

# **Using Hedonic Models of Solar Radiation and Weather to Assess the Economic Effect of Climate Change: The Case of Mosel Valley Vineyards**

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In this paper we use two alternative methods to assess the effects of climate change on the quality of wines from the vineyards of the Mosel Valley in Germany. In the first, more structural approach, we use a physical model of solar radiation to measure the amount of energy collected by a vineyard, and then to establish the econometric relation between energy and vineyard quality. Coupling this hedonic function with the physics of heat and energy permits a calculation of the impact of any temperature change on vineyard quality (and prices). We show that the variability in vineyard quality in this region is due primarily to the extent to which each vineyard is able to capture radiant solar energy, so that these data provide a particularly credible “experiment” for identifying and measuring the appropriate hedonic equation.

In a second, more commonly used approach, we measure the effect of year to year changes in the weather on land or crop values in the same region and use the estimated hedonic equation to measure the effect of temperature change on prices.

As is well known, there are likely to be winners and losers from any potential climate change. The empirical results of both analyses are broadly similar and indicate that the vineyards of the Mosel Valley will increase in value under a scenario of global warming, and perhaps by a considerable amount. Vineyard and grape prices increase more than proportionally with greater ripeness, so that we estimate a 3°C increase in temperature would more than double the value of this vineyard area, while a 1°C increase would increase prices by more than 20 percent.