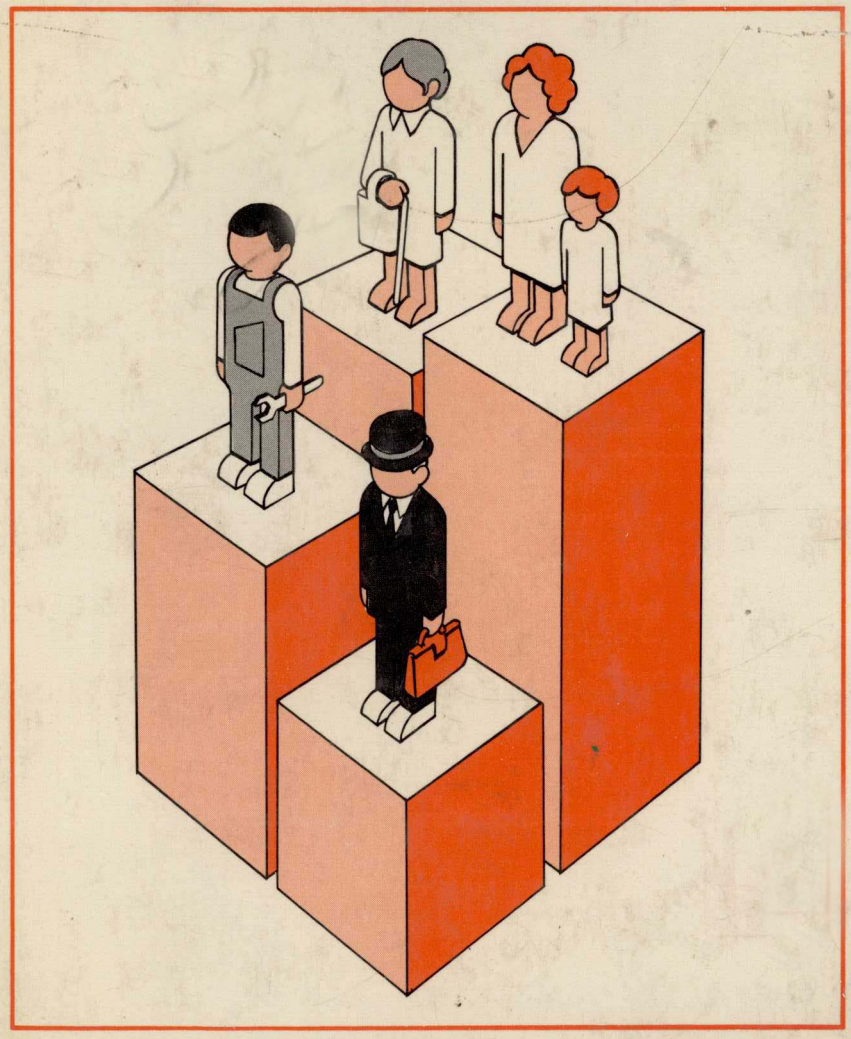
WELFARE ECONOMICS

Introduction and Development of Basic Concepts

Yew-Kwang Ng



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Preface

The persons who are responsible for encouraging me to write this book are Ross Parish of Monash University and John Dillon of the University of New England. After labouring with my poor English on the drafts of the first few chapters, I was not only ungrateful to them but cursed them bitterly for getting me into such a dreadful endeavour. It was only because of my irrational inability to accept the economist's dictum that 'bygones are bygones' (sunk costs should not affect decisions) that I had not thrown away the first few shabby chapters but have persisted in writing to the end. However, as with learning Chinese, more or less straight sailing comes after the initial painstaking endurance. (Any reader who may toy with the idea of learning Chinese is advised either not to attempt it, or, having spent some time learning it, not to give up.) Now, looking at the finished product, I feel reasonably satisfied and am grateful for their encouragement. It seems that both irrationality and imperfect foresight (discussed in Chapter 1) were productively involved in securing the outcome. (After writing the final draft, I feel obliged to say that the final stages of standardising notations, proof-reading, etc., are rather dull, tedious, and time-consuming.)

The intended audience of this book includes advanced undergraduates, graduates, and specialists. A conflict arises from the diversity of the intended audience and is resolved by putting more technical and advanced sections into appendixes and by using asterisks (*) to denote more advanced sections which the beginner may omit without much loss of continuity. The expert may, however, be particularly interested in them. The same applies to footnotes, which usually contain bibliographical references or comment on some technical or advanced complications. Sections with double asterisks contain new arguments. An asterisk after a reference indicates that it is more advanced, mathematical, or touches on a technical point. A 'U' after a reference, e.g. Groves (1978U), indicates that it is unpublished.

It may be thought that the diversity of the intended audience will make the book an inefficient tool either as a basic textbook or as a treatise. It is hoped that the following explanations will largely dispel such apprehensions. First, a textbook is not only read by students but also by the lecturer. The former will benefit more from the basic discussion and the latter from the more advanced parts. By getting the lecturer actively interested in reading the book, more effective teaching may be achieved by using it as a text. (When using a purely basic textbook, a lecturer may not even have the patience to just read through the book.) Moreover, for the elementary student (learning welfare economics for the first time), though he may have a very slight inconvenience of having to skip some sections with asterisks in the first reading, he will find that they are useful and provide the interest for a second reading. This second reading may then bring him to a much deeper understanding of welfare economics. Furthermore, he may use this book (including Appendix 10A) as a guide to his further study. By that stage, he may find the book worth more than a basic text plus an advanced treatise (since the two usually do not completely cohere with and complement each other).

Second, as a treatise, it is also useful for the author to explain clearly the basic concepts and theories and his own opinions towards them before he embarks on his own argumentation. Experts may therefore also find the basic discussion useful. It is true that many may find it too elementary to read. But they will have little difficulty in deciding which parts to skip over. Similarly, for those (e.g. graduate students, economists not specialising in welfare economics) who have some elementary training in or understanding of welfare economics and who wish to advance their understanding, it may be desirable to review the basic concepts before going further. An explanation of the organisation of the book is provided in Section 1.5 and a summary in Section 10.1. A separate summary is also provided at the end of each chapter, before the corresponding appendix.

Partly because of the semi-treatise nature of the book and partly because it is more efficient to deal with those topics I am familiar with, the selection of the non-basic topics is admittedly idiosyncratic. But I believe that a largely unbiased coverage has been achieved for the basic

topics. Nevertheless, due to space limitation, I have not been able to include detailed discussions of as many topics as I would have wished. Appendix 10A is provided as a remedy. On the other hand, due to time limitation and my other commitments, I have not been able to improve the quality of the book within its given length as much as I would have liked. Partly because of space limitation, the discussion may be a little terse in places. At the cost of some possible ambiguities, this has the advantage of provoking independent reasoning. In any case, if the reader has the patience to reread unclear parts, comprehension should not be difficult to achieve. Beginners would find lecturers' instruction and seminar discussion helpful in this respect. For average beginners, the book could thus most profitably be used under instruction.

To make the book accessible to as large an audience as possible given the content, the discussion is mainly non-mathematical and relies heavily on simple two-dimensional illustrations. Mathematics is used only when essential and appears mainly in appendixes. The conceptual discussion starts from the very basic and proceeds to the fairly complicated, including some new arguments. The main features of the book include: a methodological argument for a positive welfare economics (Chapter 1 and Appendix 1A), a proposed rehabilitation of Little's welfare criterion (Sections 3.2.2* and 3.3*), resolution of Arrow's paradox of social choice by revealing the intensities of preferences (Section 5.4*), the 'conscience effect' in externalities (Section 7.4**) and above all, a theory of third-test (Sections 9.4 and 9.5) with an extension to the equity-efficiency consideration (Appendix 9A**) and a plea for a complete study of welfare (Chapter 10). It is hoped that both the novice and the expert will find the book useful.

I am grateful to the following persons for reading and commenting on the first draft: Micheal Burns, Yew-Giam Chen, John Dillon, Avinash Dixit, Theodore Groves, John Head, Murray Kemp, David Mayston, Warren Musgrave, Luat Nguyen, Amartya Sen, Manimay Sengupta, Ian Wearing, and Patrick Xavier. My special thanks must go to Mendel Weisser for very patient reading and detailed comments. I am also grateful to the publishers of *Economica, Economic Journal, Economic Record, Journal of Economic Theory, Kyklos, Public Finance,* and *Review of Economic Studies* for permission to the use

here of material from my articles published in these journals. I also wish to thank the Technical Service in the Department of Geography, Monash University, for expert drawing of figures. Lastly but not least, I wish to thank Jan Ottrey for her efficiency and tolerance in typing both the first and the final drafts. (By coincidence, she and her husband Kevin make up the pair of heroine and hero, J and K, of this book.)

Common Abbreviations

AC	:	Average cost
CIC	:	Community indifference contour
CS	:	Compensating surplus
CV	:	Compensating variation
ES	:	Equivalent surplus
EV	:	Equivalent variation
GUFF	:	Grand utility feasibility frontier
IIA	:	Independence of irrelevant alternatives
MC	:	Marginal cost
MDE	:	Marginal-dollar equivalent
MRS	:	Marginal rate of substitution
MRT	:	Marginal rate of transformation
MU	:	Marginal utility
MV	:	Marginal valuation
SWF	:	Social welfare function
UPC	:	Utility possibility curve
WMP	:	Weak majority preference

Common Symbols

Note: Superscripts indicate different individuals, different situations, or different bundles of goods; subscripts indicate different goods of the same bundle or different indifference levels of a given preference pattern (except Chapter 7, where individuals J and K appear in subscripts).

G : Number of goods
I : Number of individuals
xI^Jy : Individual J is indifferent between alternatives x and y
J, K : Our two individuals, Jan and Kevin
p : Price
xP^iy : Individual i prefers x to y
q : A given distribution of a collection (bundle) of goods
Q : A given collection of goods
xR^iy : xP^iy or xI^iy
U : Utility
W : Welfare
x_g^i : Amount of good g consumed by individual i
X, Y : Two representative goods

Contents

1 Introduction

Welfare economics is a very important branch of economic theory. It serves as a foundation to many applied (relatively speaking) branches of economics such as public finance, cost-benefit analysis, and the economics of government policy in many areas including international trade, industry and welfare (social security, etc.). Recently, even macroeconomics is beginning to assume a microeconomic foundation and become subject to a welfare-theoretic analysis (e.g. Phelps, 1970, 1972). The increasing importance of welfare economics admits of scarcely any doubt.

Most people would agree with Pigou (1922; his work of 1912 was the first to take welfare economics as an independent study) that 'practical usefulness, not necessarily, of course, immediate and direct, but still practical usefulness of some sort' is what we mainly look for in economic investigation. In other words, bearing fruits is more important than just shedding light. To apply economics beneficially in government policies and in solving social issues we need some guidelines or criteria. Most practical policy problems are not simple enough to admit of easy answers. For example, if a change will increase the national income but make it more unequally distributed, is it desirable? If a policy will make certain groups of people better off and others worse off, should it be adopted? Should the government revenue be raised more by direct or by indirect taxes? Shall we go for freer trade even if that will lead to the collapse of some industries? Should we tax or regulate pollution? To what extent should we conserve our scarce resources? Is economic growth a good thing? Can the study of welfare economics help us to answer these problems? But what is welfare economics?

(Beginners may find the methodological discussion of this chapter rather abstract. They are advised to read it, including Appendix 1A, with perhaps not much appreciation. After they have read a few more

chapters, they will appreciate the methodological discussion better. However, if they cannot bear reading it, they may first read Section 1.5 and go on to Chapter 2 without much loss of continuity. More advanced readers are advised to read the methodological discussion of this chapter carefully.)

1.1 What is Welfare Economics?

Welfare economics is the branch of study which endeavours to formulate propositions by which we can say that the social welfare in one economic situation is higher or lower than in another.

The above definition of welfare economics is not much different from the following definition by Mishan. 'Theoretical welfare economics is . . . that branch of study which endeavours to formulate propositions by which we may rank, on the scale of better or worse, alternative economic situations open to society' (Mishan, 1960, reprinted in 1969b, p. 13). In fact, if we define social welfare as whatever is good, or whatever ought to be maximised, then the two definitions are identical. However, the terms 'better' and 'worse' are explicitly normative, while 'social welfare' may be given a normative or a positive interpretation. It is true that most people tend to regard 'social welfare' as a normative term. But there is no logical reason why we cannot adopt a positive definition of the term 'social welfare'. Two such definitions are presented below.

First, we may define social welfare as a vector of individual welfares

$$W = (W^1, W^2, \ldots, W^I), \tag{1.1a}$$

where W^i is the welfare of the ith individual and I is the relevant number of individuals. Here, individual welfare may be taken as an individual's well being, or more explicitly, his happiness, taking happiness to subsume both sensual pleasure and pain and spiritual delights and sufferings. How do we measure individual (net) happiness? One way to escape this difficulty is to assume that an individual is the best judge of his welfare and that he maximises his own welfare. Then, whenever he prefers x to y, he is assumed to be happier at x than at y. We may then use his utility function (which represents his preference) as an ordinal indicator of his welfare. (On ordinal versus cardinal measurability, See section 1.4.) Alternatively, we may directly define social welfare as a

vector of individual (ordinal) utilities. One way or another, we have

$$W = (U^1, U^2, \ldots, U^I), \tag{1.1b}$$

where U^i is a utility function representing the ordinal preference of individual i. (For the moment, we are not concerned with the technical questions of the conditions that are necessary or sufficient for such a representation; on this, see Appendix 1B.)

A vector is said to be larger than another if and only if some of its elements are larger than, and none of its elements is smaller than the corresponding element of the other vector. Thus *if* we define social welfare as a vector of individual welfares (or utilities), we say that social welfare increases if and only if W^i (or U^i) increases for some i and decrease for no i. If welfare increases for some individual and decreases for some other individual, the change in social welfare (according to the vector definition) is undefined in sign and magnitude.

The vector concept of social welfare must be carefully distinguished from the concept of a Paretian social welfare function (SWF). The Pareto criterion says that social welfare increases if some individuals are made better off without any individual being made worse off, where 'better off' may mean 'happier' or 'in a more preferred situation'. A Paretian SWF accepts the Pareto criterion. Hence, 'increase in some W^i (or U^i) and decrease in no W^i (or U^i)' is a sufficient but not a necessary condition for an increase in social welfare. For example, for a person to live in America, it is sufficient that he lives in New York. But it is not necessary for him to live in New York; he may live in Washington, which is also in America. Similarly, if a change satisfies the Pareto criterion, it must be regarded as a good change according to a Paretian SWF. But a change need not necessarily satisfy the Pareto criterion to be regarded as a good change according to a Paretian SWF. For example, a change may make a few individuals marginally worse off but many individuals significantly better off. It may be regarded as a good change by a Paretian SWF. A Paretian SWF may be written as

$$W = f(W^1, W^2, \ldots, W^I) \tag{1.2a}$$

$$\partial f / \partial W^i > 0 \quad \text{for all } i \tag{1.2b}$$

Equation (1.2a) is an individualistic Bergson SWF (Bergson, 1938) and (1.2b) make it Paretian. By the definition of a function, there exists

one and only one value of W for each set of values of $W^i, i = 1, \ldots, I$. Thus, if we have a (specific and fully defined) Paretian SWF, we know that social welfare in an alternative situation is higher or lower even if some W^i vary in opposite directions compared with the original situation. But for the vector concept of social welfare, such a comparison is not available.

The vector concept of social welfare is of course of limited interest due to its avoidance of interpersonal comparison of welfare or utility. Most people accept the Pareto criterion as a sufficient but not a necessary condition for an increase in social welfare. But it is difficult to get people to agree on a specific Paretian SWF or to provide the necessary and sufficient condition for an increase in social welfare. Hence, what is generally accepted is a vague, unspecified Paretian SWF in the form of (1.2) but with the precise form of f unknown. Hence, the vector concept of social welfare in a sense captures the 'minimum content' of this agreement. For example, analysis dealing only with the *necessary* conditions for Pareto optimality may be based on the vector concept of social welfare only. We can then say that the vector social welfare is not maximised unless such and such hold. Then the analysis does not have to be based even on the existence of a general unspecified form of SWF, Paretian or not. One need not then be concerned with the conditions for the existence of a mathematical function. Moreover, even people who do not accept the Pareto value judgement can agree that the analysis has some objective meaning, especially if the vector (1.1b) is used. This makes it possible to interpret welfare economics as a postive study.

Another positive definition of social welfare is the utilitarian concept of the sum total of individual happiness

$$W = W^1 + W^2 + \ldots, + W^I = \Sigma_{i=1}^{I} W^i \tag{1.3a}$$

If a more objective indicator is desired, one may prefer

$$W = U^1 + U^2 + \ldots, + U^I = \Sigma_{i=1}^{I} U^i \tag{1.3b}$$

The advantage of adopting (1.3) instead of (1.1) is that with (1.3), social welfare is not incomparable if some W^i increase and some decrease. A difficulty with (1.3) is the problem of interpersonal comparison of welfare or utility (Section 1.4). Since these individual welfare or utility indices are to be summed, we must be able to find a common