

Introduction to: Econometric Modeling of China

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Prior to the starting of the economic reform initiated by Deng Xiaoping in the Peoples' Republic of China in 1978, the concepts of modern economic analysis played little formal role inside the country. As for econometrics, neither was it part of the academic curriculum nor were the statistical materials for empirical model building to be found.

Outside the PRC, some economists with deep special interest in the economy of China attempted to try to follow economic events externally, using crude estimates of macroeconomic data and rough estimates of parametric specifications that were not necessarily in the minds of Chinese decision makers but more familiar to those schooled in "Western" economics. As early as 1968, such efforts produced a very comprehensive volume on trends and prospects of the Chinese economy around that time: *Economic Trends in Communist China*, edited by Alexander Eckstein, Walter Galenson and Tachung Liu, Aldine Publishing Co., Chicago, 1968. This was followed by a series of publications on the Chinese Economy by the Joint Economic Committee of the US Congress in 1967, 72, 75 and 78.¹ They were incisively summed up by Alexander Eckstein as *China's Economic Revolution*, Cambridge University Press, 1977.² These studies have tried hard to collect all the scanty statistical data available then and knit them together to peep into the working of the Chinese economy and find out the trends or prospects for the Chinese economy after the Cultural Revolution or economic reform. In

¹ They are: *An Economic Profile of Mainland China*, 1967; *People's Republic of China: An Economic Assessment*, 1972; *China: An Economic Reassessment*, 1975; *Chinese Economy Post-Mao*, 1978. As for the summary of these studies, see S. Ichimura's introduction to the translation of the Eckstein-Galenson-Liu monograph: *Chugoku Keizai no Hatten (Development of Chinese Economy)*, Sobunsha, Tokyo, 1979.

² The book was translated into Japanese under the supervision of Shigeru Ishikawa: *Chugoku no Keizai Kakumei (China's Economic Revolution)*, University of Tokyo Press, 1980. He added an interesting note as a postscript.

the 80's a significant amount of statistical data gradually began to flow out, even to foreign researchers. Modeling the Chinese economy in the macro-econometric way appeared to be possible.

A pioneer in this respect was Lawrence J. Lau of Stanford University, who undertook the task of interpreting the economy of the PRC through the medium of a macroeconometric model that would function in a compatible way with the other models of Project LINK, a system of models that aimed to analyze the total world economy by building up all the separate pieces that represented individual countries or regional groupings of a few countries. In some respects, Professor Lau's approach resembled those used in LINK for the USSR and other countries in the Warsaw Pact agreements. Where data or other information were lacking, neo-classical economic theory with judgmental coefficient estimates were used for some of the equation specifications. Well-known production function specifications were used for estimating the technological equations and their factor demands or requirements. Trade relations with other countries were guided by movements in world markets and by pieces of information about such things as harvest conditions or other major primary activities.

In Japan the first pioneering work was undertaken by Professor Haruki Niwa then of Kyoto Sangyo University, and it was published as "Chapter 12: China Model" in S. Ichimura & M. Ezaki (ed), *Econometric Models of Asian LINK*, Springer-Verlag, 1985. It suffered, however, from the shortage of reliable statistics, so that Niwa had to convert some heterogeneous time-series to indices. Regrettably this made it difficult to integrate it into the Asian LINK system of econometric models.

In 1979, the Committee on Scholarly Communication with the Peoples' Republic of China (CSCPRC-US National Academy of Sciences, Social Science Research Council, and American Council of Learned Societies) visited China in order to establish academic contacts, and two members of that delegation were Lawrence J. Lau and Irving B. Kravis. Professor Lau lectured to Chinese economists, other social scientists, and governmental officials about statistical model building for China, while Professor Kravis lectured on methods of comparing macroeconomic magnitudes (especially GDP) among countries. The attendees at these and other economic lectures, who had been through the Cultural Revolution and its aftermath, responded enthusiastically to the delegation's expositions of modern economics, including econometrics. In the next year, a six-week seminar on econometrics drew an intensely interested group of participants. Measurement for model-

building and measurement for insightful international comparisons took root and helped to generate interest in quantitative economics through-out China.³

In the meantime, some Chinese economists also visited Japanese universities and learned the methods of econometric modeling. In particular, Professor Tang Guoxing visited the Institute of Economic Research, Kyoto University and produced his first macroeconometric model of the Chinese economy in cooperation with Professor Chikashi Moriguchi in 1984.⁴ His later improved model was published as "Economy of China: 1969-89, A Macroeconometric Model," in: S. Ichimura & Y. Matsumoto (ed.), *Econometric Models of Asian-Pacific Countries*, Springer-Verlag, 1994.

It is truly remarkable that within 10 years, a corps of Chinese scholars were taught to go their own way and develop statistical data files, in the modern sense, and estimate econometric relationships of world class for use in forecasting, scenario analysis, policy formation, and other aspects of Chinese economic relationships—at home and abroad. After two decades, a considerable literature has grown on the subject of econometric analysis of the PRC.⁵

The International Centre for the Study of East Asian Development (ICSEAD) at Kitakyushu has also devoted considerable resources to hosting Chinese visiting research scholars and has also drawn upon local Japanese talent in building econometric models of China ever since its foundation in 1989. It is the objective of the present collection in this volume to demonstrate the considerable achievement of econometricians in putting the economy of China into dynamic equation systems that model the country for the purposes of econometric study. It is an enormous achievement, considering the situation that prevailed in China when the delegation from CSCPRC visited in 1979.

³ The detailed report of this delegation is available as *Report of the CSCPRC Economics Delegation to the People's Republic of China, October 1979 with an Appendix by Irving B. Kravis on "An Approximation of the Relative Real Per Capita GDP of the People's Republic of China,"* National Academy of Sciences, Washington, D.C., 1980 pp. 86.

⁴ It was presented at the LINK Project meeting, Staford University in August, 1984. His later works are made available as working papers at Osaka Sangyo University (with the help of Professor Ippei Sugiura) and Osaka International University earlier than in the Ichimura-Matsumoto volume.

⁵ The surveys of model-building in East and Southeast Asian countries including China are provided by S. Ichimura: Chapter 1: A Survey of Econometric Model-Building in East and Southeast Asia, in Ichimura-Ezaki, *op. cit.* and Chapter 1: Development of Econometric Models in Asian-Pacific Countries, Ichimura-Matsumoto, *op. cit.*

Some of the contributors to the chapters in this book are Chinese scholars. Now, they have independent knowledge and resources to carry on the econometric work that was started by outsiders. The internal scholars are much better situated to obtain data efficiently in large volume and with the least reporting delay. They are also well trained to know what to look for by way of Chinese behavioral or technological or institutional characteristics that are essential for meaningful econometric analysis.⁶

At ICSEAD and other research Centres, Chinese economic scholars have interacted for nearly 20 years with foreigners who would like to examine the econometrics of China, too. In this volume we find contributions by Japanese as well as Chinese econometricians, and there has been much fruitful sharing of information on data interpretation or assessment, on model specification, and on computational treatment of the data.

A feature of the book is to have data appendixes in which the authors indicate where the data originated, the conceptual issues of social accounting, and some of the data revisions that have occurred or are to be expected in the future. This puts Chinese econometric modeling into “international play”, a situation that is conducive to constructive appraisal, criticism, and testing. China has done so well in becoming a leading world economic power in the past two decades, that there can now be a two-way (feedback) relationship in this field of scholarly investigation as well.

All the contributions are not total-economy macroeconomic models, although that is the central theme. There are chapters on the econometrics of China’s balance of payments, substitution elasticities in foreign trade, technical progress, and other specific aspects of Chinese economics.

The paper by Tang Guoxing focuses attention on a model of China’s balance of payments, but covers other aspects of the macroeconomy as well. Given the turmoil and surprise caused by the Asian financial crisis (not involving China directly) it is entirely appropriate for model builders to pay increasing attention to payments flows between China and the rest-of-the-

⁶ More recent publications in China are numerous. Here we quote only four books which seem to have collected most important econometric models and input-output models: The State Council Development Research Center (ed.), *China’s Economic Development and Models* (*Zhongguo Jing Ji De Fazhan Yu Moxing*), Zhongguo Calizheng Jingji Chubanshe, Beijing, 1990; Chen Xikang (ed.), *Chinese Urban Economy and Input Output Analysis* (*Zhongguo Chengxiang Jingji Touru Ahanyong Chanchu Fenxi*), Kexue Chubanshe, Beijing, 1992, and Wang Huijiong, Li Boxi and Li Shantong (eds.) *Chinese Practical Macroeconometric Models* (*Ahong Shiyong Hongguan Jingji Moxing*, 1993 and also 1999), Zhon Guo Kaizheng Jingji Cheban She, Beijing, 1993 and also 1999.

world. This paper is definitely a step forward in treating balance of payments items from an econometric point of view.

Dr. Shen Lisheng, who has often attended meetings of Project LINK and worked on Asia-Pacific models at Pennsylvania and Stanford University, has built a macroeconometric model along the lines of Professor Lau's work. That forms the subject of his chapter.

Mr. Zhou-Fang's contribution is more specialized in dealing with the estimates of total factor productivity growth. That is a subject of immense importance in Asian development and has received much attention in the past five years. The lines of analysis that were developed by Professor Lau in estimating production functions have been very illuminating. Other less careful analyses have not been constructive. Zhou-Fang follows an aggregate production function approach and makes the very interesting separation between disembodied technical change (independent of the *scale* of production) and embodied technical change, where economies of scale are important. In this paper, the author shows how to separate the estimates of the two sources of technical change and develops that concept from econometric treatment of production functions.

Macroeconometric models based on methods of statistical inference are predominantly produced in this volume, but other approaches to quantitative analysis of macroeconomic performance are also explored. The chapter by Ms. Shantong Li and Mr. Fan Zhai is based on a computable general equilibrium (CGE) model of China. The CGE models are usually partially based on statistical samples but some parameters are estimated subjectively or from separate analyses (univariate time averages, *e.g.*) and are not constrained by available degrees of freedom, in the statistical sense. They are mainly concerned with long-run development and may be based on a variety of information sources. In an economy such as China's, where the statistical base is still in a development phase, the CGE approach is very attractive.

Mr. Youcai Liang, like Mr. Shen Lisheng, has frequently participated in LINK meetings and also spent much time at the University of Pennsylvania. His model for China is prepared in the present instance, for Project PAIR, centered at the Institute for Developing Economies, Japan. It covers the economy as a whole and is not confined to limited aspects of the Chinese economy. Mr. Liang pays much attention to data issues in his works.

Professor Soshichi Kinoshita does not, in his chapter⁷, estimate a total macro model for China; he reviews the equations for output and price determination in two Chinese econometric models, the model of Youcai Liang and the model of Shen Lisheng. Both models have related lineage but Dr. Liang is associated in China with the State Information Center, while Dr. Shen represents the Chinese Academy of Social Sciences.

Professor Yoshihisa Inada is associated with the staff at ICSEAD; so his model of China, covering the economy as a whole is built for the World LINK Model of ICSEAD. He too received much training at Pennsylvania and Stanford. He is able to provide an excellent Japanese assessment of the structure of the Chinese economy.

In all the models, authors fully recognized the need for data improvement and enlargement in China, in order to provide better estimation bases for the economy. Professor Shoichi Ito is very well qualified to examine Chinese statistical data. He shows how contradictions arise in estimating long run statistical series on Chinese demography. Special attention is paid to estimates of the total population, which is already a key factor in assessing China's growth prospects—econometrically based and otherwise. It is very good to know that the data for this entire project are being examined by a person of Dr. Ito's importance.

Finally Mr. So Umezaki's chapter outlines another component of the PAIR project, namely a prototype model for both China and Hong Kong. It is evident that Hong Kong's prosperity is closely tied to that of China. This is another extremely valuable PAIR project involving the Institute for Developing Economies.

A chapter is included that deals with the estimated elasticity of substitution between the exports of China, on the one hand, and the exports of each of several Asian countries that experienced financial crises in 1997 and 1998. The purpose of this econometric exercise was to see if the exchange rate policies of several East Asian countries like South Korea, Thailand, Malaysia, Indonesia, and the Philippines, by which they informally pegged their currencies to the US dollar, were responsible for the loss of world export trade to China. China unified currency rates in 1994 and then held the exchange rate of the renminbi steady during the crisis period.

⁷ Kinoshita presented his own regional model of Asia-Pacific economies in his "A Linked International Model for the Pacific-Basin Economies," in Ichimura-Matsumoto, *op. cit.* It did not include China, however.

Two significant data problems confronted Professor Y. Inada, Junichi Makino, and me at the onset of the crisis. In order to deal with the fast-moving currency values after July 1997, we resorted to monthly data to see if there was world substitution in favor of China's exports. Lags are quite long in international adjustments and our sample period was brief, January, 1994, through December, 1998. To determine the rate change when China unified rates, January, 1994, we used the swap rates (Shanghai, Shenzhen, and Hong Kong—averaged). We found evidence of significant elasticity of substitution with respect to relative prices vis-à-vis China and also vis-à-vis Japan, whose currency fluctuated in the relevant period.

Econometric modeling involves statistical approximations of live economies. The approximations can always be improved by the availability of more data, better data, more insight into national (and world) economic behavior. It is useful to take stock of the present situation in the econometric modeling of China, reflect on the results, and return to the drawing boards for improved products.