

Introduction to the Issue

This issue of the *Journal of Wine Economics* is devoted to wine and climate change.

It opens with various assessments by leading winemakers from all over the world (Adelsheim et al., 2016). Contributors are Denis Dubourdieu (University of Bordeaux, ISVV Bordeaux and various chateaux, France), Boris Champy (Louis Latour, France), Clemens Busch (Weingut Clemens and Rita Busch, Germany), Ernst Loosen (Dr. Loosen, Germany), Tamara Roberts and Matthew Strugnell (Ridgeview Wine Estate, England), Roman Horvath and Heinz Frischengruber (Domäne Wachau, Austria), Alois Lageder (Weingut Alois Lageder, Italy), Miguel A. Torres (Bodegas Torres, Spain), Laura Catena (Bodegas Zapata Catena, Argentina), Paul Draper (Ridge Vineyards, United States), Marimar Torres (Marimar Estate Vineyards & Winery, United States), David Adelsheim (Adelsheim Vineyard, United States), Frederick Frank (Dr. Konstantin Frank Wine Cellars, United States), Lawrence Coia (Coia Vineyards, United States), Brian Croser (Tapanappa Wines, Australia), and Jan “Boland” Coetzee (Vriesenhof Vineyards, South Africa). Given that the authors originate from a wide range of wine-growing regions on four continents with different climate patterns, it is not surprising that there is little consensus in their assessments about the impact of global warming on viticulture. In general, although winemakers from cool grape-growing regions welcome warmer temperatures, they also feel the detrimental effects of larger weather variability, the higher frequency of extreme weather events (e.g., spring frosts, hail, torrential rainfall, and droughts), and the increase in pest pressure. On the other hand, winemakers from warmer growing regions deem global warming a challenge. However, they have already adapted in numerous ways ranging from clonal selection and rediscovering old heat-resistant varieties to new vineyard plantings in closer proximity to the coast or in high altitudes. Overall, and even under a scenario of further moderate warming, given the respective adaptations, all leading winemakers envision a future for high-quality wine making in their respective regions.

The first research article is by Edward Oczkowski and is entitled “The Effect of Weather on Wine Quality and Prices: An Australian Spatial Analysis” (Oczkowski, 2016). Employing a two-stage recursive approach, he first analyzes weather’s impact on wine quality, differentiated by region and varietal, and then examines the impact of quality (and other control variables) on wine prices. Oczkowski finds significant differences for optimal growing-season temperatures among varieties. His research suggests that in order to stay at the price-defined temperature

optimum, further warming may require the relocation of certain grape varieties to more suitable growing regions.

This issue continues with two guest-edited symposia. The first one, edited by Marco Bindi and Paulo A.L.D. Nunes, focuses on regional effects and provides a literature overview of the economic implications of climate change on the wine industry. It opens with an introduction, “Vineyards and Vineyard Management Related to Ecosystem Services: Experiences from a Wide Range of Ecological Regions in the Context of Global Climate Change,” by the editors (Bindi and Nunes, 2016).

In “Climate Change, California Wine, and Wildlife Habitat,” Patrick R. Roehrdanz and Lee Hannah analyze the impact of climate change on wine grape suitability in California and the possible implications for nature conservation and water use. In various scenarios, their analysis projects that overall wine grape suitability in California will decline and “move into undeveloped areas that provide important habitats for native species. Coastal and upslope areas retain and improve in suitability, respectively, while inland areas see the largest losses in suitability” (Roehrdanz and Hannah, 2016, p. 69).

In another simulation study, entitled “Climate Change and Grapevines: A Simulation Study for the Mediterranean Basin,” Roberto Ferrise, Giacomo Trombi, Marco Moriondo, and Marco Bindi draw on various regional climatic models in combination with a crop growth model to evaluate the prospects for viticulture in the Mediterranean basin (Ferrise et al., 2016). Their results suggest that a generally warmer and drier climate in the Mediterranean will adversely affect viticulture in many wine-growing regions. However, not all regions will be affected in the same way. Some regions in southern France and the western Balkans may even enjoy a net benefit because of the fertilizing effect of higher atmospheric CO₂ concentrations.

In “Climate Change and Wine: A Review of the Economic Implications,” Orley Ashenfelter and Karl Storchmann provide an overview of the extensive literature on the impact of weather and climate on grapes and wine with the goal of describing how climate change is likely to affect their production (Ashenfelter and Storchmann, 2016). After discussing the physical impact of weather on viticultural variables, they survey the economic literature measuring the effects of temperature on wine quality, prices, costs, and profits. They go on to describe what has been learned about possible adaptation strategies for grape growers that would allow them to mitigate the economic effects of climate change. Climate change is likely to produce winners and losers, and there are also likely to be some substantial short-run costs as growers adapt to climate change.

The second symposium, edited by Nathalie Ollat, Jean-Marc Touzard, and Cornelis van Leeuwen, is devoted to potential viticultural issues caused by climatic changes.

After introducing the symposium and the French LACCAVE project, an interdisciplinary collaboration of numerous institutions focusing on the long-term adaptation to climate change in viticulture and enology (Ollat, Touzard, and van Leeuwen, 2016), van Leeuwen and Darriet continue with their analysis on “The Impact of Climate Change on Viticulture and Wine Quality” (van Leeuwen and Darriet, 2016). The study focuses on France, in particular on the Bordeaux region, and reports the effect of temperature, precipitation, and solar radiation on wine quality including pH level, potential alcohol, and various flavor compounds. Their research suggests that for the Bordeaux wine-growing region, increasing temperatures have been beneficial not only directly but also indirectly. For instance, warmer temperatures have induced growing vine evaporation and, therefore, have increased the water deficit over the past 60 years—independent of precipitation. So far, high water deficits appear to have been associated with better wine quality. However, if the warming trends continue, quality might be negatively affected in the near future.

In his primer, “Water Stress and Grape Physiology in the Context of Global Climate Change,” Gregory A. Gambetta introduces us to the role of water and water stress on grapevines (Gambetta, 2016). This topic is particularly important for European grape growers because irrigation is generally prohibited in most regions. Although, so far, dry weather conditions have been conducive to Bordeaux wine quality, Gambetta shows that high frequencies and levels of water stress may also be detrimental. He indicates that “this in turn requires the development of new more drought-tolerant cultivars or an increased dependence on irrigation to maintain crop productivity. Both of these strategies ... present specific challenges” (Gambetta, 2016, p. 168).

Finally, Hans R. Schultz’s article “Global Climate Change, Sustainability, and Some Challenges for Grape and Wine Production” presents the issue of wine and climate change in a wider perspective (Schultz, 2016). He shows that the effects of precipitation and evapotranspiration, air temperature and soil temperature, and CO₂ concentration vary widely among wine regions. In general, one can distinguish between two climatic scenarios: warmer and dryer and warmer and wetter, with different responses for red and white grape varieties.

Karl Storchmann
New York University

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