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The 1984 Nobel Prize in Economics

The Alfred Nobel Prize for Economics, on this 16th occasion of its award, goes to Sir Richard Stone of Cambridge University. Rather than divide the honor among scholars, as has often been done in the past, the Royal Swedish Academy of Sciences chose to stress the importance of Stone's work in formulating the system of integrated national-income accounts that have proved so useful in the post World War II era (*1*).

Economist peers will second this emphasis, while at the same time insisting that Stone has two other important achievements to his credit: innovations in econometric measurement of demands for groups of goods and services (*2*); and in linear matrix models permitting extrapolation and testing of growth relations (*3*). In framing his will, Alfred Nobel set a bad precedent for the physical sciences. A Lord Rayleigh could not win a Nobel Prize for a lifetime of deep and versatile work in all branches of theoretical physics, but fortunately could be fitted in under the rubric of being a discoverer of a new and rare component of the atmosphere. Arnold Sommerfeld, for all his innovations over an extended period of time, was not so lucky. Fortunately, committees know how to fudge on their own procedures, so that a Percy Bridgman as well as a lucky bystander could win the laurel leaves and lucre.

Social scientists, eager as always to ape the more exact sciences, can be counted on to take over the vices as well as virtues of their pace setters. Fortunately, though, the 1984 prize goes to a scholar prolific both in the empirical and theoretical sides of political economy and one recognized for having rung the bell of novel accomplishment several times.

The Anatomy of Social Accounts

First researches, like first loves, are important. J. R. N. Stone first gained world renown almost a half century ago for measurement of families' budget patterns with respect to spending and saving (*4*). Anyone who doubts that there is such a thing as economic law need only look at these well-documented ancient regularities. Stone's statistical investigations of the propensities to consume and save assumed an especial importance in the brave new dawn of John Maynard Keynes's revolutionary 1936 *General Theory of Employment, Interest and Money* (*5*).

During World War II itself, in the Offices of the War Cabinet's think tank attached to Keynes, Stone worked closely on setting up national-income accounts with James Meade (himself to share the 1977 Nobel Prize for innovation in international trade analysis). Those ideologically distanced from Lord Keynes—the late Lord Robbins and Sir Dennis Robertson for example—have testified to the exhilarating quality of that charmed circle. It was there that Stone and Meade made their first U.K. estimates, and forged the tools of interlocking accounts appropriate to a nation and, by extension, to a region or the whole world.

Cambridge University was not a friendly environment in the postwar years for a Department of Applied Economics in which people actually dirtied their hands manipulating empirical data. Stone fortunately wore the right tweeds, and as a Fellow of King's College and a protégé of Maynard Keynes was able to protect a revolving corps of able researchers. Not all of them spoke with top drawer accents and it must be admitted that many were colonials and Americans. But science, as we are told, recognizes no distinctions of class or race. Still it was considered rather much when a chair designated for finance and accounting went to a don (Stone himself) who had never met a payroll and whose double-entry items referred to societies and sectors and not to corporations and wholly owned subsidiaries.

Good wine travels far. What was good for the United Kingdom was found to be good for the United States and became the pattern for the United Nations community generally as the Stone square matrices of interlocking fund flows became the *lingua franca* of world statisticians: involved was a *production* account, and one each for *consumption, accumulation*, and *foreign finance*.

Physiology of the Circular Flow

Parallel with these accounts at the national level, there was being developed by Wassily Leontief at Harvard a

similar system of input-output relations, in which a vector of industries is seen to be connected by a vast matrix of transaction flows—the dollars received by industry i from the total expenditure flow of industry j (*6*). The general notion of such a *Tableau Économique* goes back a long way, to Francois Quesnay, Madame Pompadour's physician at the court of Louis XV and founder of the Physiocratic school of economics. Despite exaggerated claims by Quesnay's disciples—as that the *Tableau* was the greatest invention since fire and writing—both Karl Marx and Joseph Schumpeter could admire this first attempt to grapple with an economy's general equilibrium.

A scholar has predecessors, co-workers, and successors. Simon Kuznets in America had pioneered in defining and measuring national income and deservedly received the 1971 Nobel Prize for this work. Stone followed in his tradition, and in the tradition of such other laureates as Jan Tinbergen, Leontief, and Lawrence Klein. Going beyond the formal anatomy and taxonomy of social accounts, Stone set up behavior-equation hypotheses to rationalize and project future saving and income growths. A large team at Cambridge has produced volumes dealing with linear growth models (*7*).

The jury still seems to be out on how useful these exercises have been. Criticism is easy, and for every scholar who complains that these systems are oversimplified there is also a pedant who is bored by their multivarious detail. Supply-side economics is not an easy subject and it is even more difficult at the level of microeconomics than at the macroeconomic level.

Measurement in Terms of Theory

In the announcement of this year's Nobel award, the Royal Swedish Academy of Sciences stated: "*Economic theory* is at the back of Stone's system for national accounts, and these therefore provide a systematic base for economic analysis, forecasts and economic policy." Thus, behind the dollar or pound numbers of the gross national product (GNP), an economic theorist tries to discern some real scale of output of goods and services.

What is needed is some proper index number of prices that can be used to deflate the dollar totals. Thus, suppose we all spend two-thirds of our incomes on food and one-third on clothing. And suppose our total of dollar incomes doubles between 1980 and 1985 while food prices have all doubled and clothing prices have all stayed the same. How much, if at all, has our real income gone up?

In this Santa Claus example an exact answer is possible: real income has gone up almost exactly 26 percent (more precisely, it is $\sqrt[3]{2}$ times what it had been). To arrive at the correct answer, we calculate the correct weighted average of price changes: with expenditure fractions so constant and simple, our index number of prices must be

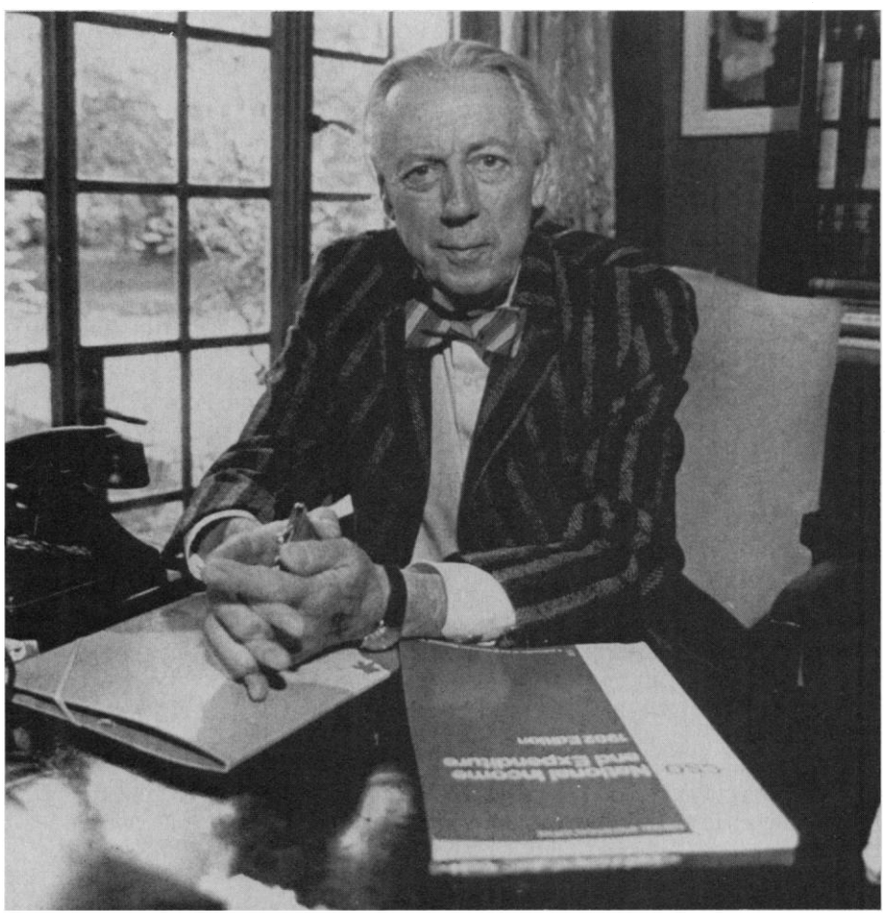
$$100(P^{85}_{food}/P^{80}_{food})^{2/3}(P^{85}_{clothing}/P^{80}_{clothing})^{1/3} = 100(2)^{2/3}(1)^{1/3} \simeq 158.74$$

Deflating the index number of GNP, 200, by 158.74 gives, after multiplication by the conventional 100, the desired answer of 125.992—a 26 percent rise.

When making calculations for all the countries in the Organization for Economic Cooperation and Development, Professor Stone proposed reasonable use of conventional price index numbers as deflators (*8*). The same general philosophy has been common among experts. Do correct theoretical methods matter? Indeed they do. Thus, it was recently thought that half-a-dozen countries had surpassed the U.S. real per capita level of income: West Germany, Sweden, Switzerland, and so forth. And that is what the World Bank Atlas recently used to show even though the experts there knew better.

When the United Nations and World Bank commissioned a team at the University of Pennsylvania—A. Heston, I. Kravis, and R. Summers—to do the research correctly, these used the same general methodology that Stone follows. They eschewed using merely exchange rates as deflators, knowing that short-term depreciations of the dollar would excessively lower the U.S. estimates. Instead they gathered prices actually paid in each country and constructed from them the proper index numbers needed as deflators (*9*). Result: America is still more than 10 percent above the European nations named.

There is one further theoretical innovation of Stone's that is closely related: the Stone-Geary or Klein-Rubin system of demand functions. Rich people are known to spend a smaller fraction of their income on food than poor people



Professor Sir Richard Stone [UPI/Bettmann Archive]

do. So instead of assuming fixed fractions—the so-called Cobb-Douglas model—Stone gets a better fit by assuming people spend on each good a fixed fraction of the income they have left after they have bought a fixed market basket of the goods (*2*). This too is an oversimplification, but it is one in the good cause of arriving at tolerable econometric fits to whole systems of observations. Fairly recently, the Kravis-Summers-Heston team has verified that such a model does approximately fit their data on more than a score of countries, ranging from poor Kenya and India to Hungary, Britain, Japan, and the United States.

Style That Makes the Man

Though Sir Richard has led teams and done joint work with many, including Lady (Giovanna) Stone, he is rather a loner and has a reserved personality. Meticulous in citing earlier work by others, probably he has arrived by his own route at much of his final work. With jaunty cap, he strides across the heath, shooting stick in hand. Poker-faced, he savors a good cigar and sips fine wine. Probably, in all his life he has never spilled gravy on his velvet waistcoats.

Competent scientists, it is reported, usually have narrow interests. Brilliant scientists reputedly have broad interests. Certainly that is the case with Richard Stone.

As you read one of his well-drafted essays or memoirs, suddenly you spy an unexpected nugget. Here is one example, culled from chapter 1 of his 1966 collection of essays (*10*).

Jean D'Alembert, the brilliant 18th-century mathematician and physicist, made rather a jackass of himself when dealing with probability. Confronted with the divergent series arising in the St. Petersburg Paradox, he alleged that all probabilities below a certain critical fraction could be treated as zero. With such humpty-dumptyism, what series could fail to converge!

More notorious was D'Alembert's insistence that, in two tosses of a fair coin, the probabilities of two heads, two tails, and of a mixed outcome of heads and tails are each one-third. By contrast, conventional minds reckon as having equal probabilities, of one-fourth each, the different cases: HH, TT, HT, TH. Stone offers D'Alembert the following ingenious defense. Not being able to be certain that the coin is indeed fair, perhaps I must consider the probability of a heads to be p, which can be more or less than one-half and might be deemed by me to be equally likely to be anywhere on the interval (0,1). In that case, the probability of HH is p^2, with expected value for it and for TT and for (HT or TH) all equal to one-third! (*11*).

To perceive how great have been both the quality and quantity of Stone's researches, the reader is referred to the *Festschrift* in his honor, which contains a bibliography of 169 Stone publications in the years 1936 to 1979 (*12*). And finally I should mention that, in an economics profession known for its standoffishness, Richard Stone has done fruitful interdisciplinary work in the realms where demographic and economic analysis overlap.—PAUL A. SAMUELSON

The author is Institute Professor in the Department of Economics of Massachusetts Institute of Technology, Cambridge 02139. He received the Nobel Prize in Economics in 1970.

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