

Chapter III

METHODOLOGY

3.1 Scope and Limitation

This study starts from the description of the social and economic background of the agricultural system which is the existing environment of the agricultural pricing and marketing system. The second part descriptively analyzes the agricultural marketing system in Hunan province with emphasis on market structure and performance.

The third part analyzes the crop responses to prices and socioeconomic factors in the marketing system. The econometric method is used to quantify how and to what extent changes in the marketing system affect agricultural production. Four crops under different degrees of government price and marketing controls are to be comparatively analyzed to find out the effects of the implementation and/or suspension of certain policies. The selected crops are rice, cotton, ramie, tobacco which are major agricultural products produced in Hunan province. Cotton and tobacco represent strictly controlled cash crops under the government monopoly marketing, rice represents subsistently produced, and moderately controlled crops, ramie represents free-of-control crops.

This research uses time series data spanning from 1974 to 1990. Hunan province is divided into 11 regions (*Figures 1 and 2*) and data of those regions is used in econometric analysis which employs cross-sectional time series data formation.



Figure 1 Position of Hunan Province in China

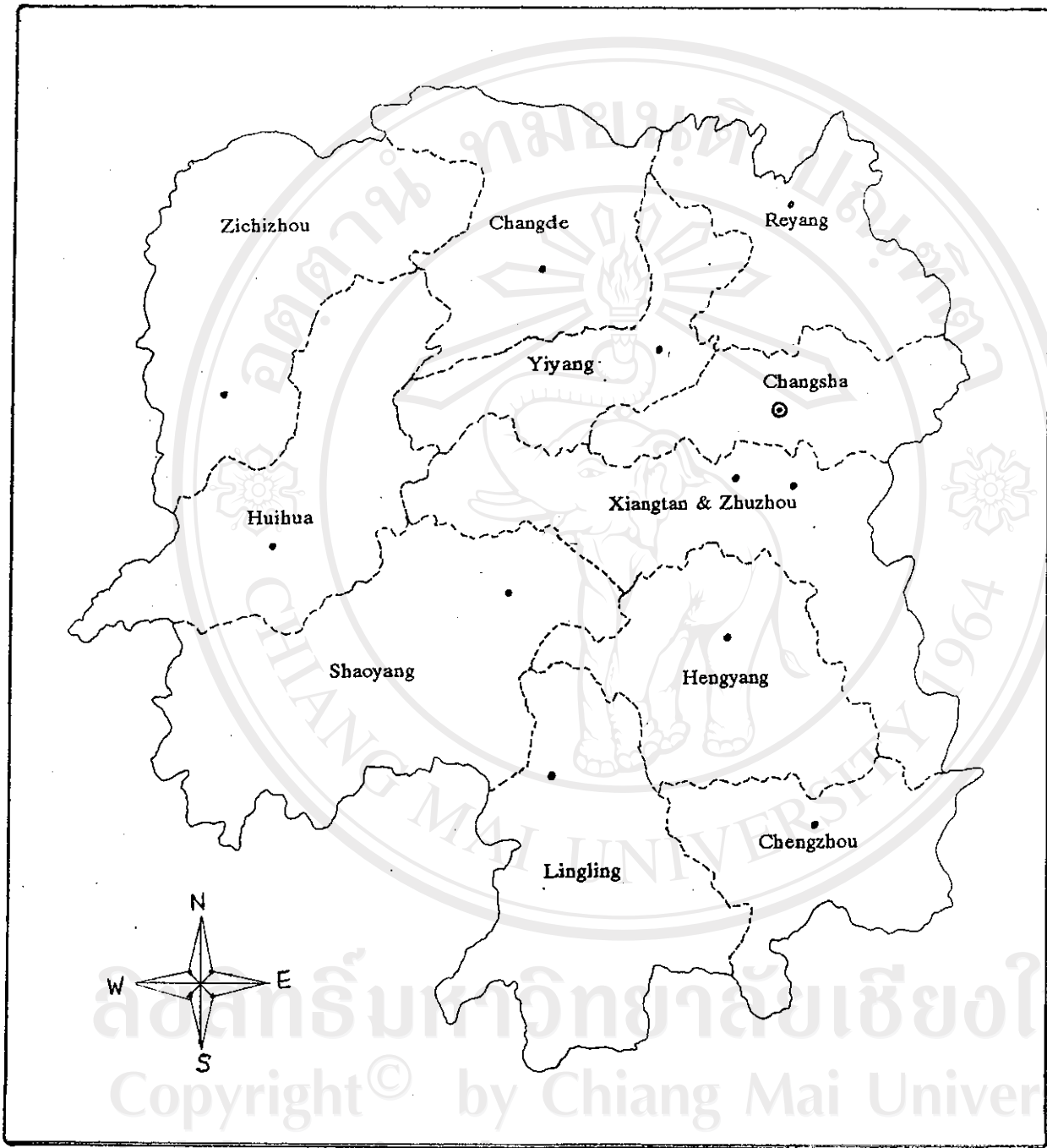


Figure 2 Map of Hunan Province and its Districts

3.2 The Conceptual Acreage Supply Model

Assume that there are m farms and n growing crops in the study region, the crop structure on farm i at time t is represented by A_{-it} . Thus:

$$\underline{A}_{it} = [A_{1it} \ A_{2it} \ \dots \ A_{nit}]' \quad (1)$$

$$(j = 1, 2, \dots, n; t = 1, 2, \dots, T)$$

Where A_{-it} is an n dimension vector, A_{jit} is the acreage of crop j on farm i at time t . The regional crop structure at time t is represented by A_{-t} which is the combination of all farms' crop structures.

$$\underline{A}_{-t} = \sum_{i=1}^m \underline{A}_{it} = [A_{1t} \ A_{2t} \ \dots \ A_{nt}]' \quad (2)$$

Where A_{-t} is an n dimension vector, A_{jt} is the acreage of crop j in the study region at time t . Based on the previous aggregated-level analyses, as mentioned before, by *Chavas & Holt, Lass & Conrado* etc., we can assume and treat the region as a hypothetical *big-farm* with all the m farms as its sub-farms. Therefore, a joint decision analysis can be conducted for the hypothetical *big-farmer* (which preserves the same characteristics of its representing m farmers of the region). The farmer

makes his crop growing decision based on the motivation of maximizing his *Expected Utility* (U_t) from his agricultural production at that time. The utility function is assumed to be:

$$U_t = U(\underline{W}_t) = U(\Pi, R, S)_t \quad (3)$$

and

$$\text{Max } E(U_t)$$

subject to

$$\underline{Q}_t = [G, N, Q]'_t \quad (4)$$

Where \underline{W}_t is the vector of explanatory variables in the utility function — the criteria set that the farmer refers to in his crop-selection decision making which includes the profitability (π) of the adopted farming activities, the associated market and production risk (R), and other exogenous variables (L); \underline{Q}_t is a restrictive vector on the farmer's decision making (reflecting the farmer's decision-making environment or pre-condition); G is the relevant government policies' condition, N represents the farmer's subsistence need of agricultural products, Q represents other restrictive factors. Profit of each crop is:

$$\Pi_j = P_j Y_j A_j - C_j A_j \quad (5)$$

Where P , Y , C and A are output price, unit output, cost per unit area, and planted area respectively. For a given technology, the planted area of the j th crop (A_j) can be expressed as a function of input and output prices (Lau & Yotopoulos, 1972). However, for utility maximization, the non-price restriction in equation (3) and (4) can be incorporated. The function of the optimum planted areas of all crops is:

$$\underline{A}_t^* = \Psi(P, R, L, D, Tr)_t \quad (6)$$

Where \underline{A}_t^* is the adopted regional crop structure which is determined by the utility-maximization decision. P is a vector of input and output prices, R , L and D are vectors of risks, other non-price exogenous variables and dummy variables, Tr represents time trend.

The planted area of any particular crop (j) could be determined by the same set of variables and the econometric equation can be expressed as:

$$A_{jt}^* = \Psi_j(P, R, L, D, Tr, u_j)_t \quad (7)$$

Where u_j is an error term. The model comprises of 4 crop response equations. The vector of error term of each equation is of size T and assumed to have a variance matrix $= \sigma^2 I$. Since a farmer's choice of crop j is not independent from other crops, the error term of one equation

probably relate to those of the others. The OLS estimation of individual crop equation separately does not yield efficient estimates. The alternative technique namely *seemingly unrelated regression* is more efficient (*Judge et al., 1980*)

3.3 Information Collection

1) Secondary information: This study mainly employed secondary information, the yearly statistic books of Hunan province, along with a number of articles and project reports, written over the years, on market analysis and market reform strategy which were found in periodicals, news papers, project reports, etc.

2) Consultation and discussion with market economists and government officials who had considerable experience in market research and market administration were conducted to verify research problem and confirm preliminary results of the previous reviews and survey.

3) Informal survey: Some farmers, local merchants, and local market agents were interviewed. The survey aimed to discover how the existing market system worked and what problems concerned people the most. This work was conducted in three major agricultural districts.

4) Seminar: One seminar was organized discussing the current market situation and the P&M reform. Some colleagues in Hunan and some influential market experts were invited to attend. This seminar facilitated rapid access to large amount of information and different opinions.