AN ANALYSIS OF EFFICIENCY AND PRODUCTIVITY IN MONGOLIAN CROP FARMING

by

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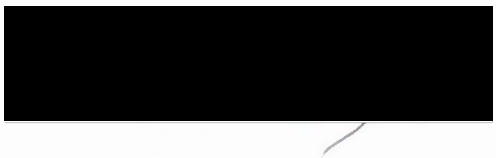
Declaration

I certify that the substance of this thesis has not already been submitted for any degree and is not currently being submitted for any other degree.

I certify that, to the best of my knowledge, any help received in preparing this thesis, and all sources used, have been acknowledged.



Abstract

In the past decade the world has witnessed the collapse of most centrally-planned economies. A large number of hypotheses have been put forward to explain this phenomenon. Among them, lack of efficiency and technical change have often been suggested as the major deficiencies of the system (Bergson, 1987; Moroney and Lovell, 1991). However, there have been few studies which have conducted detailed empirical analysis of pre-1990 firm-level data in an attempt to determine the degree of, and explanation of, the performance decline in these countries.

This study attempts to address these issues in the case of Mongolian crop farming. Detailed information on the inputs and outputs of 48 state farms producing grain and potatoes was collected from the original (hand-written) farm records. Annual data are obtained for the 14 year period from 1976 to 1989. These data cover three distinct policy planning periods. The first period (1976-1980) is characterised by increased input usage, whereas the second (1981-1985) and third (1986-1989) periods are largely characterised by the increased role of new technology, investment in human resources and the introduction of incentive systems (Unen, 1986) with the aim of improving farm productivity. In particular, during the last four years (1986-1989) of the centrally-planned economic regime, several new forms of farm incentive systems aimed at improving farm performance, were experimented with within the state farm structure, which was a reflection of the new wave of Gorbachev's "Perestroika" reforms, carried out throughout the Eastern Block.

Production in Mongolian crop farms is modelled using stochastic frontier production function (SFPF) and data envelopment analysis (DEA) methods. The SFPF is chosen as the principal method of analysis, because of its ability to accommodate data noise and traditional hypothesis tests. The DEA method is also used as a check to see if the results are robust to alternative methodologies. These methods are used to obtain estimates of technical efficiency for each farm in each of the 14 years considered. Information on technical change, production elasticities, returns to scale and scale efficiencies are also

obtained. The information on technical efficiencies and technical change is also combined to obtain measures of total factor productivity (TFP) change.

Empirical results were obtained for grain and potato farms separately. The grain farm results provided evidence of significant inefficiency, with mean technical efficiency of the order of 81.9 per cent. Technical efficiency declined over the study period by 6.7 per cent, while technical change also declined by 18.1 per cent. This provides an overall decline of 23.6 per cent in TFP for Mongolian grain farms. The relative importance of technical change in the TFP decline is in accordance with results obtained by Moroney and Lovell (1991) for the case of centrally planned economies and Koopman (1989) for the case of the Soviet agriculture. However, it is noted that the majority of the decline in TFP occurred in the first half of the study period. In fact, TFP growth of 41.7 per cent is observed in the final six years. This suggests that the shift away from policies encouraging increased input usage (prevalent in the 1970s) towards the "intensive" technology and "incentive" reform policies of the 1980s was beginning to achieve considerable success in grain farms.

For potato farms the average technical efficiency was approximately 73.6 per cent. In contrast to grain farms, TFP in potato farms actually grew by 11.6 per cent over the 14-year period. This comprised a 15.5 per cent increase in technical change and a small 3.4 per cent decline in technical efficiency. This TFP result is obviously better than that of grain farms, but is still poor in comparison to that achieved in Western economies. In terms of the TFP trend over time, it followed a similar pattern to that seen for grain farms. After an initial decline in the 1970s, a 55.1 per cent of TFP improvement was observed in the final nine years of the study.

For the case of grain farms, data on certain farm-specific socio-economic characteristics were available for the 1987-1989 period which was used to explain the efficiency variation among the grain farms. It was found that technical efficiency was significantly and positively correlated to the levels of technical education and experience of the farm workers, and to the degree of management autonomy and the extent of Russian technical assistance. This may suggest that Government investment in human capital, the

successive incentive reform attempts and Russian technical assistance may have been translated into a higher farm performance. It was also observed that the efficiency scores of large and medium farms were consistently higher than those of small farms. In addition, it was noted that these farms were characterised by either constant or mildly increasing returns to scale. Thus, this evidence suggests that the current economic reform of splitting the original state farms into smaller units may not be justified on the grounds of farm size or scale economies.

In general, the DEA results supported the SFPF results, suggesting that the results of the latter approach were robust. The efficiency scores of the two approaches were comparable. The TFP changes, both in terms of magnitudes and trends, were generally similar. Moreover, the DEA results on scale efficiencies of grain and potato farms supported the scale-economies findings of the SFPF approach.

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Dedication

I dedicate this work to my beloved mother Sandag Tumurdavaa.