Health Economics

Dr Pratap C Mohanty

Department of Humanities and Social Sciences,

Indian Institute of Technology Roorkee

Week – 08

Lecture 37- Theoretical Foundations of Economic Evaluation- II

Welcome friends once again to our NPTEL MOOC module on Health Economics. We are now in the 8th week of our module. We have already started discussing the lecture on economic evaluation, which was on the basic definitions or foundations of economic evaluations. So, in this lecture, we will discuss the theoretical foundations of economic evaluation and its further details. So far, we have clarified the social welfare ordering, where we address how economic evaluation is made, especially based on different theories. And how the societal ranking of the state in the world is made. As we know, welfare economics involves a hierarchy of value judgment starting with the Pareto criteria that ranks some states but not all. Then, we discussed the compensation test to extend the ranking, but not for optimal Pareto states. Also, these tests do not tell us which state achieves the maximum possible welfare.

In this lecture, we will address the individual ordinal ranking, then specify that only individual ordinal ranking is not a solution and that strong value judgment is needed. So first, we will shift to the concept of social welfare function instead of social welfare ordering. Second, we will introduce the concepts of non-welfarism and extra-welfarism in the later part of our lecture.

Hence, the first aspect of understanding requires a clear and systematic definition of social welfare function. A social welfare mathematical function is a function that ranks alternative social states as less desirable, more desirable, or indifferent for every possible pair of social states. As we already said, the transition from Social Welfare Ordering (SWO) to Social Welfare Function (SWF), from ordering to the exact function, represents a clear shift from the ordinal to a quantitative measurement. The social welfare function represents society's welfare as a function of individual utilities in terms of their real numbers. It aggregates individual utilities to measure overall social welfare.

Early economists like Jeremy Bentham and JS Mill tended to think of utility in concrete terms, and those potentially are measurable. In Bentham's work, utility refers to hypothetical measurement units as 'hedons'- denoting pleasure. At the same time, others have described utility in terms of utils.

Coming to the discussion of social welfare function (SWF) through Bergson and Samuelson- The SWF was actually introduced by the economist Abram Bergson in 1938. Later, it was extended and developed by economist Paul Samuelson in 1948.

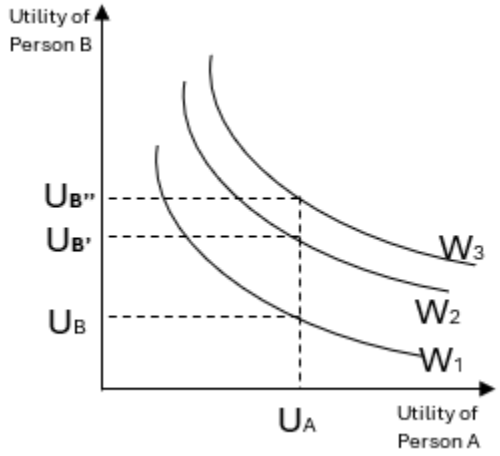
Hence, the most general formulation of SWF is known as Bergson or Bergson and Samuelson social welfare function. This SWF represents society's welfare based on individual utilities. So, basically, how aggregation is made through the individual utility is the challenge to be discussed. And in mathematical form, this is written as-

$$W(x) = f(UA(x), UB(x), UC(x), ..., Un(x))$$

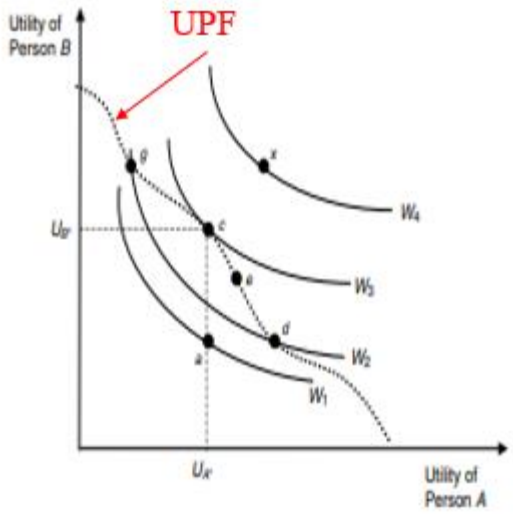
Where, W= social welfare, UA,….,Un= Utility of individual person

So, each person's utility function is clearly identified. The key properties of this SWF are as follows: First, it is not constrained to have a specific mathematical form, hence allowing for flexibility trade-off. Second, this SWF exclusively considers individual utilities as a welfarist approach. Third, social welfare increases with each person's utility, that is consistent with Pareto criteria.

Therefore, this Bergson and Samuelson SWF provides a way to represent society's well-being numerically by approximation of its individual utilities. In this figure, we have presented curves (Ws) representing the Bergson and Samuelson SWF:



It is often drawn as convex, but it is not necessarily always the case. Let's see the figure details now. If **UB** increases to **UB'**, and then **UB'** to **UB"** and **UA** remain constant, then the social welfare function shifts to the next level, from W1 to W2 and W3, respectively. You can just check the changes from the figure. There are some shifts. Now, let us discuss its details in more detail. Welfare economics transforms to the ultimate goal, that is, from the social welfare ordering (SWO) into an optimisation problem using social welfare function (SWF) and the utility possibility frontier. In this figure, we have used the utility possibility frontier concept (discussed in the previous lecture) along with the Bergson and Samuelson social welfare function (SWF) to present the best optimal choice-



Here, we will start with a within the UPF. UPF is the frontier, and a is an inefficient point. Pareto improvements are possible by moving from a to point c, d and e. You can just have a check from the figure. All possibilities are there. Now see x in the W_4, x is highly desirable but difficult to attain due to constraints. So, both a and x are cancelled out. Hence, all the remaining points (i.e., g, c, e, d) along the UPF can be termed as Pareto optimal, although unrankable by the Pareto principle or the compensation test we already discussed.

The SWF or the social welfare function introduces a stronger value judgment in designating c. c is the best distribution point of utility between A and B, as it has the highest accessible indifference curve. At this point, we are on the UPF and attending the highest possible welfare level. Hence, c is known as the optimal, optimum or bliss point. As SWF encapsulates society's views, the exact shape of SWF depends on the views about distributive justice and equity.

There are many social welfare functions. The major are discussed here. Broadly, there are three SWFs. These are- i) Classical or Benthamite and Utilitarian social welfare function, ii) Bernoulli-Nashsocial welfare function and iii) Maximin or Rawlsian SWF. Starting with the Benthamite or Utilitarian social welfare function- This advocates an ethical position and can be said to be the world's most desirable state, generating the greatest good for the greatest number.

This can be formulated as-

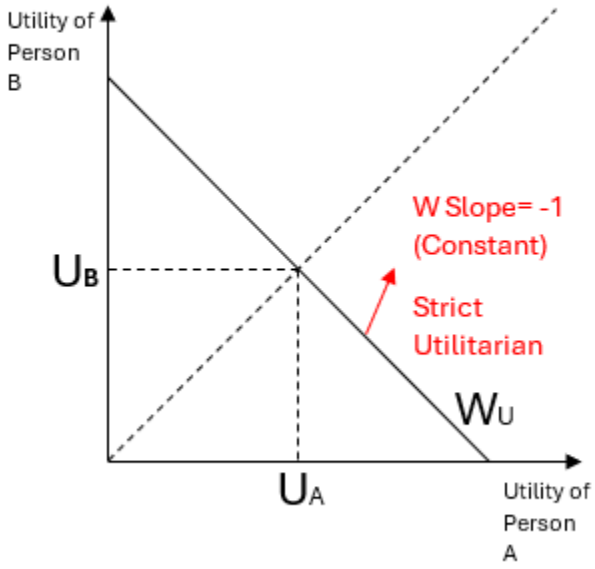
$$W(U_1, U_2, U_3, \dots\dots, U_n) = \sum_{i=1}^{n} U_i$$

Here, we used the summation of the individual utilities without their respective U weights, as they are considered similar across all the individual utilities. For simplicity, the equation can be written as the summation and the two individual-

$$W(U_1, U_2) = \sum_{i=1}^{2} U_i = U_1 + U_2$$

This SWF is strictly egalitarian because every person is equally weighted.

The utilitarian welfare function is shown in this figure, and you can see that it is a straight line as per equation-



There are strong value judgments. As aggregate utility increases, W also increases. So, it has a one-to-one relationship. There is a clear trade-off between A and B's utility choices, as one's utility will be compensated for by another.

Society may want to weigh an individual's utility differently. Let us allow society to assign varying importance to individual utilities using variant utilitarian SWF-

$W(U_1, U_2, U_3, \dots\dots, U_n) = \sum_{i=1}^{n} a_i U_i$.

Here, the term $\mathbf{a_i}$. is called welfare weight, which society attributes to a person. So, in this case, our slope will be $\mathbf{(-a_A/a_B)}$.

Now, let us discuss the Bernoulli-Nash social welfare function. As per the text from different studies, we correlated and observed that Bernoulli-Nash utility functions are not additive, carrying a product. Hence, the individual utilities in the two cases we have presented here are the product of each other.

$$W(U_1, U_2, U_3, \dots\dots, U_n) = \prod_{i=1}^{n} U_i$$

For simplicity, if we take a case of 2 individuals, the equation will be formulated as-

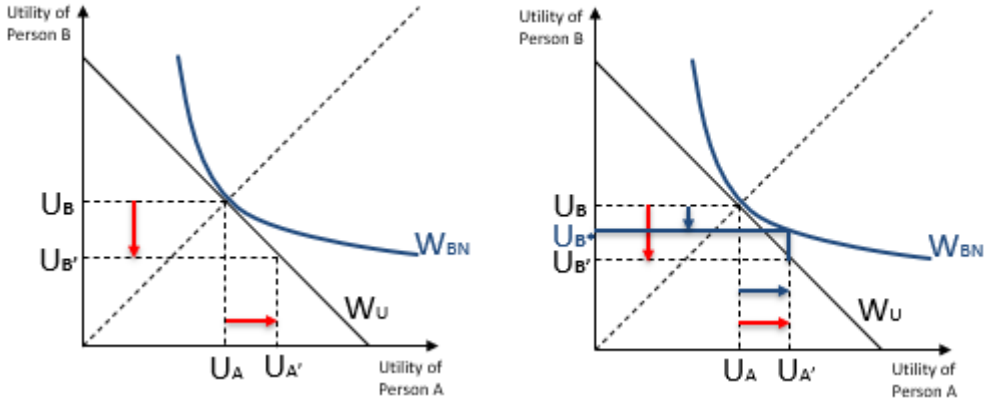
$W(U_1, U_2) = \prod_{i=1}^{2} U_i = U_1 \text{ x } U_2$

In case of varying weight, it can be represented as-

$W(U_1, U_2, U_3, \ldots\ldots, U_n) = \prod_{i=1}^{n} {U_i}^{a_i}$

Where a_i = welfare weight that society attributes to a person

And again, in this case, a reduction in one's utility will be added or multiplied with the utility of another. We will now compare the Bernoulli- Nash SWF curve with Utilitarian SWF-



When we discuss about a product-based SWF and its respective weights, we end up with the possibility of SWF of the Bernoulli-Nash SWF, which is largely a rectangular hyperbola and which has the interpretation of semi-egalitarian This is largely due to the diminishing MRS (marginal rate of substitutions). This implies that with an increase in A's utility (highlighted in the figure) from U_A to U_A', there will be a decline in B's utility. But unlike Utilitarian, in the Bernoulli-Nash SWF, the compensation or adjustment is not completely the same. In this case, an increase in A requires a smaller reduction in B's utility from U_B to U_B* compared to the utilitarian social welfare function, which was considered constant because of its linear function.

The third one, which is quite relevant and considered to be discussed largely in social welfare discussions, is called the Maximin or Rawlsian social welfare function. Rawlsian views are taken from their book 'theory of justice' authored by Rawls in 1971. It follows the Rawlsian philosophy under which social welfare is identified with the utility of the worst-off individuals.

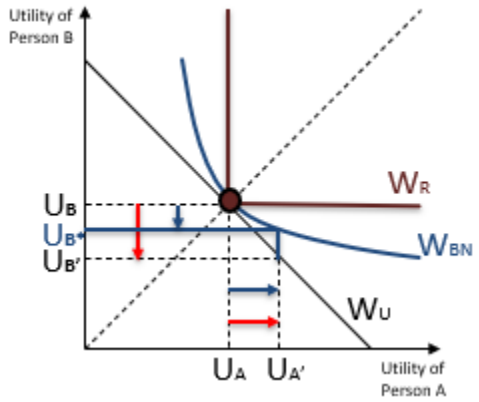
So, if the worst-off individual in society is compensated very well or is addressed equivalent to others (the worst one also receives a great degree of justice)), then the society

on the aggregate is considered the best. Hence, Rawls suggests that the minimum level of welfare should be guaranteed. The function is written as like-

$$W(U_1,\ U_2, \ldots\ldots,\ U_n) = \min\{U_1,\ U_2, \ldots\ldots,\ U_n\}$$

Here, social welfare follows a leontief structure.

On comparing all three SWFs (i.e., utilitarian, Bernoulli-Nash, and Rawlsian), via following diagram-



Rawlsian approach is followed where the minimum is derived as the best possible choice function among the individuals. Once that is attended, it is guaranteed that society attends its best.
For Example-

$$\boldsymbol{W(U_A,\ U_B) = min\ (U_A,\ U_B)}$$

Let's say- **Initial Point (•)** $\boldsymbol{= min\ (100,\ 100) = 100}$

Case 1: ↑ in B's utility $\boldsymbol{= min\ (100,\ 120) = 100}$

Case 2: ↑ in A's utility $\boldsymbol{= min\ (120,\ 100) = 100}$

So, at the initial point, if it is 100 and 100 between two individuals A abd B, then the minimum will be 100. And there are two cases you can just solve and understand. If the minimum choice between 100 and 120 is there, so the minimum will be 100. Or, the first person has 120 (i.e., B's utility increases) and another is 100, then 100 is the required minimum. The two's welfare might be considered largely complementary to each other. When the perspective of utilities is greatly complementary, utility is largely dependent on the combination of choices of others. In that case, the best for the individual with minimum utility (if any) is guaranteed, and society receives the best. This is the idea, and we have also compared the three in this diagram.

Now, let us see the problems with SWF. Attempts to construct SWFs are constrained by our ability to measure utility. So, the ability to measure utility is a bigger constraint. We will clarify it between cardinal and ordinal-based approaches. In the cardinal one, welfare economics relies on the use of money as a proxy of utility. There are some examples where cost-benefit analysis is used to explain the cardinal approach. There are also strong assumptions, such as the application requires caution in both the interpretation of results and in making recommendations. Through the ordinal values, it is possible to compare another combination. However, these are only measurable in ordinal scale and non-quantifiable. And we also discussed this in the part of Arrow's impossibility theorem where this scale is used. And if time permits, we will also give further directions. And this has a complete direction and is consistent with social welfare ordering and is usually impossible, as mentioned in the works of Arrow.

We will also discuss here the criticisms of the welfarism approach of decision-making in health. Criticisms are discussed through questions on relevance and the underlying theories, utility as the sole measure, exclusion of community values, and utility's flawed measure. We start by the relevance of underlying theories. This suggests that healthcare systems reject using markets as the sole means of funding healthcare. Economists often question whether- is it appropriate to rely on market theories of consumer behaviour to provide the basis for allocating resources in the non-market setting.

In the case of utility as a sole measure, welfarism is criticised on the grounds that it is too restrictive and the assessment is solely based on utility, and this seems reasonable to suggest other things than individual consumption utility. You can also refer to our Grossman analysis, which includes health capital or commodities as a combination of health and other commodities. This is also discussed.

The concept of exclusion of community values. is firmly rooted. Individuals are utility maximisers, ignoring the community. So, this precludes the idea that people may voluntarily contribute to some common good as mentioned in the works of Professor Amartya Sen in 1977. Amartya Sen calls it as- counter-preferential and special, this means that the obligations towards others should be emphasised. However, since we are addressing the individual utilities that might be negligent for the community, The last one is in terms of the flawed measurement. Since people differ in their ability to convert commodities into well-being, especially in measuring social welfare with certain utility, it is really misleading. And you can also check with the function and capabilities; somewhere, we will also address all sorts of directions.

We have mentioned and promised to explain the issue of non-welfarism. So far the discussion was all about welfarism foundations of economic evaluation, and it is evident that providing a comprehensive guide to decision-making is really difficult. Hence, an alternative non-Welfarist normative framework of economic evaluations is also required. So, what do we mean by this non-Welfarist framework? It is basically called a normative framework for social decision-making that rejects welfarism. There is no single theoretical

non-welfarist paradigm; non-welfarism is consistent with a diverse set of theoretical perspectives and propositions as mentioned in Morris 2012 work.

So, after discussing this basic difference, we need to just compare the welfarism perspectives based on some indicators. We start on their basis. When we say about welfarism, it is grounded in microeconomic theory, especially consumer choice theory, whereas in non-Welfarism case, it encompasses diverse theoretical perspective and propositions. In the case of formality, the welfarism perspective is considered to be systematically describing the derived conclusions which are considered to be formal, whereas in the case of non-Welfarism, this is sometimes viewed as a practical or less formulated collection of guidelines. In the evaluation, the welfarism perspective focuses primarily on individual utility and economic efficiency, whereas the other one (non-welfarism) may consider additional factors beyond utility, such as fairness, equity, community values, etc.

Another important concept in the literature is called the concept of extra-Welfarism. This is related to the function and capabilities. According to this theory, personal characteristics are based on functioning and capabilities.

In terms of functioning, we will be emphasising on what a person manages to be and for the capabilities we will be emphasising on the freedoms that a person has to make choices. So, extra-Welfarism is a concept advocated by Professor Sen and developed by Culyer. As per Sen, such characteristics that influence a person's assessment of well-being, information on them should be included into the process of comparing social states. This is also known as extra-Welfarism because things extra to utility are included in this discussion. It considers various characteristics of individuals relevant to social choices. Extra-welfarism recognises that all the characteristics are equally relevant in every decision, and the selection of pertinent characteristics is closely tied to the concept of need.

Extra-Welfarism in healthcare- In the context of healthcare decisions, extra-Welfarism emphasises the inclusion of health as a critical characteristic in the social welfare function. It is formulated as a different utility from the commodities and its utility out of health state for some consumers, some other individuals-

$$W = f(U_A, H_A, U_B, H_B, \dots \dots U_n, H_n)$$

W= Welfare, U= Utility from consumption, H= Health Status, A,B,….,n= Individuals

The difference between these with the social welfare function and those earlier studied is that health enters the social welfare function directly instead of earlier ones, which is Welfarism's SWF, where health is included alongside other commodities and social welfare function is determined strictly from the utilities.

The main difference between welfarism and extra-welfarism lies with their outcome, the source of valuation, their weighting, inter-temporal comparability, etc. We will be discussing these. In the case of welfarism, we target with the individual utility, whereas an

extra-Welfarism may include individual utility as well as extra measures and indicators of well-being such as health, health gain, distribution of health or out of patient satisfaction, caregiver burden, etc. The source of validation is the affected person in case of welfarism, whereas for the extra-welfarism, it could also be an expert, representative sample of the general public or decision makers. So, we have also cited the source, it might be helpful for your reading.

Weighting of outcomes in the welfarism concept, they are sometimes weighted according to the distribution of individual utility, whereas in extra-welfarism, this is allowed and often considered important as a means of incorporating equity considerations. Weights may be based on a variety of considerations, such as wealth or need. In terms of intertemporal comparability of relevant outcomes, there are differences. You can just have a read.

Now, coming to the criticism and limitation of this EW (Extra-Welfarism). There are issues of interdependence. Here, especially in the case of extra-Welfarism, the integration of health and utility faces challenges due to the interdependence between them and complicating optimal social location. There are some problems with the exclusion of non-health utility as well. In terms of the pragmatic health focus because the emphasis on health is the primary objective and might have originated pragmatically, lacking strong theoretical justification, relying on unclear external judgments.

Similarly, related to community versus individual, there is a blurred distinction between extra-Welfarism and the non-Welfarism concept. The line between these two is unclear, challenging the principles guiding extra-Welfarist decision-making. So, these are all.

What we are going to cover for the next lecture. We will be discussing the principles of economic evaluation, their introduction, and the types of economic evaluation techniques. For the time being, you can stick to these readings. We have also cited the specific chapter in some cases. I think this will clarify your doubts. However, we will be happy to address your queries. With this, I must stop here. Thank you.