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Kym Anderson and Signe Nelgen

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Contact details:

Wine Economics Research Centre

School of Economics

University of Adelaide

SA 5005 AUSTRALIA

Email: wine-econ@adelaide.edu.au

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Kym Anderson

Wine Economics Research Centre, University of Adelaide, Adelaide and
Arndt-Cordon Department of Economics, Australian National University, Canberra
kym.anderson@adelaide.edu.au

and

Signe Nelgen

Wine Economics Research Centre, University of Adelaide, Adelaide and
Hochschule Geisenheim University, Geisenheim, Germany
Signe.Nelgen@hs-gm.de

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Corresponding author:

Professor Kym Anderson
Executive Director, Wine Economics Research Centre
School of Economics
University of Adelaide
Adelaide SA 5005, Australia
Phone +61 8 8313 4712
kym.anderson@adelaide.edu.au

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ABSTRACT

Winegrape varieties in the world's vineyards have become more internationalized since wine globalization accelerated from the 1990s. Simultaneously, economic growth and greater openness to trade have altered beverage consumption cultures in those countries, and in non-wine-producing countries. This chapter draws out the implications of these developments for terroir-based cultural assets in the countries of origin of each winegrape variety, and in the sometimes dispersed countries planting them. It exploits two recently revised, expanded and updated global databases. One covers wine production, consumption and trade; and the other describes winegrape bearing areas by variety and region covering 99% of the world's winegrape vineyard area and more than 1,700 DNA-distinct winegrape varieties for 2000 and 2016. This latter database reveals that vignerons' varietal choices are narrowing in the wine-producing countries of the world, converging on the major French varieties. This is despite a strengthening interest by vignerons in 'alternative' and native varieties, the latter linked historically to terroir-based cultural assets. Meanwhile, wine consumers are enjoying ever-wider choice, thanks to much-increased international trade in wine. Data also suggest the quality of the current global mix of varieties has been rising well above that of a generation ago.

INTRODUCTION

How internationalized have vineyards' winegrape varieties become since wine globalization accelerated from the 1990s? Have each country's vineyards also become more diversified in their varietal mix? What are the implications for terroir-based cultural assets in the countries of origin of each variety, and in the countries planting them? How has economic growth and globalization simultaneously altered beverage consumption cultures in those countries and in non-wine-producing countries? This chapter addresses these questions with the help of two recently revised, expanded and updated global databases, one covering wine production, consumption and trade (Anderson and Pinilla 2018, 2020) and the other on winegrape bearing areas by variety and region (Anderson and Nelgen 2020a,b).

The chapter begins with reviews of the link on the supply side between culture and terroir, and of cultural changes on the demand side in the wake of income growth, urbanization and globalization. It then draws on the new global databases to see the net effects of those forces empirically. The final section draws out implications, particularly for cultural assets.

SUPPLY-SIDE LINKS BETWEEN *TERROIR* AND CULTURE

In both French and English dictionaries, the word *terroir* has at least two definitions. The narrower definition equates terroir to soil, while the broader one is closer to the English word territory and refers to all the natural and human characteristics of a delimited area of land. The geologist James E. Wilson (1998) emphasizes the former even though the sub-title of his seminal book also mentions climate and culture. Anthropologist Amy Trubek (2008) emphasizes not only place but, like Parker (2015), also taste. The geographer Warren Moran (2001) emphasizes much more the human factor in both winegrape growing and winemaking, which includes cultural dimensions. Patterson and Buechenstein (2018) provide an overview of many authoritative definitions of *terroir*, and find the view expressed by Moran (2006) the most holistic. These views from New World countries may be less appealing though to Europeans, who are more likely to view their relationship with nature as harmonious and to give more weight to historical traditions. Cappeliez (2017) seeks to bridge this gap by suggesting a distinction between elements of this cultural idea that are connected to place, which are more likely to change as the term *terroir* travels, and those more capable of remaining stable when the term travels across diverse cultural contexts.

Natural and human (including cultural) characteristics of a region affect the choice of grapes planted and the way their growth is managed, the way wine is made from them, the pride in the region, and the promotional or commercial advantages of those characteristics (which may be enhanced by legal recognition via geographical indications). In turn, those features become part of the region's culture.

Thus a region can have cultural as well as natural capital assets, and the cultural assets can be tangible (e.g., terraced vine rows, or distinctive buildings or winemaking equipment, or harvest celebrations) and intangible (e.g., the unique specific skills of the vignerons within that region, homage to families who pioneered there). This bundle of cultural and natural assets defines the *terroir* that yields a flow of services in wine regions that generates economic, social and cultural benefits, some of which have a public-good characteristic (Throsby 2001, 2015).

If in each region the natural assets (e.g., soil, climate, aspect) did not change over time, nor did the technologies of grape and wine production or regulations affecting production, nor the preferences and incomes of local wine consumers, and if each vigneron had no access to cuttings from exotic vines and was so small as to produce wine for no more than own-home consumption and sale within the growing region, then one might presume that the winegrape varieties in that region and the wine blends produced from them also would not change over time. The varietal mix, production methods and wine styles of the region would thus be confined to the region's culture.

In practice of course, almost no winegrape-growing region is so static or insular. As Scienza and Imazio (2019) make clear, migration, conquest, and peaceful cross-cultural exchanges have influenced the historical mix of winegrape varieties in each region. Indeed that has occurred for millennia, but mostly on the Mediterranean shores and hinterlands until the middle of the previous millennium when two things coincided. One was the settlement and colonization by Europeans in the so-called New World;¹ the other was the emergence of a culture of economic development and growth specific to early modern Europe that laid the foundation for scientific advances and pioneering inventions that instigated explosive technological and economic development (Mokyr 2016).

Changes in climate also have affected the extent and varietal mix of each region's winegrape vineyards over the centuries – as they are doing again this century. The impacts (such as higher temperatures, lower water availability, more extreme weather events) on the quality of winegrapes, their ripening periods and their vineyard yields are becoming better understood. Adaptation strategies by vignerons include switching to warmer-climate or more-resilient grape varieties, and re-locating to a region at a higher latitude or elevation to retain the firm's current mix of grape varieties. Especially in the New World, where regions are still trying to identify their comparative advantages and where regulations and traditions do not restrict varietal choice, winegrowers are continually on the lookout for attractive alternative

¹ The key 'New World' countries producing winegrapes are Argentina, Australia, Chile, New Zealand, South Africa, United States, and Uruguay. Brazil, Canada, Mexico and Peru also produce wine but in far smaller quantities. We refer to the 'Old World' wine-producing countries as encompassing all of continental Europe, the former Soviet Union and the Levant. China and the few other Asian countries that grow winegrapes, and the United Kingdom, are included in our 'New World' grouping for completeness of global coverage, but they have a miniscule influence on the 'New World' bearing area averages quoted below.

varieties that do well in climates similar to what they expect theirs to become in the decades ahead.

Meanwhile, ongoing investments in research are altering grape and wine technologies and creating new hybrid varieties, changes in regulations and technical standards are altering production costs, falling information and communication costs are speeding technology transfers and marketing skills between regions, and declines in trade costs are altering the inter-regional (including international) tradability of grape juice and wine and thus the competitiveness of each region's producers.

DEMAND-SIDE INFLUENCES ON BEVERAGE CONSUMPTION CULTURES

Demand-side forces add to those supply-side influences on the total area and mix of winegrape varieties in each wine region. As incomes rise, so too does the demand for luxury products, including higher-quality wines and a broader range of styles and varieties. In addition to rising incomes, reduced costs of transport, information and communication ensure that (a) local wine consumers become increasingly exposed to and interested in exotic varieties and styles that now compete with locally produced varieties, (b) the demands of wine consumers in other regions and countries also now influence local winegrape demand and hence prices and (c) more consumers take an interest in wine cultures elsewhere.

These changes in demand conditions have accelerated thanks to globalization, particularly with the emergence of large multinational wine corporations and retail supermarkets and the growth of international wine tourism (Anderson and Pinilla 2018). They have potential implications for *terroir*-based cultural assets. For example, if higher-quality wine comes from grape varieties best grown in cool climates (e.g., Pinot Noir), might the area of vineyards in cool regions grow faster than that in hot regions as global incomes and temperatures rise? And if the global diversity of winegrapes is converging on the best-known varieties (often referred to as "international" varieties), how is that impacting the cultural assets of the regions of origin and destination? Johnson and Robinson (2013, p. 8) note that vignerons are beginning to react by reverting to neglected local varieties in the Old World and by exploring or re-visiting alternatives to the main "international" varieties in the New World (and in Italy – see D'Agata 2014).

Globalization of the world's wine markets over recent decades has been associated with huge changes in national beverage consumption (Anderson and Pinilla 2018, 2020). In the

traditional wine-producing countries of France, Italy and Spain, as well as in Chile, per capita wine consumption today is only one-third of its interwar level, and it has fallen also, by about half, in Portugal, Argentina and much of Eastern Europe. With production in those countries falling far less, surpluses arose and much was disposed of via exports. Meanwhile, rising incomes in the West and the emergence of large retail supermarkets created a demand for a product in between the quality of fine/super-premium and bulk/non-premium wines, namely commercial premium bottles of approachable, homogenous quality at a scale large enough for supermarkets to advertise their availability nationally. That coincided with low real exchange rates in southern hemisphere commodity-exporting countries, resulting in a market-driven wine export boom from temperate parts of New World countries starting in the 1990s.

Consumption per capita rose greatly from low bases in beer- and spirits-consuming countries, from less than 5 litres per capita in the 1960s to more than 20 litres per capita in such countries as the United Kingdom, Ireland, most northwest European countries, North America, Australia and New Zealand (Holmes and Anderson 2017). More recently, grape wine consumption has taken off from a very low base in East Asia, to 0.8 litres per capita per year in South Korea and Taiwan, to more than a litre in China, to more than 2 litres in Japan and Singapore, and to greater than 3 litres in Hong Kong (Anderson 2020).

Cultural changes by consumers are normal consequences of disruptions such as rapid income growth, urbanization, greater openness to international trade and migration, and increased labour force participation by women (Giuliano and Nunn 2017; Giuliano 2020; Bernheim et al. 2021; Voth 2021). The latter, when combined with the supermarket revolution and the boom in exports from the New World of accessible wines, resulted in wine purchases becoming a normal part of food shopping for many women for the first time in the late 20th century. More generally, wine consumers are becoming more knowledgeable about the product, its producers and its regions of origin.

A major facilitator of these changes in beverage demand has been the rising share of global wine consumption that is imported, from below 15% pre-1990 to above 40% (Anderson and Pinilla 2020). Consumers in most countries have never enjoyed such a diversity of wine styles, qualities/prices, and winegrape varieties and blends used by winemakers. Contributing to this diversity has been the development of new wine regions, including cool ones in response not only to global warming but also to an increasing preference for the more-refined wines that cool regions are capable of supplying.

Both opportunities and competitive challenges abound for vigneron seeking to attract consumer interest by differentiating their product, or alternatively by emulating the most

successful producers. One strategy for producers has been to display names of (especially popular) grape varieties on wine bottle labels. Its success, particularly for lower-priced New World wines, has led to demands in the European Union for liberalizing labelling laws to allow such labelling there also. The recent decision by Aldi to organize the shelving of wine in its UK supermarkets according to variety instead of region of origin will strengthen that demand.

As well, producers in the New World are increasingly realizing the marketing value of going beyond country of origin to regional labelling as another form of product differentiation – something that has long been practised by Europe’s traditional producers, for reasons made clear in Patterson and Buechenstein (2018). At the extreme is a greater use of single vineyard labelling, emulating what has long been the practice for the best of Burgundy wines.

These forces could, on the one hand, lead one to expect winegrowing countries to import more exotic varieties to diversify their plantings, especially in the unconstrained growing environment in New World countries and particularly from the largest and most successful winegrowing countries of the Old World (especially France). On the other hand, if vigneron still experimenting with their terroir in the New World and in Eastern Europe felt that emulating the most successful Old-World producers was the most reliable and profitable strategy, one might expect to see new plantings dominated by the most popular varieties and blends from the most famous wine regions (e.g., the global proliferation of Bordeaux blends).

What has been the net impact of these various forces this century on the diversity of winegrape varietal plantings globally, and in key wine-producing countries? And in particular, how much has wine globalization been accompanied by the varietal mix in national vineyards becoming more ‘internationalized’ since the 1990s?

EMPIRICAL EVIDENCE FROM VINEYARD PLANTINGS

To address those question, we draw on a new global database by Anderson and Nelgen (2020a,b) that covers all winegrape plantings by variety in the world’s wine regions in recent decades. It is based on vine bearing areas in hectares and includes various shares and indexes for each of 53 countries involving 700+ wine regions that account for 99% of the world’s winegrape vineyard area. More than 1,700 DNA-distinct ‘prime’ varieties² are in the

² Winegrape varietal names of DNA-identical varieties can differ across countries for historical reasons. In their effort to ensure the diversity of varieties is not exaggerated, Robinson, Harding and Vouillamoz (2012) nominated one of those names to be the ‘prime’ variety and called all

winegrapes database, covering 2000, 2010 and 2016 as well as more-limited data for 1990. Each prime variety is linked to its country of origin, and to its synonyms, as nominated by Robinson, Harding, and Vouillamoz (2012) or otherwise JKI (2019).

The extent of varietal concentration in the world's vineyards increased non-trivially between 2000 and 2016. Half the world's bearing area of vineyards were accounted for by the top 21 prime varieties in 2000 but, by 2016, it took just the top 16 varieties to get to half (Figure 1). This increasing concentration occurred almost entirely in the New World: both it and the Old World needed almost the same number of varieties to reach half their bearing areas in 2000, but by 2016 the New World needed just 9 varieties compared with 18 in the Old World. Increasing concentration is evident as well in the data on individual varieties: for all but two of the world's top 30 varieties, the number of countries growing them is higher in 2016 than in 2000. And in three-quarters of the countries with available data, the share of the nation's top ten varieties in their total bearing area is higher in 2016 than in 2000 (Figure 2).

[insert Figures 1 and 2 around here]

This reduced diversity of the world's vineyards is summarized in the *Index of Similarity between national and global varietal mixes*, reported in Figure 3. (This index is like a correlation coefficient that ranges from 0 (no similarity) to one (identical mix) – see Anderson 2013 and Anderson and Nelgen 2020a.) It reveals that the varietal mix of less than one-quarter of countries became notably less similar to the global mix between 2000 and 2016. That is, since the new millennium a strong majority of winegrape-producing countries have become more similar to the global average in terms of the mix of grape varieties in their vineyards.

[insert Figure 3 around here]

Yet at the same time as the varietal mix is becoming less diversified nationally and globally, it is also becoming more internationalized. The extent of that necessarily varies hugely across countries, given that the share of national area that is planted to own-country prime varieties varies from zero to 100%. But note from Figure 4 that only 17 of our 53 countries have more than one-tenth of their winegrape bearing area in own-country prime varieties.

[insert Figure 4 around here]

A way to gauge the extent of internationalization is to examine the share of global bearing area of prime varieties that is outside their country of origin. More than three-quarters

other DNA-identical varieties synonyms. Their nomination is based on name used in what they believe to be the country of origin of that variety.

of countries of origin saw their varieties' aggregate share of the global bearing area rise between 2000 and 2016 (Figure 5).

[insert Figure 5 around here]

Another way to gauge the extent of spread of prime varieties beyond their place of origin is to divide the share of prime varieties originating from that nation in the global area of winegrapes by the share of that country in the total global area of all winegrapes. This *Index of Internationalization of Prime Varieties* is reported in Figure 6. Only one-third of countries of origin saw that index of internationalization of their prime varieties fall between 2000 and 2016.

[insert Figure 6 around here]

Even so, from a global viewpoint this internationalization is predominantly due to the greater adoption in many countries of French varieties. Between 1990 and 2016, the share of plantings of French prime varieties nearly doubled, rising from 21% to 39% globally. Varieties from Greece and Portugal increased their shares by one-sixth and one-seventh, respectively, but only to 3% each, while the shares of Italian and Spanish varieties in the global vineyard each fell by roughly one-third. The net effect of these changes on the distribution of prime varieties, shown in Figure 7, is that the combined share of the big three wine countries remained at around 70% but France gradually replaced Spain in first place while Italy's share in third place also shrank.

[insert Figure 7 around here]

The apparent paradox of reduced diversity and greater internationalization in the world's vineyards is partly explained by changes in national bearing areas. Between 1990 and 2016, Spain on the one hand had by far the biggest fall in its winegrape bearing area, by 515,000 ha or 35%, shrinking its share of global plantings from 18.2% to 12.5% (Anderson, Nelgen and Pinilla 2017). On the other hand, the countries whose bearing areas expanded most during 1990-2016 were Australia, Chile, the United States and especially China, all four of which now have a much higher proportion of their area under French varieties than any other country except France itself.

WHAT ABOUT CONSUMERS?

The claim earlier in the chapter that the world's consumers have never before had such a wide range of wines to choose from is not inconsistent with reduced varietal diversity in the world's

vineyards. The main reason is that two of every five bottles crosses a national border before being consumed now, compared with less than one in seven pre-1990. Greater openness to trade in any product leads to increased specialization in production and simultaneously increased diversity of consumer choice. In the case of wine, that happens in terms of styles, qualities, prices as well as the range of winegrape varieties used either on their own or in myriad blends.

As for the quality of the wines produced and consumed, that depends on many factors of course. But one indicator that wine quality globally may have risen is provided by the change in shares of the global winegrape bearing area of what are arguably some of the most iconic varieties. The top varieties from Bordeaux (Cabernet Franc, Cabernet Sauvignon, Merlot and Sauvignon Blanc), Burgundy and Champagne (Chardonnay, Pinot Meunier and Pinot Noir), Germany and Alsace (Pinot Gris and Riesling), and the northern Rhône (Syrah and Viognier), plus the top one now in Argentina (Côt) and Spain (Tempranillo), have seen their combined global share rise from 12% to 37% between 1990 and 2016 (Figure 8). By contrast, the combined share of the six most-widely planted prime varieties as of 1990 (Airén, Garnacha Tinta, Mazuelo, Rkatsiteli, Sultaniye and Trebbiano Toscano) has fallen from 33% to 13%, and arguably they are on average of lower quality.

[insert Figure 8 around here)

IMPLICATIONS FOR CULTURAL ASSETS

The above results reveal that vigneron are choosing to narrow their winegrape varietal mix on average: they are becoming less diversified as many countries converge on growing the major ‘international’ varieties, especially French ones. Yet this is not inconsistent with wine consumers enjoying ever-wider choices, because of far greater international trade in wine thanks to the current wave of globalization. Nor is that trend inconsistent with a strengthening vigneron interest in ‘alternative’ and native varieties in numerous countries, including Italy (D’Agata 2014) and Australia (Halliday 2018; Higgs 2019). That interest in minor varieties stems in part from a desire by many individual vignerons to diversify their varietal mix to differentiate their offering, as well as to hedge against increasing weather volatility. It just happens that in recent decades the latter centrifugal forces are dominated by the centripetal force of embracing the most popular noble varieties. Nonetheless, the scope for any vigneron to return to varieties her ancestors grew has never been greater, with far more consumers available via trade outside one’s own region or country. As for consumers, both the quality

and range of the currently available mix of varieties and styles of wines are substantially greater than what were on offer in the 1990s. That diversity for consumers is likely to continue to increase in the decades ahead, even if the diversity of varieties in the global vineyard does not.

What does this say about *terroir*-based cultural assets? Unless we preclude it by definition, *terroir* is certainly not a static concept at least in terms of the winegrower's varietal mix choices in a particular place. On-going climate change may even lead to faster changes in the total area and mix of winegrape varieties in each region from now on (and lead to the development of new, cooler-climate wine regions). The global spread in the use of the term *terroir* has no doubt been in part because of its commercial cache. This is especially so with the spread of Geographical Indications (GIs) to more and more non-European regions and countries. The conferring of UNESCO World Heritage status on more than a dozen of the world's wine regions so far this century (four in France, three in Italy) has further enhanced the commercial value of a long history of place and taste. A tension that will remain, however, is how finely to delimit a place in order to define its *terroir*: current GIs versus sub-regions within them versus single vineyards (Demossier 2018a, 2018b). Burgundy has chosen to explicitly emphasize the diversity of its vineyards with its 1247 *climats* (Demossier 2019), but no other region is likely to commercially justify this degree of sub-division in the foreseeable future.

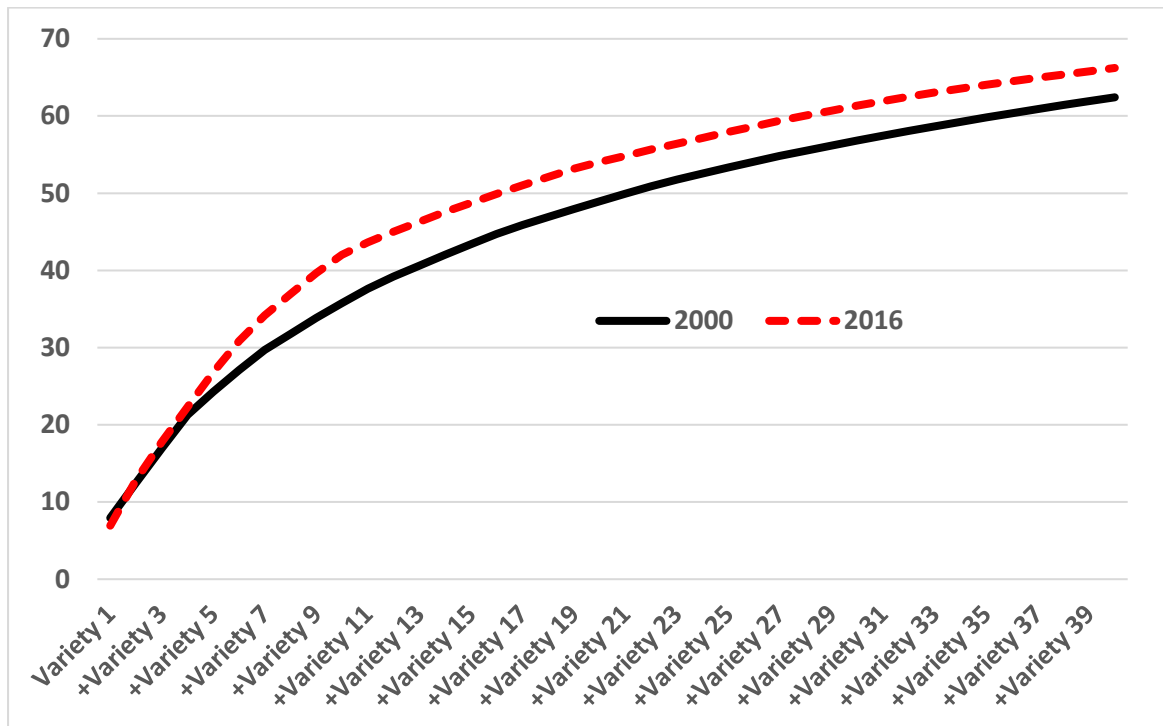
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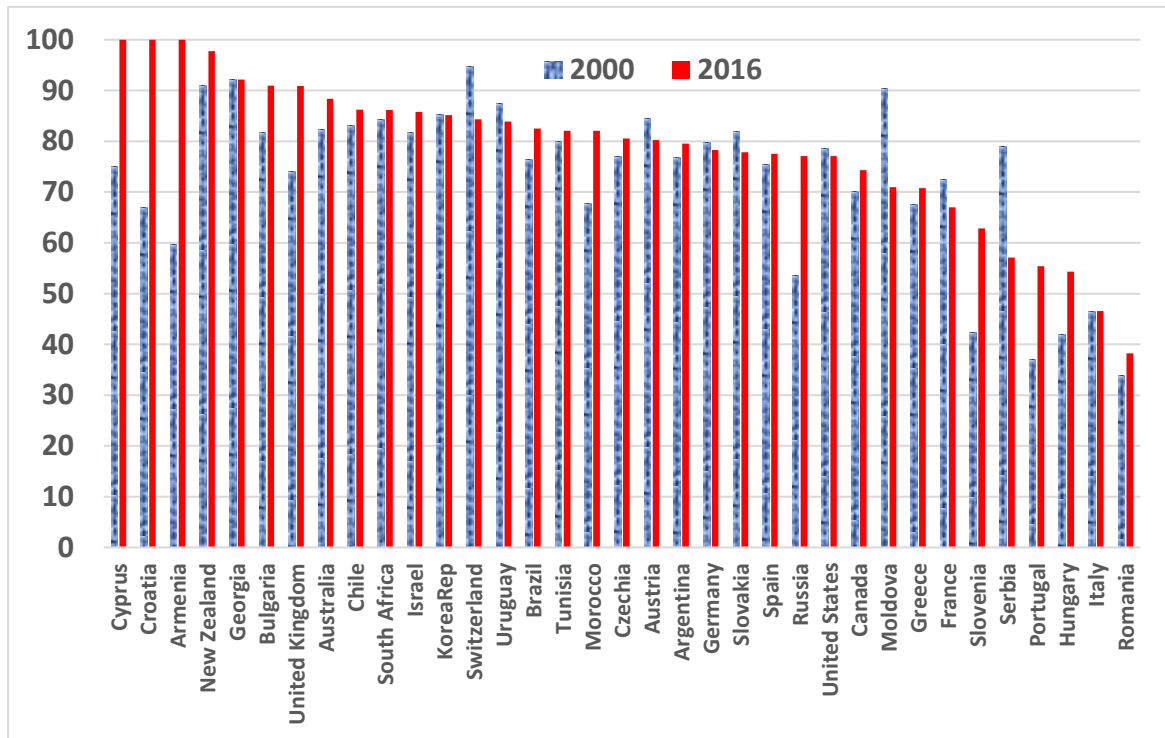
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Figure 1: Cumulative varietal shares of global winegrape area, 2000 and 2016 (%)



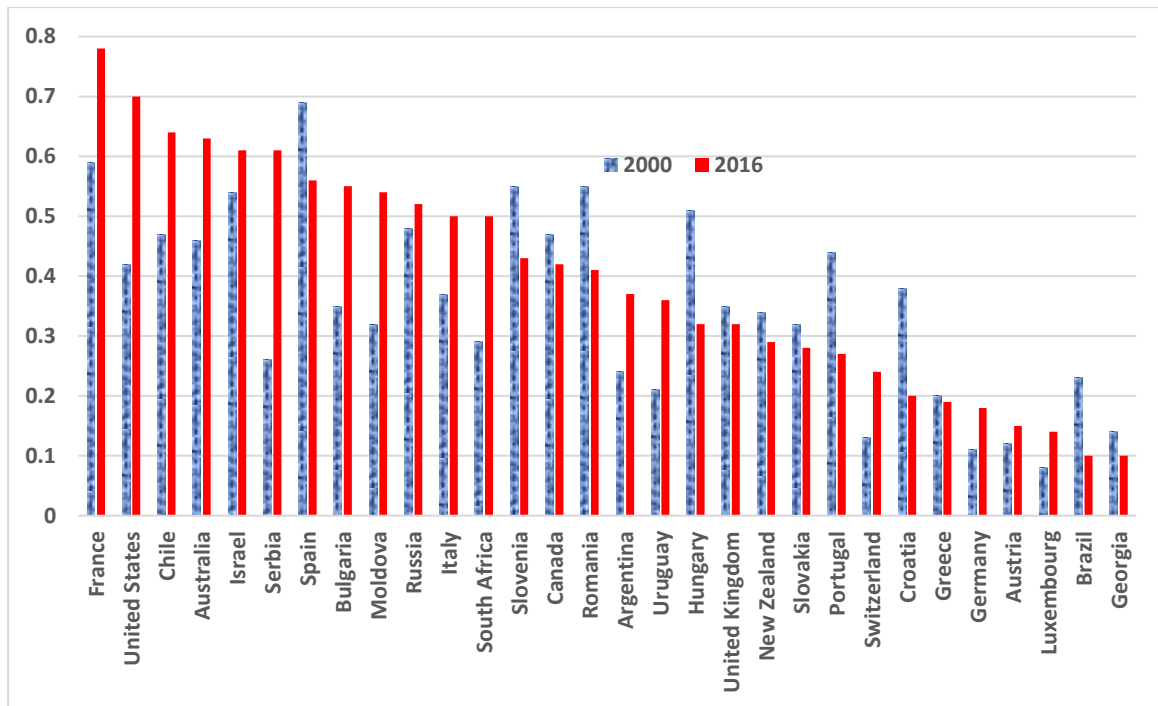
Source: Based on data in Anderson and Nelgen (2020b)

Figure 2: Share of nation's top 10 varieties in national winegrape area, 2000 and 2016 (%)



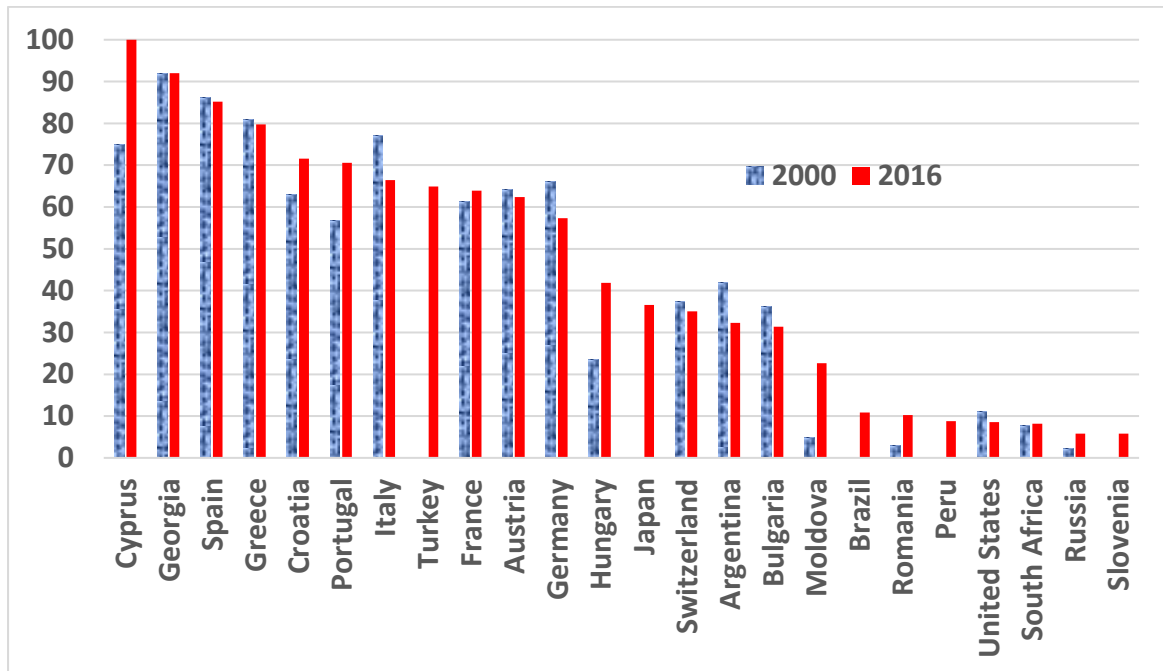
Source: Based on data in Anderson and Nelgen (2020b)

Figure 3: Index of Similarity between national and global varietal mixes, 2000 and 2016



Source: Based on data in Anderson and Nelgen (2020b)

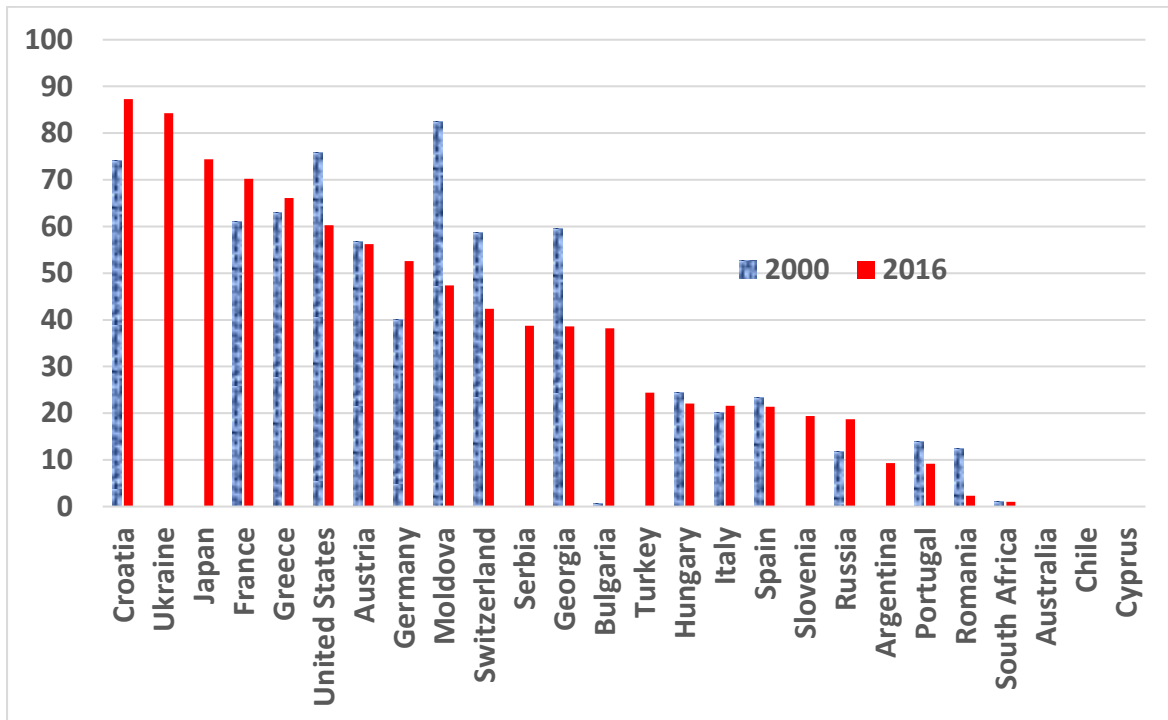
Figure 4: Share of national bearing area that is planted to own-country prime varieties, by country of planting,^a 2000 and 2016 (%)



^a All other countries are <5%.

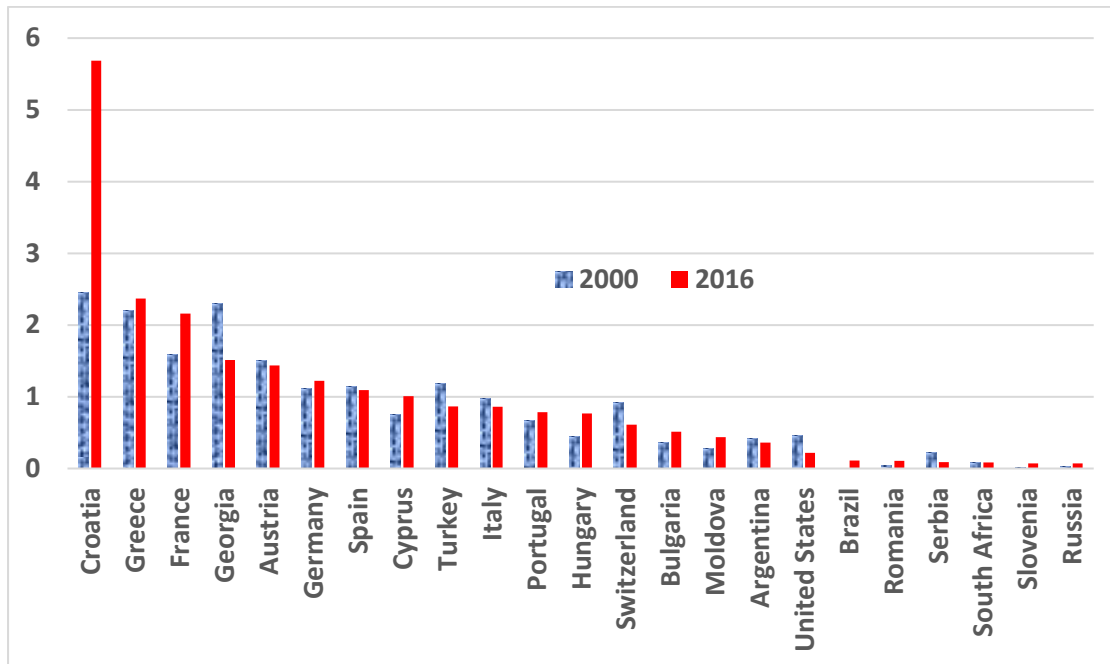
Source: Based on data in Anderson and Nelgen (2020b)

Figure 5: Share of global bearing area of prime varieties that is outside the country of origin, by country of origin, 2000 and 2016 (%)



Source: Based on data in Anderson and Nelgen (2020b)

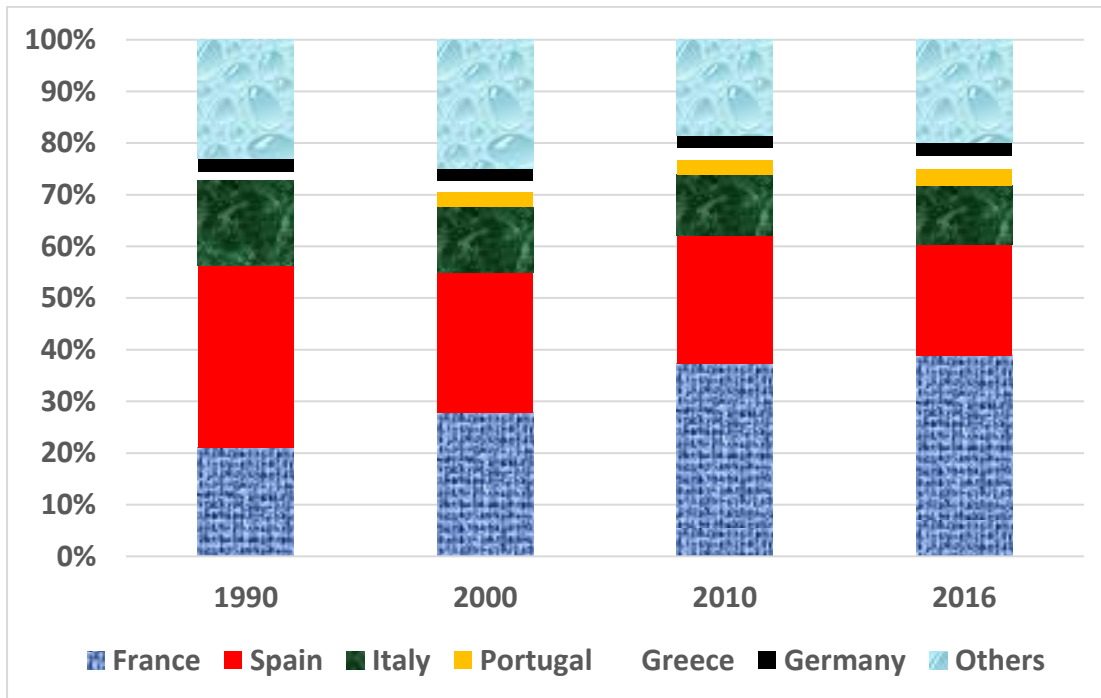
Figure 6: Index of Internationalization of prime varieties,^a by country of origin, 2000 and 2016



^a Defined for each country as the share of prime varieties originating from that nation in the global area of winegrapes, divided by the share of that country in the total global area of all winegrapes.

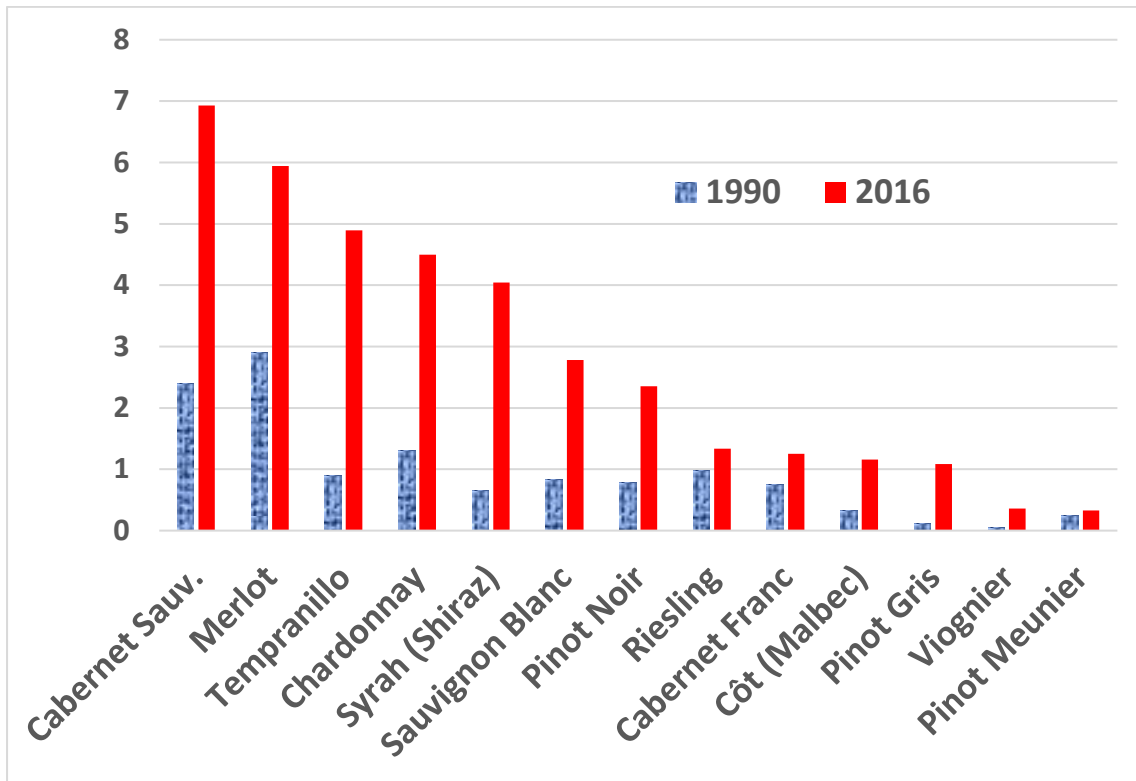
Source: Based on data in Anderson and Nelgen (2020b)

Figure 7: Shares of global winegrape bearing area by varietal country of origin, 1990 to 2016 (%)



Source: Based on data in Anderson and Nelgen (2020b)

Figure 8: Shares of premium varieties in the world's total winegrape bearing area, 1990 and 2016 (%)



Source: Based on data in Anderson and Nelgen (2020b)