the time-series data from the annual industrial survey can supply a lot of information and implications. Such analysis is a prerequisite for the process of picking the winners. Second, the technological and industrial linkages should be a factor for consideration. Especially the backward linkage analysis by an input-output table and technological linkage analysis will help in selecting industries with larger indirect effects. Also, the recognition of international linkage is important nowadays. The high growth of the East Asian economy has built up the transnational production network in the region. AICO (ASEAN Industrial Cooperation) in AFTA (ASEAN Free Trade Area) is also an important and promising area. Third, the selection of industry should accompany a long-term view of the sequence of leading sectors. For this, the double-track growth strategy (coexistence of leading export industries and potential leading industries still at the import substitution stage) of Korea and Taiwan is suggestive. Lastly, although alluded in Sato's paper, analysis of entrepreneurship is required if we depart from public industry–led technological development.

All in all, the core of the problem goes back to the first topic, how to translate the theoretical discussion about the market and government intervention in technological development into the practical and concrete plan. Since this book was written, the Indonesian economy has fallen into a deep socioeconomic crisis. The country is going through harsh structural adjustment as it accepts the trend of market orientation and globalization. In such an environment, the short-term policy issue for technological development will be to ensure the present level of school enrollment, especially in basic education, and to protect in particular the supporting industries from bankruptcy due to weakened demand and financial contraction.

This book is the first comprehensive book written in English about Indonesian technological development and without question it is informative. But the value of this book lies in the effort to generalize the problem as exemplified in Hill's "Introduction" and in some of the other pieces presented. (Hiroshi Osada)

*The Analysis of Household Surveys: A Microeconometric Approach to Development Policy* by Angus Deaton, Baltimore, Johns Hopkins University Press, 1997, viii + 479pp.

This book is about the analysis of household survey data from developing countries and how such data can be used to cast light on policy issues. Household surveys are a rich source of data on economic behavior. They provide information on consumption, income, ages, household size, education, housing, and other variables to measure living standards at the level of the individual household. In many cases, survey data have been designed and used to produce aggregate data such as the national accounts, or to provide weights for consumer price indexes. Recently, such survey data have become more and more attractive to applied econometric researchers. In many applied econometric studies using macro data, it is common to assume away the underlying heterogeneity of individuals, and analyze the

aggregated data within the framework of the representative household, ignoring the aggregation difficulties. In the case of survey data, individual records on economic behaviors are available. Econometric methods for controlling individual heterogeneity have developed rapidly. Unfortunately, it has been difficult to access data for purposes different from their original design. In Japan it is still strictly forbidden by Statistical Law to use micro data sets. However, many other government statistical offices have recently opened their micro data sets to academic researchers. This is mainly due to the fact that the government understands that survey data provide a rich source of information on economic behavior and its links to policy variables. These links between policy instruments and their outcomes have been proved empirically by using the micro data sets. The most important contribution of this book is to show how survey data can be used to cast light on a wide range of policy issues.

Chapter 1 is concerned with the design of surveys, with the types of collected data, and the effect of design on the calculation of descriptive statistics such as the mean. When the surveys were designed, many of the policy analyses which use survey data had not been contemplated. So mechanical calculations which ignore the design of the survey can produce unpredictable results. In some surveys, some types of households are overrepresented while others are underrepresented. As a result, some corrections have to be made to calculate genuinely representative totals. In some surveys, the possibility of measurement error has a severe impact on statistical inference. These issues are further complicated for panel data in which households are observed over time. This chapter also presents some of the useful formulas for estimating sample means and variance taking into account the survey design.

Chapter 2 discusses the econometric issues which arise when using survey data for estimation and statistical inference. The topics are the familiar ones: heterogeneity in regression analysis, and dependency between regressors and residuals. Those are specific to survey data and are the weighting and clustering issues. In the case of survey data, the calculations of means and other statistics strongly depend on sample design. Regression functions estimated from survey data are rarely homoscedastic. For example, if the sample design is not taken into account, standard errors can be seriously misleading. When using survey data, the limited dependent variables in regression analysis provide an inconsistent estimator. Chapter 2 reviews the various econometric methods for the survey data, such as censored regression, panel data estimation, and instrumental variable method, which are used throughout the rest of the book.

Chapter 3 discusses the use of survey data to measure welfare, poverty, and distribution. Deaton reviews the theoretical underpinning of the various measures of social welfare, inequality, and poverty and shows how they can be given empirical context from survey data. Deaton introduces a number of techniques for data analysis with particular emphasis on graphical methods for displaying large amounts of survey data. Chapter 3 also discusses the technique of nonparametric density estimation and provides direct answers to questions about distributional effects of policy changes.

Chapter 4 discusses the use of household survey data to explore patterns of household demands, and investigates how they change with standard of living. It is well known as the Engel curve analysis, and it allows us to measure the relationship between the elimination

of hunger and economic development. This chapter also addresses how goods are allocated within the household. One matter of interest is the gender issue of whether boys are favored over girls. Deaton reviews some of this work and implements one specific methodology to detect these issues from survey data. Equivalence scale of households is another important issue. This chapter discusses the extent to which survey data can be used to approach these questions.

In Chapter 4 prices are assumed to be the same for all households in the survey. This uniform price assumption is what traditionally separates the fields of family budget analysis from demand analysis. The former investigates the nature of Engel curves, while the latter is concerned with the measurement of price effects. However, there is no satisfactory justification for the uniform price assumption. Because transportation and distribution networks tend to develop along with economic growth, there is much greater scope for spatial price variation in developing countries. On the other hand, Chapter 5 discusses the effects of the price of demand in the context of tax and price reform. Survey data provide direct information on how much is consumed of each taxed and subsidized commodity. Therefore it is straightforward to calculate the first round effects of price change both on revenue and on the distribution of real income. This chapter presents a brief review on the theory of price and tax reform, which is required for practical implementation in developing countries, then estimates an empirical model using survey data. Indeed, the World Bank and the International Monetary Fund have made proposals for such reform. It is important to think about what system of prices would be desirable, at least to the extent of meeting the needs of government for revenue and redistribution while minimizing the costs of collection and distribution. Deaton argues that it is almost impossible to derive policy recommendations based on empirical evidence without using survey data.

Chapter 6 is concerned with the role of household consumption and savings in economic development. There are many reasons to be interested in the savings behavior of households in developing countries. Household savings is a major component and determinant of savings in most developing countries, and a strong linkage between savings and economic growth can be observed empirically. A second reason is to understand how people deal with fluctuations in their income. In developing countries, the majority of people are engaged in agriculture, and their livelihoods are often subject to severe uncertainty from weather, natural calamities, and fluctuations in the prices of their crops. In these cases, smoothing and insurance mechanisms are needed. This topic is one of the most interesting in modern consumption theory. Chapter 6 presents some of the most important models of household consumption behavior in poor countries, and discusses empirical results for them by using survey data. Deaton proposed the basic theory of intertemporal choices for describing household behavior in developing countries, where households have no access to credit markets but use assets as a buffer to smooth their consumption. Savings is only one of the ways that people can protect their consumption against fluctuations in their income. An alternative is to rely on other people to share risk at the community level. Deaton finds that there is some partial risk sharing taking place at the village level.

Deaton hopes that this book will be of interest to development practitioners as well as a more academic audience of students of economic development. The material in the first two chapters is also designed to help readers who study applied econometrics based on survey

data. The chapters after Chapter 6 can cast light on a wide range of policy issues in developing countries. The audience that Deaton most wants to reach is that of researches in developing countries. Statistical offices, research institutes, and universities in developing countries are now much less constrained in their computation facilities, and the calculations described in this book can be done on personal computers using readily available and relatively inexpensive software such as STATA or TSP. This book provides the STATA code to produce the results in the text. This service is not meant to supply a software package that will replicate the analyses in the text, but to provide the code to serve as a template for the user's own analysis. This book, however, is not intended as a manual for the analysis of survey data, but it provides a number of illustrations of what can be done by using survey data.

As pointed out earlier, survey data have become more and more attractive to applied econometric researchers. There has been a great deal of interest in social experiments, including the use of household survey data to evaluate the results of social experiments. Unfortunately, experiments are not always possible. In the absence of controlled experiments, we have to use econometric and statistical methodology to overcome the nonexperimental nature of data. The staring point for nonexperimental study is often a regression analysis. The book uses nonexperimental survey data to trace the differences in behavior between different people. However, survey data have various difficulties such as a correlation between error terms and explanatory variables, measurement errors, and selection issues. Fortunately, recent developments in microeconometric methodology allow us to use survey data for empirical analysis.

The most important topic that Deaton pointed out is the use of panel data. Panel data refers to the pooling of observations on a cross section of households or firms over several time periods. Panel data suggest that individual households are heterogeneous. In the case of time-series and cross-section data, we cannot observe and control this heterogeneity. It is well known that an estimated marginal propensity to consume based on cross-section data is larger than that for time-series data. It is mainly due to the fact that individual household effects are positively correlated with income. Individual effects such as age, size, and location are observed, but many others are not observed. If panel data on households are available, we can estimate a marginal propensity to consume without these unobserved individual effects because we can easily eliminate the impact of individual effects on estimation results. Panel data are also useful for studying dynamic behavior. The dynamic optimization problems of economic agents imply a set of stochastic Euler equations that must be satisfied in equilibrium. These Euler equations have a set of intertemporal variables. Unfortunately, intertemporal variables are not available in the case of cross-section data. With time-series data, on the other hand, aggregation over households or firms results in loss of important individual attributes such as liquidity constraint.

Unfortunately, very few surveys have followed the same household over a substantial period of time. At the same time, however, independent cross-section data of households on a large sample of the population are usually available. Deaton proposes to create panel data from cross-section data by aggregation. While it is usually impossible to match individuals from one survey to another, it is frequently possible to match locations, so as to create a panel at the location level. This kind of data is called a pseudo panel. Pseudo panel data are

generally regarded as inferior to true panel data, but they provide a consistent estimator even if unobserved heterogeneity causes inconsistency in the estimation.

In the case of Japan, there are several repeated cross-section data on household behavior. One is the Family Income and Expenditure Survey conducted every month by the Statistics Bureau of the Government of Japan. The number of samples is around eight thousand, which are available from January 1963 to the present. The second is the National Survey of Family Income and Expenditure conducted every five years by the Statistics Bureau of the Government of Japan. The number of samples is more than fifty thousand. The most recent survey was conducted in 1994. The two repeated cross-section data are excellent candidates for constructing pseudo panel data. Unfortunately, the Statistics Law strictly regulates the usage of both survey data. We were not allowed to access the individual items in the survey data. Fortunately, the Statistics Bureau permitted us to access the National Survey of Family Income and Expenditure conducted in 1984, 1989, and 1994 with the coordination of the Government Statistics Bureau and the project for Creating a New Frontier of Micro Data Analysis supported by the Ministry of Education and Culture as an aid for scientific research.

In using these micro data, the reviewer was able to make cohort data by using the age of household heads and the residential location as the time-invariant variables. We selected the sample of households whose age of head was between 25 and 54 years old in 1984. Households with heads less than 24 years old in 1984 were available, but the number of samples in some cohorts was zero. The households with heads more than 55 years old in 1984 were also not selected for the same reason. We also divided the samples by the prefecture where the head resided. There are 47 prefectures in Japan. Consequently, we have 1,410 cohorts and 30 one-year age bands subdivided into 47 residential locations by prefectures.

We are basically indebted to Deaton and particularly to his works reviewed in this article for the idea of making pseudo panel data. If it were not for his excellent research work illustrating the importance of using survey data to do research on policy issues, the Japanese Government Statistics Bureau would not have allowed us access to those micro data. In this sense, this book contributes to the analysis of household behavior not only for developing countries, but also for developed countries such as Japan. (Kanemi Ban)