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THE ECONOMICS OF PRODUCTION IN CHINSSE RUBBER SMALLHOLDINGS IN PENINSULAR MALAYSIA

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THE ECONOMICS OF PRODUCTION IN CHINESE RUBBER SMALLHOLDINGS IN PENINSULAR MALAYSIA

by

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APPROVAL SHEET

This thesis attached hereto, entitled "The Economics of Production in Chinese Rubber Smallholdings in Peninsular Malaysia" prepared and submitted by Chew Tek Ann for the degree of Doctor of Philosophy, is hereby accepted.

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ABSTRACT

THE ECONOMICS OF PRODUCTION IN CHINESE RUBBER SMALLHOLDINGS IN PENINSULAR MALAYSIA

by

CHEW TEK ANN

In this study standard production function techniques are used to analyse the economics of production in Chinese rubber smallholdings in Peninsular Malaysia. The data used were taken from two surveys, the 1963/64 RRI Survey and the 1978 Survey conducted by the author in the state of Selangor. Considering the importance of the rubber smallholding sector in the Malaysian economy, it is surprising that there has been only one production function study on rubber smallholdings in Malaysia thus far.

The probable reason for dearth of research in this area is the difficulty in handling the perennial nature of the rubber tree. A variable must be specified to capture the capital service flow accruing from the live capital tree-stock. In this thesis, "expected yields" estimated from yield profiles of various clonal material are used as proxies for the capital service flows. The yield profiles were drawn from published yield records of various selected commercial estates. Estates are more advanced technologically in rubber production than smallholdings. Thus the "expected yields" estimated will be higher than the real capital service flows.

However, as long as multiplicative production functions are used, the constant term will absorb whatever proportionality exists between "expected yields" and actual capital service flows. The various elasticities of production will not be affected. Thus using the "expected yields" derived as one of the independent variables, Cobb-Douglas production functions were estimated for the data obtained from the two surveys. The empirical results achieved are highly satisfactory.

Production function analyses show that resource allocations are general optimal in Chinese rubber smallholdings. The exceptional cases of nonoptimality are the "number of trees/hectare" variable which was generally below optimal for smallholdings in 1963/64 and "fertilizer-maintenance expenditure/hectare" variable which was inadequate for wage-tapped smallholdings in 1963/64. Application of tapping labour is consistent with the theory of labour market dualism.

A theoretical framework was formulated for the theory of the firm. The formulation is based on a definition that is a simplified version of Williamson's transactional paradigm. Conflicting theories on sharecropping becomes reconcilable within the framework. Further, empirical evidence both from the rubber surveys and from generalisations cited in the sharecropping literature, are consistent with the framework: eleven hypotheses were presented and tested or clarified. It is concluded that share-tapping (sharecropping) is an efficient institution given the production characteristics underlying its presence. However the efficiency argument presented

in this thesis is different from Cheung's efficiency argument. The efficiency rationale presented here was derived for the real world with transactional frictions while Cheung's efficiency argument was derived for a world with explicit zero risk and zero transaction cost assumptions. The important policy conclusion follows that any legislation which restricts or prohibits share-tapping is to be avoided.

The rate of technological progress was estimated in Chinese rubber smallholdings using microeconomic analysis. The usual procedure to determine rate of technical change is to use the aggregate production function approach. A result of 1.2% annual rate of technological progress was obtained compared with 4.2% that is cited in the literature for the estate sector. However 1.2% is realistic considering that the rate of technological progress is for smallholdings which are known to lag behind the estates in technological improvements and considering that the figure pertains only to clonal improvements. Product increase arising from increased fertilizer-maintenance expenditure is separated out in the microeconomic analysis. Product increase from ethrel stimulation is nonexistent in smallholdings. It is concluded that the major impediment to the adoption of ethrel stimulation by Chinese smallholders is the labour constraint which precludes the fertilizer-maintenance programmes needed to go hand in hand with stimulation.

CHAPTER I

INTRODUCTION

Purposes of Study

Malaysia is the world's largest producer of natural rubber. In 1977 Malaysia produced an estimated 1,613,193 metric tons which is 44.75%[1] of the world's total output of natural rubber.

Rubber production in Malaysia is carried on in "estates" and in "smallholdings". An "estate" is conventionally defined as "a producing unit with 40 hectares or more of cultivated land and operating its own set of financial accounts".[2] A producing unit less than 40 hectares is classified as a "smallholding". The introduction of land regulations in the late nineteenth century first established the size of 40 hectares as the distinction between "smallholdings" and "estates".[3] This criterion was confirmed during the subsequent rapid expansion of the rubber industry and is now an accepted convention.

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[1] International Rubber Study Group (1979). Rubber Statistical Bulletin, London, Vol. 33, No. 12.

[2] Pee Teck Yew and Ani bin Arope (1976). Rubber Owners' Manual. Economics and Management in Production and Marketing, Rubber Research Institute of Malaysia, Kuala Lumpur, p. 19.

[3] Jackson, James, C.(1968). Planters and Speculators. Chinese and European Agricultural Enterprise in Malaya 1786-1921, University of Malaya Press, Kuala Lumpur, p. XIV.

There are now some 500,000 rubber smallholdings in Malaysia, ranging in size from a fraction of a hectare to less than 40 hectares. The area under smallholdings now exceeds that under estates. Total smallholding production now exceeds estate production. It is estimated that smallholdings now occupy about 67% of total rubber area and contribute about 55% of total Malaysian rubber production.[4] It is anticipated that rubber production from the smallholding sector will increase as the sector is further expanded and modernised.

Despite the importance of smallholdings in the Malaysian economy, little is known about production relationships in smallholdings. Apart from the work by Sepien,[5] there is no study on rubber using farm level data and established production function techniques. Studies available are usually deterministic or agronomic in nature, more useful for descriptive purposes than for understanding economic behaviour. Among such studies are the Census of Agriculture, 1960,[6] the National Crop Survey

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[4]Abraham, P.D. (1978). Improving the Productivity of Rubber Small Farmers, paper presented at Technology for Rural Development Regional Conference, Hotel Merlin, Kuala Lumpur, 24-29 April.

[5]Sepien, Abdullah (1978). Technical and Allocative Efficiency in Malaysian Rubber Smallholdings: A Production Function Approach, Ph.D thesis, The Australian National University.

[6]Selvadurai, S. (1962). Census of Agriculture 1960, Preliminary Report No. 6A - Rubber Land: Area and Production, Ministry of Agriculture and Cooperatives, Kuala Lumpur.

1967/1968[7] and sample survey studies by Brown,[8] Bevan,[9] Ho,[10] Voon[11] and Selvadurai.[12] A more comprehensive study which is nevertheless deterministic in approach is the analysis by Barlow-Chan.[13]

The rubber smallholding sector comprises a very diverse group of farms, not only in terms of size but also in terms of production characteristics. On the one hand, there are frequent references in the literature to problems of uneconomic sized holdings, low productivity, lack of capital, problems of land tenancy and

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[7] Malaysia. Department of Statistics (1972). National Crop Survey, 1967-68: Acreage and Tree Population of Crops on Smallholdings, West Malaysia, Kuala Lumpur.

[8] Brown, D.W.(1960). A Reconnaissance Study of Farming Organisation in a Coastal Area of West Johore, Economics Department, University of Malaya, Kuala Lumpur.

[9] Bevan, J.W.L.(1962). A Study of Yields, Labour Inputs and Incomes of Rubber Smallholdings in the Coastal Area of Selangor, Department of Agriculture, University of Malaya, Kuala Lumpur.

[10] Ho, R. (1967). Rubber Production by Peasants of the Terachi Valley, Malaya, publication No. 41, Institute of British Geographers, London.

[11] Voon, P.K. (1967). Chinese Smallholding Industry in Selangor, M.A. thesis, University of Malaya, Kuala Lumpur.

[12] Selvadurai, S. (1972). Economic Survey of Rubber Smallholdings in West Johore, Kementerian Pertanian dan Perikanan, Kuala Lumpur.

[13] Barlow, C. and Chan, C.K. (1969). Towards an Optimum Size of Rubber Holding, Journal of the Rubber Research Institute of Malaya, 21(5).

sharecropping. On the other hand, Voon in his study concluded that Chinese smallholdings are relative progressive, modern and distinguishable from peasant farms. The most readily available criterion for grouping smallholdings so as to reduce the diversity of smallholdings somewhat therefore, appears to be the ethnic variable as had been suggested by Voon. This thesis concentrates on Chinese rubber smallholdings. The choice of either Chinese or Malay smallholdings but not both, becomes inevitable in order to give the thesis reasonable limits. In terms of area, up to the end of 1978, Malays own 0.486 million hectares while Chinese own 0.462 million hectares.[14] Thus the Chinese smallholding sector is not small.

The underlying theme in this thesis is a microeconomic analysis of Chinese smallholding rubber production. Processing and marketing are outside the scope of this study which addresses itself to the following areas:

(i) resource productivity: a major area of inquiry deals with the behaviour of yield and factor inputs as rubber smallholdings increase in size and as tenancy conditions change. Related questions include returns to scale in production and efficiency of factor use;

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[14] Sanusi Junid (1979), Deputy Land and Regional Development Minister, Malaysia, in speech in Dewan Negara, New Straits Times, December, 15.

(ii) tenancy conditions: a considerable number of journal articles in agricultural economics deal with the merits of various tenancy conditions - in particular sharecropping is an area of controversy. The second major area of the thesis concerns tenancy conditions. The sharecropping literature was reviewed and a theoretical framework of the firm was formulated which enables us to reconcile conflicting sharecropping theories. Several hypotheses with regard to tenancy conditions (including sharecropping) in rubber smallholdings were tested using the theoretical framework;

(iii) technological progress: the third area of this thesis concerns technical progress in rubber smallholdings. The technical change literature was briefly reviewed and the rate of technical change in rubber smallholdings was estimated using farm level data at two different points in time. The results were compared with work done using the aggregate production function approach.

Definitions

There are a number of terms used in this thesis whose precise meaning are important. They are defined in this section. These terms and definitions are:

(i) lot is defined as a surveyed piece of land registered with the District Land Office and possessing an identification number called a lot number. A holding or smallholding may include several lots or pieces which may or may not be contiguous;

(ii) holding (or smallholding) is a unit of ownership. All the pieces or lots a person owns make up his holding;

(iii) farm is a unit of production based on land. A farm may consist of one piece (or lot) or many pieces. The pieces may be scattered or contiguous. The important characteristic is that the farm is an active unit of production or "operation" where "operation" normally includes the whole set of crop husbandry activities from planting to harvesting. For annual crops there can be no ambiguity as usually one and the same person makes decisions with regard to all these farming activities. For perennial crops however, planting, maintenance, fertilizer application and tapping (harvesting) are inter-spersed in time and may be controlled by different

individuals.[15] For example in rubber smallholdings, planting, maintenance and fertilizer application are decided upon by the owner himself. Tapping of the trees, which is the harvesting activity, may be contracted out to hired tapper or tappers who may tap the trees in a manner or frequency the tappers consider suitable or convenient, depending on the degree of control exerted by the owner on the tapper inherent in the type of contact prevailing. The question then arises as to whether

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[15] A few words on what are involved in various rubber husbandry activities will make subsequent discussions clearer. Planting includes clearing and burning the land, making terraces if necessary, preparing cover crops and then planting the rubber seedlings. Maintenance includes slashing, weeding, root and leaf disease control and cleaning the drainage system. Fertilizer application involves applications of different fertilizer combinations at various stages of tree growth. Tapping includes peeling off the rubber laces from the collection cups and tapping panels and making the incisions on the tapping panels. The time to start tapping is important because latex flows best in the cool hours of early morning. Careless tapping causes wounds on the tapping panel leading to the onset of diseases and reduction in subsequent yield.

The subsequent activities performed by the tapper after making the incisions include collecting the latex and processing the latex where processing involves sieving, bulking, coagulating, pressing the coagulum, machining (passing the coagulum through smooth and marker mangles) and washing utensils. Finally the rubber sheets must be sun dried or sent to the smokehouses for drying. These subsequent activities are not included in our economic analysis subsequently because the essence of labour input on production yield is already captured by tapping hours as defined later. These subsequent activities, individually or collectively, may act as constraints on production. Tapping time will reflect the reduction in output if any exists.

we consider the piece or pieces tapped by each tapper as the unit of "operation" or consider all the pieces tapped by different hired tappers belonging to a single owner as the unit of "operation." Different hired tappers represent varying degrees of independent decision-making as far as the tapping activity is concerned. For our purposes, to minimise confusion with existing terminology as used in annual crops, the following approach is adopted. Among the set of activities covered by the word "operation", the planting activity is deemed to be the most important as planting is connected immediately with exclusive property rights[16] with regard to the use of land. Maintenance, fertilizer application and harvesting can be considered as activities connected with property rights with regard to the use of trees or capital and not land. In the case of Chinese rubber smallholdings, planting, maintenance and fertilizer application are controlled by the owner who may contract out the harvesting operation to a hired

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[16]"Property rights" is defined as "one's rights to do things and his effective rights to rewards, positive or negative, such rights resulting from the law, explicit contracts as well as rights resulting from tacit agreements, oral agreements or even tradition." See Wunderlich, Gene and Gibson, W.L.Jr. Eds. (1972). Perspectives of Property, published by Institute of Research on Land and Water Resources, The Pennyslvania State University.

tapper. Thus the idea of defining the farm or unit of "operation" as the unit of planting-maintenance-fertilizer application makes more sense than defining the farm based on the harvesting (tapping) activity.

It is conceivable that a farm may comprise several smallholdings as unit of "operation" (or farm) is an economic term indicating that a person is trying to produce something from the land while a smallholding is a legal term denoting possession of a piece/pieces of land. This could happen in a case where there is a transfer of property rights over use of land from owner to tenant for a fixed-rent. However such instances are virtually nonexistent among Chinese smallholders and exist only rarely in the North States of Peninsular Malaysia among Malays.[17] Thus in this thesis the terms "farm" and "smallholding" are synonymous;

(iv) farm operator is defined as a person who "operates" a farm. As with the definition immediately preceding this term can cause confusion as the word "operates" covers different activities that may be controlled

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[17] Hill, R.D. (1967). Agricultural Land Tenure in West Malaysia, Malayan Economic Review, Vol. XII, No. 1, April, p. 102.