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Alcohol in moderation

Market potential for low alcohol wine before and after excise tax increase

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Abstract

Purpose: *The study examines the market potential for low and very low alcohol wine products under two different tax regimes. The penetration and market share of low alcohol wine are estimated under both tax conditions. Consumers' alcoholic beverage purchase portfolios are analysed and those products identified, which are jointly purchased with low alcohol wines. The effect of a tax increase on substitution patterns between alcoholic beverages is examined.*

Methodology: *In a discrete choice experiment, based on their last purchase, consumers select one or several different alcoholic beverages into a purchase basket. An experimental design controlled the beverages' price variation. Applying an intra-individual research design, respondents' purchases were simulated under current and increased taxes.*

Findings: *A market potential for low and very low wine products of up to ten percent of the wine market volume is estimated under the current tax regime. Between six to eight percent of consumers are expected to adopt low alcohol wine alternatives as part of their alcoholic beverage portfolio. Consumers of cask wine and light beer are more likely and consumers of medium-full strength beer and spirits are less likely to buy low alcohol wine. Although the absolute number of items per purchase of low alcohol wine decreases under higher taxes, its relative market share rises.*

Practical implications: *The study provides the wine industry with estimates on the expected demand potential for low alcohol wine and identifies those alcoholic beverage consumers, who are most likely to adopt them. Thereby it contributes towards the wine industry's required response to the WHO reduction in alcohol consumption strategy, demanding the development and marketing of lower alcohol strength beverages to prevent stronger industry regulation.*

Keywords: Low alcohol wine, penetration, market share, duplication of purchase, DCE

1 INTRODUCTION

Wine marketers tend to focus on the social joy and pleasure from wine consumption, its cultural value, and alleged health benefits. We tend to neglect that wine as an alcoholic beverage can have harmful effects on individuals and society. There is a vast amount of evidence on social and economic costs from harmful use of alcohol, including costs associated with road accidents, lost productivity, crime, burden of disease and healthcare expenditures as well as costs borne by family members (Skov, 2009, Collins and Lapsley, 2008). Although wine consumers have a lower incidence of binge drinking than beer and RTD consumers (Srivastava and Zhao, 2010), wine is still part of alcohol misuse. Of those Australians, who drank at risky and high risk levels, 78% of females and 40% of males consumed wine or sparkling wine (MacAvoy, 2010).

1.1 Anomalies of value based wine taxation in Australia

The problem of wine being part of alcohol misuse is compounded in Australia by its unusual tax system, which taxes wine on value as percentage of the wholesale price, rather than on a volumetric basis in cents per litre of alcohol (Anderson, 2010a). Beer, spirits and RTDs are taxed on the basis of their alcohol content, contrary to wine, with spirits and RTDs taxed at a higher rate because of the perceived greater risk of abuse.

Because of the value-based wine tax anomaly, low-value cask wine attracts little taxation while more expensive premium bottled wine attracts high levels of tax. Per standard drink, spirits are taxed at \$0.87, full-strength packaged beer at \$0.39, bottled wine by large producers at \$0.49, large producers of cask wine at \$0.05 and small producers of bottled wine at \$0.00 for direct sales, based on a rebate system (Henry, 2009). This has led to cask wine being the cheapest way to get drunk, resulting in enormous social and health problems, particularly in Australia's aboriginal communities in the Northern Territories, where the per-capita alcohol consumption is 50% higher than the Australian average and likelihood of dying from alcohol is ten times the national rate (Skov et al., 2010). Therefore, the Australian Medical Association has requested to ban cask wine in the Northern Territories (Campanella, 2010).

As a consequence, a comprehensive review of the Australian tax system (Henry, 2009) has recommended wine to be taxed on a volumetric basis and that all alcoholic beverages be taxed to the same extent per litre of alcohol. Although the Australian government refrained from changing the taxes at this point in time because of the current wine glut, a future tax equalisation is very likely (Anderson, 2010b).

1.2 Consequences from the WHO strategy to reduce harmful use of alcohol

Even though Australia has somewhat unique circumstances, the quest for moderate alcohol consumption has become of global importance (Rehm et al., 2009). Reducing or limiting the level of harm from alcohol consumption has been the focus of government intervention, national alcohol taxation and licensing regulations across many countries (Freebairn, 2010, Pogue and Sgontz, 1989). The currently approved Global Strategy of the World Health Organization (WHO) 'To Reduce the Harmful Use of Alcohol', which is currently implemented by the member states, has further fuelled worldwide interest in this topic (WHO, 2010). From the wine industry's perspective this global strategy deserves special attention as it includes a number of very restrictive recommendations in the areas of alcohol availability, marketing of alcoholic beverages and pricing policies (Grant, 2010).

Before the WHO might implement restrictive actions, there is a time window until 2013, when progress on the WHO strategy has to be reported to the World Health Authority (WHA). The alcohol industry is requested to contribute to this progress by considering effective ways to prevent and reduce the harmful use of alcohol, including self-regulatory actions and initiatives. Among several potential measures to be taken by the alcohol industry, Grant (2010) stresses the need to develop and market new products of high quality with lower alcohol strength to enhance consumer choice for lower alcohol alternatives.

There are two reasons, why low alcohol alternatives are of particular importance for the wine industry. First, different from many national regulation bodies, the WHO does not distinguish between wine and other alcoholic beverages; it is only the volume of alcohol that counts to them. Second, following a quest for riper fruit and more expressive taste profiles, Australia and other countries have seen a strong increase in the alcohol strength in wine, which has considerably contributed to the rise of per capita alcohol consumption (Chikritzhs et al., 2010). The wine industry has the choice between acting now by helping to decrease alcohol consumption or waiting for rigorous regulations, similar to that of the tobacco industry.

1.3 Research Questions

In the context of the global interest in low alcohol alternatives and potential tax increases for wine in Australia and internationally, the study addresses three research questions:

- 1) What is the market potential for low alcohol wine beverages under the current alcohol tax system? The expected penetration and market share would provide wine companies with a basis for product development and marketing planning.
- 2) Which other alcoholic beverages is low alcohol wine competing with? From a public health perspective it would be desirable if low alcohol wine could substitute for high strength alcoholic beverages. Accordingly, this question addresses which other alcoholic beverages consumers are likely to give up for low alcohol wine products.
- 3) What is the expected short-term effect of a wine excise tax increase on the demand for low alcohol wine beverages? To assess the efficacy of a potential excise tax increase, it is important to know, if the market potential for low alcohol wine will increase and how competitive positioning within alcoholic beverages will be affected.

2 MATERIALS AND METHODS

Because low alcohol wines are currently unavailable in Australia, a stated preference approach in form of a discrete choice experiment (DCE) was chosen as an appropriate research method. DCEs were previously shown to result in wine market forecasts of high external validity (Mueller et al., 2010).

2.1 Specification of last purchase of alcoholic beverages

To set respondents' frame of mind into a realistic purchase situation and to achieve valid responses in the purchase simulation, respondents were first asked to detail their last off-premise purchase of alcoholic beverages by number of items bought and prices paid per product category. Ten product categories were chosen to represent products offered in liquor stores in Australia. The categories were those listed in Table 1, except for the highlighted currently unavailable low alcohol wine beverages. In the survey, respondents could access a detailed description of the product categories with a graphical product example (Appendix 1).

2.2 Low alcohol wine alternatives

Four low alcohol wine alternatives were selected for the experiment and differed in the alcohol strength (6% vol and 9%vol) and pack size (1L and 4L cask wine). An alcohol content of 9% vol is the lowest concentration required to be labelled as ‘wine’ under current EU wine market regulations (EC 479/2008) with certain exemptions for certain regional styles. The minimum required alcohol content under Australian and New Zealand Food Standard is currently 8% vol, with a request pending to reduce it to 4.5% (FSANZ, 2011). Under current regulation, wine containing less alcohol (e.g. 6%) has to be labelled as wine product or wine based beverage to comply with food standards, but is expected to fall under the wine category after a revision of the minimum alcohol content. For the experiment the label ‘very low alcohol wine-juice product’ was chosen to clarify the nature of this currently unavailable product to consumers.

As detailed in the introduction, public health researchers suggest that of all wine products cask wine is most likely to be abused for harmful drinking and would increase significantly in price after tax reform changing from a value based to volumetric based wine tax. As a consequence, low alcohol bag in box wine alternatives in sizes of 1 Litre and 4 Litre were included in the experiment, to test their ability to replace the purchase of full strength cask wine.

2.3 Discrete choice experiment

After specifying their last purchase, respondents completed eight sets of a discrete choice experiment (Louviere et al., 2000) at prices under the current tax regime. Respondents were asked to think back about their last purchase and to indicate how many of each of the items they had bought then, would they buy, if they had faced the alternatives and prices specified in each scenario. The four low alcohol wines were included as alternatives available to respondents, which were highlighted as products new in the market (see Appendix 2). The alcohol level of each alternative was specified and the total cost of the purchase basket they had chosen was provided to respondents.

Table 1: Average prices of product alternatives and alcohol levels in discrete choice experiment

	Alcohol %vol	Average price before tax increase	Average price after tax increase	Price increase in %
Bottled premium wine	13	\$ 10,99	\$ 14,99	36
Cask wine 4L	13	\$ 13,99	\$ 37,99	172
Cask wine 2L	13	\$ 11,99	\$ 24,99	108
Cask wine 1L	13	\$ 5,49	\$ 14,99	173
Low alcohol wine 4L	9	\$ 13,99	\$ 19,99	43
Low alcohol wine 1L	9	\$ 5,49	\$ 9,99	82
Very low alcohol wine-juice product 4L	6	\$ 13,99	\$ 15,99	14
Very low alcohol wine-juice product 1L	6	\$ 5,49	\$ 7,99	46
Light beer 6 pack	3	\$ 7,50	\$ 7,50	0
Light beer case 24	3	\$ 29,99	\$ 29,99	0
Mid-full strength 6 pack	5	\$ 10,25	\$ 10,25	0
Mid-full strength beer case 24	5	\$ 40,99	\$ 40,99	0
RTD 6 Pack	5	\$ 19,99	\$ 19,99	0
Spirits 700mL	40	\$ 32,99	\$ 32,99	0

To examine complementary consumption and substitution of alcoholic beverages, the prices of the fourteen alternatives varied on average by 35% around the average market price at the time of the study. Average prices for all 14 alternatives are provided in Table 1. The price variation was controlled independently for each alternative¹ by an orthogonal main effects plan with four price levels per alternative (4¹² in 64 sets, blocked into 8 versions of 8 choice scenarios per respondent). Consumers' choices under the current prices provide answers to the first and second research questions regarding market share and penetration of low alcohol wine beverages and their competition with other alcoholic beverages.

Next, respondents were informed about governmental plans to change the excise tax for some alcoholic beverages, which would impact on their prices. Respondents then received eight scenarios where the prices of the alternatives varied around new average prices (see second column to the right in Table 1). These price increases for wine beverages reflect those planned by the Australian government under excise tax equalisation. Consumers' choices in the second part of the DCE provide answers to the third research question regarding the short-term effect of an excise tax increase on the demand for low alcohol wine beverages.

2.4 Consumer sample

A total of 704 respondents were recruited in April 2010 through a reputed online panel provider, actively managing 400,000 panellists to be representative for Australian consumers. To qualify, respondents had to be of legal drinking age, were not allowed to work in wine or market research and had to drink alcohol at least occasionally. Appendix 4 provides an overview of sociodemographic and alcoholic beverage consumption sample characteristics, which is representative of the Australian population.

2.5 Analysis

Consumers' choices represent their typical purchase baskets of alcoholic beverages under varying price conditions. The penetration of each alcoholic beverage type and its market share were calculated over all respondent choices (8 per respondent, total of n=5,632) separately for both tax regimes.

To address the second research question a duplication of purchase analysis was undertaken, to identify which other alcoholic beverages low alcohol wines are mainly competing with. Duplication of purchase analysis has previously been applied to wine by Romaniuk and Dawes (2005). The Duplication of Purchase Law works on the premise that products in a category are typically substitutable, and that this 'substitution' is directly proportional to their penetration (Ehrenberg and Uncles, 1999). That is high market share products are expected to compete more closely with other high share than with small market share products.

Deviations from the Duplication of Purchase Law are known to exist, where products share more or fewer buyers than expected. Where such excess (or under) sharing occurs, the market is deemed a 'sub-market' or a 'partitioned' market (Sharp and Sharp, 1997). Such partitions are likely if products of a category share some 'functional' differences and cater for different needs, such as leaded and unleaded petrol (Ehrenberg and Uncles, 1999). As alcoholic beverages differ in their alcohol strength, the raw materials they are based on and to some degree in their consumption occasions, we would expect that partitions between alcoholic beverages exist, which limit the degree consumers substitute them (Ehrenberg, 1988). Consequently, the duplication of purchase analysis can establish to what degree light wine alternatives are able to substitute other alcoholic beverages.

¹ Only the prices of beer cartons and beer 6 packs were allowed to be related with each other.

3 RESULTS

3.1 Market potential for low alcohol wine alternatives under current tax regime

Penetration measures in Appendix 4: Penetration, market share, number of items per purchase before and after excise tax increase sorted by decreasing penetration

represent the share of respondents, who across their eight purchase scenarios choose a beverage category at least once. Measures of market share in Appendix 4: Penetration, market share, number of items per purchase before and after excise tax increase sorted by decreasing penetration

represent the share of items of each beverage type over all items chosen, but do not correct for different volume sizes; only item-based market share is measured. Volume based market shares for all wine beverages are provided in Table 2.

Not surprising for products new to the market, all low alcohol wine beverages had the lowest penetration and market shares under the current tax regime. The penetration of low alcohol 4 Litre casks was slightly higher (8%) than around 6% for the other low alcohol alternatives. Low alcohol wine products show the lowest share of consumers buying more than one item per purchase, concurring with the double jeopardy law (Ehrenberg et al., 1990); according to which products with low market share have consumers, who purchase these products less often. Between 2.3% to 3.2% of respondents purchase at least one item of low alcohol wine within their average purchase basket.

All low alcohol wine alternatives reach about 1% market share of items chosen, not considering their different volume sizes (Appendix 4: Penetration, market share, number of items per purchase before and after excise tax increase sorted by decreasing penetration

). Correcting for different pack sizes, Table 2 lists volume based market shares adding up to 100% over all wine products. Because of its higher volume, low alcohol 4 Litre cask wine reaches 5.9% volume share in the wine market, taking the third position after the two largest categories, bottled premium wine and 4L cask wine. The very low alcohol wine-juice product in 4L casks reaches a volume based market share of 4.6%, which is surprisingly ahead of 1L full strength cask wine.

Table 2: Market share of wine products at current tax and after tax reform – standardised for package volume

	Market share in % (volume)	
	Current tax regime	After tax reform
Bottled premium wine	48.8	60.9
Cask wine 4L	29.6	6.2
Cask low alcohol wine 4L	5.9	12.2
Cask wine 2L	5.7	2.4
Cask very low alcohol wine-juice product 4L	4.6	10.0
Cask wine 1L	2.7	3.0
Cask very low alcohol wine-juice product 1L	1.5	2.7
Cask low alcohol wine 1L	1.3	2.6

Table 3: Number of alcoholic beverage items in basket (chosen per choice set)

	Under current tax	After tax reform
Mean	3.40	2.39
Standard deviation	3.41	2.30

3.2 Duplication of purchase – potential to substitute other alcoholic beverages

Consumers of alcoholic beverages are known to jointly purchase a repertoire of different beverage categories (Dawes, 2008, Mueller et al., 2011). In their choices under the current tax regime, respondents on average choose 3.40 different alcoholic beverages in one purchase basket in each scenario. There was considerable variation between respondents, suggesting that consumers vary in the size of their portfolio (Table 3). Those items, which are purchased jointly by consumers can be analysed for the existence of substitution patterns. A duplication of purchase analysis examines the degree to which products within the alcohol beverage category share their buyers with each other alcoholic beverage (Sharp, 2010).

A duplication of purchase analysis was conducted for each alcoholic beverage item, calculating the share of its consumers who also choose other product alternatives. The percentage of consumers also purchasing another product is called *duplication*. The duplication of purchase table in Appendix 5 provides the proportion of a product's consumers, who also bought another particular product during their eight choices.² For instance of those 64% of consumers, who chose bottled premium wine, 24% also purchased 4L cask wine; 7% also choose 4L low alcohol wine and 41% also choose spirits (first row in Appendix 5). The diagonal cells are a product's level of consumer overlap with itself (100%) and are blanked out.

According the duplication of purchase law, consumers of an alcoholic beverage would be the more likely to also consume another product, the higher the penetration of this product is. Consequently, the '*expected duplication*' can be calculated for each product by multiplying the individual penetration figures by the theoretical Duplication Factor. The Duplication Factor D is calculated from the ratio of the average penetration to the average duplication (Ehrenberg, 1988). This coefficient basically indicates how likely a buyer of a category is to buy another product (Dawes et al., 2009). For eight simulated purchases of alcoholic beverages, the duplication coefficient was 1.09 under the current tax system. The bottom line in Appendix 5 indicates the percentage of consumers purchasing each column product that would be expected if all products would substitute each other perfectly.

A significant deviation³ of the observed duplication from the expected value indicates a limited ability for substitution between alcoholic beverages, also called a market partition (Dawes and Nenycz-Thiel, 2011). Positive deviations indicate groups of alcoholic beverages whose consumers overlap more than expected. Thus, these products are above average substitutes. On the other hand, alcoholic products with unusually low overlap in their consumer base suggest a division in the market in form of consumer segments, who purchase distinct groups of products which either are not or to a small degree substituted for each other.

Appendix 6 shows the deviations of observed duplication from the expected value for each product combination. Deviations are highlighted depending on their direction (positive deviation in green and negative in red) and size (25%, 50% and 100% deviations in agreement with Mansfield and Romaniuk (2003)). For example, bottled premium wine was shared with all other alcoholic beverages at about the expected rate, except for 4L very low alcohol wine-juice products, mid-full strength beer cases and RTDs, which are less frequently part of the portfolio of bottled premium wine consumers.

² In duplication of purchase tables, products are usually sorted by decreasing market share. To allow an easier interpretation of the deviations, similar alcoholic beverage types were grouped together.

³ The statistical significance of partitions is assessed using a permutations method which indicated that duplication coefficients of less than 5 percent are likely to occur due to random sampling variation (for further details see Dawes and Nenycz-Thiel, 2011).

Bottled versus bag in box wine

Generally we can observe a large area of positive deviation in the centre of Appendix 6, indicating substitutive relationships for full and lower alcohol strength wine packaged in bag in box (casks). This suggests that consumers who purchase any cask wine products are more likely to substitute these against other cask wine products. These products seem to be clearly distinct (partitioned) from bottled wine for those consumers who purchase bag in box wine.

Normal strength versus low alcohol wine

The second major observation relates to the substitution of normal and light wine products. Bottled premium wine consumers are slightly less likely to purchase any low alcohol wine alternative and this deviation is significant for 4L very low alcohol wine-juice products. Consumers of full strength wine casks are significantly more likely to purchase low alcohol alternatives. The deviations are strongest for consumers buying 1L and 2L cask wine and smaller for consumers of 4L cask wine.

For instance, of those who purchase 1L cask wine, 20% also choose 1L low alcohol wine (13% more than the 7% expected from product penetration) and 19% also choose 1L very low alcohol wine-juice products (12% more than the 7% expected). Not surprisingly, we find these deviations mirrored in that consumers of all low alcohol wine alternatives are more likely to also consume full strength cask wine. For instance 40% of those consumers, who choose 1L low alcohol wine, also purchase 1L full strength cask wine, more than three times of what would be expected (27% positive deviation from expected 13%). These strong and consistent positive deviations suggest that there is a substitutive relationship between full strength and low alcohol cask wine.

Low alcohol wine versus other alcoholic beverages

Consumers, who purchase light beer, are significantly more likely to also buy low alcohol wine products. The deviations are particularly consistent and strong for buyers of light beer in 6 packs, suggesting that they are rather occasional than regular light beer consumers. Buyers of light beer cases are more likely to also buy very low alcohol wine-juice products in 4L casks, suggesting that higher volume containers are preferred by these consumers, as a similar higher than expected duplication can also be observed for 4L and 2L cask wine.

Consumers, who buy mid-full strength beer cases, spirits and to some degree RTDs, are less likely to adopt low alcohol wine products. The same pattern was found for the opposite direction – those consumers, who choose low alcohol wine alternatives are significantly less (about half as) likely to also purchase mid-full strength beer cases and spirits. There are a number of potential reasons for this. First, there is a general partition between wine based and other alcoholic beverages. Wine consumers are generally less likely to buy mid-full strength beer cases, spirits and RTDs, and RTD buyers are less likely to also buy wine. Second, there is a potential partition by alcohol consumption intensity. Those who either purchase small light or mid-full beer six packs are less likely to also have mid-full strength beer 24 casks and spirits as part of their purchase portfolio.

3.3 Effect of excise tax increase on penetration, market share and competition

The effect of the tax equalisation between wine and other alcoholic beverages on consumer choice cannot be discussed here in full detail. Generally consumers reacted very strongly to the price increase (Table 1) of bottled wine and cask wine, considerably decreasing their choice in the simulated purchase, almost keeping purchase budgets constant.

Penetration and market share

The right side of Appendix 4 details the nominal reduced penetration, market share and items per purchase basket for all wine based products and Table 4 provides these changes as percentages. Surprisingly, on an absolute level, the average number of items chosen in each purchase simulation decreased for all products, except for beer in six packs and spirits (see Table 4) and particularly light beer six pack choice increased.

Although consumers did not buy more low alcohol wine on an absolute level, its relative market share within a typical purchase basket increased. Table 4 lists the relative increase in market share between both tax regimes and Table 2 shows the volume based market share for wine beverages before and after the tax change. While the volume based market share of 4L cask wine reduces from 30% to 6%, that of low alcohol 4L cask wine more than doubles to 12% under higher taxes.

Table 4: Change in market share, items per purchase and penetration due to increase of excise tax on wine

	Change in %			
	Market share*	Average items per purchase	Number of consumers buying one item	Number of consumers buying several items
Bottled premium wine	-23,5	-46,2	6,7	-45,3
Cask wine 4L	-87,1	-91,0	-68,5	-88,2
Cask wine 2L	-74,9	-82,3	-75,1	-95,2
Cask wine 1L	-33,3	-53,2	-44,6	-64,9
Cask low alcohol wine 4L	27,1	-10,7	-11,0	-15,0
Cask low alcohol wine 1L	28,8	-9,5	14,7	-34,5
Cask very low alcohol wine-juice product 4L	34,0	-5,8	-8,3	0,0
Cask very low alcohol wine-juice product 1L	13,0	-20,6	-11,5	-22,6
Light beer 6 pack	70,1	19,6	-3,4	27,8
Light beer case 24	38,3	-2,8	-5,0	1,1
Mid-full strength 6 pack	43,1	0,6	2,7	0,0
Mid-full strength beer case 24	31,0	-7,9	-5,7	-15,3
RTD 6 Pack	26,5	-11,1	-9,4	-15,5
Spirits 700mL	43,2	0,6	-3,2	5,0

*Market share is item not volume based. For volume based market shares of wine products see Table 2.

Competition between alcoholic beverages

In Appendix 7 respondents' shared purchase of alcoholic beverages under the new tax regime is shown and Appendix 8 provides the deviations from the expected duplication. Given that consumers had fewer items in their purchase basket (Table 3), it is not surprising that the Duplication Factor decreased from 1.09 to 0.87 under the new tax. Overall, fewer significant deviations can be observed for respondents' simulated choices under increased taxes and the general pattern in Appendix 8 seems similar to that under the old price system in Appendix 6.

Nevertheless, a number of changes to the degree consumers substitute and jointly buy alcoholic beverages appear under the new tax regime:

- 1) Although buyers of full strength cask wine are still more likely to buy low alcohol wine (4L and 1L) and very low alcohol wine-juice products in 4L casks, there is now a negative deviation for the 1L very low alcohol wine product, suggesting that it is less often purchased by cask wine consumers. Agreeing with this, 1L very low alcohol wine has the

strongest drop in average number of items purchased and the lowest increase in relative market share of all low alcohol wine alternatives. The higher relative price increase for 1L over 4L due to the tax reform is the most likely reason for this observation, suggesting that consumers strongly react to price differentials.

- 2) All full strength cask wine consumers, particularly those of 4L casks, are more likely to have light beer as part of their portfolio than before the tax increase. This suggests that the higher prices for cask wine after the tax reform make consumers substitute for it with light beer.
- 3) Similarly, for all full and low-strength cask wine consumers, the likelihood to also purchase mid-full strength beer in 6 packs or cartons increased; the deviations turned from negative to positive. The same is confirmed by the duplication of mid-full strength beer 6 packs and low alcohol wine. Agreeing with both prior observations, consumers of cask wine increase their share of mid-full strength beer in their portfolios.
- 4) There is now a stronger duplication across full strength cask wines, the larger 4L and 2L sizes are particularly likely to be part of the portfolio with 1L cask wine. This suggests that buyers of higher volume sizes deviate to smaller casks, whenever these are offered at lower prices. Price seems to become more important than volume preferences under the new tax system.
- 5) Interestingly, the duplication of low and very low alcohol wines shrank and now is strongest for products of the same volume size. That is, 4L low alcohol and 4L very low alcohol wine products are more likely to be in the same portfolio as are 1L low alcohol and 1L very low alcohol wine products. It seems that package size became more important for light wines.
- 6) For spirits, the likelihood to be part of the purchase portfolio of consumers buying bottled wine, 1L full strength, low and very low alcohol wine as well as of light and mid-full strength beer increased. This tendency towards this higher concentrated alcoholic beverage is confirmed by a small increase of those consumers buying more than one item of spirits and the slight increase in the average number of spirits chosen per purchase simulation (Table 4).

4 CONCLUSION AND IMPLICATIONS

The study identified a small market potential for low and very low alcohol wine of jointly up to 10% of the wine market volume under the current tax regime. Six to eight percent of Australian alcoholic beverage consumers can be expected to include low alcohol wine as part of their purchase portfolio. Particularly, consumers of full strength cask wine and light beer are likely to adopt low alcohol wine, while buyers of medium-full strength beer cases, spirits and RTDs are less likely to purchase these low alcohol wine products.

After an Australian tax reform equalising excise tax across alcoholic beverages, consumers can be expected to strongly reduce their purchase of wine, with high volume cask wine being the most affected. Under the new tax, consumers increasingly trade down to smaller cask wine volume sizes. Low alcohol wine alternatives, for which taxes would increase at a smaller scale, are less negatively affected. Although their absolute volume decreases, their relative share of the wine beverage market would increase significantly. While consumers were observed to keep the budget of their alcohol purchase basket under higher taxes almost constant to that under the old tax regime, it is unclear to what extent this budget effect will be compensated by increasing their shopping frequency or by longer term adaptation to the higher prices.

The excise tax increase for wine will have some effect on how alcoholic beverages compete with each other. Although we found some degree of market partition into wine-based beverages and other beverages (beer and spirits) under the current tax, consumers of cask wine will more strongly substitute it with light beer, mid-full strength beer in small packs and to a lesser extent with spirits after the tax increase. While a substitution by beer could potentially level or decrease total alcohol consumption, it would be a concern for public health policy, if cask wine consumers compensated their reduced wine consumption by consuming more highly concentrated alcohol products.

Our experiment suggests that tax increases have a strong effect on the average basket size of consumers purchasing alcoholic beverages. Particularly high volume items with nominal high prices are over proportionally affected. While this could be interpreted as a feasible way to reduce alcohol consumption, care has to be taken because it is unknown to what degree consumers might increase their shopping frequency or adapt the higher prices as with petrol.

This study has identified a small acceptance of low alcohol wine, which was only based on expectations about the product ((Meillon et al., 2010b, Meillon et al., 2010a, Masson et al., 2008), as consumers could not taste the currently unavailable products. Two implications follow from this. First, wine producers should increase their current investment into the development of viable low alcohol wine alternatives, which meet consumers' sensory preferences. When consumers have a chance to actually experience these products, they will be given the opportunity to potentially overcome their mainly negative expectations. Second, once these products are better known, it is more likely that they will be substituted for full strength cask wine in the case of a tax equalisation. By offering a viable alternative product, wine producers would be less affected by the inevitable reduction in wine demand and substitution to beer in the case of excise tax equalisation.

5 LIMITATIONS AND FUTURE RESEARCH

The study has a number of limitations. The purchase simulations under the new tax regime are only able to measure the immediate effect of an 'unexpected' tax increase. In a realistic setting, consumers are likely to adapt slowly to higher wine prices and to decrease their strong price sensitivity over time. On the other hand, wine consumers are very likely to hoard wine, when the introduction of a new tax regime is announced. As cask wine can be stored for several months and bottled wine even longer, this will have a major impact on initial sales after the tax increase, slowing down the recovery.

The experiment was limited to low alcohol wine in casks and future research should test the acceptance of bottled low wine alternatives. In the experiment we only measured the size and content of a purchase basket under different price conditions but not the frequency of how consumers are shopping for alcoholic beverages. The fact that consumers tended to keep their budget per purchase constant after the tax change by adjusting the number of items purchased suggests that they might compensate by shopping more frequently. This suggestion is strengthened by previous research measuring the demand for alcoholic beverages as relatively price inelastic. While the relative market shares estimated under the new tax regime are a good indication for the relative proportion of alcoholic beverages purchased, the absolute volume after the tax increase is not predictable from this study.

While we offered consumers low alcohol alternatives, which were new to the market, respondents could not actually taste them to evaluate their liking. Future research should identify those sensory properties, which increase consumer acceptance of low and very low alcohol wine alternatives. Consumers' choices were measured as stated preferences without

incentive compatibility. By framing choices in terms of consumers' last purchase, we tried to maximise external validity and the high resulting price sensitivity suggests that this attempt was successful. Future research should validate these findings with actual purchase data before and after actual tax reforms.

Appendix

Appendix 1: Respondent information on choice alternatives

Details of items in each scenario are described below.

<p>1. Cask wine 4 litre</p> <p>Wine in a 4 litre cask (e.g., Coolabah 4 litre cask wine)</p> 	<p>2. Cask wine 2 litre</p> <p>Wine in a 2 litre cask (e.g., Yalumba 2 litre cask wine)</p> 	<p>3. Cask wine 1 litre</p> <p>Wine in a 1 litre cask (e.g., Long Flat 1 litre cask wine)</p> 	<p>4. Ready to drink, pre-mixed beverages in pack of 6</p> <p>Ready to drink, pre-mixed alcohol beverages in a pack of 6 cans (e.g., UDL)</p> 	<p>5. Bottled premium wine</p> <p>Wine sold in bottles (e.g., 750ml Rosemount)</p> 
<p>6. Light beer case of 24</p> <p>Low alcohol beer up to 3% sold in a case of 24 (e.g., 4 X 6 packs of Cascade Light)</p> 	<p>7. Mid to full strength beer case of 24</p> <p>Mid to full strength beer above 3% sold in a case of 24 (e.g., 4 X 6 packs of VB)</p> 	<p>8. Light beer pack of 6</p> <p>Low alcohol beer up to 3% sold in a pack of 6</p> 	<p>9. Mid to full strength beer pack of 6</p> <p>Mid to full strength beer above 3% sold in a pack of 6</p> 	<p>10. Spirits 700ml bottle</p> <p>Spirits sold in bottles (e.g., Smirnoff Vodka)</p> 

Appendix 2: Example for choice set (here at priced before an excise tax increase)

Scenario 1 of 8

Thinking back to your **last purchase**. Please evaluate the list of beverage types and prices, and select the number of units of each type you would have purchased if they had been available.

To review details of each item, please [click here](#).

Please select the number of units by using the tick boxes.

Item Name	Alcohol	Price (\$)	Unit(s)
Cask wine 4 litre	13%	16.99	0 <input type="text"/> cask(s)
Cask wine 2 litre	13%	8.99	0 <input type="text"/> cask(s)
Cask wine 1 litre	13%	3.99	0 <input type="text"/> cask(s)
Ready to Drink, pre-mixed beverages pack of 6	5%	22.99	0 <input type="text"/> pack(s)
Bottled premium wine	15%	11.99	0 <input type="text"/> bottle(s)
Light beer case of 24	3%	30.99	0 <input type="text"/> case(s)
Mid to full strength beer case of 24	5%	43.99	0 <input type="text"/> case(s)
Light beer pack of 6	3%	7.75	0 <input type="text"/> pack(s)
Mid to full strength beer pack of 6	5%	11.00	0 <input type="text"/> pack(s)
Spirits 700ml bottle	40%	29.99	0 <input type="text"/> bottle(s)
* Cask low alcohol wine 4 Litre	9%	16.99	0 <input type="text"/> cask(s)
* Cask low alcohol wine 1 Litre	9%	3.99	0 <input type="text"/> cask(s)
* Cask very low alcohol wine-juice product 4 Litre	6%	16.99	0 <input type="text"/> cask(s)
* Cask very low alcohol wine-juice product 1 Litre	6%	3.99	0 <input type="text"/> cask(s)

* New in market

Total Cost: \$ 0.00

Appendix 3: Sample composition (n=704)

Characteristic	Criteria	Share in %
Gender	Male	49
	Female	50
Age	18-29	23
	30-44	31
	45-59	29
	60+	17
State	New South Wales	32
	Victoria	25
	Queensland	20
	Western Australia	10
	South Australia	8
	Tasmania	2
	Northern Territories Australian Capital Territory	1
Consumed at least once last month	Bottled wine	75
	Spirits	62
	Regular beer	56
	RTDs	42
	Light beer	35
	Cider	32
	Cask wine	27

	Consumption frequency alcoholic beverages				Total
	less than once per month	once or twice a month	once a week	more than once a week	
Alcohol general	11.8	21.0	22.2	45.0	100
Bottled wine	24.6	36.8	17.8	20.9	100
Spirits	38.2	34.8	14.9	12.1	100
Regular beer	43.8	28.6	10.7	17.0	100
RTDs	58.2	26.3	11.4	4.1	100
Light beer	64.6	21.6	7.8	6.0	100
Cider	78.3	15.6	3.8	2.3	100
Cask wine	73.2	13.9	4.4	8.5	100

Appendix 4: Penetration, market share, number of items per purchase before and after excise tax increase sorted by decreasing penetration

	Current tax regime					After tax reform				
	Pene- tration in %	Market share in %	Average purchase basket			Pene- tration in %	Market share in %	Average purchase basket		
Average number of items			Percentage buying one item	more than one item in %	Average number of items			Percentage buying one item	more than one item in %	
Bottled premium wine	64.2	45.6	1.55	18.6	29.7	52.7	34.9	0.83	19.9	16.3
Spirits 700mL	46.2	11.4	0.39	24.2	6.4	45.2	16.3	0.39	23.5	6.7
Mid-full strength beer case 24	31.8	7.1	0.24	16.8	3.1	26.6	9.3	0.22	15.9	2.6
RTD 6 Pack	31.4	8.0	0.27	12.7	5.0	26.7	10.1	0.24	11.5	4.2
Mid-full strength 6 pack	26.8	7.9	0.27	10.4	6.5	25.0	11.4	0.27	10.7	6.5
Cask wine 4L	22.9	5.2	0.18	10.2	1.2	3.7	0.7	0.02	3.2	0.1
Light beer case 24	18.0	3.8	0.13	9.0	1.7	16.3	5.2	0.12	8.5	1.7
Light beer 6 pack	16.1	3.4	0.11	6.3	2.2	15.3	5.7	0.14	6.1	2.9
Cask wine 1L	12.2	1.9	0.06	3.4	1.3	7.2	1.3	0.03	1.9	0.5
Cask wine 2L	11.1	2.0	0.07	4.4	1.1	3.8	0.5	0.01	1.1	0.1
Cask low alcohol wine 4L	8.0	1.0	0.03	2.8	0.4	7.2	1.3	0.03	2.5	0.3
Cask very low alcohol wine-juice product 1L	6.4	1.0	0.04	2.2	0.6	5.5	1.2	0.03	1.9	0.4
Cask very low alcohol wine-juice product 4L	6.3	0.8	0.03	2.1	0.3	5.3	1.1	0.03	2.0	0.3
Cask low alcohol wine 1L	6.0	0.9	0.03	1.7	0.5	7.2	1.1	0.03	1.9	0.3

Penetration: Percentage of consumers who purchased at least one item in eight purchases (choice scenarios)

Market share: Share over all items chosen (not standardised for different item volumes)

Appendix 5: Duplication before tax increase: Percentage of consumers who choose row also choose column product (Duplication coefficient 1.09)

	Bottled premium wine	Cask wine 4L	Cask wine 2L	Cask wine 1L	Low alcohol wine 4L	Low alcohol wine 1L	Very alc juice 4L	low wine-prod	Very low alc wine-juice prod 1L	Light beer 6 pack	Light beer case 24	Mid-full strength 6 pack	Mid-full strength beer case 24	RTD 6 Pack	Spirits 700mL
Penetration	64	23	11	12	8	6	6	6	6	16	18	27	32	31	46
Bottled premium wine	64	24	13	10	7	6	5	6	14	17	23	26	22	41	
Cask wine 4L	23	68	16	12	12	10	11	7	20	31	19	27	24	42	
Cask wine 2L	11	74	33	19	18	13	13	12	26	31	27	33	36	50	
Cask wine 1L	12	55	23	17	13	20	15	19	33	19	33	23	26	33	
Low alcohol wine 4L	8	54	36	25	20	14	29	16	30	27	29	13	21	32	
Low alcohol wine 1L	6	60	38	24	40	19	24	33	38	31	31	33	31	24	
Very low alc wine-juice prod 4L	6	50	39	23	30	36	23	20	43	45	25	20	32	32	
Very low alc wine-juice prod 1L	6	60	24	20	36	20	31	20	47	31	27	18	29	29	
Light beer 6 pack	16	57	28	18	25	15	14	17	19	19	36	15	28	43	
Light beer case 24	18	62	39	19	13	12	10	16	11	17	18	25	28	39	
Mid-full strength 6 pack	27	56	16	11	15	8	7	6	6	22	12	21	32	35	
Mid-full strength beer case 24	32	52	19	12	9	3	6	4	4	8	14	17	22	39	
RTD 6 Pack	31	45	18	13	10	5	6	6	6	14	16	28	23	48	
Spirits 700mL	46	57	21	12	9	6	3	4	4	15	15	21	27	33	
Expected duplication	70	25	12	13	9	7	7	7	7	18	20	29	35	34	50

Appendix 6: Deviation from expected duplication in percent before tax increase (*** at least 100% deviation; ** at least 50% deviation, * at least 25% deviation)

	Bottled premium wine	Cask wine 4L	Cask wine 2L	Cask wine 1L	Low alcohol wine 4L	Low alcohol wine 1L	Very alc juice 4L	low wine-prod	Very low alc wine-juice prod 1L	Light beer 6 pack	Light beer case 24	Mid-full strength 6 pack	Mid-full strength beer case 24	RTD 6 Pack	Spirits 700mL
Penetration	64	23	11	12	8	6	6	6	6	16	18	27	32	31	46
Bottled premium wine		-1	1	-3	-2	-1	-2*	-1	-3	-2	-6	-9*	-12*	-9	
Cask wine 4L	-2		4*	-1	4*	3**	4**	0	2	11**	-11*	-8	-10*	-9	
Cask wine 2L	4	8*		6*	9***	6**	6**	5**	8*	11**	-2	-1	2	0	
Cask wine 1L	-16	-2	5*		4*	13***	8***	12***	15**	-1	3	-12*	-9*	-18*	
Low alcohol wine 4L	-17	11*	13***	6*		8***	22***	9***	13**	7*	-1	-22**	-13*	-18*	
Low alcohol wine 1L	-11	13**	12**	27***	10***		17***	26***	21***	11**	2	-1	-3	-27**	
Very low alc wine-juice prod 4L	-20*	14**	11**	16***	28***	16***		13***	26***	26***	-4	-14*	-3	-19*	
Very low alc wine-juice prod 1L	-10	-1	8**	22***	11***	25***	13***		29***	11**	-3	-17*	-5	-22*	
Light beer 6 pack	-14	3	6*	11**	6**	8***	10***	12***		-1	7	-20**	-6	-7	
Light beer case 24	-8	14**	7**	-1	3*	4**	9***	4**	-1		-11*	-10*	-6	-12	
Mid-full strength 6 pack	-15	-9*	-1	1	0	0	-1	-1	4	-8*		-14*	-2	-15*	
Mid-full strength beer case 24	-18*	-6	-1	-4*	-6**	0	-3*	-3*	-10**	-5*	-12*		-12*	-11	

RTD 6 Pack	-25*	-7*	1	-3*	-3*	-1	0	-1	-3	-3	-2	-12*	-3
Spirits 700mL	-13	-4	0	-5*	-3*	-3**	-3*	-3*	-2	-5	-9*	-8	-2

Appendix 7: Duplication after tax reform: Percentage of consumers who choose row also choose column product (Duplication coefficient 0.98)

	Bottled premium wine	Cask wine 4L	Cask wine 2L	Cask wine 1L	Low alcohol wine 4L	Low alcohol wine 1L	Very alc juice 4L	low wine-prod	Very low alc wine-juice prod 1L	Light beer 6 pack	Light beer case 24	Mid-full strength 6 pack	Mid-full strength beer case 24	RTD 6 Pack	Spirits 700mL
Penetration	53	4	4	7	7	7	5	6	15	16	25	27	27	27	45
Bottled premium wine	53	2	4	5	5	5	4	3	12	14	19	21	15	15	37
Cask wine 4L	4	27	15	27	12	12	8	0	23	27	35	31	19	19	23
Cask wine 2L	4	48	15	15	7	15	7	4	26	33	26	41	30	30	30
Cask wine 1L	7	37	14	8	14	16	8	2	25	20	29	24	16	16	37
Low alcohol wine 4L	7	37	6	4	14	10	12	4	22	20	29	12	10	10	20
Low alcohol wine 1L	7	39	6	8	16	10	6	10	33	6	29	16	14	14	31
Very low alc wine-juice prod 4L	5	43	5	5	11	16	8	8	32	24	16	8	14	14	24
Very low alc wine-juice prod 1L	6	26	0	3	3	5	13	8	23	18	10	5	10	10	31
Light beer 6 pack	15	41	6	6	12	10	16	11	8	13	37	6	19	19	33
Light beer case 24	16	44	6	8	9	9	3	8	6	12	17	18	21	21	37
Mid-full strength 6 pack	25	40	5	4	9	9	3	2	23	11	15	26	26	26	35
Mid-full strength beer case 24	27	42	4	6	6	3	4	2	4	11	14	19	19	19	34
RTD 6 Pack	27	29	3	4	4	3	4	3	2	11	13	24	19	19	41
Spirits 700mL	45	43	2	3	6	3	5	3	4	11	14	19	20	25	41
Expected duplication	46	3	3	6	6	6	5	5	13	14	22	23	23	23	40

Appendix 8: Deviation from expected duplication in percent after tax reform (** at least 100% deviation; ** at least 50% deviation, * at least 25% deviation)

	Bottled premium wine	Cask wine 4L	Cask wine 2L	Cask wine 1L	Low alcohol wine 4L	Low alcohol wine 1L	Very alc juice 4L	low wine-prod	Very low alc wine-juice prod 1L	Light beer 6 pack	Light beer case 24	Mid-full strength 6 pack	Mid-full strength beer case 24	RTD 6 Pack	Spirits 700mL
Penetration	53	4	4	7	7	7	5	6	15	16	25	27	27	27	45
Bottled premium wine		-1	0	-1	-1	-1	0	-2*	-2	-1	-3	-2	-9	-9	-2
Cask wine 4L	-19*		12**	21***	5**	5**	3*	-5**	10**	13**	13*	8	-4	-4	-16*
Cask wine 2L	2	12*		8**	1	8***	3*	-1	13**	19**	4	18**	6	6	-10*
Cask wine 1L	-9	10*	4*		7**	9***	3*	-3*	12**	5*	8*	0	-8	-8	-2
Low alcohol wine 4L	-9	3	1	7**		3**	7***	-1	8*	5*	8*	-11*	-14*	-14*	-20*
Low alcohol wine 1L	-7	3	4*	9**	3*		1	5**	20***	-8*	8*	-8	-10*	-10*	-8
Very low alc wine-juice prod 4L	-3	2	2	4*	10***	2*		3*	19***	10**	-6	-15*	-10*	-10*	-15*
Very low alc wine-juice prod 1L	-20*	-3	-1	-4*	-1	6**	3*		10**	4	-12*	-18**	-13*	-13*	-9
Light beer 6 pack	-5	2	3*	6*	4*	9***	7**	3*		-1	15**	-17*	-4	-4	-6
Light beer case 24	-2	3	4*	2	2*	-4**	3*	1	-1		-4	-5	-2	-2	-2
Mid-full strength 6 pack	-6	2	1	2	2*	2*	-1	-3*	9**	-3		-8	3	3	-5
Mid-full strength beer case 24	-4	1	3	0	-3*	-2*	-3*	-4**	-10**	-3	-7*		-4	-4	-5

RTD 6 Pack	-17*	-1	1	-2	-4*	-3*	-2*	-3*	-2	-2	3	-4	2
Spirits 700mL	-3	-1	-1	0	-3*	-1	-2*	-1	-2	-1	-3	-3	1

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