

## Welfare Economics and Income Distribution



Jan Tinbergen

*The American Economic Review*, Vol. 47, No. 2, Papers and Proceedings of the Sixty-eighth Annual Meeting of the American Economic Association. (May, 1957), pp. 490-503.

Stable URL:

<http://links.jstor.org/sici?sici=0002-8282%28195705%2947%3A2%3C490%3AWEAID%3E2.0.CO%3B2-3>

*The American Economic Review* is currently published by American Economic Association.

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/about/terms.html>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/journals/aea.html>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

---

JSTOR is an independent not-for-profit organization dedicated to creating and preserving a digital archive of scholarly journals. For more information regarding JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

# WELFARE ECONOMICS AND INCOME DISTRIBUTION\*

By JAN TINBERGEN

*Harvard University and Netherlands School of Economics*

## *I. Another Critique of Welfare Economics*

The main problem welfare economics deals with may be formulated as follows: What conditions have to be fulfilled by a community of individuals in order to make its welfare a maximum? Welfare economics thus has to be conceived of as a theory of economic policy searching for some "optimum regime." If it had been successful, it should have had considerable influence on practical political thought, comparable to the influence exerted by the natural sciences on technology or by certain statistical methods on quality control. But welfare economics has not been successful in this sense. As far as results have been obtained, these are little known outside a small group of experts; and not many results of practical relevance have been obtained. Let me illustrate these two statements. Take the proposition that "under certain conditions free pricing leads to a maximum total product." The conditions referred to are not too familiar to many politicians. These conditions, as far as our present knowledge goes, are fairly strict, as you know. They are: (a) The factors of production have to be as fully used as is technically possible; (b) prices should be equal to marginal costs; (c) productivity should not depend on consumption of the individual producer nor on the distribution of consumption; (d) there should be no external economies between independent producing units.

Total product is not a sufficient measure of welfare, and this constitutes another serious limitation on the proposition. In order to prove the proposition we have to interpret the "product" as the value at free trade prices of the quantities produced of different commodities. For separate sectors or countries the buying power of their product has to be calculated by dividing its value by the price level of the goods they buy. With product a maximum its buying power need not be. Moreover, the distribution of the product or income between individuals is a major factor in welfare, which, in addition, may influence total product. Welfare hence need not be at a maximum with production or its buying power at a maximum. All these results of welfare economics are in fact seldom recognized. Lack of knowledge among politicians about welfare

\* Address presented at the joint meeting of the American Economic Association and the Econometric Society, December 28, 1956.

economics may also be illustrated by the misunderstanding, often prevailing, that a corollary of free pricing should be the absence of income transfers—either between individuals or between countries.

Apart from being badly understood, the results of welfare economics are not very relevant to practical economic policy either. Some of the most important practical issues of economic policy have to be dealt with without any help from welfare economics. This is particularly true for Europe. Ever since the now leading political party in northern Europe came into existence—I mean the Social-Democratic Party—the practical issue of income distribution has been problem number one, often linked up with goals of social justice. The importance of this issue is by no means restricted to northern Europe; in southern Europe as well and, in fact, in the world at large, it is now coming into the limelight.

The contribution of welfare economics to this problem has been wholly negative. The distribution of incomes between individuals, though investigated statistically since Vilfredo Pareto, usually is not even treated in textbooks on economics. About the factors making for this distribution—believed to have shown remarkable regularities—and hence about the ways it could be influenced, very little has so far been done. On the contrary, one would almost say, welfare economics has tended to deny that the problem of distribution makes sense. By the doctrine of the impossibility of interpersonal comparison of utility, it is implied that the concept of justice cannot be given a precise meaning.

If this critique of welfare economics—not the first one, as you know—is justified, we have to accept the consequences. It is my contention that something can be done. I propose to give an outline of what welfare economics could do about this problem of income distribution and social justice. The two subjects have a different character. An attempt at constructing a theory of income distribution has to be seen as an essay in economic theory. In trying to define the concept of social justice, one may have to leave the realm of scientific activity. Sometimes excursions into adjacent territories are useful, however.

## II. *Income Distribution within One Nation; Attributes of Individuals and "Jobs"*

When trying to explain the main characteristics of income distribution, we shall have to distinguish between distribution within one nation—where factors can move more freely—and income distribution between nations—where such freedom is far more restricted. Let us first consider how incomes within one nation are generated. Essentially we have to think of the markets for productive effort as the scene where

these incomes are formed. These markets so far usually have been subdivided into the labor, capital, and land markets, with little attention given, at least in general economic texts, to the finer subdivisions and the individual endowments of such factors. The separation into capital, labor, and land markets seems to be less relevant to start with than a splitting up of the whole complex into a large number of finer compartments, each of which is more homogeneous. Each individual supplying productive services may then be characterized by a certain number of endowments, such as a certain intelligence quotient, a certain ability to deal with other people, a certain physical strength, a certain endowment with capital or land—this last being zero for most people in most countries. The total number of such attributes may be put as high as thirty in some more refined job evaluation schemes, but probably an adequate description can also be obtained already with only three or four of them. From figures published by the U.S. Employment Services, one gets the impression that many of the eight to twelve attributes studied in a sample survey of the American people are highly intercorrelated. This made it possible for Mr. R. H. Tuck<sup>1</sup> even to try to explain income distribution by one single attribute: the ability to supervise other people. Whatever the number of attributes, we will have to distinguish between this number and their nature, on the one hand, and the degree to which a certain attribute is present with a certain individual, on the other hand. It is these degrees, or if you prefer, scores, which describe a certain individual; all individuals having about the same scores are put together in a frequency class interval. The productive population of the nation may thus be described by a multidimensional frequency distribution of their scores or degrees. One of my examples will be a two-dimensional frequency distribution. It represents the supply side of the complex of markets for productive effort.

The demand side of this complex of markets may also be characterized by a frequency distribution. The organizers of the country's production process conceive of a number of "jobs" they want to be filled. Job has to be taken in a generalized way so as to include, say, a houseowner or even a rentier. These jobs can be identified by their job evaluation marks, each of them corresponding to one of the scores of the individuals. In order to distinguish between them, we will speak of the "scores required" versus the "scores present" with the population.

### III. *Variability of Attributes*

At any given moment all these scores may be said to be given. This does not mean that they are constant in time or cannot be influenced.

<sup>1</sup> *An Essay on the Economic Theory of Rank* (Oxford, 1954).

A few remarks have to be made about their variability. First, during each individual's life there will be a certain development, as a consequence of his growing experience, in his abilities. This process, although essentially dependent on the jobs taken by the individual, may, as a first approximation, be considered to depend on the age of the individual. Next, there is the influence that can be exerted by various processes of deliberate education. In both processes there is scope for making a distinction between attributes that can be changed more or less easily. Some examples are: (*a*) the speed of work, that may almost instantaneously be influenced by appropriate stimuli in wage systems; (*b*) certain frequently wanted skills of a simple nature, for which education of a few months may be sufficient; (*c*) such attributes as require from a few to several years of school or higher training; and (*d*) fundamental abilities, sometimes called innate, of which we do not know whether they are unchangeable at all or whether perhaps after a generation or a few generations they in fact can be changed.

Some statistical and other factual material is already at hand from which coefficients could be derived indicating the costs—in time, effort, and money—involved in changing certain of the attributes of certain types of individuals. There is scope here for an “economics of learning” which could contribute to the solution of some of our educational problems, especially as to the ideal extent of our school systems and other training facilities.

So much for the variability of the attributes of individuals. The attributes of jobs are not invariable either. The products demanded by the community can be produced in different ways, by teams of different composition. Textiles may be produced by combinations of machines and men not only differing as to their relative quantities but also with regard to their qualities: workers of more training or of simpler skills may be used. The pattern of jobs available will have a certain elasticity with respect to the relative wages to be paid to different types of labor or, more generally, with respect to the relative prices to be paid for different types of productive agents. Unfortunately, we know much less about this variability than we ought to. There is some evidence of fairly large substitutability between, say, labor and capital in agriculture, the building trade, in textiles, in internal transportation, and recently in simple administration; but there is also the widespread feeling that in many other industries there is no wide range of possibilities. To the extent that this elasticity is absent, there is complementarity between a large number of types of jobs—meaning that under very different scales of relative wages a certain number of very qualified, along with numbers of less and unqualified, labor (and other effort) will always be in demand. Considerable research remains to be done in this

field, but work has recently been undertaken in various quarters. I may mention the Center for International Studies at M.I.T., the Department of Economics of Stanford University, the Netherlands Economic Institute, and the United Nations Secretariat.

#### *IV. Possibilities of Explaining a Logarithmic-normal Distribution of Incomes*

Incomes in the various compartments of the market for productive effort may be said to be the prices paid for efforts of different qualities, as characterized by the set of scores of the jobs. We may conceive of these prices as a system, or a "scale," well known in wage practice, where income is a function of these scores. The economic function of this multidimensional scale is, in the long run, to equilibrate demand and supply in the many compartments. It is this system of interrelated markets and prices of efforts which is more interesting for the problems of welfare economics than the system of interrelated markets and prices of commodities, usually analyzed in economics.

The underlying theory may be based on the same mechanism as used in demand and supply of commodity markets. Each individual, confronted with a set of prices in the various compartments, will decide where to offer his effort with a view to maximizing his satisfaction. The one basic difference from commodity demand is, to be sure, that here the total supply of an individual will as a rule be concentrated on one compartment, whereas his demand for commodities will be distributed over a large number of compartments. The compartment—or "job"—chosen will be the one that, as already said, maximizes his utility. This utility will depend on at least three variables, each of a complex nature: (*a*) the attributes of the person we consider; (*b*) the attributes of the job chosen; and (*c*) the income so to be earned, standing for the quantities of goods he will be able to buy with it.

If the incomes in all compartments were equal, the job he would choose would be the one fitting him best; i.e., indicated by the same marks as his personal attributes. There would be less satisfaction—in fact, a certain tension—if his job were below his capacities, but equally if it were beyond. It is my contention that the economic function of income in a state of unequal incomes is to induce a sufficient number of individuals to accept jobs somewhat beyond their attributes, since otherwise there would not be sufficient applicants for the highly qualified jobs. Income would, if this presentation is correct, compensate for the tension between the scores required and the scores present.

Elsewhere I have tried to give a mathematical presentation of this

market mechanism.<sup>2</sup> A theory like the one I sketched will have to be tested before we attribute importance to it. This testing does not appear so utopian as one might think at first sight. As I observed already, considerable material is available, of which the data of the U.S. Employment Services seem to be particularly promising.<sup>3</sup> They should, however, be supplemented by material about job evaluation. In the Netherlands Central Planning Bureau, we are now attempting to get material of both types. As was observed, one attribute is wealth or capital owned; the influence of this attribute on income distribution is known already and accounts for a considerable part of inequality.<sup>4</sup>

It looks as if we shall be able to give to the theory a quantitative

<sup>2</sup> Jan Tinbergen, "On the Theory of Income Distribution," *Weltwirtschaftliches Archiv*, 1956, where I am assuming two attributes only,  $t_1$  and  $t_2$  being the scores of individuals and  $s_1$  and  $s_2$  those of jobs. Their distributions are taken to be two-dimensional normal ones with averages  $\bar{t}_1$ ,  $\bar{t}_2$ , standard deviations  $\tau_1$ ,  $\tau_2$  and correlation coefficient  $r_t$  for the  $t$ -distribution and the corresponding symbols for the  $s$ -distribution. The utility function for all individuals is supposed to be  $\omega = \omega_0 \log l - \frac{1}{2}\omega_1(s_1 - \bar{s}_1)^2 - \frac{1}{2}\omega_2(s_2 - \bar{s}_2)^2$ . It can then be shown that an income scale  $\log l = \lambda_{00} + \lambda_{10}s_1 + \lambda_{01}s_2 + \frac{1}{2}\lambda_{20}s_1^2 + \lambda_{11}s_1s_2 + \frac{1}{2}\lambda_{02}s_2^2$  will equilibrate demand and supply. If both  $r_t$  and  $r_s = 0$ , the solution is:

$$\lambda_{10} = \frac{\omega_1}{\omega_2} \frac{\bar{s}_1 - \bar{t}_1}{\tau_1}; \quad \lambda_{01} = \frac{\omega_2}{\omega_1} \frac{\bar{s}_2 - \bar{t}_2}{\tau_2}; \quad \lambda_{11} = 0;$$

$$\lambda_{20} = \frac{\omega_1}{\omega_2} \left(1 - \frac{\tau_1}{\sigma_1}\right); \quad \lambda_{02} = \frac{\omega_2}{\omega_1} \left(1 - \frac{\tau_2}{\sigma_2}\right);$$

for  $r_s \neq 0$  they are more complicated, as they are for the case of non-zero elasticity of demand for productive effort. Cf. also my *Economic Policy: Principles and Design* (North Holland Publishing Co., Amsterdam, 1956), "model 08," p. 236.

<sup>3</sup> Recently I learned that Professor Ingo Ingenohl, of M.I.T., has been working along these lines for several years.

<sup>4</sup> According to S. Kuznets, *Shares of Upper Income Groups in Income and Savings* (National Bureau for Economic Research, No. 55, 1953), the following distribution existed in the United States in 1948:

AVERAGE INCOME PER PERSON, EXPRESSED IN TERMS OF AVERAGE  
TOTAL INCOME PER PERSON

	From Employ- ment	From Entre- preneurial Activity	From Property	Total
Top 1%.....	2.7	3.0	2.7	8.4
Top 5%.....	1.6	1.2	0.7	3.5
Top 10%.....	1.4	0.7	0.4	2.5
Top 20%.....	1.15	0.41	0.23	1.79
Lower 80%.....	0.61	0.15	0.05	0.81
Average all sizes of income.....	0.72	0.20	0.09	1.00

From these figures we may conclude that the difference between the income 8.4 of the highest 1 per cent and the average 1.00—being 7.4—is composed of: difference in property income, 2.6; in entrepreneurial income, 2.8; in employment income, 2.0. Inequality measured in this way, may therefore be attributed for some 35 per cent to inequality in property income. It may even be more, in that part of the inequality in entrepreneurial income may also in essence be due to inequality in property.

basis. And it also seems that along these lines we might arrive at an explanation of the income-frequency curves so far observed. I am, in particular, thinking of the so-called "logarithmic-normal" distribution curve—the curve assuming that the logarithms of incomes are normally distributed. This alternative to Pareto's formula was presented and tested by Van der Wijk, Gibrat,<sup>5</sup> and others, who did not offer an explanation, however. The more precise formulation of the theory can only be given in the mathematical terms I mentioned. Loosely speaking, the element of normal distribution would come in since required as well as available scores appear to be normally distributed, whereas the logarithm would come in as a suitable presentation of the utility function. This is very loose talk, however. There are some major problems between the formulae presented and this interpretation which I cannot now deal with. One of them is the scales used for measuring the attributes.

#### IV. Possibilities of Influencing the Income Distribution

The essential advantage of an explanation rather than a statistical description of the distribution of incomes is the possibility it offers of making statements about the ways to change it by changing its data. This is what welfare economics should be able to do. As an example, let me consider the questions (*a*) what influence education could exert on income distribution and (*b*) what conditions would have to be fulfilled in order to make an equalitarian income distribution possible?

Supposing for a while that the theory and formulae presented in footnote 2 would be a good approximation to reality, the answers would be as follows. The influence of education on income distribution would act through the effect it may have on the distribution of individual qualities. To the extent education could lift the average level of abilities present in the direction of abilities required, it could make the slope of the income scale flatter. To the extent education could reduce the standard deviation of available abilities to that of required abilities, it could make the scale of incomes a straight line instead of a parabola.

A state of income equality would require identity of the distribution of abilities (and other attributes) required and available. It would not necessarily require equal abilities for all people, as is sometimes suggested by such statements as that income inequality is due to the differences in abilities between individuals. It would suffice if the divergencies between abilities were no larger than the divergencies needed for the productive teams of which each enterprise or other productive

<sup>5</sup> J. van der Wijk, *Inkomens- en vermogensverdeling* (Haarlem, 1939); R. Gibrat, *Les inégalités économiques* (Paris, 1931).



unit is composed—to be sure, the teams needed by the organizers of production under the circumstances of equal incomes. Depending on the not too well-known elasticity of the composition of these teams with respect to relative wages, the composition of such teams might differ from what they are now. However, the teams wanted under egalitarian circumstances will not, it seems, be entirely made up of managers and professors. Maybe quite a few miners and farmers and drivers will be needed even then.

A very well-known and controversial question in this connection would be: What distribution of capital assets is necessary in order to maintain any given level of productivity or, in other terms, to what extent does the ownership of the assets which a certain number of producers operate affect productivity?

### VI. *International Income Distribution*

International differences in incomes are more pronounced than differences within one nation. This has been illustrated in a striking way by Theil in his inaugural address at the Netherlands School of Economics. Even if we assume that all incomes inside each country are equal, we find, for the international community, a distribution whose Pareto constant is far below what it ever was inside any one country for which data have been studied, pointing to considerably larger inequality. This inequality, in addition, has the tendency to increase rather than to decrease.

Turning first to a possible explanation of these differences and trying to use the same instruments of analysis, I submit that endowments with the various attributes are in fact quite different between nations. To begin with, capital and land per head are widely diverging, and, roughly speaking, proportional to income per head. In addition, other attributes vary, as is illustrated by the percentage of skilled workers or university-trained citizens in different countries. Much more significant probably is the divergence in relative numbers of managers. Some of these divergences probably are a consequence of differences in capital per head; but there may also be a causal connection the other way round, and there is the influence of climate on personal energy and ambition.

Even with some differences in capital and natural resources, there may be, as we know, factor price equalization. That is, even without free movements of factors between countries, there may be a specialization in countries with little capital per head on labor-intensive activities and in countries with much capital on capital-intensive industries sufficient to allow the same income to each factor in different countries. But we know that in order to let this happen, capital per head should

not differ too much between countries, not more, for instance, than between movable industries. Very probably the range within movable industries is not very large. It so happens that both the most capital-intensive industries (energy, land transportation) and the most labor-intensive ones (banking, personal services) are tied to the spot where their products have to be delivered. Factor price equalization therefore does not occur. Generally speaking, a man with the same abilities will receive a higher income in the wealthier countries than in the less endowed countries.

Once a certain difference in income has developed, there are various forces tending to increase that difference. Higher incomes mean higher consumption and health and this increases productivity. Higher incomes also mean higher savings ratios and hence quicker growth of the country's capital. Because of external economies in public investments (transportation, education), capital may even be attracted that otherwise might have been invested in the less developed countries. All these forces together seem to be responsible for the tendency towards the divergence in living standards we observe.

The forces involved have only partially been measured so far. Several institutions involved in studying the problem are collecting material. Such material should bear above all on the production processes available, on the influence exerted on productivity by such factors as education, social relations, and capital, and on the nature and extent of external economies.

Among the factors by which the international income distribution could most effectively be changed, capital transfers, education, and population policy should be mentioned. Whereas the importance of the first two factors will be clear from what precedes, a word may be added about the third. It will be clear that capital per head can be influenced in two ways: by changing the total quantity of capital and by changing the number of heads. Unless some check is applied on numbers, it may very well be that most of the efforts to increase capital will be ineffective. I consider it my duty as an economist to be explicit about this point.

From my brief survey of the problem of international income distribution, I conclude that useful research could be undertaken in this field too and is being undertaken.

#### VII. *Social Justice and the Social Welfare Function*

The second problem I proposed to deal with is the one of social justice. This is the problem of the appraisal of a given state of distribution. Such an appraisal exists, first of all, in the mind of each in-

dividual involved, as has recently also been realized by economists. Not very much attention has so far been given, however, to the nature of this appraisal for social purposes—i.e., in the social utility function of guiding politicians—and the concepts used in political thought to express it. For a long time economists have been mostly concerned about the appraisal of the flows of goods and services pertaining to each individual separately, and about the question how this could be maximized either for one individual or for a set of individuals. Distributional aspects often only came in as a corollary to this maximization. Even the well-known statements about an equalization of marginal utilities between different individuals usually are derived from some sort of maximization of total utility, whatever that may mean.

But the aspect of mutual relations is an autonomous element in the appraisal, both individual and social, of a certain state of the economy, or society at large. In many qualitative matters of life, certain feelings about these relations have been expressed and have influenced action.

This has now, I think, been recognized by most students of the problem. An individual's sense of happiness is not only determined by the variables pertaining to his own consumption but also by those concerning the consumption of others. The somewhat difficult situation we are now facing is that, although individuals do care for others, too, we are not certain they are caring enough. In the nineteenth century it was maintained that if only everyone took care of himself, society as a whole would automatically take care of the harmony of the group. We are now doubting this. We want our policy-makers to see to it that no harm is done to the weak. This means that the social utility function guiding the politician has to depend on what I would like to call the distributional aspect of the economy. There are interesting questions involved. We may delegate the care for this aspect to our politicians and then forget about it in our own decisions. This might mean that certain simple types of social welfare functions are excluded; e.g., those just adding up the utilities of the individuals—if that is possible at all.

As a concept of reference for the distributional aspect of the social utility function—and, if you like, also of the individual utility function—the concept of equality has come to play an important role. The concept is used in two contexts: equality of treatment and as a right deriving from inherent equality. The latter represents a hypothesis about the nature of man; the former refers to policies or regimes in different fields. In times when equality in the sense of equal treatment was remote, Christianity liked to think of men being equal before God, referring to assumed inherent equality; much later, when,

however, equality in economic treatment would still be remote, "equality before the law" developed as a goal. Each letter from a French official institution reminds us of the device of the French revolution: "*Liberté, Égalité, Fraternité.*" Later still, I think, although also in the liberal era, the concept of equal opportunities came to the forefront. Again, more recently, attempts at equalizing income as a policy were made both in Russia and Israel; war food rations basically were equal in each country.

The first question I want to take up is: What quantitative interpretation, for economic matters particularly, can we give to this age-old and deep-seated but rather vague concept of equality in treatment in order to make it a basis for the definition of justice? It is my contention that what we have in mind is equality not only of qualitative, juridical rights, not of tax rates paid or any refinement of tax equality, not equality of incomes either, but a regime leading to equality of satisfaction or utility. Whether this does or does not represent a quantitative criterion depends entirely on our ability to measure it. It is here that I will try to present another outline of research which I hope offers some attraction, compared with the flat denial, now customary, that utility can be measured (and hence interpersonal comparisons can be made).<sup>6</sup>

Surely our present-day technique of measuring it is about as bad as the measurement of temperature was before the thermometer was invented. But there is consensus about certain comparisons: starving, very ill, or wounded people are by everybody considered worse off than gay, healthy, active people. The extremes can be recognized by almost anybody. It requires the better exercised observation of parents, doctors, teachers, or psychiatrists to make finer subdivisions. Both medical and psychological tests are improving as to degree of precision. One line of attack may therefore be to follow and to apply the results of such attempts.<sup>7</sup>

A second approach would be possible if it could be assumed that all individuals had identical utility functions—an identity which might be a more precise specification of the hypothesis of "inherent equality between men." If this hypothesis applied, we might call two individuals equally happy if they were on the same indifference surface.

<sup>6</sup> I owe some encouragement to do so to discussions with Professor Robert H. Strotz.

<sup>7</sup> Sometimes one person may be able to compare his utility level and function for two different successive states he is living in and so contribute to interpersonal comparison. The states I am thinking of may be illness and health, or before and after a certain training course has been followed, or before and after surgery, or, finally, before and after an accident. Since we know already of operations influencing, to some extent, children's I.Q.'s, who knows what influence medical science will be able to exert on interpersonal comparison in the future!

At first sight this assumption may seem to be utterly unpromising. It can be given different interpretations, however, and some of the more sophisticated are less open to criticism than the simplest possible interpretation. It depends on what we consider to be the variables and what the coefficients of the utility functions. No doubt utility functions would be different for different individuals if we only considered as variables the quantities of the commodities consumed and the attributes of the job taken. All the differences in taste and in personal attributes or scores would be there to prove this difference.

Two other interpretations are possible, however. First of all, we should not care for details of taste—say for the fact that A likes American cheese better and B Swiss cheese. Only the variables relevant to large differences in well-being should be considered, I submit. Next, the personal attributes could be taken as variables rather than parameters hidden in the coefficients of the utility function. The differences between individuals could then be interpreted as shifts along the axes measuring the personal attributes ( $t$ 's in my notation of footnote 2). It would be the coefficient before the terms with these  $t$ 's that would be constant.

This construction requires some elaboration. I plot along the various axes of a multidimensional space the values of income, personal marks, and the marks of the "job." Each point in this space represents a man of a certain quality  $t$  in a certain job  $s$  with an income  $l$ . I assume there is only one system of indifference surfaces for "mankind": this is my interpretation, for the moment, of the mystical concept of equality. For, say, monkeys or ants, they will be different. To the extent that qualities are innate and unchangeable, however, I am just fooling myself, since no man can ever leave his hyperplane. There are no connecting possible variations in the direction of the  $t$ -axes. Here another part of the program emerges: it should try to answer the questions: What are the indifference surfaces in each hyperplane? Are they at least approximately equal for individuals in the same hyperplane? And can we unite them to one system of a general human set of surfaces? Two circumstances will help us. Not all human qualities are invariable, as we saw; there are movements between the planes, if only small movements. Medicine and education may develop more of them in the future. And, in addition, if we find different surfaces in one hyperplane, maybe they can be explained and removed by a new parameter.

I am coming to a third line of defense. For those who think all this is pretty fantastic—I might be one of them—I think there is a simpler way out still. Let us not try to make comparisons between the utility experienced by different individuals. Let us withdraw, for the definition

of social justice, from utility or satisfaction to the means making for satisfaction; i.e., goods, the scores of the job, and the personal scores. And let us try to evaluate these according to some outside system of valuation, some sort of price system. Unit prices in such a system need not be equal for larger and smaller quantities, however. Such a price system might be obtained from what most people would think of it. Our present-day society already applies such average scales of valuation in that it compensates certain people for certain drawbacks by offering them illness benefits, old age pensions, family allowances, overtime payments, and the like. The program of research springing from this third line of defense—or attack—is to establish a system of prices.

On all three levels, if something can be done, our endeavors should open the way to estimating, for any given constellation, the deviation from perfect social justice.

The use to be made of this concept should be clarified briefly, to finish my argument and in order to avoid misunderstanding. It would not be the only element determining the social utility function and hence economic policy or regime. Average or representative well-being also will have to influence that function. The well-known choice faces us here: often we may gain in one of these two elements at the expense of the other or gain in equality at the expense of average well-being or the other way round. The question of how much average well-being would have to be sacrificed in order to obtain any given increase in inequality should, in principle, be answered by our theory of income distribution. The question of the appraisal of such changes is an autonomous element of the social utility function. And here we are given a last item for research, independent of what precedes. It might be inquired what preference scales individuals, citizens, as well as representatives and executives, have in this regard—a subject for, say, the public opinion research centers.

I have reached “the end of my Latin.” I tried to indicate a number of items for research in welfare economics which, I hope, might contribute to overcoming the shortcomings in this branch of our science. To sum up, they are: a theory of income distribution; figures on the frequency distributions of attributes of persons and “jobs”; on the elasticity of demand for productive effort and the substitution between capital and labor; figures on the variability of attributes and an “economics of learning”; variations of abilities between nations; a study of interpersonal utility comparisons by parents, teachers, psychiatrists, etc.; of indifference surfaces for variables relevant to average well-being and its distribution and estimates of the average valuations of attributes.

One final point I want to make in this connection is that welfare economics is no exception to general economics in that it needs an equilibrium between theory and observation. One of the drawbacks of my paper is, I am sure, that it contains promises of future research rather than many results of research already undertaken. To the extent that you would give me some credit, I shall be under the burden of heavy installment payments, not uncustomary in this country. My excuse is that the research under way may profit very much from your criticism. Though no provision is made for it now, I hope you will let me have the advantage of it in some other way.