



In Memoriam

Tillman Merritt Brown, 1913–73

G.L. REUBER / *University of Western Ontario*

Merritt Brown, a delightful man, a dedicated scholar and teacher, and one of the pioneers of econometrics in this country, died in London, Ontario, on 23 August 1973, at the age of 59.

Born in Windsor, Ontario, Professor Brown obtained his BA in Mathematics and Physics from The University of Western Ontario in 1934. A year later he received his High School Teacher's Certificate from the Ontario College of Education. Although employed briefly as a substitute teacher, he was unable to find full-time work in the teaching profession because of the widespread unemployment among teachers at the time. This direct personal experience of the effects on the individual of widespread unemployment left an indelible impression on this deeply sensitive man, which greatly affected his professional attitudes in later years.

After serving in the RCAF from 1941 to 1945 as an instructor in navigation, Professor Brown attended the University of Toronto where he obtained his MA in economics in 1947. Upon graduation he was appointed Head of Economics and Development Research in the Economics Branch of the Department of Trade and Commerce, where he remained until 1959. During these years he attended the Australian National University, while on leave from the Department, to complete the requirements for a doctorate, which he received in 1958. From 1959–62 he was a Professor at the Royal Military College in Kingston. In 1962 he joined the Faculty at Queen's University and in 1967 he moved to Western, where he remained until his death. During 1962–4 he served part-time on the staff of the Royal Commission on Health Services.

The twenty-six years of Professor Brown's professional career, encompassing twelve years as a civil servant and fourteen as a professor, were all devoted to the application of mathematical and quantitative methods to the

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development of economics as a useful tool for policy analysis. He became an economist at a later age than most students because of his personal experience of unemployment during the thirties and a deep-seated conviction that economics *is* important and can help in improving the lot of mankind. In his own words, 'It is the potential uses of the empirical models that make all of this research worthwhile.' (16) He embarked on economics as a trained mathematician already fully conversant with many of the mysteries of calculus, matrix algebra, statistics, and so forth, that baffled most of his teachers and fellow students at the time. And he remained one of the few people in this country up to the early sixties who was able not only to follow but also to contribute to the substantial econometric advances in economics during this period. International recognition of these contributions came in 1972, when he was elected a Fellow of the Econometric Society, the only resident Canadian economist ever to have been so honoured.

Professor Brown's scholarly publications and papers may conveniently be grouped into two broad categories. The first group (1 to 9) is concerned with the development of econometric theory. A common characteristic is the attempt to clarify the properties of various estimation procedures and to devise methods that increase their practical applicability. Three of these papers are especially notable. In (2) Professor Brown restated the full information maximum likelihood estimator, which has optimal large sample properties, so that it could be evaluated in an operational way. This was important because the original statement by T. Koopmans et al. had been so complex as to inhibit its application to large systems of equations. The paper on simultaneous least squares (3) provided an imaginative application of the principle of least squares, or minimum distance, to estimate jointly all the coefficients of a simultaneous equation model. This was only the second estimator to do this and pre-dated three-stage least squares by several years. The third paper (4) applied the principles developed in the simultaneous least squares paper to non-linear simultaneous systems. At the end of his life Professor Brown was deeply engaged, with nine collaborators, on a large study using Monte Carlo procedures to examine the small sample properties of various econometric estimators. This study will be completed under the co-ordination of Robin Carter, a former student and close associate at Western.

The second category of research (10–18) concerned mainly the application of econometric techniques for purposes of policy analysis. These include his pioneering and perhaps most widely known paper on 'Habit Persistence and Lags in Consumer Behaviour' and his major book on the *Specification and Uses of Econometric Models*. The former was the first formal exploration of what has since become widely known as the permanent-income hypothesis, elaborated by M. Friedman and others some five years later. As L.R. Klein stated and M. Friedman acknowledged, 'Brown's work on lags

in consumer behavior is truly a complete anticipation' of Friedman.¹ His book was a bold attempt to construct a general purpose macro-economic system in a general equilibrium framework, showing how it could be used to throw light on policy questions. It abstracted from questions of estimating techniques and data and focused on specifying one large model embracing five major sectors. Heroic in conception, the book came in for criticism on the ground that it did not consider sufficiently the merits of alternative specifications and that depth had necessarily been sacrificed in the interest of extensive coverage of the economy.

Part III of the book is of particular interest because of the account given of the development within the Department of Trade and Commerce of the first major econometric models of the Canadian economy. For many Canadians Professor Brown is likely to be remembered particularly for his pioneering work on these short-run forecasting models. Initiated by O.J. Firestone, this activity was briefly under the direction of L.R. Klein during the summer of 1947. With the help of a few clerks working with desk calculators, the doughty band of Klein, Grayson, Daly, and Brown specified and estimated Model I in the record time of three months! Shortly thereafter Professor Brown found himself working alone on the model, with the help of one clerk, until he was joined by S. May in 1949. Together they formed the team that developed the impressive series of models that followed during the next decade. More recently, of course, many new and more sophisticated models have appeared reflecting the growing number of econometricians, the improved quantity and quality of data, the increased availability of funds, and, most important perhaps, the development of the electronic computer. To have been some two decades ahead of one's time is a rare achievement which few can claim.

This pioneering spirit was again reflected in Professor Brown's work for the Health Commission during 1962-4 when he estimated, once more with a bare minimum of assistance and facilities, a long-term model of the Canadian economy focusing on the determinants and prospects of long-run economic growth. While this work too has now been superseded by CANDIDE and possibly other models, it again showed Professor Brown at work on the frontier, well ahead of most of his colleagues.

Less well known but equally impressive was Professor Brown's attempt during his stay in Ghana in 1969-70 and after his return to Canada to develop an econometric model of the Ghanaian economy. It was 1947 all over again: inadequate statistics, little research assistance, desk calculators. Plunging in single-handedly, with all the optimistic enthusiasm that characterizes pioneers, he developed a comprehensive set of macro-economic data for the period 1956 to 1969, which is unique and represents a considerable

1 L.R. Klein, 'The Friedman-Becker Illusion,' and M. Friedman, 'Supplementary Comment,' *Journal of Political Economy* 66 (Dec., 1958) 541, 549

achievement. Initially he himself intended to estimate a model based on these data. Waning health and a growing concentration on his Monte Carlo study led him to transfer his work on Ghana to younger colleagues at Legon and at Western.

Apart from his dedication, his pioneering contributions to scholarship, and his care and patience as a teacher, Professor Brown lives on in the memory of all who knew him as a charming, courteous man, of elegant bearing and gallant manner. Modest, gentle, witty, humane and understanding, uncomplaining whatever the task – all this and more. Whether recounting the amusing tale of his highly unsuccessful attempts to grow tomatoes in Ghana or patiently explaining some fine point of econometrics or assisting boys from disadvantaged homes (on whom he spent considerable time), he inspired in all he met a warm affection and the deepest respect.

No more fitting words can be found perhaps to suggest Professor Brown's attitudes and approach than those found in the Preface to his book:

It is probably no exaggeration to suggest that ... the future of the world hinges on the combined international and domestic solution of welfare problems. While some of them are social, psychological and political, many of the problems are basically economic. Also economic wealth is needed to help solve the non-economic problems ... In this sense a sane and humane economics is fundamental to the creation of a sane and humane society ...

This book is optimistic that such a world can be reached.

As an expression of the esteem in which he was held, an award has been established at Western by his colleagues to honour the memory of this beloved man and one of Canada's outstanding economists.

SCHOLARLY PUBLICATIONS AND PAPERS

- 1 'Standard Errors of Forecast of a Complete Econometric Model.'
Econometrica 22 (April, 1954) 178–92
- 2 'Simplified Full Maximum Likelihood and Comparative Structural Estimates.'
Econometrica 27 (October, 1959) 638–53
- 3 'Simultaneous Least Squares: A Distribution Free Method of Equation System Structure Estimation.'
International Economic Review 1 (September, 1960) 173–91
- 4 'Structure Estimation for Nonlinear Systems of Simultaneous Equations.'
International Economic Review 4 (May, 1963) 117–33
- 5 'Approximate Small Sample Covariance Formulas for Parameters Estimated by Various Econometric Methods.' Read before the First World Congress of the Econometric Society, Rome, 1965, and The University of Western Ontario Econometrics Workshop, May, 1969.
- 6 'Simultaneous Least Squares and Invariance under Changes of Units of Measurement.'
International Economic Review 8 (February, 1967) 97–101
- 7 'Estimation of Structure for Single Nonlinear Equations.' Read before Econometric Society meetings in Toronto, August, 1967, and the

- Mathematics Colloquium, The University of Western Ontario, February, 1968.
- 8 'A General Quasi-Asymptotic Formula for The Sampling Error Covariance Matrix of Econometric Estimators.' Read before the Econometrics Workshop, Carleton University, November, 1972, and the Econometrics Workshop, The University of Western Ontario, April, 1973.
 - 9 'Conversion of Simultaneous Least Squares to a Malinvaud Minimum Distance Estimator.' Read before the Econometrics Workshop, The University of Western Ontario, January, 1973.
 - 10 'Habit Persistence and Lags in Consumer Behavior.' *Econometrica* 20 (July, 1952) 355-71
 - 11 'Some Recent Econometric Developments.' *The Canadian Journal of Economics and Political Science* 25 (February, 1959) 23-33
 - 12 'Unemployment or inflation - Economic Dilemma of the West.' *Queen's Quarterly* 68 (Summer, 1961) 226-36
 - 13 'A Forecast Determination of National Product, Employment, and Price Level in Canada from an Econometric Model.' *Models of Income Determination* National Bureau of Economic Research, Studies in Income and Wealth (Princeton, 1964) 59-86
 - 14 *Canadian Economic Growth* Royal Commission on Health Services (Ottawa, 1965)
 - 15 'The Use of Econometric Models for Estimating Optimal Growth Paths.' Read before a University of Western Ontario - University of Toronto seminar, April 1969, and the Economics Workshop, University of Ghana, October, 1969.
 - 16 *Specification and Uses of Econometric Models* (London, 1970)
 - 17 'Macroeconomic Data of Ghana.' Parts I and II. *The Economic Bulletin of Ghana* 2 (1972) No. 1, 25-53 and No. 2, 61-79
 - 18 'Economic Models and Their Uses.' In John F. Chant (ed.) *Canadian Perspectives in Economics* (Don Mills, Ontario, 1973)



Monte Carlo Research

Dr. Merritt Brown, Dr. Robin Carter and Mrs. Jean Johnson of the Computing Centre discuss how the computer worked out one of their Monte Carlo equations represented on the blackboard behind them.

UWO version of Monte Carlo

Four economists in the UWO Economics Department and the Canada Council are betting \$36,420.50 on Western's version of Monte Carlo.

The Canada Council gave Dr. Merritt Brown the grant last year to study how to improve methods of economic forecasting. The study is technically called Monte Carlo because it involves the use of random numbers which can be produced by an electronic version of a roulette wheel.

Dr. Robin Carter, who works under Dr. Brown, explains the significance of their work: "We are trying to build better tools for people to use in making economic forecasts so that policy making can be more effective. In the recent federal election there was a big hulabaloo about Unemployment Insurance payouts. The Liberal government estimated how much the scheme was to cost and it was proven wrong since it couldn't accurately forecast the future."

If Dr. Carter and the team of economists and statisticians working with him are successful, some of the guess work will be taken out of making Canada's economy more stable.

Four economists — Dr. Brown, Dr. Carter, Dr. Peter Hibham, and Dr. Ron Wonnacott — and one statistician — Dr. Tom Wonnacott — from Western are hoping to produce a book on the Monte Carlo studies.

Dr. Brown will edit chapters submitted by a total of eight economists and statisticians, including Dr. A.L. Nager, one of the world's leading econometric theorists.

The book will cover the basic theory being tested and will outline the results of the Monte Carlo tests.

Dr. Brown says: "There have been quite a few studies in the field but none have covered the areas we are covering, although there is some overlap."

"We will be considering techniques not considered before and we will be generating random numbers differently and better than others," he says.

The Monte Carlo researcher builds models or artificial worlds which he studies. When he draws his conclusions based on the processes he observed in his artificial world, he hopes they will hold in the real world.

"The problem with economics," says Dr. Carter, "is that there are some variables which we can't take account of because we can't measure them and because we don't really understand how they influence economic behavior."

Dr. Brown explains: "Most economists prefer to deal with the real world, just like most mechanics prefer to fix a real car. The mechanic likes to have his tools ready-made for him, and in a sense we are attempting to sort out and indicate the best tools for the practising economist to use. The problem the economist faces is more difficult, however, since the vast economy is not so easily seen, understood and grasped as a car."

The two major problems involved in economic forecasting are random shocks or disturbances and finding methods of accurately estimating the influences of price, dollar and labor variables in the equation which explains such economic behavior as consumer spending. Basically, the team is trying to discover the best estimators or methods of estimating these influences.

"We've got the best damn set of random numbers in town."

Dr. Carter says: "If there were only one estimator then there would be no problem. We are trying to pick out which estimators are better so that we can say to the economist with the Department of Finance: 'Under these conditions this method works best.'"

In working with artificial models random shocks or disturbances must be added because there are random

disturbances included in real world economic relationships. Random shocks are necessary for several reasons: first, in analysing real world economic behavior the economist may not have included all the relevant variables or he may have measured them incorrectly; second, it may be the case that there is a fundamental "randomness" about economic behavior.

Dr. Carter and Dr. Brown are looking for the best method of injecting randomness into a model. Dr. Carter thinks they have succeeded.

"We've got the best damn set of random numbers in town," he says. Their system is capable of producing more than 228 or more than 250,000,000 different random numbers of six digits each. The numbers are generated mathematically on a computer.

The large choices of numbers available is important because if the likelihood of repeating numbers is high, then the randomness is limited and along with it the usefulness of their work. It is also extremely important that they don't repeat numbers in such a way that they form a predictable pattern.

"The problem of deciding which estimator is best will only be definitively solved by mathematical analyses which may not be achieved for decades. We can't wait, there are six per cent unemployed now. It's worth it to do something about answering the questions even if the answers are approximations," says Dr. Carter.

Graduate aid unchanged

Ontario Minister of Colleges and Universities Jack McNie has announced that the Ontario Graduate Fellowship Program will be continued for the 1973-74 academic year with the same \$3 million financing as last year.

During the 1972-73 academic year there were 140 awards to Western students totalling \$315,000.

In a letter to university presidents, Mr. McNie said that a new graduate scholarship program recommended by the Committee on University Affairs has yet to be considered by the Government.

The purpose of the present O.G.F. Program is "to encourage dedicated, superior students to enrol in graduate programs in

our universities and so be better able to contribute to the cultural, scientific and economic growth of Canada."

The Fellowships are intended primarily for Canadian citizens who are residents of Ontario and will be awarded to both prospective and continuing graduate students. Up to 10 per cent of new applications at each university may be awarded landed immigrants.

For fellowships tenable in the 1973-74 academic year, the deadline for submitting applications to university registrars or graduate schools is February 15, 1973. Application forms and folders giving details of the Program will be distributed early in January.

Letter to the Editor

Sir:

It is indeed unfortunate that internal problems existing in our operation need be discussed in the pages of *Western News* but we would appreciate that the record remain clear.

In a letter which appeared in the Dec. 21 edition of the *News*, the business manager of *The Gazette* has once again misinformed herself on the financial and contractual issues of the paper.

First, it is stated in the contract signed by the co-editors and USC president Bob Stikeman that the USC will provide sufficient ad lines for a 16-page paper each Tuesday and Friday. They have failed to meet that contractual agreement at least 14 times in the fall term.

Secondly, we have attended only one meeting with the publications committee. Only one has been called which requested our attendance. We are not members of that committee. Perhaps exam pressures caused the illusion that more than one meeting had been called in the case of Miss Larsen.

The 30 - 50 per cent figures that she quotes are quite right and we have agreed to meet those as best we can. However, they are only guidelines and we appreciate them as such, admitting throughout that we are responsible for the financial position of the paper at all times, also a clause in our contract.

As you can well imagine, the 30 - 50 rule does have its problems. When producing a tabloid paper in 4-page multiples it is often difficult, indeed impossible, to balance the number of pages and ad volume to produce a paper at 37 per cent ads. For example, for the Dec. 12 issue of *The Gazette* we were in a position where we "violated the guidelines" whether we produced an 8 or 12 page paper given the volume of advertisements available for that particular issue.

If Miss Larsen is so convinced that we have made inaccurate comments in any paper we would like her to point them out.

But before she does she would do well to peruse the contract we have signed and realize the agreements made by the USC as well as those agreed to by the editors.

It is indeed unfortunate that we are asked to work with an uninformed person but such is the procedure with the USC too often.

As to the accuracy of the stories presented in the *News*, without accurate information from the persons interviewed, accurate presentation is impossible. Nor is the *News* an "ostensibly uninvolved paper".

Brien Holmes
and Karl Bergmann

Rathbun trust set up

The Advisory Council of the War Memorial Children's Hospital has announced the establishment of the Dr. John C. Rathbun Memorial Trust Fund.

Dr. Rathbun, who for over 17 years was Professor and Head of the Department of Paediatrics at Western and Paediatrician-in-Chief at the War Memorial Children's Hospital, died October 31.

In commenting on the Memorial Trust Fund, the Advisory Council said: "We are all aware that capital expenditures by hospitals in Ontario have been temporarily suspended while overall Provincial requirements are reviewed. Dr. Rathbun's cherished plans for the rebuilding of the War Memorial Children's Hospital are, of course, included in this suspension." The Council, however, "looks forward to the time when a much needed renewal of the facilities specifically designed for the specialized treatment of the children of Southwestern Ontario can be started."

"With this in mind, it is the intention of the Advisory Council to maintain the Trust Fund towards the establishment of a suitable unit of such renewed facilities as a permanent memorial to Dr. Rathbun and which will be so designated when completed."

According to the Council, contributions may be made to the Dr. John C. Rathbun Memorial Trust Fund and mailed to the Advisory Council, War Memorial Children's Hospital, South Street, London. Receipts will be issued.

The late Dr. Rathbun, a Fellow of the Royal College of Physicians of Canada and a Fellow of the American Academy of Paediatrics, was first appointed to the staff of The University of Western Ontario in 1949. He was widely recognized

Promise better food, service

The Department of Food Services is trying to improve both its food and its image.

The most visible of the changes are the posters in the Somerville cafeteria and the special salad offer of 29c for all you can put in a soup bowl.

Ads for the new improved version of Food Services promise cheaper, better tasting food in a wider variety dished out by friendlier people.

(For a revised schedule of Food Service hours see page 6 of *Western News*.)

Ph. D Lectures and Orals

A Chemistry Ph.D. Public Lecture will be presented by Mr. Roger Keen on Fri., Jan. 12, at 2:30 p.m., room 9, Chemistry bldg. His Oral Examination will follow immediately. The title of his thesis is "Kinetics of 'Trans' and 'Cis' Water Exchange in Some Aquochromium (III) Complexes".

A Plant Sciences Ph. D. Public Lecture will be presented by Mr. Ming-Shoyong Lin on Thurs., Jan. 18, at 10:30 a.m., room 100, Talbot College. His Oral Examination will take place on the same day at 2:00 p.m., room 142, Stevenson Hall. The title of his thesis is "Chemical Induced Chromosomal Aberrations in Relation to the Nuclear Cycle in *Zea mays*".

T. Merritt Brown

Distinguished econometrician dies

T. Merritt Brown, Professor of Economics at Western, and one of Canada's most distinguished econometricians, died on Thursday, August 23. He was 59.

Professor Brown's career as an econometrician spanned the development of the field from its infancy to its modern state. In 1972 he was elected a Fellow of the Econometric Society, the first Canadian to receive this honor.

Born in Windsor, Prof. Brown began his pioneering work as an econometrician after World War II, doing an M.A. at the University of Toronto. He then went to Ottawa to head the Econometrics Research group in the Department of Trade and Commerce where the first of the models of the Canadian economy were developed. During his stay

in Ottawa he took time out to obtain his Ph.D. from Australian National University.

In 1959 he became Professor of Economics at Royal Military College, moving to Queen's University in 1962. Then, in 1967 he returned to The University of Western Ontario where he had obtained his B.A. some 33 years earlier.

Prof. Brown's work as an econometrician included both the theoretical and applied aspects. He wrote several major articles in theoretical econometrics. His books on Canadian Economic Growth (for the Royal Commission on Canada's Health Services, 1955) and on Specification and Uses of Econometric Models (Macmillan, 1970) stand as classic contributions to the field.

He had also just completed directing a major collaborative study of the properties of various econometric estimators. During his career as a Professor, he also supervised numerous graduate theses.

Prof. Brown participated in The U.W.O.-University of Ghana twinning agreement, spending the 1969-70 academic year at the University of Ghana, where he developed the first complete comprehensive set of Macroeconomic Data of Ghana.

At the time of his death, Prof. Brown was on sabbatical leave, where he was in the early stages of a book dealing with Macroeconomic Theory and Policy. Dr. Brown is survived by his wife Elizabeth, and sons Garry, Ronald and David.

NRC publishes research directory

The National Research Council of Canada recently announced the publication of a Directory

established within the National Science Library early in 1971.

Following a comprehensive

industrial research activities in Canada.

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