

2020

36th IARIW General Conference

Paper Prepared for the 36th IARIW General Conference, Oslo, Norway, August 24-28, 2020

Environmental Attributes and the Value of Agricultural Land: A Hedonic Analysis Using a Unique Australian Data Set, 1975-2018

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Land is a fundamental asset of a farm. In Australia, agricultural land accounts for over 60% of the capital stock in the agricultural industry. The emerging challenges facing the agriculture industry of climate change and environmental degradation mean that a better understanding of the determinants of farmland productivity and hence its value is more important than ever. While current price values of the stock of agricultural land are available from the national balance sheet in the Australian System of National Accounts, there is no equivalent volume indicator. The Australian Bureau of Statistics only measures the land area with no adjustment made for quality, assumes that land quantity is constant and uses the CPI to calculate rental prices for land. As a consequence, soil degradation due to land management choices or exogenous factors such as climate and rainfall is ignored. Given the importance of land as an input into the agricultural production process, omitting these may distort the farmland values as perceived by farmers, investors, financiers and in government declared prices of agricultural land.

This study considers alternative spatial hedonic price models to assess the determinants of agricultural land values in Australia for the time span 1975-2018. The data is unique, containing a census of farm-level transactions sales record (over 400,000 observations) in Australia spanning over 40 years. Further Geographic Information Systems (GIS) mapping has been used to integrate spatial data of each farm to an extensive range of characteristics of the land parcel. This data set allows, for the first time, the construction of hedonic price indexes of land accounting for quality for Australia at regional and subregional levels.

Hedonic price models calculate the implicit marginal price of the various characteristics of the land from its sale price. While hedonic approaches are used extensively in real estate and housing market research, their use in valuing farmland is much less common. We first construct a spatial hedonic price model that includes a simple locational dummy variable. We also apply the method used by Colwell (1998) and Hill and Scholz (2018), which directly use spatial coordinate information in the model. These three models are estimated over time and at both national and regional levels. More than twelve variables are used to capture the environmental attributes of the farmland, including land use, soil acidity, minimum and maximum temperature, average rainfall, water availability, salinity, population accessibility and distance to infrastructure as well as economic factors including interest rates and commodity prices.

This study significantly advances the understanding of the determinants of agricultural land values, accounting for the environmental attributes of the land. It makes at least two contributions to the measurement of agricultural farmland values. First, the paper will quantify the link of the environmental attributes of the farmland and its value over time for Australia. Second, the paper assesses the suitability of different spatial hedonic price models to construct farmland price indexes at the national and regional level, which can be used to enhance national accounts and productivity measurement.