

surplus is the net benefit to the individual consuming x^0 units, that is, total willingness-to-pay minus expenditure.

Changes in the value of consumer's surplus are a measure of the welfare associated with the activity which caused the change. Consider the case in which the price of the commodity falls from P_1 to P_2 due to an environmental improvement as illustrated in Figure 7-6. At price P_2 , the consumer can both purchase more of the commodity, and pay less per unit. In addition, his consumer's surplus is increased by the trapezoidal area P_2P_1EB . This geometric area represents a monetary measure of the welfare effect associated with the price change.

Consumer's surplus can be estimated for an individual, using observed price and quantity data. However, instead of estimating individual demand curves, economists use aggregated data and estimate market demand curves. Market demand curves are obtained by aggregating individual demand curves, that is, adding up horizontally (along the quantity axis). This implies that tastes and preferences can be aggregated across individuals. If, however, individuals have different incomes, or if the distribution of income is altered significantly, then aggregations can lead to biases in estimates. Simple linear summation of these demand curves is inadequate. Then, one must resort to Engel curves.

There are two alternative monetary measures of the effects of a price change, known as equivalent and compensating variation (denoted as EV and CV respectively), which can be translated into a change in income. Under the circumstances where a decrease in LRTAP effects results in a price decrease, EV and CV can be defined as follows:

Compensating Variation is the change in income which, given the price decrease, maintains the consumer's original utility. CV is equal to the income which would be withdrawn to offset the price decrease.

Equivalent Variation is the change in income which, given the original price, would leave the consumer's satisfaction or utility unchanged if price decreases. An increase in income equal to EV would be given to the consumer to maintain welfare.

While EV and CV are technically the more correct measures of welfare change, they are difficult to estimate. The value of consumer surplus, which is closely related to CV and EV, is easier to measure and is therefore recommended for this analysis.

Public Goods

In the above discussion, we assumed that commodity x was traded in an organized market at a nonzero price. The impact of LRTAP on the price of a particular commodity was subsequently considered. This scenario is, of course, an over simplification. Now let us consider a certain commodity which is a "public good" such as an environmental