

Quantitative Economics and Development

Edited by

L. R. KLEIN

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S. C. TSIANG

*ECONOMIC THEORY, ECONOMETRICS,
AND MATHEMATICAL ECONOMICS*

Quantitative Economics and Development

Essays in Memory of Ta-Chung Liu

This is a Volume in
ECONOMIC THEORY, ECONOMETRICS, AND MATHEMATICAL
ECONOMICS

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Essays in Memory of Ta-Chung Liu

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Contents

<i>List of Contributors</i>	ix
<i>Preface</i>	xi
<i>Ta-Chung Liu, 1914–1975</i>	xiii
<i>Publications of Ta-Chung Liu</i>	xvii

Society, Politics, and Economic Development Revisited

I. ADELMAN, CYNTHIA TAFT MORRIS, AND SVANTE WOLD

Disjoint Principal-Components Method	2
Statistical Results	5
Principal-Components Analysis within Groups	7
Conclusion	17
References	17

On Global Stability of Some Stochastic Economic Processes: A Synthesis

R. N. BHATTACHARYA AND M. K. MAJUMDAR

I. Introduction	19
II. Basic Definitions	20
III. Some Economic Examples	24
IV. Invariant Measures for Diffusions	27
V. Stability Results for the Economic Models	38
References	42

The Design of Mechanisms for Efficient Allocation of Public Goods

WILLIAM A. BROCK

I. Introduction	45
II. A Simple Method	48
III. The Design Problem under Coalition Formation	51
IV. Examples of Quadratic Incentive Design Using (3.3) and (3.4)	58

V. Externalities in Consumption	61
VI. The Design of Individually Incentive Compatible Mechanisms in an Abstract Setting	66
VII. The Design of Mechanisms for Efficient Accumulation of Public Capital	73
VIII. Suggestions for Further Research and Summary	78
References	79

Critical Observations on the Labor Theory of Value and Sraffa's Standard Commodity

EDWIN BURMEISTER

I. Introduction	81
II. A Single Leontief-Sraffa Technique of Production	82
III. A Pure Labor Theory of Value at Positive Profit Rates	83
IV. Necessary and Sufficient Conditions for a Pure Labor Theory of Value in a Leontief-Sraffa Technology	84
V. Sraffa's Standard Commodity	88
VI. Sraffa's "Real Wage" Measure and the Constant>Returns- to-Scale Assumption	92
VII. A Pure Labor Theory of Neoclassical Production Functions	94
VIII. Simultaneous Validity of the Pure Labor Theory and the Neoclassical Parable	96
IX. A Few Fundamental Objections	100
References	102

The Selection of Variables for Use in Prediction

GREGORY C. CHOW

I. The Problem	105
II. Hotelling's Solution	106
III. A Geometric Interpretation of Hotelling's Solution	106
IV. Solution for Two Sets of Fixed Variates	108
V. Solution for Many Sets of Fixed Variates	112
VI. The Multivariate Case	112
VII. Concluding Remarks	113
References	114

Regression When Each of Two Variables Is Dependent Some of the Time

CARL F. CHRIST

I. Introduction and Summary	115
II. The Estimating Equation for $\hat{\beta}$ in a Simple Regression	117
III. The Estimating Equation for $\hat{\beta}$ in a Multiple Regression	119
IV. The Estimator of $\hat{\beta}$	120
V. Generalization to a Simultaneous Equation Model	121

An Exploratory Policy-Oriented Econometric Model of a Metropolitan Area: Boston

ROBERT F. ENGLE

I. Introduction	123
II. Distinctive Features of the Model	124
III. Individual Sectoral Models	129
IV. Simulations	146
V. Conclusion	154
Appendix: Variable Names	154
References	156

The Effect of Simple Specification Error on the Coefficients of "Unaffected" Variables

157

FRANKLIN M. FISHER

References	163
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Temporal Aggregation and Econometric Models

GARY FROMM AND E. C. HWA

I. Introduction	165
II. Time Aggregation and Structural Specification	167
III. Time Aggregation of Forecasting Errors	169
IV. Time Aggregation and Linear Regression	171
V. Effects of Measurement Errors	174
VI. Empirical Tests	176
VII. Error Analysis	191
VIII. Policy Responsiveness	195
IX. Conclusion	221
Appendix	222
References	223

Recent Economic Fluctuations and Stabilization Policies: An Optimal Control Approach

LAWRENCE R. KLEIN AND VINCENT SU

I. Introduction and Summary	225
II. Experimental Design	229
III. Dynamic Multiplier	233
IV. The Optimal Control Solutions	239
V. A Final Correction	245
VI. An Algorithmic Variation	252
References	254

Notes on Income Distribution in Taiwan

SIMON KUZNETS

I. Introduction	255
II. Changes to Income Distribution, 1964-1975	258
III. Distribution among Groups by Occupation of Household Head, 1964-1975	264
IV. Differences in Per Worker Product between <i>A</i> and Non- <i>A</i> Sectors, and Disparities in Per Person Income between Farmer and Nonfarmer Households	273
V. Concluding Comments	278
References	280

On the Uniqueness of the Representation of Commodity-Augmenting Technical Change

LAWRENCE J. LAU

I. Introduction	281
II. Statement of the Problem	283
III. The Main Theorem	284
IV. Conclusion	288
References	289

Technological Change and Growth Performance in Taiwan Agriculture, 1946-1975

ERIK THORBECKE AND JACKSON KARUNASEKERA

I. Introduction	291
II. Growth Performance of the Agricultural Sector	292
III. Choice of Techniques in Taiwan's Agriculture	297
IV. Relative Income Shares and Technological Change in the Agricultural Sector	304
V. Conclusions	306
References	307

Exchange Rate, Interest Rate, and Economic Development

S. C. TSIANG

I. Introduction	309
II. Objections to Our Proposals and the Invalidity or Irrelevance of Their Arguments	314
III. The Effects of Our Proposals on the Economic Development of Taiwan	329
References	345

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Preface

Ta-Chung Liu suffered an untimely death in 1975, just prior to the third World Congress of the Econometric Society in Toronto. We recognized his parting at that congress, but many of us felt that a more lasting tribute would be more fitting to his honor and our memory of him.

Ta-Chung's professional career was centered at Cornell University, but he also spent considerable time at the International Monetary Fund, as Visiting Professor at Johns Hopkins, and as a consultant to the government of Taiwan. Some of those who knew him and were influenced by him at those places or in other professional encounters were brought together by their mutual respect and desire to honor him in order to put together this volume in his memory.

Some of the contributors are former students of Ta-Chung Liu, and he was truly an inspirational teacher with fruitful issue. Others are colleagues and economists who interacted with him over the years of his active career.

We believe, dear Ta-Chung, that we have produced a volume that is worthy of your high standards for scholarship.

LAWRENCE KLEIN
MARC NERLOVE
S. C. TSIANG

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Ta-Chung Liu, 1914–1975 *

Ta-Chung was always a prodigious worker. His enormous energy and productivity astounded all of us who knew him and was, we suspect, due in no small part to the great support and help which his wife, Ya-Chao, gave him throughout his career. Although Ta-Chung first studied engineering in China, and later in the United States at Cornell University, it was as a student at Cornell that he encountered Professor Fritz Machlup, whose influence, Ta-Chung once said, was responsible for his conversion to economics. Ta-Chung mastered his chosen field with extraordinary rapidity, and received his Ph.D. in Economics from Cornell in 1940. Much of his dissertation was later published by the Brookings Institution in 1946 and dealt with China's national income from 1931 to 1936. It was, as far as we know, the first attempt to construct national accounts for China. Concern with the statistical data of China and construction of national accounts for that country were themes which were to occupy him throughout his professional career. In 1959, he reported preliminary estimates of the national income of China from 1952 to 1959, and these were later amplified and incorporated together with his earlier work, in his massive study with K. C. Yeh, *The Economy of the Chinese Mainland: National Income and Economic Development, 1933–59*, published by Princeton in 1965. His work on the Chinese economy and concern with the basic data resulted in many other publications and statements before the Joint Economic Committee of the Congress of the United States in 1967 and 1972. Few econometricians of his stature and high level of technical competence have been as concerned as Ta-Chung was with the basic data, which are the raw material of econometric models, and to which he was often to apply the most sophisticated of econometric methods.

As econometric modeling spreads from the United States to other developed market economies and to those of developing and socialist nations,

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it is clear that we know very little about the economy of China. Eventually, we can expect to have input-output and macroeconomic models for China that are the equal of those now being prepared for the USSR and other socialist countries, and it is certain that researchers who achieve success in this endeavor will build significantly on the deep work already done by Ta-Chung.

Although much of Ta-Chung's later work dealt with econometric models and methods, he had more general interests in national economic policy and in problems of international trade and international monetary affairs. He not only wrote several important scholarly papers in these areas, but also had considerable practical experience during the Second World War as Assistant Commercial Counselor in the Chinese Embassy and as the Secretary of the Chinese delegation to Bretton Woods, and he was, for ten years, an economist with the International Monetary Fund in Washington, D.C., before taking a professorship at Cornell.

Beginning in 1954, Ta-Chung began a series of visits to Taiwan, which were to prove of the greatest significance to the development of that economy and which culminated in his Chairmanship of the Commission on Tax Reform (1968-1970) and the award of the Order of Bright Star with Grand Cordon, Second Class, by the Republic of China. His first trip in 1954 was with Tsiang to study the problems of the balance of payments and foreign exchange reserves. As a result of their advice, Taiwan abolished an extremely complicated system of multiexchange rates and effectively adopted a floating rate. The expansion of Taiwan's exports and the accelerated growth of the economy were due in no small part to this reform.

In 1964, Ta-Chung once again journeyed to Taiwan, this time to assist in economic planning. As a good econometrician, he was quick to point out that sound policy must be based on an accurate aggregate econometric model of the economy, and, typically, when he found the basic data were not sufficient or reliable enough for this purpose, he set to work to improve them and to construct for important variables series which had not existed heretofore. In the course of his work he not only built an econometric model for Taiwan, but he developed an interindustry input-output table for the economy and improved the national income statistics.

Beginning in 1968, as Chairman of the Commission on Tax Reform, Ta-Chung took a more active role in policy formulation and implementation. He was able to check widespread tax evasion by computerizing the collection process and through a series of reforms which also reduced the burden of low-income taxpayers and increased the progressivity of the tax structure. Other reforms were also suggested to encourage more investment in capital-intensive industries and to substitute a value-added tax for the previous haphazard system of specific commodity taxes.

Finally, in 1973, he led a team of experts which made a number of proposals for monetary reform and for freeing money and exchange markets from artificial constraints. Few econometricians have been so actively engaged in the formulation of economic policy or so influential in the course of economic development of any country.

Beginning quite early in his career, perhaps stemming from his interest in the construction of national income accounts, Ta-Chung worked on a series of models of the U.S. economy and successively refined these models to apply to shorter and shorter time periods. In these efforts he was concerned, as always, with the development of the basic data, and he published estimates of national product components by month as early as 1951. His first annual model of the U.S. economy was published in 1955, and in 1963 he published an exploratory quarterly econometric model for the U.S. postwar economy. By 1969 he had published his first monthly econometric model of the United States, and in 1974 a more refined and elaborate version of his monthly model was published in the *International Economic Review*. He was able to construct not only a national monthly model but one for New York State as well! His national model and data were entered in the calculations of the Seminar on Comparisons of Econometric Models and came out very well in the final tabulations. In particular, Ta-Chung's monthly simulations compared favorably with those from the best of the quarterly models and looked especially promising when averaged into quarterly value. A significant breakthrough could yet be achieved in the use of monthly models constructed along the lines pioneered by Ta-Chung.

Besides his concern with macroeconometric models, we should not fail to mention Ta-Chung's important book, with George Hildebrand, on manufacturing production functions, using cross-section data for the United States. This study led to a great deal of debate and deepened our understanding of the problems of estimating economic relations from cross-sectional data.

Ta-Chung's interests in econometrics extended well beyond the problems of model construction into the more esoteric realms of methodology. But, as always, he drew inspiration from practical problems, and his papers on underidentification, structural estimation and forecasting, the effects of aggregation over time, and testing for identifiability, concern problems which he encountered in his more practical work.

In connection with the identification problem, he noted, quite correctly, that, in the spirit of the true Walrasian system, everything depends on everything else; therefore, the a priori constraints in the form of nil effects attributed to several variables in each individual equation of a complete model are, at best, suspect. These a priori zero restrictions are the principal

means by which we identify our equations in econometric systems. If we reject these dubious restrictions, the structure of the economy is basically under-identified and the best that we can hope for is to estimate reduced form equations. These ideas set forth by Ta-Chung led Franklin Fisher to generalize the concept of identification to encompass "near identification," where coefficients may not be zero but have only small effects on other variables in a given relationship.

Ta-Chung's career, cut short by his untimely death, was a remarkable one which blended an interest in basic data and sophisticated econometric theory with the practical concerns of national income accounting and econometric modeling and, above all, with policy formulation and implementation. He was, and is, an inspiration to all of us who knew him and his work.

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Manufacturing Production Functions in the United States, 1957: An Inter-Industry and Interstate Comparison of Productivity. Ithaca, New York: School of Industrial and Labor Relations, Cornell University, 1965 (with George H. Hildebrand).

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