the near future of some kind of interdisciplinary science of politics and economics that will rescue welfare economics from the theoretical blight to which it has fallen victim.

Having said this much, we ought to add a note of warning about the quaint notion of the 'new' welfare economics that propositions about 'efficiency' are somehow value-free, while propositions about 'equity' are necessarily value-laden. Interpersonal comparisons of utility are only one kind of value judgement and not perhaps even the most critical of the value judgements that inevitably enter into welfare economics. Thus, the concept of a Pareto-optimal allocation of resources is predicted on three assumptions which are undeniably judgements of values: (1) that every individual is the best judge of his own welfare; (2) that social welfare is defined only in terms of the welfare of individuals, and that these are independent of each other; and (3) that the welfare of individuals are not comparable in operational terms. It is perfectly true that these value judgements command wide assent, at least among economists, but even a perfect consensus on value judgements does not render them 'objective': they nevertheless remain value judgements (although (3) may be an untestable empirical judgement rather than a value judgement). In short, there is no such thing as 'value-free welfare economics' and, indeed, the phrase itself is a contradiction in terms. To say that something is an improvement in 'welfare' is to say that it is desirable and evaluatory statements of this kind necessarily involve ethical considerations, that is, value judgements.

21 The marginal conditions

Once the question of income distribution has somehow been settled by a collective decision, a series of marginal conditions can be set out that must be satisfied if resources are to be optimally allocated. These marginal conditions are no more than the set of equations that must be solved to determine the unknown prices and quantities of all goods and services allocated to each and every use. Given a knowledge of the stocks of resources on hand and the technical coefficients of production, as well as a Bergsonian welfare function incorporating an ethics of distribution, it should be possible theoretically to solve the system of equations in terms of the unknown prices and quantities. In view of Walras's contributions to the theory of general equilibrium, it comes as something of a shock to realise that most of the marginal conditions of social optimum were never stated explicitly and in detail until very recently. Even Pareto and Barone did not go very far beyond a statement of the optimum conditions of exchange. The entire inventory of optimum conditions appeared for the first time in Lerner's articles on socialist economics in the mid 1930s, culminating in two classic articles by Bergson and Hicks in 1938 and 1939.

As a useful review of virtually the whole of neoclassical microeconomics, we will now list the more important optimum conditions. The reader can verify any of these himself by the usual equimarginal rule that defines an optimum as a situation in which no mutually profitable trade can be arranged.

1 *The optimum condition of exchange.* The ratio of the marginal utilities or the marginal rate of substitution for each pair of consumers' goods must be the same for all households that consume both; in other words, all households must end up somewhere along the exchange contract curve in a box diagram.
2 *The optimum condition of production.* Within the limits of technical constraints, the ratio of the marginal physical products or the marginal rate of substitution for each pair of productive factors must be the same for all firms in an industry producing a homogeneous product. With the productive factors measured along the axes of a box diagram, the isoquants of any pair of firms must be tangent to each other; all firms must end up somewhere along the production contract curve. By extension, the marginal rate of transformation between any two products must be the same for any two firms that produce both.
3 *The optimum condition for the composition of output.* If the first and second conditions are satisfied, the marginal value product of each factor will be the same in each industry, and the prices that are used to arrive at these marginal value products will be equal to the common value for all households of the marginal rates of substitution in consumption. Summing up, the marginal rate of substitution between any pair of products for any household consuming both must be the same as the marginal rate of technical transformation between them in production.
4 *The optimum condition for intensity of factor use.* The marginal rate of substitution between work and leisure must be equal to the marginal technical rate of transformation between hours of work and the resulting product; in other words, it should not be possible to increase the *value* of output by paying a worker to work shorter or longer hours, or to shift to another occupation.
5 *The optimum intertemporal condition.* If we distinguish among inputs according to the moment of time at which they are applied and among outputs according to the moment of time they emerge, the first four marginal conditions can be applied to yield the optimum condition for allocation of factor inputs and product outputs through time. The marginal temporal rate of transformation between every pair of factors and products, as well as the marginal temporal rate of substitution between every pair of factors and between every pair of products, must be equal to the rate of interest on riskless securities. That is, the rate of interest must equate the marginal time preferences of all individuals with the rate of return over cost. When some assets are illiquid and their return uncertain, the marginal rates of substitution between every pair of assets of different degrees of liquidity and certainty must be equal for all households.

All these conditions may be summed up in one grand criterion: *Between any two goods (products and factors), the subjective and objective marginal rates of substitu-*

tion must be equal for all households and all production units respectively and these subjective and objective ratios must be equal to each other.

Together, the five conditions constitute a necessary basis for the attainment of maximum welfare. Since they are marginal or first-order conditions, they do not suffice to guarantee a welfare *maximum.* In addition, we require second-order 'diminishing returns' conditions to the effect that all indifference curves are convex and all transformation curves are concave from below in the neighbourhood of the maximum welfare position. But even if both first-order and second-order conditions are satisfied, we cannot be sure that we have reached a *maximum maximorum:* 'There is nothing in the marginal conditions', as Boulding puts it, 'which can differentiate the top of a molehill from that of Mount Everest'. For welfare to be at maximum, the 'total conditions', as Hicks calls them, must also be satisfied: it must be impossible to increase the sum of producers' and consumers' surpluses by introducing a new product or by withdrawing an old product. Provided the marginal, second-order and total conditions are all satisfied, economic welfare will be maximised. We stress again, however, that this maximum is merely one of an infinite number of Pareto optima among which we cannot choose without postulating a Bergsonian social welfare function, that is a set of scalars for the ranking of individual utilities.

Let us now imagine a capitalist economy in which we create a price system having the following characteristics: (1) all inputs and outputs have fixed prices which no buyer or seller can alter; (2) only products which can be sold at cost-covering prices will be brought to market; and (3) any firm can produce any product at these prices if it cares to do so. If every consumer now maximises his utility and every firm now maximises its profits, all the preceding first-order as well as the second-order optimum conditions are automatically satisfied by the market mechanism. This is what Samuelson has called the Invisible Hand Theorem, which is also known as the first and second Fundamental Theorems of Welfare Economics; it states, not only that a long-run perfectly competitive equilibrium will yield an optimum allocation of resources, always subject to the proviso that the distribution of income is given, but also that every optimum allocation of resources is a long-run perfectly competitive equilibrium.

22 The optimal characteristics of perfect competition

'At least from the time of the physiocrats and Adam Smith', Samuelson has observed, 'there has never been absent from the main body of economic literature the feeling that in some sense perfect competition represented an optimal situation.' In precisely what sense is now apparent. This is not to say, of course, that Adam Smith or any other classical economist justified a competitive economy solely because it achieved the static efficiency conditions of general equilibrium. We know that they defended competition largely in terms of its dynamic effects on individual incentives (see chapter 2, section 19). Nor is the classical argument that the flow of capital and labour will level the rate of profit and wages between industries a disguised way of stating that the marginal optimum conditions will be satisfied in