

Chapter 5

Summary and Conclusion

This dissertation proposed empirical methods to study agricultural household models with market failures. In case the markets for some commodities are missing or constrained, their internal prices play an important role in equilibrating the demands for with the supplies of them within the household. A clear recognition of the distinct role of their internal prices helps establish the formal equivalence between the optimality conditions associated with the nonseparable model and those associated with the corresponding separable model. Thus, the formal equivalence gives rise to demand and supply functions for the nonseparable model which include the endogenous internal prices of the commodities in place of their exogenous market prices. The similarity and the difference between the two models enable us to estimate the nonseparable model with market failures for labor. The production function is estimated first to obtain the marginal revenue products of farm labor or the demand wages, which are equated to the reservation or supply wages in equilibrium. Then, parameters of the utility function are estimated by use of a linear expenditure system with the internal wages being included in place of the market wages. In the comparative statics analysis, we should carefully examine the internal wage effects since they are responsible for possible anomalous responses caused by the market failures. In particular, it is very important to interpret how the internal wages respond in the internal markets for labor since the other comparative statics analysis is similar to that in the regular microeconomic analysis.

These methods were applied to the data on Japanese rice farmers for the period 1982-91. Chapter 2 assumed the homogeneity of on- and off-farm labor as well as the constrained off-farm wage employment. Their internal wage estimated by use of a Cobb-Douglas production function was much lower than their off-farm wage, so that their off-farm employment constraint is inferred to be binding under this specification. Furthermore, the examination of the internal market for labor showed that the slope of

the supply function is steep and that both the demand and supply functions shift greatly in response to changes in the price of rice and to those in the opportunities for off-farm wage employment. These results seem to reflect the importance of their production revenue from growing rice as well as their long working hours both on and off their farms. Thus, changes in the two exogenous factors cause large changes in their internal wage, which in turn cause large internal wage effects on their rice supply. In particular, these effects are large enough to make the supply function of rice slope downward.

The analysis in Chapter 2, however, fails to pay due attention to the labor heterogeneity emphasized by many authors. To take it into account, Chapter 4 allowed for both the heterogeneity of on- and off-farm labor and that of male and female on-farm labor to give a more plausible account of the behavior of Japanese rice farmers. The internal wages estimated by use of a better specified translog production function were higher than the internal wage estimated in Chapter 2, and the statistical test showed that the Cobb-Douglas specification is restrictive. According to the results of the comparative statics analysis, the internal markets for labor exhibit a structure common to males and females, i.e., the demand function is relatively flat and shifts in response only to the price of farm commodity, while the supply function is relatively steep and hardly shifts in response to the market prices. Hence, changes in the price of rice have relatively large “initial effects” on the internal wages, while those in other market prices do not. In addition, the low substitutability between male and female labor does not expand the initial effects very much through the interactions of the two internal markets, which results in the responses of the internal wages similar between one and two market failures as well as between males and females. In other words, the “intensified internal instability”, an anomalous response expected of households with two market failures, was not observed as clearly as the one observed in Chapter 3. These responses of the internal wages and the low substitutability among factors and among commodities cause the small internal wage effects of changes in the market prices for most cases. Hence, these internal wage effects are not main causes for the

inelastic price responses or the “external stability”, another anomalous response expected of households with market failures. By contrast, the internal wage effects associated with changes in the price of rice makes the supply response of rice significantly inelastic, though the corresponding internal wage effect in Chapter 2 seems overestimated. These results seem to reflect the gender division of labor as observed in many other countries and the peculiar division of labor within Japanese rice-farming households that younger members work mainly for off-farm wage employment while elderly members remain in rice farming. Hence, the behavior of Japanese rice farmers is better described by allowing for the heterogeneous types of family labor.

Thus, the empirical methods proposed in this study reveal various responses of agricultural households which have not been studied by other authors and verify the empirical relevance of nonseparable agricultural household models. Before concluding the dissertation, it may be worth mentioning the necessity to estimate nonseparable models which require an extensive set of data on prices and expenditures. We examine whether the use of more tractable separable models provides good estimates of the household’s response in case the markets for labor are missing or constrained. In this case, the estimation by use of separable models faces two difficulties. One is associated with the inconsistency of the parameter estimates and the other with the omission of the internal wage effects. The extent of the inconsistency depends on the correlation between the market and internal wages, but it is inferred to be weak from the results of this study as well as the previous studies (Jacoby, 1993; Skoufias, 1994). Thus, even if the internal wage effects are expected to be small, it seems difficult to obtain good estimates of the household’s response in case the market wages are used for estimation in place of the internal wages. Nonetheless, if we employ an appropriate econometric method to make a single estimation of a production function or a simultaneous estimation of a production function with the optimality conditions for factors except for labor, we can still have consistent estimates of the parameters at the cost of efficiency. Then, separable models estimated in this way will provide good estimates of the

household's response associated with production organization if the internal wage effects are expected to be small. It is inferred from the empirical results in Chapters 2 and 4 that such cases are not few for households whose demands for variable inputs are responsive to changes in the own and output prices but not responsive to those in the other prices. These inferences may or may not be applied to the response of households in other economies since the inferences are drawn from only a set of data on Japanese rice farmers. In order to make the inferences more valid, we need to estimate nonseparable models for other sets of data, and at the same time, to improve the empirical methods proposed in this study.

Finally, there are several issues to be addressed in the future research. First, the structural parameters of the nonseparable models estimated in this study are consistent but not efficient because the household's production organization and its consumption choice are not jointly estimated. The resulting lack of information not only reduced the flexibility of the translog production function in Chapter 4, but also limited the utility functions to the Stone-Geary types in Chapters 2 and 4. Since joint estimation based on the primal approach has not yet produced plausible results, it may be necessary to develop an estimation method based on the dual approach. Secondly, it is assumed that on- and off-farm labor are homogeneous in Chapter 2 while they are heterogeneous in Chapter 4. It is also assumed that the off-farm wage employment is constrained in Chapter 2 while it is not in Chapter 4. These assumptions should be statistically tested but are not in this study because the associated hypotheses are nonnested and are not as tractable as the other hypotheses. This issue will be settled by applying a nonnested test similar to Lopez (1984). Application of this test to other periods may reveal some additional facts about the behavior of agricultural households in each stage of economic development. Thirdly, this study has employed static agricultural household models with market failures for labor, however, it may be necessary to analyze the behavior of Japanese rice farmers in the dynamic context, as attempted by Kang (1994), in order to consider such issues as the mobilization of land ownership.