Regional consequences in Australia of wine export demand shocks and alternative wine taxes: an economy-wide approach

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Executive summary

This paper provides modeling results on the national and regional implications of two challenges currently facing the Australian wine industry: a decline in export demand for premium wines because of the economic recession in the US and other economies; and a possible change in the consumer tax on domestic wine sales following the Henry Review of Taxation.

Three model simulations were run:

- A 20 percent decline in the export demand for super-premium wine coupled with a 10 percent rise in commercial premium wine export demand;
- A follow-on change from the current ad valorem wine tax of 29 percent to a volumetric tax that raises the same tax revenue from the wine industry; and
- An alternative wine tax reform in which there is not only a switch to a volumetric tax but also a hike in the tax rate to bring that new wine tax up to the rate applying to beer.

The reason for considering these two challenges together is because the demand shock could have opposite regional consequences to the tax shock. This is because Australia's cool regions specialize in producing super-premium wine (whose demand abroad is shrinking in the first simulation) while non-premium wine mostly comes from hot winegrape regions (whose demand domestically will shrink if the tax changes from ad valorem to volumetric. Since warm regions of both types plus commercial premium wines, the effects on them are uncertain without empirical modeling.

The findings are as follows:

- The demand shock would cause:
    - a net decline in the demand for Australian exports, so
    - national real GDP, imports and real household income fall slightly.
    - Regional GDP falls in the cool and warm wine regions (by 0.1 and 0.2 percent, respectively) but rises in the hot wine regions (by 0.2 percent), mostly because
    - the gross value of wine production falls in the cool and warm wine regions (by 5.7 and 2.5 percent, respectively) but rises in the hot wine regions (by 1.9 percent).
    - The aggregate national decline in the gross value of wine production is 1.6 percent, made up of a fall for super-premium wine of 8.3 percent, a rise of 5.5 percent for commercial premium, and no significant change for non-premium wine.
    - The gross value of grapes would fall nationally by 0.5 percent.
- A wine tax revenue-neutral change from an ad valorem to a volumetric tax would cause:
    - a net increase in Australian exports of 0.04 percent.
    - Regional GDP rises in the cool and warm wine regions, more than offsetting its fall in the previous (export demand) shock, for a combined increase of 0.1 and 0.2 percent, respectively, while GDP in the hot wine regions would fall by 1.0 percent, far more than offsetting the 0.2 percent rise in the previous scenario so its combined change is a fall of 0.8 percent. This is because
    - the gross value of wine production rises in the cool and warm wine regions (by 12 and 5 percent, respectively) but falls in the hot wine regions (by 10

percent). When combined with the export shock, this results in changes of 6.4, 2.5 and -8.3 percent for the cool, warm and hot wine regions, respectively.
    - The aggregate national change in the gross value of wine production is 2.2 percent, made up of a rise for super-premium wine of 17 percent and falls of 9 and 19 percent for commercial premium and non-premium wine. Thus when combined with the export shock, this results in changes of 9, -3.4 and -19 percent for super-premium, commercial premium and non-premium wine, respectively.
    - The gross value of grape production would rise nationally by 1.1 percent, more than offsetting the 0.5 percent fall resulting from the export demand shock.
    - When combined with the export shock, this results in aggregate changes in the value and volume of domestic wine consumption of 2.1 and 0.8 percent and a 1.3 percent rise in the average price of domestic wine sales. The super-premium price drops 6.6 percent while the prices of commercial premium and non-premium wine rise 5 and 20 percent, respectively, and the value of commercial premium and non-premium domestic wine sales fall 3.5 and 10.6 percent, respectively.
    - Assuming average alcohol content is the same in the 3 wine types, national alcohol intake from wine changes little (a rise of 0.8 percent), but it falls by 8 percent for commercial premium and 37 percent for non-premium while rising by 15 percent for super-premium.
- If instead of a wine tax revenue-neutral change, the switch from an ad valorem to a volumetric tax was accompanied by a hike in the rate up to that for beer, it would instead cause:
    - regional GDP to rise slightly more in the cool and warm wine regions, so even more than offsetting its fall in the export demand shock, for a combined increase of 0.1 and 0.3 percent, respectively, while GDP in the hot wine regions would fall by 1.5 percent, offsetting even more the 0.2 percent rise in the previous scenario so its combined change would be a fall of 1.3 percent. This is because
    - the gross value of wine production would rise even more in the cool and warm wine regions (by 14.5 and 5.1 percent, respectively) but fall even more in the hot wine regions (by 15 percent). When combined with the export shock, this results in changes of 8.8, 2.6 and -13.3 percent for the cool, warm and hot wine regions, respectively.
    - The aggregate national change in the gross value of wine production is a slightly smaller rise than in the revenue-neutral tax change, of 1.5 percent, made up of a rise for super-premium wine of 22 percent and falls of 13 and 28 percent for commercial premium and non-premium wine. Thus when combined with the export shock, this results in changes of 13, -7 and -27 percent for super-premium, commercial premium and non-premium wine, respectively.
    - The gross value of grape production would rise nationally by 0.7 percent, only slightly offsetting the 0.5 percent fall resulting from the export demand shock.
    - When combined with the export shock, this results in aggregate changes in the value and volume of domestic wine consumption of 10 and -1 percent and an 11 percent rise in the average price of domestic wine sales. The super-premium price drops 3.5 percent while those for of commercial premium and non-premium wine rise 18 and 51 percent, respectively, yet the value of

commercial premium and non-premium domestic wine sales would hardly alter.

- Assuming average alcohol content is the same in the 3 wine types, national alcohol intake from wine would fall but only by 1.2 percent, but it would fall by 18 percent for commercial premium and 54 percent for non-premium while rising by 22 percent for super-premium.

These results depend on numerous parameters, and are particularly sensitive to the assumed elasticity of substitution in consumption between the three wine types. The default elasticity is 2.0, causing total alcohol tax revenue to rise by $430 million p.a. when the volumetric tax is set at the beer rate rather than at a wine-tax-revenue-neutral rate. But if that elasticity is instead 0.5 (or 4.0), the rise in alcohol tax is $618 million (or $248 million). That elasticity assumption makes little difference to the change in aggregate domestic consumption volume and hence to the total value of wine output, but it makes big differences to the composition of both: instead of falling 27 percent, non-premium wine output would fall 10 percent (41 percent) if the elasticity was 0.5 (4.0), while instead of rising 13 percent, super-premium wine output would rise 2 percent (26 percent) if the elasticity was 0.5 (4.0). This is because the volume of domestic consumption of non-premium wine would fall 19 percent (79 percent) if the elasticity was 0.5 (4.0), while instead of rising 22 percent, super-premium wine consumption volume would rise 3 percent (44 percent) if the elasticity was 0.5 (4.0). Thus if the intent of a switch to a volumetric tax on wine is to discourage binge consumption of non-premium wine, then the higher the degree of substitutability between different wine types the more effective will be the policy switch.

Regional consequences in Australia of wine export demand shocks and alternative wine taxes: an economy-wide approach

Glyn Wittwer, Ernesto Valenzuela and Kym Anderson

The Australian wine industry has been facing a number of challenges of late. Some of them are weather-related (bushfires, extreme heatwaves, drought and associated unavailability of adequate water, excessive rain or frost in some areas). Some are due to the rapid expansion in vineyard plantings in the 1990s and early this decade in Australia, followed by similarly rapid expansions in other New World wine-exporting countries. This paper focuses on two other challenges. One is the current decline in export demand for premium wines following the 2008 financial crisis in the United States and the consequent recession in many economies. The other is the prospect of a change in the consumer tax on domestic wine sales, once the Henry Review of Taxation in Australia is completed in 2009.

The reason for considering these two challenges together in this paper is because of the possibility that they could have offsetting effects. On the one hand, the export demand shock is taking the form of less demand for super-premium wines but a greater demand for cheaper commercial premium wines as consumers adjust to the decline in their perceived wealth. On the other hand, one set of proposed consumer tax changes – from an ad valorem to a volumetric wine tax – would lead to a fall in domestic sales of non-premium wines but possibly an increased demand for more-expensive wines, depending on whether the tax reform was revenue-neutral or also involved raising the wine tax in order to bring it closer to the rates applying to other beverages on a volume-of-alcohol basis. Given that the hot winegrape-growing regions of Australia produce most of Australia's non-premium wine while the cool regions specialize in producing super-premium wine (with warm regions having more of a mix of both plus commercial premium wines), these challenges are going to have important implications for different regional economies in Australia.

The paper is structured as follows. In the next section we explain the modeling approach used. We then present the results from three simulation: an export demand shock, a follow-on change from the current ad valorem wine tax of 29 percent to a volumetric tax that raises the same tax revenue from the wine industry, and an alternative wine tax reform in which there is not only a switch to a volumetric tax but also a hike in the tax rate to bring that new wine tax up to the rate applying to beer. The final section draws together the implications of the findings.

The modeling approach

The approach to be taken in this analysis is thus to use an economy-wide model of the Australian economy that is capable of distinguishing between the three types of wine just mentioned and of showing the impacts at a disaggregated regional level. For that purpose we use the ORANIG model (see http://www.monash.edu.au/policy/oranig.htm), which has been modified to generate ORANIG06-WINE, based on 2006 data for the Australian economy. The national economy has been disaggregated into 36 regions, all but six of which are wine-intensive regions. This model is regional only in a top-down manner, however, unlike the TERM model which is a bottom-up regional model. That is adequate for analysing an external demand shock and a national policy issue such as a change in national alcohol taxes, because in both cases it is defensible to assume that wine prices change across all regions by the same proportion for each of the three wine types.[1]

The advantage of modifying ORANIG rather than TERM for analyzing a change in national alcohol taxes is that it is much easier to make the desirable disaggregation of alcoholic beverages into numerous sectors with a top-down specification (unlike for a multi-region bottom-up model, which would require some complicated coding and large amounts of detailed regional data).

[1] Even in the ORANIG model some industries are designated as "local". These include Utilities, Construction, Trade, Transport, BankFinIns, OwnerDwellng and PersOthSrv. In these sectors, regional output changes follow changes in regional income, which captures regional multiplier impacts, so output changes will differ across regions for these industries.

ORANIG has been modified to create ORANIG06-WINE as follows:

- The published 2001-02 national input-output database has a single wine, spirits and tobacco sector and a single beer sector. The former was split into three types of wine (non-premium, commercial premium and super premium), plus spirits and tobacco, and the beer sector was split into non-premium and premium types. A new ready-to-drink sector, RTDs, was created partly from spirits and partly from the soft drinks sector.
- The database was updated to 2005-06 to reflect available national accounts and international trade data, using the ADJUST procedure devised by Mark Horridge at the Centre of Policy Studies (see www.monash.edu.au/policy/archivep.htm TPMH0058). The value added in the model's 2005-06 three wine sub-sectors and its grape sector in each wine region and climate zone is summarized in Table 1, the shares of gross value of wine production from the three sub-sectors is shown for each region in Table 2, and the model's structure of costs in wine production that year are summarized in Table 3.
- The model also includes a top-down regional module that separates out all the significant wine regions of Australia (Table 1 and Figure 1). The wine regions are also classified into three climatic zones: cool, warm and hot. One-tenth of the value added in grape production comes from the cool region, two-thirds from the warm region and one-quarter from the hot region in 2005-06 (bottom of Table 1).
- Indirect taxes on both household consumption and intermediate inputs are split into three: GST, ad valorem top-up taxes, and volumetric taxes. Given the significance of on-premise alcohol consumption, this allows us to account for on-premise taxes in the hotels and restaurants sector. The significance of this is that as on-premise markups typically exceed 100 percent, we do not overestimate the impacts of particular tax scenarios which would arise from treating all alcohol consumption as if purchases were at off-premise prices. The tax revenue raised from alcohol consumption taxes according to the model's 2005-06 database is summarized in Table 4.
- ORANIG06-WINE also contains a small fiscal module, so as to allow for direct taxation. The significance of this modification is that we wish to ensure that the

overall government budget balance is unchanged. In the event that a wine tax policy change is not budget-neutral, there is an accommodating direct tax rate shift to maintain overall budget neutrality.

Models in the ORANI family (Dixon et al. 1982) usually have a linear expenditure system (LES) of household demand. The advantage of LES in an economy-wide model is that it models expenditure and price effects with relatively few parameters (*n* parameters in a system of *n* commodities). The disadvantage is that there are no specific cross-price effects, with cross-price elasticities being determined by expenditure effects alone. This system is satisfactory for relatively broad groups of commodities, as are usually found in published input-output tables. In the context of finely disaggregated commodities that are potentially substitutable, and particularly in a policy scenario in which there is the assumption of such substitution, as in the present case of a wine tax switch, LES is unsatisfactory, because a revenue-neutral tax switch is likely to entail negligible expenditure effects and significant price effects. Therefore, a modification that allows for price substitution, if at the expense of commodity-specific expenditure elasticities, is appropriate. We modified household demands accordingly, by grouping alcohol consumption into three nests, namely beer, wine, and spirits/RTDs. Each of the three has an expenditure elasticity (or marginal budget share) within the LES. Household demand for beer is a constant elasticity of substitution (CES) nest of two beer types, while wine consumption is a CES nest of three types. Finally, spirits and RTDs form a CES nest that is part of the LES. We do not allow for cross-price effects between, for example, non-premium wine and beer types.[2] However, we explore the effects on results of altering the CES between the three wine types from the default value of 2.0 to either 0.5 or 4.0.

[2] The extent to which preference independence applies for different types of alcohol may be matter of debate.We could have chosen ostensibly more elaborate demand forms, such as a translog system (Dixon et al., 1992) or CRESH (Hanoch 1971). Each of these forms allows for different pairwise elasticities of substitution, although the restrictions of each system may erode their intuitive appeal. That is, target cross-price elasticities between alcohol types regarded as close substitutes may be confounded by the adding-up conditions of the system.

Applying the model: estimating effects of export demand and tax reform shocks

Three set of simulation results are reported in this section: an export demand shock (a 20 percent decline in super-premium wine export demand coupled with a 10 percent rise in commercial premium wine export demand), a follow-on change from the current ad valorem wine tax of 29 percent to a volumetric tax that raises the same tax revenue from the wine industry, and an alternative wine tax reform in which there is not only a switch to a volumetric tax but also a hike in the tax rate to bring that new wine tax up to the rate applying to beer. To make it easy to compare results across the simulations, the combined effects of the first and each of the latter two scenarios are also presented and all three scenarios' results are shown in each of the tables below, even though the discussion will focus initially on one scenario at a time.

A change in demand for Australian wine exports

With the recession in OECD countries from 2008, demand for Australian super-premium wine exports has shrunk, as consumers eat out less and tighten their spending. Substitution to lower-quality premium wines is occurring though. To simulate this, we assume that, relative to 2005-06, there is a 20 percent reduction in export demand for Australia's super-premium wine but a 10 percent increase in export demand for commercial premium wine. The estimated macroeconomic effects of this shock, shown in column 1 of Table 5, reveal that this is a net decline in the demand for Australia exports. It causes real GDP, imports and real household income to fall slightly. Regional GDP falls in the cool and warm wine regions (by 0.1 and 0.2 percent, respectively) but rises in the hot wine regions (by 0.2 percent), as shown in Table 6. This is mostly because, as shown in Table 7, the gross value of wine production falls in the cool and warm wine regions (by 5.7 and 2.5 percent, respectively) but rises in the hot wine regions (by 1.9 percent).

The aggregate national decline in the gross value of wine production is 1.6 percent, made up of a fall for super-premium wine of 8.3 percent, a rise of 5.5 percent for

commercial premium, and no significant change for non-premium wine. The gross value of grapes would fall nationally by 0.5 percent (Table 7).

A revenue-neutral switch from an ad valorem to a volumetric wine tax

Suppose there were to be – on top of the above export demand shock – a follow-on change from the current ad valorem wine tax of 29 percent to a volumetric tax that raises the same tax revenue from the wine industry. The reason for considering these two challenges together is because the demand shock could have opposite regional consequences to the tax shock. This is because Australia's cool regions specialize in producing super-premium wine while non-premium wine mostly comes from hot winegrape regions (with warm regions having more of a mix of both plus commercial premium wines).

A wine tax revenue-neutral change from an ad valorem to a volumetric tax causes a net increase in Australian exports of 0.04 percent (Table 5). Regional GDP rises in the cool and warm wine regions, more than offsetting its fall in the previous (export demand) shock, for a combined increase of 0.1 and 0.2 percent, respectively, while GDP in the hot wine regions would fall by 1.0 percent, far more than offsetting the 0.2 percent rise in the previous scenario so its combined change is a fall of 0.8 percent (Table 6). This is because the gross value of wine production rises in the cool and warm wine regions (by 12 and 5 percent, respectively) but falls in the hot wine regions (by 10 percent). When combined with the export shock, this results in changes of 6.4, 2.5 and -8.3 percent for the cool, warm and hot wine regions, respectively (Table 7).

The aggregate national change in the gross value of wine production is 2.2 percent, made up of a rise for super-premium wine of 17 percent and falls of 9 and 19 percent for commercial premium and non-premium wine. Thus when combined with the export shock, this results in changes of 9, -3.4 and -19 percent for super-premium, commercial premium and non-premium wine, respectively. The gross value of grape production would rise nationally by 1.1 percent, more than offsetting the 0.5 percent fall resulting from the export demand shock (Table 8).

When combined with the export shock, this results in aggregate changes in the value and volume of domestic wine consumption of 2.1 and 0.8 percent and a 1.3 percent rise in the average price of domestic wine sales. The super-premium price drops 6.6 percent while the prices of commercial premium and non-premium wine rise 5 and 20 percent, respectively, and the value of commercial premium and non-premium domestic wine sales fall 3.5 and 10.6 percent, respectively (Table 9).

Assuming average alcohol content is the same in the 3 wine types, national alcohol intake from wine changes little (a rise of 0.8 percent), but it falls by 8 percent for commercial premium and 37 percent for non-premium while rising by 15 percent for super-premium (Table 9).

A revenue-raising change to a higher volumetric wine tax

If instead of a wine tax revenue-neutral change, the switch from an ad valorem to a volumetric tax was accompanied by a hike in the rate up to that for beer, it would instead cause regional GDP to rise slightly more in the cool and warm wine regions, so even more than offsetting its fall in the export demand shock, for a combined increase of 0.1 and 0.3 percent, respectively, while GDP in the hot wine regions would fall by 1.5 percent, offsetting even more the 0.2 percent rise in the previous scenario so its combined change would be a fall of 1.3 percent (Table 6). This is because the gross value of wine production would rise even more in the cool and warm wine regions (by 14.5 and 5.1 percent, respectively) but fall even more in the hot wine regions (by 15 percent). When combined with the export shock, this results in changes of 8.8, 2.6 and -13.3 percent for the cool, warm and hot wine regions, respectively (Table 7).

The aggregate national change in the gross value of wine production is a slightly smaller rise than in the revenue-neutral tax change, of 1.5 percent, made up of a rise for super-premium wine of 22 percent and falls of 13 and 28 percent for commercial premium and non-premium wine. Thus when combined with the export shock, this results in changes of 13, -7 and -27 percent for super-premium, commercial premium and non-premium wine, respectively. The gross value of grape production would rise nationally

by 0.7 percent, only slightly offsetting the 0.5 percent fall resulting from the export demand shock (Table 8).

When combined with the export shock, this results in aggregate changes in the value and volume of domestic wine consumption of 10 and -1 percent and an 11 percent rise in the average price of domestic wine sales. The super-premium price drops 3.5 percent while those for of commercial premium and non-premium wine rise 18 and 51 percent, respectively, yet the value of commercial premium and non-premium domestic wine sales would hardly alter (Table 9).

Again assuming average alcohol content is the same in the 3 wine types, national alcohol intake from wine would fall but only by 1.2 percent, but it would fall by 18 percent for commercial premium and 54 percent for non-premium while rising by 22 percent for super-premium (Table 9).

These results depend on numerous parameters, and are particularly sensitive to the assumed elasticity of substitution in consumption between the three wine types. The default elasticity is 2.0, causing total alcohol tax revenue to rise by $430 million p.a. when the volumetric tax is set at the beer rate rather than at a wine-tax-revenue-neutral rate. But if that elasticity is instead 0.5 (or 4.0), the rise in alcohol tax is $618 million (or $248 million – Table 10).

That elasticity assumption makes little difference to the change in aggregate domestic consumption volume and hence to the total value of wine output, but it makes big differences to the composition of both: Table 11 shows that instead of falling 27 percent, non-premium wine output value would fall 10 percent (41 percent) if the elasticity was 0.5 (4.0), while instead of rising 13 percent, super-premium wine output would rise 2 percent (26 percent) if the elasticity was 0.5 (4.0). This is because the volume of domestic consumption of non-premium wine would fall 19 percent (79 percent) if the elasticity was 0.5 (4.0), while instead of rising 22 percent, super-premium wine consumption volume would rise 3 percent (44 percent) if the elasticity was 0.5 (4.0), as shown in Table 12. Thus if the intent of a switch to a volumetric tax on wine is to discourage binge consumption of non-premium wine, then the higher the degree of substitutability between different wine types the more effective will be the policy switch.

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Figure 1: Grape and wine value-added as a share of regional GDP (%), 2005-06

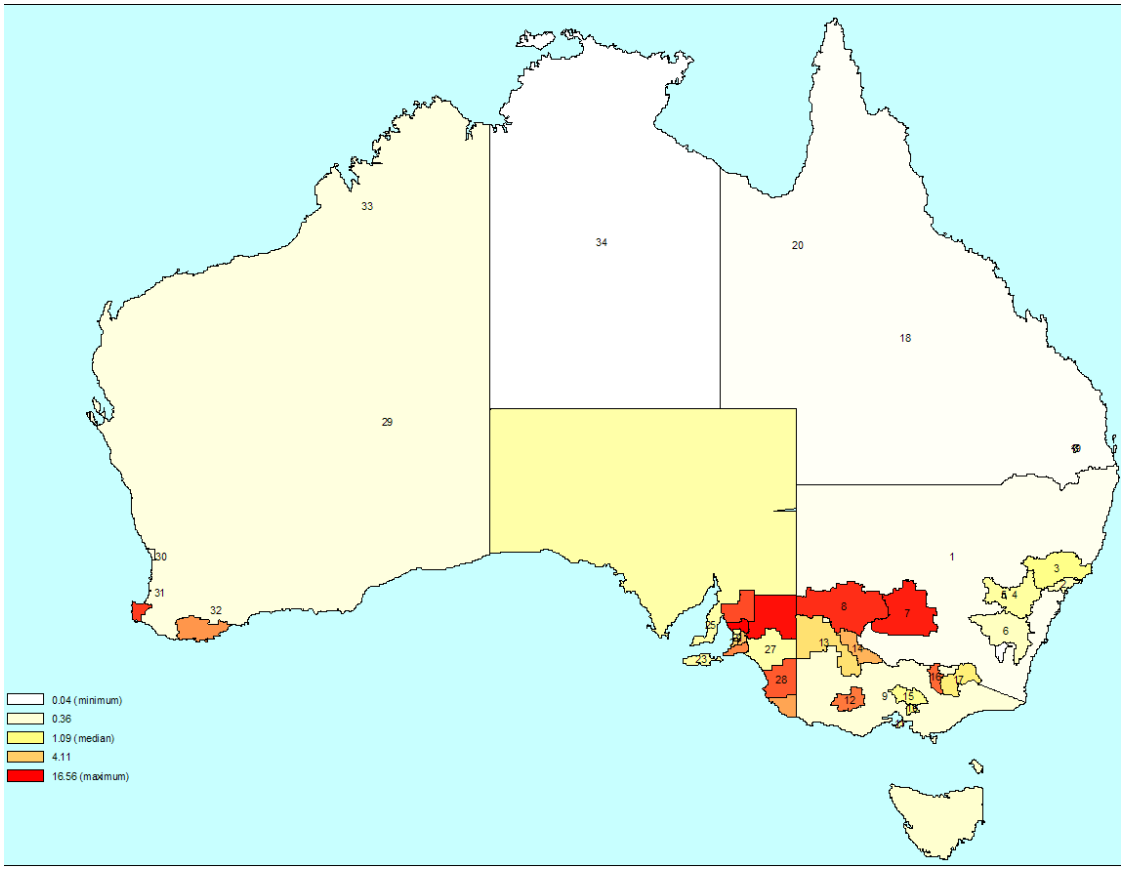

Table 1: Value added by grapes and wine sub-sectors, by region, Australia, 2005-06
($million)

	Grapes	Wine non-premium	Wine com-premium	Wine super-premium
RoNSW	17	24	58	75
NwcstlNSW	5	0	25	33
HunterBalNSW	5	0	11	14
CentTbleNSW	2	0	4	5
OrangeNSW	1	0	2	2
STblelndNSW	2	1	2	3
LMrmbNSW	16	36	42	5
MrryDrlngNSW	11	5	5	1
RoVIC	63	0	125	162
YarraRngVic	7	0	11	27
MorningtnVic	3	0	8	10
WCentrlHLVic	2	0	7	9
WOvnsMrryVic	6	7	16	21
EOvensMurVic	1	1	2	3
SWGoulbuVic	2	1	3	4
WstMalleeVIC	3	1	1	0
EMalleeVic	20	3	4	1
DrlngDwnsQld	2	2	4	6
RoQLD	7	10	24	32
RoSA	10	13	32	41
SAdelaideSA	23	0	76	98
BarossaSA	25	0	60	156
MtLoftRanSA	6	0	6	16
FleurieuSA	10	0	9	11
LwrNthSA	11	1	10	26
RiverLndSA	38	30	35	5
UpperSESA	9	0	14	18
LowerSESA	7	0	14	18
NMetroWA	1	2	6	7
RoWA	16	13	31	40
VasseWA	14	0	23	60
KingWA	6	0	9	24
TAS	7	0	14	18
NTAct	1	1	3	4
TOTAL, Australia	**357**	**124**	**686**	**965**
WINE CLIMATIC ZONES				
Hot	95	85	111	44
Warm	229	65	519	805
Cool	35	1	66	106

Source: Database of the ORANIG06-WINE model

Table 2: Shares of non-premium, commercial premium and super-premium in the gross value of Australian wine production, by region, 2005-06 (percent)

	Non-premium (%)	Commercial premium (%)	Super premium (%)
RoNSW	20	39	41
NwcstlNSW	6	56	38
HunterBalNSW	6	56	38
CentTbleNSW	11	89	0
OrangeNSW	1	50	50
STblelndNSW	20	39	41
LMrmbNSW	72	28	0
MrryDrlngNSW	31	69	0
RoVIC	8	43	49
YarraRngVic	1	6	93
MorningtnVic	0	5	95
WCentrlHLVic	0	49	51
WOvnsMrryVic	20	39	41
EOvensMurVic	20	39	41
SWGoulbuVic	20	39	41
WstMalleeVIC	31	69	0
EMalleeVic	31	69	0
DrlngDwnsQld	20	39	41
RoQLD	20	39	41
RoSA	0	49	51
SAdelaideSA	1	23	76
BarossaSA	1	33	67
MtLoftRanSA	1	13	86
FleurieuSA	1	60	40
LwrNthSA	0	35	65
RiverLndSA	20	80	0
UpperSESA	4	47	50
LowerSESA	1	20	79
NMetroWA	0	49	51
RoWA	20	39	41
VasseWA	0	15	85
KingWA	0	32	68
TAS	0	1	100
NTAct	20	39	41

Source: Anderson et al. (2009) and database of the ORANIG06-WINE model

Table 3: Cost structure of wine production in Australia, 2005-06

(percent)

	Labour	Capital	Grapes	Inter-mediate inputs, land, and other costs	Total
WineNonPrem	6	19	6	69	100
WineComPrem	9	22	15	54	100
WineSupPrem	12	26	13	49	100
TOTAL Wine	**10**	**24**	**13**	**53**	**100**

Source: Database of the ORANIG06-WINE model

Table 4: Alcohol tax revenue, Australia, 2005-06

($million)

Beer	1966
Spirits and RTDs	1775
Wine	893
Total alcohol taxes	4634

Source: Database of the ORANIG06-WINE model

Table 5: Simulation results: macroeconomic changes

(percent change)

	From demand changes for Australian wine exports	From export demand changes plus a switch to a volumetric wine tax (tax-revenue neutral)	*Change due just to switch to a volumetric wine tax (tax-revenue neutral)*	From export demand changes plus a switch to a volumetric wine tax at the beer rate	*Change due just to switch to a volumetric wine tax at the beer rate*
Real household	-0.006	-0.009	*-0.003*	-0.029	*-0.023*
Real investment	0.001	-0.005	*-0.006*	-0.001	*-0.002*
Real govt spending	0.000	0.000	*0.000*	0.000	*0.000*
Export volume	-0.047	-0.008	*0.039*	-0.017	*0.030*
Import volume	-0.048	-0.006	*0.042*	-0.009	*0.039*
Real GDP	-0.003	-0.007	*-0.004*	-0.018	*-0.016*
Aggreg employment	0.000	0.000	*0.000*	0.000	*0.000*
Average real wage	0.001	-0.012	*-0.013*	-0.121	*-0.122*
Aggreg capital stock	-0.002	-0.002	*0.000*	-0.003	*-0.001*
GDP Price Index	-0.005	0.005	*0.010*	0.061	*0.066*
Consumer Price Index	-0.004	0.009	*0.013*	0.107	*0.111*
Export Price Index	-0.004	0.002	*0.006*	0.004	*0.008*
Real devaluation	0.005	-0.005	*-0.010*	-0.061	*-0.066*

Source: Authors' model simulation results

Table 6: Simulation results: effects on regional GDP, all sectors
(percent change)

	From demand changes for Australian wine exports	From export demand changes plus a switch to a volumetric wine tax (tax-revenue neutral)	*Change due just to switch to a volumetric wine tax (tax-revenue neutral)*	From export demand changes plus a switch to a volumetric wine tax at the beer rate	*Change due just to switch to a volumetric wine tax at the beer rate*
RoNSW	0.01	-0.01	*-0.02*	-0.01	*-0.02*
NwcstlNSW	0.02	0.00	*-0.02*	-0.01	*-0.03*
HunterBalNSW	0.02	0.00	*-0.01*	-0.01	*-0.03*
CentTbleNSW	0.05	-0.03	*-0.09*	-0.06	*-0.12*
OrangeNSW	0.01	0.01	*0.01*	0.01	*0.00*
STblelndNSW	0.00	-0.01	*0.00*	-0.02	*-0.01*
LMrmbNSW	0.20	-1.51	*-1.71*	-2.31	*-2.50*
MrryDrlngNSW	0.26	-0.54	*-0.80*	-0.96	*-1.23*
RoVIC	0.00	0.00	*-0.01*	0.00	*-0.01*
YarraRngVic	-0.11	0.13	*0.24*	0.19	*0.30*
MorningtnVic	-0.05	0.07	*0.12*	0.10	*0.16*
WCentrlHLVic	-0.07	0.13	*0.19*	0.12	*0.19*
WOvnsMrryVic	-0.10	-0.10	*0.00*	-0.24	*-0.14*
EOvensMurVic	-0.02	-0.02	*0.00*	-0.06	*-0.03*
SWGoulbuVic	0.00	-0.03	*-0.02*	-0.05	*-0.04*
WstMalleeVIC	0.04	-0.07	*-0.10*	-0.12	*-0.15*
EMalleeVic	0.04	-0.09	*-0.12*	-0.17	*-0.21*
DrlngDwnsQld	0.00	0.00	*0.00*	-0.01	*-0.01*
RoQLD	0.01	-0.01	*-0.02*	-0.01	*-0.02*
RoSA	-0.04	0.00	*0.04*	0.00	*0.04*
SAdelaideSA	-0.10	0.12	*0.21*	0.16	*0.26*
BarossaSA	-0.94	1.11	*2.06*	1.37	*2.31*
MtLoftRanSA	-0.19	0.21	*0.40*	0.28	*0.48*
FleurieuSA	0.00	0.06	*0.06*	0.00	*0.00*
LwrNthSA	-0.29	0.35	*0.63*	0.41	*0.70*
RiverLndSA	0.54	-0.73	*-1.27*	-1.35	*-1.90*
UpperSESA	-0.09	0.11	*0.20*	0.08	*0.18*
LowerSESA	-0.16	0.12	*0.29*	0.15	*0.31*
NMetroWA	0.01	0.00	*-0.01*	0.00	*-0.01*
RoWA	0.01	0.00	*-0.02*	-0.01	*-0.02*
VasseWA	-0.75	0.80	*1.56*	1.10	*1.85*
KingWA	-0.18	0.21	*0.39*	0.27	*0.44*
TAS	-0.02	0.03	*0.05*	0.05	*0.07*
NTAct	0.00	0.00	*-0.01*	0.00	*0.00*
WINE CLIMATIC ZONES					
Hot	0.2	-0.8	*-1.0*	-1.3	*-1.5*
Warm	-0.2	0.2	*0.4*	0.3	*0.5*
Cool	-0.1	0.1	*0.2*	0.1	*0.2*

Source: Authors' model simulation results

Table 7: Simulation results: changes in regional gross value of wine production
(percent)

	From demand changes for Australian wine exports	From export demand changes plus a switch to a volumetric wine tax (tax-revenue neutral)	*Change due just to switch to a volumetric wine tax (tax-revenue neutral)*	From export demand changes plus a switch to a volumetric wine tax at the beer rate	*Change due just to switch to a volumetric wine tax at the beer rate*
RoNSW	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
NwcstlNSW	-0.1	0.5	*0.6*	-0.7	*-0.6*
HunterBalNSW	-0.1	0.5	*0.6*	-0.7	*-0.6*
CentTbleNSW	4.9	-5.1	*-10.0*	-9.6	*-14.5*
OrangeNSW	-1.4	2.7	*4.1*	2.7	*4.1*
STblelndNSW	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
LMrmbNSW	1.5	-14.6	*-16.1*	-21.9	*-23.5*
MrryDrlngNSW	3.8	-8.2	*-12.0*	-13.6	*-17.4*
RoVIC	-1.7	1.6	*3.3*	1.2	*2.9*
YarraRngVic	-7.4	8.2	*15.6*	11.7	*19.1*
MorningtnVic	-7.6	8.5	*16.1*	12.2	*19.8*
WCentrlHLVic	-1.6	3.0	*4.6*	3.2	*4.7*
WOvnsMrryVic	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
EOvensMurVic	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
SWGoulbuVic	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
WstMalleeVIC	3.8	-8.2	*-12.0*	-13.6	*-17.4*
EMalleeVic	3.8	-8.2	*-12.0*	-13.6	*-17.4*
DrlngDwnsQld	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
RoQLD	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
RoSA	-1.5	2.9	*4.4*	3.0	*4.5*
SAdelaideSA	-5.0	6.0	*11.0*	8.1	*13.2*
BarossaSA	-3.8	4.9	*8.6*	6.3	*10.0*
MtLoftRanSA	-6.4	7.3	*13.7*	10.2	*16.6*
FleurieuSA	0.0	1.5	*1.5*	0.7	*0.7*
LwrNthSA	-3.4	4.7	*8.1*	5.9	*9.4*
RiverLndSA	4.4	-6.5	*-10.9*	-11.3	*-15.8*
UpperSESA	-1.6	2.2	*3.7*	2.0	*3.6*
LowerSESA	-5.5	6.4	*11.9*	8.8	*14.3*
NMetroWA	-1.5	2.9	*4.4*	3.0	*4.5*
RoWA	-1.3	-1.4	*-0.2*	-3.1	*-1.8*
VasseWA	-6.3	7.3	*13.5*	10.2	*16.4*
KingWA	-3.8	5.1	*8.9*	6.6	*10.4*
TAS	-8.2	9.0	*17.3*	13.1	*21.3*
NTAct	-1.2	-1.5	*-0.2*	-3.1	*-1.8*
WINE CLIMATIC ZONES					
Hot	1.9	-8.3	*-10.2*	-13.3	*-15.2*
Warm	-2.5	2.5	*5.0*	2.6	*5.1*
Cool	-5.7	6.4	*12.1*	8.8	*14.5*

Source: Authors' model simulation results

Table 8: Simulation results: changes in gross value of national production in the grape and wine sub-sectors

(percent)

	From demand changes for Australian wine exports	From export demand changes plus a switch to a volumetric wine tax (tax-revenue neutral)	*Change due just to switch to a volumetric wine tax (tax-revenue neutral)*	From export demand changes plus a switch to a volumetric wine tax at the beer rate	*Change due just to switch to a volumetric wine tax at the beer rate*
Grapes	-0.5	0.5	*1.1*	0.2	*0.7*
Wine non-premium	0.0	-18.9	*-18.9*	-27.4	*-27.5*
Wine comm premium	5.5	-3.4	*-8.9*	-7.4	*-12.9*
Wine super-premium	-8.3	9.1	*17.4*	13.2	*21.5*
TOTAL Wine	**-1.6**	**0.7**	***2.2***	**-0.1**	***1.5***

Source: Authors' model simulation results

Table 9: Simulation results: changes in national volume and (tax-inclusive) value of household consumption of alcoholic beverages

(percent)

	From export demand changes plus a switch to a volumetric wine tax (tax-revenue neutral), change in:			From export demand changes plus a switch to a volumetric wine tax at the beer rate, change in:		
	expend.	volume	price	expend.	volume	price
RTDs	0.0	0.0	0.0	0.02	0.00	0.0
Spirits	0.0	0.0	0.0	0.02	0.01	0.0
BeerPremium	0.0	0.0	0.0	0.02	0.01	0.0
BeerNonPrem	0.0	0.0	0.0	0.02	0.00	0.0
WineNonPrem	-10.6	-36.9	20.3	3.0	-53.6	50.6
WineComPrem	-3.5	-8.4	4.9	-0.3	-18.3	18.0
WineSupPrem	8.8	15.4	-6.6	18.7	22.2	-3.5
Total Wine	**2.1**	**0. 8**	**1.3**	**10.1**	**-1.2**	**11.3**

Source: Authors' model simulation results

Table 10: Sensitivity analysis[a] of tax hike simulation results: change in alcohol tax revenue

($million)

	Wine CES = 0.5	Wine CES = 2.0 [default value]	Wine CES = 4.0
Beer	-0.8	-0.7	-0.7
Spirits	-1.0	-0.9	-0.8
Wine	619.6	431.8	249.8
Total tax	**617.8**	**430.2**	**248.4**

[a] Showing sensitivity to change in the elasticity of substitution in consumption between wine types from the default value of 2.0

Source: Authors' model simulation results

Table 11: Sensitivity analysis[a] of tax hike simulation results: change in sectoral outputs

(percent)

	Wine CES = 0.5	Wine CES = 2.0 [default value]	Wine CES = 4.0
RTDs	-0.08	-0.03	0.01
Beer premium	-0.03	-0.03	-0.03
Beer non-Premium	-0.03	-0.03	-0.03
Spirits	-0.11	-0.11	-0.11
Grapes	-0.6	0.2	0.8
Wine non-premium	-10.0	-27.4	-40.6
Wine comm premium	-2.8	-7.4	-14.4
Wine super-premium	1.6	13.2	26.1
Total Wine	**-1.6**	**-0.1**	**1.5**

[a] Showing sensitivity to change in the elasticity of substitution in consumption between wine types from the default value of 2.0

Source: Authors' model simulation results

Table 12: Sensitivity analysis[a] of tax hike simulation results: change in domestic demand

(volume percent change)

	Wine CES = 0.5	Wine CES = 2.0 [default value]	Wine CES = 4.0
Wine non-premium	-19	-54	-79
Wine comm premium	-7	-18	-36
Wine super-premium	3	22	44
Total Wine	-3.5	-1.2	0.9

[a] Showing sensitivity to change in the elasticity of substitution in consumption between wine types from the default value of 2.0

Source: Authors' model simulation results