ECONOMIC ASPECTS OF TRACTOR AND ANIMAL USE IN LUWU, SOUTH SULAWESI, INDONESIA: A QUADRATIC RISK PROGRAMMING APPROACH

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by

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Abstract

Quadratic risk programming was used in this study to evaluate farmers' choices between tractors and draught animals for the preparation of rice land. A case study approach was adopted, with separate models being developed for each of six farm-household units in three categories of tractor and animal use in one Indonesian village.

Mean-variance (E,V) frontiers were obtained for two versions of the quadratic risk programming models. In the first version, variance-covariance matrices were computed by combining historical price data with farmers' subjective probability distributions for rice yields with and without tractor use. A second version was then created for the purposes of sensitivity analysis. This involved using an alternative variance-covariance matrix calculated from historical yield and price data in which no distinction was made between tractorised and non-tractorised rice production.

It did not prove possible to elicit usable utility functions from the case study farmers. Consequently, a single utility-maximising farm plan for each farmer could not be identified. Instead, a range of plausible levels of risk aversion was suggested, based on the findings of other researchers. It was concluded that, ceteris paribus, practical alternatives to the risk neutral farm plans would generally only be adopted if the farmers were extremely risk averse.

Sensitivity analyses were conducted with the linear (risk-neutral) versions of both 'subjective' and 'historical' models. Factors which were investigated included the supply and cost of family and hired labour, the ownership and value of cattle, the supply of land, the cost of tractor hire and assumptions concerning rice yields with and without tractor use. The last of these was found to be the most important. Tractor use was generally inferior to animal use (in terms of utility) except when tractorised rice yields were assumed to be higher than

non-tractorised rice yields. An expected yield increase of slightly more than ten per cent was necessary for fully tractorised land preparation to be optimal on all sample farms.

This finding corresponded closely with the actual tractor use patterns of the case-study farmers. The three farmers who hired a tractor for land preparation in the wet season of 1983 all expected their mean rice yields to be considerably higher than if they were to use draught animals instead. The expected increase ranged from 13 to 25 per cent. On the other hand, the three farmers who did not use a tractor in 1983 all expected their mean yields to be the same with or without tractor use.

These results suggest that the farmers' expectations concerning the effects of tractor use are an important determinant of their choice of land preparation technique. Since there is no clear evidence that tractor use in Luwu actually increases rice yields, it seems possible that non-optimal decisions are being mistakenly encouraged.

I certify that:

1. the substance of this dissertation has not already been submitted for any degree and is not being currently submitted for any other degree;

2. any help received in preparing this dissertation and all sources used have been acknowledged herein.

[redacted]

Julie C. Delforce

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