# Efficiency and Equity

# Questions

- How do we choose between two PO allocations? Given the fact that welfare gain of one comes at the expense of another's loss.

- What is Social Welfare Function?

- Why is that useful?

- How to analyse the trade-off between efficiency and inequality?

- How to measure poverty an inequality?

- How to practically translate theory to policy implementation by Government?

# Welfare Theorems so far....

- We know –

1. Pareto optimality

2. $1^{st}$ Welfare theorem – competitive markets – efficiency

3. But, even if the economy is efficient, the resulting income distribution might not be desirable

4. $2^{nd}$ Welfare theorem – alter the distribution by influencing the initial endowments

# What more do we need?

- The importance of balancing efficiency and income distribution

- We need a framework that enables us to do that

# Efficiency and Distribution Trade-offs

- Let RC starts with 10 oranges and F with 2

- Govt thinks this is not equitable

- Tries to transfer 4 oranges to F from RC – but in the process, 1 orange is lost (why?)

- RC ends up with 6 and F with 5

- Quite equitable but inefficient

# Debate

- Debate 1 – nature of trade-off

- To reduce inequality, how much efficiency is to be sacrificed? Will that 1 orange vanish?

- Debate 2 – relative value to be assigned to a decrease in inequality compared to a decrease in inefficiency

- Group1 suggests that inequality is the central problem while group2 suggests that efficiency is sacrosanct – increase the pie, both will get higher shares!

# Social Choices

- We start with individual choices – utility maximization

- So, economy is efficient if it operates on the Utility Possibilities Schedule

- 1$^{st}$ FWT suggets that competitive economies are always on the utility possibilities schedule.

- The second fundamental theorem of welfare economics says that every point on the utility possibilities schedule can be attained through a competitive market process if the government redistributes initial endowments accordingly.

# Social Choices

- How does society select a point along the utility possibilities curve?

- indifference curves for individuals - tradeoffs between different goods

- **social indifference curves describe how** society might make trade-off s between utility levels of different individuals

- Restate the two central questions of welfare economics in terms of this social choice framework

# Social Indifference Curve

- The social indifference curves describe how society evaluates trade-offs between two individuals; it gives the combinations of utilities between which society is indifferent.

- Society is better off on a higher social indifference curve, just as an individual is better off on a higher individual indifference curve.

- society's preferred point on the utility possibilities curve is the point at which the social indifference curve is tangent to the utility possibilities curve

# Social Indifference Curve
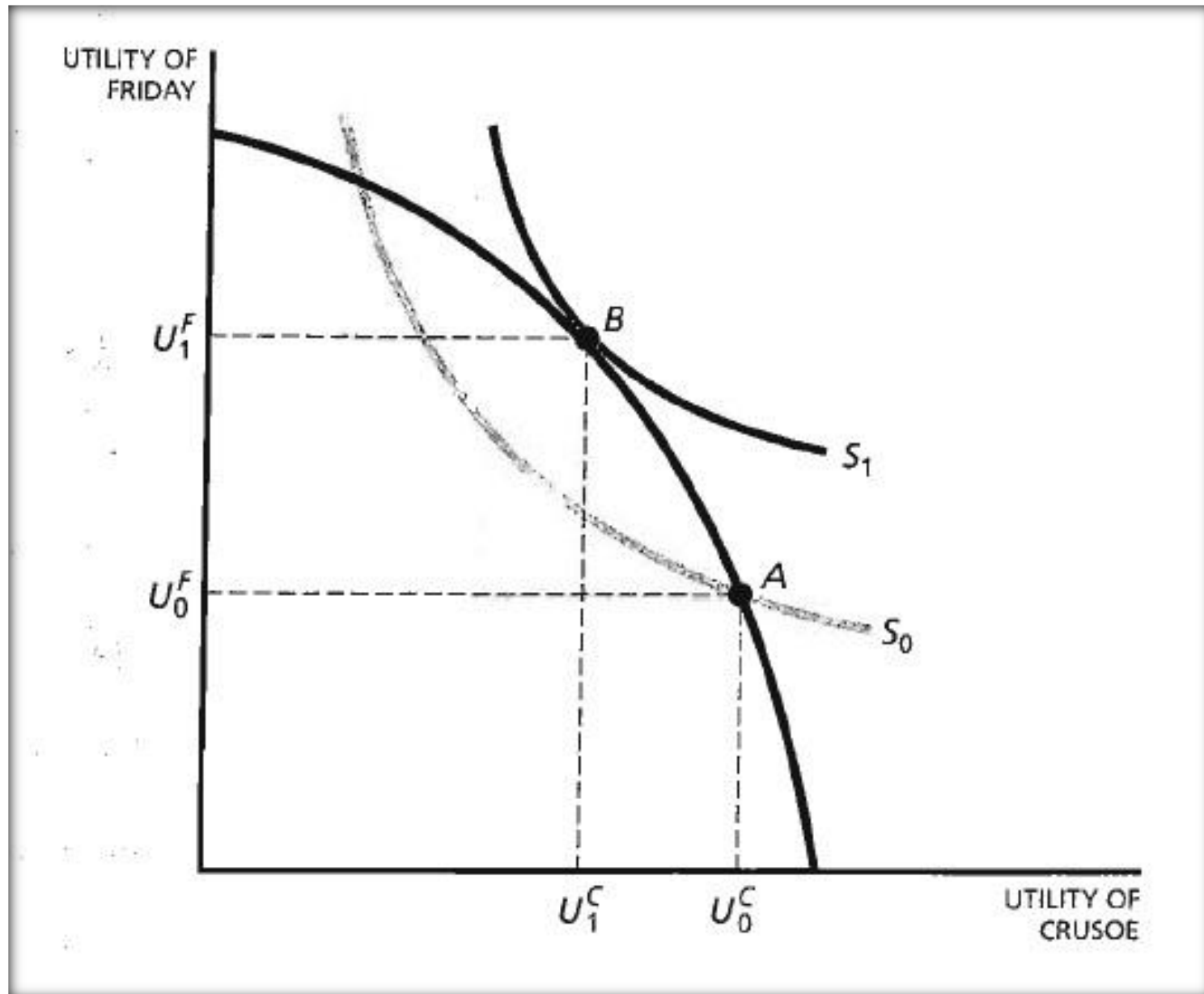
# Social Indifference Curve

- Assume the current competitive market equilibrium is represented by the point A on the utility possibilities schedule.

- Suppose society decides to move, say, from point A to point B along the utility possibilities schedule, representing an increase in Friday's utility and a reduction in Crusoe's utility.

- What is the trade-off ?

- Increase in Friday's utility and decrease in Crusoe's utility….

# Social Indifference Curve

- How does society evaluate the trade-off ?

- The slope of the social indifference curves gives the trade-off s for which society is indifferent.

- Point B is on the social indifference curve S1, which is tangent to the utility possibilities curve, and lies on a higher indifference curve than S0.

- Point B is therefore preferred by society.

# Determining the Trade-offs

- The utility possibilities schedule shows us the tradeoff s of transferring utility from Crusoe to Friday

- Movement from A to B - Friday's utility increases and Crusoe's utility decreases

- However, the decreases in Crusoe's utility are small in comparison to the increases in Friday's utility

- Let's consider the following transfer – A to B to C

# Determining the Trade-offs
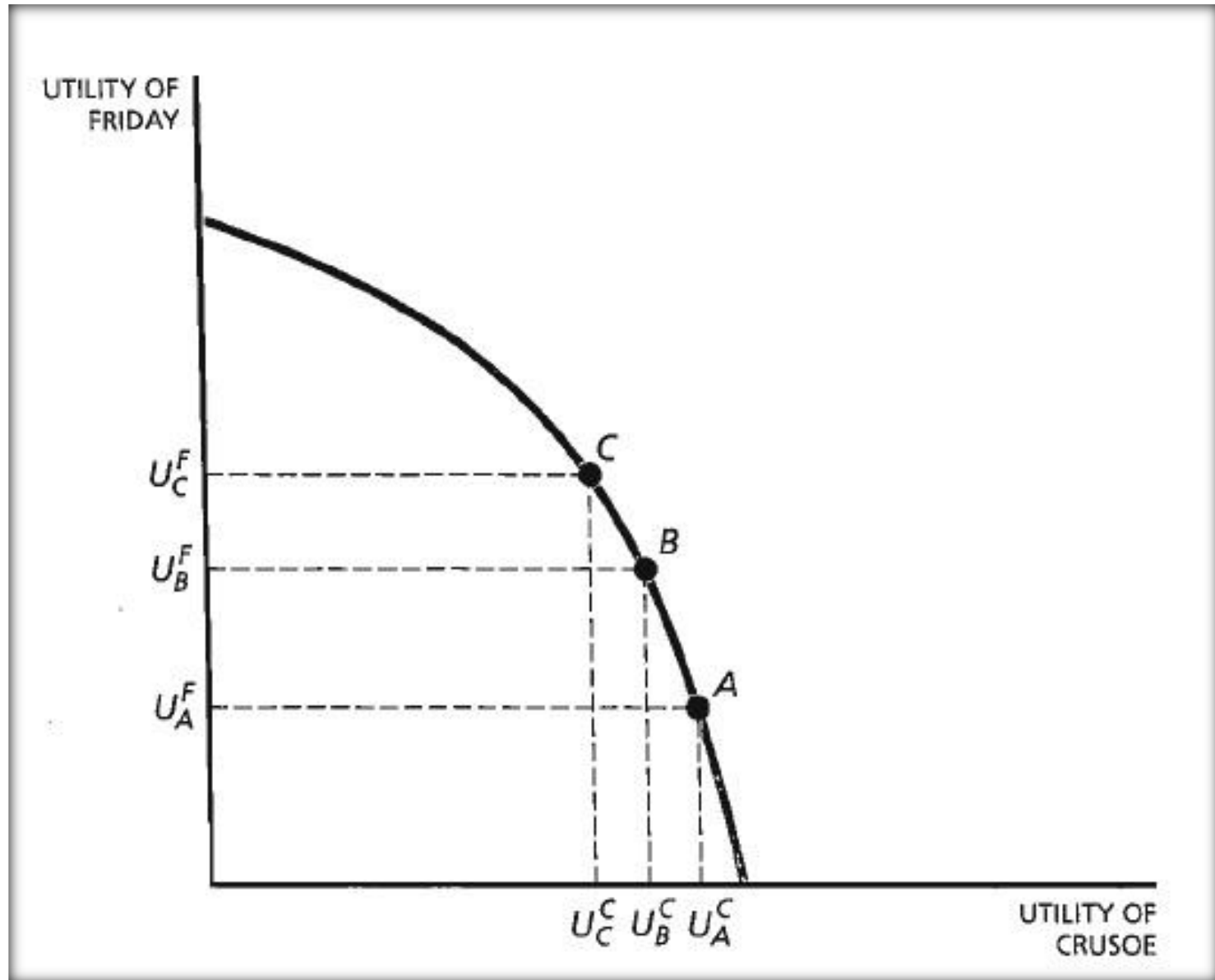
# Utility Theory

- Utility theory helps explain this outcome.

- Economists use the term **utility function** to describe the relationship between the number of oranges and Friday's level of utility

- The extra utility Friday gets from an extra orange is called his **marginal utility.**

- At each point, marginal utility is the slope of the utility function; utility rises more slowly, and marginal utility falls.

- Diminishing marginal utility

# Utility Theory

- Hence, as we take away oranges from Crusoe, his utility decreases; and as we take away more and more oranges, the extra utility he loses from each additional loss of an orange increases

- when Friday has very little income (few oranges), we can increase his utility a great deal with a small decrease in Crusoe's utility

- But when Friday is much better off , we can increase his utility only a little with even a large decrease in Crusoe's utility.

# Efficiency of Transferring Resources

- A second important determinant of the shape of the utility possibilities schedule is the efficiency with which we can transfer resources from one individual to another

- the way we transfer resources from one group (say, the rich) to another (say, the poor) is by taxing the rich and subsidizing the poor.

- The rich may work less hard than they would otherwise because they reap only a fraction of the returns for their effort, whereas the poor may work less hard because by working harder, they may lose eligibility for benefits.

# Efficiency of Transferring Resources

- The magnitude of these disincentives affects the entire shape of the utility possibilities schedule.
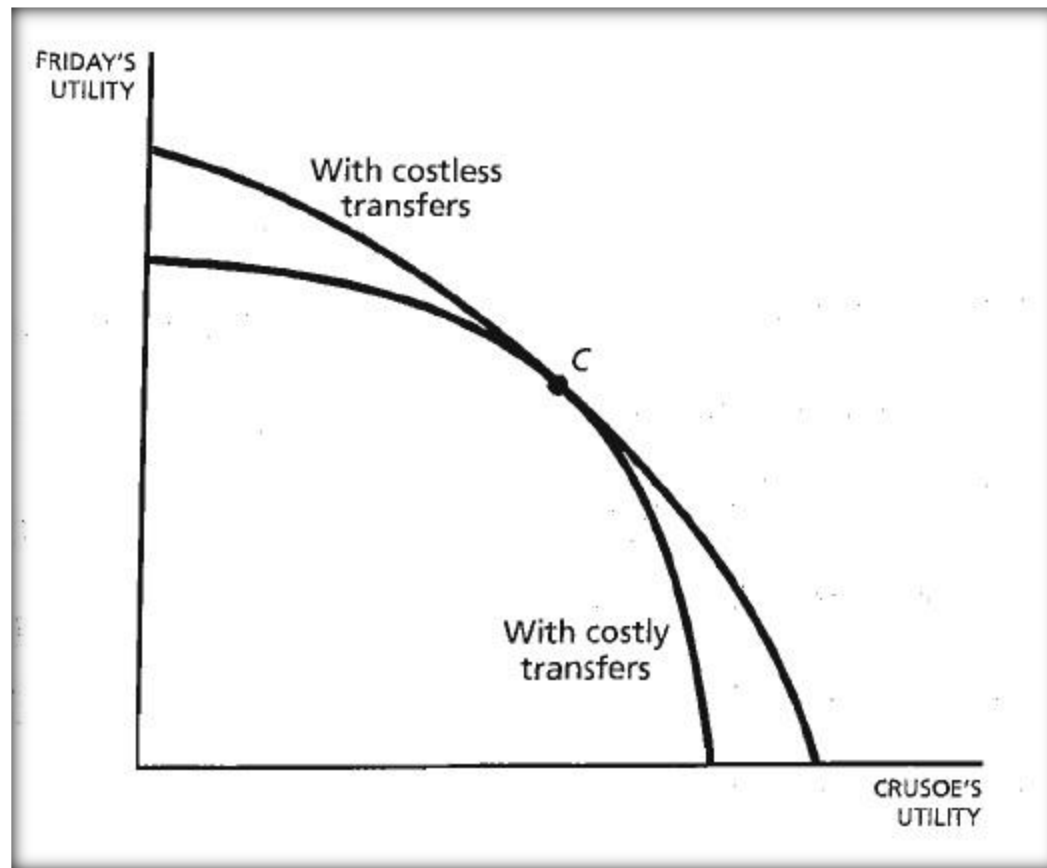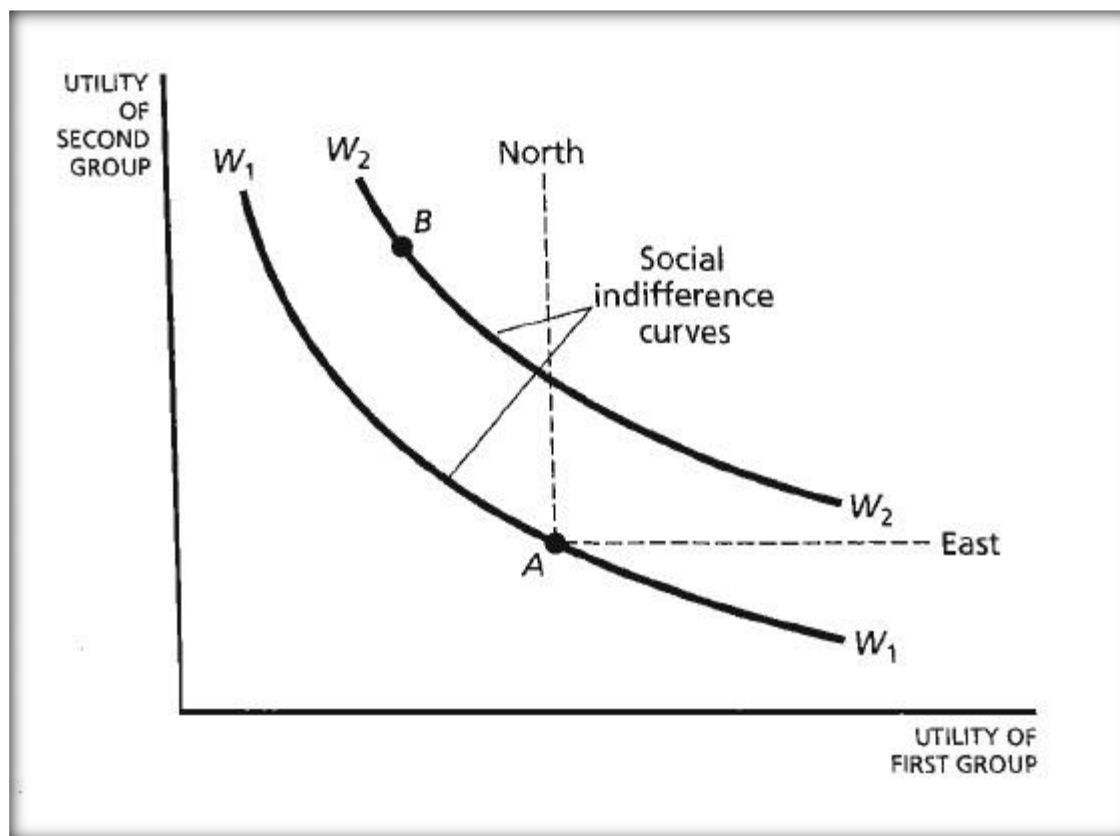
# Evaluating The Trade-offs

- The second basic concept used in analyzing social choices is the social indifference curve.

- Just as individuals derive utility from the goods they consume, we can think of society as deriving its welfare from the utility received by its members.

- The *social welfare function* gives the level of social welfare corresponding to a particular set of levels of utility attained by members of society.

# Evaluating The Trade-offs

- The social indifference curve is defined as the set of combinations of utility of different individuals (or groups of individuals) that yields equal levels of welfare to society

- In other words, the social welfare function has the same value

- The social welfare function provides a basis for ranking any allocation of resources: we choose the allocations that yield higher levels of social welfare.

- The Pareto principle says that we should prefer those allocations in which at least some individuals are better off and no one is worse off .

# Evaluating The Trade-offs

- It says that if some individuals' utility is increased and no one else's utility is decreased, social welfare increases.



- The combinations to the northeast of A make everyone better off , and hence satisfy the Pareto principle

# Evaluating The Trade-offs

- Unfortunately, most choices involve trade-offs, with some individuals being made better off and others worse off .

- At point B the second group is better off than at A, but the first group is worse off.

- We thus need a stronger criterion, and this is what the social welfare function provides.

- SICs makes a simple visual portrayal of the kinds of trade-off s society faces

# Evaluating The Trade-offs

- If society is very concerned about inequality, it might not care that Crusoe has to give up seventy oranges for Friday to get one orange, "since Crusoe has so many to begin with."

- As long as Friday is poorer than Crusoe, any sacrifice on Crusoe's part that makes Friday better off would be justified.

- Society might not care at all about inequality; it could value an orange in the hands of Friday exactly the same as an orange in the hands of Crusoe, even though Friday is much poorer.

# Evaluating The Trade-offs

- In that case, it would focus only on efficiency

- No redistribution of oranges from Crusoe to Friday would be justified if, in the process, a single orange was lost.

- Social welfare functions—and the associated social indifference curves—can take a variety of shapes
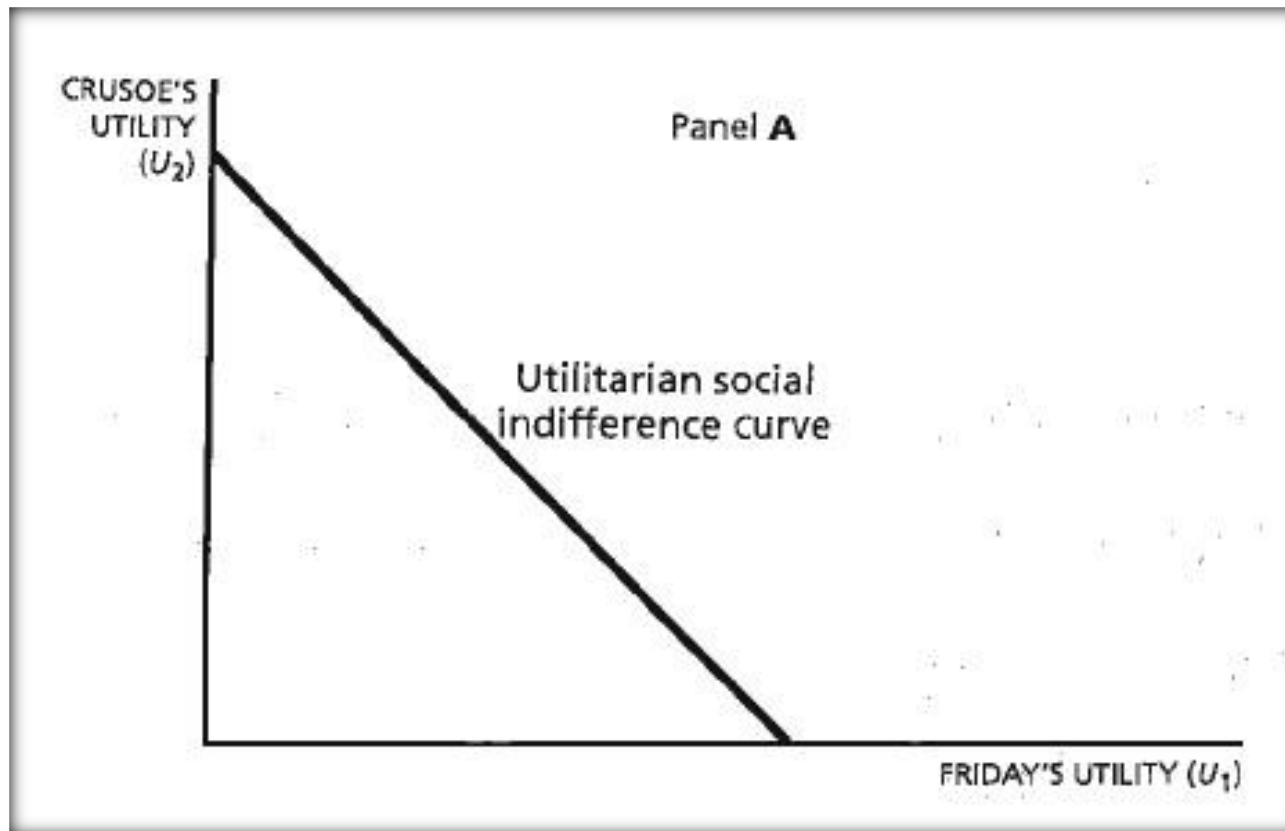
# Utilitarianism

- Assume that the SIC is straight line

- implying that no matter what the level of utility of Friday and Crusoe, society is willing to trade off one "unit" of Friday's utility against one unit of Crusoe's

- The view represented by this social indifference curve has a long historical tradition, dating back to Jeremy Bentham, the leader of a group called **utilitarians**.

- They argued that society should maximize the sum of the utilities of its members

# Utilitarianism

- For example, with two individuals, the social welfare function is

$$W = U_1 + U_2$$

CRUSOE'S UTILITY ($U_2$)

Panel **A**

Utilitarian social indifference curve

FRIDAY'S UTILITY ($U_1$)

# Utilitarianism

- It is important to emphasize that with a utilitarian social welfare function, society is not indifferent to an increase of one orange (or one dollar of income) for Individual 1 and a decrease of one orange (or one dollar of income) for Individual 2.

- If Individual 1 has a lower level of income (fewer oranges) than Individual 2, then the increase in utility of Individual 1 from one more orange (one more dollar) will be greater than the decrease in utility for Individual 2.

- What the utilitarian social welfare function says is that the utility of any individual should be weighted equally to the utility of any other individual.

# Utilitarianism

- Many would argue that when one individual is worse off than another, society is not indifferent to a decrease in the utility of the poorer (Individual 1) matched by an equal increase in the utility of the richer (Individual 2).

- Society should be willing to accept a decrease in the utility of the poor only if there is a much larger increase in the utility of the rich.

- SIC would be decreasing at increasing rate curve

# Utilitarianism

- As the poorer individual becomes worse and worse off , the increment in utility of the richer individual that makes society indifferent must be larger and larger
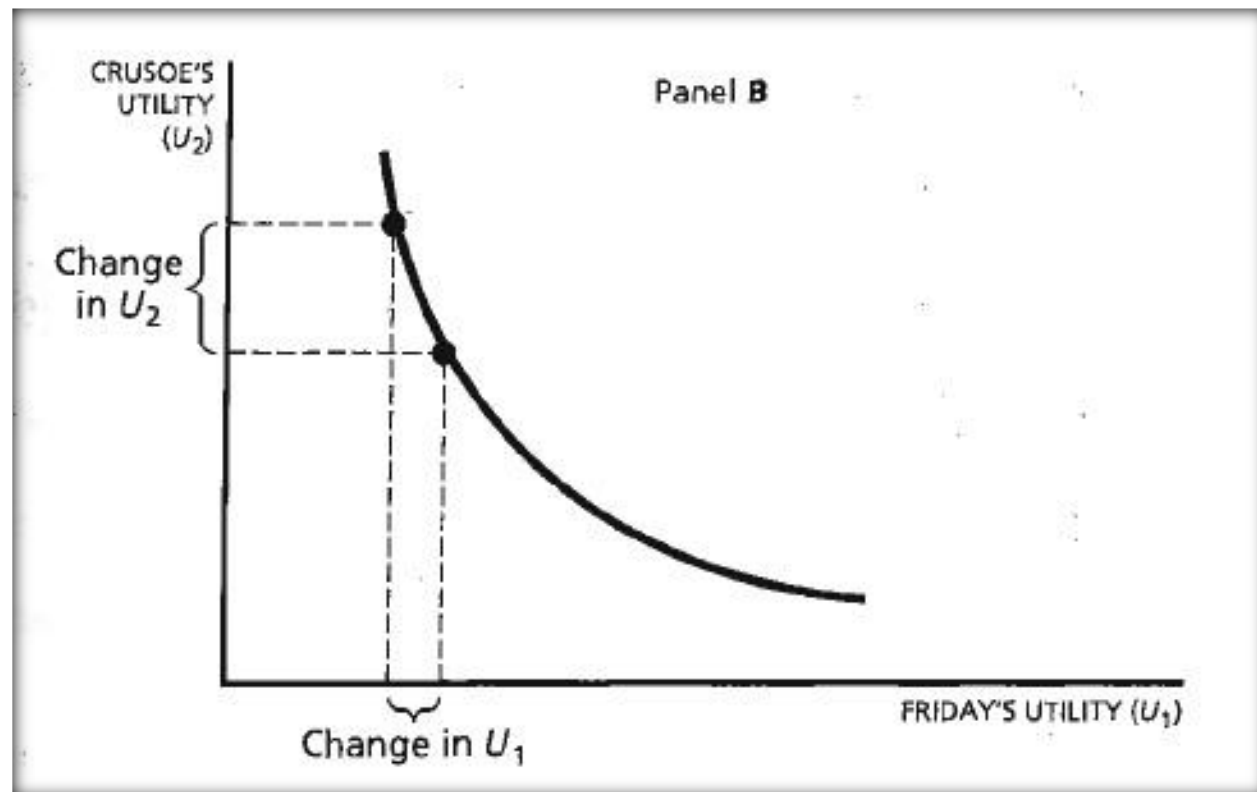
# Rawlsianism

- Rawls argued that the welfare of society depends only on the welfare of the worst-off individual.

- So society is better off if you improve that individual's welfare, but gains nothing from improving the welfare of others.

- There is no trade-off!!!

- If Friday is worse off than Crusoe, then anything that increases Friday's welfare increases social welfare.

# Rawlsianism

- As oranges are transferred from Crusoe to Friday, it makes no difference how many are lost in the processas long as Friday gets something.

- Loss of efficiency in the transfer process is irrelevant

- No amount of increase in the welfare of the better-off individual could compensate society for a decrease in the welfare of the worst-off individual.

# Rawlsianism

- L-shaped SIC
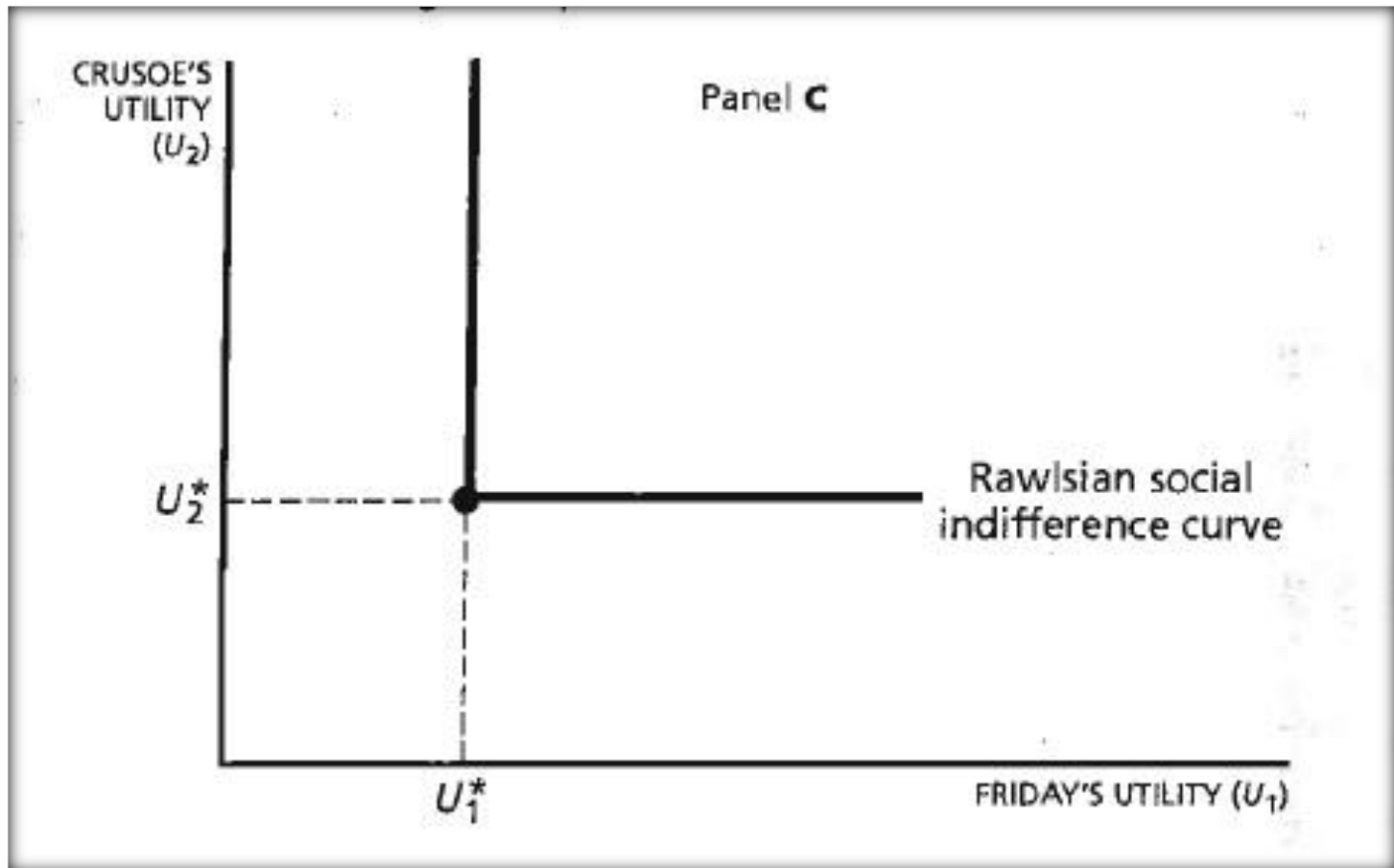
# Social Choice in Theory

- **Construct the opportunity set**.
  - The utility possibilities schedule describes how much one person's utility must be decreased when another's is increased.

- **Define preferences**.
  - Social indifference curves describe how much society is willing to decrease one person's utility to increase another's by a given amount.

- **Adopt programs that increase social welfare**.
  - Find the programs that put society on the highest social indifference curve.

# Criticisms

- **Interpersonal Comparisons**

- We assume that when an individual consumes more, his or her utility rises.

- But we cannot measure the level of utility or the change in utility.

- In some situations, it may be possible to use the amount of money an individual would be willing to pay for an object as a measure of the utility of that object.

- However, this does not resolve the problem of comparing utilities across individuals.

- Social welfare functions seem to assume not only that there is a meaningful way of measuring an individual's utility, but that there is a meaningful way of comparing the utility of different individuals.

# Criticisms

- For example, with the utilitarian social welfare function, we add up the utility of the different members of society.

- Because we add Crusoe's and Friday's utility together, we are assuming that somehow we can compare, in a meaningful numerical way, their levels of utility.

- But when we transfer an orange from Robinson to Friday, how can we compare in an objective way the value of Friday's gain and Robinson's loss?

# Criticisms

- The same problem arises with a Rawlsian social welfare function,
- where we are told to maximize the welfare of the worst-off member of society.

- To judge who is worst off, we must somehow compare utilities.

- Many economists believe that these **interpersonal utility comparisons** cannot be made in any meaningful way.

- Economists argue that there can be no scientific basis for making welfare comparisons

# Criticisms

- And because there is no "scientific" basis for making such welfare comparisons, many economists believe they should limit themselves to describing the consequences of different policies—only pointing out who are the gainers and who are the losers—and that should be the end of their analysis.

- They believe that the only circumstances in which economists should make welfare judgments are those in which the policy change is a Pareto improvement.

- Unfortunately, as we have said, few policy changes are Pareto improvements; hence, without making interpersonal comparisons of welfare, economists have little to say regarding policy.

37

# Political Views

- **Flute Story (Amartya Sen)**

- 3 kids, one flute – kid 1 can play the flute, kid 2 has made the flute and kid 3 is very poor and have no toys

- View 1: Give it to the one who can play the flute (Liberal)
- View 2: Give it to the one who's labour has gone into (Marxist)
- View 3: Give it to the one who is poor (egalitarianism)

- Look, Implementation is contingent upon your political view

# Criticism 2

- The second set of objections concerns the very nature of social welfare functions.

- Individuals have preferences – they can choose between bundles

- Society consists of many individuals, but society itself does not have preferences.

- We can describe the preferences of each individual, but whose preferences does the social welfare function represent?

# Criticism 2

- If there were a dictator, the answer to that question would be easy: the social welfare function would reflect the preferences of the dictator.

- But in a democratic society, there is no easy answer to the question.

- Some individuals (particularly the rich) may care little for redistribution, whereas others (particularly the poor) may argue that greater weight should be placed on redistribution.

- Back to politics!!!

# From normative to positive

- In practice, government officials do not derive utility possibilities schedules, nor do they write down social welfare functions.

- But their approach to deciding whether, say, to undertake any particular project does reflect the concepts we have introduced.

- First, they attempt to identify and measure the net benefits (benefits minus costs) received by different groups.

- Second, they ascertain whether the project is a Pareto improvement (Pareto principal)

# From normative to positive

- If the project is not a Pareto improvement, matters are more difficult.

- Some gain, some lose.

- The government needs to make an overall judgment.

- One commonly used approach looks at two summary statistics, describing "efficiency" and "equity" effects.

# From normative to positive

- Efficiency is measured by simply summing the gains or losses for each individual

- Equity is measured by looking at some overall measure of inequality in society

- Thumb Rules:

- If a project has net positive gains (positive efficiency effects) and reduces measured inequality, it should be undertaken.

- If a project has net positive losses and increases measured inequality, it should not be undertaken.

43

# From normative to positive

- If the efficiency measure shows gains but the equality measure shows losses (or vice versa), there is a trade-off

- How much extra inequality is society willing to accept for an increase in efficiency?

# Measuring Benefits

- Utility Theory: The standard way this is done is in terms of *willingness to pay.*

- However, how much a person is willing to pay is different from how much that individual *must pay.*

- What he has to pay depends on market prices; what he is willing to pay reflects his preferences.

- *Marginal Utility*

# Measuring Benefits
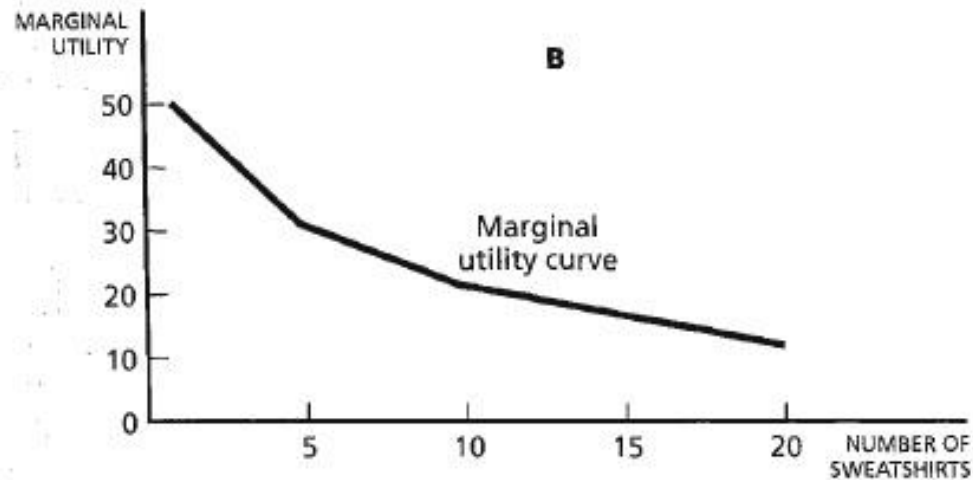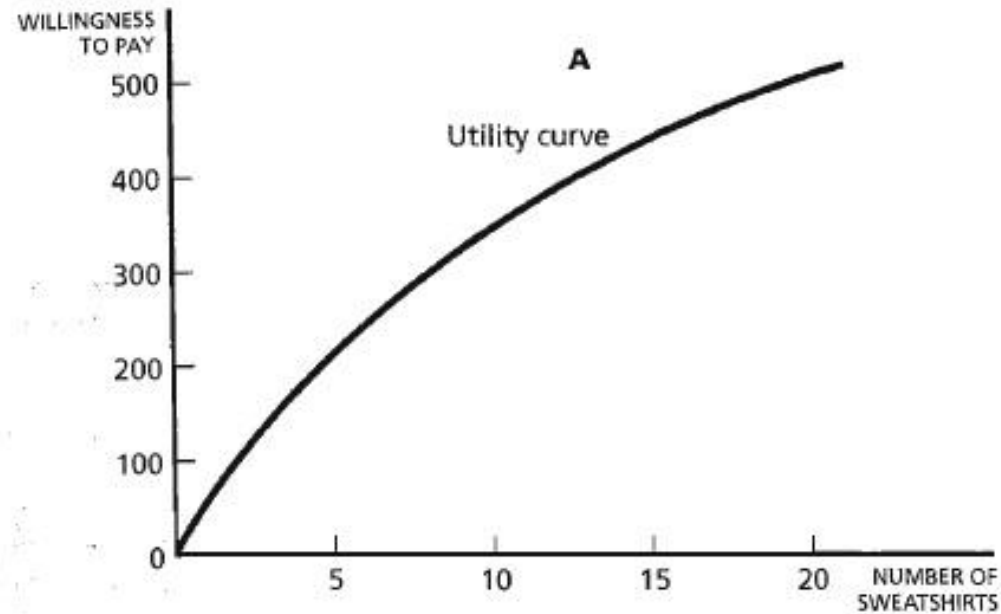
# Measuring Benefits

- We can use the concept of willingness to pay to construct a demand curve.

- the marginal utility curve drawn can also be thought of as the demand curve

- this is a special demand curve, called the ***compensated demand curve***, which differs slightly from the ordinary demand curve
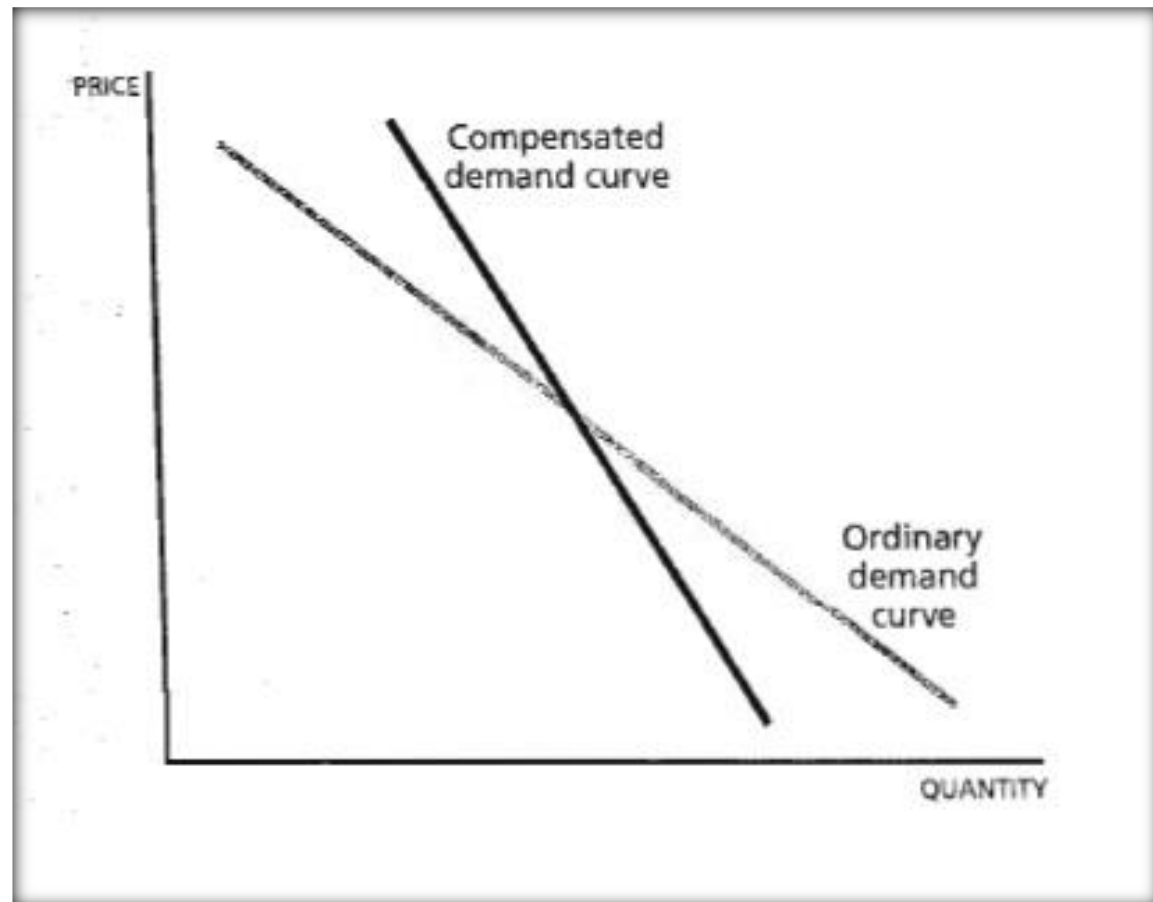
# Measuring Benefits

- The compensated demand curve gives the demand for a good, assuming as price is changed that money is taken away, or given to the individual to leave that individual just as well off as he or she was before the price change.

- It thus measures only the substitution effect associated with the price changes.

- as price is lowered individuals are better off, and as a result buy slightly more of (normal) commodities, the ordinary demand curve is slightly flatter than the compensated demand curve.

# Measuring Benefits

- Thus compensated demand curve reflects only substitution effect and no income effect

# Measuring Benefits

- **Consumer Surplus**
  - Measured by the area under the (compensated) demand curve.
  - Used to measure the value of a government project or assess the magnitude of an inefficiency.

- Social benefits are typically measured by adding up the benefits received by all individuals.

- The numbers obtained represent the total willingness to pay of all individuals in society.

- The difference between the total willingness to pay and the total costs of a project can be thought of as the net "efficiency" effect of the project.

- It is a dollar value of the net benefits.

# Measuring Benefits

- The consumer surplus here is indicated by the shaded region
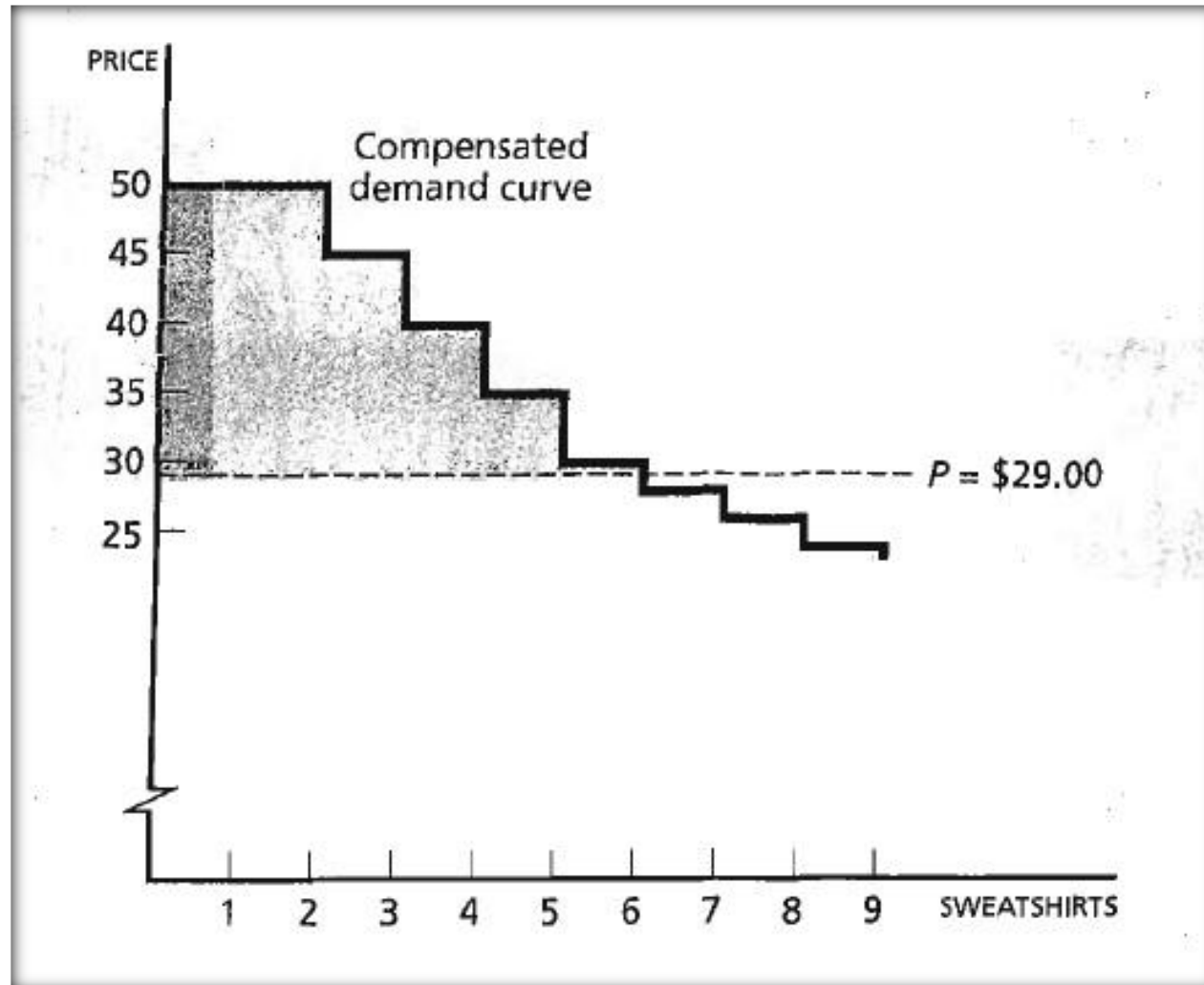
# Measuring Efficiency

- How much would an individual be willing to give up to have the inefficiency eliminated?

- We ask each individual how much he or she would be willing to pay to have the tax on cigarettes eliminated.

- Say one answer is $100; thus eliminating the cigarette tax and imposing in its place a $100 **lump-sum tax** leaves this individual's welfare unchanged

# Measuring Efficiency

- The difference between the revenue raised by the cigarette tax (say, $80) and the lump-sum tax that the individual would be willing to pay is called the **deadweight loss** or **excess burden** of the tax.

- It is the measure of the inefficiency of the tax.

- We can calculate the deadweight loss using compensated demand curves.

# Measuring Efficiency

- The area *ABC measures the* deadweight loss, the efficiency loss as a result of a cigarette tax. A lump-sum tax that would have the same effect on the individual's welfare as the cigarette tax would raise an additional revenue of *ABC*.
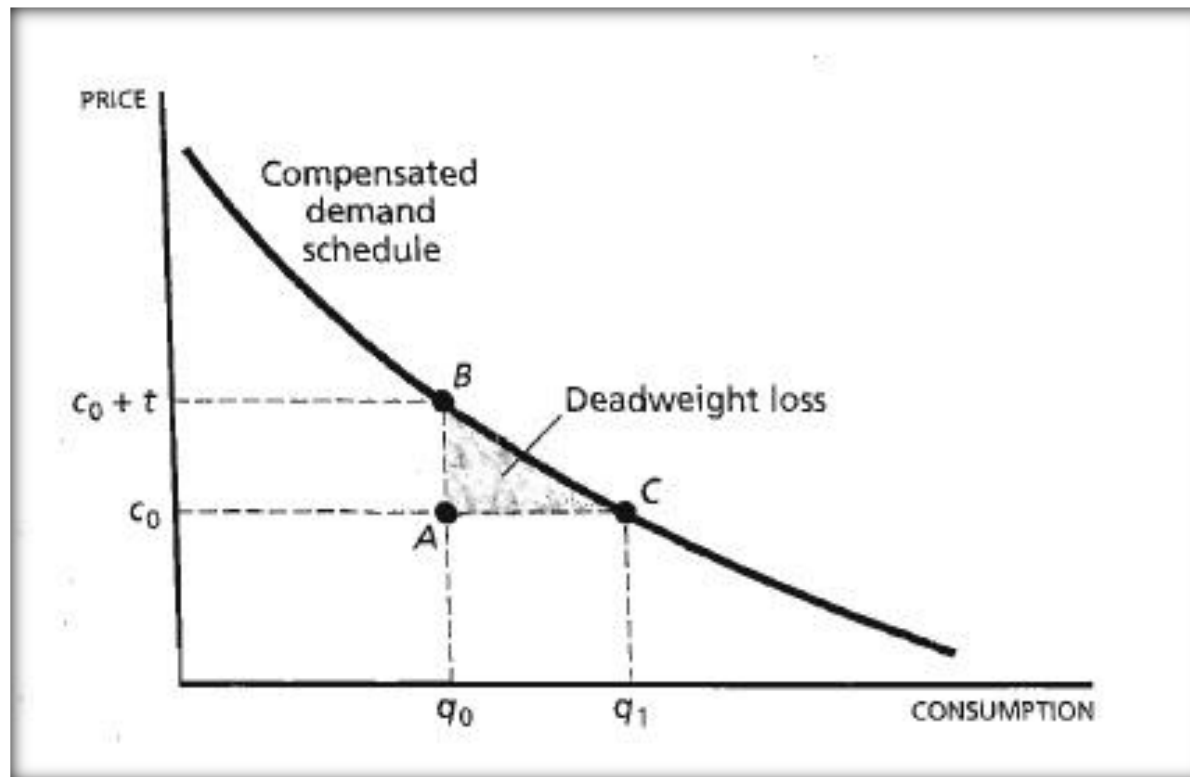
# Quantifying Distributional Effects

- Assessing the distributional effects of a project or a tax is often far more complex than assessing the efficiency effects.

- There are many groups in a society, and each may be affected differently.

- Some poor individuals may be hurt, some helped; some middle-income individuals may be helped, others hurt.

- In some cases, the rich may be helped the most, the poor helped moderately, and the middle class made only slightly worse off .

# Poverty Index

- In practice, governments focus on a few summary measures of inequality.

- Because the poor are of particular concern, they receive special attention.

- The **poverty index** measures the fraction of the population whose income lies below a critical threshold; below that threshold, individuals are considered to be in poverty.

# Poverty Gap

- Another measure is the **poverty gap.**

- The poverty index only counts the number of individuals who are below the poverty threshold; it does not look at how far below that threshold they are.

- How much income would we have to give to the poor to bring them all up to the poverty threshold?

# Lorenz Curve

- The Lorenz curve shows the cumulative fraction of the country's total income earned by the poorest 5 percent, the poorest 10 percent, the poorest 15 percent, and so on.

- If there were complete equality, then 20 percent of the income would accrue to the lowest 20 percent of the population, 40 percent to the lowest 40 percent – the Lorenz curve would be a straight line

- If incomes were very concentrated, then the lowest 80 percent might receive almost nothing, and the top 5 percent might receive 80 percent of total income – the Lorenz curve would be would be bowed

# Lorenz Curve
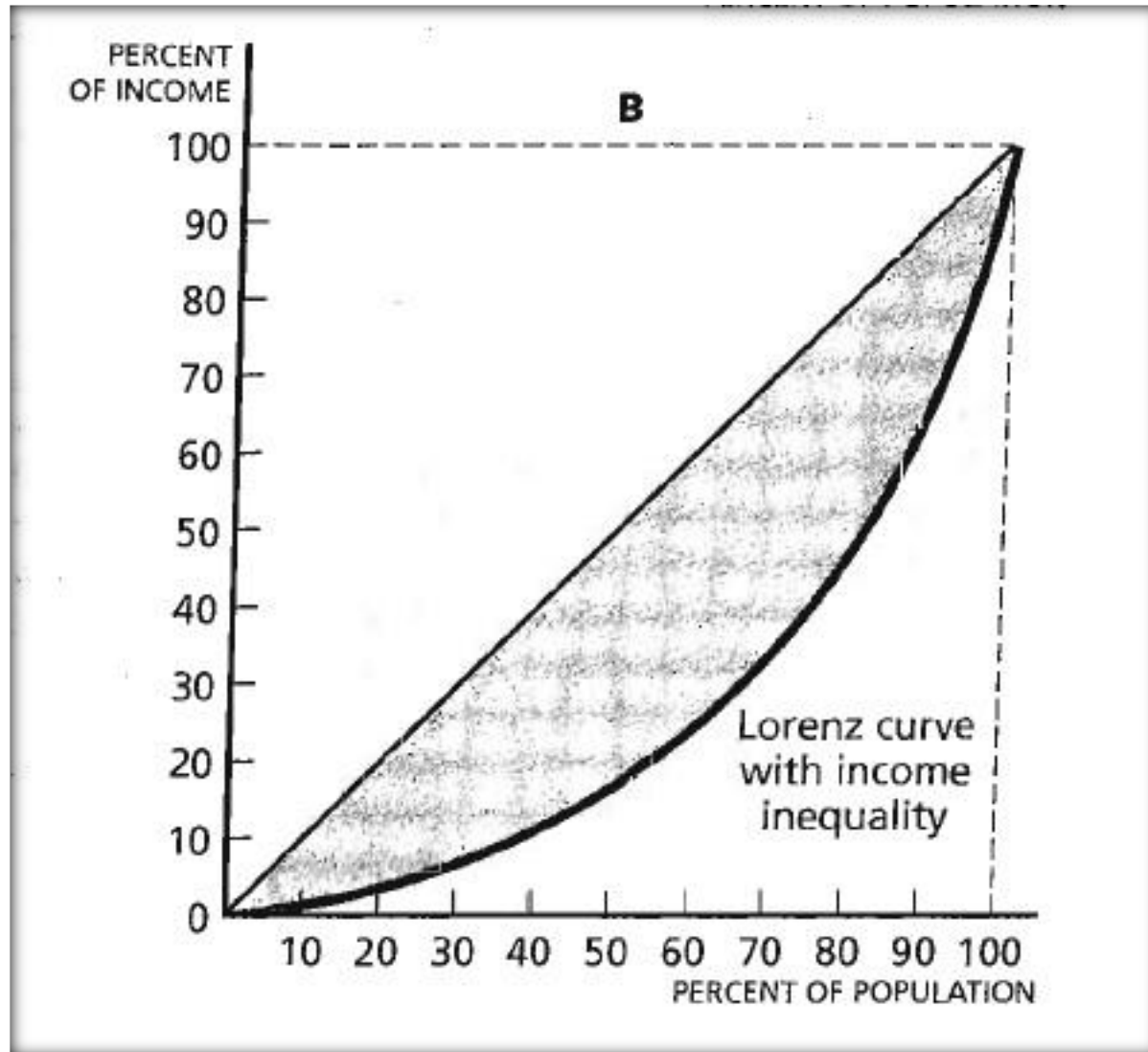
# Lorenz Curve

- The Lorenz curve shifting due to taxation –
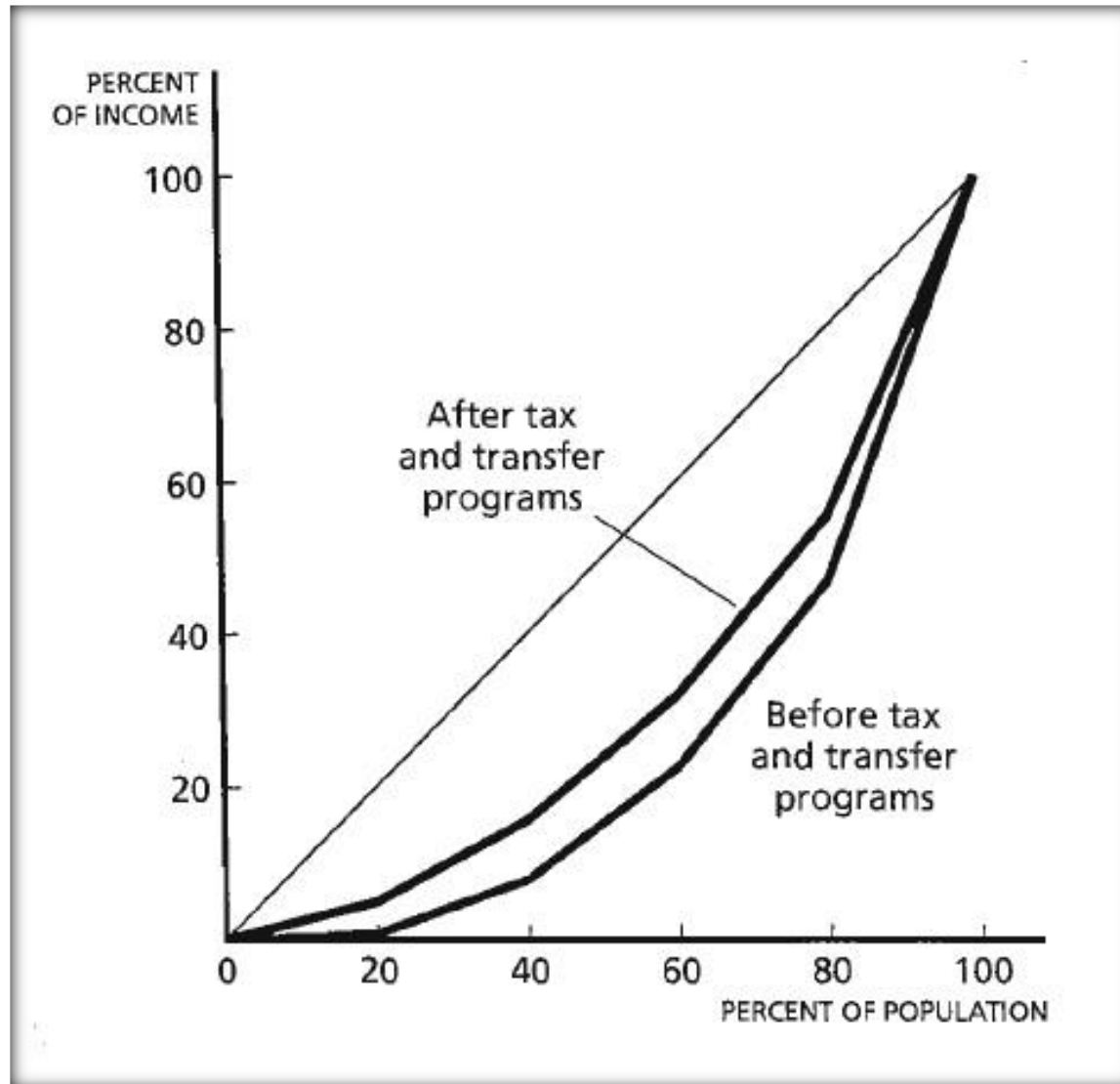
# The Compensation Principle

- What happens if the total willingness to pay exceeds the total costs, but the costs borne by some individuals exceed their willingness to pay?

- Should the project be undertaken?

- The **compensation principle says that** if the aggregate willingness to pay exceeds the cost, the project should be undertaken.

- Most economists criticize this principle, for it ignores distributional concerns.

- Only if the compensation is actually paid to those adversely affected can we be sure that the project is desirable, for then it is a Pareto improvement.

# Trade-offs Across Measures

- With a measure of efficiency (net benefits) and a measure of inequality, public decision making—conceptually, at least—should be easy: one simply evaluates whether the increase in efficiency is worth the increase in inequality, or vice versa.

- Ideally, we would look at the impacts on each individual, and then use the social welfare function to add up the effects.

- In practice, the government does not attempt to identify impacts on every individual, but it does attempt to ascertain the effects on each major group.

# Weighted Net Benefits

- If the aggregate net benefit (the sum of the willingnesses to pay minus costs) is positive, and if the poor are net beneficiaries and the rich are net losers, then the project increases both efficiency and equity and should be adopted.

- Reality more complex - say, the poor and the rich may be worse off, but middle-income individuals better off.

- We turn to our social welfare function to add up the effects.

- The weighted net benefits approach assigns weights to the net gains of different groups

# Weighted Net Benefits

- Because of the concern for equity, effects on higher-income groups are weighted less heavily

- The use of weights can be thought of as based on three assumptions:
  - first, that there is diminishing marginal utility;
  - second, that different individuals have the same relation between utility and income; and
  - third, that society is concerned with total utility—the sum of the utilities of all individuals (the utilitarian social welfare function).

# Social Choice In Practice

- Identify Pareto improvements.

- If some individuals are better off while others are worse off, identify groups of individuals who are better off and groups that are worse off

  - Ascertain whether aggregate net benefits are positive (compensation principle).
  - Look at change in measure of efficiency and measure of inequality, and evaluate trade-offs.
  - Calculate weighted net benefits, weighting gains and losses to the poor more heavily than those to the rich, according to the social welfare function.