# Bordeaux 2016 Abstract Submission

## Title
WATER USE EFFICIENCY AMONG SMALL AND MEDIUM VINEYARDS FARMERS IN CENTRAL CHILE

## I want to submit an abstract for:
Conference Presentation

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## Keywords
Stochastic Frontiers, Irrigation, Technical Efficiency, vineyards

## Research Question

What is the efficiency of use of water in vineyards production?
What is the shadow price of irrigation in vineyards for wine production?

## Methods

A stochastic production frontier model is then formulated incorporating traditional inputs (land, labor, capital) and we include quantity of water applied

## Results

Results differs depending on type of irrigation systems. Drip irrigation and furrow irrigation were compared.

## Abstract

Over the past three decades the relative importance of different actors in the wine industry scene has changed significantly. During the 1980s, Old World countries, such as France, Italy and Spain, played a dominant role in both wine production and consumption. The rapid globalization of agricultural trade has forced Old World countries to compete with emerging New World producers, particularly Australia, New Zealand, Argentina and Chile. Currently, Old World domestic markets have become oversupplied while international demand has increased, which has led to a wine industry that is increasingly export-oriented.
In Chile, over the last three decades, agriculture has become a key and growing contributor to export earnings and wine has played an important and rising role. This evolution in Chilean agriculture has been attributed to significant structural reforms, particularly the land reform, initiated in the early 1960s, along with macroeconomic policies introduced after 1973. It has been widely argued that the lower concentration of land ownership brought about by the land reform along with free market policies implemented by the military regime after 1973, allowed entrepreneurs to benefit from the natural advantages that Chile has in fruit production. The fast growth in demand for horticultural products and wine in the developed world has also been a major contributor to the Chilean success story.

Vineyard grapes are one of the most relevant crops in the Chilean agricultural sector. The planted area in 2012 was 128,638 ha, where both regions compromise 73% of the total national. The increasing Chilean wine production and exports have pushed this sector to make relevant changes in productive strategies, being especially focused on producing high quality grapes highly sensitive to water stress management. Despite the major evolution of wine production and exports in Chile, the production of wine grapes is undergoing significant challenges arising from low prices received by growers, more stringent requirements for fruit quality, and agronomic risks in production stemming from water scarcity. Globally, 70% of freshwater is used for agriculture and is expected that 15% of this availability will need to be re-directed to other uses in the medium term. Moreover, climate change has led to increases in temperatures, decreases in rainfall and increased droughts, generating greater uncertainty in the availability of water for irrigation.

Therefore, the objective of this presentation is to analyze farm level water use efficiency and the shadow value of irrigation water in wine grape vineyards located in the O'Higgins and Maule regions in Central Chile. For this purpose, 452 farms were surveyed over the period November 2014 and April 2015. The research question of our paper are i) What is the efficiency of use of water in vineyards production?, and ii) What is the shadow price of irrigation in vineyards for wine production?

This paper is part of FONDECYT Project N° 1140615 entitled “Factors affecting adoption and profitability of irrigation technologies (pressurized irrigation and scheduling) among medium and small scale vineyard producers in Central Chile”. The project has three specific objectives: i) to estimate the degree of full adoption (adoption + adaptation to the productive system) of pressurized irrigation and scheduling by farmers as complementary aspects of the technology; ii) to estimate profits associated with adopting irrigation technology; and iii) to measure the degree of awareness of the benefits of irrigation technology and the impact of social capital and networking in the full adoption of the technology by farmers.

The survey used to collect information from producers was divided into 6 modules: general information; irrigation technologies; vineyard revenues and costs; social capital; farmer behavior; and farmer networks. On average, farm size is 37 hectares while the yield is 14.4 tons of grapes per hectare. There is considerable heterogeneity in terms of grape type (red or white), quality (premium or varietal), and vineyard conduction system. Gross margin (GM) is on average US $3,830 per hectare, though there is a high variability, which is discussed in depth in this research (from negative GM to over US $ 9,000). Of the total 452 farmers surveyed, 168, or 37% of the sample, use modern irrigation and the rest have irrigation by gravity; however, alternative mechanisms and irrigation scheduling strategies are observed for both systems.

A stochastic production frontier model is then formulated incorporating traditional inputs (land, labor, capital) and is augmented by including quantity of water applied as well as a number of attributes of the vineyard and dummy variables to capture agro-ecological zone. Cobb-Douglas and translog functional forms are estimated and the results are used to quantify the shadow value of water (i.e., marginal value product), output oriented farm level technical efficiency, and irrigation water use efficiency. These measures are analyzed considering various characteristics such as farm size and location, irrigation technology, and irrigation scheduling, among others. Drip irrigation and furrow irrigation were compared. Results differs depending on type of irrigation systems.