The Demand for Winegrapes in California
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In California, grapes, including wine, table, and raisin rank as the highest valued crop and the second-highest valued product after milk and cream. California produced 86% of both U.S. winegrape volume and value in 2010. Wine grapes alone contributed roughly $2.5 billion in total value of California farm production in 2010. While measures of demand, and in particular, elasticities, are often used in policy analysis, despite the economic importance of this industry, very few studies have estimated the demand for wine produced in California, and even fewer have estimated the demand for California winegrapes.

Several complexities in the market for California winegrapes may explain this dearth of studies. First, the structure of supply and demand is recursive; in any year, the total quantity of wine grapes is predetermined as a consequence of decisions taken in previous years based on expectations of returns. Thus modeling this industry necessitates use of an inverse demand model, in which price, \( p \), is a function of quantity demanded, \( q \). An additional matter of note is that wine is a traded good and, consequently, the demand for wine made from California winegrapes (and thus the demand for California winegrapes) is effectively a residual demand, which is influenced by global supply and demand conditions, making the relevant demands much more elastic than they would be otherwise. We explicitly address this aspect of demand both in our estimates of elasticities of demand and in the interpretation of these estimates.

Finally, wine is a highly differentiated product, and California produces correspondingly differentiated winegrapes across a very diverse range of agroecologies to supply a range of market outlets. Reflecting this diversity, the California Department of Food and Agriculture (CDFA) collects detailed data at the level of the crush district of which California has a total of 17, which for the purposes of this analysis we have aggregated into three primary regions—named “High,” “Medium,” and “Low” reflecting the average prices (and quality) of the winegrapes they produce and the wine made from them.

We have estimated an inverse flexible-form demand system using a model presented by Brown, Lee, and Seale (1995). This model nests several functional forms that can be obtained by imposing restrictions, although we opted to use the fully flexible form of this model because it produced the most sensible results; it was the only model for which, after inverting the matrix of flexibilities to obtain elasticities, all of the own-price elasticities of demand were negative. The econometric analysis yields estimates of the own-price elasticity of demand of about –9.5 for “High”-quality winegrapes (from Napa and Sonoma counties), about –5.3 for “Medium”-quality winegrapes (mainly from other coastal valleys and the northern San Joaquin Valley and Lodi), and –2.6 for “Low”-quality winegrapes (from the southern San Joaquin Valley where per acre yields are nearly 10 times those in Napa). Thus demands for all three categories are fairly elastic, with high-quality winegrapes being the most price-responsive. “Expenditure” elasticities (i.e., elasticities of demand for winegrapes from a particular region with respect to expenditure on California winegrapes) were computed using Wold and Juréen’s (1955) result: the sum of the direct and cross-price elasticities for a given category must be equal to the negative of the expenditure elasticity. The expenditure elasticity is much greater for high-quality than for low-quality winegrapes. The estimates of the expenditure elasticity of demand are about 2.0 for “High”-quality winegrapes, about 0.7 for “Medium”-quality winegrapes, and 0.1 for “Low”-quality winegrapes.

Elasticities of the derived, residual demand for winegrapes can also be estimated using published estimates of relevant parameters combined with some educated guesswork. We use estimates of parameters from a meta-analysis by Fogarty (2010) and a range of “best guesses” for parameters for which published estimates were not available, along with the Slutsky equation. We first obtain estimates of the elasticity of demand for California wine. Reflecting alternative assumptions, these estimates range from –
11.1 to – 2.5. Next we derive estimates of the corresponding elasticity of the derived demand for California winegrapes, which range from – 4.6 to – 1.0 reflecting the range in the values for the elasticity of demand for wine. In turn, each estimate of the elasticity of demand for California winegrapes in total can be used to estimate elasticities of demand for the three categories of California winegrapes that we defined for the econometric estimates (“Low”, “Medium”, and “High”). The own-price elasticities of demand using this method range between – 7.9 and – 2.2 for “High,” between – 7.6 and – 2.1 for “Medium,” and between – 9.1 and – 2.7 for the “Low” category. The estimated elasticities of demand vary with changes in assumptions about the elasticity of demand for undifferentiated winegrapes, the elasticity of substitution between grapes of different qualities, and the degree of price transmission between wine-producing countries.

This paper presents alternative estimates of the elasticity of demand for wine from different regions in California, differentiated on the basis of average prices as an indicator of quality. It adds to the wine economics literature by estimating the demand for the most important input in winemaking: winegrapes. “Synthetic” estimates of elasticities of demand for wine and winegrapes were calculated using readily available information, along with careful guesswork and sensitivity analyses where data were not available. These estimates are broadly comparable to their econometrically estimated counterparts, and provide some corroboration for the econometric finding that the demand for California winegrapes is highly elastic but differentiated among qualities.