Technical Efficiency for a Sample of Chilean Wine Grape Producers
A Stochastic Production Frontier Analysis

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The increase in wine production in New World Wine countries has been a recent success and this has led to losses in market share by traditional wine exporting countries like France, Spain and Italy (Anderson, 2005). In particular, Chile has become an increasingly important player in international wine markets but the overall rise in wine supplies has brought growing competition to capture market share which highlights the importance of productivity gains for wine and grape producers. Productivity concerns are of special significance during economic recessions when the market for many products including wine tends to soften.

Although many studies examining the technical efficiency (TE) component of productivity in farming have been published around the world (Bravo-Ureta, et al, 2007) there appears to be only a handful of such studies focusing on productivity and TE in wine grape production. One exception is the work by Townsend, Kirsten and Vink (1998) who analyzed the relationship between farm size, productivity and returns to scale for wine grape producers located in four regions of South Africa for the years 1992 to 1995. Another study for South Africa, by Conradie, Cookson and Thirtle (2006), examined the relationship between technical efficiency and farm size for samples of Western Cape Province producers. These authors estimated stochastic production frontier models using panel data for wine grape farms located in the Robertson and Worcester regions for the years 2003 and 2004, and cross sectional data for table grape farms located in De Doorns region for 2004. A more recent study was conducted by Henriques, Carvalho and Fragoso (2009) who used non-parametric techniques to measure TE for a sample of 22 wine grape farms from the Alentejo region of Portugal for the years 2001 and 2004.

The purpose of this paper is to estimate and analyze the technical efficiency component (TE) of productivity for a sample of wine grape producers in Chile. The data includes 38 farms located in seven different valleys throughout the wine production regions of Chile. The input-output information is for individual blocks which yields a total of 263 observations. We use a Cobb-Douglas model to estimate a stochastic production frontier (SPF) following the Battese and Coelli (1995) specification.

The results indicate that the variable that has the major impact on output, according to the estimated partial production elasticities, are Labor (0.37), Machinery (0.32) and Block Size (0.29). The partial elasticity for Material is much smaller (0.06) and not statistically significant. Based on the resulting value of the function coefficient the analysis suggest that wine grape production is subject to constant returns to size.

Blocks with grapes that are five years of age or older, as would be expected, exhibit a higher level of output while grape varieties that are used for red wine are found to have lower average output than those used for white wine. In addition, blocks that have grapes classified for production of premium wines compared to those going for varietal wines have lower output. The trellis system is not found to have a significant effect on output while the valley in which the vineyard is located does, but no systematic geographical pattern emerges.

Finally, the results concerning productivity reveal that average TE at the farm level is 66.6% while the average at the block level is 65.4%. These averages are lower than those reported for several other farming activities for a large variety of settings by Bravo-Ureta et al (2007). Thus, these results suggest that average profitability could be improved by narrowing the gap between actual and best performance in wine grape production in Chile.