



J. R. N. STONE

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John Richard Nicholas Stone 1913–1991

THE LAST FIFTY YEARS has seen the transformation of economics into a scientific and empirical enterprise, with its foundations in measurement and statistical inference, and with branches reaching into all of the social sciences. One of the most important figures in this revolution was Sir Richard Stone, economist and statistician, who devoted his life to the construction of a unified system of measurement and modelling. Although rooted in economics, his vision was of society as a whole, and his work extended beyond economics into demography and sociology. He was also devoted to the history of his subject, especially to the history of measurement in economics, and he was engaged on this up to the time of his death.

Richard Stone was born in London on 30 August 1913, the only child of Gilbert (later Sir Gilbert) and Elsie Stone. He was educated at Cliveden Place Preparatory School and at Westminster, which he attended from 1926 to 1930. His father was a barrister, and intended that his son should follow him into the law. As a result, his studies were directed towards classics, with little attention to mathematics beyond elementary arithmetic, algebra, and geometry. He was fond of telling how his real passion as a schoolboy was making wooden models of trains and boats, an activity in which his father was 'a skilled and enthusiastic collaborator.' Otherwise, he was thoroughly bored at school, and there were no regrets on either side when he accompanied his parents to India after his father was appointed to be a High Court judge in Madras. A year later he went up to Cambridge to read law at his father's old college, Gonville and Caius. At Cambridge he was as intellectually distinguished as he had been undistinguished at school, gaining a first in the Law Tripos, followed by a first in economics. His examiners in 1935 were A. C. Pigou, C. W. Guillebaud, E. A. G. (later Sir Austin) Robinson, and J. R. (later Sir John) Hicks, who awarded five firsts, including in addition to Stone, D. G. Champernowne and D. M. Bensusan-Butt. In the same year,

W. M. Jenkins of Newnham appears on the (separate) class list for women; she was to become Winifred Mary Stone in the following year.

Like so many economists of his and later generations, Stone was drawn to the subject in a time of economic depression and distress, believing that it offered not only an intellectual interest, but a means of improving the lot of mankind, a belief that many years later he described, with characteristic deprecatory good humor, as 'bred of youthful ignorance and optimism'. He was supervised as an undergraduate by Richard Kahn and Gerald Shove at King's, and by J. W. F. Rowe at Pembroke, since Caius had no economists in those days. Although he followed Maynard Keynes' lectures on the embryonic *General Theory* and was invited to attend his *Political Economy Club*, he developed no special relationship with Keynes until they came together again during the war. The teacher who influenced him most was Colin Clark, who lectured in statistics. Clark was possibly the first of the many economists who were to be counted, not only as collaborators and colleagues, but as close friends, and it was Clark's interest in estimates of national income, in measuring prices and standards of living, and in the whole range of economic statistics that laid the foundations for Stone's subsequent work. Even so, there is a lack of theory in Clark's work that was not to characterize that of his pupil. Although Stone was always impatient with theorizing for its own sake, and with those who made no attempt to test their theoretical predictions, he enjoyed and appreciated economic theory, as would any talented student of Kahn and Keynes. He also realized from the first how formal theory could be used to organize data, and how to confront theory with the data. He spent one of his undergraduate summers estimating the parameters of a Cobb-Douglas production function, painfully calculating by hand the coefficients in a three-variable regression of the logarithm of output on a time trend and on the logarithms of capital and labour. (The calculation had to be repeated several times, with more figures carried each time, until there were enough digits to obtain a useful estimate of the difference of two large numbers!) Pleased with this early attempt to bring the theory to the data, and prompted by friends, Stone showed the results to Pigou; 'the Prof' showed polite interest but, by his own admission, understood nothing.

After Stone's graduation Caius offered him a research studentship, but he felt unable to accept it. He was unsure that he was ready for research and his father, already displeased by the move from the law, was anxious to see his son settled in a proper job. So he went into the City as an insurance clerk at C. E. Heath and Company, a firm of Lloyd's underwriters who paid him £50 a year. In his spare time, he kept up his economic interests, which were actively shared by his wife. They worked and wrote

together on a range of economic issues and in 1938 published one of the first papers to provide empirical estimates of the marginal propensity to consume and of the Keynesian multiplier. When Colin Clark moved to Queensland in 1937, he had bequeathed to them the monthly *Trends*, which was published as a supplement to *Industry Illustrated* and featured graphs of economic series and occasional articles on topics of current interest. Stone and his wife wrote *Trends* for two years until the editor of *Industry Illustrated* refused their request that the fee be raised from £5 an issue.

This work attracted some attention and, when war became imminent, Stone was asked to join the Ministry of Economic Warfare. He accepted, and took up his new duties on 2 September 1939. On the quite erroneous supposition that he was knowledgeable about shipping, he was given the task of tracking imports of oil by neutral countries. In May 1940, he noticed a dramatic change of course by Italian tankers, all of which appeared to be making for neutral ports round the Atlantic. He calculated that by June 10th they would all have reached their intended destinations, and predicted that on that day Italy would declare war. His reporting of this entirely correct inference succeeded only in earning him a reprimand from his superiors. ('Unfounded suspicions . . . Italy was a delightful country and a firm friend. What if it imported a lot of oil; it was a Catholic country and needed a lot of paraffin for altar candles.')

On 20 October 1939, Keynes addressed Cambridge's Marshall Society on the problem of war finance, and his booklet *How to Pay for the War*, illustrated with figures updated by Erwin Rothbarth from Colin Clark's estimates, appeared early in 1940. Austin Robinson, who was a member of the Central Economic Information Service of the War Cabinet, had heard the talk and realized the importance of having more accurate data to support and implement Keynes' analysis. He persuaded the Secretary to the Cabinet, Edward Bridges, to authorize the recruitment of two people to produce fresh estimates, even though at that time Keynes had no official position in the Treasury and it was unclear whether his views on war finance would be officially adopted. James Meade, who had been working at the League of Nations in Geneva, was appointed to the Central Economic Information Service in early June of 1940, and shortly thereafter wrote a paper, 'Financial aspects of the war economy', which argued that the best way of monitoring the financial effort of the economy was through a system of interlocking, balancing, national accounts. But Meade's system was still a system of empty boxes when, in August 1940, Stone was moved from the Ministry of Economic Warfare to help fill in the numbers. They were to work together on a formal basis only until the April 1941 Budget, but in those few months they were to lay the foundations of national

accounting, an enterprise that in one form or another would concern Stone for the rest of his life, and for which he was to be awarded the Nobel Memorial Prize in Economics in 1984. The two men also formed a working comradeship that was to grow into a life-long friendship.

James Meade tells how Dick Stone joined him in his tiny room in Richmond Terrace off Whitehall, a room furnished with a single desk, on a corner of which Dick established himself with a quill pen and a Monroe hand calculator, a 21st birthday present from his parents. Together, they assembled the data from a wide range of official and private sources, guessing numbers when all else failed, but refusing to leave any blanks. Gradually, Dick moved from the corner of the desk to its centre, and James found himself turning the handle of the calculator. Although the original conceptual framework was that of the older man, the process of converting the theory into reality raised an endless series of conceptual as well as practical questions, and what had started out as Stone assisting Meade turned into a joint enterprise in which neither man could ever separate his contribution to the whole. By the end of 1940, they had produced a simple system of three accounts for 1938 and 1940: national income and expenditure; personal income, expenditure, and saving; and sources and uses of government funds. The accounts appeared to be roughly in balance, although there were only very limited opportunities for cross-checking in these primitive calculations, where many of the magnitudes had been estimated as residuals. Early in the next year Meade and Stone described their methods in a conceptual paper which was published by Keynes in the *Economic Journal*, while the first estimates were published as part of a White Paper that accompanied the Budget of 7 April 1941. 'It was a great day. We drank champagne that night and we felt we had accomplished something.' The Chancellor of the Exchequer in his budget speech assured the House that such official estimates of national income and expenditure would not become a regular feature of future budgets, but in fact they did, thanks to Keynes' intervention, and Stone was responsible for producing them until the end of the war, Meade having turned to other tasks.

Their collaboration did not end here, however. In 1945 they published a booklet, *National Income and Expenditure*, which gave parallel sets of accounts for Britain and the United States, and which was to be the standard text on the subject for over thirty years. The first edition was written mainly by Meade with statistics by Stone, but by the time it had reached its tenth edition in 1977, Meade had bowed out, and Stone had developed the conceptual framework well beyond its original range. The work that Meade and Stone began during the war, was continued not only in Britain, where the three accounts of the 1941 White Paper have

expanded into the several hundred pages of the annual 'Blue Books' on *National Income and Expenditure*, but through the United Nations' *System of National Accounts* (SNA), first prepared by Stone in 1952, has grown into a set of guidelines for national income accounting for statistical agencies throughout the world. Of course, Stone and Meade did not invent the concept of national income, nor indeed that of national accounts, as Stone himself was always at pains to stress. The first balanced estimates of 'the income and expence of the kingdom' were made in 1664 by William Petty, the founder of 'political arithmetick', and thirty years later Gregory King constructed several versions of the national accounts. After this brilliant start the idea of balanced accounts evaporated, but estimates of national income continued to be made, if only sporadically and imperfectly. With the improvement in official data collection, the quality improved, and in the interwar years Clark had constructed a number of unrelated series of income, expenditure, and output that were to provide some of the building blocks for Meade and Stone. And in the United States, Simon Kuznets had measured the depth of the depression by calculating estimates of national income for the years 1929–32, and for this and subsequent work on the methodology of the calculations was later awarded a Nobel Prize.

But the vision that was expressed in the wartime estimates, and even more so in the later SNAs, was one, not of measuring a single magnitude, such as national income, but of providing an accounting *system* for the economy as a whole. In fact, it was the vision of the political arithmetician—a term that Stone liked to apply to himself. To quote from a report prepared by him for the League of Nations in 1945:

. . . all the transacting entities of an economic system are classified into broad sectors such as productive enterprises, financial intermediaries and final consumers, and a series of accounts for each of these categories is set up, in which the separate entities represent economically distinct categories of transactions. Economic activity is represented by money flows and related bookkeeping transactions, actual or imputed, between accounts. The national income and other similar aggregates are obtained from the system by selecting and combining the constituent entries in the accounts. In this way, a logical framework is presented into which the greater part of economic statistics can be fitted.

At first these ideas met with a certain amount of resistance. The differences between Stone's vision and that of his critics can be gauged by Kuznets' hostility to the innovations ('a dubious addition to the theoretical equipment by aid of which we define national income and reckon its distribution'). Nevertheless, it was the vision of a system that carried the day with the statistical offices of the world, and the SNA is the core of

national accounting practice to this day. Nor was the opposition very long-lived; the first national accounts for India were designed in 1950 by Stone and Kuznets working together.

After the 1941 Budget, the Economic Information Service was split into an Economic Section, to which Meade was attached, and a Central Statistical Office, where Stone continued with the national accounts. At the same time, he began his work on modelling consumer behaviour with a small group he directed at the National Institute of Economic and Social Research (NIESR). His first marriage had been dissolved in 1940, and in 1941 he married Feodora Leontinoff, who, after a brief period teaching philosophy at University College had become secretary to the Institute. In the first years of the war, most of the NIESR had been absorbed into the Ministry of Economic Warfare and she had been little more than a caretaker, but she was subsequently to play an important role in its revival.

The end of the war marked another turning point in Stone's career. In the late 1930s Keynes had set up in Cambridge, with funds from the NIESR, an informal research group to study various aspects of the economy, and in 1939, at his instigation, the University had approved plans for a Department of Applied Economics. The plans were reactivated in 1944, and in November of that year the steering committee, chaired by Keynes and consisting of David Champernowne, Dennis Robertson, Austin and Joan Robinson, Gerald Shove and Piero Sraffa, offered the Directorship to Stone—a lifetime appointment. It took the university until May to approve, not Stone's appointment, but the existence of the position, and while the staffing and funding of the Department proceeded during the rest of 1945, Stone first severed his links with the Civil Service, and then spent three months at the Institute for Advanced Study in Princeton from September to December, when he returned to his Directorship and to a Fellowship at King's.

In Princeton, Stone had intended to write up his ideas on national accounting, and his intention was unexpectedly reinforced by Alexander Loveday, head of the Intelligence Department of the League of Nations, then housed in Princeton, who asked him to prepare a report on national income statistics for the League's Committee of Statistical Experts. This was not the beginning of the international dissemination of Stone's work. In 1944 he had been sent from the CSO to chair tripartite discussions between the British, Canadian, and American statistical offices on the development of common accounting practices. However, the League of Nations report was the start of the world-wide adoption of systems of national accounts. An international committee met in December 1945, and its report was published by the United Nations in 1947; this document contains an Appendix written by Stone which lays out the conceptual

foundations of national accounting, based on the experience of the previous five years. Around the same time, the OEEC (later the OECD), which had initially been established to administer Marshall Plan aid from the United States, decided at the suggestion of Richard Ruggles that national income accounts were the appropriate framework for allocating aid, for planning and for monitoring Europe's economic recovery.

Once again, Stone was asked to help, this time by directing a National Accounts Research Unit which the OEEC set up in Cambridge for the purpose of training European statisticians in national accounting methods and designing a uniform accounting framework for the countries concerned. As Richard Ruggles recalls, under Stone's enthusiastic direction, 'a house was rented, staff was hired, and statisticians arrived from a variety of countries. Many of them lived in the house that Stone had rented for the centre. Aukrust came from Norway, Hansen from Denmark, Derksen from the Netherlands, Marczewski from France, Bilkur from Turkey, Geronimakis from Greece, and many others'. The unit was in operation from 1949 until 1951, and the OEEC's *Standardised System of National Accounts* came out in 1952.

In July 1952, Stone was called in by the United Nations to chair an expert group appointed to draw up what became the SNA. The job was done in a month, in broiling heat, with the group working by night and sleeping by day. The guidelines that emerged were similar to those for the OEEC, and were used throughout the world for fifteen years, in both developing and developed countries. In 1968, with the help of Abraham Aidenoff of the United Nations' Statistical Office, Stone revised and extended the SNA; the major changes were the incorporation of flow-of-funds accounts and of an input-output system. Aidenoff of the UN and Milton Gilbert at the OEEC provided two more of the happy working relationships that Stone particularly singled out in his 1984 Nobel Laureate's biographical note.

In Cambridge, Stone's major research interest had moved on from national accounting to the work that he had begun at the National Institute during the war, on constructing models to analyse patterns in consumers' demand for commodities. Although social accounting and consumer behaviour are apparently disparate topics, the link is a very natural one, as could be predicted for someone like Stone, whose research always moved seamlessly from one topic to the next. A system of national accounts, unlike any summary statistic, is a framework for observing behaviour, and it is impossible to observe behaviour for very long without wondering about its determinants. Furthermore, the Meade-Stone system provides accounts of economic transactions, describing where consumers, firms, and government receive their money from and what they spend it

on. From such aggregates, it is a short step to marginal spending patterns, and to the calculation of the marginal propensities to consume which appeared in one of Stone's earliest papers. The analysis of consumer behaviour goes one step further, and traces the links from consumers' incomes to the individual items of consumers' expenditure, with appropriate allowance for the effects of prices. Technically however, the steps are very large ones. Quite different tools are required for modelling than for accounting. Mathematical economics provides the models of behaviour, and statistical inference the tools to test the models and to estimate the parameters that turn theory into practical reality. Stone's paper 'The analysis of market demand' which appeared in 1945 in the *Journal of the Royal Statistical Society*, established its author as Britain's leading econometrician, fully conversant not only with his data—as would be expected from the author of the national accounts—but with the latest methods in what was then an extremely technical subject that had only officially come into existence twelve years before (the Econometric Society was founded in 1933). Certainly it was an extraordinary achievement for someone with no formal training in mathematics.

The work that was first reported to the Royal Statistical Society reached its fulfilment in the monumental 1954 monograph *The Measurement of Consumers' Expenditure and Behaviour in the United Kingdom 1920–1938*. This book is one of the classics of applied econometrics, and even now, after forty years of rapid technical development in the subject, much can be learned from it about statistical model-building in economics. It begins with a long introduction declaring the author's approach to econometrics, quoting Marshall's dictum that the combination of facts and 'general reasoning' is '*alone economics proper*', followed by 237 (quarto) pages on the construction of the data relating to the consumption of individual commodities during the inter-war period. Only in Chapter XVIII do we reach a statement of the theory of consumer behaviour; this is mostly drawn from the work of others, but is notable for its focus on the role of the theory in providing *testable* hypotheses about behaviour, and for the attention given to developing the theory into a set of propositions that can actually be confronted with real market data. Classical demand theory delivers propositions about individual agents consuming narrowly-defined, homogeneous and perishable commodities in a world in which they can buy as much as they can afford at a given market price. In contrast, the data concern aggregates of consumers buying composite commodities, some of which are durable, and some of which are occasionally rationed or otherwise unavailable. All of these issues are discussed, and if few are decisively resolved, neither are they today, and the chapter sets the agenda for all the subsequent research that has used demand theory as the basis

for empirical analysis. Chapter XIX, entitled 'Estimation problems and statistical procedures' is as remarkable as its predecessor. Its ten sections lay out the multivariate regression model in the now standard matrix notation, with discussion of serial correlation, simultaneity and identification, errors in measurement, multicollinearity, the combination of prior and sample information, and problems posed by the presence of time trends. A contemporary course in econometrics could use these same headings, and a good deal of the text; only the use of Frisch's bunch maps strikes a discordant, antique note.

There are three chapters of results, on the demand for food, the demand for drink and tobacco, and the demand for fuel and light. Stone chooses an essentially arbitrary double logarithmic form for the demand functions, but uses the theory to help with his most pressing empirical difficulty, which is the brevity of the time-span of the data. The homogeneity of price effects (absence of money illusion, so that proportional changes in income and prices affect nothing) is used to express demands in terms of relative prices, and Slutsky's decomposition of price effects is used to express demands in terms of *real* income and the substitution effects of prices, and the latter can be set to zero when goods are supposed to be neither complements nor substitutes. The income effects are not estimated from the data, but imposed using prior estimates from household survey data, and the equation is first-differenced prior to estimation, in an attempt to control for what would now be described as spurious common trends. The results for each commodity are presented in detail, variants discussed, and special factors taken into account—in a famous example, the demand for beer is shown to respond positively to its strength, as measured by specific gravity. Price elasticities were typically negative and of credible magnitudes, and several goods displayed the theoretically appropriate patterns of substitutability and complementarity. As H. S. Houthakker later wrote, 'The empirical results in the 1954 volume were impressive; they fully justified the persistence with which Stone had pursued his project over more than a decade, and set a standard for demand analysis that was difficult to exceed.'

In the first decade of the Department of Applied Economics, Stone gathered around him a group of collaborators, economists and statisticians, whose combined talents made them one of the most formidable teams to have been assembled in economic research. His visits to the United States had enabled him to meet young economists there, and the existence of a team of econometricians in Cambridge was a magnet for scholars from all over the world who were working in the young discipline. The list of those who were on the staff or who visited for extended periods includes James Tobin, H. S. Houthakker, Sigbert Prais, T. W. Anderson, James Durbin,

Geoffrey Watson, Guy Orcutt, Donald Cochrane, Richard Brumberg, Alan Prest, Gerhard Tintner, James Duesenberry, Roy Geary, Mike Farrell, Phyllis Deane, Sydney Afriat, and J. S. (Mars) Cramer. Stone was always open to the ideas of others, especially those of young scholars. He was a great listener, and by the attention that he gave to even the most callow ideas, he would encourage the young researchers in whom he believed to pursue their ideas with confidence and energy. His 1954 monograph builds on the research done by his collaborators, most notably on Prais and Houthakker's work on family budgets, and on the work of Durbin and Watson and of Cochrane and Orcutt on time-series econometrics. Conversely, there is also a great deal of Stone in the writings that do not bear his name. He was a great believer in team research, and the first decade of the DAE provides (together with the Cowles Commission in the United States) one of the few examples in economics of cooperative research at the frontiers of the subject.

The monograph did not exhaust Stone's research programme in demand analysis. In 1954 he published in the *Economic Journal* a paper on linear expenditure systems, in which he set out a new methodology for applied demand analysis. Rather than specifying an arbitrary set of demand functions, as he had done in his book, he characterized the class of linear expenditure functions that were consistent with the theory of utility maximization, and proposed a simple estimation technique that allowed recovery of the parameters. Such a procedure takes the inference much deeper into the problem, recovering the fundamental parameters of the process, and tries to discern the building blocks of behaviour, rather than being content with a description of its superficial and obvious manifestations. This is how modern graduate schools teach their students that inference ought to be done; once again, Stone's extraordinary 'feel' for his subject produced work that was many years ahead of its time.

In 1953–4, Stone spent six months on sabbatical at Johns Hopkins in Baltimore, then one of the liveliest economics departments in America, and he much enjoyed the experience. He had several opportunities to move permanently to the United States, and often remarked that had he been a generation younger, he would have done so; he felt that after the mid-1950s, the intellectual balance in economics had shifted across the Atlantic. (It is also characteristic of him that he would say so to those of us who in later years made the move, however much he would have preferred us to stay in Britain.) He returned to Cambridge in 1955 to become the first (and last) holder of the P. D. Leake Chair of Finance and Accounting. In those days the Directorship of the DAE carried neither professorial status nor professorial emolument, so that the offer of the new chair, which carried no teaching duties, was an attractive one which he

accepted. However, the Cambridge Keynesians (not Keynes, who had died in 1946) arranged matters so that Stone had to give up the DAE in order to take up the chair, though he made it a condition that he would retain a research group within the department. In his good-humoured way, Stone would later say that this was all for the best—his research was not restricted, and he was relieved of administrative burdens—but there is no doubt that losing the DAE was a source of much sadness. Keynes had helped to appoint him the first and lifetime director, and to the outside world Stone *was* the DAE, and its international reputation rested entirely on his work and that of his collaborators. Indeed, in 1955 he was President of the Econometric Society, and a year later was elected a Fellow of the British Academy. But his colleagues in Cambridge had little time for microeconomics, and even less for econometrics, and wanted the department to be a pool of assistance for faculty research projects.

This was also a time of great unhappiness because Feodora, after a long illness, died in 1956. Until then, because of her job at NIESR, their home had been in London, Stone spending the week at King's and going home at weekends. After her death he moved to Cambridge with their small daughter Caroline. This was a period about which Dick was always reluctant to talk, and for two years this most productive of men wrote nothing.

From the late 1950s, and for the next fifteen years or so, Stone's main concern was with the synthesis of accounting and econometric analysis into models of the economy as a whole. As always, the vision is of a framework of accounts each of which opens a window on the operation of the economic system, supplemented with models that describe the processes revealed through those windows. A clear statement appears as early as 1959 in the book *Social Accounting and Economic Models*, coauthored with Giovanna Croft-Murray (née Saffi) who became his wife in 1960 and who until his death helped him in all his work. The book sets forth the principles of national accounting, shows how the various transactions can most conveniently be laid out as matrices—social accounting matrices, inevitably known as SAMs—and then discusses the various models of behaviour: an input-output system for production, a linear expenditure system for the demand for non-durable goods, and dynamic demand functions for durable goods. (The last was based on his work with Deryck Rowe where he had introduced the simple stock-adjustment model, another lasting contribution to the empirical arsenal.) This remarkable little book gives what is in effect a skeletal model of the economy, and this was to be progressively filled out and expanded in Stone's next enterprise, the Cambridge Growth Project.

Stone's main collaborator in the Growth Project was Alan Brown, who

had been in the DAE since 1952, and who, like other collaborators before and since, had become a close friend. It would have been very difficult for Stone to work closely with someone who did not share his general views about economics, who was not, as he would put it, 'on our side of the movement', and it would have been as unthinkable for anyone who shared his views not to be a friend. Stone and Brown laid out their conception in *A Computable Model of Economic Growth*, which became the first volume in a series of twelve 'Green Books', known collectively as *A Programme for Growth* and published between 1960 and 1975. Although in later years, the Cambridge model came to be similar to the other large scale macro-econometric models that are used for forecasting and policy analysis, in its original conception it was not a forecasting model, but a tool for planning, that could explore possible alternative outcomes for a year some distance in the future. If the British economy was to grow more rapidly, it was important to identify what would be required for it to do so, in terms of industrial structure, manpower requirements, and so forth. Diagnosis of potential bottlenecks would lead to their elimination, and this exercise in 'indicative planning' would help to give industrialists the confidence needed to undertake the investment that would bring higher growth into being. Once again, the research was undertaken as a team effort, although now there had to be an allocation of the responsibilities for each sector of the model. Even so, the reins were very light, and researchers were given a great deal of free time to explore their own fields. Stone himself continued his work on dynamic demand functions for durable goods, and wrote a series of papers on the relationship between saving and income, the subject of one of his earliest papers, but now incorporating the distinction between permanent and transitory income that had been introduced by Milton Friedman. Stone's work is notable for its demonstration of the power of government credit restrictions to influence consumer spending, and through it the economy.

In the early 1960s, Stone also began work on a project designed to extend his picture of the economic system to include other aspects of society, particularly demographics, health, and education. He began by setting up a matrix of educational stocks and flows and gradually developed a vast system of socio-demographic 'accounts', in which the human being is the unit of measurement. The system accommodates data on demography, education, employment, health, welfare, and crime, and links them to one another and to the economic accounts. His *Demographic Accounts and Model Building* was published by the OECD in 1971, and in 1975 the UN published *Towards a System of Social and Demographic Statistics* (SSDS), with text, mathematical models and numerical examples by Stone and a number of tables by Aidenoff. Although the SDSS has not

so far had the impact of the earlier SNA, having been partially implemented only in the Netherlands, Stone saw these extended accounts as having the potential to integrate the social sciences—economics, demography, and sociology—in the same way that his earlier national accounts had yielded an integrated framework for economics. Much of his research in the 1970s and 1980s was devoted to these issues.

In his later years, Stone turned his attention to the history of his subject. He wrote two papers applying econometric analysis to seventeenth century data. When he died, he had almost finished a book entitled *Some British Empiricists in the Social Sciences* which describes the life and work of twelve pioneers of economic, demographic, and social statistics, ranging from William Petty's national accounts to Charles Booth's great survey of the London poor. Fortunately, he carried the work far enough for his wife to complete it.

Throughout his Cambridge career Stone conscientiously took his share in the running of his Faculty, though it was not an activity that gave him great pleasure. He hated strife and tried to keep aloof from faculty quarrels, so that in spite of his intellectual distinction and international standing, he did not play a large role in shaping economics at Cambridge. Austin Robinson recalls that, when he was chairman of the Faculty, it was Richard Kahn, Nicholas Kaldor and Joan Robinson who continually brought pressure on him, not Stone, and recognizes how limited was the awareness by Stone's colleagues of how he was reshaping economics. Indeed, one of Stone's most trying experiences was as a member of the committee for the reform of the economics tripos in the late 1950s, when he fought a long battle for the introduction of mathematics into the curriculum. The proposal was resisted on all sorts of grounds, among them that it would discourage headmasters from sending boys to Cambridge.

Still worse were the awful two years 1970–2, when he agreed to be the Chairman of the Faculty Board. Faculty politics in those years in Cambridge were as ill-natured and fractious as Stone was the opposite, and it is hard to imagine a less suitable Chairman for a period when the students were in revolt, and when a radical element in the faculty was pushing the University to abolish all traditional forms of examination in economics. Stone believed in gentlemanly behaviour, and in good manners, and that with enough of both, consensus could be achieved. But this time there were too few gentlemen and too little good manners, and while Stone was always prepared to pour oil on troubled waters, the situation was an impossible one, and he found it a great strain. He was quite unsuited to political sparring. His friendship was given unstintingly and quickly; he could sense at once that you were his sort of person. But he could also hold a grudge when his loyalty was betrayed. Some years

later, a Cambridge colleague formed an alliance with him over a potential appointment, but at a crucial point reneged on their agreement. This was never forgiven, and although the sin was indeed an ordinary—and possibly even defensible—one by the standards of academic politics, Stone was profoundly shocked at the manner of it, and subsequent friendly overtures were treated as impertinent.

Stone maintained good relationships with his two colleges, King's and Caius. During the ten years of his directorship of the DAE, King's was his Cambridge home and he had a group of non-economist friends including E. M. Forster, Stephen Glanville, George (Dadie) Rylands, Michael Jaffé and John Barton. After he moved house from London to Cambridge he ceased to be an assiduous college man, though he did begin his demographic accounting project at the King's Research Centre. He also continued to serve on a number of college committees, including the Fellowship Electors and the wine committee, both much more congenial than the Faculty committees. He was also the college's cigar steward. He remained a Fellow of King's all his life. In 1976 he was elected an Honorary Fellow of Caius, which gave him great pleasure (not to mention access to one of Cambridge's greatest cellars).

Stone was never a conventional teacher. His formal teaching was limited to the supervision of graduate students. In professional seminars, his presentations were elegant and clear, but he did not care to be challenged or interrupted, and he was uncomfortable in 'cut-and-thrust' workshops. He had none of the sheer verbal force that characterizes many great scholars. But he probably influenced more people and had more disciples than any other British economist, simply through his leadership and personal example. He was much admired by those who worked with him, and his scholarship, technical expertise, and sheer pleasure in his subject were magnetic examples. His writing also accounts for much of his influence. It has a simplicity, clarity, and elegance that is a superb foil to the technical material, and that, in the reading, conveys the elegance and spirit of the man. Indeed, elegance is a term that applied to every aspect of his life, to his conversation, his dinner table, his manners, and his attire. There is a story of his coming to work during the war, brushing the bomb debris from his hat, exclaiming, 'Really, James, this is too much!' He always wore bow ties, of which he had an extensive collection, complemented some six feet below by luminous yellow or pink socks. These had briefly been the fashion among rock-and-rollers in the 1960s, and Stone had laid in a lifetime supply. His favourite author was P. G. Wodehouse. He was an inveterate smoker, alternating between cigars and unfiltered cigarettes smoked through long coloured holders. One of the highlights of his visit to Cuba in the early 1970s had been a guided tour of a cigar factory from which he had not returned empty-handed.

Those of us who worked on the Growth Project during those years, and were fortunate enough to become friends of Dick and Giovanna, were immersed, not just in research in empirical economics, but in a way of living. The main room at 13 Millington Road is long and narrow, with black walls. It looks out over a rose garden, so that by day the black walls make it seem shallow and project the room into the garden. By night there are pools of light, near the fire, by the Bösendorfer, and over the round dining table, which is covered with yellow leather. This was not only the family sitting and dining room, but was also a place for work. Indeed, for Dick there never could be any separation between his work, his family and his friends. Not everyone likes to live in such a way, and for those who preferred an eight hour day, the late-night editing sessions for the Green Books were less than fully appreciated, however lively the atmosphere and good the wine. But for many more of us, Millington Road became a very special place. Dick and Giovanna kept a splendid dinner table, sparkling with multicoloured glassware. Anyone interesting who came through Cambridge would be invited, many of them economists and statisticians, but never exclusively so. There was a constant stream of visitors from all over the world, from Nobel laureates to research students with barely a word of English. Giovanna guided the conversation with wit, grace, and occasional outrageousness. Dick would preside, enjoying the food, the wine, the talk, his guests, and the sense of belonging to a worldwide community of scholars and friends. Always the model of affability, he would agree to the most preposterous statements. 'I suppose, when you come to think of it, you're right,' and just for a moment you would be struck with the wisdom of your remark. Occasionally, *very* occasionally, and only when pressed, would come the counterpart, 'Well, if you ask *me*, it's all the most frightful rot!'

For many years, there were regular trips to Geneva and New York, and during the 1960s and early 1970s, there were annual visits to the villa Saffi near Forli, home of Giovanna's father. In typical style, they drove to Kent, whence a half-hour flight whisked them and their Citroën to the French coast. From there to Italy, they could indulge their taste in romanesque architecture. After his retirement in 1980, Dick could indulge to the full his favourite hobby—staying at home—entertaining and working in the beautiful library that he and Giovanna had designed as an extension to the house in Millington Road. They continued to work together until his death, although there were increasing interruptions through ill-health. Even so, their dinner table in 1991 was no less pleasurable and no less sparkling than it had been 25 years before. He died on 6 December 1991.

Stone was an unassuming man, hardly aware of his reputation. The

honours he received gave him pleasure and their increasing frequency never seemed to destroy the surprise with which he received them. He was awarded a CBE in 1946 and a knighthood in 1978, and held honorary degrees from several universities both in England and abroad. He was a Fellow of the British Academy, an Honorary Member of the American Academy of Arts and Sciences, and a Foreign Member of the Accademia dei Lincei, which pleased him especially because one of the founding members had been Galileo. The culminating award was the Nobel Prize in 1984, awarded for his work on national accounting. Of course, in a perfect world, the Nobel committee would have found a way of honouring Stone's contribution to demand analysis, not to mention some joint recognition of the early work with James Meade (who had earned his own prize for unrelated work some years before). In the world as it is, Dick Stone came as close to living the ideal academic life as it is possible to imagine, a life in which work and pleasure were completely integrated. He was much loved by his friends, and he left behind him a body of work that marks him as a great British empiricist, or as he would have preferred it, a political arithmetician. I remember him last in his magnificent library, surrounded by the books that gave him as much physical as intellectual pleasure, filling in the numbers in a table.

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Note. I wish to acknowledge my debt to Lady Stone, who provided me with extensive comments on a first draft of this memoir, and without whose generous help I could not have completed it. In preparing the material I was helped by a number of previous memoirs, and I am grateful to their authors, Sir Claus Moser, Geoffrey Harcourt, Luigi Pasinetti, and Graham Pyatt. I am also most grateful to Sir Austin Robinson and James Meade for material about the war years, and to Richard Ruggles for his broader perspective on Stone's contribution to the international spread of national accounting systems. Geoffrey Harcourt, James Meade, Luigi Pasinetti, Sir Austin Robinson and Richard Ruggles provided comments on the first draft. I have also drawn on Stone's interview with Hashem Pesaran in *Econometric Theory*, Vol. 7 (1), 1991, and on Stone's autobiographical sketch that appears in *Les Prix Nobel 1984* (Stockholm: Almqvist & Wicksell.) For more technical discussions of Stone's contributions to economics, see Leif Johansen's 1985 paper in the *Scandinavian Journal of Economics*, Hendrik Houthakker's 1985 Harvard Discussion Paper, 'Richard Stone and the analysis of consumer demand', Richard Ruggles' 1985 Yale University Discussion Paper 'The role of national accounts in the statistical system', and my own *Richard Stone* in *The New Palgrave Dictionary of Economics*. A bibliography of Stone's works up to 1989 is appended to the interview in *Econometric Theory*.

The sources for the quotes in the text are as follows. The quotes on pages 1 and 2 come from the Nobel autobiography. The story of the Italian tankers is

reported in the interview in *Econometric Theory*. The champagne drinking statement is quoted in Vol. XXII of the Royal Economic Society's collected writings of John Maynard Keynes, p. 353. The Stone and Kuznets quotes on pages 5–6 are cited in Richard Ruggles' paper, and the quote about the Cambridge National Accounting Research Unit is from a personal letter from him. The Houthakker citation on page 10 comes from the paper listed above. The bomb debris story comes from Sir Claus Moser's memoir, and ultimately from James Meade.