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**A global macroeconomic perspective
on the Australian wine industry**

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A global macroeconomic perspective on the Australian wine industry

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Abstract

Australia's wine industry is coming out of the bottom of its latest cycle – its 5th since 1850. A key question is: how, and how soon, might producers be able to earn sustainable profits again? This paper briefly examines the anatomy of the latest cycle, which began in the late 1980s. It points to differences as well as similarities with previous cycles. A key feature is the strong export focus of the latest expansion – at a time of rapid globalization of many industries – and then its emulation by other New World wine-producing countries. For nearly two decades the stars were favourably aligned for Australian producers. However, they suddenly became badly misaligned. One major element of the boom and then the crisis was the pattern of movements in real exchange rates. It helps explain the differing phases of the industry's competitiveness in Australia vis-a-vis competitor countries. A model of the world's wine markets is used to show empirically the strength of this influence over recent years. The model also explores prospects for the next five years, focusing in particular on the roles not only of further changes in bilateral exchange rates but also of a return by consumers to higher-quality wine purchases and of continuing rapid growth in wine demand in emerging economies, especially China. The model results reveal how much the recent devaluation of the AUD, if sustained, could benefit Australian winemakers and hence grapegrowers by 2018, and how quickly China could become a major destination for Australian wine exports. Both could boost substantially the profitability of those in the industry that adapt most successfully to those prospective market developments.

A global macroeconomic perspective on the Australian wine industry

Introduction

Two major shocks to the world economy have impacted non-trivially on the wine industry in all major wine-producing countries in recent years. One is the global financial crisis, which brought substantial changes to bilateral exchange rates and – due to the fall in income and wealth – a temporary decline in the quantity and quality of wine demanded in traditional markets. The other development is the rapid economic growth in China and other emerging Asian economies, which slowed only slightly when high-income economies went into recession after 2007. Since Asia's emerging economies are natural resource-poor, their rapid industrialization and economic growth has strengthened primary product prices and hence the real exchange rates of natural resource-rich countries such as Australia. And since their income growth has led to a burgeoning middle class and enriched their elite, the demand for wine in Asia and especially China has surged. The latter in turn has stimulated vineyard expansion and rapid growth in wine production in China, although not (yet) quite enough to match domestic demand growth. Australia's wine industry has been hurt by the appreciating AUD but is being helped by the growth in Asian import demand.

Grapegrowers and winemakers in both the Old World and the New World are far more exposed to such shocks to the world economy now than they were in the 20th century. This is partly because of the move by most countries to flexible exchange rates since the 1980s, and also because the wine industry has become more globalized in the past two decades than ever in its long history. The share of global wine production exported more than doubled between 1989 and 2009, rising from 15 percent (which was already above its peak in the first globalization wave a century before) to 32 percent (Anderson and Nelgen 2011), and it had reached 41 percent by 2012 (OIV 2013). For the four biggest European wine-exporting countries, their export

propensity rose over the two decades to 2009 from 20 to 35 percent, while for New World exporters it rose from just 4 percent to 37 percent (Anderson and Nelgen 2011). By 2012, those shares had reached 49 and 42 percent, respectively, according to OIV (2013).

The extent of exposure to global shocks varies across countries according to not only the share of their production that is exported, but also the extent to which their domestic wine markets are open to imports. Figure 1 shows just how pervasive the growth in two-way trade in this product market has been over the 25 years to 2007, and it has risen even more since then. In 2012, the share of Australian wine production volume that was exported was 64 percent, and 16 percent of its domestic sales volume was supplied by imports (up from just 2 and 3 percent, respectively, in 1980-84). In value terms the share of imports in domestic sales in Australia is even higher, at around one-quarter. Moreover, it is not only winemakers who are vulnerable to exchange rate and other shocks to the market: even though winegrapes themselves are not often traded internationally, their prices soon adjust when wine price prospects alter.

The dramatic growth in Australia's wine exports since the mid-1980s was stimulated by a low Australian dollar (AUD). In US dollar terms, the AUD hovered between 0.60 and 0.80 from 1983 to 1999, and then it fell to slightly below 0.50 in 2001 before returning to 0.80 by the beginning of 2007. Since then, however, it rose to a peak of US\$1.10 in 2011, and it remained in the 0.98 to 1.08 range for the 18 months to early May 2013. Similar paths have been traced by the UK pound since 1985 and the Euro since 2007 (Figure 2). As a consequence of those and other bilateral exchange rate movements, Australia has lost global market share to other wine exporters: since 2007, the gap between the US\$ value of Australia's wine exports and that of the smaller New World exporters has halved (Figure 3), while the share of the country's domestic consumption supplied by imports has more than doubled.

In the light of these developments, the purpose of this paper is two-fold: to assess the extent to which bilateral real exchange rate (RER) movements globally (not just the nominal US\$, Euro and UK pound rates for the AUD) have reduced Australia's competitiveness in the world's wine markets since 2007; and to examine how Australia's competitiveness might evolve over the next five years. Two alternative changes from 2011 RERs are considered over those next five years: no change, and a half-way return to 2009 rates. The latter seems the more likely scenario, given recent prognoses by Garnaut (2013) and Sheehan and Gregory (2013) and the

sudden fall in the value of the AUD in May-July 2013. Nevertheless, a comparison with the no-change scenario gives a sense of the importance of future RER movements.

Exchange rates are not the only pertinent things that will change between now and 2018 of course. There will be changes in national consumption as populations and income grow, and also in national preferences, technologies, and capital investments in grape and wine production. Two trends in particular that are expected over the next half-decade are the growth in China's import demand, and the expected preference swing toward higher-quality wine consumption in many markets. A formal model of economic behavior in the world's wine markets is used to analyze the market responses to such anticipated changes.

The next section of the paper outlines briefly a revised model of the world's wine markets and the way in which RER changes and shocks to other variables are applied. The model's simulation results of the effects of RER changes between 2007 and 2011 on Australia's wine industry are then summarized. Prospective changes to grape and wine markets by 2018 are then reported for two alternative paths for RERs over the next five years (no change, and a half-way return from 2011 to 2009 rates), and two alternative scenarios for China's import demand growth (high and low). The paper concludes by drawing out implications for Australia's wine industry in the years ahead.

Outline of a model of the world's wine markets

We have revised and updated a model of the world's wine markets that was first published by Wittwer, Berger and Anderson (2003) to examine wine's globalization (Anderson 2004, Ch. 2). Several significant enhancements have been made to that original model. Wine has been disaggregated into five types, namely non-premium (including bulk), commercial-premium, super-premium and iconic still wines, plus sparkling wine.¹ There are two types of grapes, premium and non-premium. Non-premium wine uses non-premium grapes exclusively, super-

¹ Commercial-premium still wines are defined by Anderson and Nelgen (2011) to be those between US\$2.50 and \$7.50 per litre pre-tax at a country's border or wholesale. Iconic still wines are a small subset of super-premium wines. They are assumed to have an average wholesale pre-tax price of \$80 per litre and to account for just 0.45 percent of the volume of global wine production in 2009.

premium and iconic wines use premium grapes exclusively, and commercial-premium and sparkling wines use both types of grapes.

The world is divided into 44 individual nations and 7 composite regions. The model's database is calibrated initially to 2009, based on the data provided in Anderson and Nelgen (2011). For the first part of the report, the model is shocked by the changes in RERs between 2007 and 2011, assuming no other changes occur (so as to isolate the effects of movements in just this one variable). Those exchange rate changes, shown in Appendix Table 1(a), are calculated for each country as the percentage change in national production costs divided by the percentage change in US production costs expressed in that country's local currency units. For the second part of the report, the model is projected forward in two steps. The first step involves using actual aggregate national consumption growth between 2009 and 2011 (Appendix Table 2(a)), together with actual changes in RERs between just 2009 and 2011 (Appendix Table 1(b)). This second step assumes aggregate national consumption and population grow from 2011 to 2018 at the rates shown in Appendix Table 2(b), and that real exchange rates over that period either (a) remain at their 2011 levels (the Base scenario) or (b) return half-way to their 2009 rates (the more-realistic scenario given the changes in RERs during May-July 2013). In the latter scenario (call it Alternative 1) Southern Hemisphere RERs devalue relative to both the US\$ and the Euro; but for China and India we assume in this alternative case that their RERs continue to slightly appreciate (by an aggregate of 15 percent between 2011 and 2018). In each of those two steps, a number of additional assumptions are made concerning preferences, technologies, and capital stocks.

As for preferences, there is assumed to be a considerable demand swing in China towards all wine types as more Chinese earn middle-class incomes, so as to set aggregate increased wine consumption to the projections of the major commodity forecasters of a 70 percent rise over that 7-year period in our most-likely scenario in which exchange rates revert half-way back from 2011 to 2009 rates. That implies a rise in per capita consumption from 1.0 to 1.6 litres per year. This may be too conservative. Per capita wine consumption grew faster than that in several West European wine-importing countries in recent decades, and Vinexpo claims China's 2012 consumption was already 1.4 litres. With the number of middle class in China currently around 250 million and growing at 10 million per year (Kharas 2010; Barton, Chen and Jin 2013), and with grape wine still accounting for only 4 percent of Chinese alcohol consumption, large

increases in volumes of wine demanded are not unreasonable to expect. However, if China's income growth were to grow slower than the rate we assume, and if that meant the RMB did not continue to appreciate slightly, wine import growth would be slower. For the rest of the world, the long trend preference swing away from non-premium wines is assumed to continue.

Both grape and wine industry total factor productivity is assumed to grow at 1 percent per year everywhere, while grape and wine industry capital is assumed to grow net of depreciation at 1.5 percent per year in China but zero elsewhere. This means that China's production rises by about one-sixth, one-quarter and one-third for non-premium, commercial premium and super+ premium wines between 2011 and 2018 – which in aggregate is less than half that needed to keep up with the modeled growth in China's consumption. If China's wine production from domestic grapes were to grow faster than the rate we assume, wine imports would increase less.

Given the uncertainty associated with several dimensions of developments in China's wine markets, we also compare the more likely of our two main scenarios to 2018 (in which RERs for all but China and India revert half-way back from 2011 to 2009 rates, called Alternative 1) with a third scenario (called Alternative 2) in which three dimensions are altered: China's expenditure growth during 2011-18 is reduced by one-quarter (from 7.5 to 5.6 percent per year), its RER does not change from 2011 instead of appreciating 15 percent over that period, and its grape and wine industry capital is assumed to grow at 3 instead of 1.5 percent per year. All three changes ensure a much smaller increase in China's wine imports by 2018 in this Alternative 2 scenario. It should be considered very much a lower-bound projection though. This is because, even if China's growth in GDP, industrialization and infrastructure spending were to slow down even more than assumed in our Base scenario, and there was less conspicuous extravagance and iconic gift-giving by business and government, Chinese households are being encouraged to lower their extraordinarily high savings rates and consume more of their income.

The model has supply and demand equations and hence quantities and prices for each of the grape and wine products and for a single composite of all other products. Grapes are assumed to be not traded internationally, but other products are both exported and imported. Each market is assumed to clear before any shock, and to find a new market-clearing outcome following any exogenously introduced shock.

Impacts of exchange rate movements on competitiveness, 2007 to 2011

The first column of Table 1, and Figure 4, summarize the actual changes between 2007 and 2011 in real exchange rates in key wine-exporting and wine-importing nations. It is clear that, during the 2007 to 2011 period, Japan and China (like other rapidly emerging East Asian economies) and natural resource-rich Australia appreciated their real exchange rates heavily against the US dollar (by 29-35 percent). Other Southern Hemisphere wine exporters (Chile, New Zealand, South Africa) also saw their real exchange rates appreciate, albeit more moderately (by 9-23 percent). By contrast, the British pound *depreciated* heavily against the US dollar (by 18 percent), while for other West European countries – both wine-exporting and wine-importing – their real exchange rates remained close to the US dollar during that period.

If there were no other shocks to the world's wine markets over this 2007-11 period, what would those real exchange rate changes lead one to expect? Since Australia has experienced one of the largest real appreciation among the wine exporters, its wineries are likely to have been seriously affected: receiving less AUD for their exports, and facing more foreign competition in their home market. As for wine-importing countries, those whose real exchange rates appreciated most (notably China and Japan) would be expected to import more wine, if all other things were equal, while for those experiencing a real depreciation, most notably the United Kingdom, wine imports would be expected to fall.

That is indeed what is shown in the other columns of Table 1; and the impacts on bilateral wine trade volumes are summarized in Table 2. Specifically, the real exchange rate changes are responsible for declines in grape and wine production in the southern hemisphere where real exchange rates appreciated, and for slight production increases in the United States and Europe where real exchange rates changed relatively little.

Since Australia has had the largest appreciation of the wine-exporting countries shown in Table 1, its winemakers and hence grapegrowers are estimated to suffer the largest reduction in domestic prices in real local currency terms from this shock: winegrape and commercial premium wine producer prices are reduced by almost one-eighth, and super premium wine prices by one-fifth. Associated with that is a decline in the volume of Australia's wine production, but given the resistance of producers to downsize except in the longer term, those changes are small. Real prices in domestic currency terms decline in the other Southern Hemisphere countries shown in

Table 1 as well, but by less than two-thirds as much as in Australia. Furthermore, real grape and wine prices (again in domestic currency terms) *rise* in the United States and Western Europe, by between 3 and 6 percent, so output is estimated not to have been reduced at all in those regions as a consequence of recent real exchange rate movements. In short, those exchange rate shocks have been a major contributor to the decline in the international competitiveness of Australian wine producers since 2007.

The trade consequences of that set of exchange rate shocks also depend on how it affects wine consumption. With lowered prices for both domestic and imported wines, Australian consumption is estimated to have been boosted by 4 percent because of these real exchange rate changes – which is very close to the proportional change in *actual* consumption during that period (see final two columns of Table 1). This suggests the net effect on domestic consumption of all other influences over the period 2007-11 was close to zero.

In Europe's key wine-exporting countries and in the United States, by contrast, the rise in their wine prices would have reduced domestic wine consumption in the absence of other influences. Other influences evidently were not absent, however. In the United States, wine consumption actually rose by 2 percent over that period, perhaps as the economy there began recovering from the global financial crisis by 2011. In Western Europe's wine-exporting countries, by contrast, it fell by 10 percent, perhaps because those economies were still recovering from the financial crisis in 2011.

Estimated changes in consumption in wine-importing countries are shown in Table 1(b). The 18 percent real depreciation of the UK pound against the US dollar on its own caused the consumer price of wine in that market to rise such that estimated wine consumption fell 4 percent, which is a little less than the actual decrease over that period of 7 percent. Discrepancies arise when there is a non-trivial net effect of economic changes other than in RERs. For example, China's rapid income growth and increasing absorption of western tastes meant that there was a substantial increase in wine demand there between 2007 and 2011, so that observed wine consumption grew by 22 percent over that period despite almost no contribution from RER changes. In the case of nations that went into recession, income deterioration between 2007 and 2011 affected actual consumption markedly. For example, Japan's actual wine consumption declined 2 percent even though RER changes on their own are estimated to have induced a 10 percent increase.

The negative impact on consumption of the real depreciation in the United Kingdom is bad news for all wine-exporting countries, but the impact is even worse for Australia (which was the 2nd most important supplier in volume terms of wine to the UK market after Italy, and 3rd in value terms after France and Italy). The first set of rows of Table 2 shows the impact on the UK's import volumes by country of origin. Australia and other Southern Hemisphere countries (most notably South Africa) are the standout losers in this scenario, with annual demand for their wine falling by 64 ML – half of which is borne by Australia. By contrast, the annual sales by the Old World and the US each fall by only 2 ML as a consequence of RER movements between 2007 and 2011.

The modeled reduction in wine consumption in the United States is borne almost entirely by Australian and other Southern Hemisphere producers (Row 2 of Table 2), whose wines become more expensive than domestically produced or Old World wines in the US market. That set of RER shocks reduces the Southern Hemisphere's share of US total wine consumption from 21 to 19 percent. The pattern of impact on bilateral wine trades with Canada, Germany and other Western European wine-importing countries is not quite as severe, but in all those cases Australian and other Southern Hemisphere producers lose out to US and Old World suppliers.

China remains the market in which wine exporters anticipate the highest rate of import growth in the future. China's renminbi appreciated in real terms more than most major currencies between 2007 and 2011, the effect of which in isolation would be for China to increase its share of global wine consumption. Table 1(b) shows that real local currency prices of wine in China fell by one-sixth due to observed RER movements. This induces increased imports of wine from all sources, with more from both the New World (15 ML including the USA) than the Old World (7 ML). Those imports substituted for domestic wine, whose consumption is discouraged by the real appreciation: estimated consumption of domestic wine is 24 ML less than it would have been without RER changes, and imports 24 ML greater. As for other Asian markets and the rest of the world, Australia again loses slightly while the US and Old World wine exporters gain.

In aggregate, RER movements over the 2007-2011 period are estimated to have reduced Australia's annual wine exports by 64 ML. This is more than half the aggregate loss to all other Southern Hemisphere exporters of 110 ML, and it contrasts with estimated export gains of 193 ML to the United States and 167 ML to Western Europe's key wine-exporting countries. This reversed somewhat the massive gains of the Southern Hemisphere exporters at the expense of the

Old World over the past two decades. It also strengthened the competitiveness of the US wine industry relative to other New World wine producers in both the US and European markets.

Australia is the country whose wine trade has been most adversely affected by real currency changes since 2007. In addition to losing export sales, however, it has also seen a considerable increase in imports. One-sixth of the estimated extra imports due to currency changes are from New Zealand, because of the greater real appreciation of the AUD compared with the NZD. The bracketed numbers in Table 3 show that New Zealand's extra penetration of the Australian market is especially strong in the super-premium+ category (predominately Sauvignon Blanc and Pinot Noir), while France's is predominantly in sparkling wine and Italy's in commercial-premium wines.

How do the modeled outcomes compare with observed export changes in Australia? Historic data indicate that between 2006-07 and 2010-11, the volume of Australia's wine exports fell only slightly, from 798 ML to 727 ML; but, in domestic currency terms, exports dropped from almost AUD2.9 billion to just under AUD2.0 billion over that period (www.wineaustralia.com). Therefore, the modeled effects of RER changes shown in Table 3 suggest those RER changes explain all but one-tenth of the actual drop in the volume of wine exports of 71ML, and all but one-sixth of the actual drop in value.

Thus these results go a long way towards explaining why market shares and producer prices have changed so much for some New World wine-exporting countries in recent years. In particular, they explain most of the improvement in competitiveness of the US and EU and the decline for Australian and other Southern Hemisphere exporters between 2007 and 2011. This only slightly reverses the upward trend in the Southern Hemisphere's share of global wine exports over the previous 15 years though, and does not necessarily mean that previous trend won't return. After all, RER changes can easily reverse. We turn now to consider the period to 2018, and in particular to examine how much a reversal of RER trends would affect Australian and other wine exporters.

Projections of the world's wine markets to 2018

To project global wine markets forward, it is important to first update the model's 2009 baseline with known data. Sufficient data were available globally to calibrate the model to 2011, so we project the model to that year first using actual aggregate national consumption and population growth together with actual changes in real exchange rates between 2009 and 2011 and assumed changes in preferences, technologies, and capital stocks as described. Once this new baseline is in place, the second step is to assume aggregate national consumption and population grow from 2011 to 2018 at the rates shown in Appendix Table 2(b) and that preferences, technologies, and capital stocks continue to change as described above, plus that RERs over that period either (a) remain at their 2011 levels or (b) return half-way to their 2009 rates (except for China and India) as reported in Appendix Table 1(b).² The latter may well happen long before 2018, according to both Garnaut (2013) and Sheehan and Gregory (2013) and given the rapid changes in exchange rates during May-July 2013 when the Australian dollar fell more than 10 percent against the US dollar, the Euro and the UK Pound (which is more than half the change in those bilateral rates being modeled in this Alternative 1 scenario). A third scenario, Alternative 2, presents a lower-bound projection of what might happen to Chinese wine import demand if China's economy slows and simultaneously domestic grape and wine production grows twice as fast.

The impacts of those changes on real producer prices in the sector, in local currency units, are reported in Table 4 for the world's main wine-producing countries. For the period to 2018, Australia's non-premium grape and wine prices are projected to fall further if real exchange rates don't change from their 2011 levels, while super-premium and iconic still wine prices rise by more than 40 percent (Table 4(a)). If, on the other hand, RERs were to return half-way toward what they were in 2009, real prices in Australia in local currency terms would rise above 2011 levels for most grape and wine types, especially for super+ premium wines (Table 4(b)). The extent of those rises would be somewhat but not substantially less if China's import growth were slower as in the Alternative 2 scenario (Table 4(c)). Consumer prices tend to move in the same direction as producer prices, but the changes are more muted because of the presence of trade and transport margins.

² Except for China and India, whose currencies are assumed to appreciate a further 2 percent per year over this projection period from 2011 because of their assumed strong economic growth.

Even if there were no changes in exchange rates, Australia is projected to expand its output by 2018 for all wine types except non-premium. For commercial premium and super-premium, the increases are 8 percent and 15 percent; but, with the reversal in RER trends, those output increases would be 13 and 18 percent, respectively, unless China's import growth was much slower in which case they would be one percentage point less (Table 5). Note that production grows in both hemispheres, thanks to the assumed growth in grape and wine productivity of 1 percent per year. Were there also to be a devaluation of Southern Hemisphere exchange rates, Table 5(b) suggests that output in that region would expand even more while output expansion in the Northern Hemisphere would be slightly less, although less so if Chinese market growth slows – consistent with the producer price changes shown in Table 4.

The income, population and preference changes together mean that consumption volumes grow over the period to 2018 for all but non-premium wine, but least so for commercial premium. The percentage increases are very similar in the three scenarios for the Old World and Japan, but are somewhat more in the United Kingdom, China and especially the United States in the altered currencies' scenarios versus the scenario with no changes in real exchange rates. This is consistent with the differences in local currency consumer price changes. What is more striking is the concentration of consumption growth and declines, as shown in Figure 5. In all scenarios the growth is concentrated in the US, Brazil and especially China, while there are substantial declines in consumption in the Old World (mostly of non-premium wines).

When combined with the changes projected in production, it is possible to get a picture of what is projected to happen to wine trade. Table 6 provides projections for the main wine-trading regions. In terms of volumes, world trade grows 6 percent in the base scenario and 7 percent in the Alternative 1 scenario in which RERs change. Virtually all of that increase in those two scenarios is due to China's import growth. In the Alternative 2 scenario, in which China imports less, global trade also expands less (by only 4 percent). In terms of the real value of global trade, however, the upgrading of demand elsewhere means that China accounts for only a fraction of the global import growth, namely 36, 43, and 30 percent in the Base, Alternative 1 and Alternative 2 scenarios, respectively. In all three scenarios the value of global wine trade rises by about one-sixth (last row of Table 6).

China has already become by far the most important wine-consuming country in Asia (Figure 6) and, with a projected extra 620-940 ML to be added by 2018 to its consumption of

1630 ML in 2011, that dominance is becoming even greater. Since China's domestic production is projected to increase by 'only' about 210-290 ML by 2018, its net imports are projected to rise by between 330 and 740 ML. The Southern Hemisphere supplies a little more than half of those extra imports in the base scenario, and a little less than half in the alternative scenarios. The United States reduces its imports by 24ML and expands its exports to China by 50ML in the base scenario, but in the alternative scenarios it increases its imports of premium wines (Table 7).

Implications for Australia's wine industry over the next five years

The above results suggest that RER changes over the period 2007 to 2011 altered substantially the global wine export shares of the Old World and USA versus the Southern Hemisphere's New World exporters and especially Australia. This development reversed somewhat the massive gains of the latter group at the expense of the Old World over the past two decades. The exchange rate changes also strengthened the competitiveness of the US wine industry, relative to other New World wine producers, in both the US and European markets. Given those results, it is not surprising that the comparison between scenarios involving no RER changes from 2011 versus a half-way return to 2009 rates suggests there would be a reversal in international competitiveness of the various exporting countries.³

The projections to 2018 reveal an even more striking prospect, however. It has to do with the continuing growth of China's net imports. Australia is projected to supply between 65 and 150 ML of China's extra imports (Table 8), amounting to between US\$350m and \$650m per year. That represents about one-fifth of China's total import volume increase, and – more importantly – between 22 and 30 percent of the value of China's extra imports.

What about Australia's exports to other countries? Again it depends very much on the scenario. If real exchange rates did not change from 2011 to 2018, Australia's exports to all destinations other than Asia would decline, and in aggregate volume would be no more than in 2011. By contrast, if exchange rates were to settle at half-way back to those of 2009 (Alternative

³ Had we analysed the effect of changes in real exchange rates over the dozen years to 2000, we would have predicted a dramatic growth in Australian wine exports because over that period Australia's currency depreciated in real terms by almost 30 percent. In fact the volume and US\$ value of Australia's wine exports grew 16 and 18 percent per year, respectively, over that period. An analysis of the effects of US dollar appreciation at the turn of the century is provided by Anderson and Wittwer (2001).

1), Australian total annual exports would increase by 90 ML to become about one-eighth more than in 2011; while in Alternative 2 (slower import growth by China) that increase is only two-thirds as large. The increase in the US\$ value of total exports from Australia is much greater though, ranging from 20 percent to 50 percent over 2011 values (Table 8).

There is little joy for Australian producers of non-premium wines (and thus grapes) in these projections, however: their exports are expected to fall in all but the most optimistic (Alternative 1) scenario (Table 9). This is partly because only a small fraction (between one- and two-fifths) of the increased volume of imports by China is projected to be non-premium wines (Table 7). For Australia those fractions are similar: between 25 percent and 42 percent of the projected increase in volume of its exports to China – and much less of the value of those sales – are non-premium.

The share of China in Australia's total value of wine exports is projected to grow from 6 percent in 2009 to between 20 and 28 percent by 2018, depending on how rapidly China's aggregate wine imports grow. The UK share, by contrast, is projected to stay flat or fall by 2 percentage points so as to be well below China's by 2018 in the Base and Alternative 1 scenarios and to be barely above it even in the Alternative 2 scenario. Even the US share barely recovers from its low 2012 level and falls below China's if China keeps growing rapidly (Figure 7).

In terms of import competition in Australia's domestic market, the share of sales supplied from abroad is projected to not change if there is no change to real exchange rates, but to fall by two percentage points in both value and volume terms in the two Alternative scenarios in which exchange rates move half-way back to 2009 rates.

Conclusion

This modeling exercise suggests RER changes go a long way towards explaining why market shares and producer prices have changed so much for New World wine-exporting countries in recent years – especially the decline in competitiveness for Australia and the improvement for the US. They also suggest exchange rates are capable of playing a major role in the years ahead. But on top of that, the above projections point to the enormous speed with which China may become a dominant market for Australian wine producers. While the recent and projected rates of

increase in per capita wine consumption in China are no faster than what occurred in several West European wine-importing countries in earlier decades, it is the sheer size of China's population – and the fact that grape wine still accounts for only 4 percent of Chinese alcohol consumption – that makes this import growth opportunity unprecedented. It would be somewhat less if China's own winegrape production increases faster, as in the Alternative 2 scenario, but certainly in as short a period as the next five years that is not able to reduce the growth in China's wine imports very much, especially at the premium end of the spectrum.

Of course these projections are not predictions. Where exchange rates move, and how fast Australian wine producers (as compared with their competitors abroad) take advantage of the projected market growth opportunities in Asia, will determine the actual changes in market shares over the coming years. Not all segments of the industry are projected to benefit, with non-premium producers facing falling prices if demand for their product continues to dwindle as projected above. Nor will all exporting firms benefit. In particular, those firms that fail to invest sufficiently in building relationship with their initial Chinese importer/distributor may find they do not get repeat orders, for example. But at least the above results can alert producers to possibilities, given the range of assumptions built into our model of global wine markets.

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Table 1: Estimated impact of 2007-2011 changes in real exchange rates on domestic prices (in real local currency) and quantities of wine, main exporters and importers

(percent)

(a) Main exporters

	Real exchange rate	Nonprem grape price	Prem grape price	Comm. premium wine ^b producer price	Super premium wine ^b producer price	Comm. premium wine ^b prod'n volume	Super premium wine ^b prod'n volume	Domestic wine consum. volume (model)	<i>Domestic wine consum. volume (actual)</i>
W. Europe 6 ^a	0	6	5	5	5	2	2	0	(-10)
United States	0	3	4	2	4	1	2	-1	(2)
New Zealand	9	-1	-1	-1	-1	0	0	2	(0)
Chile	16	-8	-6	-8	-8	-2	-1	-2	(-5)
South Africa	23	-9	-8	-10	-12	-2	-2	1	(-1)
Australia	33	-12	-13	-13	-19	-2	-3	4	(3)

(b) Main importers

	Real exchange rate	Comm. premium wine ^b consumer price	Super premium wine ^b consumer price	Domestic wine consum. volume (model)	<i>Domestic wine consum. volume (actual)</i>
United Kingdom	-18	8	8	-4	(-7)
Other W. Europe ^c	4	-2	-3	1	(na)
Japan	29	-9	-8	10	(-2)
China	35	1	2	0	(22)

^a France, Italy, Spain, Portugal, Germany and Austria.

^b Commercial-premium wines are defined by Anderson and Nelgen (2011) to be those between US\$2.50 and \$7.50 per litre pre-tax wholesale or at a country's border.

^c Other W. Europe = Belgium, Denmark, Finland, Ireland, the Netherlands, Sweden and Switzerland

Source: Authors' model results

Table 2: Impact of real exchange rate changes on export volume of Australia and other wine-exporting countries, 2007 to 2011

(ML)

<i>Importer:</i>	<i>Exporter:</i> Australia	Other Southern Hemisphere	United States	Western European exporters	Other
United Kingdom	-33	-31	2	2	1
United States	-23	-38	0	6	0
Canada	-3	-10	4	6	0
New Zealand	0	0	0	0	0
Germany	-2	-13	1	7	-6
Other W. Europe ^a	-7	-24	2	32	9
China	5	8	2	7	2
Other Asia	-1	1	5	30	-1
Other countries	0	-3	3	75	1
TOTAL WORLD	-64	-110	19	167	6

^a Other W. Europe = Belgium, Denmark, Finland, Ireland, the Netherlands, Sweden and Switzerland

Source: Authors' model results

Table 3: Impact of real exchange rate changes on Australia's wine export and import volumes and values, by wine category, 2007 to 2011

	<u>Volume (ML)</u>		<u>Value (AUS\$m)</u>	
	Exports	Imports (and % from NZ)	Exports	Imports
Non-premium wine	-17	0.4 (43)	-94	-2
Commercial-premium ^c	-35	1.7 (20)	-531	-11
Super-premium+ wine	-7	0.8 (90)	-89	5
Sparkling wine	-4	1.5 ^b (1)	-35	-9
Total	-64	4.4 (18)	-748	-17

^a 33 percent of the increase in commercial-premium wine is from Italy.

^b 37 percent of the increase in sparkling wine is from France.

^c Commercial-premium wines are defined by Anderson and Nelgen (2011) to be those between US\$2.50 and \$7.50 per litre pre-tax wholesale or at a country's border.

Source: Authors' model results

Table 4: Projected real producer price changes, in local currency, 2011 to 2018

(percent)

(a) 2011 to 2018: **Base scenario** (assuming no RER changes from 2011)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	CHILE	SAF	China
Non-premium wine	-24.9	-26.9	-26.0	-26.0	-26.3	-26.6	-15.3	-19.1	-23.4	-18.8	-17.7	-17.1	29.2
Commercial-premium	-2.0	-5.0	-4.3	-5.2	-8.3	-3.4	2.7	-1.3	-2.1	3.9	3.1	-0.2	93.2
Super-premium	37.9	37.4	41.8	35.5	30.0	35.1	49.7	42.9	40.7	46.4	45.8	54.0	164.4
Iconic still wine	41.2	41.8	42.3	41.9	39.9	40.9	44.8	45.2	46.4	85.3	61.6	84.3	119.5
Sparkling wine	4.2	4.8	5.0	5.1	3.3	3.0	8.3	7.7	7.7	34.9	9.9	7.8	8.9
Premium grapes	21.5	10.8	14.4	7.1	24.4	9.6	20.1	34.6	29.8	7.0	13.9	13.5	60.2
Non-premium grapes	-7.5	-18.6	-19.4	-15.9	-18.3	-12.8	-6.1	-10.6	-10.6	-3.8	-7.5	-11.9	28.8

(b) 2011 to 2018: **Alternative 1** (assuming RERs return half-way from 2011 to 2009 rates)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	CHILE	SAF	China
Non-premium wine	-25.5	-27.5	-26.4	-27.0	-26.7	-27.4	-5.9	-14.2	-24.1	-17.2	-12.4	-12.1	20.8
Commercial-premium	-3.9	-7.2	-6.5	-7.3	-9.4	-5.8	19.0	6.4	-3.7	7.3	11.4	8.3	75.9
Super-premium	36.0	35.2	38.9	33.7	29.7	33.5	67.9	56.0	40.2	52.5	56.5	63.6	144.4
Iconic still wine	38.5	39.0	39.5	39.5	39.2	38.9	49.6	55.4	44.6	84.9	64.3	85.7	102.7
Sparkling wine	3.0	3.0	3.4	3.2	2.3	2.0	19.0	15.0	6.7	35.9	18.1	20.2	-0.2
Premium grapes	19.7	8.4	11.9	4.9	23.8	7.9	34.6	45.9	29.0	10.5	23.5	24.9	52.4
Non-premium grapes	-9.2	-20.1	-20.7	-17.9	-19.5	-14.5	12.2	-1.2	-12.2	-0.9	1.3	-2.3	24.3

(c) 2011 to 2018: **Alternative 2** (assuming also slower Chinese import growth)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	CHILE	SAF	China
Non-premium wine	-26.9	-28.0	-26.8	-28.0	-27.1	-28.1	-11.7	-17.2	-26.0	-18.0	-16.3	-13.3	-16.0
Commercial-premium	-7.6	-9.7	-8.8	-9.8	-10.7	-8.8	12.2	2.7	-6.5	5.2	5.8	5.6	47.4
Super-premium	33.8	33.6	37.2	32.4	29.5	32.2	59.0	53.2	39.8	51.0	53.5	62.2	97.4
Iconic still wine	38.5	38.9	39.4	39.4	39.1	38.8	49.5	55.3	44.6	84.9	64.3	85.6	67.2
Sparkling wine	2.6	2.7	3.1	2.9	2.1	1.7	18.5	14.5	6.5	35.8	17.6	19.8	1.3
Premium grapes	17.7	6.1	9.7	2.5	23.1	6.3	29.8	42.8	27.8	8.4	17.7	21.7	36.8
Non-premium grapes	-11.7	-21.6	-22.1	-19.9	-20.7	-16.0	4.4	-6.0	-15.2	-2.5	-5.0	-4.9	6.1

Source: Authors' model results

Table 5: Projected grape and wine output volume changes, 2011 to 2018

(percent)

(a) **Base scenario** (assuming no RER changes from 2011)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	BRA	CHILE	SAF	CHINA
Non-premium wine	-9.0	-10.3	-11.7	-7.2	-11.7	-10.6	-8.1	-9.9	-5.0	-1.5	-7.4	-4.2	-14.0	17.9
Commercial-premium	6.4	5.9	6.0	5.7	2.6	6.5	8.1	5.5	5.9	7.2	7.9	7.3	5.1	25.9
Super-premium	15.1	15.1	15.6	15.4	14.6	15.0	15.3	18.9	15.5	15.6	17.1	15.3	18.4	29.1
Iconic still wine	15.7	15.9	16.1	16.1	15.9	15.4	15.4	19.1	15.8	12.6	14.2	15.0	18.1	34.2
Sparkling wine	8.6	9.2	9.3	9.3	8.5	8.6	11.4	10.3	9.6	12.0	10.1	11.9	9.8	0.3
Premium grapes	9.8	8.8	9.3	8.4	10.3	8.6	9.6	12.2	10.6	7.2	9.0	9.5	8.9	20.2
Non-premium grapes	6.0	2.3	1.5	3.4	2.0	4.7	6.1	3.8	4.9	5.2	3.7	5.2	0.3	17.8

(b) **Alternative 1** (assuming RERs return half-way from 2011 to 2009 rates)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	BRA	CHILE	SAF	CHINA
Non-premium wine	-9.7	-11.0	-12.2	-8.3	-12.2	-11.6	1.4	-3.7	-5.6	-0.9	-2.2	-3.5	-6.2	17.2
Commercial-premium	5.6	5.0	5.1	4.9	2.0	5.6	13.4	9.6	5.2	8.3	11.6	9.1	10.1	24.6
Super-premium	14.9	14.9	15.3	15.2	14.6	14.8	18.0	20.4	15.4	16.7	18.1	15.4	19.2	28.4
Iconic still wine	15.3	15.6	15.8	15.9	15.8	15.2	16.3	20.1	15.6	12.8	14.2	15.1	18.1	32.9
Sparkling wine	8.2	8.7	8.8	8.8	8.1	8.3	15.1	12.6	9.3	12.2	12.6	13.5	15.2	-15.9
Premium grapes	9.6	8.5	9.0	8.1	10.3	8.4	11.4	13.0	10.5	7.7	10.1	9.7	10.5	19.7
Non-premium grapes	5.6	1.8	1.0	2.8	1.6	4.3	9.6	7.0	4.5	5.7	6.6	6.2	5.1	17.3

(c) **Alternative 2** (assuming also slower Chinese import growth)

	FRA	ITA	POR	SPN	AUT	GER	AUS	NZL	USA	ARG	BRA	CHILE	SAF	CHINA
Non-premium wine	-11.6	-11.6	-12.6	-9.4	-12.6	-12.6	-4.4	-7.3	-7.6	-1.3	-5.9	-3.9	-7.7	23.5
Commercial-premium	3.7	3.7	3.9	3.6	1.0	4.1	11.7	7.8	3.8	7.6	9.2	8.7	8.7	35.3
Super-premium	14.6	14.7	15.1	15.1	14.5	14.6	17.3	20.1	15.4	16.5	17.9	15.4	19.2	39.3
Iconic still wine	15.4	15.7	15.9	15.9	15.8	15.3	16.4	20.2	15.6	12.8	14.3	15.1	18.1	43.6
Sparkling wine	8.2	8.7	8.8	8.8	8.1	8.3	15.3	12.6	9.3	12.2	12.8	13.5	15.2	15.2
Premium grapes	9.5	8.2	8.7	7.8	10.2	8.2	11.0	12.8	10.4	7.4	9.4	9.7	10.1	30.9
Non-premium grapes	5.0	1.2	0.4	2.1	1.1	3.9	8.2	5.6	3.6	5.4	4.7	5.9	4.0	27.4

Source: Authors' model results

Table 6: Projected change in global wine import and export volumes and values, 2011 to 2018

(a) Imports

	Volume (ML)			Value (US\$m)		
	Base	Alt. 1	Alt. 2	Base	Alt. 1	Alt. 2
United Kingdom	-54	-36	-29	98	174	93
North America	-23	11	37	961	1097	1015
Other Europe	-122	-162	-140	1012	646	552
China	627	739	334	1948	2305	1178
Other Asia	20	14	16	877	788	769
Other developing	152	133	141	498	311	318
WORLD	600	696	359	5394	5321	3925

(b) Exports

	Volume (ML)			Value (US\$m)		
	Base	Alt. 1	Alt. 2	Base	Alt. 1	Alt. 2
Australia	0	90	59	336	933	675
Other New World	78	219	75	469	954	597
Old World	538	412	263	4370	3489	2653
WORLD	600	698	359	5394	5321	3925
	(6%)	(7%)	(4%)	(17%)	(17%)	(15%)

Source: Authors' model results

Table 7: Projected changes in wine consumption in major importers by source of imports, 2011 to 2018 (ML) Source: Authors' model results

(a) **Base scenario** (assuming no RER changes from 2011)

	Old World	USA	All Sthn. Hemisph.	<i>All imports</i>	<i>Home sourced</i>	Total cons'm
USA						
Non-premium wine	0	0	-34	-37	-38	-75
Commercial-premium	22	0	-30	-9	22	13
Super-premium+	12	0	2	15	71	86
Sparkling wine	7	0	0	7	8	15
Total	41	0	-61	-24	62	38
China						
Non-premium wine	82	21	121	224	116	340
Commercial-premium	179	29	169	383	97	480
Super-premium+	11	0	4	18	6	24
Sparkling wine	2	0	0	2	0	2
Total	274	50	293	627	218	845

(b) **Alternative 1** (assuming RERs return half-way from 2011 to 2009 rates)

	Old World	USA	All Sthn. Hemisph.	<i>All imports</i>	<i>Home sourced</i>	Total cons'm
USA						
Non-premium wine	-2	0	-17	-23	-40	-63
Commercial-premium	19	0	-9	9	19	28
Super-premium+	13	0	6	19	71	90
Sparkling wine	7	0	1	8	8	16
Total	37	0	-19	14	58	72
China						
Non-premium wine	86	23	181	290	111	401
Commercial-premium	187	30	202	425	93	518
Super-premium+	12	0	6	20	6	26
Sparkling wine	2	0	0	2	0	2
Total	287	53	389	739	209	948

(c) **Alternative 2** (assuming also slower Chinese import growth)

	Old World	USA	All Sthn. Hemisph.	<i>All imports</i>	<i>Home sourced</i>	Total cons'm
USA						
Non-premium wine	-4	0	-11	-17	-38	-55
Commercial-premium	18	0	6	23	21	44
Super-premium+	14	0	8	22	71	93
Sparkling wine	7	0	1	8	8	16
Total	35	0	5	37	62	99
China						
Non-premium wine	21	5	48	74	152	226
Commercial-premium	107	16	121	248	133	381
Super-premium+	6	0	3	10	8	18
Sparkling wine	1	0	0	2	0	2
Total	134	22	172	334	292	626

Table 8: Projected change in Australian wine export volumes and values, 2011 to 2018

	Volume (ML)			Value (US\$m)		
	Base	Alt. 1	Alt. 2	Base	Alt. 1	Alt. 2
United Kingdom	-40	-25	-11	-59	42	48
Other Europe	-20	-13	-5	-26	28	36
United States	-36	-14	4	-22	115	130
China	108	147	65	428	649	356
Other	-12	0	56	15	99	105
WORLD	0	90	59	336	933	675
	(0%)	(13%)	(8%)	(18%)	(49%)	(36%)

Source: Authors' model results

Table 9: Projected change in Australia's wine export and import volumes and values, 2011 to 2018

(a) **Base scenario** (assuming no RER changes from 2011)

	Volume (ML)		Value (AUS\$m)	
	Exports	Imports	Exports	Imports
Non-premium wine	-22	0	-38	-5
Commercial-premium	20	4	213	18
Super-premium	2	2	130	19
Iconic still wine	0	0	25	34
Sparkling wine	1	3	6	33
Total	0	8	336	97

(b) **Alternative 1** (assuming RERs return half-way from 2011 to 2009 rates)

	Volume (ML)		Value (AUS\$m)	
	Exports	Imports	Exports	Imports
Non-premium wine	26	-1	44	-1
Commercial-premium	55	3	944	58
Super-premium	6	1	268	23
Iconic still wine	0	0	71	37
Sparkling wine	3	1	34	50
Total	90	4	1361	166

(c) **Alternative 2** (assuming also slower Chinese import growth)

	Volume (ML)		Value (AUS\$m)	
	Exports	Imports	Exports	Imports
Non-premium wine	-3	-1	10	-3
Commercial-premium	52	2	754	45
Super-premium	7	1	214	20
Iconic still wine	0	0	71	37
Sparkling wine	3	1	33	49
Total	59	3	1081	148

Source: Authors' model results

Appendix Table 1: Cumulative changes in exchange rates and prices relative to the US dollar, 2007-11

(percent)

(a) 2007 to 2011

	ϕ_d	P_d^g	P_d^c	ϕ_d^R		ϕ_d	P_d^g	P_d^c	ϕ_d^R
	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
FRA	-1.5	5.8	6.7	0.1	UKR	57.8	91.4	71.4	13.0
ITA	-1.5	6.5	8.6	0.7	TURK	28.5	35.4	35.7	-1.9
POR	-1.5	4.3	6.9	-1.3	AUS	-18.9	16.2	13.0	33.4
SPN	-1.5	4.3	9.0	-1.3	NZL	-7.0	8.8	13.4	9.0
AUT	-1.5	6.9	9.1	1.1	CAN	-7.9	8.5	7.5	9.7
BEL	-3.9	7.3	10.5	4.0	USA	0.0	7.3	8.5	0.0
DEN	-1.4	10.3	10.1	4.1	ARG	32.8	77.2	100.0	24.3
FIN	-1.5	7.3	7.2	1.5	BRA	-14.1	34.4	24.1	45.8
GER	-1.5	3.4	6.5	-2.2	CHILE	-7.4	15.7	5.3	16.4
GRE	-1.5	11.3	14.1	5.3	MEX	13.7	26.0	23.3	3.3
IRL	-1.5	-7.7	1.0	-12.7	URU	-17.7	30.0	33.2	47.1
NLD	-1.5	4.2	7.5	-1.4	SAFR	3.1	35.8	30.8	22.8
SWE	-3.9	7.3	7.2	4.0	OAFR	5.3	52.7	61.9	35.2
SWI	-26.0	3.3	2.9	30.1	CHINA	-15.1	23.2	14.5	35.1
UK	24.9	10.4	14.2	-17.7	HK	-0.2	4.8	13.0	-2.2
BUL	-1.6	22.0	23.3	15.5	INDIA	12.9	34.9	46.5	11.3
CRO	-0.4	13.0	12.2	5.7	JAP	-32.2	-5.8	-1.0	29.4
GEO	1.0	27.4	30.1	17.6	KOR	19.3	12.2	15.2	-12.4
HUN	9.5	16.3	20.5	-1.0	MAL	-11.0	14.3	11.3	19.6
MOLD	-3.3	33.2	30.3	28.4	SING	-16.5	0.7	15.9	12.5
ROM	25.0	31.9	27.8	-1.7	TAIW	-15.1	23.2	14.5	35.1
RUS	14.9	55.6	47.6	26.2	THAI	-11.7	14.5	12.1	20.7

Appendix Table 1 (continued): Cumulative changes in exchange rates and prices relative to the US dollar, 2007-11

(percent)

(b) 2009 to 2011

	ϕ_d	P_d^s	P_d^c	ϕ_d^R		ϕ_d	P_d^s	P_d^c	ϕ_d^R
	(1)	(2)	(3)	(4)		(1)	(2)	(3)	(4)
FRA	-0.1	2.4	3.7	-1.4	UKR	2.3	31.6	18.1	23.9
ITA	-0.1	1.7	4.3	-2.1	TURK	8.1	14.8	15.6	2.2
POR	-0.1	1.7	5.1	-2.1	AUS	-24.4	6.4	6.3	35.5
SPN	-0.1	1.8	5.1	-2.0	NZL	-20.9	3.5	6.8	25.9
AUT	-0.1	3.9	5.1	0.0	CAN	-13.4	6.3	4.7	18.1
BEL	-0.1	3.7	5.8	-0.2	USA	0.0	3.9	4.8	0.0
DEN	0.2	4.7	5.1	0.6	ARG	10.8	35.3	45.0	17.5
FIN	-0.1	4.1	4.2	0.2	BRA	-16.3	15.8	12.0	33.1
GER	-0.1	1.4	3.5	-2.4	CHILE	-13.8	10.5	4.8	23.3
GRE	-0.1	3.4	8.2	-0.4	MEX	-8.1	9.8	8.2	14.9
IRL	-0.1	-1.5	1.6	-5.2	URU	-14.4	13.9	15.3	28.0
NLD	-0.1	2.5	3.7	-1.3	SAFR	-14.3	16.5	9.5	30.8
SWE	-15.2	1.9	4.2	15.6	OAFR	7.0	22.4	22.5	10.1
SWI	-18.4	0.7	0.9	18.7	CHINA	-5.4	15.0	8.9	17.0
UK	-2.8	5.3	7.9	4.2	HK	0.4	3.9	7.7	-0.4
BUL	0.0	7.9	6.8	3.8	INDIA	-3.6	17.1	21.9	16.9
CRO	1.1	3.1	3.3	-1.9	JAP	-14.7	-4.2	-1.0	8.1
GEO	1.0	18.5	16.2	13.0	KOR	-13.2	5.4	7.1	16.9
HUN	-0.6	6.7	9.0	3.3	MAL	-13.2	11.3	4.9	23.3
MOLD	5.7	19.3	15.6	8.7	SING	-13.5	9.1	8.2	21.4
ROM	0.0	10.9	12.2	6.8	TAIW	-5.4	15.0	8.9	17.0
RUS	-7.4	29.3	15.9	34.4	THAI	-11.1	8.1	7.3	16.9

Key: ϕ_d = nominal exchange rate change; P_d^s = change in GDP deflator; P_d^c = change in the consumer price index; ϕ_d^R = calculated change in real exchange rate.

Source: Authors' compilation based on data downloaded from data.worldbank.org, and on estimated inflation rates for Argentina from Cavallo (2013).

Appendix Table 2: Cumulative consumption and population growth, 2009-11 and 2011-18
(percent)

(a) Observed, 2009 to 2011					
	Aggregate consumption	Population		Aggregate consumption	Population
FRA	2.0	1.1	AUS	5.9	3.0
ITA	0.6	1.0	NZL	3.0	2.1
POR	-2.1	0.0	CAN	5.7	2.2
SPN	0.2	0.7	USA	3.7	1.6
AUT	1.6	0.6	ARG	18.5	1.8
BEL	2.4	2.0	BRA	12.8	1.8
DEN	0.4	0.9	CHILE	19.7	1.9
FIN	3.2	0.9	MEX	8.8	2.5
GER	2.5	-0.2	URU	20.5	0.7
GRE	-13.6	0.2	OLAC	12.9	2.2
IRL	-4.3	0.6	SAF	8.3	2.6
NLD	-0.2	1.0	TURK	13.8	2.5
SWE	5.4	1.7	NAFR	9.4	3.5
SWISS	2.9	2.1	OAFR	9.4	3.5
UK	0.4	1.3	MEST	0.0	0.0
OWEN	-1.4	0.2	CHINA	5.6	1.0
BUL	-0.9	-1.4	HK	14.5	1.0
CRO	-0.6	-0.5	INDIA	14.8	2.8
GEO	0.0	1.7	JAP	2.8	0.2
HUN	-2.6	-0.5	KOR	6.9	1.2
MOLD	6.5	-0.2	MALAY	5.3	3.3
ROM	15.0	-0.4	PHILI	9.3	3.4
RUS	22.9	0.0	SINGA	8.6	3.9
UKR	17.6	-0.8	TAIW	5.6	1.0
OCEF	22.9	0.0	THAI	6.1	1.2
			OAPA	0.0	4.6

Appendix Table 2 (cont.): cumulative consumption and population growth, 2009-11 and 2011-18
(percent)

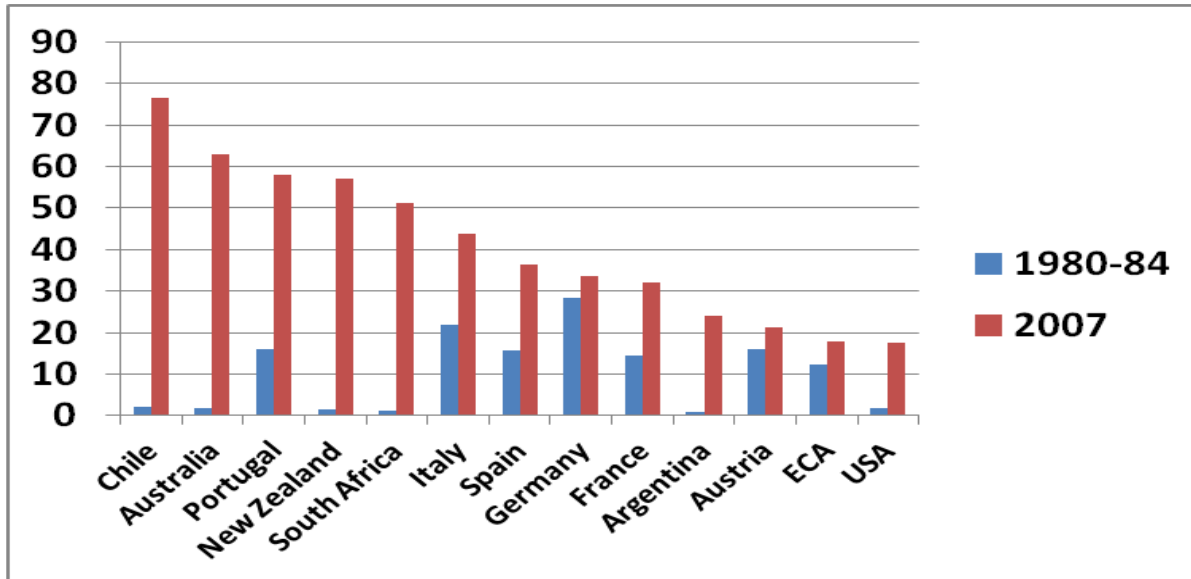
(b) Assumed, 2011 to 2018					
	Aggregate consumption	Population		Aggregate consumption	Population
FRA	10.0	0.7	AUS	17.8	7.3
ITA	10.0	0.7	NZL	15.4	5.9
POR	10.0	0.7	CAN	14.2	5.6
SPN	10.0	0.7	USA	15.5	5.2
AUT	10.0	0.7	ARG	30.0	4.9
BEL	10.0	0.7	BRA	27.3	3.8
DEN	10.0	0.7	CHILE	23.4	5.0
FIN	10.0	0.7	MEX	22.0	4.6
GER	10.0	0.7	URU	25.6	7.3
GRE	10.0	0.7	OLAC	25.6	7.3
IRL	10.0	0.7	SAF	23.1	3.0
NLD	10.0	0.7	TURK	31.8	9.1
SWE	10.0	0.7	NAFR	31.8	9.1
SWISS	10.0	0.7	OAFR	55.8	15.1
UK	10.0	0.7	MEST	31.8	9.1
OWEN	10.0	0.7	CHINA	69.0	2.7
BUL	23.1	1.9	HK	23.7	4.7
CRO	23.1	1.9	INDIA	63.1	7.0
GEO	23.1	1.9	JAP	7.1	-1.3
HUN	23.1	1.9	KOR	22.0	0.7
MOLD	23.1	1.9	MALAY	34.4	8.2
ROM	23.1	1.9	PHILI	34.4	9.8
RUS	20.6	-1.7	SINGA	18.6	5.6
UKR	23.1	1.9	TAIW	34.6	2.3
OCEF	23.1	1.9	THAI	36.0	2.6
			OAPA	32.2	11.2

Source: Projections from global economy-wide modeling by Anderson and Strutt (2012).

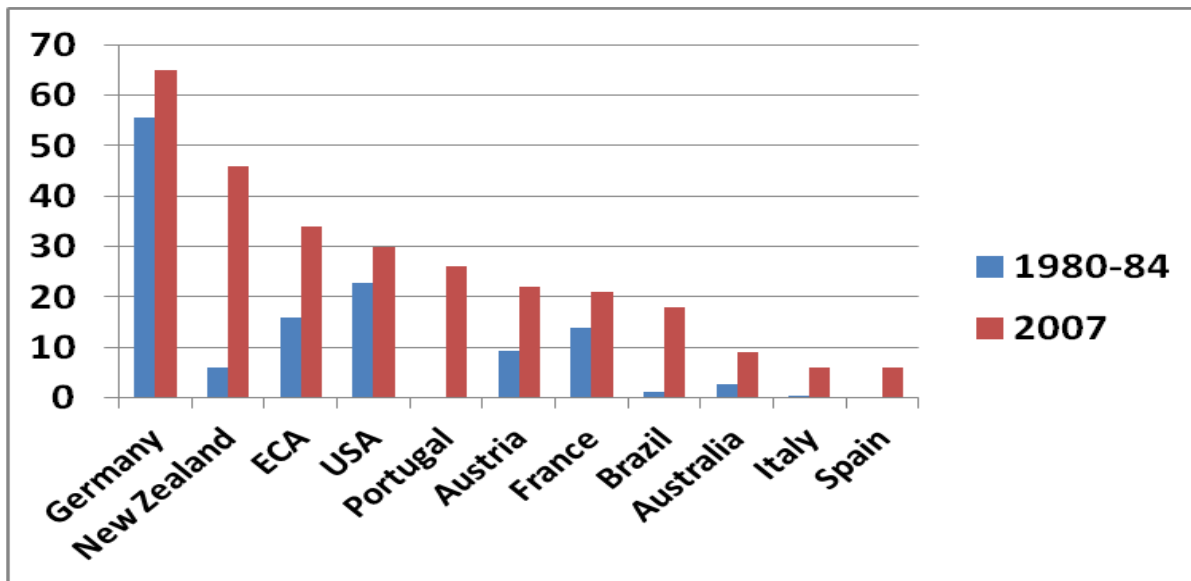
Figure 1: Trade volumes as percent of production and consumption volumes, 1980-84 and 2007^a

(percent)

(a) Exports as percent of production



(b) Imports as percent of consumption



^a For 2007 the Australian number refers to 2006-08, because 2007 was a severe drought year. ECA is the former Comecon countries of Eastern Europe and the former Soviet Union.

Source: Anderson and Nelgen (2011, Tables 51, 52, 120 and 121)

Figure 2: Nominal value of the Australian dollar, January 1970 to May 2013

(US dollars, Euros and UK pounds per AUD)

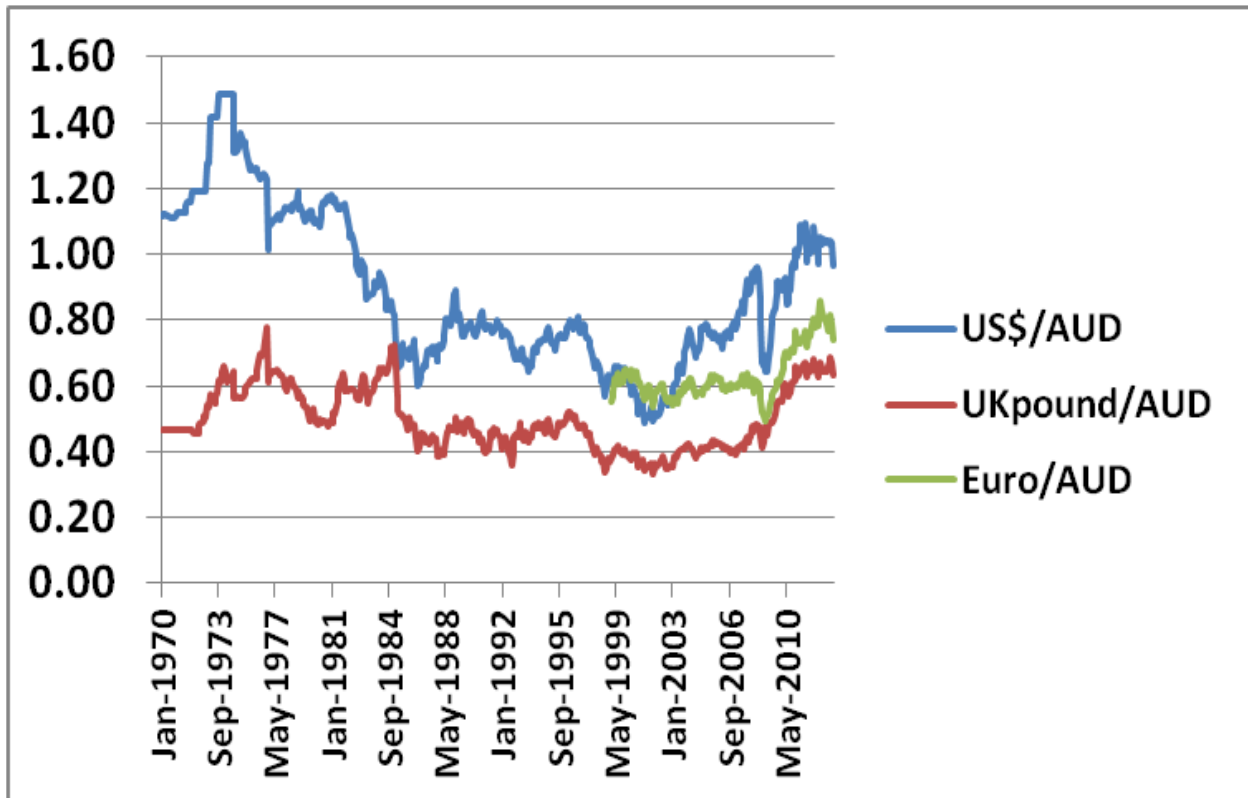
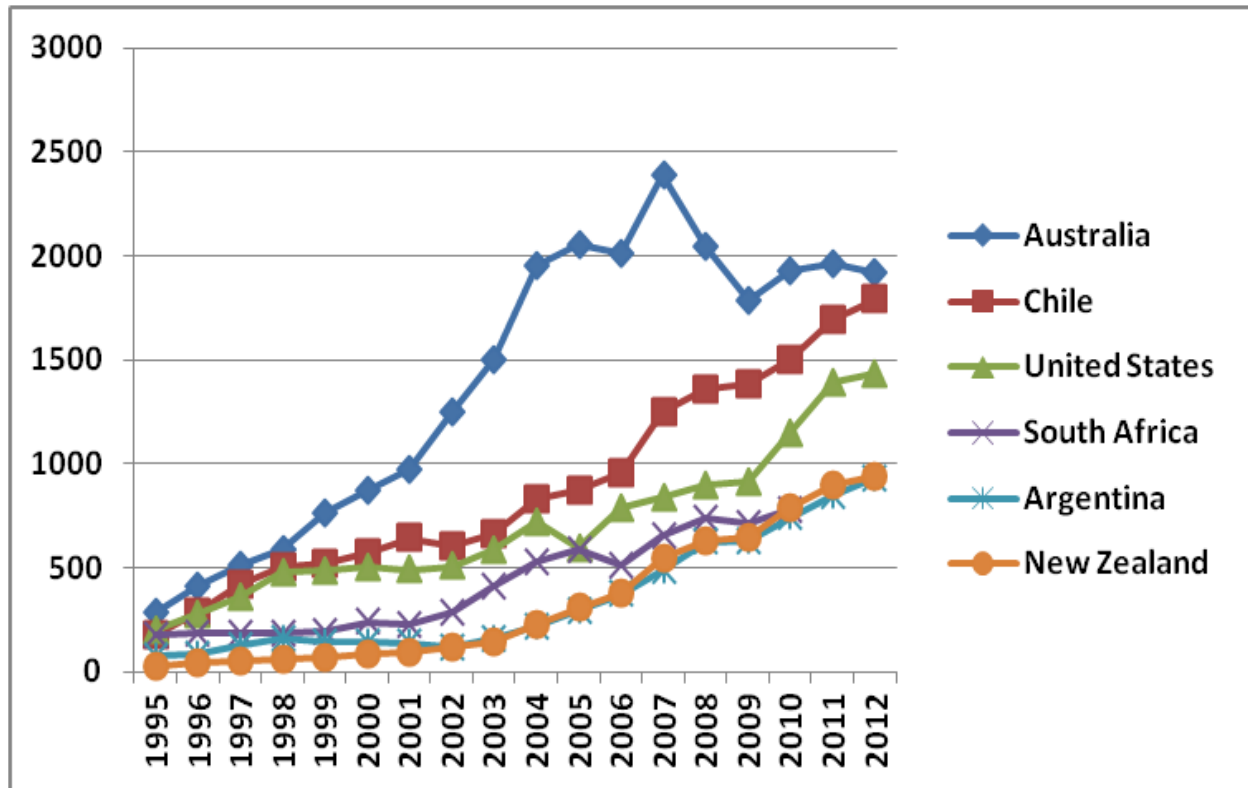
Source: Reserve Bank of Australia (www.rba.gov.au, accessed 11 June 2013)

Figure 3: Value of wine exports from New World countries, 1995 to 2012

(US\$ million)

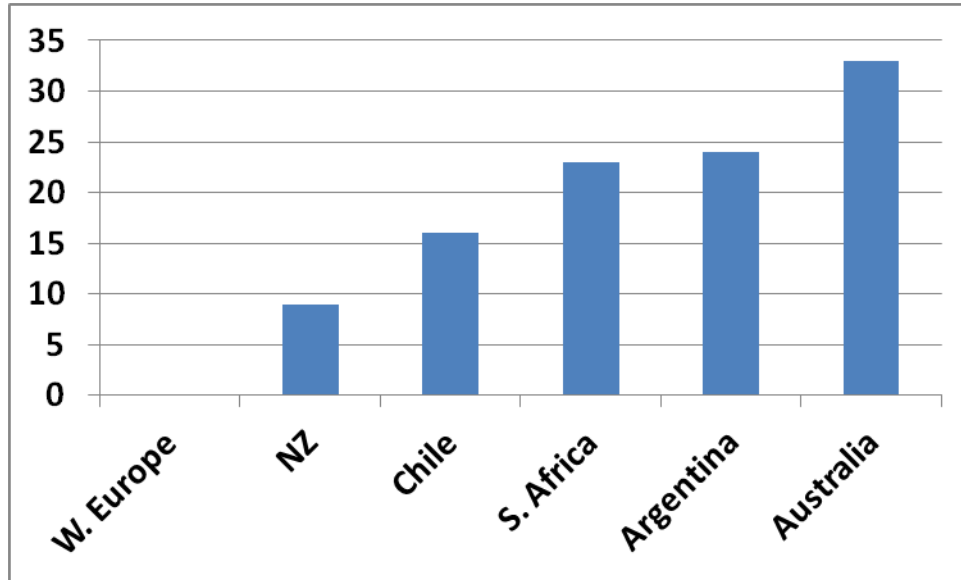


Source: Updated from Anderson and Nelgen (2011, Table 63).

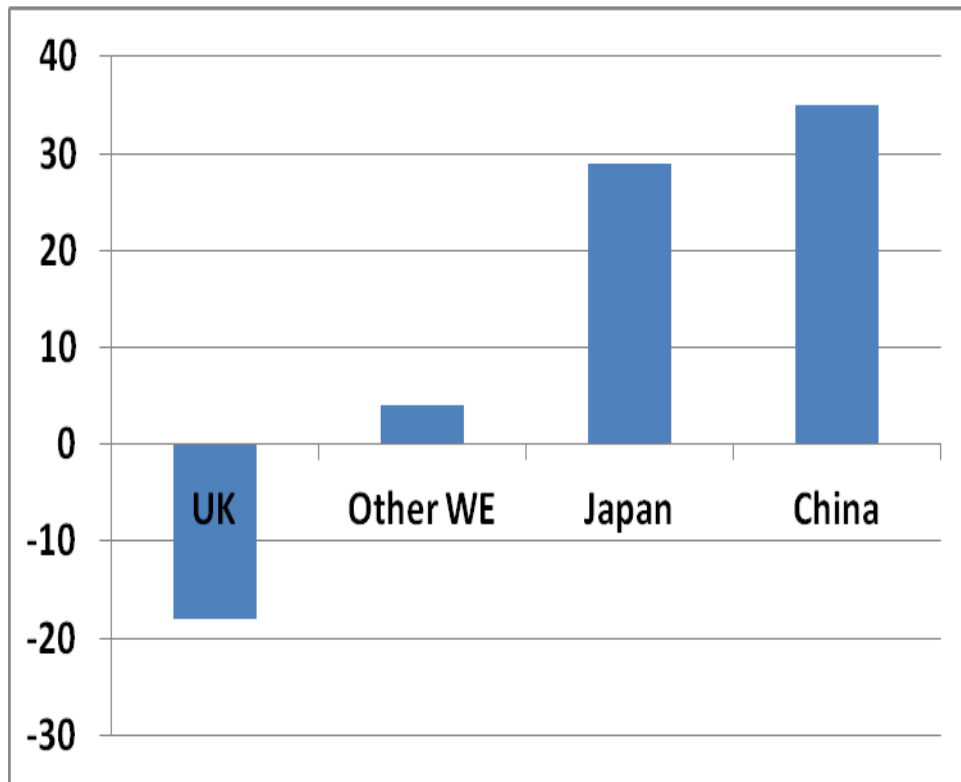
Figure 4: Real exchange rate changes, 2007 to 2011

(percent appreciation relative to US\$)

(a) Main exporters



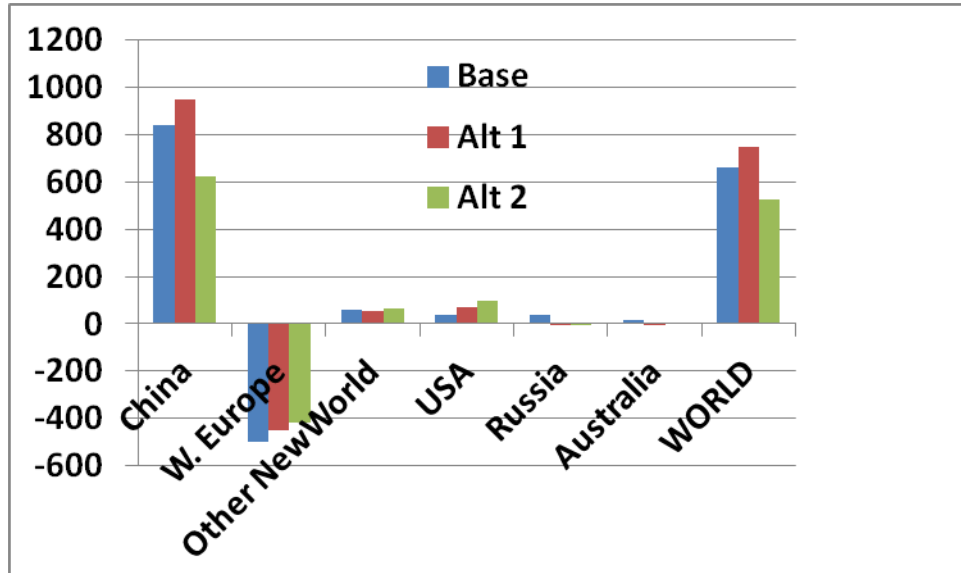
(b) Main importers



Source: Authors' calculations

Figure 5: Changes in consumption of all wines, 2011 to 2018

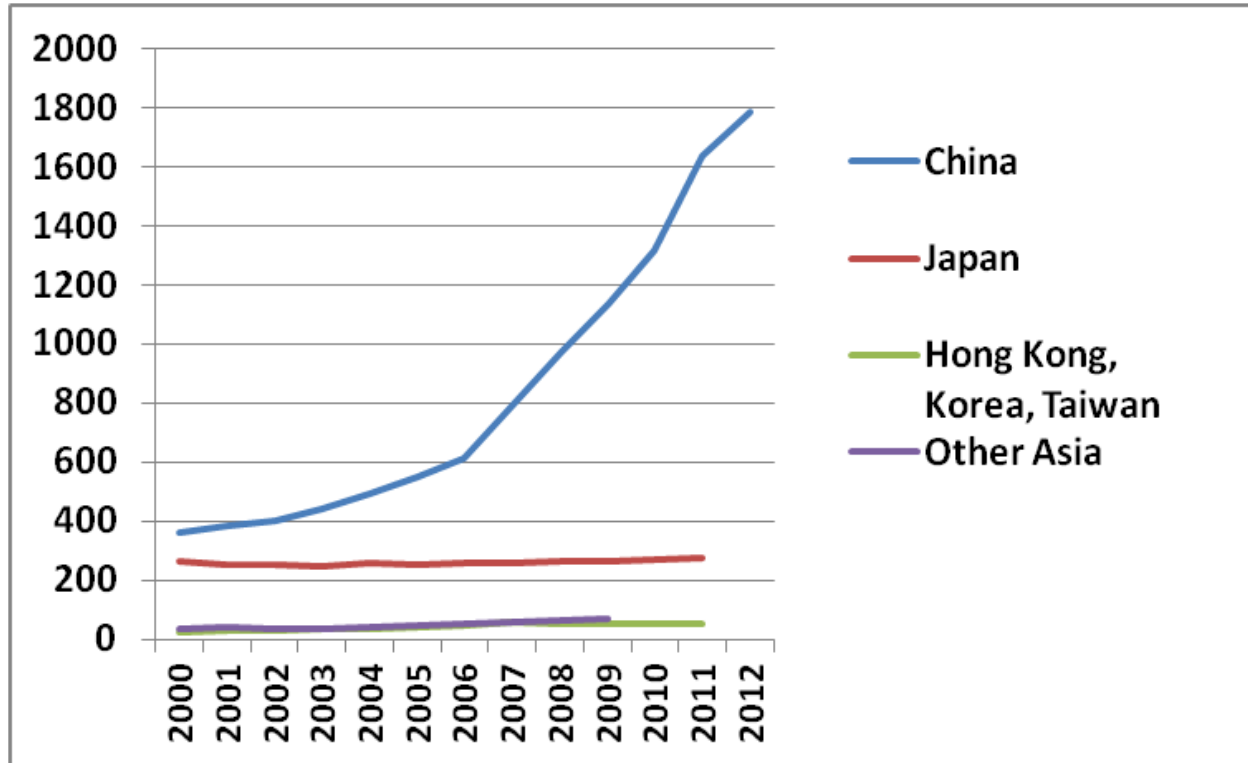
(ML)



Source: Authors' model results

Figure 6: China's increasing dominance in Asian wine consumption, 2000 to 2012

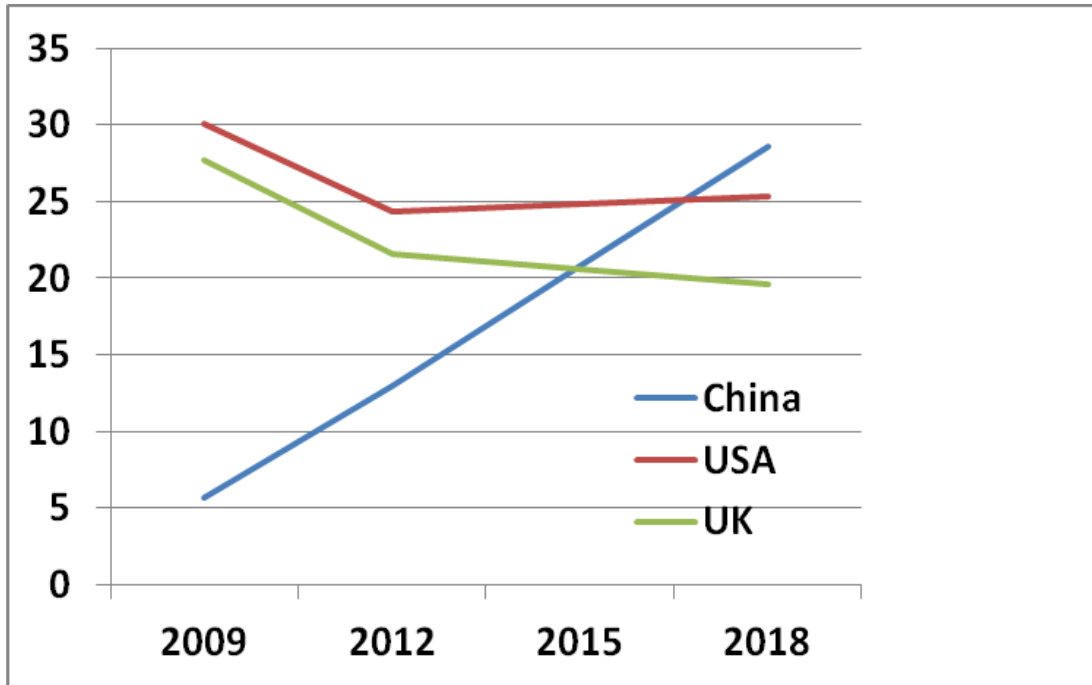
(ML per year)



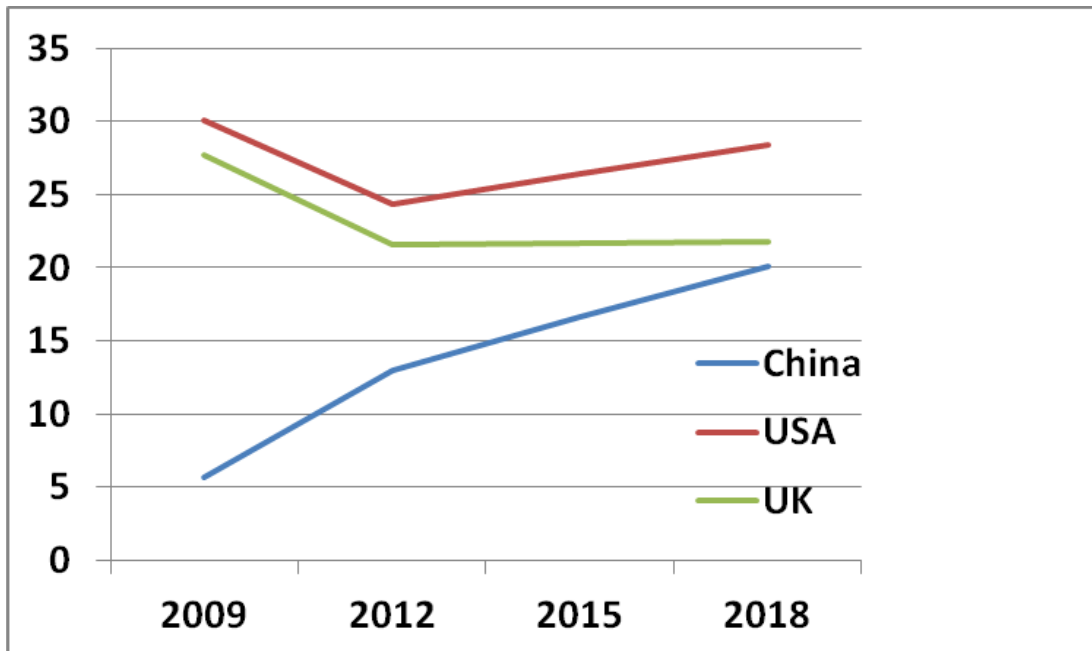
Source: Anderson and Nelgen (2011, Table 16), updated for China from OIV (2013) and for other countries from Euromonitor International.

Figure 7: Shares of value of Australian wine exports to US, UK and China, 2009 to 2018
(percent)

(a) **Alternative 1** (assuming RERs return half-way from 2011 to 2009 rates)



(b) **Alternative 2** (assuming also slower Chinese import growth)



Source: Historical data from www.wineaustralia.com and projections from authors' model results