AUSTRALIAN AGRICULTURAL ECONOMICS SOCIETY AWARDS 1983

MASTER'S THESIS PRIZE

The prize was awarded to Allan W. Tunstall for a thesis entitled 'The Storage and Pricing of the Victorian Apple Crop', submitted to the School of Agriculture, La Trobe University, for the degree Master of Agricultural Science.*

Thesis Abstract

Allocating products between markets is a general economic problem which has been widely studied in agriculture. The storage of apples and their intertemporal marketing in Victoria provided an interesting example of this problem. The wholesale prices of stored apples in Victoria during the 1970s were characterised by unusual variability. In some years, prices were extremely stable, barely increasing by the cost of storage, whereas in other years, increases in prices were quite large. These price patterns appeared to be unrelated to the total quantity of apples stored. These observations led to an hypothesis that the pricing and seasonal (monthly) allocation of stored apples was not (always) consistent with a perfectly competitive market.

Economic theory relevant to storage and pricing decisions and the seasonal demand for apples was used to develop intertemporal pricing rules based on perfectly competitive and monopoly pricing models. However, the relevance of these conventional market models to the economic environment of the Victorian apple market was questioned. An alternative approach using the theory of price mark-ups or margins (herein called the mark-up model) was developed and applied to the intertemporal pricing problem. Pricing rules and storage strategies for these three market models were compared.

The relevant literature on the problem of product allocation between markets is immense. Much of the literature reporting studies of the market allocation of apples, published in the period 1960-80, was reviewed in this study. A major aim of the review was to reconcile the wide range of elasticity estimates and modelling methods which have been produced over this period. Although this task was inconclusive, the discussion served to highlight a number of technical and practical problems associated with estimating demand functions and applying the estimated parameters in mathematical optimising routines such as linear and quadratic programming.

Alternative econometric models of the seasonal (monthly) demand for stored apples were estimated by ordinary least squares using data from the period 1971 to 1980. The models presented in the thesis differ in the way seasonal and yearly variation in demand were treated. Intercept and slope shifting dummy variables were used as proxy measures to cap-

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ture sources of variation not explicitly accounted for by the variables included. In one model an innovative approach was used to test a 'switching parameters' hypothesis to explain demand variation between price-stable and price-variable years.

The estimated price flexibilities from the preferred model mostly showed a 'U'-shaped movement with prices being 'more flexible' (less elastic) in the middle of the storage season (August/September) compared with early (June) or late storage (November). However, the absolute values of the estimated price flexibilities were always less than 1.0 and were mostly in the order of 0.49 to 0.08. These estimates are broadly within the range of price flexibilities (elasticities) presented by other researchers using similar models for the US apple market. Similar studies have not been published for the Australian apple market.

These results could, however, only be used and interpreted with caution because of statistical limitations of the estimated models. For exemplar cases, the estimated demand functions were incorporated into optimising algorithms based on the theoretical pricing rules established previously. Optimisation was carried out using Lagrange methods, linear programming and quadratic programming and the sensitivity of the simulated sales pattern was evaluated by relaxing important assumptions. The relative forecasting performance of the simulated markets was compared. For the examples considered, the mark-up model was considered to have the best forecasting performance. However, only selected results from years of high price variability were used because of the statistical limitations of the estimated model.

In conclusion, evidence was found for non-competitive pricing of stored apples in certain years. This was associated with particular patterns of seasonal demand variation, and was thought to be consistent with co-operative bargaining over the marketing margin attributable to storage. However, it was not possible to distinguish statistically between alternative forms of non-competitive behaviour, and for some years it was not possible to rule out competitive pricing.

JOURNAL ARTICLE PRIZE

The award for the best article published in the *Australian Journal of Agricultural Economics* was awarded to Brian S. Fisher and Robyn G. Munro for their article entitled 'Supply response in the Australian extensive livestock and cropping industries: a study of intentions and expectations' published in Volume 27(1), pp. 1-11.