

# TINBERGEN AND THE “BLURRING” OF THE HUMAN CAPITAL PARADIGM: A REVIEW

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Today, most economists would agree that human capital theory has become the “normal science” (in Kuhn’s sense<sup>1</sup>) of earnings behaviour. Textbooks in fields as diverse as labour and development economics apply its approach, conferences assemble its wisdom and articles in learned journals explore intricate theoretical subtleties within its framework. Even anomalies which are as painfully apparent to highly educated college professors as their own declining real incomes (both absolutely and relatively to less-educated groups) find explanations—perhaps somewhat forced—within the paradigm. Still, all is not static in economic thought and although one cannot really say that for most practitioners a paradigmatic “crisis” exists—in the sense that fairly large numbers of people believe that the theory is not adequately coping—the strain of “anomalies”<sup>2</sup> has led to the emergence of such alternative approaches as the “screening” models of Arrow, Spence, *et al.*<sup>3</sup>

Kuhn has maintained that “all (paradigmatic) crises begin with the blurring of a paradigm and the consequent loosening of the rules for normal research”<sup>4</sup> and I think it is in this light that Professor Tinbergen’s new book *Income Distribution Analysis and Policies*, which is really a synthesis of a number of previously published articles of the last five years and a continuation of an approach dating at least to his 1956 article in *Weltwirtschaftliches Archiv*,<sup>5</sup> should be viewed. Not that more was not intended. Tinbergen himself differentiates his approach as a separate school of thought from the human capital school (p. 4) and when a writer of his stature undertakes to deal not only with the questions of how income inequality can be explained and reduced but what aims *should* be pursued in dealing with it, then one must expect his viewpoint to have some impact.

The book begins with a survey of income distribution in developed countries in which several measures of inequality are compared in the cross-section and (to the

<sup>1</sup>T. S. Kuhn, *The Structure of Scientific Revolutions* (second edition), University of Chicago Press, 1970.

<sup>2</sup>To be less flippant, one can point to such findings as the *negative* partial relation between educational dispersion and earnings dispersion at the U.S. local labour market level—see L. S. Osberg, *A Structural Approach to the Distributions of Earnings*, Ph.D. dissertation, Yale, 1975.

<sup>3</sup>K. J. Arrow, “Higher Education as a Filter,” *Journal of Public Economics*, July 1973; M. Spence, “Job Market Signalling,” *Quarterly Journal of Economics*, August 1973; J. E. Stiglitz, “The Theory of ‘Screening,’ Education and the Distribution of Income,” *American Economic Review*, June 1975, p. 283.

<sup>4</sup>T. S. Kuhn, *op. cit.*, p. 84.

<sup>5</sup>J. Tinbergen, “On the Theory of Income Distribution,” *Weltwirtschaftliches Archiv*, 1956, p. 155.

extent the data permit) over time. The main conclusion drawn is that strong trends to decreased inequality exist in income post-tax and after redistribution. Chapter Three discusses the relationship found between the distributions of education and income in the work of Chiswick, Schultz, *et al.* and introduces, for Netherlands data, an index of demand for, as well as supply of, education. The heart of the volume begins, however, in Chapter Four with the specification (and some tests) of a utility function for individuals which depends on individual income and education—such a specification will be required to give content to the social welfare functions and the discussions of optimal and equitable income distributions of Chapters Seven and Eight.

The model is closed in Chapter Five with the estimation of a Cobb–Douglas production function using education types as inputs. In a static sense this estimation enables the calculation of optimal redistributive policies by maximization of a social welfare function (the aggregate of individual utilities) subject to the constraint of aggregate production. Chapter Six, however, also explores the race between the changing demands of technological development for education and current trends in its supply. The volume concludes with a discussion of desirable policy alternatives.

In his mixture of the positive and heretofore-considered-normative Tinbergen breaks new ground (or, rather, returns to something quite close to the original Benthamite position) as he not only formulates and “tests” explicit individual utility functions but also uses them to calculate an “optimal” distribution of income. This aspect of the work is the one likely to have the least impact on the profession as the entrenched position of an ordinalist, non-interpersonally-comparable approach to utility theory and the compression of the entire work into 158 pages virtually ensures that “It would not be difficult . . . to write a convincing and killing critique and many such reviews will be written” (p. 150). The main value, to me, of Tinbergen’s book lies in his forceful exposition of the proposition that the human capital approach, which outlines the considerations governing the acquisition and supply of human capital by individual economic agents, requires supplementation by a theory of the demand for human capital if it is to provide a comprehensive theory of the distribution of earnings. Furthermore, Tinbergen proposes that policies with respect to technological research and industrial structure should be developed with explicit consideration of their income distributional effects—a proposal that calls for economic research on inequality quite different from most that is done today.

The similarities of Tinbergen’s approach to that of human capital theorists include a complete disregard of the labour market “screening” literature or the “queuing” approach of writers such as Thurow.<sup>6</sup> Tinbergen uses years of schooling completed as a sufficient statistic for labour market characteristics—not even age or experience intrudes—and views labour allocation as a process whereby jobs which require  $X$  years of schooling are filled by people with that many, or almost that many, years of schooling (the latter eventuality entailing lower labour productivity). Just as in the human capital literature education is

<sup>6</sup>See L. C. Thurow, *The American Distribution of Income: A Structural Problem*, U.S. Congress, Joint Economic Committee, 1972.

viewed as an addition to the actual productive capacity of individuals (rather than as a rationing device) and all varieties of education are seen as identical in their effect on productivity. The collapsing of years of schooling into three discrete groups further simplifies the model, to the point of almost straining one's credibility as to how much of the real functioning of labour markets can be captured in a model with such limited informational content.

Years of schooling and income are also the only variables allowed to enter the utility functions of households. Few people would query the inclusion of income but many will find unconvincing Tinbergen's assertion that utility is a negative function not only of the level of education "required" for the household head's job but also of the square of the discrepancy between actual and "required" education. The former proposition is not specified *a priori*—it falls out of the "testing" procedure to be discussed below and could conceivably be positive—but the latter is. Some might protest that they can think of many maladies worse than the psychic strain of earning the same as higher (or lower) educated people but Tinbergen not only specifies the same functional form for all utility functions but in addition requires that all households have the same coefficient values. This enables specific statements to be made about the "optimal" and "equitable" (which are the same in this formulation) distributions of utilities but one must protest that this specification is not "the mathematical expression of 'fundamental equality,'" (p. 129) of individuals; it is a statement of identity. A belief in the moral equivalence of individuals for income distribution purposes in no way implies a belief in the identity of their tastes—nor does the converse hold.

Furthermore, the idea that a certain level of education can be "required" for a job when many workers with less education are always actually working in it is not really very satisfying intuitively but it turns out that what is meant is that people of given education have a certain productivity in a given level of jobs and a greater productivity (but still less than more educated workers) in a higher level of jobs (p. 86). Since the "required" education for social groups is simply the upper quartile of the education distribution of its members (p. 77), Tinbergen's discretization (p. 81) of the labour inputs of a Cobb–Douglas-like production function should not make human capital theorists too unhappy. The reason for such a production function, of course, is to close the model and provide a specification of production as well as consumption.

Again the ambition of the undertaking is gigantic but many are the groups who will pause at various points in the text. Labour economists may be unhappy that variability in labour supply is not allowed to explain any of the distribution process—all workers are assumed to be employed full time at standard hours (p. 60). Neither is education an individual decision variable (p. 59) and the whole question of ensuring adequate labour supply under an optimal distribution régime is simply begged. Educational planners may question the "optimality" of educational policies to maximize social welfare which omit mention (p. 118) of the costs of providing increased education. Statisticians may point out that in practice the measure of inequality used is the ratio of college graduate to non-graduate salaries and that the theory of the book really concerns the distribution of labour earnings whereas the statistics used almost all concern the distribution of income. They may also protest that it is really too cavalier to dismiss income inequality as

being “mostly” inequality of earnings. Socialists will, however, cheer when Tinbergen concludes in one example that because the “optimal” taxes on labour incomes<sup>7</sup> (as derived from a maximization of the sum of cardinal utilities constrained by the above-mentioned Cobb–Douglas-like production function) are negative for *all* social groups (p. 122) the source of these taxes must be precisely this capital income. The capitalistically-minded will, however, note Tinbergen’s warning (p. 31) on the instability of many of his regression coefficients (due to multicollinearity) and point to such theoretical difficulties as the fact that people of equal education (about whom nothing else is assumed to be known) are earning in a market context at two different wage rates (p. 109). Democrats of all types will also be unhappy that when Tinbergen introduces into his specification of utility functions (because his original formulation “had to be rejected” for Netherlands data) a variable for “the ability to make independent decisions” and then obtains insignificant regression coefficients he chooses to conclude (p. 67) that this ability “is a personal parameter rather than a job variable” (but this variable disappears later on).

It is a flawed work and nowhere more so than in its test of the specification of utility functions. Clearly an assertion of the comparability and cardinality of utilities is of the greatest importance and, if true, could save us all a lot of bother in applying economic policies. The “instruments of observation” used by Tinbergen are, however, the same as those used by early human capital writers—i.e., aggregative data on occupational and educational distributions—and seem inadequate to their expanded tasks. Complex, and questionable, methods of interpolation are used to associate the one distribution with the other but surely, since utility functions pertain to individuals, a more straightforward test would have focussed on data on individuals. Micro-data on individuals and households would seem to enable not only more elegant tests of Tinbergen’s basic hypothesis of cardinality but also the possibility of expanding and making more credible its specification. As it stands assumptions are made such as “that the main nonfarm occupational groups placed in the order of their average incomes, require the education, in terms of school years completed, indicated in the left-hand column” (p. 68). The intra-occupational dispersion of education and income, which we know to be substantial,<sup>8</sup> is simply lost. With so many and such strong “technical” assumptions one becomes dubious as to the succeeding “verification” and such statements as “the disutility of work requiring one more year of education is half as large for the average Dutchman as for the man from Illinois” (p. 72).

<sup>7</sup>Tinbergen views income taxes as definitely second-best measures relative to a lump-sum abilities tax—the level of which is to be set by “psychotechnical testing.” He makes a strong plea for the development of such testing methods but I think (and profoundly hope) that this brave new world is cons away. Despite its many deficiencies, our current economic system does offer individuals the freedom *not* to maximize their earnings stream (in a monetary sense) if they so wish. One *has the option* of idealistic poverty but if Tinbergen’s abilities tax were to be enforced one would have little choice but to sell one’s services to the highest bidding employer—and Schweitzer could never have gone to Lambarene if he had had to pay off Tinbergen’s abilities tax. Individual freedom has always been used as a justification for capitalistic or mixed economies and it seems to me that this sort of measure, if enforceable, would considerably reduce the choice sets of a good number of people.

<sup>8</sup>H. Lydall, *The Structure of Earnings*, p. 104; also Jenks *et al.*, *Inequality: A Reassessment of the Effects of Family and Schooling in America*, Basic Books, pp. 226–229.

The flaws of this section should not blind one, however, to Tinbergen's contributions in emphasizing the demand for as well as the supply of skills. My own research indicates that the structure of production at the local level (as represented by the proportions of employment in groupings of 2-digit S.I.C. categories) is a significant determinant of earnings inequality at that level.<sup>9</sup> At the national level Tinbergen uses much more aggregated measures (i.e., total in manufacturing and total in agriculture) as explanatory variables in cross-section analyses of income distribution. (He also finds unambiguously that more education decreases inequality—at the local level I could only part of the time find this effect and generally found industrial structure variables to explain more of the variations in extent of inequality.) Tinbergen uses an aggregative, almost Cobb–Douglas production function in computing his “optimal” income distribution but he also makes a strong plea for research on the impact of types of technological development on inequality. It is this sort of research, on demand factors and the impact of the structure of economic production on inequality, which could well “blur” the human capital paradigm in the sense used by Kuhn.

Although I think that the most lasting impact of Tinbergen's work will lie in a broadening of the type of research done on income distribution, a broadening which may both expose more “anomalies” of the existing paradigm and provide part of the basis for the elaboration of its successor, still this was not the intended purpose. Tinbergen feels that the current inflation of Western countries is, to a considerable extent, cost-push inflation and dissatisfaction over distribution is its underlying cause. He sees the only sensible way out of the maelstrom of social groups pushing, shoving and striking for larger shares as an agreement on “some more objective yardstick for the future distribution” (p. 136). His book is intended to contribute to both an awareness of the history of income distribution and to providing an ethical principle for a consensus on acceptable inequality. For the former, serious questioning can be made of his assertion of an ‘almost monotonous reduction in inequality’ in the last twenty years. For the latter, his aim of a more precise definition of equity (to give content to which is the reason for his specification of cardinal utility functions) is achieved only to the extent that those utility functions are credible. Furthermore, it is difficult to believe that we can optimize something as central to society as income distribution without profoundly altering other social institutions, and considerations of the broader social order were excluded from the start. For the principle, and the knowledge, that will painlessly resolve the economic conflicts of our current society we will have to wait.

<sup>9</sup>L. S. Osberg, *op. cit.*, Chapter 5.



## ERRATA

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The following corrections should be made:

p. 273, formula (5,1), in place of "Y" insert "I"

p. 277, line 8 should read:

factor productivity might not be commensurate with distortions in  
valuations of