MPA 52

Bil Iechyd y Cyhoedd (Isafbris am Alcohol) (Cymru)
Public Health (Minimum Price for Alcohol) (Wales) Bill
Ymateb gan Swyddfa Ffederal Iechyd y Cyhoedd, Swistir
Response from Federal Office of Public Health, Switzerland

Dear Ms Sargent, dear Dr. Dai Lloyd,

Many thanks for your letter. Congratulations to the work on the Minimum Price-Bill you have started.

Concerning the evidence on price changes and corresponding changes in alcohol consumption in Switzerland, we are happy to share the following information with you:

In 1999 the price for imported spirits fell in Switzerland up to 50% (30%-50%), due to the accession of Switzerland to the WTO general agreement on Tariffs and Trade (GATT), which forced the country to liberalize spirit imports and cut import-taxes.

The Swiss Alcohol Board initiated a research-project in order to accompany this change of practice scientifically and to monitor possible changes in alcohol consumption. Please find the study published 2003 in the "Addiction"-Journal attached.

In order to assure the quality of the research, the project-proposal was submitted to the American National Institute on Alcohol Abuse and Alcoholism (NIAAA). It received an excellent evaluation and was even supported by the NIAAA. In addition, a supervisory group consisting of renowned alcohol-policy researchers was put in place to accompany the project.

The study consisted of two surveys: One was conducted before the implementation of the new regime in spring 1999 (price change was introduced on 1st of July 1999). 4000 randomly selected inhabitants of Switzerland (age 15 and older) were interviewed on their alcohol consumption. In autumn 2001, the same people were interviewed a second time, where 73% responded.

The survey proved a significant rise of spirit consumption after the introduction of the new regime. Spirit consumption rose by 39% (+0.27 Gramm of pure alcohol on average per person per day). The consumption of wine also rose, but to a much smaller extent (8.6%). The rise in wine consumption can partly be explained by age effects. The consumption of beer did not significantly change. Overall, alcohol consumption rose significantly, largely due to the rise in spirit consumption. The share of spirit consumption on overall alcohol consumption rose by 24%.

Highest changes in spirit consumption occurred among young people. In the group of the 15-29 years old, spirit consumption rose by 60%, compared to an increase of 34% among the 30-59 year old. Among young men (age 15-29), spirit consumption rose by 75% (women 15-29y: +44%).

The increase in spirit consumption was higher among persons with an initially low consumption than among people with an already high consumption. This confirmed the results of the scientific literature.

Thus, the increase in spirit consumption was higher among women (+49%) than among men (+31%).

Please find more detailed results in the article attached.

A further effect of the accession to the WTO-GATT was, that import prices of sweetened premixed alcoholic beverages (alcopops) - mainly consumed by young adults and minors - decreased significantly as well. This led to an rise in import and consumption by adolescents, peaking in 2002. Based on demand for more youth protection, an excise tax on alcopops was introduced on February 1st, 2004, rising the price of alcopops

significantly. Thus, already in 2003, the import quantities started to decrease, leading to a decrease in sold alcopop quantities to one fifth of the quantity of alcopops sold in 2002 (source: Swiss Alcohol Board).
As important substitution effects to sweetened beer and self-mixing with cheap import wodka occurred, the overall alcohol consumption of young adults and minors did not decrease significantly.
Pleas find attached a factsheet and a graphic (in German, showing alcopop imports), as well as a link to a study from Germany (in English: http://onlinelibrary.wiley.com/doi/10.1111/j.1360-0443.2010.02956.x/epdf), reporting a very similar development.

We hope, that this information will support your work.

In case of further questions, please do not hesitate to contact us.

Yours sincerely,

Marc Raemy
Scientific advisor

Changes in alcohol consumption following a reduction in the price of spirits: a natural experiment in Switzerland

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ABSTRACT

Aims To discover what changes in alcohol consumption had occurred in subgroups defined by age, sex, volume of drinking and drinking occasions, following a reduction in the price of spirits in Switzerland in July 1999.

Design Quasi-experimental. Longitudinal general-population survey with baseline 3 months before and follow-up 3 months after price change.

Participants Probabilistic telephone sample of 1347 individuals with at least monthly consumption on average in the previous 6 months at both interviews. The response rate at baseline was 74,8% and the attrition rate from baseline to follow-up 20.2%.

Measurements Alcohol consumption was assessed by means of a beverage-specific graduated-frequency measure. High volume of drinking was defined as 40 + g/day for men and 20 + g/day for women. Binge drinking was defined as six + drinks on an occasion for men and four + drinks for women.

Findings Spirits consumption increased significantly (by 28.6%) in the total sample, and specifically in young males and in individuals who were low-volume drinkers at baseline. Consumption of alcohol overall, or of wine or beer, did not change significantly. No indication of effects of substitution was found.

Conclusions Spirits consumption showed price-responsiveness in the early postintervention period. This finding is of particular interest, as (a) the increase in spirits consumption took place at a time of generally declining consumption of alcohol in Switzerland; and (b) in contrast to the findings of most studies, the intervention, namely price reduction, increased availability.

KEYWORDS Longitudinal study, price changes, spirits consumption, taxation.

INTRODUCTION

The control of alcohol availability has become a serious public-health issue because of the well-established harmful effects of alcohol consumption on health, manifested in increased morbidity, premature mortality and personal injury, as well as for its negative social consequences (Bruun *et al*. 1975; *Addiction* 1993; Holder & Edwards 1995). Control measures that affect alcohol availability, especially taxation, have been shown to reduce health impairment and other adverse effects of alcohol consumption (Edwards *et al*. 1994). Alcohol research has been concerned especially with the relationship between economic access to alcohol and consumption. Evidence about price-sensitivity of alcoholic beverages indicates that an increase in price is followed by a decline in consumption, and a fall in price by increased consumption (for overviews see Ornstein 1980; Ornstein & Levy 1983; Godfrey 1988; Leung & Phelps 1991; Österberg 1995; USDHHS 1997; Österberg 2001).

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Changes occurring within a short period in specific aspects of alcohol availability have been referred to as 'natural experiments' (Wagenaar & Holder 1991). The advantage of 'natural experiments' is that they serve as a quasi-experimental means of identifying particular determinants of alcohol consumption, while other determinants are expected to remain unchanged. The effect of an intervention can thus be isolated, as confounding factors are viewed as negligible. This is often not possible with time-series analysis, the usual method of identifying such determinants: time-series usually span longer periods (e.g. decades of annual sales statistics) and hence time-series analysis estimates of effects will reflect, and be confounded with, long-term cultural and structural changes rather than only short-term economic changes (Simpura 1995).

A recent 'natural experiment' in Switzerland has been the reform of taxation on spirits, which came into effect on 1 July 1999, in accordance with the World Trade Organization agreement on the elimination of discriminating duties on foreign spirits. Previously the tax rate per litre of pure alcohol for domestic spirits was Swiss francs 26.00 and for foreign spirits between Swiss francs 32.00 and 58.00, according to type of beverage and alcohol content (EAV 1998). The highest rates applied to popular liquors such as whisky and gin. The new regulation introduced a uniform tax rate of Swiss francs 29.00 for domestic and foreign spirits.

The fiscal reform also liberalized the import of spirits. Restrictions on the number of companies permitted to import bottled spirits were eased. Increased competition among importers led to lower profit margins. The result was, combined with decreased taxes, a reduction of 30–50% in the retail price of foreign spirits. Prices of domestic spirits, however, did not change: the industry compensated for the modest increase in taxes by reducing its share of profits to avoid loss of customers. The Swiss Alcohol Board has estimated that in 1998, before the intervention, imports accounted for about 53% of the total domestic consumption of spirits, expressed in grams of pure alcohol (SFA 1999).

With regard to availability, the reform affected only price; it brought no structural change in the market, such as in outlet density, opening hours, advertising rules or legal drinking age. Earlier research with 'natural experiments' concerned mainly the privatization and deregulation of alcohol monopolies in the previous two decades in the European Union (Nordic Studies on Alcohol and Drugs 1999) and in North America (see Her *et al.* 1998, 1999; Wagenaar *et al.* 1999). The effect of those processes was to extend the alcohol distribution system, with resultant changes in both economic and structural availability (Gruenewald 1993). An inherent difficulty of earlier research was that of disentangling economic and structural effects. The present study does not have these problems of multiple effects and can investigate the pure effect of price reduction on alcohol consumption. Findings of an overall increase in spirits consumption after a 28 month follow-up were recently reported (Kuo *et al.* 2003). The present study deals with short-term changes in spirits consumption in different subgroups, defined by volume and heavy occasional drinking, 3 months after the price of foreign spirits decreased. In addition, a more detailed analysis of potential regression towards the mean effects is provided.

Most empirical studies on price effects have used time-series analysis of per capita consumption, i.e. analysis at the aggregate level. As per-capita data are often available on an annual basis only, and many time-points are needed for efficient estimation (Rehm & Gmel 2001), such data usually reflect historical interest more than actual economic impact (but note exceptions using monthly data, e.g. Wagenaar & Holder 1995). Little is known therefore about individual-level effects, particularly short-term effects, of change in economic availability, such as substitution of one beverage for another or addition of an easier available beverage to previous consumption (Mäkelä, Room & Single 1981a) or altered drinking patterns. Relatively few studies have been carried out with individual-level data and they date mainly from the 1980s (see Österberg 1995); the lack of such studies has been widely commented on in the literature (Godfrey 1997; Chaloupka, Grossman & Saffer 1998; Her *et al.* 1999). In particular, there is little evidence from natural experiments, derived from individual-level data, about effects of price changes.

Earlier studies raise two issues. First, the evidence base on which one society determines alcohol policies is considered to be transposable to other societies, irrespective of the specific context of each society. The pertinence of this principle to an effective alcohol policy has been questioned, however. New studies on price effects in modern societies are needed in order to adjust for societal changes (e.g. Plant, Single & Stockwell 1997; Rehm, Gmel & Her 2000). Instances of such changes are the long-term trends in alcohol consumption since the 1980s (Room 1991; Smart 1991); homogenization of alcohol consumption owing to the globalization of trade; and factors that promote cultural uniformity (Pyörälä 1990; Hupkens, Knibbe & Drop 1993; Edwards *et al.* 1994; Simpura 1995; Simpura, Paakanen & Mustonen 1995). Even within the European Union, countries differ in these respects (Gmel, Rehm & Frick 2001b). Secondly, aggregate-level studies cannot address effects by subgroups, for example the differential effects of price responsiveness among different types of drinkers (heavy, moderate or light) or among different age groups. The limitations of aggregate-level studies have long been discussed in the

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literature (e.g. Cook & Campbell 1979; Rehm & Strack 1994; Morgenstern 1998; see also Rehm & Gmel 2001 for a discussion of time-series analysis in the alcohol field).

Evidence on price-sensitivity in heavy drinkers is central to primary and secondary prevention (Whitehead 1998). Heavy drinkers are considered to be more price-responsive than light or moderate drinkers (Becker & Murphy 1988; Becker, Grossman & Murphy 1991; Grossman 1993). However, empirical evidence is not conclusive. The assumption that heavy drinkers are at least as responsive or more responsive as moderate drinkers (see Edwards *et al.* 1994; Österberg 1995) has been supported mainly by older studies in the United States (Grossman, Coate & Arluck 1987; Coate & Grossman 1988) and in Scotland (Kendell, de Roumanie & Britson 1983) or by indirect evidence, such as the association between price-responsiveness and liver-cirrhosis mortality at the aggregate level (Sloan, Reilly & Schenzler 1994; Chaloupka *et al.* 1998). A more recent publication, based on data of the early 1980s (Manning, Blumberg & Moulton 1995), however, suggests that heavy drinkers may be even less price-responsive than other drinkers. Kenkel (1996) found that heavy drinkers who were well informed about the health effects of alcohol consumption were price-responsive whereas less-informed heavy drinkers were not. The evidence from individual-level studies for the higher price-responsiveness of heavy drinkers has certain limitations. The US study (Grossman *et al.* 1987; Coate & Grossman 1988) was based on young people aged 16–31 years. Extrapolations to general populations may be misleading, as price responsiveness may be related to a lack of money specific to this subgroup or to an age-specific drinking pattern. The results of the Scottish study (Kendell *et al.* 1983) may have regression to the mean as alternative explanation. According to this phenomenon, measurement of consumption contains a time component, and as a consequence second measurement of respondents with extreme values tend to be closer to the mean (see also below).

The present study used a quasi-experimental, longitudinal design with individual data to investigate the effect of a price decrease consequent to taxation reform. Changes in consumption were determined from assessment of the alcohol consumption of the same individuals before and after the intervention. The changes examined were related to overall and beverage-specific consumption of spirits, wine and beer, and particularly to the association between changes in overall consumption and in consumption of spirits. In accordance with recent findings that adverse consequences of alcohol consumption are associated with both heavy drinking and heavy-drinking occasions (Rehm *et al.* 1996; Godfrey 1997; Klingemann & Gmel 2001), both these aspects of heavy drinking are examined separately and conjointly, as well as in subgroups defined by sex, age and alcohol consumption. The study adds further knowledge derived from individual-level data and the impact of a clear intervention related to prices of spirits in particular, while other aspects of availability (e.g. outlet densities) remained unchanged. It is novel in that it is concerned with an increase in availability following a decrease in price, whereas most 'natural experiments' have been in the form of public health measures designed to decrease availability.

METHODS

Sample

The data were obtained from a longitudinal study on changes in alcohol consumption in the resident population of Switzerland aged 15 years or more. They were collected at baseline, in March 1999, 3 months before the intervention and at follow-up, 3 months after, in October 1999. The method used was computer-assisted telephone interviewing. Respondents who could not be interviewed in German, French or Italian, or participate for health reasons, were excluded. The study used a two-stage random sample stratified by linguistic regions (germanophone, francophone, italophone). First, a random sample of households was drawn from the Swiss telephone directory. Secondly, a household roster was established during the first telephone contact and a target person was selected at random. The final sample size was 4007 at baseline, and the response rate was 74.8%. The response rate at baseline was similar to response rates of health surveys in the Swiss general population or even higher (BFS 1994, 1998, Fahrenkrug & Müller 1989, Gmel 1996). Individuals who could not be reached because of incorrect telephone numbers, or whose numbers were business numbers, or addresses were holiday dwellings, as well as people not matching the sample specifications (relating to language or health) were regarded as neutral non-respondents. Non-neutral non-responses were due to refusals and time restrictions. Time restriction arose because interviews had to be completed within a short period—about 1 month—in order to distinguish the consumption before the intervention from the consumption after the intervention. Individuals who could not be contacted during this period were considered as non-respondents. The study had two special features. First, owing to budget constraints the study was restricted to current drinkers, defined as people having had at least six alcoholic drinks during the 6 months preceding the interview ($n = 2902$). Secondly, although all participants were interviewed by telephone at baseline, the sample was split randomly into two subsamples for follow-up. One

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subsample ($n = 1061$) received a written questionnaire including a weekly drinking diary and questions related to brands, purchasing and stocking of spirits in order to collect detailed information. This subsample was followed-up by the written questionnaire only. The second subsample ($n = 1841$), which received no additional diary at baseline, was followed-up by telephone. Only the latter is analysed in the present study.

At follow-up the survey included 1470 participants (attrition = 20.2%). Forty-three neutral non-responses occurred because of address errors; 17 individuals could not be interviewed, for health reasons; 115 could not be re-contacted within a month; and 196 refused further participation. A number of current drinkers at baseline had become non-drinkers at follow-up; the inverse change (i.e. non-drinkers had become drinkers) could not be observed, however, as the study design excluded non-drinkers at baseline. To ensure parallelism with baseline, and thus avoid downward bias of changes in consumption, the analysis was restricted to individuals who satisfied the consumption criterion (at least six drinks in the preceding 6 months) at both baseline and follow-up ($n = 1347$). To counterbalance the exclusion of non-drinkers who eventually became drinkers, drinkers who became non-drinkers were also excluded.

Measures

A graduated frequency (GF) instrument was used to measure alcohol consumption. It is recognized that measurement with a GF instruments gives higher values for volume of alcohol intake than with a quantity–frequency (QF) instrument (for an overview see Rehm 1998), and GF instruments are recommended for surveys of alcohol consumption (WHO 2000). Whereas QF asks about the usual quantity and usual frequency of drinking, GF enquires about the frequency at which several quantities of alcohol are consumed. Thus, instead of assessing only a single typical quantity and a single typical frequency in the QF, variability of different drinking occasions is more accurately captured with GF. GF has been shown especially to yield higher proportions of heavy drinkers and lower proportions of light drinkers (Midanik 1994) than QF. It has been argued that GF captures variability of consumption better than QF and therefore requires less averaging of consumption on the part of respondents (Hilton 1989); they may tend to focus less on the mode of the respondent's distribution of drinking occasions. QF, compared with GF, may therefore insufficiently assess infrequent heavy-drinking occasions (Kühlhorn & Leifman 1993).

The questions asked were beverage-specific for beer, wine and spirits. For each type of beverage, respondents were asked whether they had drunk it during the past 7 days; and, if so, on how many days; and on how many of the days they had had 11 or more (or 9–10, 7–8, . . . , 1–2) standard drinks. Respondents with no weekly consumption were asked similar questions about their consumption during the previous 6 months. For the same gradations of quantities, respondents reported the associated frequency of drinking, with response categories of once a week, twice or three times a month, once a month, less often than once a month and never. For each type of beverage, volume of drinking was obtained by converting quantities and related frequencies into grams of pure alcohol a day. The volume percentages used for beer (volume percentage = 4.8%), wine (volume percentage = 11.0%), and spirits (volume percentage = 40.0%), were those determined by the Swiss Alcohol Board (Maurer, Blanchard & Helfer 1996). Beverage-specific volumes of drinking were totalled to determine total consumption. For analysis by subgroups, three age categories were used: 15–29, 30–59 and 60 years or older. This categorization was chosen instead of a continuous measure of age because of the distribution of alcohol consumption in Switzerland, which is approximately inversely U-shaped by age (Rehm & Arminger 1996). In accordance with common definitions of risky alcohol intake (English *et al*. 1995; WHO 2000) high-volume drinking was defined as drinking 40 g of pure alcohol a day or more for men and 20 g or more for women, which is about four standard drinks a day for men and two standard drinks for women. Heavy-drinking occasions ('binge drinking') were defined for men as drinking six drinks or more, and for women four drinks or more, at least once during the 6 months preceding the interview.

Statistical analysis

Analysis of survey data should take into account the complex sampling design to yield correct standard errors—i.e. correct significance tests and correct confidence intervals (Rehm & Bondy 1996; Korn & Graubard 1999). The estimation therefore incorporated probability inclusion weights (reflecting household size and disproportional sampling of regions) and stratification by linguistic regions. Statistical analysis used STATA for parameter estimation of the complex survey design (StataCorp 1999). Tests were derived by means of sample design-based survey estimators. All estimators used robust estimation of standard errors.

T-statistics were used to test changes in mean consumption between baseline and follow-up in the total sample and in subgroups. Multiple-regression models were used to measure the conjoint influence of the variables, with dummy coding for the combinations of ages (15–29 years, 30–59 years, 60 years or older) and sex (male/female), high-volume drinking (40 +/20 + g/less), and binge drinking (at least once in the past previous 6

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months/none). In addition, combinations of drinking categories at baseline and follow-up for both volume-drinking and binge-drinking were constructed, as follows:

- stable high-volume drinking (stable binge-drinking): high-volume drinking (binge-drinking), at both baseline and follow-up;
- increased high-volume drinking (increased binge-drinking): high-volume drinking (binge-drinking), at follow-up only;
- decreased high-volume drinking (decreased binge-drinking): high-volume drinking (binge-drinking), at baseline only;
- stable low-volume drinking (stable non-binge drinking): low-volume drinking (non-binge drinking), at both baseline and follow-up.

Combinations of those drinking categories at baseline and follow-up were also used as one means of accounting for effects of regression to the mean. Regression to the mean may be misinterpreted as an intervention effect. Correction formulas, and use of control groups or of multiple measurement points, are common approaches applied to disentangle effects of intervention and of regression to the mean (Yudkin & Stratton 1996). These approaches, however, rely on restrictive statistical assumptions (e.g. multivariate–normal distributions) and on additional empirical data such as longitudinal data not affected by an intervention. In the present study, the use of combinations of drinking categories at baseline and follow-up was designed to weaken the effects of regression to the mean. Regression to the mean is assumed to occur because an individual's consumption fluctuates by chance in a limited range. The use of combinations of the drinking categories for measurements at baseline and follow-up makes it possible to capture approximately the individual's range of fluctuations. If most individuals are not too close to the category cut-offs, chance fluctuations are unlikely to change an individual's allocation to a category. Thus, without real changes in consumption, most drinkers should stay consistently within their category. For example, the consumption of most stable low-volume or high-volume drinkers should fluctuate within the low or the high drinking categories. Chance fluctuations occur because especially at baseline some drinkers are at the lower end of their individual drinking range while others are at the upper end. If changes are due solely to chance fluctuations, decreases from baseline to follow-up should compensate increases and vice versa. Similarly, for drinkers close to the cut-offs, changes in categories will be compensated. For instance changes from high-volume drinking to low-volume drinking will be compensated by changes from low-volume drinking to high-volume drinking.

In the present study, however, the intervention effect is expected to increase the consumption of spirits. For drinkers close to the cut-offs, the counterbalancing effect of chance fluctuations for individuals changing their drinking category may therefore be attenuated. At follow-up, because of the upward shift in consumption due to intervention, there will be more drinkers with a high drinking status than drinkers with a low drinking status. The following remarks address how intervention affects the allocation to the drinking categories compared with regression to the mean without intervention.

- Stable high-volume drinkers with intervention: this group includes stable high-volume drinkers without intervention, as intervention is supposed to result in an upward shift of consumption at follow-up. Thus, the drinking status does not change at follow-up. In addition, stable high-volume drinkers with intervention may include some decreased high-volume drinkers without intervention, who were close to the cut-off at baseline, especially those with downward chance fluctuations to follow-up. The intervention keeps them in the stable high-volume drinkers' category. Because the effects of regression to the mean are not counterbalanced in this group, they contribute to an underestimation of the intervention effect in classified stable high-volume drinkers.
- Increased high-volume drinking with intervention: this group includes increased high-volume drinkers without intervention. Because of the intervention effect, the drinking status at follow-up does not change. In addition, this group may include some stable low-volume drinkers without intervention close to the cut-off at baseline, especially those with upward chance fluctuations to follow-up. Regression to the mean and intervention would therefore put them in the increased high-volume drinkers' category. As chance increases are not counterbalanced in this group, the increase due to the intervention may be overestimated.
- Decreased high-volume drinking with intervention: this group includes only partly decreased high-volume drinkers without intervention. Some decreased high-volume drinkers without intervention close to the cut-off at follow-up, especially those with downward chance fluctuations from baseline, may counterbalance decreases of consumption due to regression to the mean by the intervention. Thus, they became stable high-volume drinkers. As chance decreases are lost, the increase due to the intervention may be overestimated.
- Stable low-volume drinkers with intervention: this group only includes partly stable low-volume drinkers without intervention. Some individuals close to the cut-off at baseline, especially those with upward chance fluctuations, may become increased high-volume drinkers. As chance increases are lost, the

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increase due to the intervention may be underestimated.

In general, under and overestimation depends on the number of individuals close to the cut-off of 40 g of pure alcohol a day (men) or 20 g a day (women) and the effect of the intervention. Assuming that alcohol consumption close to the cut-off is defined as 37–43 g of pure alcohol a day in men and 17 and 23 g in women, only 2.2% of men and 3.3% of women consumed within these boundaries. The departure of 3 g from the cut-off correspond to almost the 10-fold of the change of total alcohol consumption (– 0.32 g, see Results)

To assess effects of substitution across beverages, changes in consumption of non-spirits were tested in the total sample and in subgroups. Cross-price elasticity of non-spirits was calculated by dividing the percentage changes in the consumption of non-spirits by percentage changes in the prices of spirits.

RESULTS

Table 1 summarizes changes in overall and beverage-specific consumption in the total sample in the 6 months between baseline and follow-up. Consumption of spirits increased significantly while that of beer and wine, as well as overall consumption, decreased, although not significantly. In grams of pure alcohol per day, the increase for spirits was 0.28 (28.6%); and the decrease for wine and beer together was non-significant at – 0.60 (CI: – 1.28; 0.07, percentage decrease 6.2%). Given the 30–50% range of price reduction for foreign spirits, price elasticity of spirits was at least between –0.56 and –0.94, and cross-price elasticity of non-spirits between 0.12 and 0.21. Almost zero values of cross-price elasticity indicated that the increase in spirits consumption was only marginally, if at all, offset by decreases in consumption of other alcoholic beverages.

As Table 2 shows, the drinking distribution remained fairly stable over the 6-month interval between baseline and follow-up. As measured by volume at both time-points, around 90% remained high-volume or low-volume drinkers, and 70–80% either binge or non-binge drinkers. Consequently, the percentages of high-volume drinkers or binge drinkers changed little between the two waves. Women in the middle-age group accounted for the most marked changes: a decrease of about 4.5% in heavy drinkers and about 5.2% in binge drinkers. In older men, binge drinkers decreased by 4.6%. Stable high-volume drinking was highest in older men and lowest in young men. Stable binge drinking and increased binge drinking declined with age in men and women.

Table 3 shows changes in spirits consumption by subgroup. Consumption increased significantly in men, by about 0.42 g of pure alcohol a day (36.9%). Women showed a non-significant increase of about 0.13 g (14.8%). Increases in spirits consumption were most pronounced in high-volume increasers and in young males. Effects in women were not significant. Lack of significance in subgroups may be due to small sizes.

In men, spirits consumption was found to have increased in those who were low-volume drinkers at baseline, and also in the low-volume drinking category at follow-up. In absolute numbers, most marked changes were found in high-volume increasers at follow-up. Spirits consumption decreased significantly in those who were high-volume drinkers at baseline. Thus, spirits consumption increased among stable low-volume drinkers, and increased even more among high-volume increasers, but declined among high-volume decreasers. Given the different sample sizes of the combinations of drinking categories, most of the overall changes were attributable to stable low-volume drinkers whereas the other drinking-category subgroups offset one another. Except for binge-decreasers, spirits consumption increased among all groups defined by binge-drinking status. Increasers were of similar magnitude, indicating that changes in spirits consumption were largely independent of binge-drinking categories. This was also true of women, who showed no significant changes. Significant increases in spirits consumption among women were found among high-volume drinkers at follow-up and therefore also among high-volume increasers. The same as with men, female high-volume decreasers reduced their consumption significantly but less so than the high-volume increasers.

Table 1 Changes in overall and beverage-specific consumption in the total sample in g/day.

	March 1999 estimates	*October 1999 estimates*	*Changes*				
			Estimates	*SE*	t	P	*95% CI*
Overall	10.67	10.35	– 0.32	0.38	– 0.84	0.40	– 1.06, 0.42
Spirits	1.00	1.29	0.28	0.09	3.14	< 0.01	0.11, 0.46
Wine	5.96	5.61	– 0.35	0.23	– 1.50	0.13	– 0.80, 0.11
Beer	3.71	3.46	– 0.25	0.23	– 1.12	0.26	– 0.70, 0.19

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Table 2 Proportions of respondents (SE) within drinking subgroups

	Males				*Females*			
	15–29 years (n = 135)	*30–59 years (n = 417)*	*60 years + (n = 141)*	*Overall (n = 693)*	*15–29 years (n = 126)*	*30–59 years (n = 370)*	*60 years + (n = 158)*	*Overall (n = 654)*
Volume drinking								
*t*1 low (*n* = 639/589)	91.4% (0.03)	94.4% (0.01)	93.6% (0.02)	93.5% (0.01)	97.1% (0.01)	91.2% (0.02)	94.2% (0.02)	93.2% (0.01)
*t*1 high (*n* = 54/65)	8.6% (0.03)	5.6% (0.01)	6.4% (0.02)	6.5% (0.01)	2.9% (0.01)	8.8% (0.02)	5.8% (0.02)	6.8% (0.01)
*t*2 low (*n* = 646/620)	92.4% (0.03)	95.0% (0.01)	92.3% (0.02)	93.9% (0.01)	96.6% (0.01)	95.7% (0.01)	97.4% (0.01)	96.2% (0.01)
*t*2 high (*n* = 47/34)	7.6% (0.03)	5.0% (0.01)	7.7% (0.02)	6.1% (0.01)	3.4% (0.01)	4.3% (0.01)	2.6% (0.01)	3.8% (0.01)
Binge drinking								
*t*1 no (*n* = 388/426)	42.9% (0.05)	49.6% (0.03)	69.8% (0.05)	51.4% (0.02)	47.4% (0.05)	63.0% (0.03)	89.3% (0.03)	64.0% (0.02)
*t*1 yes (*n* = 305/228)	57.1% (0.05)	50.4% (0.03)	30.2% (0.05)	48.6% (0.02)	52.6% (0.05)	37.0% (0.03)	10.7% (0.03)	36.0% (0.02)
*t*2 no (*n* = 395/432)	40.9% (0.05)	52.8% (0.03)	74.4% (0.04)	53.6% (0.02)	43.4% (0.05)	68.2% (0.03)	89.5% (0.03)	66.1% (0.02)
*t*2 yes (*n* = 298/222)	59.1% (0.05)	47.2% (0.03)	25.6% (0.04)	46.4% (0.02)	56.6% (0.05)	31.8% (0.03)	10.5% (0.03)	33.9% (0.02)
Changes of volume drinking								
Low to low (*n* = 619/573)	86.6% (0.04)	91.8% (0.02)	91.0% (0.02)	90.3% (0.01)	94.8% (0.02)	89.2% (0.02)	92.6% (0.02)	91.2% (0.01)
Low to high (*n* = 20/16)	4.7% (0.03)	2.6% (0.01)	2.6% (0.01)	3.1% (0.01)	2.3% (0.01)	2.0% (0.01)	1.5% (0.01)	2.0% (0.01)
High to low (*n* = 27/47)	5.8% (0.03)	3.3% (0.01)	1.3% (0.01)	3.6% (0.01)	1.8% (0.01)	6.5% (0.01)	4.7% (0.02)	5.0% (0.01)
High to high (*n* = 27/18)	2.9% (0.02)	2.4% (0.01)	5.1% (0.02)	3.0% (0.01)	1.1% (0.01)	2.3% (0.01)	1.1% (0.01)	1.8% (< 0.01)
Changes of binge drinking								
No to no (*n* = 307/344)	25.8% (0.05)	40.8% (0.03)	60.7% (0.05)	40.4% (0.02)	32.4% (0.05)	51.1% (0.03)	81.4% (0.04)	52.1% (0.02)
No to yes (*n* = 81/82)	17.1% (0.04)	8.9% (0.02)	9.1% (0.03)	11.0% (0.01)	15.0% (0.04)	11.8% (0.02)	7.9% (0.03)	11.9% (0.02)
Yes to no (*n* = 88/88)	15.2% (0.04)	12.0% (0.02)	13.7% (0.04)	13.1% (0.02)	11.0% (0.03)	17.1% (0.02)	8.1% (0.03)	14.0% (0.02)
Yes to yes (*n* = 217/140)	42.0% (0.05)	38.3% (0.03)	16.5% (0.04)	35.4% (0.02)	41.6% (0.05)	20.0% (0.02)	2.5% (0.01)	22.0% (0.02)

The *ns* in the first column refer to the unweighted group sizes for males/females. Volume drinking: low = less than 40 g/day for men and less than 20 g/day for women, high = 40 + g/day men and 20 + g/day women. Binge drinking: no = no occasion of six (men)/four (women) drinks or more in the 6 months preceding interview; yes = at least one occasion of six (men)/four (women) drinks or more in the 6 months preceding interview.

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Table 3 Changes in spirits consumption in subgroups in g/day.

	Males				*Females*				*Overall*			
	March 1999 estimates	*Oct. 1999 estimates*	*Change*		*March 1999 estimates*	*Oct. 1999 estimates*	*Change*		*March 1999 estimates*	*Oct. 1999 estimates*	*Change*	
			Estim. (SE)	*95% CI*			*Estim. (SE)*	95% CI			*Estim. (SE)*	*95% CI*
Age												
15–29 years (*n* = 135/126)	1.28	2.21	0.93*(0.38)	0.19; 1.68	1.29	1.32	0.03 (0.32)	– 0.59; 0.65	1.29	1.81	0.52* (0.26)	0.02; 1.03
30–59 years (*n* = 417/370)	1.01	1.24	0.23* (0.11)	0.01; 0.45	0.67	0.89	0.22 (0.17)	– 0.11; 0.55	0.85	1.07	0.22* (0.10)	0.03; 0.42
60 years + (*n* = 141/158)	1.35	1.65	0.30 (0.24)	– 0.17; 0.77	0.86	0.82	– 0.04 (0.20)	– 0.43; 0.34	1.12	1.25	0.14 (0.16)	– 0.17; 0.44
Volume drinking												
*t*1 no (*n* = 639/589)	0.95	1.49	0.55* (0.12)	0.31; 0.78	0.74	0.91	0.17 (0.13)	– 0.09; 0.43	0.85	1.22	0.37* (0.09)	0.19; 0.55
*t*1 yes (*n* = 54/65)	3.86	2.48	– 1.38* (0.67)	– 2.69; – 0.07	2.38	1.92	– 0.46 (0.56)	– 1.56; 0.64	3.15	2.21	– 0.94* (0.45)	– 1.82; – 0.06
*t*2 no (*n* = 646/620)	0.99	1.32	0.32* (0.11)	0.11; 0.53	0.81	0.70	– 0.11 (0.09)	– 0.28; 0.07	0.91	1.03	0.12 (0.07)	– 0.02; 0.26
*t*2 yes (*n* = 47/34)	3.36	5.27	1.91 (1.11)	– 0.27; 4.09	2.00	8.05	6.05* (2.19)	1.75; 10.35	2.89	6.24	3.36* (1.07)	1.27; 5.46
Binge drinking												
*t*1 no (*n* = 388/426)	0.79	1.28	0.49* (0.12)	0.24; 0.73	0.63	0.76	0.13 (0.11)	– 0.09; 0.35	0.71	1.01	0.30* (0.08)	0.14; 0.47
*t*1 yes (*n* = 305/228)	1.50	1.85	0.35* (0.22)	– 0.08; 0.78	1.24	1.36	0.12 (0.30)	– 0.46; 0.70	1.40	1.66	0.26 (0.18)	– 0.09; 0.61
*t*2 no (*n* = 395/432)	0.79	1.09	0.31*(0.11)	0.09; 0.52	0.68	0.60	– 0.08 (0.09)	– 0.26; 0.11	0.73	0.84	0.11 (0.07)	– 0.04; 0.25
*t*2 yes (*n* = 298/222)	1.54	2.10	0.55* (0.23)	0.09; 1.01	1.19	1.72	0.53 (0.33)	– 0.13; 1.18	1.40	1.94	0.54* (0.19)	0.16; 0.92
Changes of volume drinking												
Low to low (*n* = 619/573)	0.87	1.30	0.42* (0.10)	0.23; 0.62	0.74	0.70	– 0.04 (0.09)	– 0.21; 0.13	0.81	1.02	0.21* (0.07)	0.07; 0.34
Low to high (*n* = 20/16)	3.08	7.09	4.02* (1.68)	0.71; 7.32	0.81	10.61	9.80* (3.68)	2.59; 17.0	2.26	8.35	6.09* (1.73)	2.69; 9.49
High to low (*n* = 27/47)	4.02	1.74	– 2.28* (0.97)	– 4.19; – 0.37	2.04	0.78	– 1.26*(0.48)	– 2.20; – 0.32	2.92	1.21	– 1.72* (0.52)	– 2.74; – 0.70
High to high (*n* = 27/18)	3.67	3.36	– 0.31 (0.80)	– 1.88; 1.27	3.35	5.17	1.82 (1.36)	– 0.85; 4.48	3.56	3.98	0.42 (0.75)	– 1.04; 1.89
Changes of binge drinking												
No to no (*n* = 307/344	0.70	1.11	0.41* (0.13)	0.15; 0.67	0.58	0.61	0.02 (0.09)	– 0.15; 0.20	0.64	0.85	0.21* (0.08)	0.05; 0.36
No to yes (*n* = 81/82)	1.13	1.90	0.78* (0.32)	0.14; 1.41	0.85	1.45	0.60 (0.48)	– 0.34; 1.53	1.00	1.68	0.69* (0.29)	0.13; 1.25
Yes to no (*n* = 88/88)	1.04	1.02	– 0.02 (0.21)	– 0.42; 0.39	1.04	0.58	– 0.46 (0.29)	– 1.03; 0.11	1.04	0.81	– 0.23 (0.18)	– 0.58; 0.12
Yes to yes (*n* = 217/140)	1.67	2.16	0.48* (0.29)	– 0.09; 1.05	1.38	1.86	0.49 (0.44)	– 0.38; 1.36	1.57	2.05	0.49 (0.24)	– 0.01; 0.96
Overall (*n* = 693/654)	1.14	1.56	0.42* (0.12)	0.18; 0.66	0.85	0.98	0.13 (0.13)	– 0.13; 0.38	1.00	1.29	0.28* (0.09)	0.11; 0.46

The *ns* in the first column refer to the unweighted group sizes for males/females.

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None of the age or sex subgroups showed significant changes in consumption of non-spirits (results not shown). This may indicate that non-spirits were not being substituted for spirits. Similarly, stable low-volume drinkers showed the most changes in the consumption of spirits, reducing non-spirits consumption by 0.31 g a day (= 3%). Thus, cross-price elasticity resulting from a decrease of 30–50% in the price of spirits ranged from 0.06 to 0.1. In most subgroups, the increase or decrease in the consumption of spirits was accompanied by increases or decreases in non-spirits consumption, indicating additive effects of alcoholic beverages rather than substitution of spirits for beer or wine.

Multivariate regression analysis (Table 4) included combinations of gender and age as well as drinking status defined by volume and binge drinking at baseline and follow-up. It widely confirmed bivariate findings. Because the subgroups defined by sex and age differed widely in their changes in spirits consumption, the six combinations of the sex and age variables were coded as five dummy variables. Young men increased their spirits consumption the most, even when consumption was adjusted for combinations of volume-drinking and binge-drinking status. High-volume increasers showed a significantly higher increase in spirits consumption than stable low-volume drinkers. High-volume decreasers showed a decrease, although less than the amount of increase in high-volume increasers. The effects for binge-drinking status were less than the effects for volume status. Drinkers defined by binge-drinking status changed less than those defined by volume status. Binge-decreasers showed a significant change by comparison with stable non-bingers, the reference subgroup).

DISCUSSION

This study used longitudinal individual data and a before/after-intervention design to examine initial effects on alcohol consumption of a reduction of 30–50% in the price of imported spirits in Switzerland. The main findings were an increase of almost 30% in consumption of spirits, and no significant change in that of wine or beer, or in total alcohol consumption. Analysis of subgroups showed that the increase in spirits consumption was associated mainly with the variables sex, age and volume of drinking. The association with sex was central. Females showed no significant change; males showed an increase of about 38% in spirits consumption, young men showing the highest increase. In the total sample, most of the excess consumption over the baseline measure occurred in stable low-volume drinkers. In high-volume drinkers at baseline, spirits consumption showed no increase. Spirits consumption had increased markedly, however, in those found at follow-up to have become high-volume drinkers.

In intervention analysis of longitudinal data, effects of regression to the mean may be confounded with the intervention effect. In the present study, the use of combinations of drinking status at baseline and follow-up made it possible to control partly for the effect of regression to the mean by distinguishing stable low-volume or stable high-volume drinkers from those who had changed drinking status (i.e. either decreasers or increasers). The intervention led to a significant increase in spirits consumption in stable low-volume drinkers. High-volume decreasers reduced their consumption of spirits significantly. High-volume increasers drank significantly more spirits. The increase in spirits consumption across all

Table 4 Regression analyses of changes in spirits consumption in g/day.

	Coefficients	*Standard errors*	t	p	*95% CI*
Constant	– 0.01	0.19	– 0.05	0.96	– 0.38; 0.36
Age/sex	0				
(ref.women 60 + years)					
Men, 15–29 years	0.82	0.33	2.50	0.01	0.17; 1.47
Men, 30–59 years	0.19	0.23	0.82	0.41	– 0.27; 0.66
Men, 60 + years	0.23	0.31	0.74	0.46	– 0.38; 0.84
Women, 15–29 years	– 0.03	0.33	– 0.10	0.92	– 0.70; 0.63
Women, 30–59 years	0.30	0.24	1.26	0.21	– 0.17; 0.77
Volume	0				
(ref. low to low)					
Low to high	5.73	1.70	3.36	< 0.01	2.39; 9.07
High to low	– 2.01	0.55	– 3.61	< 0.01	– 2.39; – 0.92
High to high	0.11	0.79	0.14	0.89	– 1.43; 1.65
Binge	0				
(ref. no to no)					
No to yes	0.20	0.26	0.77	0.44	– 0.31; 0.72
Yes to no	– 0.50	0.19	– 2.65	0.01	– 0.87; – 0.13
Yes to yes	– 0.01	0.19	0.04	0.97	– 0.37; 0.39

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combinations of either binge drinking or volume of drinking at baseline and follow-up was highest for high-volume increasers in both sexes, and particularly higher than the decrease in high-volume decreasers. This could mean that regression to the mean, if it occurred, was weakened by the intervention effect in high-volume decreasers and exaggerated in high-volume increasers. Given the pattern of results, although regression to the mean may have accounted for some effects, it is unlikely to be the only explanation. First, although changes in consumption of spirits were analysed, groups designated by volume of drinking or binge drinking were constructed for overall consumption, not for spirits only. Hence, with regard to the use of groups defined by extreme values at baseline, mostly accounting for effects of regression to the mean, the extreme values did not necessarily refer to consumption of spirits. For example, the proportion of spirits in total consumption usually declines with increasing total consumption (Gmel & Schmid 1996). In the present study, the correlation between consumption of non-spirits (i.e. beer and wine) and the consumption of spirits was 0.20 at baseline and 0.26 at follow-up. Secondly, coupled with the hypothesis that individual measures vary in a narrow range rather than from one end of the spectrum to the other (Yudkin & Stratton 1996), strong changes from low to high volume of drinking can be expected not to be attributable exclusively to regression to the mean.

The present study has shown that changes in consumption of spirits were associated with changes in overall drinking status, specifically from low-volume to high-volume drinking. Such a finding contradicts the assumption of substitution of alcoholic beverages, which is consistent with previous findings (Mäkelä *et al.* 1981b; Österberg 1995; Österberg 2001).

The study confirms the findings of previous research (Ornstein 1980; Ornstein & Levy 1983; Godfrey 1988; Leung & Phelps 1991; Österberg 1995) that, for the total sample, spirits are price-elastic, on the whole, like common consumption goods. The findings draw attention to three factors:

- First, changes in the social environment, such as those in life-style and consumption, have brought a long-term downward trend in the consumption of alcohol, including spirits, in most established market economies since the 1980s (Simpura 1995). In Switzerland between 1980 and 1998, for instance, the decrease for alcohol overall was 17.8% and for spirits 32.8% (Blanchard 2001).
- Secondly, most studies on price effects have analysed the effects of rising prices. Hence, expected decreases in consumption following price increases occurred in a period of generally declining consumption, and effects may have been confounded. The present study shows that price-elasticity of alcoholic beverages holds true for falling prices even in a period of declining consumption.
- Thirdly, the use of individual-level data in this study permitted an examination of short-time variation in spirits consumption. Price sensitivity is usually analysed on the basis of aggregated data, often long-term time-series of national sales statistics. The use of sales data to determine the level of alcohol consumption in a population is controversial, however, as changes in sales data may not be congruent with consumption changes in individuals (Rehm 1998; see also Mulford & Fitzgerald 1988). Effects of stocking or variation in cross-border purchases, for instance, may especially bias short-term consumption changes inferred from sales data. This study found an immediate reaction in spirits consumption to price decrease.

Related to the increase in consumption of spirits is the central issue of addition or substitution effects. This issue is crucial, as drinkers can respond to a price decrease in two essentially different ways: they increase their consumption of the beverage concerned and either do not change their use of other beverages or offset their increased consumption of the beverage by reducing their consumption of other beverages (Mäkelä *et al.* 1981a). It is a common finding that, with increased availability of an alcoholic beverage, drinkers usually increase their intake of it but do not decrease their consumption of others (Österberg 1995; Österberg 2001). Thus, changes in drinking patterns have a cumulative rather than an interchangeable character. Findings of the present study do not support substitution effects. The decrease in consumption of wine and beer was not significant and may reflect more the general trend of decreasing consumption in Switzerland. It should be noted, however, that because of the larger quantity of alcohol consumed in beer and wine compared to spirits, beer and wine consumption decreased absolutely at twice the rate at which the consumption of spirits increased. Therefore, the price changes of spirits may not have resulted in an overall increase in alcohol consumption in Switzerland. According to Swiss Alcohol Board sales data (Blanchard 2001), the consumption of beer, wine and spirit decreased steadily since the 1980s. The present study indicates that this trend may have been reversed for the consumption of spirits. Cross-price elasticity resulting from those non-significant decreases were small, and the strongest effects of increased or decreased spirits consumption were found among those individuals who also increased or decreased their consumption of alcoholic non-spirits. Beverage-specific substitutions have so far been scarcely studied at the individual level, but research on cross-elasticity with aggregate data has similarly indicated only weak and mostly insignificant substitutions of one beverage for

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another (for overviews see Edwards *et al.* 1994; Nelson & Moran 1995; Österberg 2001).

Price responsiveness is known to be related inversely to the integration of a beverage in a drinking culture (Labys 1976; Godfrey 1989; Sparrow *et al.* 1989; Godfrey 1990). Thus, the less a beverage is consumed, the more price-responsive it will be. The present findings are consistent in this respect as, according to data of the Swiss Alcohol Board for 1999, the proportions of spirits, beer and wine in total consumption in Switzerland were, respectively, 16.1%, 31.1% and 52.9% (Blanchard 2001). Spirits should accordingly be price-responsive. In the present study, price elasticity could not be exactly determined as reduction in prices varied between 30% and 50%. Price decreases attributable to tax changes and lower profit margins of importers varied with type of spirits. Moreover, the price decrease applied only to imported spirits, or about half of all spirits consumed in Switzerland before the reform (SFA 1999). These findings therefore indicate a conservative price elasticity of −0.6 to −1.0, which is well within the range of price elasticity of spirits in other studies (Clements, Yang & Zheng 1997; for an overview see Österberg 1995).

However, although cultural embedment of a beverage may be one explanation of price responsiveness in the sample as a whole, it does not sufficiently explain differences between subgroups. In the whole sample, for instance, the share of spirits in total consumption is roughly the same across all age-groups and both sexes (ranging between 11% and 15%); larger-scale surveys in Switzerland have also confirmed a relatively stable proportion of spirits in total consumption (Gmel & Schmid 1996). Spirits consumption increased significantly only in men, however, and most in the youngest age-group, and in low-volume more than high-volume drinkers. One possible explanation at the subgroup level is that the level of alcohol consumption is determined by a combination of economic and cultural or structural factors, including drinking patterns (Simpura 1995). Economic factors may be the most influential in the short term and cultural factors in the long term (Treno, Parker & Holder 1993; Österberg 1995). If cultural and normative drinking styles are highly dominant, changes in prices of spirits may affect mainly the young, who have not yet adopted such culturally determined drinking styles. For instance, in an 8-year follow-up study in Switzerland, Gmel and colleagues (Gmel, Truan & François 1999) were able to show that beverage preferences remained highly stable and changed only at younger ages. Mainly, young people changed their 'youth drinking style' to the predominant drinking style of their region.

It is of interest that information about the price responsiveness of heavy drinkers has been derived mainly from studies with young people in the United States (Grossman *et al.* 1987; Coate & Grossman 1988). Young people are commonly the group most affected by prices as they have the least money to spend on drink (Edwards *et al.* 1994). The combination of unstabilized drinking patterns and financial constraints, not heavy drinking *per se*, is likely to determine their price responsiveness. We would argue, then, that consumption varies mainly with economic factors, if integration in a drinking culture is not yet completed.

Cultural norms or greater social acceptance may be also a factor in explaining why young women in the present study were not price-responsive, contrary to findings of studies in the United States (Chaloupka & Wechsler 1996; Kenkel 1996). According to social theories of 'diffusion of innovations' (Rogers & Shoemaker 1971; Rogers 1995), socio-economic groups show differential adoption processes and do not adopt innovations equally fast. For instance, women often lag several years behind men in adopting new consumption styles (for the 'smoking epidemic' see Peto *et al.* 1994; Graham 1996). Adoption processes generally take time, often several years. This study needs to be continued to discover whether women in Switzerland are generally not affected by the price change of spirits or simply will catch up with men later.

Contrary to other studies, mainly in the 1980s (Coate & Grossman 1988; Kendell *et al.* 1983; Grossman *et al.* 1987), the present study found that high-volume drinkers were not price-responsive or less so than moderate drinkers. This accords with recent findings that heavy drinkers are less price-responsive than light drinkers, and that most heavy drinkers are almost insensitive to price change (Manning *et al.* 1995; Kenkel 1996). However, the direction of the change in price (a decrease) may explain why drinkers who were high-volume at baseline were the least price-responsive. As high-volume drinkers are at the upper end of the consumption distribution a further increase is unlikely, whereas a decrease in consumption with increasing prices is still possible. Hence, high-volume drinkers may be price-responsive when prices rise but not when they fall. In addition, because of the high price of spirits, high-volume drinkers in Switzerland drank other beverages before the price change, and this pattern may have persisted.

On binge drinking the study gave mixed findings. Although stable male bingers and male binge increasers increased spirits consumption, these effects were no longer significant in the multiple regression model controlling for age, sex and volume. This may indicate that effects of binge drinking are already captured by age and low-volume drinkers, as binge drinking decreases with age (Table 2) and most Swiss binge-drinkers are low-volume drinkers (Gmel *et al.* 2001a). In contrast to volume of drinking, however, increases in spirits consumption

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were found in male subgroups defined by binge-drinking status at baseline and follow-up except for binge decreasers, hence for bingers and non-bingers. Volume of drinking is probable, therefore, to be more predictive of change in spirits consumption than binge drinking.

Some shortcomings of the present study must be acknowledged. As for Kendell *et al.* (1983) it was restricted, for budgetary reasons, to respondents who took alcohol at least monthly during the 6 months before interview. This excluded abstinent respondents and very light drinkers. The increase in spirits consumption could have been underestimated, therefore, if the very light drinkers were more price-responsive than average or if abstainers began to drink above average. Some findings indicated, however, that very light drinkers were less price-responsive than moderate drinkers (Manning *et al.* 1995). As usual, self-reported consumption was lower than the sales data (Rehm 1998), but under-coverage can be expected to have a limited impact on change in consumption, as it occurs in a similar way in the baseline and follow-up surveys.

In line with the intervention, the findings showed a rapid increase in spirits consumption, mainly in men and light drinkers. The evolution of the consumption of spirits requires further investigation. Impulsive consumption due to presumed bargain opportunities may have been responsible for the early increase. Although drinking patterns and preferences may change, established drinking habits are likely to limit the increase, at least in middle-aged or older men. Evidence of a decrease in consumption from the 'gin epidemic' in England in the 18th century indicated that the effect of price changes was short term, lasting only a year (Warner *et al.* 2001). The rise in consumption may be followed by a decrease therefore also in Switzerland. This seems especially likely in conditions of decreasing consumption over a longer period, as changes in prices may be widely independent of changes in cultural factors. Results from the 'gin epidemic' study may be inapplicable to the present case, as it was an aggregate-level study in a very different time and context. For instance, because of the continuing decrease in alcohol consumption, an alternative hypothesis for further research could be that the price reduction in Switzerland brought about a permanent increase in the proportion of spirits within total consumption despite a continuing downward trend in total consumption. This could mean in the long and medium terms a relative, not an absolute, increase in consumption of spirits.

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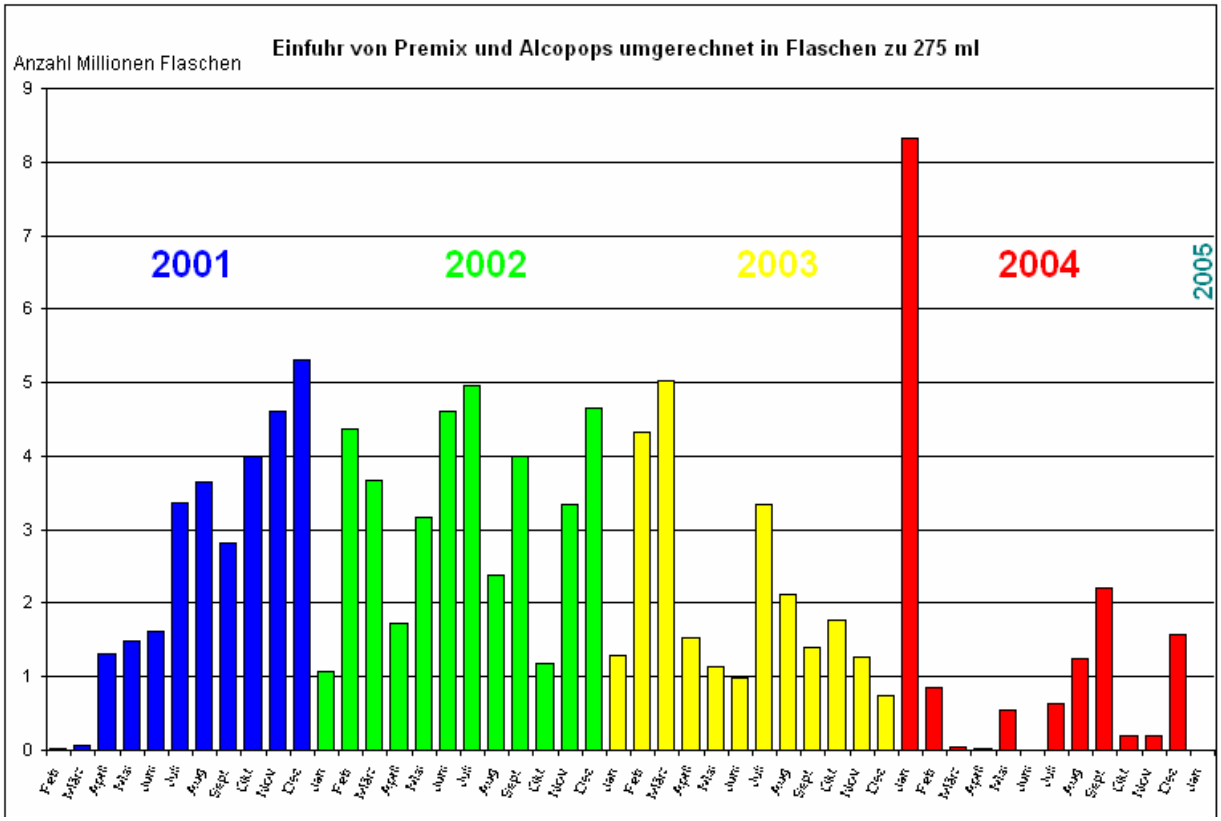
Several studies have confirmed how alcohol consumption can be influenced by playing on the price/demand fluctuation. This kind of prevention must be even more effective when it is aimed at children and juveniles who do not have the same financial resources as adults do. The Swiss special tax on alcopops is once again proof of this effect.

In 2004, imports declined to 16 million bottles, while 2002 was a record year with 40 million bottles of alcopops. It is due to this special tax, that the traditional alcopops which tasted very sweet have disappeared from the market.

The largest quantity of alcopops sold nowadays in bars, restaurants or by retailers, are products having a new recipe with less sugar (for which they are not specially taxed), but also less sweet in taste. These substitutes are definitely not a market success.

Import of premix and alcopops calculated in bottles of 275 ml, 5,6 % vol
Millions of bottles



This graph shows quite clearly the influence of tax on the alcopops market. The special tax rate came into effect on 1 February 2004. Previously it was 45 centimes, and after 1 February 2004, it was fixed at CHF 1.80 for a bottle containing 275 ml and 5.4% by volume of alcohol. Therefore the industry cleared its stock during December 2003, and restocked it with over 8 million bottles only in January 2004, knowing well that the price has a great impact on the market. Hence, they did not have to produce alcopops for the months ahead. In summer 2004, the alcohol industry introduced new alcopops (with less sugar) on the market. That way they could avoid paying the special tax. (See also the enclosed relevant special tax law article at the end of this text).

However, as you can see on the graph above (including the alcopops with less sugar), and as it is also evident from newspapers reports, these products did not have the same success as the originally-launched alcopops.

So we can see that the special tax did have an effect on the market, but the market nevertheless tries to find loopholes in the law.

Taxation

According to Article 23bis paragraph 2bis of the Alcohol Law (SR 680), alcopops are subject to a special tax. The tax is raised by 300 percent for sweet alcoholic drinks containing less than 15 percent by volume of alcohol and at least 50 grams sugar per litre, expressed as invert sugar, or an equivalent sweetening and reach the market mixed and ready-for-consumption in bottles or other containers. The special tax is CHF 116 per litre of pure alcohol.

Einfuhr von Premix und **Alcopops** (Hektoliter reinen Alkohols) in den Jahren 2000 bis 2015

SUCHT | SCHWEIZ

Quelle: Eidgenössische Alkoholverwaltung (EAV) (2016). *Jahresbericht 2015.*