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AUSTRALIAN AGRICULTURAL ECONOMICS SOCIETY AWARDS 1991/92

Ph.D. PRIZE ('Prize for Ph.D. Research')

The Ph.D. prize was awarded to Donna C. Brennan, University of Western Australia, for her thesis entitled 'Peak Load Problems in the Australian Grain Distribution Industry: An Economic Analysis'.

Thesis Abstract

Peak load problems have important implications for the costs of providing economic services. Two peak load problems in the Australian grain distribution industry were studied in this thesis. One is brought about by the short annual grain harvesting period, which means that there is a peak demand placed on the central grain distribution system to transport and store the grain. The other is due to the variability in grain production between years, which means that the total demand for services is high in some years and low in others.

Institutional constraints that have existed historically in the Australian grain distribution industry imply that the current methods of dealing with these peak load problems may be inefficient. Theoretical models were developed to examine the effects of the peak load problems on grain handling costs. These models were used to examine the efficiency of the existing system and to highlight ways in which grain distribution costs could be reduced.

An examination of the annual peak load problem revealed the important trade off between peak transport costs and the location of grain storage capacity. For example, the high cost of investing in transport capacity that would only be used during short harvest period means that most grain is stored in the country in the immediate post harvest period. Similarly, the benefits of increasing farm to silo distance to achieve economies of size at country receival points must be traded off against the costs associated with increasing the peak burden on the farm to silo transport sector.

A spatial-temporal mathematical programming model of the Kwinana region of Western Australia was used to quantify the effect of the annual peak load problem on the cost of operating the current grain distribution system. In contrast to previous models, the shape of cost curves at country receival points were endogenously determined, according to the allocation of scarce rail capacity in the receival period.

Detailed peak and off peak transport costs, including a queuing cost function which was exponentially related to truck arrivals at a site, were modelled. It was shown that peak load transport costs limit the

other benefits associated with increasing centralization, which have been highlighted in other studies (e.g., Blyth, Noble and Mayers (1987), MacAulay, Batterham and Fisher (1988)). The benefits of extending the delivery period in order to reduce the annual peak load problem do not appear to be significant in years of average production, but may reduce total costs in years of peak production. A price rationing policy which informs farmers about the existence of bottlenecks in the peak period allows rail capacity to be used more productively and reduces grain handling costs by 15% when compared to a cost pooling policy.

A theoretical model was also developed to examine the problem of fluctuating annual grain production on investment decisions at country receival points. The model showed how the total costs of investing in and operating grain storage facilities under uncertainty can be minimized by having the right combination of technology at a site. The analysis showed that capital intensive horizontal storage technology should be used to satisfy most demand, while less capital intensive bunker storage should be used to satisfy the extra production occurring in peak years. The ability to make short term investment decisions after obtaining information about current seasonal conditions reduces the optimal level of investment in horizontal storage. It also reduces the costs associated with 'supply failure'.

An analysis of the W.A. grain handling infrastructure revealed that there were many sites where there was excess storage capacity. This high level of over-investment in the industry implied that at some sites the 'perceived cost' associated with not having enough grain storage capacity exceeded the marketable value of the grain. This over-investment was attributed to the effect of historical regulation on the efficiency of the grain handling industry.

MASTER'S THESIS PRIZE

The Master's Thesis prize was awarded to Aileen Joan Murrell, University of Western Australia, for her thesis 'Does the Producer Benefit From Price Stabilisation? An Empirical Analysis of the Australian Wool Corporation's Reserve Prize Scheme.

Thesis Abstract

For almost two decades, from 1974 to 1991, the Australian Wool Corporation (AWC) operated a guaranteed minimum reserve price scheme for wool sold at auction in Australia.

There has been continuous debate over the merits of this form of intervention since before the introduction of the Scheme and until its demise in 1991.

In this study the benefits and costs of this Reserve Price Scheme are estimated for Australia wool producers.

The procedure is to first, assess the degree of price stability from intervention, and second to estimate the welfare consequences resulting from that degree of price stability. The analysis covers the period 1974-75 to 1988-89 for nine wool categories including the Market Indicator series.

Estimates of the degree of price stability are obtained by comparing estimates of wool price variability in the presence of intervention (*ex post*), and in the absence of intervention (*ex parte*).

Estimates of *ex post* price variability are obtained from the residuals of ARIMA models of order (p, d, q), Estimates of *ex ante* price variability are obtained from a statistical technique which takes into account the impact of price stabilisation i modifying the distribution of prices. The method used in this study further develops the work of Fraser (1989).

Producer benefits are measured in terms of a producer's willingness to pay for the Reserve Price Scheme in response to its effects on the expected level and variability of their income, given their attitude to risk. This model is based on the 'transfer and risk benefits' framework developed in Newbery and Stiglitz (1981).

Producer costs of the Reserve Price Scheme are based on the opportunity cost of contributions to the Market Support Fund.

The analysis shows that between 1974-75 and 1988-89 the Reserve Price Scheme resulted in a reduced level of price uncertainty for the producers of all grades of wool. However, the level of stability varied significantly between grades. The Scheme had the most significant effect on stabilising the prices of finer wool types. For 19 micron wool the coefficient of variation was reduced by 77.83 per cent, for 21 micron wool and merino carding wool the coefficient of variation was reduced by 55.97 per cent and 39.20 per cent respectively. The percentage reduction in the coefficient of variation for 23 and 25 micron and crossbred carding wools, plus the market indicator series, ranged between 20 per cent and 30 per cent. The percentage change in the coefficient of variation of prices for 27 and 30 micron wool was 7.88 per cent and 4.78 per cent respectively.

Produced benefits by grade are estimated for a range of producer attitudes to risk. These results indicate that the more risk averse producers are willing to pay more for a given level of price stability than less risk averse producers. Hence, producers' of finer quality wools are willing to pay more for the Reserve Price Scheme than other producers because they experience a greater level of price stability.

A comparison of producer costs and benefits indicates that the costs of the scheme generally exceed the benefits. The cost-benefit ratio for all risk neutral producers (R=0) exceeds unity. For all other producers with more averse attitudes to risk (R=.30 to R=.90) the cost-benefit ratio exceeded one except for the producers of 19 micron wool. Sensitivity analysis shows that the cost-benefit ratio always remains

greater than unity except in the case of 19 micron wool and merino carding wool.

UNDERGRADUATE PRIZES

Anthea McClintock (University of Sydney)
Elizabeth Crowe (University of Sydney)
Andrew Dowd (Charles Sturt University)
Jodie Lewis (La Trobe University)
Leigh Vial (University of Melbourne)
Christopher Laing (Massey University)
Andrew White (University of Western Australia)
James Bindon (University of New England)
Fiona Scott (University of New England)
Tim Keith (University of Queensland)