 1, 2001. General opening hours at this time was 10.00 – 18.00 Monday to Friday, a number of stores closing later on some days, foremost on Thursdays, and 10.00 – 14.00 on Saturdays.

During 1991 – 1996 a trial of seven self-service stores was undertaken which stimulated an estimated 7-9 percent increase in sales, measured as pure alcohol. Sales of wine increased almost twice as much as sales of spirits. In 2000 the board of Systembolaget decided that all stores should be converted to self-service. In 2005 half of the stores had been converted to self-service and in 2006 250 of 410 stores were self-service. The self-service stores accounted for 81 percent of Systembolaget's turnover and 81 percent of the total number of customers' visits in 2006.

In addition to increased number of stores, Systembolaget has increased its number and diversity of its products offered for sale. A partial motivation for increase product diversity is the requirements of the European Union that all products from member countries must be treated equally with products from Sweden which may also stimulate the introduction of new brands. See Table I-1 for a summary of product selection for the period 1990 through 2006.

¹ Systembolaget Årsredovisning 2006, p. 34. The English version of the annual report is wrongly translated to say "incl. alcohol tax".

Table I-1 Annual Product Assortment for Systembolaget 1990-2006.

Year (in January)	No. of brands in ordinary assortment	New brands launched	Special order assortment, approx.
1990	904		
1991	961		
1992	998		
1993	1278		
1994	1386		
1995	1905		
1996	2369	1338	850
1997	2613	880	1550
1998	2586	871	1750
1999	2531	938	1950
2000	2554	819	2350
2001	2519	767	2800
2002	2323	942	3050
2003	2250	1602	3100
2004	2726	1623	3550
2005	2831	1555	3550
2006	2298	2116	3700

A recent EU court decision could have important but unknown effects on Systembolaget. Distance sales from abroad of alcohol beverages have been prohibited by law since 1916 in Sweden. The prohibition has been considered to be in breach of the EC Treaty in a judgment by the European Court of Justice from June 5, 2007, and is therefore not enforceable.² As it is clear from EC law and earlier judgments by the European Court of Justice that alcohol tax should be paid in the country of consumption, in this case Sweden, this may not have any significant effect on the Swedish retail monopoly provided that the tax control can be upheld by the national authorities. The only exception to the taxation rule is when a traveler personally brings alcohol beverages for private use across a national border within the EU, i.e. traveler's import.

The reason for creating the prohibition in 1916 was to enable the local retail monopolies of this era to retain their control over sales, both regarding the rationing of spirits, and later wine and beer, and the non-profit principle applied by the monopolies³.

The European Court of Justice considered "the prohibition ... unsuitable for attaining the objective of protecting the health and life of persons", that "it manifestly goes beyond what is necessary with regard to the objective pursued of protecting young persons from the harmful effects of alcohol" and that "the prohibition is not proportionate for achieving the objective of protecting young persons against the harmful effects of alcohol".⁴

² Judgment in the Case C-170/04, the European Court of Justice, June 5, 2007.

³ Proposition 1915:187 to the Swedish Parliament.

⁴ Press release No 38/07, European Court of Justice, June 5 2007.

C. Swedish discussion with regard to privatising off-premise alcohol sales

There is a constant threat from EU and others to eliminate the Swedish alcohol retail monopoly. Although there is no concrete proposal or currently active discussions in Swedish media or in the political parties in the Swedish parliament to privatise the retail alcohol monopoly, it is of public interest to investigate the possible consequences of such a change.

There are expressions of overall support for the monopoly in public opinion polls, in parliament and from the government. Polls of public opinion show an increasing majority supporting the monopoly since the beginning of the decade. In polls made by the retail monopoly in 2006, 57 percent support a retail monopoly on alcohol beverage.⁵ Other opinion polls show similar results. There is, however, historical opposition to the alcohol retail monopoly from the second largest political party in the Swedish parliament, the right-wing Moderate party. The party has not actively been pushing the issue in recent times. One moderate member of parliament has in the last year put forward a private bill in parliament demanding the privatisation of the monopoly.⁶

The other main opposition to the alcohol retail monopoly comes from commercial interests, mainly from grocery stores' organisations^{7 8 9 10}, who express a desire for demonopolisation in order to be able to sell alcohol beverages in grocery stores. The Swedish organisations of wholesalers of wine and spirits do not currently request the abolishment of the monopoly (1).

The present Swedish government consists of a right-wing coalition of four parties. Of the government parties it is only the Moderate Party that at times expresses opposition to the retail monopoly. The position of the government as a whole is supportive of restrictive alcohol policies, including the retail monopoly, and the government strive to decrease mean alcohol consumption.¹¹ The three parties in parliament that are outside of government at present also support the retail monopoly. There have been discussions in the government on abolishing the gambling and pharmacy monopoly, but not the alcohol retail monopoly.

D. Recent Trends in Swedish Total Alcohol Consumption including unrecorded consumption

The annual value of total Swedish per capita alcohol consumption is based on recorded alcohol consumption plus estimates of unrecorded alcohol consumption. In 2006, overall consumption of alcoholic beverages in Sweden amounted to 9.7 litres 100 per cent alcohol per inhabitant 15 years and older. Recorded alcohol consumption which includes sales at Systembolaget, medium light beer sold in general stores and alcohol sales in restaurants accounted for 69 per cent of the total and the rest consists of various sources of unrecorded consumption, foremost travellers' imports, smuggling and homemade alcohol.

⁵ Systembolaget Annual Report 2006

⁶ Swedish Government bill 1915:187

⁷ Svensk Handels Program 2006 – 2008

⁸ I höst gungar det under de statliga monopolen, Thomas Svaton, *Fri köpenskap* 2004-08-20

⁹ Livsmedelshandel på landbygden, ICA, 2005

¹⁰ ICA verksamhetsberättelse 2005

¹¹ Regeringsförklaring 2006-10-06

Recent development in total alcohol consumption displays some fluctuations both regarding the level and with respect to where Swedes buy their alcohol. Overall alcohol consumption increased from 9.1 to 10.5 litres per inhabitant 15 years and older between 2001 and 2004 and has then declined in 2005 and 2006. The rise between 2001 and 2004 was mainly driven by increasing unrecorded alcohol consumption in particular travellers' imports and smuggling whereas recorded alcohol consumption remained fairly stable. The decline in 2005-2006 is basically due to a return in travellers' imports back to levels that prevailed before the rapid rise in travellers' allowances in 2003 and 2004. It is worth noting that this decrease has occurred at the same time as Systembolaget sales have increased.

The proportion of recorded versus unrecorded alcohol has consequently varied during this period. The percentage of unrecorded alcohol increased from about 29 to 38 per cent between 2001 and 2004 and has then declined to 31 per cent in 2006. The fraction of recorded consumption consequently declined from 71 to 62 per cent between 2001 and 2004 followed by a rise to 69 per cent in 2006. Alcohol sales at Systembolaget, which represent 70-75 per cent of recorded consumption declined from 50 to 45 per cent of total consumption between 2001 and 2004 and has then increased to 52 per cent of total consumption in 2006.

II. Possible changes in the Swedish Alcohol Retail System

A. Introduction

This study examines the effects of possible changes in the Swedish alcohol retail system. This section first summarizes the published scientific research concerning the replacement of retail alcohol monopolies in other countries. Summaries of possible alcohol policy changes in Sweden considered by this group are summarized next. This study analyzed two future scenarios: 1) replacing the current alcohol retail monopoly with private licensed alcohol stores, which specialize in alcohol sales, or 2) making alcohol available in grocery stores. In the early stages of the study, we considered and rejected two other alternatives as infeasible or unlikely: 3) restricting the current alcohol retail system in the interest of improved public health policy, and 4) allowing sale of medium strength beer up to 4.7 percent alcohol by volume in grocery stores (which is the current system in Finland and Norway).

B. Previous Studies of Privatization of Alcohol Retail Monopolies

There have been previous studies of actual changes in alcohol retail monopolies which examined effects of replacement of a retail monopoly with a private licensing system. The strongest design for attributing effects resulting from this replacement is longitudinal, preferably using time series analyses. Through such a design one is able to compare differences in an outcome variable, say consumption of the specific beverage classes, total alcohol consumption or alcohol-involved problems such as traffic crashes before and after a change, e.g., eliminating a retail monopoly. Not all previous studies meet this condition. See Appendix B for a more detail summary of studies of the replacement of existing retail monopolies with private licensed systems.

One type of abolishment of alcohol retail monopoly has been that of wine monopolies. Since 1970 at least six U.S. states (Idaho, Maine, Washington, Virginia, West Virginia and Iowa), New Zealand (community-trust operated off premise outlets) and the Province of Quebec in

Canada, have specifically eliminated government owned public monopolies on the sales of all wine, imported wine or fortified wine or some combination. Privatization of such sales has generally resulted in a greater number of outlets for off-premise wine sales, longer opening hours for purchase and often lower prices as a result of commercial competition.

Wagenaar and Holder (1996) reviewed all published studies at the time on the specific ending of retail wine monopolies and reported that out of 13 studies, 10 found significant increases in wine consumption following an ending of the wine monopoly and in many cases, there was a net increase in total alcohol consumption, allowing for substitution with other beverage types (2). The most recent study of privatization of wine sales was undertaken by Trolldal (2005) who undertook an interrupted time-series analysis (ARIMA) of this change in Quebec using all of Canada, with the exception of Quebec as the control (3). Contrary to earlier studies regarding these policy changes in Quebec (4, 5), Trolldal found that the sales of wine increased by 10%. However, the effect was not so large that it affected total sales. One explanation could be that the policy change in Quebec was valid only for a limited number of wines, which accounted for only a fraction of the total alcohol sales market.

The State of Iowa was also the first U.S. state to eliminate a spirits retail monopoly since the end of Prohibition. In March 1987 all state retail stores were closed, and private establishments were licensed to sell distilled spirits. Holder and Wagenaar conducted an interrupted time-series analyses of spirits consumption in Iowa, controlling for nationwide sales trends over the past two decades, and identified a statistically significant 9.5% increase in spirits sales following the policy change (6). While there was a corresponding 13.7% decline in wine sales, and no change in beer sales, privatization of spirits retail sales yielded a net increase in total alcohol consumption in Iowa. No changes were found in spirits sales in states bordering Iowa.

Trolldal also studied the privatization of the retail sale of all alcohol in Alberta, Canada, which took place primarily between the end of the 1980s and the beginning of the 1990s (7). Utilizing an interrupted time-series analysis (ARIMA), Trolldal found that privatization had a significant lasting effect on the sale of spirits while the effect was not large enough to affect total sales. A recent overall assessment found that prior to the privatization of liquor retail sales in 1993/94, Alberta had 310 total retail stores, whereas by January 2003 there were 983 retail stores (8).

There appear to be inherent characteristics of monopolies that imply protective effects. Any monopoly by definition eliminates competition in the alcohol marketplace. In a monopolistic environment, demand is not able to stimulate increased availability and convenience. The number of retail outlets is not stimulated by demand (or expected profitability) in a monopolistic situation as it naturally would be in a privatized environment (open market). As demand increases, in a free market condition, alcohol outlets or supply will naturally increase.

C. Alcoholic beverages to private specialty alcohol stores

In Finland, the High Administrative Court has ruled that EU member rules preclude denying an on-premise licence for restaurants or pubs or other on-premise places on means test, i.e., for a social good or commercial or any other reason not to open new places serving alcoholic beverages. Therefore, if the alcohol law would be changed in Sweden to allow licensing of off-premise sales of alcohol beverages in specialty alcohol stores, denying off-premise licences to control density is likely to be impossible. Although putting a high price on licences

for specialty alcohol stores makes conceptual sense as a way to reduce density, it also is implausible in an EU member state, because licensing fees that exceed the costs of controlling sales can be interpreted as barriers to trade. Thus the state's ability to control the number of licenses would be limited by requirements such as: (a) Specialty alcohol stores should have their own personnel and alcohol stores should have their own door, i.e. they cannot be departments of supermarkets. Similar rules exist in the Netherlands. (b) Distilled spirits or strong alcoholic beverages should be sold over the counter. Similar rules have existed in Scotland, and (c) Alcohol stores cannot be opened near kindergardens, schools, churches etc.

There are different ways to privatise Systembolaget. One way would be to close all Systembolaget shops and then open licensed private specialty alcohol stores. Initially, this approach might lead to less chain controlled alcohol sales. Another possibility would be to sell Systembolaget stores either individually or in greater combination by auction to the private sector. Independently of how Systembolaget would be dissolved, after perhaps 10 years the situation might look as follows:

- The state is not a commercial actor in the alcohol field.
- The number of alcohol stores is much larger than the number of Systembolaget stores today.
- Agent stores or remote delivery places might disappear, although political pressure might result in specialty shops being allowed to continue to sell through agent stores in sparsely populated rural areas.
- The variations between and visibility of alcohol stores would be greatly enlarged.
- Total alcohol assortment in Sweden would be greater but the assortment in an average alcohol store would be smaller than the assortment in an average Systembolaget store.
- Alcohol stores would stock cheap products that Systembolaget presently is not selling, e.g. big food chains offering low-priced alcoholic beverages with own brands, which would have lower quality than the cheapest wines and spirits at Systembolaget.
- Alcoholic beverages would not be special offer products but different stores could have quite different pricing systems.
- Prices of alcoholic beverages would be higher in more remote places than in large cities.
- Thus selling alcoholic beverages in private alcohol stores is if anything slightly less efficient than the Systembolaget system, which means that privatisation would not change the price level as much, especially since Systembolaget is allowed only a modest mark-up over costs and an important part of the retail price consists of alcohol excise duties and value added taxes. It is possible that specialty shops can use lower price promotions of alcohol to attract customers.
- Opening hours would be longer than today but probably not as long as in general stores.
- Age limits control could – or could not – be as effective as in Systembolaget, depending on whether staff training is similar to Systembolaget's and enforcement is vigorous. The drive for profit, however, may prompt certain stores to risk selling to underage people and people heavily under the influence of alcohol. The risk of higher sales to underage persons at privately licensed alcohol outlets is consistent with the results from a number of international studies but most importantly from Nordic countries. The successful enforcement effort of Systembolaget is much more effective than that of private grocery shops and recent comparative studies of purchase attempts in Finland and Norway show that 18 years old who look young for their age (the minimum legal age for purchase of beer and wine is 18 years in Finland and Norway) succeed in purchasing alcohol (beer) in more than 50% of the attempts, and it seems that in Finland the success rate is somewhat lower in the monopoly outlets as compared to other (private outlets) (9). It should, however, be noted that the number of successful purchase attempts in monopoly outlets was relatively low. See discussion in Chapter VI, Section B.

- Systembolaget is organizationally under the state apparatus and clearly state controlled. Shifting to a private off premise sale system for alcoholic beverages could and would pressure the state to liberalize the restrictions put on the private specialty alcohol store system (for instance, not a separate store, longer opening hours, Sunday sales). The whole system with only specialty stores and no strong beer, wine or distilled spirits in ordinary grocery stores or general stores would be questioned as unduly restrictive, for instance, during each election period.

D. All alcoholic beverages to grocery stores

The other feasible alternative is to allow grocery stores to sell all alcoholic beverages. We do not believe that a system that tried to restrict the range of beverages sold in groceries and kept the remaining beverages at Systembolaget would be feasible over the long term for legal, political, and economic reasons. First, the Finnish experience suggests that at a minimum sales of all fermented alcoholic beverages (beer and wine, beverages that are at most 15 percent alcohol by volume) would be started in grocery stores. That would mean that most sales of fermented beverages would move from Systembolaget to grocery stores. Total sales of beer and wine would increase, displacing some sales of distilled beverages, because outlet density and sales hours for these beverages would increase, making them more convenient, and promotion of these beverages also would increase. Meanwhile Systembolaget sales would shrink dramatically, forcing it to close or reduce hours at many of its stores and agent shops, reducing distilled spirits accessibility. Distilled spirits producers almost surely would press a restraint-of-trade suit seeking to allow grocery stores to sell mixed distilled beverages at most 15 percent alcohol by volume. With the Systembolaget network in financial distress, they also are likely to find sympathetic ears as they organize political pressure to allow sales of all distilled spirits in groceries. So the only feasible sales restrictions under a grocery store sales alternative are likely to be:

- Alcoholic beverages can only be sold in general stores also selling food.
- Gasoline stations are not able to get licences to sell alcoholic beverages but this seems unlikely since gasoline stations are already selling food.

After perhaps 10 years, the situation might look as follows:

- A high percentage of Swedish grocery stores would sell alcoholic beverages.
- Total alcohol assortment in an average grocery store would be much smaller than the assortment in an average Systembolaget store, prompting the growth of urban specialty stores (e.g., gourmet wine shops) that would stock a wider range of products in a product category than Systembolaget currently offers or carry goods from just one or two producers.
- Opening hours would mirror grocery store hours, which are much longer than Systembolaget's current opening hours and include Sunday.
- Alcohol stores would stock cheap products that Systembolaget presently is not selling, e.g. big food chains offering low-priced alcoholic beverages with own brands and lower quality than the cheapest wines and spirits at Systembolaget.
- Alcoholic beverages could be special offer products that affect the price level at least periodically. Grocery stores would subsidize of the price of selected alcoholic beverages with profit on other products in order to generate store traffic. Alcoholic beverages could naturally not be used as special offer products to entice customers into the store to buy other products than alcohol, but promotions, including price promotions, of some brands could certainly be used in the same way as for the same reason, to make people come into the shop and also buy other products.

- Opening hours would be much longer than today.
- Age limits control would most probably be less effective than in Systembolaget. See Chapter VI, Section C.
- Selling alcohol in groceries stores can create economies to scale in labour that reduces staff down time and in space rental, but the larger number of outlets will reduce the stock turnover rate per square meter. On balance, selling alcoholic beverages in grocery stores, coupled with price promotions, seems likely to produce a reduction in average price.

E. Reversal of Changes in Systembolaget

The project group discussed if it was possible to reverse some of the features which the current retail monopoly has taken to increase alcohol availability or the convenience of the customers to buy alcoholic beverages. These changes have been generally done to increase the service of the current alcohol retail monopoly to its customers and to indirectly increase public support of the current retail monopoly system amidst the pressures to increase retail access of alcoholic beverages. The group discussed the following and concluded:

- It would be difficult to return to counter sales or inconvenient Systembolaget store locations due to public acceptance of these increases in convenience.
- It would be impossible to stop accepting credit cards in Systembolaget stores.
- The retail network might be decreased but this could raise a storm of protest by the customers of Systembolaget stores that would be closed.
- The shorter opening hours in Systembolaget compared to grocery or specialty stores and the absence of Sunday sales make it impossible to shorten the time alcoholic beverages are available in Systembolaget stores without a strong reaction from its customers.

As a result the group elected not to evaluate the potential public health benefits of any reversal of current changes in Systembolaget services or sales outlets.

F. Medium beer or all alcoholic beverages up to at most 4.7 per cent by alcohol to grocery stores

We do not believe that a system that tried to restrict the range of beverages sold in groceries and kept the remaining beverages at Systembolaget would be feasible over the long term for legal, political, and economic reasons. First, the Finnish experience suggests that at a minimum sales of all fermented alcoholic beverages (beer and wine, beverages that are at most 15 percent alcohol by volume) would be started in grocery stores. That would mean that most sales of fermented beverages would move from Systembolaget to grocery stores. Total sales of beer and wine would increase, displacing some sales of distilled beverages, because outlet density and sales hours for these beverages would increase, making them more convenient, and promotion of these beverages also would increase. Meanwhile Systembolaget sales would shrink dramatically, forcing it to close or reduce hours at many of its stores and agent shops, reducing distilled spirits accessibility. Distilled spirits producers almost surely would press a restraint-of-trade suit seeking to allow grocery stores to sell mixed distilled beverages at most 15 percent alcohol by volume. With the Systembolaget network in financial distress, they also are likely to find sympathetic ears as they organize political pressure to allow sales of all distilled spirits in groceries. The most restricted decrease in the scope of Systembolaget's monopoly would be to introduce beer up to at most 4.7 percent alcohol by volume, the old medium beer, to grocery stores. This would mean that Sweden would go back

to the system prevailed between 1965 and 1977, and to a quite similar system prevailing at the moment in Finland and Norway.

Starting medium beer sales in groceries would in the longer run almost certainly mean that cider and alcopops or RTD-drinks with at most 4.7 percent alcohol by volume would be offered as well. Sales of alcopops and cider in grocery stores began in Norway because the EFTA Court required it based on non-discrimination on different alcoholic beverages and producers.

Although privatising sales of all alcoholic beverages up to 4.7 per cent alcohol by volume is practically possible, it is largely infeasible politically. These beverages are seen as beverages preferred by youngsters. What is more, evaluation showed the privatised medium beer sales period in Sweden in 1966-1977 was especially problematic for alcoholic beverage consumption by young people. Therefore, this alternative was rejected.

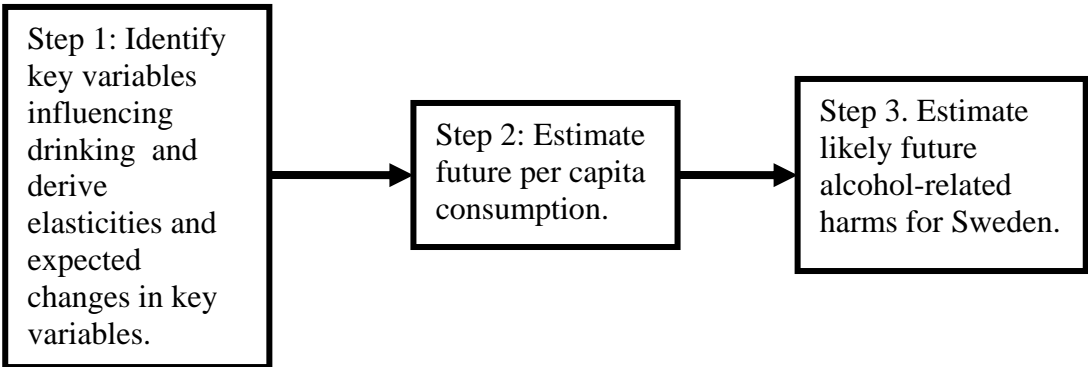
III. Description and Rationale for Swedish Forecasting Model

A. Documentation of General Forecasting Model

We modelled the effects on alcohol consumption and associated harm of replacing the current retail monopoly with private licenses that allow alcohol sales either (a) in specialty stores only or (b) in grocery stores.

The general forecasting model used in this project is based on three steps as shown in Figure 1 below.

Figure 1: Basic Forecasting Approach.



Step 1 is to identify the key variables which influence or affect total per capita consumption. Step 2 is to construct a model which estimates the total per capita consumption based upon (a) the elasticity of each factor and (b) the estimated change in that factor which is associated with each of the scenarios described above. The model then produces a range of possible

estimates of per capita consumption of alcohol. Step 3 is to estimate potential alcohol-related harms which are likely to result from the changes in total per capita consumption.

Step 1: construction of the model. The model combines the effects of five factors:

- (1) Hours of sale
- (2) Retail prices
- (3) Promotion and advertising
- (4) Number of retail outlets
- (5) Substitution, with consumption increases from privatised stores reducing consumption of alcohol purchased outside of Sweden.

The general form of the forecasting model is:

$$\% \text{Consump}_i = \% \text{Systembolaget} * ((1 - \text{Subst}_i) * (\text{ElastDens}_i + \text{ElastHrs}_i + \text{ElastPromo}_i) + (1 - \text{Subst}_{\text{price-}i}) * \text{ElastPrice}_i)$$

where

$\% \text{Consump}_i$ is the percentage change in consumption from privatised sales under scenario i

$\% \text{Systembolaget}$ is the percentage of current alcohol that is purchased at Systembolaget outlets,

Subst_i is the percentage of consumption change that substitutes for consumption from non-Systembolaget sources,

ElastDens_i , ElastHrs_i , ElastPromo_i , and ElastPrice_i are the elasticities (expressed as a percentage of relevant consumption) associated with increased density, increased hours, increased promotion, and reduced price under scenario i , and

$\text{Subst}_{\text{price-}i}$ is the percentage of price-related consumption change that substitutes for consumption from non-Systembolaget sources.

In sensitivity analysis, we also use a multiplicative model:

$$\% \text{Consump}_i = \% \text{Systembolaget} * (1 - (1 - \text{Subst}_i) * ((1 - \text{ElastDens}_i) * (1 - \text{ElastHrs}_i) * (1 - \text{ElastPromo}_i))) * (1 - \text{Subst}_{\text{price-}i}) * (1 - \text{ElastPrice}_i)$$

Both models were implemented in an Excel spreadsheet that isolated the percentage change in consumption associated with varying levels of the five factors that influence consumption.

For each of the factors, two sets of values are needed for the forecasting model, the elasticity values (based upon a careful review of the research literature) and the expected changes in that factor under each of the two scenarios to be explored. For each factor, the model involves a linear or non-linear elasticity function which expresses the response of consumption to a change in the factor and the expected change in the factor as a result of the scenario examined. Below the estimated elasticities and associated range of changes in level for each factor are presented, along with a rationale based on the published scientific research.

B. Hours of sale

Recommended Elasticity Function and Range of Variation in Hours. Table 2 shows the historic and projected sales hours changes analysed and the per hour and cumulative

consumption changes associated with each. We conservatively assumed that adding hours would raise sales/consumption at a diminishing rate. The table indicates the range of possible changes in total opening hours analysed in the analysis, the assumed marginal rise in consumption for each incremental change, and the aggregate rise in consumption relative to the current hours. Our best estimate is that specialty stores would stay open an additional 10 hours, increasing consumption by 3.25%. We assumed that the commercially viable maximum hours stores would stay open in a completely deregulated private market would match current Swedish grocery store hours — 12 hours a day throughout the week or 84 hours per week. Those hours would double the sales hours before Saturday opening was added, increasing current consumption by 8.00%.

Table 2. Total hours open and estimated consumption impact by opening hours scenario.

Scenario	Total Hours Open	Incremental Increase Per Hour Above Prior Listed Scenario	Cumulative Consumption Increase
<i>Hours Until 2001</i> , Monday-Thursday 10:00-18:00, Friday 10:00-20:00	42	Not Applicable	Not Applicable
<i>Current Hours</i> (5 Saturday Hours Added), Saturday Hours, 10:00-15:00	47	0.8%	Base for Model
Add 5 Saturday Hours, 10:00-20:00	52	0.7%	3.5%
Add 5 Late Hours On Weekdays to Reach <i>Specialty Store Hours</i> , Monday-Thursday, 10:00-19:00, Friday 10:00-21:00, Saturday 10:00-20:00,	57	0.6%	6.5%
Add 5 More Late Hours, Monday-Thursday, 10:00-20:00, Friday-Saturday 10:00-21:00	62	0.5%	9.0%
Add 10 Sunday Hours, 10:00-20:00	72	0.35%	12.5%
Add 12 Hours to Reach <i>Grocery Store Hours</i> , Daily, 9:00-21:00	84	0.2%	14.9%

Rationale and Evidence. The available evidence shows that, all other factors being equal, increased liquor sales hours normally lead to increased alcohol consumption. Historically, a 5 hour increase in the trading hours of Swedish monopoly outlets from 42 hours to 47 hours per week resulted in a 4% overall increase in liquor store sales (10). Recent studies in the USA further support this conclusion as do Swedish studies, though to a more limited degree. Importantly, relevant studies are numerous but of mixed quality, with many lacking control areas or comparison groups. Consequently, study results also are quite mixed with many finding no impact on consumption but the better designed studies generally finding stronger effects.

The international evidence clearly suggests that changes in trading hours on harm indicators (road crashes, violent incidents) tend to be more pronounced than on per capita consumption (e.g. (11)). Babor and colleagues concluded that reductions in the hours and days of sale generally lead to reductions in alcohol consumption and related problems (12). A recent well-controlled study examining the impact of the introduction of Sunday sales of liquor stores in New Mexico found an average increase of 29% in weekly alcohol-related crashes, varying

between 4% and 90% across individual counties (13). Lower levels were associated with early reversal of the policy in some local areas, further supporting the underlying and strong causal relationship. Recent well-controlled studies of the impact of increased late-night trading for public bars in Australia found significant increases in both violent incidents (14) and alcohol-related crashes (11), while purposeful restrictions of trading applied to welfare cheque payment days in Australia were associated with reduced levels of harm (15). The evidence, however, suggests weaker links between per capita alcohol consumption and acute alcohol related mortality (16). Even in the absence of changes in overall consumption, the evidence suggests high risk drinkers are most likely to take advantage of either late or early trading hours (e.g. (17, 18)).

If Systembolaget was replaced by a mixed private or wholly private liquor store market, in theory, current trading hours could persist. In practice, experience in other countries in jurisdictions such as Alberta and British Columbia in Canada suggests that liquor store associations might lobby persistently for the right to open longer hours. Nevertheless, in Norway where low alcohol content beverages (below 4.7%) are sold in (licensed) grocery stores, alcohol sales are not permitted after 8pm on weekdays (Monday through Friday) or 6 pm on Saturdays and no sales are allowed on Sundays, so a privatised Swedish market for the full range of alcoholic products might not be associated with expanded trading hours. Despite this, we believe some expansion of Saturday hours to better match other retail closing times would be likely in a privatised system.

To estimate the elasticity function, we gradually stepped down the expected increase per added trading hour from the 0.2% consumption increase per hour that resulted when five Saturday trading hours (10 am to 3 pm) were added in Sweden (10). That change raised total opening hours from 42 to 47.

C. Retail Prices

Recommended Elasticities and Range of Price Changes. We concluded no price change was likely. Sensitivity analysis considered a 5% price decrease. Absent substitution, a 5% price decrease would raise associated consumption by 1.35%.

Rationale and Evidence. Table 3 shows the most recent alcohol price elasticity estimates derived from quarterly and monthly Swedish price and consumption data (19).

Table 3. Estimated price elasticities.

	Quarterly data	Quarterly data	Quarterly data	Monthly data
Time Period	1984:1-1994:4	1995:1-2004:1	1984:1-2004:1	1984:1-2004:3
Beer	-1,36***	-0,55* used	-0,79***	-0,90***
Wine	-0,62**	-0,81(*)	-0,57** used	-0,63**
Spirits	-1,16***	0,34	-0,96*** used	-0,81***

*** p<0,001; ** p<0,01; * p<0,05; (*) p<0,10

used= preferred parameters used in estimates of future alcohol consumption

The elasticities used for forecasting the effects of price on consumption are designated in Table 3 as “used”. For wine and spirits, we chose elasticities derived from all available data. For beer, however, the elasticity decreased significantly over time, so our best estimate relies solely on recent data.

Why do we regard a price change unlikely? Because high alcohol taxes are the reason Swedish alcohol prices are much higher than in nearby Denmark, Finland, and Germany. For example, Germany does not tax wine but Sweden imposes a 30% tax. Systembolaget gets excellent wholesale prices as a bulk purchaser. It should be noted that large private corporations can also obtain special wholesale prices as well. Systembolaget has low expenses because its stores typically have much higher volumes than smaller stores would and because its opening hours are shorter than at stores in privatised systems. Systembolaget only takes a mark-up around 4 kroner (0.5 Euros) per bottle plus 17% over cost of product *before* expenses. Consequently, Swedish pre-tax prices are lower than prices in Denmark's private specialty shop system (20). After tax, Danish prices are 29% lower than Swedish prices and German prices are 44% lower (WHO, 2007). Finnish prices are 25% lower for wine and spirits but exceed Swedish prices for beer.

Conservatively, the main model assumes no price change. That assumption is consistent with experience in Alberta, Canada in the four years after privatisation. On the other hand, sensitivity analysis considers a 5% price reduction decrease associated with promotion, loss leaders, and large chains of stores offering low-priced, low-quality alcoholic beverages with their own brands. Combining the recommended elasticity estimates by beverage with Swedish data on volume consumed by beverage suggests that, absent substitution, a 5% price reduction would raise associated consumption by 1.35%.

D. Promotion and Advertising

Recommended Effects. We believe that privatisation would lead to radio advertising and wider print advertising, but that the impact on consumption would be softened by required warning labels and anti-advertising required if a brand name is mentioned in Swedish alcohol advertising. Conservatively, we assumed that the increased promotion in a privatised specialty shop system would raise consumption by 5%. This estimate ignores the effects of point-of-sale advertising. For the grocery store scenario, point-of-sale advertising has had a significant impact in similar situations, suggesting a total rise of 8%. In sensitivity analysis, we considered the possibility that promotion would raise imported, smuggled, and internet sales as well, with no substitution.

Rationale and Evidence. Competition is an essential element of any open economic system. Through competition, businesses grow, prices decline, and products and services to the consumer increase. Such processes are inherent in any free enterprise and one of the cornerstones of modern economic systems. Thus for alcohol, like for soap and bread, producers, wholesalers, and retailers can, and strive to, stimulate demand. Sweden has had a historical pattern of total bans on alcohol advertising but regulations from the EU and outside pressures have eroded the restrictions. Product alcohol advertising is rising and can be expected to increase further in the future even without privatisation. As a result of a judgment of the Swedish Market Court (Marknadsdomstolen) 2003, after receiving a preliminary ruling from the European Court of Justice, the Swedish law restricting print advertising was changed to apply only to beverages above 15 % alcohol by volume. Given the current situation in Sweden where alcohol advertising in mass media is naturally increasing, research concerning general alcohol advertising and the effects of a total advertising ban are not as relevant. In addition, the literature concerning such total bans is limited.

Saffer and Dave (2002) estimated that allowing advertising of beer and wine or of spirits in one media (radio, TV, or print) raised consumption by 5% (21). Snyder *et al.* (2006) found a

3% consumption increase by 15 – 25 year olds for every dollar spent on measured media advertising per capita (22). Currently Systembolaget has chosen not to advertise strong beer, wine and spirits, in printed media, but private retailers almost surely would choose to advertise and some wholesalers already have begun advertising. Two of the four major TV channels in Sweden broadcast from outside the country and accept alcohol advertising. Rather than lose advertising revenue to offshore enterprises, government seems likely to allow domestic channels to accept similar advertising. No radio advertising is in use. We believe that privatisation would lead to radio advertising and wider print advertising, but that the impact on consumption would be softened by required warning labels and anti-advertising required if a brand name is mentioned. Conservatively, we estimated that the increased promotion in a privatized specialty system would raise consumption by 5%.

Selling alcohol in licensed specialty shops or grocery stores in Sweden would create an additional source of investment in alcohol promotion which can affect consumption level. A marketing study in *Beverage Industry* 2001 found that point-of-purchase (POP) marketing including location advertising and placement can increase total beer sales by as much as 17% (23). The article found that beer manufacturers use base wrap for 28% of beer products and brand signs on 18% of beer product displays. The study also found that base wrap increased sales 2.9% and branded signs, 6.7%. When combined, base wrap as part of the display and a branded sign increased beer sales by 9%. When a thematic sign was added, beer sales increased by 13%, which rose to 17% when a branded shipper was added. These results are echoed in advice to retailers by "When Are Stockpiled Products Consumed Faster?", which presents a model of convenience and salience and finds that promotion increases consumption more for convenient products, i.e. products that do not have to be prepared before consumption. Using the ratio of sales-to-advertising for the grocery sector today, calculated to 0,6 %, the possible increased investment from the assumption of the same sales volume on the market after privatization as today from Systembolaget, would be SEK 7.68 per capita 15+, which roughly corresponds to a dollar (see "Investments measured media grocery stores Sweden 2005.doc" for data and calculations). This could correspond to an increase of consumption of 3%. There might be a substitution effect between advertising by wholesalers and retailers, though, but given that the advertising to sales-ratio is 9% for the alcohol industry, according to Saffer and Dhaval (2002) in comparison with 3% for the average industry (21), there seems to be room for increases in alcohol advertising investments in Sweden. The investment ratio in measured media by grocery stores of 0.6% of sales may on first glance seem too small yet persons with knowledge of the Swedish grocery market report that the total investment in marketing, including all forms, is approximately 3% of total sales, so the 0.6% figure is perhaps reasonable.

A major source of on-site product promotion is price discounts. Estimates are that more than 65 per cent of all wine is sold on price promotion in the UK according to AC Nielsen (<http://www.jancisrobinson.com/articles/wineneews060808>). The British purchase almost two-thirds of their wine from supermarkets, and the great majority of that from just four - Tesco, Sainsbury's, Morrisons/Safeway and Asda (owned by Wal-Mart). (<http://www.jancisrobinson.com/articles/wineneews051022>). Oddbins, a significant chain of wine stores in the United Kingdom, however, has announced the end of all price promotions, discounts and special offers on single bottles of wine.

Research showing that point-of-purchase promotion, especially price promotion, can affect alcohol consumption tends to be indirect, focusing on demonstrating harm reductions. Snyder *et al.* (2006) found that restrictions on point-of-purchase price advertising at liquor stores

reduced the probability of drinking and driving among all drinkers and with price advertising, prices may be expected to fall, thereby leading to increases in overall consumption (22). Ellickson and colleagues found that for seventh-grade non-drinkers, exposure to in-store beer displays predicted drinking onset by grade 9 and exposure to beer concession stands at sports or music events predicted frequency of grade 9 drinking (24). These research findings are reflected in sales information that 74% of all beer sales in the U.S. are in retail establishments, led by convenience stores and gas stations, that young adults (aged 21-27) are most likely to purchase beer in package and convenience stores (25), and that 75% of teens shop at convenience or convenience/gas stores weekly (26).

Bray *et al.* investigated the association between beer product characteristics (type, package size, and brand name), market-area socioeconomic characteristics, and promoted sales of beer in grocery stores (27). The researchers noted that marketing research has shown in-store merchandising and promotions to substantially increase beer sales and that purchasing large package sizes may increase total consumption. Given the greater opportunity for product and price promotion, the widespread use of print advertising, and the offer of large-volume containers in grocery stores elsewhere in the EU, we assume that expanding sales to grocery stores would increase promotion-related consumption by 3% more than in the specialty store scenario or 8% total.

E. Outlet density

Recommended Elasticities and Density Changes. Conservatively, for specialty shops, we assumed that each 10% rise in the density of alcohol outlets would increase alcohol consumption by 1%. For grocery stores, we assumed a 45% rise in consumption. These estimates then were adjusted downwards to eliminate the effects of changes in sales hours that implicitly were included in the effects on consumption. Privatising sales in specialty stores would raise outlets from 400 to an estimated 1,256. It is questionable whether net density would rise in border areas where much alcohol is now purchased from specialty shops in other countries, with any increase in Swedish shops offset by closing of shops ringing the borders with countries with lower prices. We estimate that the affected border areas house 20% of the Swedish population, so total shops might rise to only 1,084. Moreover, the price analysis in Section III-C suggests that the much higher alcohol tax levels in Sweden than in neighbouring countries will strongly discourage the border shops from migrating into Sweden. Shifting to a grocery store network would effect density much more, with sales outlets probably rising to 8,000.

Rationale and Evidence. A number of studies have investigated the relationship of alcohol retail outlets and consumption and alcohol-related problems. Of greatest relevance to the current project are studies of the association between off-premise alcohol outlets and consumption. Although a few United States studies used actual sales data and alcohol outlet data at the state level for all 50 states, most studies examined municipalities and local counties where all consumption data were based upon self-report which is typically a 40% to 60% under reporting of sales. Gruenewald *et al.* (1993) conducted an aggregate time series cross-sectional data from U.S. states to evaluate the relationships between alcohol beverage prices, availability, and alcohol sales within one analytic model (28). The model related beverage prices and alcohol availability directly to alcohol sales in the context of an assumed simultaneous relationship between sales and availability. The results show that, independent of the effects of beverage prices, and controlling for the endogeneity of sales and availability, physical availability of alcohol was directly related to sales of spirits and wine. The analyses

found that a 10% reduction in the density of alcohol outlets would reduce consumption of spirits from 1% to 3% and consumption of wine by 4% based upon sales. These appear to be the best estimates of the elasticity between density and consumption. (Based upon private conversation with Dr. Paul Gruenewald, Prevention Research Center, Berkeley, CA, USA, on 2 February, 2007). Conservatively, we assumed a 1% increase. This estimate controls for price changes, but implicitly incorporates a 25-hour rise in sales hours. From Table 2, that means the effect of outlet density alone is 12.5% lower than Gruenewald *et al.* suggest. The 1% elasticity estimate is based on analyses of changing to private specialty shops. For the grocery store sales scenario, we assumed a more modest 45% rise, roughly equal to the 46% rise in total consumption that occurred when Finland switched beer sales (these sales increased by 256%) to grocery stores but forbade price reductions (29) This change was accompanied a 10-hour increase in sales hours, meaning the net rise due to density change was 38.5%. Table 4 summarises the estimated density and consumption changes.

Table 4. Rises in alcohol outlet density and consumption for sales at specialty stores and at grocery stores versus at retail monopoly stores.

Scenario	Outlets	Consumption Increase
Retail Monopoly	400	Base for Model
Specialty Stores, No Density Rise in Border Areas	1,084	14.6%
Specialty Stores	1,256	18.9%
Grocery Stores	8,000	38.5%

For many years, Systembolaget has sold alcohol at roughly 400 monopoly stores. Analysing U.S. data, Gruenewald, Madden and Janes (1992) find that outlets become 3.14 times as dense if sales are privatised in specialty stores, suggesting a rise from 400 to 1,256 shops (30). It is questionable whether net density would rise in border areas where much alcohol is now purchased from specialty shops in other countries, with any increase in Swedish shops offset by closing of shops ringing the borders with countries with lower prices. We estimate that the affected border areas house 20% of the Swedish population, so total shops might rise to only 1,000 ($0.2 \cdot 400 + 0.8 \cdot 400 \cdot 3.14$). Moreover, the price analysis below suggests that the much higher alcohol tax levels in Sweden than in neighbouring countries will strongly discourage the border shops from migrating into Sweden. Extending sales to grocery stores would allow sales at 8,000 outlets.

F. Substitution of Unrecorded Purchases and Recorded Consumption

Recommended Effects. In the interest of building in conservative assumptions to the analytic model, a 10% substitution effect between Systembolaget sales and unrecorded sources of alcohol was assumed. We tested this assumption using a sensitivity analysis of a range from 0% and 30%. An assumption of any substitution is conservative because the model establishes that the projected percentage rises in consumption associated with changes in each factor applies only to the 52% of alcohol that comes from Systembolaget stores. The model then translates this into impact on total consumption.

Rationale and Evidence. If alcohol sales from Swedish stores significantly increased because privatisation increased convenient local access, regular drinkers might spend slightly less on

average on alcohol from sources outside Sweden. One theoretical discussion of the nature of alcohol availability suggests that a variety of factors in combination (price and convenience of access in both time and place) operate to produce an overall accessibility factor that influences consumer choices (31). Such a model suggests that an increase in the physical availability of alcohol from a more expensive source (in this case Swedish stores) could substitute to some degree for sales from less convenient (especially in areas distant from borders) though more affordable alcohol. This reflects the actual or perceived cost and difficulty of seeking lower cost alcohol from a distant source.

Although availability with Systembolaget has changed little since 2001, Table 5 shows that recorded retail sales have increased from 4.6 litres per capita to 5.1 litres, an increase of 11 %. This growth probably resulted from price changes. If there had been any recent major change in availability at Systembolaget, a direct estimation of substitution resulting from availability changes. However, during the 2001-2006 time period with good data on unrecorded consumption, only two rather modest changes in availability and taxes occurred; Saturday opening on July 1 2001 and a tax cut for wine in December 2001. It is unlikely that these changes were large enough to be traceable in total consumption data, especially since they happened at the same time as relaxed import restrictions required by the European Union were causing unrecorded alcohol sales to rise in Sweden.

Table 5. Alcohol consumption in Sweden 2001-2006 expressed as alcohol (100%) per inhabitant 15 years and above divided into recorded and unrecorded consumption (Source: SoRAD, Stockholm university).

	2001	2002	2003	2004	2005	2006
ESTIMATED TOTAL	9,09	9,87	10,22	10,47	10,16	9,70
RECORDED	6,49	6,9	6,88	6,46	6,54	6,66
Systembolaget	4,58	4,98	5,08	4,76	4,92	5,08
Restaurants	1,04	1,09	1,00	0,99	0,96	0,94
Grocery stores (beer)	0,87	0,83	0,80	0,71	0,66	0,64
UNRECORDED	2,6	2,98	3,33	4	3,62	3,05
Travellers' imports	1,77	1,88	2,27	2,71	2,28	1,89
Smuggling	0,40	0,56	0,66	0,89	1,00	0,89
Homemade	0,43	0,54	0,40	0,40	0,30	0,23
Internet	-	-	-	-	0,04	0,04
PROPORTION OF TOTAL (%)						
Recorded	71,4	69,9	67,3	61,7	64,4	68,7
Unrecorded	28,6	30,2	32,6	38,2	35,6	31,4
Systembolaget	50,4	50,5	49,7	45,5	48,4	52,4

NB: "Consumption" from Systembolaget unavoidably includes sales of alcohol that crosses the border into Norway, where after-tax prices are more than double Swedish prices.

The major change in availability during this period concerns unrecorded alcohol and particularly the more generous import quotas which have led to an increase in travellers'

imports. It appears likely that the increase in travellers' imports replaced some sales at Systembolaget. For instance, when the import quotas were practically abolished in 2004, a considerable decline in Systembolaget sales was observed at the same time as both smuggling and travellers' imports rose significantly (Table 5). Norström & Ramstedt (2007) examined the relationship between Systembolaget sales and unrecorded alcohol more systematically on the basis of quarterly data for 2001 and 2005 using ARIMA time series analysis (32). Travellers' imports appeared to be the driving force in the relationship, with the substitution effect estimated at 20%. This means that a doubling of travellers' imports was associated with a reduction in Systembolaget sales by 20%. Illegal sales, i.e. smuggling, and Systembolaget's sales do not influence each other, according to the analysis (with smuggling accounting for around one third of the unrecorded consumption).

These findings do not reveal what would happen to unrecorded alcohol sales if sales of recorded alcohol in Sweden significantly increased due to privatisation. Logically, if Swedes buy more of lower price alcohol in Denmark and Germany, they will buy less in Sweden. But the reverse is much more uncertain, i.e. that when one buys more from Systembolaget or from a private licensed retail source, will they will buy less lower-priced alcohol from abroad. This conundrum is especially important since the study assumes that the effects of privatization on other factors will likely increase domestic sales in Sweden through private licensing. Assuming a similar effect on unrecorded alcohol if major changes in domestic availability took place might suggest a 20% substitution or possibly the mid point on a range of possible substitution of 0-30%. ARIMA models, however, could not establish an effect of changes in Systembolaget sales on travellers imports, which would have been a more accurate empirical basis for our assumptions.

Because 29% of alcohol consumed in Sweden is imported or smuggled, with past-months reports by 10% of the population of importing alcohol and by 5% of smuggling alcohol, some increased consumption due to privatisation may simply substitute for consumption of alcohol purchased outside of Sweden. Substitution is likely to be tempered by the higher price of Swedish alcohol. The main analysis in this study assumed a 10% of the total consumption rise resulting from privatisation would substitute for alcohol from other sources. We conducted sensitivity analyses with no substitution and with 30% substitution as well. The sensitivity analysis on specialty shop outlet density implicitly allowed for some substitution in assuming no density increase in border areas, arriving at the equivalent of a 22.5% substitution rate.

IV. Estimation(s) of total consumption associated with defined scenarios

The forecasting model was loaded with the elasticities and predicted changes in each factor associated with each scenario. For each scenario sensitivity analyses were used to derive upper and lower estimates of total per capita consumption based on various assumptions or combinations of the alcohol retailing system in Sweden. Sensitivity analyses also examined the difference in aggregate impact if rather than additive, the factors were multiplicative (in other words, if each represented the percentage change in existing and added consumption after the previous factors were considered). It also varied the percentage impact of each of the five factors.

Table 6 summarizes the estimates from the model. Our best estimates are that privatisation would raise consumption by 14% (1.4 litres/capita) if sales were restricted to specialty stores or by 29% (2.8 litres/capita) if sales were at grocery stores. The estimates are minimally affected by the choice between additive and multiplicative models, with the additive model the more conservative. Substitution would shift additional consumption to retail outlets in Sweden, with an estimated 6% reduction in consumption of imported and smuggled alcohol with specialty stores and a 10% reduction with grocery stores. If substitution were 30% of consumption rather than 10%, the reduction would range from 17% to 34%. Since the large price differentials between Swedish purchases and these other sources would persist, these higher substitution rates seem suspect.

Table 6 Estimated percentage change in per capita consumption due to privatisation, by scenario.

Scenario	Specialty Shops	Grocery Stores
Retail Monopoly	Base	N/A
Best Estimates (Additive Model)	14.3%	28.9%
Multiplicative Model	15.5%	33.8%
No Substitution	+1.6%	+3.2%
No Density Change at the Border (Equivalent of 22.5% Substitution)	-2.0%	N/A
30% Substitution	-3.2%	-6.4%
Add 5 Late Hours Instead of Best Estimate	-1.5%	-5.4%
Add 10 Late Hours Instead of Best Estimate	Best Estimate	-3.9%
Allow 10 Sunday Hours & 10 Late Hours Instead of Best Estimate	+2.8%	-1.1%
Promotion Raises Imports, Smuggling & Internet Sales by 5%	+1.7%	+1.7%
5% Price Reduction, 30% Substitution	+0.5%	+0.5%

Note: Current consumption is 9.7 litres/capita. All percentage changes assume 10% substitution unless otherwise stated.

N/A = Not Applicable

In 1995 it was estimated that alcohol consumption in Sweden would rise to 12.7 litres/capita with no licensing restrictions if the current retail monopoly was replaced with private licensed alcohol outlets caused by Swedish membership in the European Union (33). Our current estimate for the grocery system is similar - 12.5 litres/capita with 10% substitution or 12.8 litres/capita without substitution. Per capita consumption was 6.3 litres at the time of the Holder *et al* (1995) study. Erosion of features of the retail monopoly through loosening of import and promotion restrictions required by the European Union, as well as expansion of Systembolaget hours, contributed to a consumption rise to 9.7 litres/capita by 2005.

V. Estimates of alcohol-related harm associated with each defined scenario

A. Introduction

The public health concern associated with increases in total alcohol consumption is that such increases are most always linked to increases in harm. As a result, this study wished to estimate the likely levels of alcohol-related harm which might be expected if the increases in Swedish total consumption actually occurred. The project elected to estimate alcohol-related harm based upon changes in per capita total consumption using two different methods. The first approach utilized was based upon attributable fractions, i.e., total mortality expected from a number of causes of death (each with a relative risk or probability of being alcohol-involved and thus associated with changes in total consumption and drinking patterns. This approach was based upon model of Rehm et al. (2004) (34). A second modeling approach was based upon time series analyses which established the historical relationships between total consumption and harm as a means to estimate likely percentage changes in specific alcohol-related problems associated with changes in total consumption. Our study first wished to determine if each forecasting approach would yield similar results using similar historical parameters and geographical references. It should be noted clearly that both approaches to estimating alcohol-related deaths and thus neither gives the absolute totals. This occurs because while many deaths in which alcohol is involved are specifically coded as involving alcohol. On the other hand, there are notable deaths in which alcohol can be a contributing cause which may not be specifically coded as involving alcohol and thus the relevant percentage of these deaths involving alcohol is estimated based upon prior epidemiological studies.

Whereas both methods produce estimates of total deaths for Sweden, they actually begin with different baselines and as such the most relevant means of comparison is the estimated percentage change in alcohol-related mortality yield by both approaches. To establish as much comparability as possible, both models utilized the 0-69 age group and risk estimates or parameter values based upon analyses across European Union countries. The age group upper limit was set at 69 years of age since after this age, the cause of death coding becomes more and more unstable and inconsistent. Since data from EU countries were available from previous research for both approaches, these comparable data were used. Swedish data was also used as described below.

B. Estimates of Mortality based upon Attributable Fractions Method

The Attributable Fraction methods to estimate harm related to alcohol was an application of approaches developed for the World Health Organization's Global Burden of Disease Study (35). This study estimated numbers of premature deaths, injuries, illnesses and related disabilities caused by each of 20 health risk factors for different regions of the world. In addition to alcohol these risk factors included tobacco use, illicit drug use, high blood pressure, poor sanitation, inadequate nutrition, unprotected sex and lack of physical exercise. Specific methods for assessing alcohol as a risk factor are described in detail by (34). A key part of this method is the estimation and application of 'attributable fractions' for alcohol which are used to estimate the proportions of various causes of death, illness and injury known to be partly caused by excess alcohol use. The calculation of these alcohol attributable fractions is made from a formula which requires input information regarding (i) population data on mortality for some 50 different ICD-10 causes of death known to be alcohol-related

by age and gender (ii) the proportions of the adult population in question known to drink at hazardous or harmful levels also by age and gender (iii) the increased risk of each of these causes of death, illness and injury associated with both hazardous and harmful drinking. More specific methodological details can also be found in the WHO International Guide for Monitoring Alcohol Consumption and Related Harms (36). For the present study, 2002 mortality data and alcohol consumption data from a SoRAD national survey for Sweden in 2004 were available.

In order to get an estimate of the impact of increases in per capita alcohol consumption on mortality, Dr Jürgen Rehm, the author of the alcohol section of the WHO global burden of disease report (34) was contacted and kindly agreed to provide estimates specifically for Sweden of the impact of changes in alcohol consumption on mortality under the specified scenarios. To assist these calculations, the present study group estimated the impact of increased consumption under the two specified scenarios on the prevalence of hazardous and harmful alcohol consumption using conservative assumptions described below.

Estimates of deaths were restricted to persons up to 69 years of age and are presented below under three scenarios: (i) using the SoRAD 2004 national alcohol survey for estimates of hazardous and harmful drinking (ii) using estimates of hazardous and harmful drinking increased to account for an estimated 14.3% increase per capita consumption (iii) using estimates of hazardous and harmful drinking increased as a consequence of a 28.9% increase per capita consumption. The latter two estimates of population drinking levels were based on the 2004 SoRAD survey drinking levels with the conservative assumptions built in that the number of abstainers remained constant and that a) 14.3% (or 28.9%) of low risk drinkers would become hazardous drinkers and b) 14.3% (or 28.9%) of hazardous drinkers would become harmful drinkers. Rehm *et al* (34) also refer to these drinking levels as Level I (up to 20 g for women, up to 40 g for men), Level II (21 to 40 g for women, 41 to 60 g for men) and Level III (41 plus grams for women, 61 g plus for men). These are conservative assumptions as a number of studies have found that there is a disproportionate rise in hazardous and harmful alcohol consumption for a given increase in per capita alcohol consumption (e.g.(37)). The Global Burden of Disease methodology also takes account of drinking patterns in the population of interest by applying weights according to a survey of key informants from different regions of the world regarding a) typical quantities consumed per drinking occasion b) whether or not alcohol is usually consumed with food and c) the proportion of drinkers who consumed alcohol daily or almost daily d) the extent of drinking to intoxication e) the association of consumption with violence (34). In this particular case, Sweden is included in a large group of the economically developed countries in the European region (Andorra, Austria, Belgium, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Slovenia, Spain, Sweden, Switzerland and United Kingdom). It is likely that as a consequence the traditional Scandinavian drinking pattern of more occasional but heavier drinking occasions will be underestimated by this method. These estimates of alcohol exposure under the three scenarios are summarised in Appendix C. A further conservative element built into these methods is that contrary to the published Global Burden of Disease methodology, there was no adjustment upwards into survey estimates of hazardous and harmful alcohol consumption to reflect under-reporting in surveys. This aspect of the GBD has been questioned recently (38).

These estimates are restricted to the diagnosed cause of death of Swedish people in 2002 aged 0 up to 69 years of age due to the increasing unreliability of such diagnoses in persons aged

70 years and older. This model is also based upon drinking patterns and mortality risk associated with drinking using average data from Europe, specifically from countries which are members of the European Union. The estimates from the attributable fraction model utilized estimated proportions of Swedish population by age and gender drinking at different levels of health risk under different scenarios, based on the SoRAD 2004 national alcohol survey. The resulting forecasting produced estimates of total alcohol-related mortality based upon per capita consumption increases of 14.3% and 28.9%.

It was also considered to use a Toolkit available from the World Health Organization designed to help member countries estimate impacts of different risk factors such as alcohol on the global burden of disease in their population using Disability Adjusted Life years and Person Years of Life Lost as the main outcome variables (35). Member countries can input estimates of prevalence of hazardous and harmful drinking from national surveys into the Toolkit and generate estimates based on aetiologic fraction methods. It became apparent that it was not possible to use this method to model the impact of *changes* in survey estimates of hazardous and harmful consumption, since these did not impact on estimates of 100% alcohol caused conditions or of deaths from road crashes in the underlying methods.

As shown in Table C-1 in Appendix C, there were estimates of increasing numbers of lives lost for males and females under the two scenarios of increased per capita consumption. There were slight effects estimated regarding health benefits of alcohol consumption with small increases in lives saved estimated for males but slightly larger offsetting increases in lives saved for females under the scenarios of increasing per capita alcohol consumption. The net effect on alcohol caused mortality estimated for a 14.3% increase in per capita alcohol consumption in Sweden in 2002 was 293 extra deaths (1074-781) and for a 28.9% increase per capita alcohol consumption 505 extra deaths (1286-781). A more detailed breakdown of estimated alcohol caused deaths under each scenario is provided in Appendix C. The reader is cautioned that while precise numbers are given here, the actual estimates themselves are not precise and are based on a number of assumptions derived from previous research on probable relationships between levels of alcohol consumption and the risk of different causes of death.

The estimated increase in premature deaths under each scenario is made up from a combination of extra premature deaths caused by high alcohol intake and slightly fewer estimated deaths prevented due to weakened health benefits among women. It should be noted that there is some controversy regarding the nature and extent of health benefits associated with moderate alcohol consumption. Recent studies have questioned the scientific basis of these benefits in relation to the major effect assumed in these estimates from the global burden of disease study - reduced coronary heart disease (38, 39). If these beneficial effects are discounted, the estimated percentage increase in total alcohol-related deaths associated with changes in total consumption is (i) 19.2% or an increase of 285 deaths over baseline [(1237+520) - (1047+425)] in the scenario of alcohol sold in private speciality alcohol shops and (ii) 33.4% increase or an additional 491 deaths [(1377+586) - 1047+ 425] in the scenario of alcohol sold in general food shops.

C. Estimates Utilizing Time Series Modelling

The times series approach to examining the alcohol harm and total consumption relationship is based upon conducting analyses of relatively long time series data to document (after controlling for other potentially confounding factors) the historical relationship between a specific harm and total per capita consumption. In studies that attempt to evaluate the impact

of changes in population drinking on harm it is obvious that one should include a broad range of indicators which cover acute as well as chronic effects of alcohol consumption. In this first evaluation of a time series model, the estimates were limited to total alcohol-related mortality to be comparable with the Attributable Fraction estimates. This was similar to the ECAS-study (40), which looked at the link between mortality and population drinking in the EU-countries and Norway, focused on those of the indicators that gauge mortality (i.e., not assaults or sickness absence). Fatal accidents are also associated with episodic intoxication drinking, thus reflecting the acute consequences of consumption. Suicide and homicide may be regarded as acute indicators of self-destructive and aggressive behaviours, respectively, which are likely to be influenced by drinking. To get a complete picture of the health impact of population drinking, possible beneficial effects should be considered as well. An outcome that lies near at hands in this context is heart disease mortality. However, none of the existent aggregate level studies, covering a large number of countries, indicate any heart-protective effect of alcohol at the population level (41, 42); that is, there is no tendency that heart disease mortality would decrease when per capita consumption goes up.

Cirrhosis mortality is the classical indicator of harmful effects of chronic heavy consumption. However, there are certainly additional causes of death that are candidates to this list, and it therefore seems feasible to use a more encompassing set of indicators (Explicitly alcohol-related mortality) that reflect consequences of long-term heavy drinking.

For the ARIMA estimating results to be comparable to the Attributable Fraction model, similar constraints were utilized, i.e., utilizing total population from 0-69 and measures and parameters from EU member countries. These parameter values were available from the ECAS study (40).

Mortality data analysis revealed 1,250 baseline deaths from diseases caused by alcohol including 989 for men and 261 for women. Deaths from diseases caused by alcohol include: mental and behavioural disorders due to alcohol (ICD-code: F10), alcoholic liver disease (K70), toxic effect of alcohol (T51), alcoholic pancreatitis (K852; K860), alcoholic polyneuropathy (G621), alcoholic cardiomyopathy (I426), alcoholic gastritis (K292), alcoholic myopathy (G721), degeneration of nervous system due to alcohol (G312). Baseline estimates for the alcohol-related portion of fatal accidents, modelled from current consumption using the ARIMA equations, was 954; 826 for men and 128 for women. Note: accidents and suicide include all cases (15-69), not only alcohol induced.

Utilizing the projected increases in per capita consumption of Scenario 1, i.e., consumption increases by 14.3% or 1.41 litres, and Scenario 2, i.e., consumption increases by 28.9% or 2.85 litres, the estimated increases in number of deaths is 337 for Scenario 1 or a 15.3% increase and 730 for Scenario 2 or a 33.1% increase.

D. Comparison of Estimates from two forecasting approaches.

We initially recognized that the two estimation approaches are based upon rather different sets of assumptions and approaches to estimating alcohol-related mortality. Therefore, in this study we attempted to determine the comparability of percentage changes in alcohol-related mortality utilizing as comparable a set of values and factors as possible. This results in quite similar estimated percentage increases in total alcohol-related mortality associated with forecasted changes in per capita consumption as shown in Table 7 below:

Table 7 Comparison of Estimates of Changes in Alcohol Mortality for both Scenarios Using Two Approaches.

	Scenario 1—Private licensed Alcohol Shops	Scenario 2—Alcohol Sold in Grocery Stores
Estimated Total Consumption Increase	14.3%	28.9%
Percentage Change in Alcohol-Related Mortality using Attributable Fractions	19.2%	33.4%
Estimated Percent Change in Alcohol-Related Mortality using Time Series Modelling	15.3%	33.1%.

These estimated percentage changes in total alcohol-related mortality are quite similar and gives considerable confidence to the estimates of harm yielded. Estimates of prevented deaths from heart disease protection are excluded for Attributable Fraction estimates of prevented deaths. There is no statistically significant evidence of population level heart protection using the time series analyses of Europe (40). Thus, both estimation results have a comparable base concerning alcohol heart protection.

Looking at the estimates of alcohol-related mortality, ARIMA consistently estimates approximately twice the number of deaths in each scenario compared with Attributable Fraction method. The ARIMA model includes "lagged effects" in estimating size of relationships for chronic type consequences (illnesses and diseases) while the Attributable Fraction approaches utilizes relative risk estimates based on best available case-control studies. While the baseline estimates for both methods are quite different, the estimated percentage increases in total alcohol related mortality under each scenario for our study are almost identical. Both approaches utilized the ages of 0-69.

It is important to stress that the underlying statistical and theoretical models behind these methods are quite different, the estimates have fairly large confidence intervals and it should be expected that numerically different estimates will result. There are some specific reasons why the Attributable Fraction method will be more conservative. Firstly, the attributable fraction method is based on a conservative assumption on how much the proportions of Level II and Level III drinkers increase with the projected increases in total consumption, which implies a deflated estimate of projected deaths. Secondly, there was no adjustment for underreporting in the 2004 SoRAD survey made in these estimates of alcohol cause mortality. Thirdly, the effects of the more hazardous Scandinavian drinking pattern of occasional by the heavier drinking will have been diluted by the global burden of disease method of including Sweden as part of a large group of European countries with a generally lower risk drinking pattern (34). Finally, the attributable fraction method relies heavily on systematic reviews of published literature linking level of alcohol consumption with a variety of causes of death, injury and illness. While this literature is substantial, it is not comprehensive and hence models based on all the observed deaths in the population of interest (here Sweden in 2002) may include deaths caused by adverse effects of alcohol consumption not yet well researched in isolation. It should also be noted, that the time series ARIMA method is also subject to bias due to uncontrolled confounding effects on mortality and related to alcohol consumption which may have led to exaggerated estimates.

E. Estimates of Harms Based upon Swedish Data and Time Series Approach

Since both methods yielded similar values for estimated increased percentages in alcohol-related mortality and there already existed unique time series parameters for the Nordic Countries as well as specifically for Sweden, it was decided to base the estimates of alcohol-related harms for Sweden upon these parameters and to expand the list of possible outcomes. Table D-1, Appendix D presents indicators that have been used in previous studies utilizing time series modeling with that aim. Non-fatal assaults and sickness absence is a global health measure that is affected by chronic heavy consumption as well as episodic intoxication drinking.

All of the indicators were included in a study that aimed at assessing the consequences of a scenario with decreased alcohol taxes in Sweden (43). Holder et al. (1995), in their study of possible consequences of Swedish EU-membership, used the same set of indicators except for sickness absence (33). See Appendix D, Table D-1 for current annual Swedish mortality by gender, ages 0-69, and estimated increases in alcohol related harms resulting from privatization under the two scenarios that were estimated with Nordic time series data. The time series analysis was based on alcohol-related illness (all ages), and injury (ages 0-69).

Estimates of alcohol related harms as described above are shown in Table 8. As shown, privatisation would greatly increase the harm resulting from alcohol consumption in Sweden. With specialty shops, it annually would cause an estimated 700 deaths, 6,700 assaults, and 7.3 million sick days. Deaths from causes that sometimes relate to alcohol would rise by an estimated 18%, nonfatal assaults by 10%, and sickness absence days by 18%. With grocery stores, the estimated annual toll would be 1,580 deaths, 14,200 assaults, and 16.1 million days of sick leave. Deaths from causes that sometimes relate to alcohol would rise by 41%, nonfatal assaults by 22%, and sickness absence days by 40%.

Table 8. Annual harm from the alcohol consumption increases resulting from privatization, estimated using Swedish time series data.

Nature of Harm	Specialty Shops	% Increase	Grocery Stores	% Increase
Alcohol-related Illness Deaths	430	26%	1,000	61%
Fatal Accident	120	10%	250	22%
Suicides	130	14%	290	30%
Homicides	20	18%	40	40%
Total Deaths from Stated Causes	700	18%	1,580	41%
Nonfatal Assaults	6,700	10%	14,200	22%
Sickness Absence Days	7,300,000	18%	16,100,000	40%

VI. Summary, discussion and implications

A. Discussion and Summary of results — consumption and harms

Our best estimates are that privatisation of all retail sales of alcohol in Sweden would raise consumption by 14.3% (1.4 litres/capita) if sales were restricted to specialty stores or by 28.9% (2.8 litres/capita) if sales were at grocery stores (Table 6). The estimates are minimally affected by the choice between additive and multiplicative models, with the additive model the more conservative. In addition, as described above, the estimates were subjected to critical test of sensitivity to determine the effect of various model parameters on the outcomes. These estimates are, at best conservative, and it is certainly possible that if all alcohol retail sales in Sweden were transferred to private licensing, the increase in total consumption could be even higher. However, the results presented here are quite important and reflect a significant public health consequence from privatization of all alcohol-retail sales in Sweden.

Holder et al. (1995) estimated that alcohol consumption in Sweden would rise to 12.7 litres/capita with no licensing restrictions if the current retail monopoly was replaced with private licensed alcohol outlets caused by Swedish membership in the European Union (33). Our current estimate for the grocery system is similar – 12.2 litres/capita with 10% substitution or 12.5 litres/capita without substitution. Per capita consumption was 6.3 litres at the time of the Holder et al. (1995) study. Many features of historical Swedish alcohol policy have been eroded via pressures and requirements from the EU. With the increased limits on private import, unrecorded consumption has substantially increased in recent years. In addition, restrictions on alcohol promotion have been relaxed. Each of these coupled with changes in Systembolaget hours and national beer excise taxes appears to have contributed to a consumption rise to 9.7 litres/capita by 2005.

Based upon international alcohol research and historical research within Sweden, an increase in per capita consumption will inevitably stimulate increases in both chronic and acute harms associated with alcohol. The project has undertaken estimates of possible alcohol-related harm using two separate techniques as describe above. These techniques, time series (ARIMA) modeling and Attributable Fraction method, represent quite different approaches to estimating alcohol-related harm associated with specific levels of total per capita consumption. Each of these techniques has its own assumptions, strengths and limitations. Confidence in our estimates of alcohol-related harms was substantially increased since utilizing comparable age ranges and EU-wide parameter estimates, both methods produced a percentage increase in alcohol-related mortality alone of 15.3% to 19.2% for Scenario 1 and an estimated increase of 33.1% to 33.4% for Scenario 2.

Since the Attributable Fraction method incorporated European values for relative risks and it was believed that Swedish consumption patterns may be rather different, the time series modeling using Nordic specific data was used for final estimates of alcohol-related harms. Replacing the current alcohol monopoly with private licensed specialty shops would greatly increase the harm resulting from alcohol consumption in Sweden. With specialty shops, it annually would cause an estimated additional 700 deaths, 6,700 assaults, and 7.3 million sick days. With grocery stores, the estimated annual added toll would be 1,580 deaths, 14,200 assaults, and 16 million days of sick leave.

As a point of reference the project also examined the probable consequences for Sweden if the Swedish total per capita consumption rose to the level of Finland (i.e. 13 litres of pure alcohol

per capita age 15+), for example, if the study was too conservative in its assumptions. These results are shown below.

Nature of Harm	If 13 Litres/Capita
Alcohol-related Illness Deaths	1,240
Fatal Accidents	290
Suicides	350
Homicides	30
Total Deaths from Stated Causes	1,910
Nonfatal Assaults	16,900
Sickness Absence Days	19,444,000

B. Effects of policy changes for vulnerable groups

Alcohol policy is not only concerned with the overall effects on health and social consequences of drinking in the population, it is often also concerned with consequences for particularly vulnerable groups. Consequently, a number of policy levers are directed at limiting consumption and harms in young people; such as minimum legal purchase age and restrictions on advertising directed at young people; and some policy levers are directed at limiting consumption and harms in heavy drinkers; such as regulations of over-serving and sales to intoxicated persons (see for instance (12)). We will in the following address some of the likely consequences of a possible privatization of the Swedish retail sales of alcohol for such vulnerable groups as young people and heavy drinkers.

Likely consequences for young people

Enforcement of minimum legal purchase age:

As of today the minimum legal age for purchasing alcohol (i.e. strong beer, wine and liquor) in the monopoly outlets in Sweden is 20 years. The sales personnel in the monopoly stores are trained in enforcement of the minimum legal purchase age, and all monopoly outlets are continuously checked by testing whether persons aged 20-25 years succeed in purchasing alcohol without presenting an ID. This implies that approximately 5,000 checks are performed in the 410 monopoly outlets per year. The rates of successful purchase attempts (i.e. the test persons have purchased alcohol without having presented an ID) have been around 10-20 % over the past 5-6 years (44). In other words, 20-25 year olds who do not present an ID are denied purchase of alcohol in the Swedish monopoly outlets in 80-90% of the cases. On the other hand, studies of purchase trials (of medium strength beer) in Swedish grocery stores have showed that 18 year old ‘mystery shoppers’ who appeared younger, were denied purchase in approximately a third of the cases (45). Thus, enforcement of legal age of purchasing alcohol seems to be better in monopoly outlets compared to grocery stores. Studies of sources for procuring alcohol among under-aged in Sweden also indicate that adolescents rarely obtain alcohol from the monopoly outlets (46). When we compare this to studies in other countries that have assessed enforcement of legal age for purchasing alcohol, it appears that the Swedish monopoly system is quite effective in enforcing the minimum legal purchase age.

Comparative studies of purchase attempts in Finland and Norway (9) show that 18 years old who look young for their age (the minimum legal age for purchase of beer and wine is 18

years in Finland and Norway) succeed in purchasing alcohol (beer) in more than 50% of the attempts, and it seems that in Finland the success rate is somewhat lower in the monopoly outlets as compared to other (private outlets). It should, however, be noted that the number of successful purchase attempts in monopoly outlets was relatively low. A survey among Norwegian under-aged current drinkers (i.e. 13-17 years) showed that private on- and off-premise outlets accounted for 20% of the times alcohol was procured, whereas monopoly outlets accounted for less than 1% of the times (47). Moreover, under-aged current drinkers stated that they attempted to purchase alcohol in private on- and off-premise outlets far more often than they attempted to purchase alcohol in monopoly outlets, also when travel distance to the various commercial sources was taken into account (48). On the other hand, among those who attempted to purchase alcohol, more than half succeeded in private off-premise outlets; two thirds succeeded in monopoly outlets and four fifths succeeded in private on-premise outlets (48). A recent correlation study of US states showed that alcohol consumption and alcohol related harms among under-aged (21 years) were significantly lower in states with a retail monopoly sales as compared to states with privatized sales (49). A number of purchase trial studies from other countries have also generally demonstrated that under-aged (or persons who look younger than the minimum legal age for purchase) to a large extent succeed in purchasing alcohol in private outlets. In the UK more than three fourths of 16 year olds boys and girls and 40% of 13 year old girls succeeded in purchasing alcohol (50). In Minnesota, USA half of the purchase attempts among persons looking younger than the minimum legal age were successful (51), and even higher success rates in similar studies were reported from the US east coast (52) and the Australian east coast (53). A recent study of purchase trials in Oregon communities (54) showed that a third of under-age looking decoys succeeded in purchasing alcohol; the proportion being lower in stores participating in a state liquor control program. Consequently, it seems that monopoly outlets may be more effective in enforcing the minimum legal purchase age, and moreover that the Swedish monopoly outlets appear to be particularly effective in enforcing the minimum legal purchase age as compared to monopoly outlets in Norway and Sweden.

Thus, it seems very likely that a privatization of Swedish retail alcohol sales will increase the availability of alcohol among under-aged and thereby also increase alcohol consumption among under-aged. For various reasons, it is, however, not possible to obtain any estimate of how much an alleged decrease in enforcement will affect under-age drinking.

Changes in price:

Comparisons of alcohol retail prices of the same products in the Nordic countries suggest that the retail prices net of taxes may actually be higher in private alcohol retail sales than in monopoly outlets (55). Although privatization does not necessarily imply any change in the retail prices of specific alcohol products (assuming that taxes are not changed), it seems nevertheless likely that low-price products may be introduced to the market by the few and large whole-sale companies that operate on the grocery market. If such cheaper products are introduced on the market, it seems likely that these will attract young people in particular. Previous studies of the association between alcohol consumption and prices on alcoholic beverages suggest that young people (who tend to have less disposable income) are more sensitive to price changes than the general population (56); (57).

Thus, it seems likely that a privatization of the Swedish alcohol retail market may lead to an increase in youth drinking for various reasons, one of them being the likelihood that alcoholic beverages at lower prices than today may be available on the market and particularly attractive to young people.

Changes in density:

An increased availability due to increased density following privatization is very likely to affect also young people. A study among college students in the USA (58) found a high correlation between density of alcohol outlets and heavy and frequent drinking and alcohol-related problems. A study from California, USA showed that drunk driving occurred more frequently in areas with higher density of alcohol outlets compared to other areas (59). Conversely, when medium strength beer was repealed from Swedish grocery stores (and hence the density of beer outlets decreased dramatically), hospitalizations with alcohol-related diagnoses (e.g. alcohol intoxication), decreased significantly among the 10-19 year olds, whereas there was no statistically significant impact in the other age groups (60).

Changes in promotion and marketing:

It is likely that a privatization may imply an increase in promotion and marketing of alcoholic beverages. If so, this will also imply an increase in consumption among young people. Studies have found that young people appear to be particularly sensitive to advertising and marketing of alcoholic beverages (22, 61).

Likely consequences for heavy drinkers:

In public debates on alcohol issues it is often stated that heavy drinkers (or alcohol abusers) are not affected by alcohol policy changes, and that they drink heavily irrespective of price and availability of alcoholic beverages. Although this is not a topic that has been addressed extensively in the research literature, there are a number of studies demonstrating rather unambiguously that heavy drinkers are indeed also affected by significant alcohol policy changes. Well in line with Skog's (1985) theory of collectivity of drinking and that all consumer groups, including heavy drinkers, move up and down in concert with changes in total consumption, we also find that heavy drinkers respond to policy changes, and often to a larger extent than other consumer groups (62). In Denmark in 1917 prices on spirits increased dramatically, which implied a huge reduction in total consumption and also a dramatic decrease in number of alcohol-related deaths (typically attributed to long term heavy drinking) (63). When prices on alcohol increased due to an increase in excise duties in 1981 a panel study of 'regular drinkers' showed that consumption decreased at least as much among the heavy drinkers as among the moderate and light drinkers(64). An estimated 29% reduction in total alcohol consumption during Gorbachev's anti-alcohol campaign in 1985-1987 was in Moscow accompanied by a 63% reduction in hospital admissions for alcohol-related mental and behavioural disorders and 50% reduction in deaths from alcohol poisonings (65). When alcohol consumption increased by 46% in Finland following the privatization of retail sales of beer, the increase in consumption was larger among those who initially drank the most (heavy drinkers) compared to other consumer groups (66, 67). Conversely, a long strike in the Norwegian alcohol monopoly outlets in 1982 had only a very modest impact on total consumption (4% decrease), but a significant impact on reduction in admissions to an alcohol detoxification centre (mostly used by skid-row alcoholics) (68).

In addition to the abovementioned arguments that heavy drinkers are likely to increase their consumption to an even larger extent than other drinkers in the case of an increase in total consumption, we may also consider the possibility that privatization may imply an increase in sales to intoxicated persons. Particularly with respect to off-premise sales of alcohol, it seems plausible, despite scientific evidence, that intoxicated persons are often heavy drinkers. One of the underlying assumptions for the monopoly system is that the absence of a private profit

motive enhances denial of alcohol sales to both under-aged and to intoxicated persons. The Swedish alcohol retail monopoly has a training program for the staff, aiming at avoiding sales not only to under-aged but also to intoxicated persons. However, whether or to what extent the retail monopoly outlets succeed better than private outlets in denying sales to intoxicated persons is, to our knowledge, not addressed in studies reported in English. Hence, we cannot speculate whether a privatization of alcohol retail sales in Sweden may imply an increase in sales to intoxicated persons, and thereby contribute to further increase consumption and harms among heavy drinkers.

Given the projected changes in availability, low price products, enforcement of minimum legal age and promotion and marketing, it seems, on the basis of the existing research literature on this topic, nevertheless very likely that a privatization of the Swedish alcohol retail market will contribute to a significant increase in alcohol consumption and thereby also to alcohol-related harms among particularly vulnerable groups as young people and heavy drinkers.

C. Conclusions and Implications for Sweden

This study has undertaken a rather ambitious effort to estimate the changes in per capita consumption of alcohol which might be associated with the replacement of the current monopoly retail system with a private licensing system. This private licensing system could be defined in two alternatives which became scenarios for our study, i.e., all alcohol beverages would be sold in speciality shops which were specifically licensed to sell alcohol or all alcohol beverages were available to be sold in grocery stores (also under special license). The study developed and tested a series of forecasting models which incorporated a number of specific factors related to alcohol sales which have been shown by international research to influence per capita alcohol consumption. As shown above, either scenario was projected to substantially increase alcohol consumption as the effects of private market forces for alcohol enters Sweden.

As a member of the European Union, Sweden since its early entry has been questioned about its alcohol retail monopoly and there exist rather constant pressures from the EU to eliminate aspects of national alcohol policy which have historically be established for Sweden in the interest of protecting public health and safety. Under a private licensing system, no matter how the system is created and regulated, there are no examples in which private systems result in lower levels of total consumption nor alcohol-related harms when compared with public retail monopolies. This results naturally from the inherent tensions between an open market approach to alcohol and the more regulated and controlled approach carried out by an alcohol retail monopoly.

A private licensing system also naturally attracts business operations and economic investments which are designed to increase profit through greater sales of a product. For most products, such competition stimulates lower prices and greater availability for the customer. Thus a product like milk or clothing or shoes becomes typically of lower cost and more easily obtained. Any economic opportunity for greater sales and thus profit attracts the interest of producers and retailers who consistently seek greater opportunity for sales. However, alcohol is a product which has well defined negative public health and safety consequences and any increase in sales and consumption of alcohol will have associated increases in alcohol-related harm, just as this study has demonstrated.

The attraction of new participants into the retail sale of alcohol will, based upon the experiences in the United States and Canada (8, 69), bring more pressure on any regulations which have been or might be proposed for a private licensing system. Such regulations which might be challenged or modified via political pressure include alcohol taxes, legal ages of alcohol sales and enforcement of such sales, enforcement of sales to obviously intoxicated persons, days and hours of sale of alcohol, and concentration or density of alcohol retail outlets. Any laws or regulations established at the time of creating a private licensing system are always subject to future modification to accommodate the economic interests of producers, wholesalers, and retailers. This has consistently been the experience from other countries which have established private licensed systems for alcohol sales.

In the end, based upon our review of the international research literature on the number of harms associated with alcohol, the risk of increased sales and consumption of alcohol, especially by youth and heavy drinkers, and the conservative estimates of increased per capita consumption of alcohol associated with a private licensing system, the judgment of the authors on the balance of the evidence that the consequences of establishing a private licensing system would be detrimental to Swedish public health and safety.

Appendices

Appendix A: History of Systembolaget: The Swedish Alcohol Retail Monopoly

The creation of Systembolaget

The origin of the current Swedish alcohol policy system can be dated back to the mid-nineteenth century, when Swedish Government banned private distillation of spirits (70). The ban was an effort to eliminate private, small-scale distilling of alcohol and to concentrate the production of distilled spirits into fewer and larger units, which could be licensed and from which revenues could be extracted. Also the Gothenburg system, established in the 1860s was designated to clean up perceived abuses of public drinking related to restaurants. In this system local authorities granted a local monopoly to sell distilled spirits, and profits went into public funds. In 1917 these monopolies were granted exclusive rights to the sales of all wines and distilled spirits. At the same time, a monopoly on the manufacture, importation and wholesale of distilled spirits was established (71).

In 1917, instead of a prohibition, a unique system was introduced in Sweden, based on the idea that people who are able to drink without social damage should be allowed to purchase alcoholic beverages off the premises and those who cannot, should be denied to buy them. This system became known as the Bratt system, named after its inventor Ivan Bratt. The system was based on a ration book that was provided to those authorised to purchase distilled spirits. In addition to the rationing system the sale of alcohol was very carefully controlled (72).

The Bratt system was eliminated in October 1955. Many aspects of the rigid alcohol control system were, however, retained. Local off-premise retail monopolies were merged into a national off-premise retail alcohol monopoly, Systembolaget, which was given the monopoly on off-premise sales of distilled spirits, wine and strong beer as well as wholesale of the same beverages to the restaurants. The state owned Central Wine and Spirits Corporation (Vin & Sprit) had a monopoly on the domestic production of distilled spirits and the importing of distilled spirits, wine and strong beer.

Restrictive Policies

The restructured alcohol control system still continued the historical principle of limiting the private profit motive in the sale of alcoholic beverages. In the 1960s, the approach to alcohol control was somewhat liberalised. In 1965 medium beer was introduced in ordinary grocery stores, and in 1969 the purchasing age in monopoly stores was reduced from 21 to 20 years (71).

The liberal period of the 1960s and early 1970s was replaced with more restrictive policies and legislation in the late 1970s and early 1980s (71). In the mid-1970s, the Swedish government appointed an Alcohol Policy Commission (APU) which put forward many proposals for a new law, which was enacted in 1977 and came to form the Swedish alcohol policy for the next two decades. APU also emphasised that the alcohol issue must be viewed in the wider context of social policy (73).

In 1977, the responsibility for alcohol policy in Sweden was transferred from the Ministry of Finance to the Ministry of Health and Social Affairs. At the same time the administrative

responsibility was shifted from the National Tax Board to the National Board of Health and Welfare. From 1977 on the primary objective of Swedish alcohol policy has been to reduce total alcohol consumption and the rate of alcohol-related diseases and injuries.

The new alcohol act of 1977 attempted to reduce alcohol consumption by reducing alcohol availability, restricting private profit interest and decreasing drinking among young people. Concrete measures to achieve a reduction in alcohol consumption included, for instance, the withdrawal of medium beer from grocery stores and discontinuing the production of medium beer in Sweden. In 1978 a new law was enacted banning almost all alcohol advertising. Four years later, in 1982, a decision was agreed upon to close the Systembolaget stores on Saturdays (71). Some of the retail monopoly stores opened their doors again on Saturdays in February 2000 as a part of an experiment lasting for one year, and as of July 2001 all Systembolaget stores are open on Saturdays.

In 1991 a new institute, the National Institute of Public Health, was created. Its work on alcohol-related issues began in July 1992. Its responsibilities included research and the development of methodology in the area of prevention of alcohol misuse, support for local preventive initiatives, as well as the production of information materials for schools and the public. In 1994 the Alcohol Policy Commission presented a pessimistic report on the prospects for maintaining Swedish alcohol policy and achieving the goal of the European Office of the World Health Organization of reducing the total alcohol consumption by 25 per cent with Sweden's accession to the EU (74).

In June 1994, the National Institute of Public Health was commissioned to direct and coordinate intensified efforts for reducing alcohol-related harm and drug abuse. This was to be conducted with the aid of a national Steering Group under the Institute's chairmanship. As part of this assignment, a National Plan of Action was prepared and presented to the Government in June 1995. The plan was based on long-term strategies encompassing measures for the entire population and for groups at risk, and local mobilisation (75).

Sweden joins the European Union

With Sweden's entry into the EU on January 1, 1995, a new Alcohol Act came into force. Monopoly control on production, import, export and wholesale was abolished, but the off-premise alcohol retail monopoly as exercised by Systembolaget was continued. The National Alcohol Board was set up for the supervision and control of producers and wholesalers, while the former monopoly company Vin & Sprit continued to operate as a state owned and controlled company competing with other importers and distributors, who were allowed to sell directly to the retail monopoly, restaurants and bars (71).

In 1994, following the recommendations of the Alcohol Policy Commission, municipal authorities were given the right to license the off-premise retail sale of lighter beers, as a means to increase local control of alcohol. Prior to this, the state administration was responsible for granting licences. The shift from state administration to municipalities occurred during a four-year period, between 1994 and 1998. After the shift in power the responsibilities of the state administrative boards at the county level are limited to the supervision and coordination of regional and local development. Since 1998, the licensing of restaurants and bars for alcohol sale has been the responsibility of local authorities (71).

As a new member of the EU, Sweden was granted derogation from the limits on travellers' private tax-free importation of alcoholic beverages until December 31, 1996. These limits

were 1 litre of distilled spirits or 3 litres of intermediate products, 5 litres of wine and 15 litres of beer. In the autumn of 1996, these limits on travellers' alcohol allowances were renegotiated and Sweden agreed to keep its derogation until 30 June, 2000, when new negotiations would be held with the EU Commission on continuation of this derogation. In these new negotiations Sweden agreed to gradually increase the limits on travellers' private tax free importation of alcoholic beverages from other EU member states, so that the normal EU practice would come into force by the end of the year 2003 (76); see also (77), 62-64).

As price policy has partly lost in importance, the focus of Swedish alcohol control policy has been shifting from restrictive measures to intensified efforts to disseminate information, mould public opinion and drinking habits and address high consumption at an earlier stage. In February 2001 the parliament adopted an alcohol action plan for the years 2001-2005. The implementation of the plan on the national level was coordinated by a national steering committee (Alcohol committee) and in the municipalities coordinators are appointed to take care of the implementation of the plan on the local level.

The Government allocated about 120 million euros over a seven year period (2001-2007) to fund the implementation of measures to counteract the adverse effects of alcohol. In addition to this, the municipalities have granted substantial funds for the implementation of the alcohol action plan, which main objective is to reduce the overall level of alcohol consumption and subsequently the medical and social harms caused by alcohol.

Sweden's present alcohol control policy builds on a balance between high taxes on alcoholic beverages, an off-premise retail alcohol monopoly, restrictions on alcohol availability, information and treatment. The tax instrument is still seen by far the most effective means of limiting consumption and the harm caused by alcohol. However, Swedish alcohol tax levels are continuously threatened by EU-rules and travellers' duty free imports of alcoholic beverages from lower-tax EU countries.

In accordance with the EU membership Sweden had to adapt its alcohol taxation system to EU regulations. This happened January 1, 1995 with the aim to keep the amount of collected alcohol tax revenues constant. The main change was that excise duty scales ceased to be progressive with respect to the alcohol content in a given beverage category. Consequently, excise duty rates for distilled spirits containing less than 40 per cent alcohol by volume were increased, while excise duty rates for distilled spirits containing more than 40 per cent alcohol by volume were lowered. Excise duty rates for wines containing less than 10 per cent alcohol were increased, but they decreased for wines near the upper limit of 15 per cent alcohol by volume. Beer with an alcohol content of at most 2.25 per cent continued to be free of taxes, and beer containing alcohol between 2.25 and 3.5 per cent continued to be taxed less than stronger beers. This exception was secured during the EU membership negotiations but only for two years. After that the same excise duty rate had to be applied to all beers over 2.8 per cent alcohol by volume. Still in 1996 the excise duty rate for strong beer was nearly twice that applied to people's beer (71).

After joining the EU Sweden experienced an increase in cross-border trade of beer especially in Southern Sweden. In this situation the adaptation of the Swedish taxation on beer in January 1, 1997 was done in such a way that the new taxes on strong beer came significantly closer to the old taxes on people's beer, while beer up to 2.8 per cent alcohol by volume became totally free of alcohol taxes. The decrease in the excise duty rate of strong beer was 39 per cent and it led to a price decrease of strong beer of about 20 per cent. This in turn led to

the situation that wines were taxed heavier than beer, which according to the EU commission favoured domestic beer compared to imported wines. After many discussions and especially after getting a reasoned opinion from the Commission Sweden agreed to lower excise duty rates for wine in December 2001 by 19 per cent.

In 2003 a Commission was appointed to find means to fight against the threat posed to the Swedish alcohol monopoly by the vast amounts of alcohol brought from abroad. The Alcohol Import Commission produced two reports (*Var går gränsen?*, 2004; *Gränslös utmaning*, 2005). In both reports, several suggestions were made to diminish the increase in traveller's imports of alcoholic beverages (78). The reports proposed amongst other a 40 per cent decrease in spirits taxes and a 30 per cent decrease in both beer and wine taxes. The tax reductions were, however, never approved by the parliament.

In February 2006 the parliament adopted a new alcohol action plan for the years 2006-2010. The main goal of the action plan, which can be seen as a continuation of the alcohol action plan for the years 2001-2005, is to promote public health by minimising medical and social harms caused by alcohol. Especially three areas are prioritised. These concern the children of abusing parents, young adults and alcohol in the workplaces (79). The action plan also stresses the importance of influencing alcohol policy issues on the international and especially at the EU level. As its predecessor also this plan is generously funded. The National Institute of Public Health is responsible for following up the goals of the action plan.

Appendix B: Studies of Replacing Retail Monopolies for Alcohol by Private Licensing

Introduction

One means to document potential outcomes from a change in the retail availability of alcohol is to examine effects of replacement of a retail monopoly with a private licensing system. The strongest design for attributing effects resulting from this replacement is a longitudinal design, preferably using time series analyses. With such a design one is able to compare differences in an outcome variable, say consumption of the specific beverage classes, total alcohol consumption or alcohol-involved problems such as traffic crashes before and after a change, after eliminating a monopoly. Therefore, the elimination of a monopoly provides an opportunity to study an effect of a change in alcohol availability.

Ending Wine Retail Monopolies

One end of a form of monopoly has been the end of wine retail sale monopolies. Since 1970 at least six U.S. states (Idaho, Maine, Washington, Virginia, West Virginia and Iowa, the country of New Zealand, and the Province of Quebec in Canada have eliminated public monopolies on the sales of all wine, imported wine or fortified wine or some combination. Privatization of such sales usually results in a greater number of outlets for off-premise wine sales, longer available hours for purchase and often lower prices as a result of commercial competition.

Three of the papers seeking to evaluate the effects of privatization of wine sales have employed longitudinal designs utilizing retail sales or wholesale shipments of wine, and in some cases beer and spirits, as dependent measures. Smart (5) analyzed annual wine sales and total alcohol sales in Ontario and Quebec from 1967-1983 with ordinary least squares

(OLS) regression models into which three effect parameters and four related interaction terms were introduced. Smart concluded from his analysis that the introduction of wine into grocery stores "created no short- or medium-term increase in wine sales or total per capita alcohol consumption."

Macdonald (80) analyzed annual wine, beer, and spirits sales in four U.S. states for the period 1961-1978 using OLS regression to predict sales for each beverage in each state at the time wine availability was modified. The forecasts and the associated confidence intervals were compared with the actual post-intervention annual sales figures. From these analyses, Macdonald concluded that wine consumption following privatization was significantly greater than one would expect in three of the four states. No significant changes in the sales of beer or spirits were found.

Mulford and Fitzgerald (81) studied privatization of wine sales in Iowa using (a) pre- and post-intervention data from a state survey, and (b) monthly sales data for wine, beer and spirits from July, 1983, through August, 1987. Mulford and Fitzgerald found a statistically significant increase in self-reported (last 30-day) purchase of wine, a significant decrease for distilled spirits, and no significant change in self-reported beer purchases. Only spirits had a significant decrease in centiliters of self-reported alcohol consumed in the past 30 days. Results of the state surveys and a visual inspection of 50 months of sales figures using an OLS regression line led Mulford and Fitzgerald to conclude that there was little change in self-reported consumption or in self-reported heavy drinker or problem drinking rates, and that sales figures indicated "no long-lasting sales increase."

All of these studies of wine privatization have serious methodological problems making interpretation of their findings problematic. Each has made use of OLS regression techniques. Two problems with OLS estimates based on time-series data are autoregression of the dependent variable and serial correlation in the error term. The basic OLS regression assumption of independent observations is typically violated, since time-series observations are often serially correlated. One result of serially correlated errors is biased standard error estimates, leading to invalid statistical tests and confidence intervals.

Wagenaar and Holder (82) studied the end of the wine monopoly in Iowa (1985) and a similar change in West Virginia (1981). Using an interrupted time series design for beer, wine, and spirits as well as all neighboring states, they found that privatization was associated with statistically significant increases in wine sales in Iowa and West Virginia, after controlling for an initial stocking effect and broader nationwide trends in alcohol sales in the 1980s. In addition, there was a net increase in absolute alcohol consumed in both states across all beverages (beer, wine, and distilled spirits) associated with privatization.

Mulford, Ledolter, and Fitzgerald (83) have reported an alternative finding concerning the elimination of the state wine monopoly in Iowa using a time series analysis. They conclude that the findings of Wagenaar and Holder concerning Iowa are caused by the concurrent increased availability and popularity of wine coolers (fruit juice mixed with table wine). As a result, Mulford and associates do not find a significant increase in table wine sales following the elimination of the state wine retail monopoly. However, Wagenaar and Holder (84) have responded by pointing out a number of methodological problems with this study. They argued that the Mulford, Ledolter, and Fitzgerald (1991) study was characterized by several serious methodological problems. The most critical error is the design of their study as a single interrupted time-series, with no comparison groups. Second, one of the most important

threat to the interval validity of time-series designs is instrumentation, i.e., a change in measurement of the outcome variable that confounds assessment of intervention effects(85). Mulford and associates' method of measuring wine sales changed exactly at the time the privatization policy was implemented, as they acknowledge ("beginning with the wine and spirits privatizations a growing proportion of each beverage's bottled sales were estimated from wholesaler's inventory reductions"). Wine data used by Mulford and associates comes from two different sources: actual retail sales in state stores before the elimination of the state monopoly, and estimates of wholesale shipments after.

Other methodological problems included mis-specification of time-series models and overparametized models with a series of arbitrarily defined dummy variables, which are multiple dummy variables that do not reflect policy changes or other theoretically significant factors and appear added to the model to absorb the increase in wine sales previously documented

Wagenaar and Holder (82) in order to assess the effect of privatization on absolute ethanol consumption, utilized a monthly mean of sales for each beverage over the five calendar years prior to the wine intervention in each state was calculated, (1980-84 for Iowa and 1976-80 for West Virginia). The estimated percent increase or decrease for each beverage over the period following wine privatization from the full time-series models was then used to calculate a monthly mean quantity of each beverage post-intervention. These values were converted to quantities of absolute alcohol and were the basis for calculating monthly and annual net change in ethanol across the three types of beverages associated with privatization. Results revealed a net increase attributable to wine privatization of 28,602 liters of absolute ethanol per month (343,224 liters annually) for Iowa and a net increase of 25,235 liters per month (302,820 annually) for West Virginia. Such similar findings in two states even though the interventions occurred some four years apart in different regions of the U.S. significantly increase confidence that effects observed are caused by wine privatization, not other factors.

In 1978, grocery stores in Quebec were allowed to sell domestically produced wine along with wine that was imported and bottled by the Liquor Board in Quebec. This right was extended in 1983 to include imported wine that was bottled by privately owned manufacturers in Quebec. Larger grocery store chains were also allowed to sell wine in 1984. Trodall (2005) undertook an interrupted time-series analysis (ARIMA) of this change in Quebec using all of Canada, with the exception of Quebec as the control. All time series were differenced to remove long-term trends. Possible permanent effects of the policy changes on alcohol sales were measured by means of intervention variables. Alcohol sales, in liters of pure alcohol per inhabitant aged 15 and above, were used as the dependent variable. Alcohol prices and the inhabitants' disposable income were used as control variables. Contrary to earlier studies regarding these policy changes in Quebec (4, 5), the results presented in this study showed a significant and permanent effect of the policy change in 1978. The sale of wine increased by 10%, but the effect was not so large as to affect total sales. Sales of spirits and beer were not significantly affected. One explanation could be that the policy change in Quebec was valid only for a limited number of wines, which accounted for only a fraction of the total alcohol sales market.

See Table B-1 for summary of changes in consumption of wine and other beverages associated with an ending of a wine retail monopoly.

Ending a Spirits Retail Monopoly

The State of Iowa was also the first U.S. state to eliminate a spirits retail monopoly since the end of Prohibition. In March 1987 all state retail stores were closed, and private establishments were licensed to sell distilled spirits. Holder and Wagenaar (6) conducted an interrupted time-series analyses of apparent spirits consumption in Iowa, controlling for nationwide sales trends over the past two decades, and identified a statistically significant 9.5% increase in spirits sales following the policy change. While there was a corresponding 13.7% decline in wine sales, and no change in beer sales, privatization of spirits retail sales yielded a net increase in total alcohol consumption in Iowa. No changes were found in spirits sales in states bordering Iowa.

The end of the state monopoly represents the first such major change in the U.S. since Prohibition. Unlike other changes in the form and extent of availability in the U.S., such as hours of sale, density of outlets, change in form of on-premise liquor availability, and prices, this was a radical change which substantially increased the number and density of off-premise outlets, the daily hours of sale, and the number of days wine and spirits were available for purchase. In addition, convenience of payment was increased through the use of personal checks and credit cards by private licensed stores.

Elimination of the Iowa wine and liquor off-premise monopoly was not promoted by a public desire to relax alcohol control; rather, the stimulus was economic. The elimination of the state stores in Iowa occurred amidst a dynamic situation. Iowa has been going through a serious economic depression resulting from reduced farm prices, farmer indebtedness, and farm foreclosures. Iowa is the only state in the U.S. with a net negative population growth. The state government of Iowa was overspending available tax dollars and it was believed that elimination of the state store system and the use of private licensed sales would generate at least \$9.9 million for the state treasury and reduce the cost of the state personnel involved in retail sale. However, within the first quarter of the state's fiscal year (July - September, 1987) sales were 2-1/2% below the same period in 1986 with only \$3 million going into the treasury (Des Moines Register, October 7, 1987, 1A).

Evidence to date is that all of these hopes have not been realized. Total sales from private licenses have been above and below the level of sales from the state stores. For example, within the first six months, private license liquor sales were 2-1/2% higher overall than for the state stores in the same period (March - July). Yet sales in August 1987 were 7% lower than August 1986. More importantly, the state markup of liquor has been reduced to permit a greater profit margin for retail outlets. Therefore, a sales level by private retail outlets would have to exceed state store sales by enough to offset the lower income generated by the state due to reduced wholesale markups. This has the potential to stimulate greater total sales of wine and distilled spirits. Apparently, the lower retail price of liquor expected to be generated by private licensee competition has not been realized. Best evidence to date is that average prices are slightly higher (about 2.7%) than state store levels as private retailers seek to make higher profits (Des Moines Register, December 13, 1987, 6B).

There has been a significant savings to the state by the elimination of most of the retail sales positions required to maintain state stores. However, there were a number of hidden costs not expected including (a) the cost to handle empty bottles returned to private licenses and the management of bottle deposits and (b) costs of putting state deposit labels on each bottle sold. Both of these functions were previously carried out by state store employees. In the case of

the 5-cent deposit, the state contracted this activity out to a private company at a cost of 5-1/2 cents per bottle. See Discussion by Holder (1988).

This illustrates the importance of longitudinal designs in examining the effects of monopolies on alcohol consumption and considering the full range of other factors which surround the elimination of the monopoly. Cross-sectional studies comparing various governmental jurisdictions whether towns/cities, counties, states, or countries are usually too confounded by cultural differences to provide an adequate design to rule out alternative explanations for any differences found.

The other domain of effects for public monopolies is from overall reduction in alcohol availability. An interesting study in one U.S. state, Tennessee, was conducted by Dull and Giacomassi (86). Tennessee represents a unique opportunity to consider differences in alcohol availability with a common cultural context. The investigators found that the type of alcohol structure (prohibition to full availability) and thus the associated level of alcohol availability do play an important role in contributing to higher consumption and higher alcohol-involved mortality from traffic crashes, liver disease and cirrhosis, suicide, and homicide. They did conclude that various population and demographic characteristics strongly interact with the alcohol availability measures in determining outcomes. Magruder (1976) in a similar study in North Carolina (which, like Tennessee, permits local option concerning the form of alcohol availability) found that the form of alcohol availability at the county level was strongly related to the level of cirrhosis mortality (87).

In a recent study, Trollidal studied the privatization of the retail sale of alcohol in Alberta, Canada, which took place primarily between the end of the 1980s and the beginning of the 1990s (7). The study utilized an Interrupted time-series analysis (ARIMA) with a quasi-experimental control area design was used, and all series were differenced to remove long-term trends. Canada, with the exception of Alberta, was the control area. The effects of privatization were measured by means of created privatization variables. In the analyses of the effects of privatization on alcohol sales, the inhabitants' disposable income and alcohol prices were used as control variables. The study period was 1950-2000. When effects on the number of fatal motor vehicle traffic accidents were analysed the number of road motor vehicle registrations was used as a control variable, and the study period was 1950-98. While privatization had a significant permanent effect on the sale of spirits, the effect was not large enough to affect total sales. The effect on wine and beer sales was not significant. There was no significant effect on the number of fatal motor vehicle traffic accidents.

A recent overall assessment (8) found significant changes in the market structure of alcohol in Alberta since the implementation of a private licensing system which provides a more comprehensive story. The advent of privatization has dramatically changed the market structure of liquor retailing in Alberta. Prior to the privatization of liquor retailing in 1993/94, Alberta had 310 total retail stores. Subsequently, Alberta licensing authority has licensed any business that meets minimal conditions and has expectations of local authority approval. By January 2003, there were 983 retail stores. There are two reasons for the large increase in the number of private retailers of alcoholic beverages under privatization. Entrants can open a small store with minimal capital costs and easy licensing—easy entry; and these entrepreneurs often believe that liquor is an easy industry in which to make profit (8).

In Alberta, retail liquor stores, including off-sales, can remain open until 2:00 a.m. 364 days of the year. In 2000-2001, Alberta had almost three times the national average of stores per

capita and more than a third greater than the number in British Columbia. The number of stores in Alberta continues to climb. The data for Alberta above includes private liquor and general merchandise stores, but does not include approximately 600 off-sales licensees. As well, the table does not include private stores in provinces other than Alberta. For example, The Beer Store is the primary distribution and sales channel for beer in Ontario, with 433 retail stores in 2002. And in British Columbia in addition to the 368 government and agency stores there are 290 private cold beer and wine stores (now fully licensed for all liquor, including spirits), and 110 private manufacturer /VDQ stores (2002), and 26 consignment agency stores (8).

See Table B-2 for a summary of changes in spirits consumption and other beverages associated with ending of retail monopolies for spirits.

General Analyses

The formal powers and resources of state alcohol beverage control agencies place them in a position to regulate access to alcoholic beverages through restrictions on retail distribution and sales. For example, monopoly states restrict access to spirits, and sometimes wine, by allowing retail sales only through state stores. On the other hand, license and monopoly states share in restricting sales through the use of price posting and fixing provisions. The degree to which these powers are realized in restrictions on alcohol outlets (e.g., licenses) and subsequent alcohol consumption (e.g., sales) was investigated in the current study. In a cross-sectional analysis of data available by Gruenewald, Madden, and Janes (30) from 44 alcohol beverage control (ABC) jurisdictions in the United States, it was shown that states with greater restrictions on retail sales had greater resources for the conduct of ABC activities and lower densities of spirit outlets. These states, however, had greater densities of wine and beer outlets. States with greater marketplace restrictions had more resources for ABC enforcement activities and lower outlet densities across all beverage types. Further, supporting the suggestion that availability and demand may be simultaneously related, greater outlet densities were related to greater alcohol consumption (for beer) and greater levels of consumption were related to greater outlet densities (for wine).

Table B-1. Net effects of wine privatization on absolute ethanol consumed per month. (All volume measures are liters). Pre-Intervention vs Post-Intervention.

State	Beverage	Average Quantity	% Change (D)	Net Ethanol Quantity Change	Ethanal Equivalent (E)	Net Change Across all beverages	% Net change N=E/D
Iowa (82)	Wine	718,266	+93.0	+667,988	85,737		
	Beer	22,457,536	-3.1	-696,183	-31,328		
	Spirits	1,162,821	-5.4	-62,792	-25,807	+28,602 Tot= +1,580,678	+1.809
(83, 88)	Wine only		Temporary increase				
West Virginia (82)	Wine	323,428	+48.2	+155,892	20,110		
	Beer	9,959,254	+12.0	+1,195,110	53,779		
	Spirits	857,846	-13.8	-118,195,110	-48,655	+25,234 Tot= +842,451	+2.99
Idaho	Wine only		+190.0				
Washington	Wine only		+26.0				
Maine (80)	Wine only		+305.0				
Alabama	Wine only		+42.0				
Montana	Wine only		+75.0				
New Hampshire (89)	Wine only		+13.0				
Quebec (4)	Wine only		Temporary increase				
(3)	Wine only		+10.0				No increase
New Zealand (90)	Wine only		+17.0			Increase in overall related to Wine increase. No decrease in other beverages.	Up to +17.0

Table B-2. Results from Elimination of Distilled Spirits Monopolies.

State	Beverage	Ethanol change	% change	Total Ethanol Consumption Change	% change in total consumption
Iowa (6)	Wine		-12.1		
	Beer		0.00		
	Spirits		+9.50		
	Total			+24,000	+1.6
Alberta (7)	Wine	Non sig.			
	Beer	Non sig.			
	Spirits	12.0			
	Total				Not significant

Appendix C: Attributable Fraction Analyses

Table C-1 Alcohol-caused deaths (lost and saved) for men and women (0-69 years) according to Rehm's estimates based for Sweden in 2002 and with a 14.3% and 28.9% increase in alcohol consumption.

Alcohol consumption Scenario	<i>Males</i>			<i>Females</i>			<i>Total</i>
	Lives lost	(Lives saved)	Net lives lost	Lives lost	(Lives saved)	Net lives lost	Total Net lives lost
Sweden 2002	1,047	(449)	598	425	(241)	183	781
14.3% increase	1,237	(454)	783	520	(229)	291	1,074
28.9% increase	1,377	(461)	916	586	(216)	370	1,286

Table C-2

a) Distributions of drinking category levels by age and gender based on SoRAD 2004 estimates.

Exposure category	15-29 yrs	30-44 yrs	45-59 yrs	60-69 yrs
Men				
Abstainers	8.9%	5.3%	7.7%	13.4%
Drinking Level I (low risk)	79.7%	89.0%	87.8%	83.3%
Drinking Level II (hazardous)	5.5%	3.4%	2.9%	2.2%

Drinking Level III (harmful)	5.9%	2.3%	1.6%	1.2%
Women				
Abstainers	12.5%	10.8%	11.0%	18.5%
Drinking Level I (low risk)	78.4%	84.8%	83.9%	77.3%
Drinking Level II (hazardous)	6.8%	3.5%	4.2%	3.3%
Drinking Level III (harmful)	2.3%	0.9%	0.9%	1.0%

b) Projected distributions of drinking category levels by age and gender under assumed 14.3% increase of per capita consumption.

Exposure category	15-29 yrs	30-44 yrs	45-59 yrs	60-69 yrs
Men				
Abstainers	8.9%	5.3%	7.7%	13.4%
Drinking Level I (low risk)	68.3%	76.3%	75.2%	71.4%
Drinking Level II (hazardous)	16.1%	15.6%	15.0%	13.7%
Drinking Level III (harmful)	6.7%	2.8%	2.0%	1.5%
Women				
Abstainers	12.5%	10.8%	11.0%	18.5%
Drinking Level I (low risk)	67.2%	72.7%	71.9%	66.3%
Drinking Level II (hazardous)	17.0%	15.1%	15.6%	13.8%
Drinking Level III (harmful)	3.3%	1.4%	1.5%	1.5%

c) Projected distributions of drinking category levels by age and gender under assumed 28.9% increase of per capita consumption

Exposure category	15-29 yrs	30-44 yrs	45-59 yrs	60-69 yrs
Men				
Abstainers	8.9%	5.3%	7.7%	13.4%
Drinking Level I (low risk)	56.7%	63.3%	62.4%	59.2%
Drinking Level II (hazardous)	26.9%	28.1%	27.4%	25.5%
Drinking Level III (harmful)	7.5%	3.3%	2.4%	1.8%
Women				
Abstainers	12.5%	10.8%	11.0%	18.5%
Drinking Level I (low risk)	55.7%	60.3%	59.7%	55.0%
Drinking Level II (hazardous)	27.5%	27.0%	27.2%	24.6%
Drinking Level III (harmful)	4.3%	1.9%	2.1%	2.0%

Table C-3 Estimated alcohol caused mortality for Sweden in 2002 based on each scenario.

Disease Category	M	W	T	Scenario
Cancer	142	167	309	Baseline
Neuropsychiatric disorders	335	80	416	Baseline
Cardiovascular Diseases	-3	2	-1	Baseline
Cirrhosis of the liver*	84	48	132	Baseline
Unintentional injuries	289	48	337	Baseline
Intentional injuries	135	43	178	Baseline
Total 'detrimental effects' attributable to alcohol	1,047	425	1,472	Baseline
Diabetes mellitus	-5	-9	-14	Baseline
Cardiovascular diseases	-444	-232	-676	Baseline
Total 'beneficial effects' attributable to alcohol	-449	-241	-690	Baseline
All alcohol-attributable net deaths	598	183	781	Baseline
All deaths in Sweden in 2002	11,118	6,985	18,103	Baseline
Percentage of all deaths attributable to alcohol	5.4%	2.6%	4.3%	Baseline
Cancer	165	197	362	114.3% pcc
Neuropsychiatric disorders	348	85	433	114.3% pcc
Cardiovascular Diseases	7	2	9	114.3% pcc
Cirrhosis of the liver*	232	131	363	114.3% pcc
Unintentional injuries	330	55	385	114.3% pcc
Intentional injuries	154	49	203	114.3% pcc
Total 'detrimental effects' attributable to alcohol	1,237	520	1,757	114.3% pcc
Diabetes mellitus	-17	-10	-26	114.3% pcc
Cardiovascular diseases	-437	-219	-656	114.3% pcc
Total 'beneficial effects' attributable to alcohol	-454	-229	-683	114.3% pcc
All alcohol-attributable net deaths	783	291	1,074	114.3% pcc
All deaths in Sweden in 2002 plus projected additional alcohol attributable deaths	11,801	7,219	19,020	114.3% pcc
Percentage of all deaths attributable to alcohol	6.6%	4.0%	5.6%	114.3% pcc
Cancer	185	227	412	128.9% pcc
Neuropsychiatric disorders	355	88	443	128.9% pcc
Cardiovascular Diseases	17	3	20	128.9% pcc
Cirrhosis of the liver*	273	152	425	128.9% pcc
Unintentional injuries	373	62	435	128.9% pcc
Intentional injuries	174	55	229	128.9% pcc
Total 'detrimental effects' attributable to alcohol	1,377	586	1,964	128.9% pcc
Diabetes mellitus	-30	-10	-40	128.9% pcc
Cardiovascular diseases	-431	-206	-637	128.9% pcc
Total 'beneficial effects' attributable to alcohol	-461	-216	-677	128.9% pcc
All alcohol-attributable net deaths	916	370	1,286	128.9% pcc

Disease Category	M	W	T	Scenario
All deaths in Sweden 2002 plus projected additional alcohol attributable deaths	11,916	7,289	19,205	128.9% pcc
Percentage of all deaths attributable to alcohol	7.7%	5.1%	6.7%	128.9% pcc

*Cirrhosis deaths were adjusted upwards from Dr Rehm's estimates based on aetiologic fractions to match recorded alcoholic cirrhosis deaths in Sweden for 2002.

Appendix D: Current annual Swedish alcohol-related mortality and estimated changes

Table D-1: Current annual Swedish mortality by gender from alcohol-related causes and estimated increases resulting from privatization (estimated with Swedish time series data).

Nature of Harm	Deaths in 2005			Specialty Shops Add			Grocery Stores Add		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Alcohol-related Illness Deaths	1,322	339	1,661	400	35	435	932	74	1,006
Fatal Accidents	894	242	1,136	105	10	115	225	21	246
Suicides	699	251	950	104	30	134	227	63	290
Homicides	60	33	93	11	6	17	24	13	37
Total Deaths	2,975	865	3,840	620	81	701	1,408	171	1,579

N.B. Alcohol-related illness deaths are at all ages. Accidental, suicidal, and homicidal injury deaths are at ages 0-69. Of the 2,179 current injury deaths, an estimated 1,178 (54%) are attributable to alcohol.

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