



DIVERSITY AND INTERNATIONALIZATION OF WINE GRAPE VARIETIES: EVIDENCE FROM A REVISED GLOBAL DATABASE

Kym Anderson^{1*} and Signe Nelgen²

¹ Wine Economics Research Centre, University of Adelaide, Adelaide, South Australia, 5005, Australia

² Research Associate, Geisenheim University, Germany

*Corresponding author: kym.anderson@adelaide.edu.au

Abstract

Aim: To quantify the extent to which national mixes of wine grape varieties (in terms of vineyard bearing area) have become more or less diversified, and ‘internationalized’, since wine globalization accelerated from the 1990s.

Method and Results: In addition to bearing area (in hectares), shares and indexes are estimated for each of 53 countries in an updated global database involving 700+ wine regions that account for 99% of the world’s wine grape vineyard area and 1,700+ DNA-distinct prime wine grape varieties and 1350+ synonyms, for 2000, 2010 and 2016. This global database (Anderson and Nelgen, 2020) is a major revision, extension and update of Anderson (2013). Its prime varieties are linked to their country of origin and synonyms are as nominated by Robinson *et al.* (2012) or otherwise JKI (2019).

Conclusion: These results reveal that vigneron’s wine grape varietal choices are narrowing across the world. That is, they are becoming less diversified as many countries converge on the major ‘international’ varieties, especially French ones. This is not inconsistent with the fact that wine consumers are enjoying an ever-wider choice range, thanks to far greater international trade in wine associated with the current wave of globalization. Nor is it inconsistent with strengthening vigneron interest in ‘alternative’ and native varieties in numerous countries, including Italy (D’Agata, 2014) and Australia (Higgs, 2019). That interest stems in part from a desire to diversify their varietal mix to differentiate their offering – including through the terroir-driven use of minor varieties in blends – and 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 varieties for ease of marketing and presumably higher profits. Moreover, the quality of the current global mix of varieties is arguably substantially above the average quality of the top half-dozen varieties as of 1990.

Significance and Impact of the Study: The apparent paradox of reduced diversity and greater internationalization in the world’s vineyards is partly explained by major changes in a few national bearing areas. This new database provides many other insights in addition to those highlighted in this paper. For example, it includes for the first time numerous climate variables for each of its 700+ regions, prepared with the assistance of Gregory Jones of Linfield University, Oregon. That allows one to examine the varietal mix in regions whose climate in recent years is similar to what other regions will endure in the decades ahead thanks to on-going climate changes.

Keywords: Index of similarity between national and global varietal mixes, index of internationalization of prime varieties

Introduction

The dramatic globalization of the world's wine markets over the past three decades has seen the share of global wine consumption that is imported rise from below 15% pre-1990 to above 40% (Anderson and Pinilla, 2017, 2018). Consumers in most countries have never enjoyed such a diversity of wines to choose from in terms of styles, qualities/prices, and the range of wine grape varieties and blends. Countless new wine consumers have joined the market, many shifting from beer or spirits to wine as their preferred beverage. Contributing to this consumer diversity has been the opening up of new wine regions, including cool ones in response to global warming and an increasing preference for more-refined wines. Both opportunities and competitive challenges abound for producers seeking to attract the attention of consumers by differentiating their product, or alternatively by emulating the most successful producers.

One strategy for producers to attract consumer attention 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 freeing up labelling laws so as to allow such labelling there also. 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 practiced by Europe's traditional producers, for reasons made clear in Patterson and Buechenstein (2018).

Meanwhile, producers everywhere are well aware of the impact climate changes (higher temperatures, more extreme weather events) are having on the quality their wine grapes and on vineyard yields. Adaptation strategies 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 current mix of grape varieties. Especially in the New World, where regions are still trying to identify their varietal comparative advantages and where regulations do not restrict varietal choice, winegrowers are continually on the lookout for attractive alternative varieties that do well in climates similar to what they expect theirs to become in the decades ahead.

These various forces could, on the one hand, lead one to expect winegrowing countries to be importing 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 (France, Italy and Spain). On the other hand, if vignerons 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 profitable strategy, one might expect to see new plantings dominated by the most popular varieties.

With that in mind, this paper seeks to answer the following questions: What has been the net impact of these various forces this century on the diversity of wine grape varietal plantings globally, and in key wine-producing countries? And in particular, has wine globalization been accompanied by the varietal mix in national vineyards becoming more 'internationalized' since the 1990s?

Materials and Methods

Addressing those questions requires a global database of wine grape bearing areas by variety and region. The first such database, provided by Anderson (2013), has recently been revised, expanded and updated by Anderson and Nelgen (2020). In addition to bearing area (in hectares), shares and indexes are estimated for each of 53 countries involving 700+ wine regions that account for 99% of the world's wine grape vineyard area and 1,700+ DNA-distinct wine grape varieties and 1350+ synonyms, for 2000, 2010 and 2016. The prime varieties are linked to their country of origin, and synonyms are as nominated by Robinson, Harding, and Vouillamoz (2012) or otherwise JKI (2019). Numerous climate variables are included for each of the regions, prepared with the assistance of Gregory Jones of Linfield University, Oregon and Germán Puga of the University of Adelaide.

This paper leaves aside the regional details and area responses to climate change so as to focus on global and national changes. To do so, it introduces indexes of varietal mix similarity and of internationalization of prime varieties.

Specifically:

- The *Index of Similarity between national and global varietal mixes* is like a correlation coefficient that ranges from 0 (no similarity) to one (identical mixes)¹; and
- The *Index of Internationalization of Prime Varieties* is defined for each country as the share of prime varieties originating from that nation in the global area of wine grapes divided by the share of that country in the total global area of all wine grapes.

Results and Discussion

The extent of varietal concentration in the world's vineyard increased non-trivially between 2000 and 2016. Half the world's plantings were accounted for by 21 prime varieties in 2000 but, by 2016, it required only 16 varieties (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. This increasing concentration is evident as well in the varietal data: 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).

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. It reveals that the varietal mix of less than one-quarter of countries became significantly less similar to the global mix between 2000 and 2016. That is, since the new millennium a strong majority of wine grape-producing countries have become more similar to the global average in terms of the mix of grape varieties in their vineyards.

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 wine grape bearing area in own-country prime varieties.

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

Another way to gauge the extent of spread of prime varieties from their place of origin is to divide the share of prime varieties originating from that nation in the global area of wine grapes by the share of that country in the total global area of all wine grapes. 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.

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%. 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 fell by a little below and above one-third, respectively. 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

¹ When there are M varieties in the world, this index is defined as:

$$\omega_{ij} = \frac{\sum_{m=1}^M f_{im} f_{jm}}{\left(\sum_{m=1}^M f_{im}^2 \right)^{1/2} \left(\sum_{m=1}^M f_{jm}^2 \right)^{1/2}},$$

where f_{im} is the area of plantings of grape variety m as a proportion of the total grape plantings in country i , and f_{jm} is the area of plantings of grape variety m as a proportion of the total grape plantings in the world, such that these proportions fall between zero and one and sum to one.

remained at around 70% as France gradually replaced Spain in first place and Italy's share in third place also shrank.

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 wine grape bearing area, by 515,000 ha or 35%, shrinking its share of global plantings from 18.2% to 12.5% (Anderson *et al.*, 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 of which now have a much higher proportion of their area under French varieties than any other country except France itself.

The claim in the paper's Introduction 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 wine grape varieties used either on their own or in myriad blends.

The quality of the wine's produced and consumed depends on myriad factors of course, but one indicator that the quality globally may have risen is provided by the change in shares of the global bearing area of what are arguably some of the most iconic varieties: the top ones from Bordeaux (Cabernet Franc, Cabernet Sauvignon, Merlot and Sauvignon Blanc), Burgundy and Champagne (Chardonnay, Pinot Meunier and Pinot Noir), Germany and Alsace (Pinot and Gris Riesling), and the northern Rhone (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, while the combined share of the top six as of 1990 (Airén, Garnacha Tinta, Mazuelo, Rkatsiteli, Sultaniye, and Trebbiano Toscano – most arguably of modest quality) has fallen from 33% to 13%.

Conclusion

These results reveal that vignerons' wine grape varietal choices are narrowing across the world, becoming less diversified as many countries converge on the major 'international' varieties, especially French ones. This is not inconsistent with the fact that wine consumers are enjoying an ever-wider choice range, thanks to far greater international trade in wine associated with the current wave of globalization. Nor is it inconsistent with strengthening vigneron interest in 'alternative' and native varieties in numerous countries, including Italy (D'Agata, 2014) and Australia (Halliday, 2018; Higgs, 2019). That interest stems in part from a desire to diversify their varietal mix to differentiate their offering – including through the terroir-driven use of minor varieties in blends – and 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 varieties. Moreover, the quality of the current global mix of varieties is arguably substantially above the mix of the top half-dozen varieties as of 1990.

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Appendix

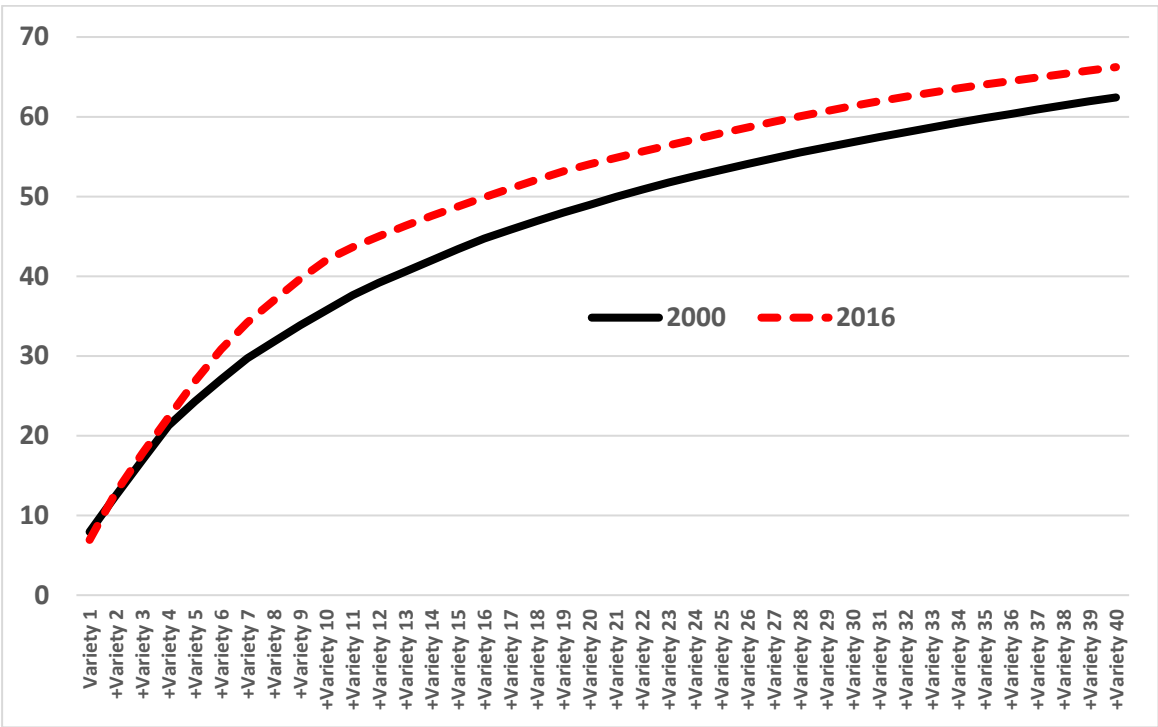


Figure 1: Cumulative varietal shares of global winegrape area, 2000 and 2016 (%)

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

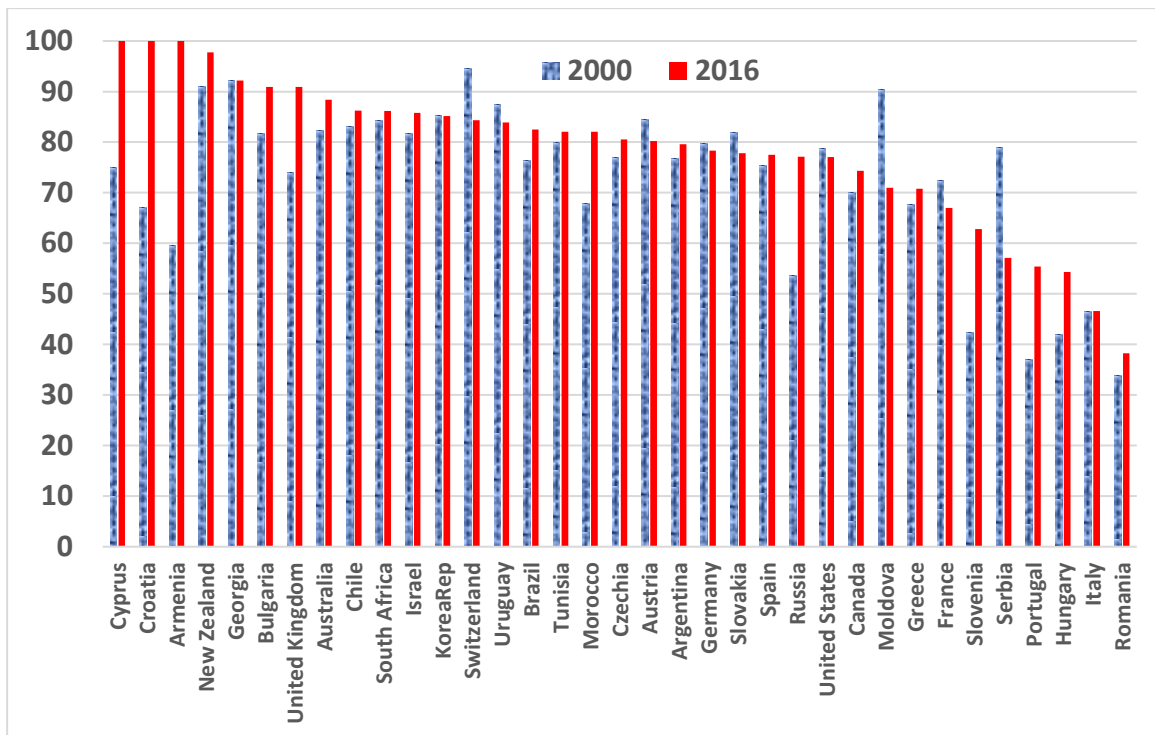


Figure 2: Share of nation's top 10 varieties in national winegrape area, 2000 and 2016 (%)

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

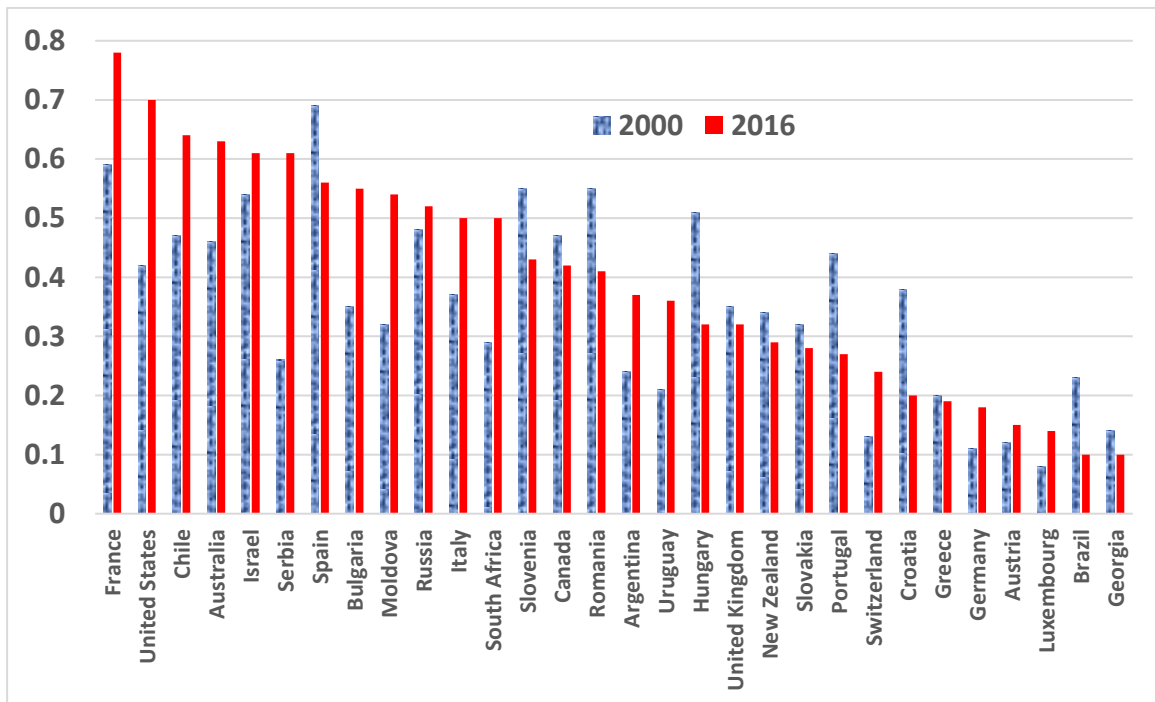


Figure 3: Index of Similarity between national and global varietal mixes, 2000 and 2016

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

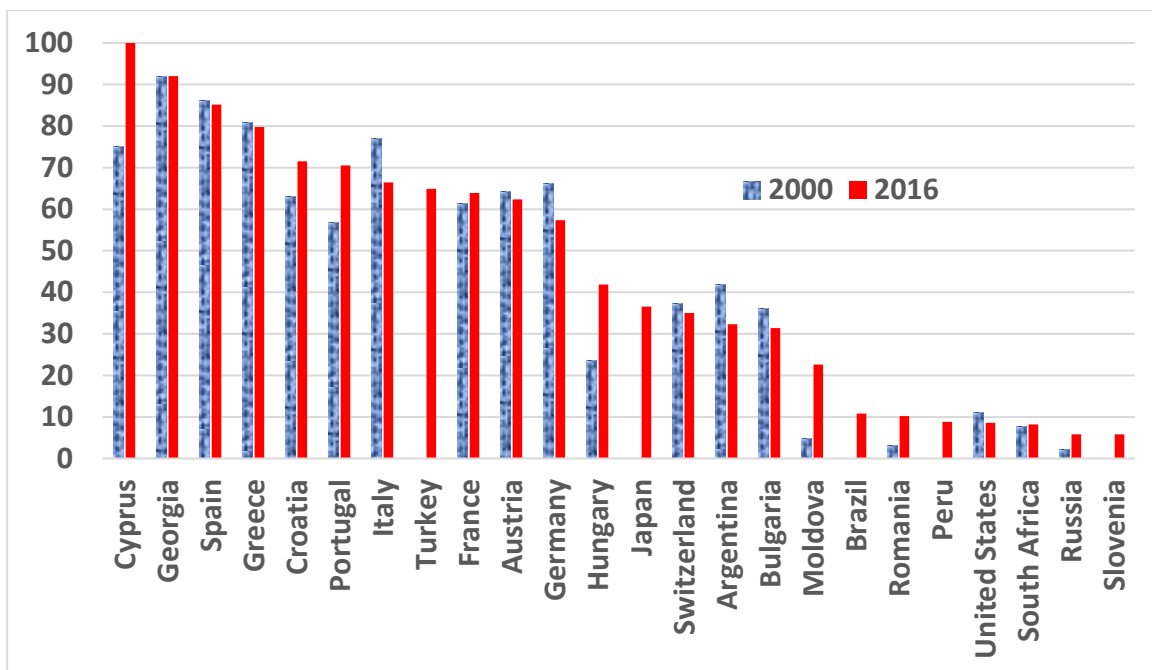


Figure 4: Share of national bearing area that is planted to own-country prime varieties, by country of planting,^a 2000 and 2016 (%)

^a All other countries are <5%.

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

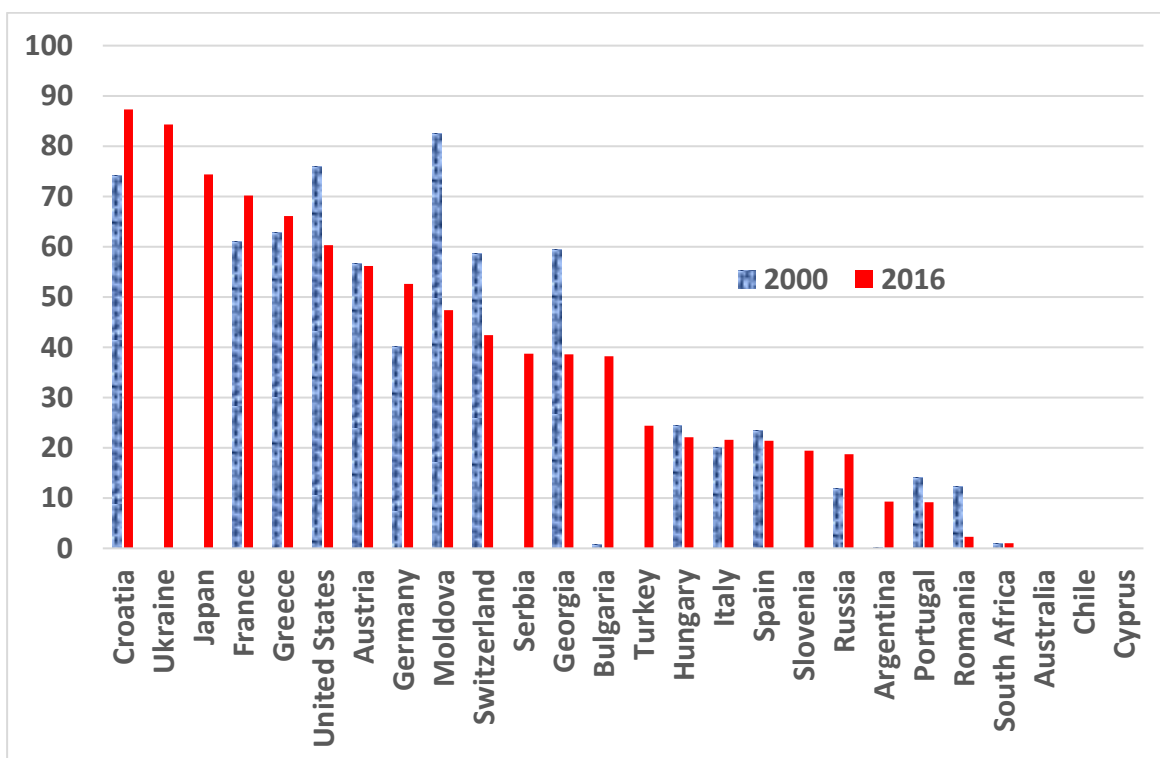


Figure 5: Share of global bearing area of prime varieties that is outside the country of origin, by country of origin, 2000 and 2016 (%)

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

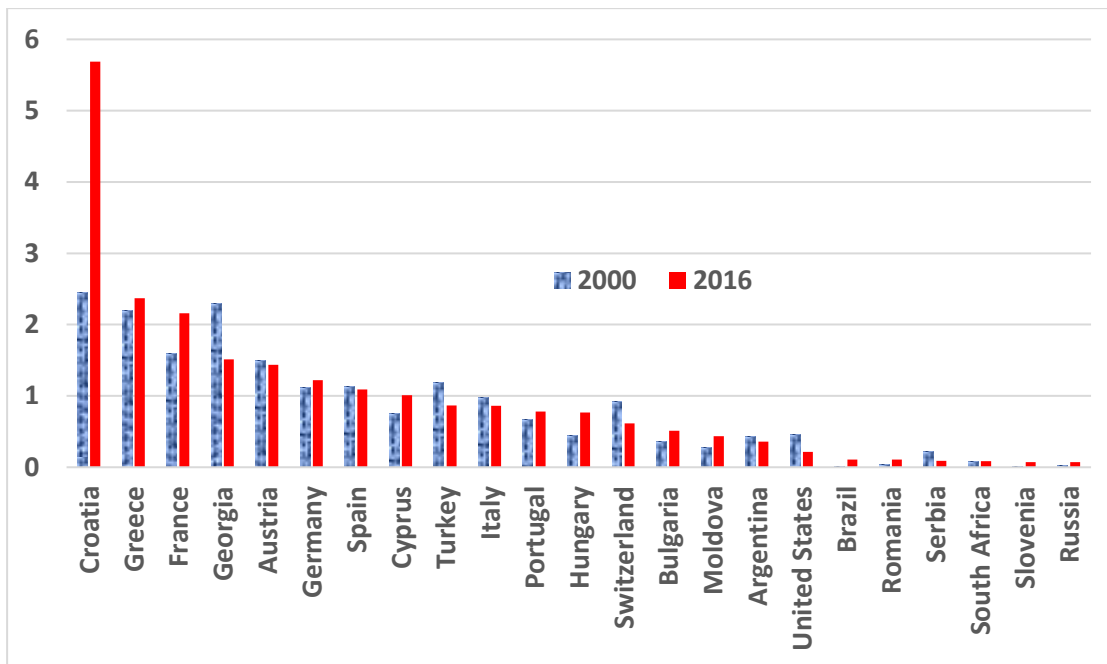


Figure 6: Index of Internationalization of prime varieties,^a by country of origin, 2000 and 2016

^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 (2020)

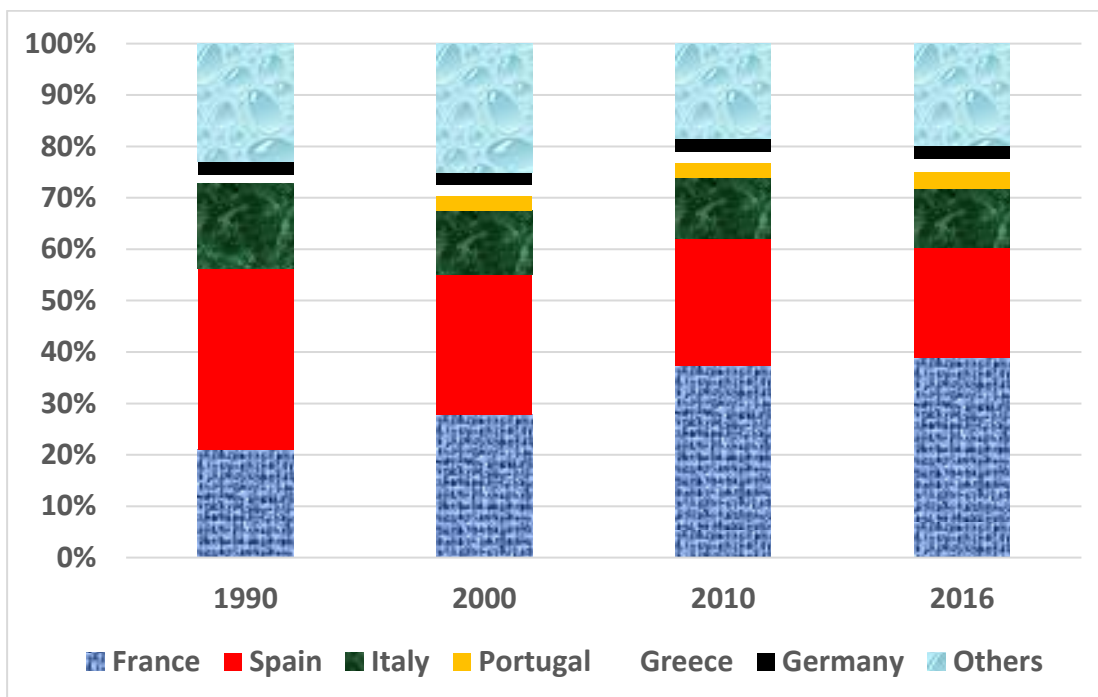


Figure 7: Shares of global winegrape bearing area by varietal country of origin, 1990 to 2016 (%)

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