Ithaca 2018 Abstract Submission

Title
Who will Replace Parker? A Copula Function Analysis of Bordeaux en primeur Wine Raters

I want to submit an abstract for:
Conference Presentation

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Research Question
Given the impact of Robert Parker on Bordeaux wines, we use copula function modelling to determine which Bordeaux en primeur wine raters might ultimately replace Parker in terms of influence.

Methods
Copula function modelling is used to examine the bivariate distributions of the ratings of various wine criticss and those of Robert Parker with respect to Bordeaux en primeur wines.

Results
Significant upper tail dependence in the bivariate distributions between Parker's ratings and those of several other wine critics is delineated and explored for both left and right bank wines.

Abstract
Introduction and Research Question

Numerous studies such as Noparumpa et al. (2015), Ali et al. (2010), Ashenfelter, (2010), Jones and Storchmann, (2001) have shown that Bordeaux en primeur prices are heavily dependent on critics' barrel ratings despite the many uncertainties from the continued aging, blending and bottling process. In particular, it has long been known that barrel scores from the prestigious wine critic Robert Parker Jr. have had a significant influence on the initial en primeur price offering by the chateaux. Indeed, Parker's ratings have been largely viewed as the authority on Bordeaux en primeur wines with his scores and palate having a significant influence over a close to 40 year period. For example, a low rating by Parker has a significant adverse impact on the release price of the wine (Mendick et al., 2016).

His reign as the world's leading wine critic on Bordeaux wines has not been without some controversy, however, having been criticized with advocating style over substance and creating a homogenous world of highly oaked and over-extracted wines. However, he has been credited with having pushed the Bordeaux wine industry into investments in newer technology and equipment, resulting in greater consistency over the years (Millar, 2015).

In February 2015, Parker announced that he would no longer review Bordeaux wine futures; turning the responsibility over to his successor Neal Martin, a British wine critic. Martin's rise to prominence as a wine critic had been relatively quick having his beginnings as a wine buyer and taster, and as a wine blogger commencing in 2003 with the website Wine Journal (Mendick et al., 2016). He gained a substantial following in a short period of time, and consequently was asked by Parker to join the Wine Advocate as a wine writer and critic in 2006 (Lyons, 2015).

As of April 2016, Martin assumed responsibility for the review of all Bordeaux wines, both in barrel and bottle, for Parker's prestigious publication, the Wine Advocate (Demmond, 2016; Pickford, 2016).

Given the long-standing influence of Parker on the Bordeaux wine industry, the appointment of Martin creates some uncertainty for many chateaux, both with respect to the future influence of Martin's ratings and their consistency, or lack thereof, with that of Parker's. Indeed the question remains that despite the "passing of the mantle" on the part of Parker to Martin, what will be the potential future impact of other wine raters on Bordeaux wine. Indeed the question has arose among some wine industry writers as to the future influence of the Wine Advocate and who will truly succeed Parker (Lipsey, 2016; Staveley, 2017).

Although the past influence of Parker's palate and preferences may diminish with time, it has had a significant impact on many producers in terms of their choices with respect to wine production, and on the preferences of consumers as evidenced by his impact on prices. Hence reasonable questions arise as to the similarities in the ratings of various wine critics, including Martin, with that of Parker.

Cyr, Kwong and Sun (2017) used copula function modelling to examine the bivariate distributional relationship between Parker and Martin's wine ratings over the period of 2010 – 2012 when both experts independently rated en primeur wines. Their findings indicate significant upper tail dependence in terms of Parker's and Martin's ratings of left bank wines, particularly in the years 2011 and 2012. However in terms of right bank wines they note a changing pattern in the bivariate relationship of Parker and Martin ratings over the three year period with a lack of upper tail dependence in 2011 and 2012 and lower correlation overall. They speculate that Martin may have begun to develop his own idiosyncratic preferences over that time period.

The current study expands the results regarding Parker and Martin by analyzing a number of other prominent en primeur wine critics. The goal of the study is to identify which ones have shown the strongest consistency in terms of ratings, with those of Parker, both in terms of overall correlation, but also in terms of nonlinear relationships expressed through copula function modelling.

Methodology and Data

To explore the relationship between the ratings of various critics and that of Parker we employ copula function modelling which provides a practical way of characterizing a multivariate distribution. Its strength lies in that it can capture basic non-linear relationships, or tail dependence, over the range of the multivariate distribution, that are frequently overlooked by methods that implicitly assume linearity, even in the case of small data sets. It also has the added advantage of being able to deal implicitly with different wine rating scales. Although Martin and Parker employed the same rating scale, other experts may not. The methodology of copula function modelling identifies the relationship between variates, independent of their marginal distributions.

Copula functions originate from the work of Sklar (1959) where Sklar's Theorem essentially shows that any multivariate distribution can be expressed in terms of its univariate marginal distribution functions along with a copula function which describes the dependence structure between the variables. The copula is a multivariate probability distribution for which the marginal probability distribution of each variable is uniform. A key element of Sklar's Theorem is that in modelling a multivariate distribution, it allows for the separation of the modelling of the individual univariate marginal distributions and that of the dependence structure captured by the copula function.

Although the number of copula functions is theoretically infinite, there are parametric copulas which can capture typical dependence structures between two covariates, with known parameters that can be estimated. These parametric forms then allow the classification of copula functions into families; two of particular importance are the elliptical and the Archimedean families. A detailed description of other copula families may be found in Nelsen (2006) among others. Typical copulas of the elliptical family frequently employed are the Gaussian or normal copula and the Student T copula. However, they are limited to radial symmetry restricting their ability to fully capture nonlinear, and particularly asymmetric, tail dependence between covariates. Fortunately, the Archimedean family of copulas includes some relatively simple closed forms with dependence parameters that capture asymmetric tail dependence in a tractable way. Common forms of the Archimedean family employed are the Gumbel, Clayton, and Frank copulas. The Clayton copula, for example, enables the modelling of greater correlation or tail dependence in the lower values of the covariates, while the Gumbel copula captures tail dependence in the higher values. The Frank copula captures greater correlation in the middle of the distribution as opposed to the tails. It is also possible, by negative transformation of either, or both, of the two uniform covariates to capture other forms of asymmetric tail dependence. Upper and lower tail dependence measures can frequently be derived from the copula parameters as well as, in limited cases, the relationship to standard dependence measures such as Kendall's tau and Spearman's rho (Cherubini et al., 2004).

Data

A rich database of en primeur wine prices along with the ratings of various wine critics are available from the wine sellers Bolomey Wijnimport Amsterdam (http://www.bordoverview.com) that extends from 2004 through to 2016, with Parker's ratings available up to and including 2012. Not all wine critics rated en primeur wines every year throughout that period and, in some cases, not always wines from both the right and left banks. However, the data allows for a fairly robust analysis of the ratings of a number of key Bordeaux wine critics such as Jancis Robinson, James Sucking and Rene Gabriel along with wine critics from the Decanter wine magazine, La Revue du Vin de France, and the Dutch wine magazine Perswijn. The ratings of the English wine critic Jane Anson are also available for comparison with that of Parker, but from the period of 2006 onward.

Hence, for the period of 2005/6 through 2012 we examine the patterns of best fitting bivariate copula functions describing the relationship between the ratings of Robert Parker and those of various other wine critics. Our analysis examines the extent of correlation and tail dependence year by year and for the complete time period; for both left and right bank wines, and in aggregate.

Results

With few exceptions the results indicate significant upper tail dependence in the bivariate distributions between Parker's ratings and those of several critics. This is fairly consistent across years and for both left and right bank. However, the results indicate lesser and transitioning correlations for several critics and a strengthening in terms of others. Differences are also noted between left and right bank wines.