
The State of Economics

Author(s): P. T. Bauer and A. A. Walters

Source: *The Journal of Law & Economics*, Apr., 1975, Vol. 18, No. 1 (Apr., 1975), pp. 1-23

Published by: The University of Chicago Press for The Booth School of Business, University of Chicago and The University of Chicago Law School

Stable URL: <https://www.jstor.org/stable/725244>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



, The University of Chicago Law School and The University of Chicago Press are collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Law & Economics*

JSTOR

THE STATE OF ECONOMICS*

P. T. BAUER and A. A. WALTERS
London School of Economics

SINCE the emergence of economics as a distinct subject, the objectives, claims, achievements and techniques of economists have been regarded by the public, often including scholars in other disciplines, with a mixture of awe and derision. There has also been much radical professional criticism of objectives and methods, of which that of the institutionalists, economic historians and Marxist-oriented writers are the most familiar. In recent years discontents and doubts, even on some fundamentals, have been voiced on prominent occasions by eminent practitioners, whose doubts and criticisms have no political thrust. Examples include major addresses by Professors E. H. Phelps Brown and Wassily Leontief, and Mr. G. D. N. Worswick.¹

The titles and the tenor of these addresses reflect the pessimistic note of the observations of their authors, some of which question the reality or even the possibility of progress in economics. Such a situation is certainly unusual in an expanding subject, and may even be unique. We intend in this paper to examine some of the grounds for recent discontent. We shall suggest that neither progress nor stagnation conveys adequately the distinctive state of our subject, which seems rather one of confusion in the sense of substantial and at times rapid progress in some directions, coupled with decay at the centre. We shall also suggest some reasons for this curious condition.

1. ADVANCES AND TRANSGRESSIONS

Many recent critics of the subject have emphasised the failure of economics to solve major social problems in the face of ambitious claims by practitioners and high expectations on the part of the customers. The encouragement of unwarranted expectations may well have affected the provision of resources to economists, and thus the volume, direction and quality of their output, with possible adverse results such as misdirection of effort or

* We wish to thank Professor B. S. Yamey for valuable help in the preparation of this article.

¹ E. H. Phelps Brown, *The Underdevelopment of Economics*, 82 *Econ. J.* 1 (1973) (Presidential address to Royal Econ. Soc., July 1971); Wassily Leontief, *Theoretical Assumptions and Nonobserved Facts*, 61 *Am. Econ. Rev.* 1 (1971) (Presidential address to Am. Econ. Ass'n, December 1970); G. D. N. Worswick, *Is Progress in Economic Studies Possible?*, 82 *Econ. J.* 73 (1972) (Presidential address to Section F of British Ass'n, September 1971). Some penetrating and entertaining observations on the state of economics, especially on model building will be found in Axel Leijonhufvud, *Life Among the Econ*, 11 *Western Econ. J.* 327 (1973).

subsequent disenchantment. Inability to solve practical problems is not in itself valid ground for discontent, much less for suggestions that the subject has not advanced. Thus failure to eliminate poverty or industrial conflict is not evidence of lack of progress in economics, because these matters do not depend primarily on the advance of knowledge, let alone of economic knowledge. And even where a solution depends on knowledge only, it is not a pertinent criticism that a particular stage of knowledge has not yet been reached. Failure to cure the common cold, to promote perennial youth or lasting happiness, does not mean that medicine, biology or philosophy have not progressed.

On the other hand, extravagant claims are grounds for valid criticism. They arouse unwarranted expectations which must lead to disenchantment; they place practitioners in a false position; they deflect attention and resources from more promising directions and often lead into blind alleys; and they may even lead to a neglect of simple fundamentals.

The promotion of unwarranted claims reduces the effectiveness and potentialities of a subject. In recent decades exaggerated and even extravagant hopes have been entertained of the practical potentialities of economics, from the so-called fine tuning of advanced economies in the short period, or the forecasting of their position and prospects for decades ahead, to its potentialities in promoting the progress of less developed societies by sophisticated planning models. And many economists have readily encouraged these expectations both about the subject as a whole and about certain techniques and methods. These expectations have often been accompanied by extensive claims for the ability of economists to establish generalisations which make possible the realization of these expectations. As Leijonhufvud said to us, collective hubris has afflicted much of the profession.²

Since the Second World War there has been indisputable progress in major areas of economic study, including the incidence of taxation, the determination of exchange rates, the theory of tariffs and many others. However, simultaneously with these advances we can observe frequent grave and avoidable lapses which often amount to neglect of established and accepted elementary ideas and concepts or of simple evidence. These lapses are so serious and extensive that in some major parts of the subject they amount to retrogression.

Refinement of price theory has been a major topic in the recent literature.

² What may be an extreme case of the claims of economists was perhaps the observation of Professor Paul Rosenstein-Rodan, *Programming in Theory and in National Practice* (mimeographed paper at Mass. Inst. of Tech., Mass. Center for Int'l Studies, 1955), that one of many vicious circles that afflicts under-developed countries was a lack of an economic civil service for their development planning. Even if under-developed countries were caught in a vicious circle of poverty, their emergence from it would not depend on economic knowledge or an economic civil service.

Examples include the analysis of shadow prices, externalities and second best. Some of these refinements are genuine advances. Others are in the nature of trivia or *curiosa*, or shall we say *esoterica*; and the application even of genuine theoretical advances has often contributed little to knowledge.³ Alongside these elaborations we find discussions which treat supply and demand as fixed quantities independent of price and cost.⁴ Thus the effects of export taxes on the production of cash crops, or the effects of import duties on demand, are often ignored in technical publications.⁵

Some of these theoretical developments are designed to emphasize alleged imperfections of the market system with clear implicit or explicit suggestions for policy. The alternative policies or arrangements are rarely specified but are usually left in an idealised form. Yet allegations of inadequacy are meaningless without fully specifying the alternative system envisaged. For instance in the discussions of the divergence of social and private cost and returns it is rarely made clear what alternative systems are envisaged, nor are the costs of establishing such systems examined, nor whether in fact there are divergencies in particular conditions, how they arise, what they reflect, and how important they are quantitatively. And what is perhaps especially pertinent in the present context is that these exercises often reveal

³ It is of some interest that the theory of games, one of the most mathematical fields of economics which had aroused high expectations, has added little to our substantive knowledge of monopoly, duopoly and oligopoly where most was expected of it. Indeed the main outcome of the literature of game theory is that there are few analytical solutions to the perennial problems of bargaining. Generally, the theory of games has not served as a fruitful source of hypotheses on the behaviour of monopolies and small groups; it has provided interesting puzzles rather than valuable insights or testable hypotheses.

⁴ This kind of treatment has always been characteristic of non-technical discussions in such contexts, for instance, as the housing shortage. But since the Second World War it has intruded into the economics literature. Mr. Redvers Opie wrote in 1949, when reviewing Sir Roy Harrod's *Are These Hardships Necessary?*: "But it also shows to what a pass the neglect of the economic verities can bring us, when Mr. Harrod must solemnly acknowledge his indebtedness to another British economist for opening his eyes to the fact that rent restriction not only depresses the supply of unsubsidised new houses but encourages extravagance in the demand for housing accommodations." 39 *Am. Econ. Rev.* 527, 528 (1949).

⁵ In the report of the World Bank Mission to Nigeria, *Int'l Bank for Reconstruction & Development, The Economic Development of Nigeria* (1955), the response to supply and demand to price was ignored even in the context of the imposition of heavy indirect taxes. The report comprised a main report and twenty-one technical reports and was claimed to serve as a model for other subsequent Bank Reports. Compare also a subsequent exchange between John H. Adler, *The Economic Development of Nigeria, A Comment*, and P. T. Bauer, *A Reply*, 64 *J. Pol. Econ.* 425, 435 (1956).

Disregard of the effects of price on output (together with a failure to distinguish historical from functional relationships) was conspicuous in a series of articles in the *Economic Journal* in 1953-1954 on the West African export monopolies: Polly Hill, *Fluctuations in Incomes of Primary Producers*, 63 *Econ. J.* 468 (1953); P. Ady, *Fluctuations in Incomes of Primary Producers, A Comment*, 63 *Econ. J.* 594 (1953); B. M. Niculescu, *The Reduction of Fluctuations in Incomes of Primary Producers: A Critical Comment*, 64 *Econ. J.* 698 (1954).

unfamiliarity both with elementary economic theory and with the real world, reflected, for instance, in failure to distinguish between unavoidable scarcity and contrived scarcity, between scarcity rent and monopoly profit, or even in an inability to handle the concept of opportunity cost. Studies of state-sponsored industrialisation and of government-operated or supported trading corporations frequently judge such policies in terms of the output of these activities, an approach which confuses scarce resources with free goods and which is characteristic of lay discussions.⁶

Sophisticated approaches and crude lapses co-exist in the same branch of the subject, the writings of the same author, or even in the same publication. The familiar difficulties of laymen in coming to grips with certain simple and fundamental ideas of economics have come to afflict the practitioners themselves.

In macroeconomics perhaps the most revealing lapse is the discussion of the balance of payments without reference to domestic prices, incomes, exchange rates or monetary and fiscal policies. The discussion of the 1940's and 1950's of the dollar shortage and the likelihood or even inevitability of its persistence provides a celebrated example. Many economists, including outstanding price theorists, treated this matter without reference to these variables. The prompt falsification of these predictions by events in the late 1950's did not reflect unsuccessful forecasting in the conventional sense of the term, criticism of which would simply reflect the wisdom of hindsight. The inevitable and persistent dollar problem or shortage was discussed largely, at times completely, without reference to the rate of exchange, that is the price of the so-called scarce commodity—the familiar practice of readers' letters to the press—or to such basic determinants of the rate of exchange as monetary and fiscal policies, the supply of money and comparative rates of interest.⁷

⁶ This approach has been characteristic of writings on Indian Economic Planning. Examples include India, Planning Comm'n, Second Five Year Plan (1956). Compare also P. C. Mahalanobis, Draft Recommendations for the Formulation of the Second Five Year Plan, 1956-61 (known as Draft "Plan Frame," 1955). Mahalanobis's Draft Plan Frame was approved by twenty-one leading economists (*id.*). A similar approach was adopted in Surendra J. Patel's, Export Prospects and Economic Growth: India, 69 *Econ. J.* 490 (1959).

⁷ Examples include: Thomas Balogh, *The Dollar Crisis, Causes and Cures* (1949); J. R. Hicks, *An Inaugural Lecture*, 5 *Oxford Econ. Papers* 117 (n.s. 1953); Charles P. Kindleberger, *The Dollar Shortage* (1950); Donald MacDougall, *A Lecture on the Dollar Problem*, 21 *Economica* 185 (n.s. 1954); and *The World Dollar Problem: A Study in International Economics* (1957); Lionel Robbins, *The International Economic Problem*, *Lloyds Bank Rev.*, January 1953, n.s., at 1; D. H. Robertson, *Britain in The World Economy* (1954); E. A. G. Robinson, *The United Kingdom's Economic Problems*, in Charles K. Webster, *et al.*, *United Kingdom Policy: Foreign, Strategic, Economic* (1950).

Some participants ignored the determinants mentioned in the text more completely than did others. The central role of these determinants was ignored by all the participants—had it not been the discussion would have proceeded along radically different lines. This was recognised

The discussants also underrated the capacity of market participants to develop new institutions and substitutes in foreign exchange markets, in much the same way as in other forms of economic activity.⁸

It was the discussion of the prospective dollar shortage which initiated the notion of a persistent shortage of foreign exchange allegedly afflicting some countries or categories of countries. It also led to the view that international liquidity would be persistently and chronically in so-called short supply. A further example of an often encountered crude lapse in the same general area is the practice of citing the decline of exports of a product from one particular country as evidence by itself of a decline in world demand for that product.⁹ Discussion of unemployment, without examining money wages, real wages and substitution possibilities between factors is another example of the neglect of pertinent basic variables.

Elementary lapses of analysis are often accompanied or compounded by disregard of patent evidence. Examples include the idea that substantial progress of poor countries must entail external payments difficulties (foreign exchange gap) or that poverty sets up insurmountable obstacles to its own

by Professor Gottfried Haberler who was an early critic of these procedures, in his essay, *Dollar Shortage?*, in *Foreign Economic Policy for the United States* 426 (Seymour E. Harris ed. 1948).

Nor did these practices end with the end of the dollar shortage. A discussion of the balance of payments prospects for Britain up to 1975 by the National Institute for Economic and Social Research, W. Beckerman and Associates, *The British Economy in 1975* (Econ. & Soc. Studies 23, 1965), did not refer to exchange rates or to monetary conditions.

⁸ This particular oversight is an example of a major limitation of much modern mainstream economics, both analytical and applied, which in many contexts amounts to a major shortcoming. Much of contemporary economics envisages economic activity primarily in terms of situations rather than of processes. Yet economic life represents a series of processes the participants in which often have both the capacity and the interest of adapting to change, including the inclination and ability to develop new products, processes, markets and forms of organisation, unless forcibly prevented from doing so. This defect of contemporary theory prevades much of the literature of competition, as has been noted by Friedrich A. Hayek, among others, especially in *Individualism and Economic Order* (1948).

⁹ This transgression is conspicuous in much of the discussion on the position and prospects of LDCs. An example is Patel's article already noted. That article together with the views of Ragnar Nurkse, *Patterns of Trade and Development* (1959) is used as basis for the article by K. N. Raj & A. K. Sen, *Alternative Patterns of Growth Under Conditions of Stagnant Export Earnings*, 13 *Oxford Econ. Papers* 43 (n.s. 1961), which accepts Patel's approach and puts it in a mathematical form. Both papers propose the expansion of state-sponsored heavy industry which they discuss without examination of labour costs or of consumer demand. Patel identifies changes in exports from one source with changes in aggregate world demand for these exports. These articles also discuss export earnings without reference to exchange rates or to monetary and fiscal policies. And while the article of Raj & Sen takes Patel's conclusions as its starting point, their article in turn serves as the starting point for an article by A. B. Atkinson, *Import Strategy and Growth under Conditions of Stagnant Export Earnings*, 21 *Oxford Econ. Papers* 325 (n.s. 1969). Atkinson does examine the shadow price of foreign exchange under conditions where "the critical assumption . . . (is . . . that) the export earnings are independent of conditions on the supply side." *Id.* at 337. His model, he claims, is "relevant to an oil sheikdom." *Id.* It should be evident that the notion of stagnant export earnings is meaningless without examination of the reasons for it.

conquest (vicious circle of poverty); or that economic contact with advanced countries is likely to be damaging to less developed countries (for example, the international demonstration effect).¹⁰ Acceptance of such ideas reveals the absence even of simple reflection.¹¹

Pronounced differences in the competence and consistency of performance of practitioners are inevitable in scholarship and science. What seems peculiar to economics is the frequency of lapses of simple analysis and disregard of evidence by leading practitioners. Sometimes the lapses are of a kind which are readily apparent to reflective laymen who have not studied economics, a situation which rarely applies in other disciplines. It seems that neither progress nor stagnation describes appropriately the condition of economics; rather it is one of confusion in the sense of the co-existence of sophisticated advances and crude lapses.

There is much other evidence suggestive of the confused state of economics, such as the prevalence of the widest disagreements on the merits of the work or competence even of prominent practitioners, or on the appropriateness of different methods of economic study, or on the interest of different branches of subject, or even on the purposes of its study; frequent abrupt changes of intellectual fashion, within the profession; and occasional comments by leading economists that much widely acclaimed work (including their own) is of little pertinence to reality.

Extending the frontiers of knowledge is a hackneyed expression of academic discourse, which clearly implies that the territory within the frontiers is conquered and is well known to the practitioners. This is not so in economics where the lapses often show that the practitioners are lost in what

¹⁰ These insubstantial notions have been frequently advanced by prominent writers: ". . . there must be something wrong with an underdeveloped country that does not have foreign exchange difficulties," Gunnar Myrdal, *An International Economy* 270 (1956). In fairness to Professor Myrdal it must be noted that he considers disinterested reasoning in economics to be impossible or even inconceivable. *Id.* at 336.

". . . there is the small capacity to save, resulting from the low level of real income. The low real income is a reflection of low productivity, which in its turn is due largely to the lack of capital. The lack of capital is a result of the small capacity to save, and the circle is complete." Ragnar Nurkse, *Problems of Capital Formation in Under-Developed Countries* 5 (1953).

". . . the general scarcity relative to population of nearly all resources creates a self-perpetuating vicious circle of poverty. Additional capital is necessary to increase output, but poverty itself makes it impossible to carry out the required saving and investment by a voluntary reduction in consumption." Mass. Inst. Technology, Center for Int'l Studies, *The Objectives of United States Economic Assistance Programs* 37 (Senate Sp. Comm. to Study the Foreign Aid Program, 85th Cong., 1st Sess., Comm. Print 1957).

¹¹ Analytical ability, even the most outstanding analytical ability, may be unaccompanied by reflectiveness. Professor Paul A. Samuelson in the second edition of his celebrated textbook adopted the thesis of the vicious circle in its most uncompromising form. "The [backward nations] cannot get their heads above water because their production is so low that they can spare nothing for capital formation by which their standard of living could be raised." *Economics: An Introductory Analysis* 49 (2nd ed. 1951).

should be familiar territory. It is as if our subject were progressing rapidly at its frontiers, while disintegrating or eroding at the centre. This situation makes it difficult to know where we are or whether we are going backwards or forwards. The erosion is taking place at a time when both the subject as a whole and some of its techniques have advanced considerably, and when the claims of economists for their subject have become exceedingly ambitious and their ideas are widely accepted as basis for policy.

2. LIMITATIONS OF THEORETICAL GROWTH MODELS

Criticism of economics both from within and from outside has often been directed at the degree of abstraction and the choice of variables. This criticism has been frequent in discussions of theoretical models of long-term economic growth, and to a lesser extent of macroeconomic models of the behaviour of wages, earnings and prices.¹²

The necessity for abstraction is not in dispute. What needs to be examined are primarily the significance of the variables specified in the models and the inter-relations postulated between them. The principal variables of most growth models are aggregate output, the stock of capital, the rate of saving and investment and the supply of labour. The selection of included variables accords largely with that in the *General Theory* which inspired many of these models.¹³ The major social and personal determinants of economic performance are treated as constants; it follows from this treatment that changes and differences in these determinants, and in the way in which they interact themselves and with the proximate influences behind them, are also disregarded. The determinants and influences so treated include people's at-

¹² Examples include the prominent addresses noted *supra* note 1. Somewhat similar observations have also been put forward even by leading exponents of growth models. Thus Professors F. H. Hahn and R. C. O. Matthews wrote in their celebrated survey article: "While not disparaging the insights that have been gained, we feel that in these areas the point of diminishing returns may have been reached. Nothing is easier than to ring the changes on more and more complicated models, without bringing in any really new ideas and without bringing the theory any nearer to casting light on the causes of the wealth of nations." F. H. Hahn & R. C. O. Matthews, *The Theory of Economic Growth: A Survey*, 74 *Econ. J.* 779, 890 (1964). Perusal of the journals suggests, however, that these warnings have gone unheeded.

¹³ "We take as given the existing skill and quantity of available labour, the existing quality and quantity of available equipment, the existing technique, the degree of competition, intensities of labour, and of the activities of supervision and organisation, as well as the social structure. This does not mean that we assume these factors to be constant; but merely that, in effect and context, we are not considering or taking into account the effects and consequences of *changes* in them." John Maynard Keynes, *The General Theory of Employment, Interest and Money* 245 (1936). It will be remembered that the *General Theory* was concerned primarily with the short term. But it is doubtful whether the factors listed can be appropriately treated as constant even in the analysis of short period fluctuations of industrialised economies. It is certainly inappropriate so to treat them in the context of long-term material progress; they are major determinants of material progress in the long run.

titudes, mores and motivations; the direction and deployment of people's energies, activities and financial resources; geographical and occupational mobility and the range and volume of external contacts. We do not claim to know how important these determinants are in different societies or at different times, but there is no doubt that they are usually significant.

Even in advanced industrial societies the *modus operandi* of the determinants of economic behaviour and performance which are disregarded in these models (in the same sense of not figuring among the included variables) can change appreciably over quite short periods. And such changes can occur as a result of changes in the variables which are included in the models. Similarly policies designed to influence variables included in the models often affect the determinants which are not included. Such considerations apply for instance to the behaviour and expectations of workers and consumers, and the deployment of people's financial assets. These changes in turn affect the productivity both of the labour force and of the stock of capital.

The limitations of formal growth models are much more pronounced when they are thought to explain long-term development; notably when they are intended to serve as bases of policy.¹⁴ Many of these exercises overlook that an economy consists of people whose capacities, attributes and motivations largely determine its performance, and whose needs and requirements economic activity has to satisfy.

Disregard of the personal, social and political determinants of economic performance must be inappropriate in these contexts since changes in them are invariably necessary and often sufficient conditions for material progress, a process in which these factors must be seen as variables which cannot be legitimately treated parametrically or ignored altogether. Moreover the changes in the variables considered by formal theory often induce changes in the excluded factors which can affect the situation or sequence under examination much more than the direct effects of changes in the conventional variables.

The repercussions of changes in variables on factors ignored in conventional analysis or treated parametrically raise issues of much intellectual interest and practical significance. The study of these interactions seems to

¹⁴ The restrictive assumptions of the growth models in the development and planning literature designed to serve as a basis for policy are often left implicit and unspecified. On occasions they are made explicit, as in the following example: "The planning considered is 'technical' in the sense that the planning takes place within technological but not behavioural or financial constraints. Thus, I do not explicitly consider models of autonomous determination of the behaviour of economic agents such as consumers and investors . . . The models considered are aggregate in terms of individuals (consumers, firms). Planning is discussed in terms of total consumption or total production of the various commodities. . . There is no discussion of uncertainty. Indeed, there has been practically no theoretical investigation of uncertainty in economic planning." Roy Radner, Notes on the Theory of Economic Planning 19-20 (1963).

offer a worthwhile extension of the activities of economists. The interactions may differ widely in different contexts but are nevertheless susceptible to observation, analysis and prediction. Once again we do not claim to have the answer in the sense of knowing the *modus operandi* of the determinants of material progress. But this inability does not invalidate criticism of unilluminating methods of analysis and study.¹⁵

Abstract models have helped to direct policies towards the typical included variables, thereby diverting attention from other significant influences. When these models serve as basis for policy (which they often do whatever the intention of those who construct them) the model-builders often act as *terribles simplificateurs*. The projections and policies based on their constructs assume that the social and political determinants of long-term development will not change or at any rate will remain unaffected by the policies.

These models usually consider investment expenditure, the supply of capital goods and the volume of imports among the most significant determinants of development. Measures designed to operate on these factors often greatly affect political and social institutions and administrative behaviour, the direction of people's energies and resources and other excluded factors. The recognition and appreciation of such interactions is indispensable for an assessment of the likely outcome of different policies, especially wider policies, such as the restriction of consumption to finance public investment or to conserve foreign exchange. And it is pertinent also to the choice of instruments for these purposes, for example, the choice between taxes, specific controls or changes in the exchange rate. In assessing the case either for these overall policies, or for one instrument in preference to one of the others, it is necessary to go beyond changes in the familiar variables and consider the probable repercussions on the political climate, on administrative and business conduct, on social and personal attitudes, on occupational and geographical mobility, and on the spread of new ideas, techniques and products. For instance, attempts to restrict imports of consumer goods by specific controls are likely to confer windfall profits on recipients of licenses which are often tantamount to cash gifts and on this ground more likely to exacerbate political tension (especially in multiracial societies), than a corresponding reduction of imports by tariffs. Formal growth models offer no guidance at all on the choice between instruments the repercussions of which differ so greatly. It is not necessarily valid criticism either of economic analysis or of theoretical growth models that the variables whose interrelations they study exclude major determinants of economic situations and sequences and especially of the determinants of long-run material progress. But it is misleading and reprehensible to pretend otherwise.

¹⁵ Ignorance of the cause of cancer is no reason for not exposing a quack.

It is perhaps debatable how far exponents of formal growth models recognise the practical limitations of their constructs or how far they have influenced policy, whether for good or bad. These models are certainly widely regarded as helpful for the framing of economic policy, especially development policy, and their exponents have held and hold influential positions as advisers to governments and to the major international organisations.

3. MATHEMATICAL METHODS: SOME USES AND LIMITATIONS

Much of the criticism of contemporary economics is directed at some results and implications of the rapid spread of mathematical methods.¹⁶ In an important sense such criticisms are surprising. In principle, the development of new methods could be expected to benefit a discipline since it extends its potentialities. Mathematics can enhance the effectiveness of the thought process by enabling us to take short cuts and to see speedily the path of argument. Thus a larger part of a necessarily limited supply of thought can be deployed in areas outside the reach of mathematical methods. These considerations could be expected to apply to the adoption of mathematical methods in economics. The principal phenomena studied by economists include multi-variate functional relationships so that knowledge of mathematics should make it easier to handle them. These methods have often helped economists to specify underlying assumptions and to draw out the implications from constellations of these assumptions.

The prestige of mathematical methods in economics is, at least in part, attributable to their success in providing integrated formal solutions to problems in many branches of economics, for instance, those of constrained maximization and duality. These theories have shown how seemingly different approaches to optimisation are mirror images of one another, and they thereby make it possible to use evidence more extensively and imaginatively in interpreting the optimisation process. And the appeal of these methods is the greater because once the formal solution has been found it can be applied over and over again.¹⁷ This prestige has been enhanced by the spectacular and undisputed success of mathematical methods in the natural sciences, especially physics. The application of mathematics in the physical sciences has contributed greatly both to the understanding of the physical world and also to the solution of practical problems of the greatest significance. The

¹⁶ Some of the remarks about mathematical economics and methods in this article (as in the addresses of Phelps Brown, Leontief and Worswick, *supra* note 1) refer both to mathematical economics and to econometrics, while others refer to one or other of these two disciplines as will be indicated or will be clear from the context.

¹⁷ There are many examples in Robert Dorfman, Paul A. Samuelson & Robert M. Solow, *Linear Programming and Economic Analysis* (1958).

successes of mathematical methods especially in the natural sciences, have generated great expectations about its potentialities both for the understanding of the economic world and for the solution of practical economic problems.

The high claims for mathematical methods take insufficient notice both of the distinctive, but nevertheless limited character of the achievements of mathematics in economics, and also of the incomplete nature of the analogy with the physical sciences. It seems convenient to deal with the latter consideration first. The rules of logic apply equally in the natural sciences and the social sciences, but the appropriate methods of study differ. This is so ultimately because the social sciences deal with a changing world and the natural sciences, especially the non-life sciences, with those components of reality which are unchanging. This distinction is pertinent to the potentiality of the fruitful application of mathematics in social study. And the difference is most prominent between economic processes and the phenomena studied by physics and physical chemistry, that is, the disciplines in which the application of mathematics has been outstandingly successful. The characteristics of economic processes pertinent in this context include the multiplicity of past and current factors influencing economic phenomena; the instability of the parameters; the changing interaction of specified variables with the factors treated parametrically; the differing and varying lags both in the responses of variables to changes in other variables or in the parameters; the frequency of unpredictable external shocks; and the limited scope for experiment. Again, in economic life the outcome of a change in variables is often much affected by the manner in which the change is brought about; this complication is either absent or less pronounced in relationships studied by the natural sciences, and especially the non-life sciences.¹⁸ Furthermore, economics deals with the conduct of agents who react with perception to information and events, which is absent in the non-life sciences and applies to a much lesser extent in the life-sciences, especially in the contexts where mathematics has been effectively used.

These characteristics of many economic phenomena and sequences set evident problems for the establishment of firm propositions of generality and depth, notably in the establishment of the numerical values of functional relationships. And even when regularities or numerical values have been established they may not and often do not hold elsewhere or at other times. Whether they do or do not can be established only by observation, often by

¹⁸ The appropriateness and limits of the applicability of the methods of natural science to the study of society has, of course, been much discussed in familiar and readily accessible publications. Attention may, however, be drawn to an illuminating article, relatively little known to economists, by Michael J. Moravesik, *Scientists in Politics—And Out*, *Bull. of Atomic Scientists*, January 1966, at 32. There are also some penetrating observations on this subject in Sir Peter Medawar's *The Art of the Soluble* (1967).

direct observation and reflection. And the differing and shifting nature of these factors severely limits the applicability of techniques which have been applied successfully in the invariant phenomena of the physical world. These complexities are not so acute in the application of elementary supply and demand analysis in which wide and firm generalisations can be established and where the application of simple mathematical methods has proved valuable. On the other hand the difficulties are pronounced in the study of the material progress of entire societies for which mathematical methods have proved of little value.

The complexity of many economic phenomena greatly restricts the application of the general scientific desideratum of explaining much by little. This applies in many contexts, notably so in the attempted explanation of long-run material progress. Aptitudes and attitudes, religious beliefs, institutional arrangements, confidence in political and social stability are patently significant influences on economic performance, yet they cannot be readily incorporated in formal models, nor can their often varying interaction with the specified and measured variables. The difficulties presented by this kind of complexity cannot be resolved successfully by augmenting the number of variables in formal models. Increasing the size of the models that include many variables and sectors normally produce results that can be expressed only in the form of a bewildering taxonomy.¹⁹ The frequent conclusion to be drawn from such large and complicated mathematical models is that “anything might happen” depending upon the antecedent conditions and the constellation of assumptions about the values of parameters.

Observation without reflection and analysis cannot inform or explain in economics any more than in any other discipline. But the complexity, instability and local variation of many economic phenomena imply that the establishment or understanding of relationships requires that analysis be supplemented by extensive observation, and also that the enquiry must often extend beyond statistical information to direct observation and use of primary sources. The character of economic phenomena presents difficulties in establishing the appropriate mix between analysis and observation and also between different types of observation. But protracted analysis without frequent recourse to observation is likely to mislead. Hence Marshall’s much-neglected injunction about the importance in economic reasoning of forging many short chains and many single connecting links rather than a few long chains.²⁰

¹⁹ See F. H. Hahn & R. C. O. Matthews, *supra* note 11. An example of the complicated taxonomy that comes from multi-sector growth models even of a fairly simple kind can be seen in Murray C. Kemp & Pham Chi Thanh, On a Class of Growth Models, 34 *Econometrica* 257 (1966).

²⁰ Alfred Marshall, *Principles of Economics* 773 (7th ed. 1916).

The need for direct observation in economics is underlined by the ambiguities of some of the concepts widely used in economics, notably mathematical economics (noted later in this section), while certain difficulties of interpreting phenomena (for reasons to be noted in section 4 below) also underline the need for direct observation. Preoccupation with mathematical methods, including econometrics, has contributed to the neglect of direct observation. Phelps Brown, Leontief and Worswick have all noted the deleterious effects of this neglect.

In certain branches of economics mathematical models provide a framework of reference.²¹ Although they can do no more than rearrange what is put into them, the results of such rearrangements can reveal interesting and unexpected implications of the axioms. And these implications in turn often represent unequivocal solutions to analytical problems of wide applicability. This unequivocal nature of the formal solutions together with their wide applicability, which we have already noted, have encouraged great expectations about the potentialities of these models as major instruments for an understanding of a complex and shifting reality and even for the solution of social and economic problems. But by themselves formal solutions cannot contribute significantly to these objectives. Yet once an intellectual fashion induced by exaggerated expectations or claims gets under way in a non-experimental subject, uninhibited speculation can feed on itself as practitioners are led increasingly to examine each other's models rather than to observe and analyse reality.²²

This inclination is reinforced by the inconclusive nature of most empirical work in economics. The subject offers no scope for the critical, reproducible

²¹ The framework of reference or analytical filing system supplied by these models may help impose a pattern on reality in certain branches of economics. However for this purpose their usefulness is much more limited than that of the familiar taxonomies of natural science. For instance, they are much less rooted in observation; they ignore basic determinants of the phenomena they purport to classify; their concepts, distinctions and categories are frequently vague and unstable; and the classification usually cannot be supported by experiment.

²² Leontief has noted at length this tendency for self-reinforcement in the context of the prestige of mathematical methods and the neglect of direct observation: "Continued preoccupation with imaginary, hypothetical, rather than with observable reality has gradually led to a distortion of the informal valuation scale used in our academic community to access and to rank the scientific performance of its members. Empirical analysis, according to this scale, gets a lower rating than formal mathematical reasoning. Devising a new statistical procedure, however tenuous, that makes it possible to squeeze out one more unknown parameter from a given set of data, is judged a greater scientific achievement than the successful search for additional information that would permit us to measure the magnitude of the same parameter in a less ingenious, but more reliable way. . . . A natural Darwinian feedback operating through selection of academic personnel contributes greatly to the perpetuation of this state of affairs. Thus, it is not surprising that the younger economists, particularly those engaged in teaching and in academic research, seem by now quite content with situations in which they can demonstrate their prowess (and incidentally, advance their careers) by building more and more complicated mathematical models and devising more and more sophisticated methods of statistical inference without ever engaging in empirical research." *Supra* note 1, at 3.

experiment. The data emerging from economic processes are susceptible to widely differing interpretations. Moreover even undisputed interpretations may be of limited validity in time and place. These limitations of empirical work derive from the nature of economic processes and suggest again the need for a diversity of methods for collecting information. These limitations cannot be removed by further refinement of models.

Preoccupation with technique rather than content, and emphasis on mathematical methods rather than observation and reflection have diverted much of economics into directions unrelated to reality. Variables are chosen because of their susceptibility to formal analysis, not for their operational significance. Hence the emphasis in growth models and planning models on such variables as capital-output ratios to the neglect of the personal and social determinants of development which we have already noted.²³ And the result is not the useful abstraction or simplification which reduces complex reality to manageable proportions, but a misleading travesty altogether unrelated to reality.²⁴ Indeed the inferences from some of these exercises are so removed from reality that the situations they assume or suggest are not merely travesties, but fables.

In section 1 above we have noted the profusion of crude lapses of analysis and evidence in serious publications. In some branches of the subject notably development economics and perhaps labour economics and Soviet economics, the neglect of reality has compounded the profusion of crude lapses to bring about a situation so unsatisfactory that these branches of economics may have retrogressed rather than progressed in recent decades.

For instance, in development economics, books published a generation or two ago, such as those by Vera Anstey, Allan McPhee and W. K. Hancock,²⁵ are more informative and of greater predictive usefulness than much of the more recent development literature. This literature is also often less informative and less useful as a guide to policy than many of the publications of anthropologists, economic historians or observers such as Nirad Chaudhuri, Noni Jabavu and V. S. Naipaul²⁶ who actually know the societies they write about. Indeed over a wider area, the fiction of Joseph

²³ The choice of independent variables in many growth models or planning models may have been influenced by the amenability of these variables to the kind of government action favoured by the model maker. But the ease and plausibility with which they can be embodied in formal models has facilitated the emphasis on these variables.

²⁴ As a colleague has said, some exponents of these methods have minds like razors with which they slash the air.

²⁵ Vera Anstey, *The Economic Development of India* (1929); Allan McPhee, *The Economic Revolution in British West Africa* (1926); W. K. Hancock, *Survey of British Commonwealth Affairs: Problems of Economic Policy* (1942).

²⁶ For example, Nirad Chaudhuri, *The Autobiography of an Unknown Indian* (1964); *id.*, *The Continent of Circe* (1965); Noni Jabavu, *Drawn in Colour* (1960); V. S. Naipaul, *An Area of Darkness* (1964).

Conrad, Rudyard Kipling, R. K. Narayan, R. Prawer Jhabvala, and Solzhenitsyn is more informative on many aspects and relations of economic life than the publications of many economists in major branches of the subject. Their fiction is rooted in reality.

Some of the concepts and distinctions extensively employed in mathematical models are ambiguous or altogether vague and capable of widely different and even conflicting interpretation and measurement. This applies, for example, to concepts such as capital-output ratios or investment and consumption or intermediate and final goods. Concepts widely employed in mathematical economics are often given interpretations which differ radically from their accepted use in other contexts, such as exploitation or subsistence consumption. The imprecision applies primarily to references to activities or factors of production rather than to commodities, say to labour, capital, investment or exploitation, rather than to bushels of wheat. Because of the vagueness of these concepts, the rigour and elegance of some of these models are apparent rather than real. Such ambiguities are of course not confined to mathematical economics: witness the widely different interpretations by non-mathematical economists of concepts such as inflation, deflation, investment or full employment. But the use of mathematical methods and symbols suggests precision and rigour which often serves to conceal these limitations or shortcomings.²⁷ This result is regrettable because firm and consistent treatment of concepts and distinctions is an urgent requirement in much of economics, notably macroeconomics and development economics.

The apparatus of mathematical economics has also often served to shield behind a protective facade major lapses of analysis or disregard of evidence or the vagueness of underlying concepts. Some publications with a large mathematical content, which discuss ostensibly sophisticated ideas and models, are vitiated by elementary errors such as the confusion of changes in exports from one country with changes in the total demand for the product, discussion of the balance of payments without considering domestic

²⁷ The imprecision underlying apparently rigorous reasoning has been noted by critics of mathematical economics with impeccable credentials. Keynes wrote in the *General Theory*: "Too large a proportion of recent 'mathematical' economics are mere concoctions, as imprecise as the assumptions they rest on, which allow the author to lose sight of the complexities and interdependencies of the real world in a maze of pretentious and unhelpful symbols." John Maynard Keynes, *supra* note 12, at 298. This observation of Keynes's, and some of George J. Stigler's criticisms of the inappropriate application of mathematics, are well known. See George J. Stigler, *Five Lectures on Economic Problems* (1949). Less familiar are some scathing observations on the subject by Norbert Wiener, the founder of cybernetics, in *God and Golem Inc.*, ch. VII (1964).

The imprecision of some of the concepts of mathematical economics and econometrics, as well as of their application in major contexts are also noted in A. A. Walters, *Production and Cost Functions: An Econometric Survey*, 31 *Econometrica* 1 (1963); and *Incremental Capital-Output Ratios*, 76 *Econ. J.* 818 (1966).

economic policy or rates of exchange, or the adoption of assumptions plainly inappropriate in the context, such as fixed factor proportions in discussions of economic development or a zero elasticity of supply and demand in discussions of foreign exchange availabilities.²⁸

Many of the transgressions are fundamental in the sense that they are inconsistent with the basic ideas of the subject, such as recognition of the limitation of resources, or ignore the simplest facts of life, such as the progress of many individuals or even whole societies from poverty to prosperity. It is as though in the technical literature of geophysics we found discussion of the relative merits of models envisaging the earth as a flat surface, or as a cube or as a cone or as a pyramid; or as if apparently sophisticated biological discussion debated whether children were brought by storks or were to be found under gooseberry bushes or originated in other ways. Pigou claimed it as an advantage of the mathematical method that it acted as a barrier to charlatans.²⁹ He overlooked the possibility that it could provide a protective facade for incompetent or irrelevant analysis. This is a significant danger because much of economics has been reduced to the status of rather simple mathematics requiring little substantial knowledge either of mathematics or of economic life.

Mathematical methods cannot be held directly responsible for the recurrence of the elementary lapses which disfigure so much of economics, many of which are perpetrated by authors innocent of mathematics. But the prestige of these methods and of their practitioners may in various ways have assisted the emergence and survival of some of the lapses. The prestige of mathematical methods has drawn many practitioners into areas which they were not at home. This has induced a sense of insecurity in many economists which in turn has not only placed them at the mercy of intellectual fashion, but has even loosened their grip on fundamentals and blinded them to the pertinence and use of established knowledge and readily available evidence. This influence operates in two directions. Some economists with modest analytical ability or competence in mathematics are drawn into mathematical or quasi-mathematical economics; and some mathematical economists address themselves to practical problems where they ignore many of the basic pertinent issues. Both forms of false position induce intellectual insecurity.

The untoward results noted in the last few paragraphs are often self-perpetuating and cumulative. Preoccupation with elaborate and often esoteric formal analysis not only diverts attention from the determinants of economic events, it often conduces to a neglect of observation, reflection, common sense and even elementary economic theory. In prominent univer-

²⁸ See references *supra* note 1.

²⁹ *Economics in Practice* (1935).

sities renowned for their teaching of advanced methods, we have encountered faculty members and graduate students who do not know that the elasticity of demand is normally different at every point on the demand curve; that taxes on factors in perfectly inelastic supply cannot be shifted; that incomes are usually generated by their recipients rather than extracted from other people; that it is possible for poor people to become prosperous; or that the presence of traders is more likely to reduce than increase seasonal fluctuations in farm prices.

4. ECONOMETRICS AS CORRECTIVE?

The great increase in the volume of statistical material and the development of econometric techniques for analysing such data could have been expected to help to establish the extent and limitations of the empirical validity of the propositions of economics. And indeed there have been conspicuous successes. Familiar instances of the successful application of econometric methods include the important work of Professors Friedman, Solow and Stone.³⁰ It is however notable that much of the illuminating or even seminal work relied on relatively simple statistical methods, albeit used in a sophisticated manner and combined with penetrating economic insights. In recent years econometric (and mathematical) methods have also been applied in historical studies with informative results when used by scholars with extensive knowledge of the background and aware both of the advantages and of the limitations of these methods.³¹ Nor are such successes unexpected since, as we have already noted, development of new techniques can be expected to promote a deeper understanding. However, the progress of this branch of knowledge has not helped to prevent the persistence of simple transgressions by prominent practitioners, nor to expose the limitation of formal model building. Some limitations of econometrics in these contexts have been emphasized by Phelps Brown, Leontief, and Worswick.

An important technical reason for the limitations of econometrics warrants examination. There are significant differences between the phenomena and problems to which statisticians outside the social sciences have addressed themselves and the studies of econometricians. Economists and econometricians cannot normally work with experimental data such as formed the basis of classical statistical works, notably R. A. Fisher's *Statistical Methods for Research Workers* and *The Design of Experiments*.³² The

³⁰ For instance, Milton Friedman, *A Theory of the Consumption Function* (Nat'l Bureau Econ. Res. 1957); Robert M. Solow, *Technical Change and the Aggregate Production Function*, 39 *Rev. Econ. Stat.* 312 (1957); and Richard Stone, *The Measurement of Consumers' Expenditure and Behaviour in the United Kingdom, 1920-1938* (1954).

³¹ An illuminating example is R. W. Fogel & S. H. Engelman, *Time on the Cross* (1973).

³² *Statistical Methods for Research Workers* (1925); *The Design of Experiments* (1935).

interpretation of statistical tests of economic theories should recognise that the data originated in social processes, especially market processes, rather than in reproducible experiments with the invariant aspects of natural phenomena.

The use of the multiple correlation coefficient (R^2) as a measure of the "success" of a theory provides an example of the need for care in this general context. Students of econometrics are habitually warned that high correlations may be spurious in that a high R^2 does not establish a functional relationship. It is less well known, however, that a low correlation coefficient may also be spurious. For instance it may reflect evident problems presented by the swamping of a functional relationship by other influences, problems which may be intractable in particular cases. But in econometrics there are often other reasons. Spuriously low R^2 may arise, for instance, from a cross section sample. Thus a set of observations of households will reflect the particular characteristics associated with each household, and the variation of those characteristics will be reflected in high sampling errors and low R^2 of the estimated regressions.³³ It would be misleading to interpret the value of R^2 as though it were the sort of result normally obtained in the natural sciences.³⁴ Thus in econometric analysis even with a large sample, a low R^2 does not negate the predictive value of a theory specifying postulated relationships between stipulated variables. Analysis of variance applied to experimental data or to the invariant aspects of natural phenomena does not normally encounter such difficulties in establishing functional relationships: the appropriate inference from the value of R^2 is different in a natural science and social studies.³⁵ The difficulties of valid statistical inferences are exacerbated by the non-quantifiable character of major determinants of economic processes.

These considerations suggest the need for reliance on historical analysis and detailed examination of situations and processes.³⁶ The rise and prestige

³³ Increasing the size of sample does not diminish that part of the estimated standard error of the regression coefficient which reflects the presence of these particular characteristics of each cross-section observation.

³⁴ The presence of such characteristics may be classified as a misspecification of the model. The difficulty could be overcome in principle by introducing additional variables. But the distinction between errors of specification and random errors is critical, and it affects much of the information available to economists and econometricians. It is worth recalling that the writings of R. A. Fisher, *supra* note 31, as of other pioneers of modern statistical practices, were intended primarily for the use of research workers in the life sciences rather than for economists or other students of society.

³⁵ The significant difference in meaning of the results of the analysis of variance in the natural sciences and in social studies is examined in A. A. Walters, *An Introduction to Econometrics* (1968).

³⁶ This necessity has been explicitly recognised by a master of contemporary economics who has relied extensively on quantitative methods. In their discussion of the Great Contraction, Milton Friedman and Anna Jacobson Schwartz argue that the death of Benjamin Strong had

of econometrics has to some extent obscured the need for these procedures. They have also contributed to the confusion of an important truth and a misleading idea: the valid and pertinent idea that knowledge of magnitudes is an important tool of the trade of economists and the misleading notion that the most significant factors are those which can be quantified readily, or at any rate, plausibly.

Inappropriate preoccupation with the quantifiable may also account for the frequent oversight by economists, noted by Worswick, that many familiar quantities in economics which look like physical quantities are proxies for values or utilities. This pertinent consideration is ignored, for example, in the all-too-familiar discussions in which phenomenal rates of recorded growth are noted without a reference to the usefulness of the output of the economy.³⁷ And this preoccupation with the quantifiable often encourages indiscriminate collection and amassing of statistics of little significance, interest or even meaning, and often subject to wide margins of error. The belief that econometric methods, especially esoteric ones, are useful for the establishment of functional relationships encourages the assembly of a mass of uninformative material and its ostensibly sophisticated manipulation. The assiduous search for relationships which exhibit high correlations will certainly ensure that many are found irrespective of whether a functional relationship exists. Such practices are not new nor are they confined to econometrics; but the prestige of econometrics and of computer techniques has endowed them with undeserved respectability.

The prestige of econometrics has probably contributed to the widespread tendency to forget that in social study quantification is often, perhaps even generally, meaningless without going behind the figures. This applies to almost all phenomena investigated by economists. The meaning of poverty; the volume of unemployment; the significance and value of public expenditure; the interpretation of changes in export earnings; the implications of indebtedness; all depend on information which requires some knowledge of the background to the figures.

The methods of econometrics usually assume that the variables are measured accurately and without error in the technical sense. The disturbance

important and far-reaching consequences in deepening the depression, *A Monetary History of the United States 1867-1960*, 414 (1963).

³⁷ There are many other important non-quantifiable dimensions of economic facts relevant to an understanding of the situation or the framing of policy. For instance, growth in conventionally measured aggregate output may be secured at the cost of substantial inflation which causes widespread anguish or provokes social tension (which are not likely to be assuaged by the notion that in some unspecified way the losers from inflation could in principle be compensated out of the additional output). Again, the dependence of producers on a particular product cannot readily be inferred from simple statistics such as those of the proportion of their income derived from it, because this dependence is much affected by the ease with which they can transfer to another activity.

usually enters only into the equations and not into the measured variables. Yet it is often true that the basic concepts are imprecise in two radically different senses. First the statistical measurement is unreliable. Second and more important, some of the familiar empirical correlates used are vague in that they carry different meanings in different contexts. Examples include investment, a concept which may refer to expenditure designed to increase money demand; or to the output of certain types of goods; or to all changes increasing the productivity of resources. Even aggregate output has a number of quite different meanings. Because of this vagueness of the concepts apparently similar exercises may have quite different substantive content. Yet the technical apparatus often conceals the underlying imprecision or vagueness and suggests misleading ideas of the consistency, precision and scientific nature of these procedures.

Such criticisms apply to macroeconomic regression models of LDCs.³⁸ They apply also to large econometric models of developed economies, the focus of so much effort in recent years. The size of these latter models inhibits effective criticism. Very few people can test large econometric models such as the FRB-MIT-Penn model of the behaviour of the United States economy, or even the more modest models such as that of the London Business School. Large sums of money are needed for the necessary runs; and in addition much time is required to enable a critic to assimilate all the peculiarities of the model. The sheer size of some of these models makes it very difficult to *understand* the nature of the system being investigated. Effects may be produced which are inconsistent with common observation or indeed with common sense. But it is difficult to trace the true source of such paradoxes. Moreover, misleading results may be hidden in the equations and remain unrecognised for a long time.³⁹

Preoccupation with econometrics has diverted attention from the close observation which is often indispensable for an understanding of particular situations and processes. This preoccupation also makes it easier plausibly to dismiss criticism as mere casual empiricism even if it is soundly based on observation and analysis.

Insistence on the value of close direct observation and reflection should not be mistaken for advocacy of the anecdotal approach. Their relevance can be illustrated simply. Econometric studies involving international data

³⁸ See Arun Shourie, *The Use of Macro-economic Regression Models of Developing Countries for Forecasts and Policy Prescription*, 24 *Oxford Econ. Papers* 1 (n.s. 1972).

³⁹ An instructive example is provided by the results of the tests carried out by Arnold Zellner and Stephen C. Peck on the FRB-MIT-Penn model. When the model was subjected to conditions of a major slump it was found to perform in most peculiar ways. Cf. Arnold Zellner & Stephen C. Peck, *Simulation Experiments with a Quarterly Macroeconomic Model of the United States Economy*, in *Australasian Conf. of Econometricians, Econometric Studies of Macro and Monetary Relations* 149 (Alan A. Powell & Ross A. Williams eds. 1973).

often include *per capita* national income of LDCs among the variables. However, Dan Usher has shown convincingly, on the basis both of direct evidence and of general analytical reasoning stimulated by it, that because of various substantial biases estimates of *per capita* income in LDCs and therefore international comparisons involving these estimates are subject to margins of error of several hundred per cent.⁴⁰ Because of these biases econometric studies relying on *per capita* incomes of LDCs issue in misleading or even spurious results. Yet such studies proliferate years after the publication of Usher's results and often purporting to estimate the national income of LDCs to within one or two percentage points. The nature of these distortions is such that the results of econometric studies employing data of per capita incomes, or of changes in them, are grossly misleading or even spurious. Again, the percentage of the labour force employed in manufacturing industry (or the percentage of the national income generated in it) is sometimes used as a measure of the level of economic development. Yet from detailed knowledge of particular less developed countries it is evident that the underlying official statistics cannot bear the weight even of simple statistical analysis, since statistics of occupational distribution are heavily affected by the extent and stability of occupational specialisation. Those who have no direct experience of the phenomena which form the subject of their enquiries, that is people who in a literal sense do not know what they are talking about, often cannot assess the meaning of the data in their studies. Their preconceptions prevent the intrusion of reality.

Direct observation and proper use of primary and near primary sources are always helpful and often indispensable. For instance, such methods are necessary for an appreciation of the impact of external contacts on attitudes and mores, and the effects of different economic policies on the social and political climate. Again, wide differences in economic performance between religious and ethnic groups are not shown in official statistics and are apt to be ignored in the absence of direct observation. The limitations of occupational statistics in conditions of incomplete specialisation are again likely to be overlooked by those who by choice or necessity rely solely on statistical information. In many official statistics and reports of less developed countries, trading is ignored, or is dismissed as insignificant when in fact a very

⁴⁰ Some of Usher's observations are especially pertinent in our context: "In Thailand I saw a people not prosperous by European standards but obviously enjoying a standard of living well above the bare requirements of subsistence. Many village communities seemed to have attained a standard of material comfort at least as high as that of slum dwellers in England or America. But at my desk I *computed* statistics of real national income showing people of underdeveloped countries including Thailand to be desperately if not impossibly poor. The *contrast between what I saw and what I measured* was so great that I came to believe that there must be some large and fundamental bias in the way income statistics are compiled." Dan Usher, *The Price Mechanism and the Meaning of National Income Statistics* (1968) at xi (*Italics added*).

large volume of such activity is manifest from direct observation, and indeed from statistics other than those of occupational distribution.⁴¹ The acceptance of these official statistics of occupational distribution by economists who have visited these countries suggests that the faculties of direct observation and reflection have been atrophied by neglect.

5. CONCLUDING OBSERVATIONS

Our subject is clearly not stagnating, but is certainly in a state of confusion. Solid and substantial advances exist side by side with crude lapses which reflect disregard of elementary concepts and ideas of economics, or of available empirical evidence, or both. We find a profusion of exercises for which informative value or operational significance is claimed, but which are nevertheless misleading because the major determinants of the situation have been ignored together with the repercussions of changes in the included variables on these determinants. We have seen that the extensive application of mathematics and the advance of econometrics has not served to prevent the neglect of elementary analysis or obvious evidence. Indeed, elaborate techniques have often provided a protective screen for simple transgressions, inappropriate methods and loose terminology. But of course such lapses also occur in the writings of non-mathematical economists, or outside the context of mathematical economics.

Unwarranted expectations of the practical potentialities of economics have helped to encourage the rapid expansion of both the number of economists, and their publications. Rapid expansion in turn gives rise to problems of quality control, notably in exposing shortcomings. The vast expansion has much increased the difficulty of effective exposure even of ubiquitous simple lapses, because those responsible for them may remain genuinely unaware of the criticisms, and can in any case safely ignore them.⁴² These difficulties are especially pronounced in social studies, where the complexity of the material and the virtual impossibility of experiment precludes the establishment of immediate and vivid distinction between the valid and the false. And the difficulties are exacerbated even further by the widespread confusion between advancement of knowledge and promotion of

⁴¹ Economists at times imply that their reasoning relies on observation when the evidence adduced in support of this reasoning is fictitious, or even fabulous, again in the literal sense of this term. An illuminating and instructive article by Steven N. S. Cheung, *The Fable of the Bees*, 16 *J. Law & Econ.* 11 (1973), presents an excellent critique of the practice of some economists, including some of the most distinguished, to think up lively fables unrelated to real life, which nevertheless suggest that they are related to reality. As Cheung observes, these fables often carry far-reaching suggestions or implications for policy.

⁴² Compare, for instance, the continued reliance on conventional national economic estimates of less developed countries, many years after the exposure of their defects by Usher, which we noted *supra* note 40.

policy. This confusion has been evident in the publications of many economists in recent decades, and has had untoward results. For instance, when economists speak or write on policy, particularly for a wider audience (as in official reports) woolly or dubious statements can be rationalised by the need for unanimity, or awareness of political or administrative constraints, or by the over-riding presence of political objectives. Conversely, their exposure can be brushed aside as reflecting mere political differences. The cumulative effects of these various factors present great difficulties in establishing effective methods of filtering. Indeed, the difficulties of effective filtering are not surprising in view of the wide disagreements among economists on the objectives and methods of economic study, as well as on some fundamentals of the subject.

Attribution of responsibility for the recurrence of elementary lapses and of inappropriate methods of enquiry is necessarily somewhat conjectural. However, it seems to us that the subordination of the pursuit of knowledge to political and personal ends, failure to recognise the limitations both of the subject as a whole and of some of its methods, neglect of direct observation, a lack of reflection, and the rapid expansion of the subject, have all contributed to the confused and perplexing state of economics.