24

Welfare Economics[1]

24.1 THE NEW WELFARE ECONOMICS, BERGSON AND SAMUELSON

The New Welfare Economics

By the late 1930s many economists had come to accept the arguments of Myrdal and Robbins, that interpersonal utility comparisons could not be used as the basis for a scientific welfare economics. In response to this there arose a series of attempts to construct a welfare economics free from interpersonal utility comparisons, this becoming known as the "New Welfare Economics", as opposed to the old welfare economics of Marshall and Pigou. These attempts were made possible by developments in consumer theory, where a theory of the consumer based on utility was being replaced with one based on the concepts of preference and indifference.

The starting point for the New Welfare Economics was the idea that a change increased potential welfare if the gainers from the change could compensate any losers and still remain better off. This criterion was first used by Pareto (1896) and was taken up by Barone (1908), but after that it was neglected until its revival by Kaldor (1939).[2] Kaldor attached great importance to this compensation test, for it provided a means of separating welfare economics into two parts: one dealing with production; the other with distribution. This separation was something Pigou had been able to do because of his utilitarianism: Pigou was able to consider separately factors affecting the sum total of utility, and factors affecting its distribution. The merit of the compensation test was that this separation could, it was claimed, be achieved without any interpersonal utility comparisons. Kaldor was thus able to argue that a scientific welfare economics was possible, this being one which analysed situations with a view to establishing whether or not it was *possible* to make everyone better off. This left the issue of distribution to be settled outside economics, for, he argued, it was "quite impossible to decide on economic grounds what particular pattern of income distribution maximizes social welfare".[3]

Hicks took up Kaldor's idea of separating the issues of production and distribution, defining an *optimum* as a situation in which "every individual is as well off as he can be made, subject to the condition that no reorganization permitted shall make any individual worse off".[4] It was only later that such an optimum was called a "Pareto optimum" (Little, 1950). Hicks was able to use this definition to show: (1) that there was an infinite number of such optima; and (2) that an optimum required certain conditions to be satisfied,

in particular that the marginal rate of substitution between any two commodities be the same for all consumers consuming the two commodities, and for all producers producing both of them. These results provided a framework in which Hicks, without referring to utilitarianism, was able to discuss discrepancies between social and private costs, and the welfare implications of monopoly and imperfect competition.

Where did the compensation principle come into all this? The answer is that it could be used to enlarge the set of welfare improvements beyond the set of Pareto improvements, which Hicks considered virtually empty. There were, however, problems with this approach, the most notable being pointed out by Scitovsky (1941). Scitovsky derived the paradoxical result that it was possible for a change from A to B to pass the Kaldor–Hicks compensation test, and for the change from B to A to pass it as well. In other words, the Kaldor–Hicks compensation test could give contradictory results.

The nature of the problem here, and the reason for the Scitovsky paradox, can be seen most clearly by using the concept of the utility possibility frontier, developed by Samuelson (1950). Suppose we have an economy in which there are two individuals, one of which produces commodities, the other consuming them. Assume that the utilities of these individuals are initially those indicated by the point X in Figure 24.1. By redistributing income from the producer to the consumer we can increase the consumer's utility at the expense of the producer's utility, and in so doing we trace out the utility possibility frontier associated with the point X.[5] Now suppose that we consider a change, such as the introduction of protection, which moves the economy to point Y, and that, by the same method of redistributing income, we construct the utility possibility frontier corresponding to Y. If the situation is as shown in Figure 24.1, we have the Scitovsky paradox: if we are at X we could reach point Y' by introducing protection and redistributing income so as to compensate the consumer; similarly, if we were at Y we could move to X' by bringing in free trade and compensating the producer. Both the introduction of protection and its removal pass the Kaldor–Hicks compensation test.

Scitovsky's response to this was to require that the Kaldor–Hicks criterion be satisfied in one direction, and to be violated in the other direction: the so called Scitovsky double criterion. It turns out, however, that even this is not enough, for the only case where it can be said that one situation is *unambiguously* better than another is, as Samuelson pointed out, where one utility possibility frontier is completely outside the other.

The problem with both the Kaldor–Hicks and the Scitovsky criteria is that they do not require that compensation is actually paid. In our example this means that the introduction of protection alters the distribution of income, something which matters because the choice between protection and free trade depends on the distribution of income: if the consumer is very well off compared with the producer (we are in top left part of Figure 24.1) then protection is preferable; whilst if the producer is well off (we are in the bottom right part of the diagram) then free trade is better.

Consumer's
utility

Utility possibility frontier
with Y (protection)

Y'

X

X'

Utility possibility frontier
with X (free trade)

Y'

Producer's utility
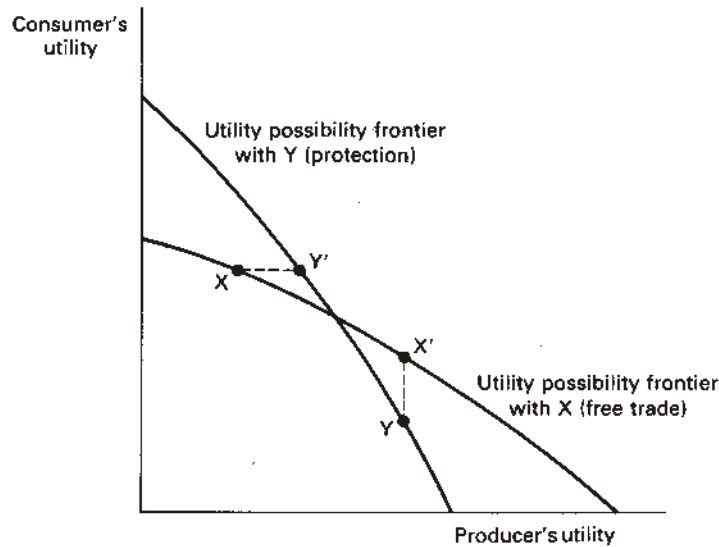
FIGURE 24.1 *Compensation Tests*

The reason why this issue is so important is that the arguments involved undermine the idea that the issues of production and distribution can be separated. Without knowing the distribution of income it is impossible to say whether or not a change is desirable, except in the very special case where everyone is made better off, or everyone worse off. This had implications not only for abstract welfare economics, but also for the significance of the statistics on national income, which were being compiled on a large scale for the first time in the 1940s. At the time when statisticians were beginning to calculate figures for national income, its justification as a measure of welfare, provided by Pigou, was being undermined. In this context the significance of the Kaldor–Hicks criterion was that it provided a reason, so its proponents believed, for claiming that an increase in national income corresponded to an increase in potential welfare: if national income rose, it would be possible to make everyone better off. Thus some of the main contributions to the New Welfare Economics were made in articles dealing with the measurement of national income (e.g. Hicks, 1940; Samuelson, 1950).

The issue of compensation tests was not, however, the only issue in welfare economics relevant to the problem of measuring national income, for the following questions also had to be answered:

(1) How should commodities entering into national income be valued?
(2) How should the public sector be treated?
(3) What was the *economic* significance of the various types of index number which might be used?

Economists were returning to the problems discussed by Pigou at the start of his *Economics of Welfare*, but they were considering them differently, in the context of the new theory of value. In the same way that Sidgwick, Marshall and Pigou had had to reconsider the significance of national income in the light of the marginal utility theory of value, so too did the economists of the 1930s and 1940s have to reconsider the issue in the light of the new consumer theory.[6]

Hicks' rehabilitation of consumers' surplus

Even if utility were measurable, there were problems with Marshall's concept of consumer's surplus, but with the criticisms of utility theory made by Myrdal and Robbins it became completely untenable. The main architect of the revival of consumers' surplus as a usable concept was Hicks, first in *Value and Capital* (1939) and then in a series of articles in the 1940s. Marshall had argued that consumer's surplus required the assumption that the marginal utility of income was constant. Hicks' contribution was to show that the definition of consumer's surplus was a separate issue from the issue of whether or not it could be measured by the area under a demand curve – it was only the latter that depended on the marginal utility of income being constant. He then argued that consumer's surplus could be measured by what he called the *compensating variation* in income, "whose loss would just offset the fall in price and leave the consumer no worse off than before".[7] This is a perfectly well-defined, measurable concept. Similarly, *consumers'* surplus was interpreted in this way as "the amount of money consumers as a body would have to lose in order to make each of them as badly off as he would be if the commodity disappeared".[8] Although *it can no longer be interpreted as a utility sum*, this has a perfectly clear meaning. It is at this stage of the argument that issues are raised similar to those involved in the measurement of real income, for it is because Hicks goes on to define an optimum as a situation where "no reorganisation is possible which will leave any individuals so much better off that they will be able to compensate the losers and still be left with a net gain",[9] that he can use changes in consumers' surplus as a measure of changes in welfare. Hicks' rehabilitation of consumers' surplus was thus only partial.

Bergson and Samuelson

The outcome of the New Welfare Economics was that an optimum came to be defined as a situation in which it was not possible to make anyone better off without making someone else worse off. In the absence of utilitarianism, however, it was not at first clear exactly what it was that was optimal in such an optimum. An answer to this question was first provided by Bergson (1938), who defined what Samuelson later described as an individualistic social welfare function. Bergson started from the general state-

ment that social welfare must be a function of the quantities of all the commodities consumed, and all inputs including labour. As it stands, such a social welfare function says no more than that social welfare depends, in an unspecified way, on the resources available to society. The merit of the approach was that it enabled Bergson to do two things. (1) He was able to work out the value judgements implicit in various statements of the conditions for a welfare optimum (in particular the judgement that welfare depends only on individual utilities; and that social welfare increases when all individuals become better off).[10] The utilitarian social welfare function is clearly a special case of a more general function embodying these judgements. (2) He showed that many of the optimum conditions, such as equal marginal rates of substitution, applied whatever the exact form of the social welfare function: in other words, whatever additional value judgements we choose to make.

This concept of a social welfare function was further developed by Samuelson (1947 and 1950), who related it to the utility possibility frontier, using these concepts to put into perspective many of the ideas discussed earlier in this section. Samuelson was able to show that the Pareto-optimum conditions give necessary conditions[11] for being on the utility possibility frontier, but that they do not establish any particular point on the frontier. To single out a particular point on the frontier, further ethical judgements are required. According to Samuelson, potential welfare can be said unambiguously to increase only if the *entire* utility possibility frontier shifts outwards, something that a single index number could never show. In the words of one contemporary survey, "Samuelson has shown that we cannot even be *sure* that group A is better off than group B even if A has collectively more of everything."[12]

The theory of the second best

The first order conditions for a Pareto optimum yield results such as marginal cost pricing, the inefficiency of tariffs, and so on. Arguments such as these, however, are based on the assumption that everything else in the economy is optimally adjusted: that price equals marginal costs in all other industries; that there are no other tariffs; and so on. In the early 1950s economists began to question whether these results were justified should the Pareto optimality conditions not be satisfied in other parts of the economy. For example, if there are monopolies in the private sector, should marginal cost pricing be adopted in the public sector? The conclusion was reached that such conclusions were generally not justified.[13] These results were brought together and integrated under the name of the general theory of the second best by Lipsey and Lancaster (1956). They showed that, in general, where more than one of the Pareto optimality conditions was violated, it would not necessarily be an improvement to satisfy one of them if the others remained violated.

24.2 ARROW AND SOCIAL CHOICE THEORY

Arrow's general possibility theorem

A completely different approach to the problem of social welfare was taken by Arrow in his influential book, *Social Choice and Individual Values* (1951a). Starting from the proposition that if social choices are to be made on the basis of individual preferences, value judgements have to be made, Arrow investigated the problem of whether various generally accepted value judgements were compatible with each other. To do this he defined a social welfare function in a different way from Bergson and Samuelson. He assumed that each individual could rank *all the possibilities open to society* in order of preference. The social welfare function is then a mechanism for deriving a social ranking (order of preference) for the various alternatives from the set of individual rankings. Examples of such mechanisms include majority voting, or the dictatorship of one individual. So Arrow's problem can be restated: does there exist a social welfare function (a mechanism for getting from the set of individual preferences to a social preference) which satisfies reasonable ethical criteria?

The criteria Arrow thought ought to be satisfied are: (1) unrestricted domain (it should work whatever are the individual preferences); (2) the Pareto criterion;[14] (3) independence of irrelevant alternatives (choice between two alternatives should depend neither on whether or not a third, irrelevant, alternative is available, nor on individuals' preferences between alternatives not being considered); (4) non-dictatorship (which should be self-explanatory). Arrow then showed that there existed no social welfare function satisfying all these conditions. In other words,

If we exclude the possibility of interpersonal comparisons of utility, then the only methods of passing from individual tastes to social preferences which will be satisfactory and which will be defined for a wide range of sets of individual orderings are either imposed or dictatorial.[15]

This was his general possibility theorem.

Arrow's theorem, frequently referred to as his *impossibility* theorem, had a widespread influence on economists, contributing to the general pessimism as to the scope of welfare economics in the early 1950s. The New Welfare Economics had failed to provide a value-free basis for welfare economics; the theory of second best suggested that even the limited guidance provided by Pareto optimality conditions might be unreliable; and Arrow had shown that it was impossible to derive an ethically acceptable social welfare function.[16] In this situation economists were faced with three possible responses. (1) To lose interest in welfare economics altogether. (2) Simply to assume that there did exist some set of ethical principles on which social choices could be based, these being represented by, say, a Bergson–Samuelson social welfare function. If they went ahead and used these, they would eventually discover which of Arrow's postulates was violated.[17] (3) To investigate Arrow's result further, replacing his conditions with alterna-

tive ones, and seeking ways round his possibility theorem. This route led to the development of social choice theory as a distinct branch of welfare economics.[18] When economists came to investigate Arrow's result in this way they found it to be remarkably robust, similar theorems emerging when the problem was formulated in a variety of ways.

The implementability of social choice rules

Arrow's theorem is concerned with the problem of using individual preferences to obtain a social ranking of the various alternatives open to society. Such social choice rules are, however, useless unless there is a way of finding out what the individuals' preferences are. This raises the issue of whether individuals would, if a given social choice rule were implemented, reveal their preferences correctly. Suppose a given social choice rule were being used to determine public policy. If individuals knew this rule they might be able to obtain a better outcome for themselves by misrevealing their preferences (i.e. by lying). A social choice rule is said to be *strategy-proof* if it is impossible for any individual to obtain a more preferred outcome by misrevealing his or her preferences: if individuals have no incentive to lie.

A theorem which some economists would consider as equal in importance to Arrow's theorem is the Gibbard–Satterthwaite theorem.[19] This states that, assuming there are at least three alternatives to be chosen from, any strategy-proof social choice function is dictatorial: one individual gets his or her way irrespective of what other individuals prefer. In other words, there is no solution to the problem of providing each individual with an incentive to reveal his or her preferences correctly. As with Arrow's theorem, economists have sought ways round this very undesirable result.[20]

Utility measurement

Since Arrow, economists have turned again to the issue of utility measurement and interpersonal utility comparisons. In a sense this represents a revival of the utilitarian approach discussed in chapter 14, but to see it in this way would be misleading. Utility, as used by Bentham, Sidgwick and Pigou, was essentially a practical, commonsensical concept, one for which little justification was given, utilitarianism emerging naturally from it. In contrast, utility in its modern incarnation is very different, not being vulnerable in the same way to criticisms such as those of Myrdal and Robbins.

There are two main ways in which testable, interpersonal utility comparisons can be made, neither of which is vulnerable to the Myrdal–Robbins critique. One is to correlate utility with observable individual characteristics (for example, if A smiles more than B then he must be happier, and hence have a higher utility). Such judgements may be controversial, but they can nonetheless be stated sufficiently precisely for interpersonal utility compari-

sons to be meaningful in the sense of being testable. The other way is to assume that individuals can make judgements of the form, "I would prefer to be her in her situation than to be me in mine." Such a statement is a subjective opinion, but it expresses a preference, just as much as if an individual expresses a preference for one bundle of goods rather than another. As such it can be argued that such subjective statements can form the basis for a scientific welfare economics, in the same way that preferences between bundles of goods form the basis for a scientific consumer theory.

Consider, for example, the case where there are two individuals, A and B, both of whom would prefer to be A (i.e. have all A's personal characteristics, tastes and so on) in A's position (i.e. consuming the bundle of goods that A consumes) than to be B in B's position. There is a strong case here for saying that A's utility is higher than B's. This instance, of unanimity in making interpersonal utility comparisons, may be of only limited relevance, but it is sufficient to establish the *possibility* of making interpersonal utility comparisons, if only under a limited range of circumstances.

Economists adopting this approach have thus been able to clarify the issues involved in making interpersonal utility comparisons in a variety of ways.

(1) Interpersonal utility comparisons *do* involve subjective judgements, but these can be stated explicitly, and they can be the subject of rational discussion.

(2) Utilities may be *partially* comparable, the choice not being solely between total comparability and the complete absence of any comparability, as was assumed in the literature on the New Welfare Economics.[21] This partial comparability is something that can be stated formally, in order to derive the implications of different degrees of comparability.

(3) Economists have also looked more closely at the types of interpersonal utility comparability required for the use of various welfare criteria. For example, to use the utilitarian criterion it is enough to be able to compare the units in which utilities are measured (i.e. *differences* in utility): there is no need to compare utility *levels*.

These points may seem unduly technical, but they have important implications for the way welfare economics is viewed. Modern utilitarianism, for example, is very different from earlier utilitarianism, for although both may refer to maximizing the sum of individual utilities, the reasoning behind them is different: modern utilitarianism is based on precisely formulated premises, premises which can be, and have been, compared with alternatives.

Justice

There are two ways in which considerations of justice can be brought into social choice theory. One is to use arguments about justice in order to say

something about the appropriate form for the social welfare function. The other is to bring concepts of justice into social choice theory as alternatives to the traditional welfare criteria. Both approaches have been used.

The use of concepts of justice related to the idea of fairness in order to justify certain forms of social welfare function stems above all from Harsanyi (1955) and Rawls (1958, 1971). Their ideas have in common the notion that a fair allocation of resources is one that people would be able to agree upon if they did not know which position in society they were themselves to occupy. Such a social contract theory, however, can still lead to very different social welfare functions. Harsanyi used it to justify utilitarianism: if individuals each believe that they have an equal chance of any position in society, then they will maximize their expected utility by agreeing to a utilitarian allocation of resources. Rawls, on the other hand, assumed that people were completely ignorant as to the positions they would occupy in society, and he inferred from this[22] that a fair allocation of resources was one that took most care of the worst-off person in society.[23] Rawls' work, in particular, has had a substantial influence on welfare economics, though it could be argued that this is not so much because of his discussion of justice, as because he provided economists with a new, easily-applied welfare criterion.

Ideas of justice have also, however, been used to raise doubts about social welfare functions, whether of the Bergson–Samuelson or the Arrow type, and even to raise doubts about the Pareto criterion itself. An issue which has attracted a lot of attention is one raised by Sen (1970b), namely whether or not liberalism is compatible with the Pareto criterion. His argument is that there are certain personal choices (e.g. whether to sleep on one's back or on one's belly; or one's choice of reading matter) which are no-one else's business. In other words, people have certain rights which should be respected by any social welfare function. Though the idea is not inconsistent with the most general formulations of Bergson–Samuelson and Arrow social welfare functions, the properties that these social welfare functions are usually assumed to exhibit (e.g. the Pareto criterion) are inconsistent with it. Sen's liberalism implies that social welfare depends on more than simply individual preferences: in order to evaluate social welfare, for example, we need to know whether my utility is derived from eating bananas or from torturing you. If this argument is accepted, it undermines the Pareto criterion, for in the case where a change makes everyone better off, the Pareto criterion *rules out* the use of non-utility information. If we accept that people have certain rights, Sen argues, then non-utility information cannot be ruled out in this way.

Social choice theory after Arrow

Although he was not the first to introduce the problem of group decision making into economics,[24] it was Arrow's work which inspired much of modern social choice theory. The general possibility theorem was a challenging, paradoxical result, thought by many to be catastrophic in its

implications for welfare economics. At the same time, it provided great scope for the application of advanced mathematical techniques. Recent work has made Arrow's theorem much more comprehensible: if economists are confined to using only utility information, and if the available utility information is very poor (i.e. no interpersonal comparability whatsoever) then it is hardly surprising that acceptable social welfare functions are hard to find. These restrictions are, however, inappropriate if recent arguments on interpersonal utility comparisons, and on the use of non-utility information, are accepted. Thus though modern social choice theory owes much of its inspiration to Arrow's possibility theorem, it has developed beyond it.

24.3 WELFARE ECONOMICS AND PUBLIC POLICY

Pareto-efficiency and social welfare functions

The two fundamental theorems of welfare economics – that competitive equilibria are Pareto-efficient, and that, under certain conditions, any Pareto optimum can be achieved as a competitive equilibrium – were established in their modern form by Arrow (1951c) and Debreu (1951). These theorems constitute the modern equivalent of the doctrine of maximum satisfaction. To understand them it is necessary to note that they are more than the old doctrines dressed up in more sophisticated mathematical techniques, for they show, in a way that the older doctrines were unable to do, the stringency of the conditions required to ensure an efficient equilibrium, even when efficiency is defined in the weak sense of Pareto-optimality.[25] These conditions require not only perfect competition in all markets, but also complete information, and a complete set of both futures and insurance markets.

Probably of more significance than this, however, is the fact that in the period under consideration the use of the criterion of Pareto-efficiency has become completely routine. When constructing a model of economic equilibrium, whether a static model, an intertemporal model, a model with rationing, a bargaining model, or any other, economists examine the solution in terms of Pareto-efficiency as a matter of course.[26] This may seem an obvious thing to do, but that is only because we are now so used to the idea. In part this arises, no doubt, from the increased use of mathematics (establishing Pareto-optimality, or its absence, means one more theorem), but its main motivation stems from the developments in welfare economics discussed above. The outcome of the New Welfare Economics was that the Pareto criterion (that at least one person be made better off, with no-one being made worse off) was apparently the only generally acceptable criterion for an increase in welfare.[27] Where Pigou would have asked whether the national dividend was being maximized, post-war economists have asked whether an equilibrium is Pareto-optimal.

Economists have not, however, defined their attention to Pareto-efficiency, being increasingly willing to use explicit social welfare functions

of the Bergson–Samuelson type. It might be thought that this involved a reversion to pre-Paretian welfare economics, the only real different lying in the greater degree of abstraction permitted by the use of more complicated mathematical techniques This, however, is not the case, for social welfare functions are frequently used to make explicit the implications of alternative value judgements, rather than to argue for a particular policy objective. The example of the literature on optimal taxation is considered below. Another example worth mentioning is Atkinson's index of inequality – a measure which can be used, for example, to show whether income is more equally distributed in one country than in another. This measure is defined as "the proportion of the present total income that would be required to achieve the same level of social welfare as at present if incomes were equally distributed".[28] This measure of inequality clearly depends on the form of the social welfare function, but the reason for using it is to show that the measurement of inequality depends on attitudes towards inequality. These value judgements are introduced in the form of a parameter, the value of which reflects the degree of aversion to inequality. The point of introducing a social welfare function is not to bring in implicit value judgements, but to make explicit the implications of alternative value judgements.

One of the characteristics of economic theory in recent decades has been the attention given to public policy. In the same way that it is now routine for economists to investigate the welfare implications of their models, it is also routine for economists to examine the implications of their models for government policy. An important branch of welfare economics is thus concerned with criteria for government policy. To give some idea of the way in which economists have approached the question of government policy in recent years, three particularly important examples will be discussed: the theory of optimal taxation, Samuelson's theory of public goods, and Coase's theorem on externalities. Though these are very important examples, it is important to stress that these are only examples, chosen from a literature that covers an enormous variety of issues not mentioned here.

The theory of optimal taxation[29]

The aim of this section is not to present technical details but to give an idea of the type of argument that is used in the theory of optimal taxation, and of the type of conclusion that can be obtained. As representative of much recent work on the subject, consider the treatment of optimal taxation contained in Atkinson and Stiglitz's *Lectures on Public Economics* (1980). Their starting point is Pareto-optimality and the two fundamental theorems of welfare economics. They introduce these, however, not to argue that competition is thereby justified, but to point out why free markets may *fail* to produce an efficient allocation of resources. Competition may be imperfect, markets may be missing, and information may be incomplete.[30] In addition, they point out that "Pareto efficiency does not ensure that the distribution of income that emerges from the competitive process is in

accord with the prevailing concepts of equity (whatever these may be)."[31]

Recognizing that the Pareto criterion provides inadequate guidance on most matters of policy, Atkinson and Stiglitz make extensive use of social welfare functions. Their defence of the use of social welfare functions is worth quoting at length:

> a complete incidence analysis [i.e. of how the burden of taxation is distributed amongst different people] would specify the effect of any tax policy on every individual in the economy, but such an approach, even were it practicable, would not be of much use for public policy purposes, and the information, once obtained, would undoubtedly be reduced to some form of summary statistics. The social welfare functions we employ ... can be seen as forms of summary statistics, embedding both judgements about the distribution of income and trade-offs beween 'mean income' and inequality.[32]

These value judgements are made as explicit as possible, the implications of a variety of social welfare functions being considered.[33]

A further important aspect of their treatment is that they see the design of public policy is seen as inherently a second best problem. The reason for this is that not only are the only non-distortionary taxes lump sum taxes, but "the information on which to base lump sum taxes is not observable, or it is observable only at great cost, and individuals have an incentive not to reveal it".[34] This means that only a restricted range of lump sum taxes is available. For example, to reach a social optimum (to find this we need to make the necessary value judgements) it might be necessary to tax people according to their earning *capacity* (the maximum that they could earn) so that the tax does not induce them to work less hard. Earning capacity, however, is not directly observable. Because a lump sum tax based on earning capacity (the "first-best" solution) is not available, it is necessary to find a "second-best" solution. It is necessary to develop ways of relating tax to observable characteristics (such as actual income) in such a way as to achieve the desired relation of taxation to the unobservable characteristics (such as earning capacity) in which we are interested.[35]

The first problem Atkinson and Stiglitz tackle is the structure of indirect taxation: how to raise a given amount of revenue, using indirect taxes (taxes on different types of expenditure) in such a way as to minimize the loss of utility.[36] Because all individuals are assumed to be identical, the criterion of maximizing one individual's utility is equivalent to adopting a utilitarian social welfare function. It can be argued that if all individuals are identical a utilitarian social welfare function is acceptable, for the question of equity in the distribution of income does not arise. In addition to investigating the optimal structure of indirect taxation, Atkinson and Stiglitz go on to analyse the second-best problem: what can be said about the possibilities for increasing welfare by changing taxation. After that the model is extended to cover differences between individuals, at which stage considerations of equity are brought in.

There follows a similar analysis of optimal income taxation. Their starting point is the utilitarian approach of Sidgwick and Edgeworth, with its implication that the structure of taxation should be such as to render the

marginal utility of income the same for all individuals.[37] Like Sidgwick and Edgeworth they recognize the need to modify this to take account of the effect of taxes on incentives. There are three ways in which they are able to take their analysis well beyond that of earlier economists.[38] Firstly, their use of social welfare functions enables them to discuss alternatives to the utilitarian criterion. Rawlsian and non-Paretian functions are discussed, the concept of social welfare functions providing a framework within which to discuss the value judgements involved. Secondly, they tackle the second-best problem of what should be done when the choices available to the government are restricted. Finally, the improved mathematical techniques available make it possible to investigate aspects of the problem that could not otherwise be tackled. Does it, for example, make much difference whether the government is constrained to have a constant marginal tax rate?

Given that even the most complicated of the models used are nonetheless highly simplified compared with any real economy, what does such analysis achieve? Atkinson and Stiglitz do not prescribe definite policies on the basis of their theories. Speaking of indirect taxation, for example, they conclude that "There are not typically simple rules of wide applicability."[39] They provide three main arguments for the value of such research.

(1) It casts doubt on conventional rules, such that a uniform sales tax is more efficient than a rate which varies from commodity to commodity.[40] Once we start considering second-best problems, Atkinson and Stiglitz argue, intuition becomes an unreliable guide.[41] Consider, for example, the notion that equity implies that luxuries should be taxed more heavily than necessaries. If high taxes on necessaries were to raise enough revenue to enable a regressive poll tax to be reduced, it might be more equitable to retain the taxes on necessaries than to abolish them.[42]

(2) The results obtained in the literature on optimal taxation depend critically on parameters about which we have little empirical knowledge (e.g. the elasticity of supply of labour, elasticities of demand for commodities).[43] The theory of optimal taxation provides an indication of where empirical research might produce the greatest improvements in the design of taxation.

(3) Analysis of particular problems such as that of optimal taxation helps us understand the implications of alternative objectives which might be pursued:

The exploration of the implications for tax policy of the Rawlsian difference principle, for example, has helped to clarify the nature of that principle, and has influenced the degree to which it has been accepted as a basis for redistributive policy.[44]

Public goods

The theory of public goods and externalities could be considered under the heading of either positive or normative economics, but is considered here

for convenience. Modern theories of public goods stem from two articles by Samuelson (1954a, 1955).[45] He examines what he called "a strong polar case" where each individual's consumption of a collective consumption good (public good) led to no subtraction from the quantity consumed by any other individual. The total supply of the public good enters every individual's utility function. Samuelson went on to derive Pareto-optimality conditions for an economy comprising both public and private goods, thus deriving conditions for the optimal supply of public goods.

Samuelson reached the conclusion that "no decentralized pricing system can serve to determine optimally these levels of collective consumption".[46] No individual will supply the socially optimal amount of a public good, for he or she will be prepared to provide it only up to the point where its marginal cost equals the marginal benefit to him or her personally: the social benefits, comprising the sum of individuals' benefits, must exceed the benefits to any individual.[47] Public goods raise even more fundamental problems, however. Suppose the state were to decide to supply the optimal quantity of a public good, charging individuals according to the benefits they derive from it. To do this it would have to ascertain the benefits to individuals of the public good. Any individual, however, will have an incentive to understate the value of the public good to him or her: if others value the good it will be provided anyway, even if one individual contributes nothing. This is the so called "free rider" problem.[48]

From the starting point provided by Samuelson, economists have developed the theory in a variety of directions. For example, a problem with Samuelson's theory is that pure public goods are very difficult to find. The analysis, therefore, has to be extended to cover "impure" public goods, such as ones where people can choose not to consume the good (e.g. broadcasting) or cases where people can, possibly at a cost, be excluded from consuming the good. Alternative methods of financing various types of public good can be investigated with respect to various welfare criteria. Schemes for inducing potential consumers to reveal their preferences can be devised and evaluated.

Externalities

Like public goods, externalities raise the possibility of market failure. Following Pigou,[49] economists have often argued that externalities call for government action, such as taxes or subsidies, in order to bring marginal private costs into line with marginal social costs. The problem of inducing people to reveal their preferences correctly, however, causes problems with this argument: because many externalities (e.g. pollution) have the character of public goods, people will often have an incentive to misreveal their preferences. It cannot be assumed that the government will necessarily be able to perform better than the market, though of course it may be able to do so.

The aspect of the literature on externalities that will be considered here is Coase's "The problem of social cost" (1960). Apart from being one of the

most frequently cited economics articles,[50] this article is important for changing economists' perspective on the problem of externalities. Coase argued that where one business's actions caused damage to another business (e.g. a grazier's cattle may damage a farmer's crops if there are no fences) it was wrong to assume that such damage should necessarily be prevented. The crucial issue, Coase argued, was whether total production was higher with or without the damage taking place.

Coase started by considering the case where markets work freely: where "the operation of the pricing system is without cost".[51] He then compared two cases: where the damaging business does, and does not, have to pay for any damage caused. Coase argued that total production would be the same in either case. Consider the case of the grazier whose cattle destroy crops. if the grazier is liable for the damage his cattle cause, then he will allow damage to occur only where the benefits to him exceed the damages he has to pay. He will take account of crop damage in deciding, for example, how many cattle to rear, and whether or not it is worth putting up fences. This was well understood. Where Coase went further was in pointing out that similar conclusions would hold if the grazier was *not* liable to pay damages. The mechanism in this case was that, if the prevention of crop damage would result in higher overall production, it would be in the farmer's interest to pay the grazier not to damage his crops. The allocation of resources would be optimal whether or not damages had to be paid.

The implication of this argument was that, provided property rights were properly defined (i.e. businesses know whether they are liable for damages or not), and provided that all necessary transactions could occur costlessly, the distribution of property rights affected only the distribution of income, not the level of output. When market transactions are costly, however, the situation is very different.

Firstly, the distribution of property rights may affect the outcome. With certain externalities, even if liability to damage is well defined, transactions costs may make the payment of damages prohibitively expensive. Transactions costs are likely to be particularly high, for example, where damage is inflicted not on a single business, but on a large number, for it may be expensive even to find out who is affected, let alone enter into a contract with each of them.

Secondly, where the costs of undertaking market transactions are high, businesses will have an incentive to find alternative forms of economic organization. If production is organized within a firm, for example, certain transactions can be organized administratively, within the firm, rather than through the market. The optimal way of organizing production, therefore, will depend on the relative costs of making different types of transaction.[52] The government can, from this perspective, be regarded as a "super-firm", able to influence the use of factors by administrative decision.[53] Coase thus reached the conclusion that "All solutions have costs, and there is no reason to suppose that government regulation is called for simply because the problem is not well handled by the market or the firm."[54]

24.4 CONCLUSIONS

Welfare economics provides an excellent example of how developments in economic theory can result in a new perspective on the history of economic thought. By the 1960s it had become generally accepted that there was no scientific basis for making inter-personal utility comparisons, and as a result of this utilitarian welfare economics appeared completely discredited. Although subsequent developments have not re-instated the utilitarian welfare economics of Sidgwick and Pigou, they have shown that the movement towards Paretian welfare economics went too far: although the scope for scientific inter-personal utility comparisons may be very limited, it is an exaggeration to say that such comparisons cannot be made at all. From the perspective of the 1980s, therefore, the shift from utilitarian to Paretian welfare economics is seen to have involved Kuhnian losses as well as gains.