



LINEAR REGRESSION

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BORDEAUX WINE

IT WOULD BE COOL TO ABLE TO PREDICT THE PRICE YEARS IN ADVANCE

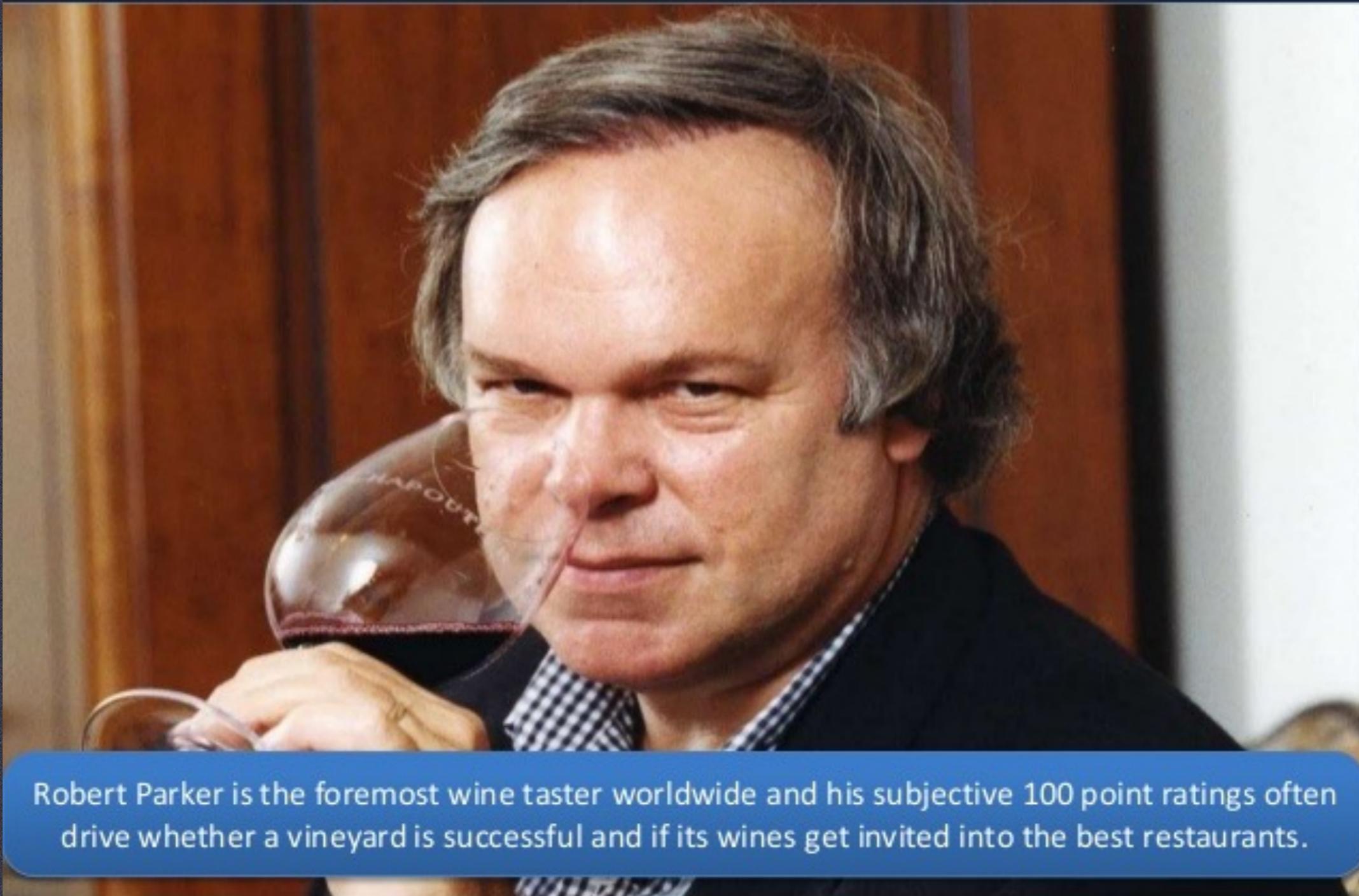
A spirited problem

- * Large differences in price and quality from year to year
- * .. even though process is the same
- * Quality improves with ageing, hard to predict years in advance
- * Expert sommeliers predict if today's wine will be good tomorrow
- * Can machines do better?



Meet Robert Parker Jr., Wine Guru

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Robert Parker is the foremost wine taster worldwide and his subjective 100 point ratings often drive whether a vineyard is successful and if its wines get invited into the best restaurants.

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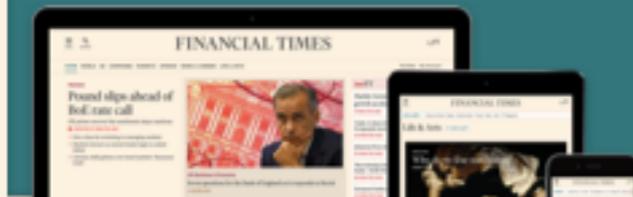
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Man vs machine - Grape expectations: the price of wine

By Ian Ayres

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Orley Ashenfelter is an economist at Princeton university, a former editor of the prestigious American Economic Review and a wine enthusiast. About 30 years ago, that led to some trouble. He decided that instead of using the "swishing and spitting" approach of wine gurus such as Robert Parker to predict auction prices, he would use statistics. Bordeaux are best when the grapes are ripe and their juice is concentrated. In years when the summer is hot, grapes get ripe. And, in years of below-average rainfall, the fruit gets concentrated. So it's in the hot and dry years that you tend to

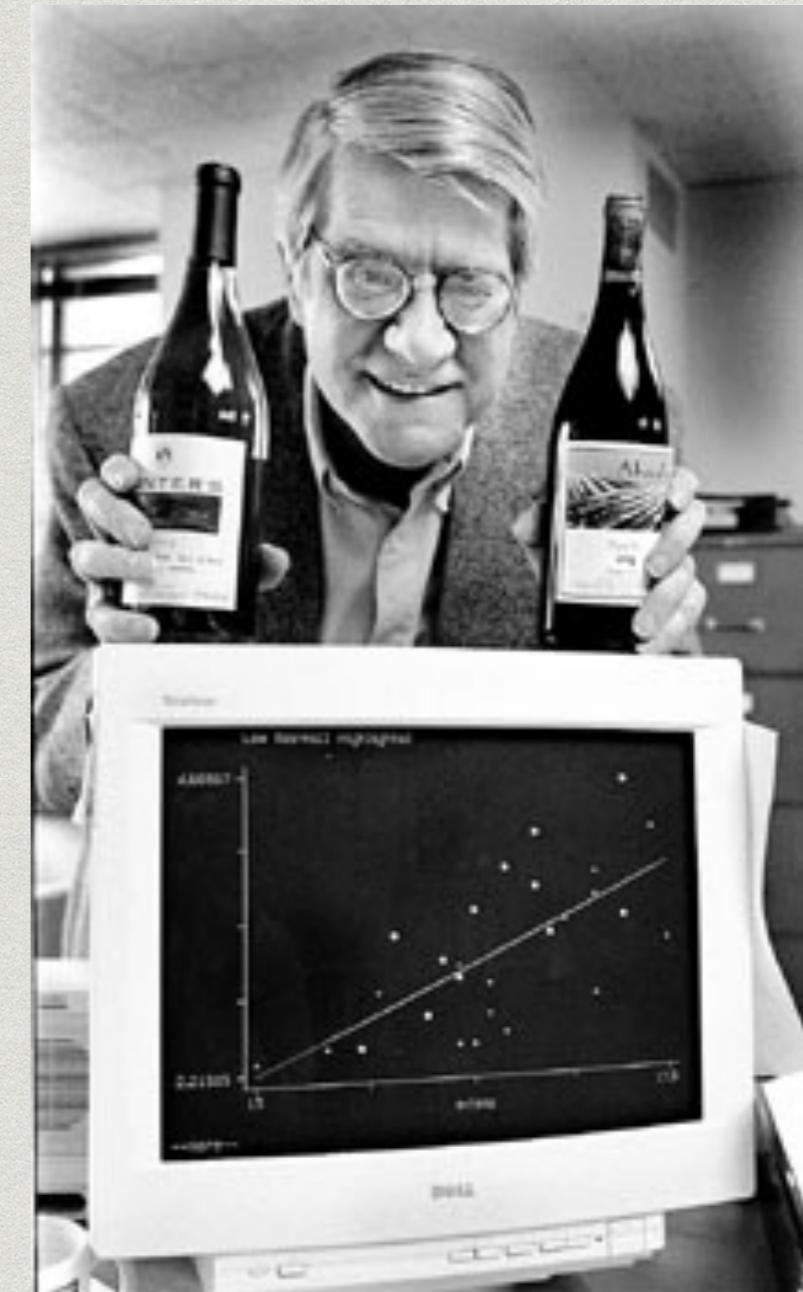
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MAN VS MACHINE, AGAIN

Man vs Machine, again

- * Princeton economist and wine lover Orley Ashenfelter believed his machine predictions would be more accurate than that of the best wine critic
- * Model is an example of (multivariate) LINEAR REGRESSION



Sour grapes

- * Robert Parker branded the attempt “Ludicrous and absurd!” and described Ashenfelter as an “absolute and total sham”
- * Britain's Wine magazine said “the formula's self-evident silliness invite[s] disrespect”.
- * When Ashenfelter gave a wine presentation at Christie's wine department, dealers in the back hissed.
- * And Parker said Ashenfelter was “**rather like a movie critic who never goes to see the movie but tells you how good it is based on the actors and the director**”.



Clash of cultures

$$\begin{aligned}\log(price) = & -12.14 + 0.0011 \textit{WinterRain} \\& + 0.6 \textit{AveSummerTemperature} \\& - 0.004 \textit{HarvestRain} \\& + 0.0023 \textit{AgeOfVintage}\end{aligned}$$

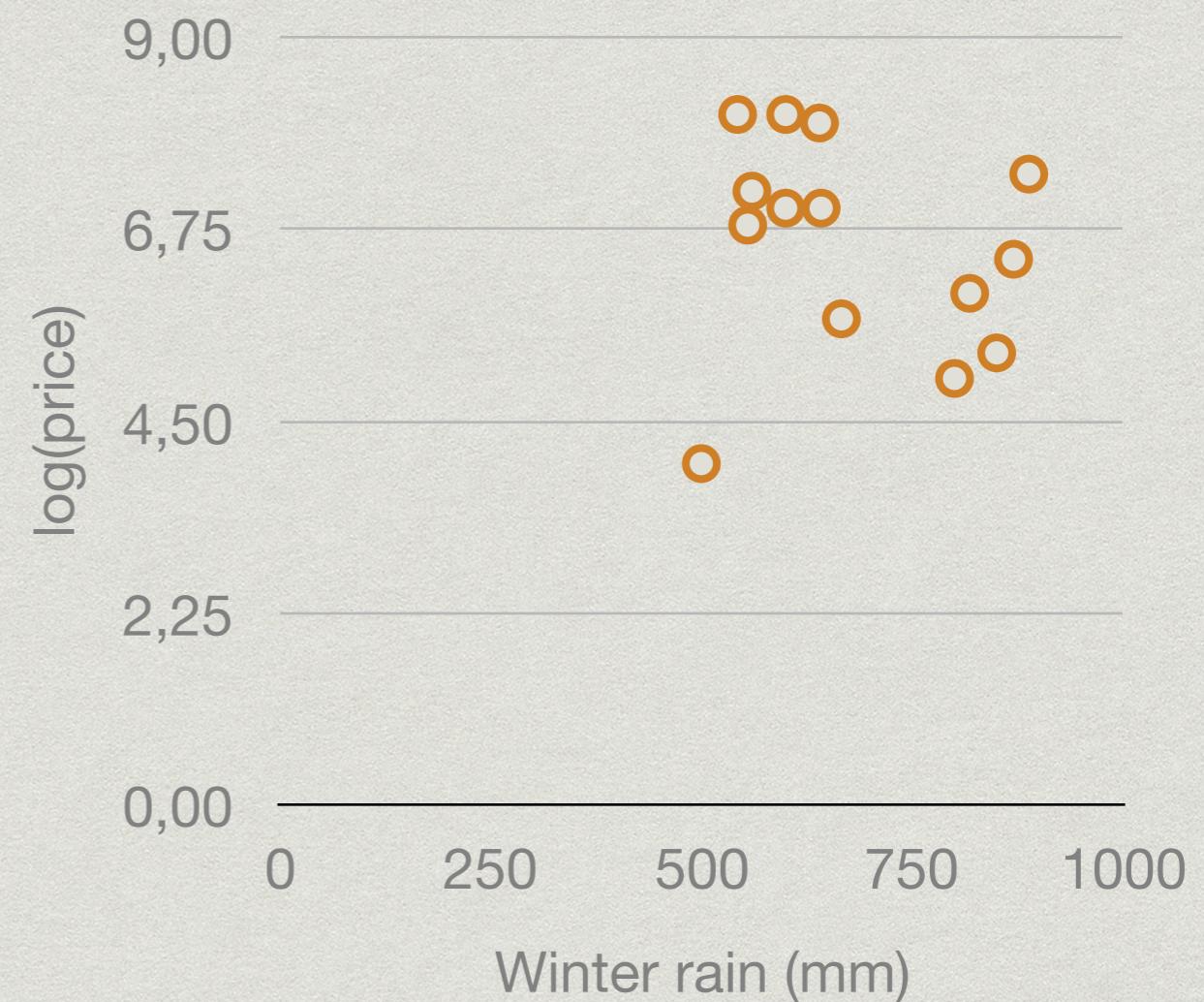

The method

- * The critical concept, Professor Ashenfelter acknowledges, came from Bruno Prats, owner of Chateau Cos d'Estournel in the St.-Estephe region of Bordeaux. Mr. Prats charted both the average temperature during the growing season and rainfall during the harvest months to make systematic comparisons between vintages.



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The method

- * Four features were selected as good predictors of the price: age of the wine, harvest season rain, winter rain, average summer temperature
- * ..then a classical linear regression model was tuned to these data

The method

- * According to this "multivariate regression analysis," heavy rains in the winter followed by a hot summer improve wine quality, while rainfall before the harvest damages it. The statistical fit from 1952 through 1980 is remarkably snug for the red wines of Burgundy as well as Bordeaux. [NYT]
- * Parker claimed that 1986 is “very good to sometimes exceptional”
- * ...while according to Ashenfelter 1986 is mediocre. Moreover 1989 will be “the wine of the century” and 1990 will be even better.
- * In wine auctions, 1989 sold for more than twice the price of 1986. 1990 sold for even higher prices!
- * Later, Ashenfelter predicted 2000 and 2003 would be great. Parker has stated that “2000 is the greatest vintage Bordeaux has ever produced”

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