

# MICROECONOMICS AND POLICY ANALYSIS - U8213

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Class Notes - Spring 2001

## Surplus

**Monday, February 19 and Wednesday, February 21**

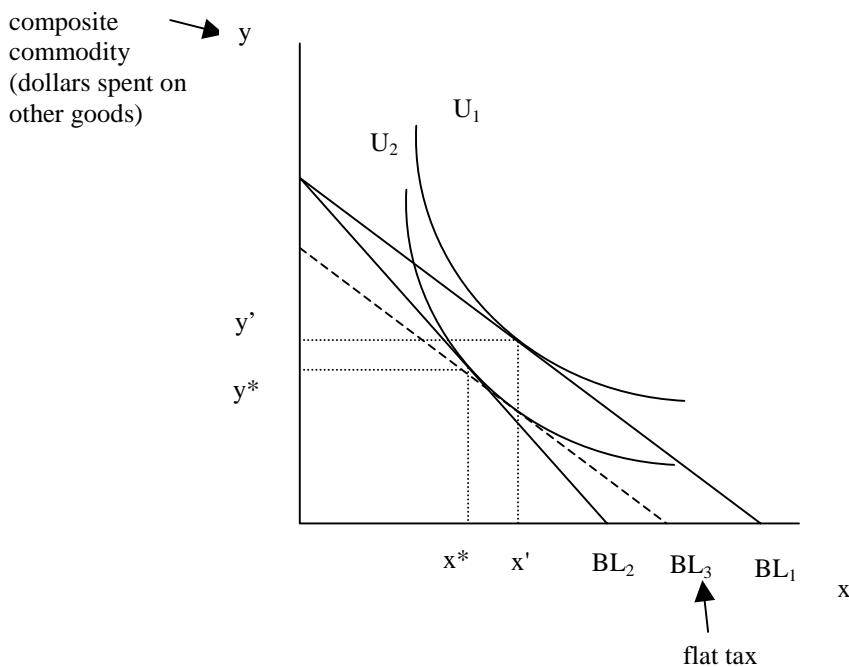
Reading: PR Chapter 4.1, 9.1-9.4, Eaton, Chapter 4

How much better or worse off is an individual made from a particular policy change? Previously we answered this question through Pareto Optimality but now we want to be able to quantify with specific numbers.

Let's say you want to buy something and you are willing to pay \$75, but ended up only spending \$50 for this good. That means you would have a **consumer surplus** of \$25.

Let's look at an example of a tax that is a percentage of the price of a good (excise tax). Take the budget line  $P_x \cdot x + P_y \cdot y = M$ .

The tax would be  $\frac{-(1+t) \cdot P_x}{P_y}$  represented by  $BL_2$ .



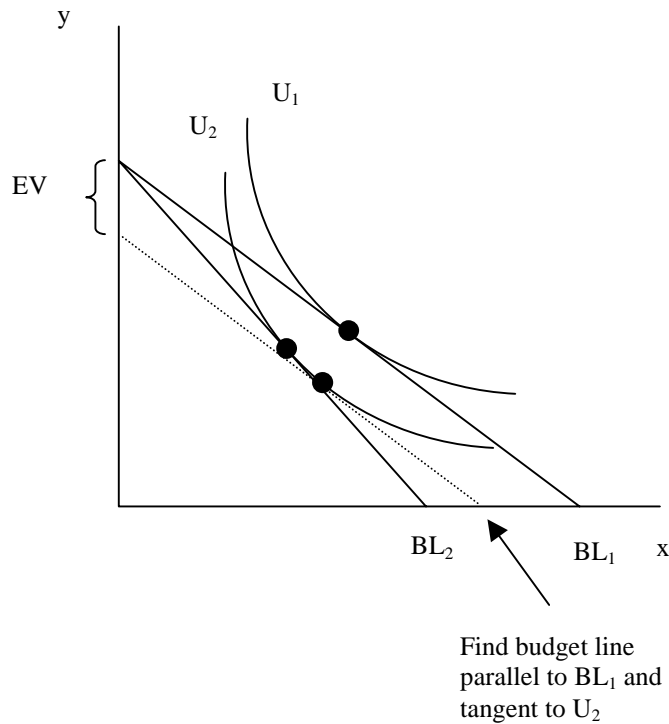
IS there a better way to raise the same revenue than the excise tax? Yes, the consumer is better off with a flat tax - represented by  $BL_3$ . A flat tax is the least distortionary tax - doesn't distort prices or incentives in the economy. For instance, it doesn't change the relationship between labor and leisure for the individual.

So, how much is the individual better off or worse off?

There are different ways to measure how much the individual is better off or worse off:

### (1) Measure at old prices

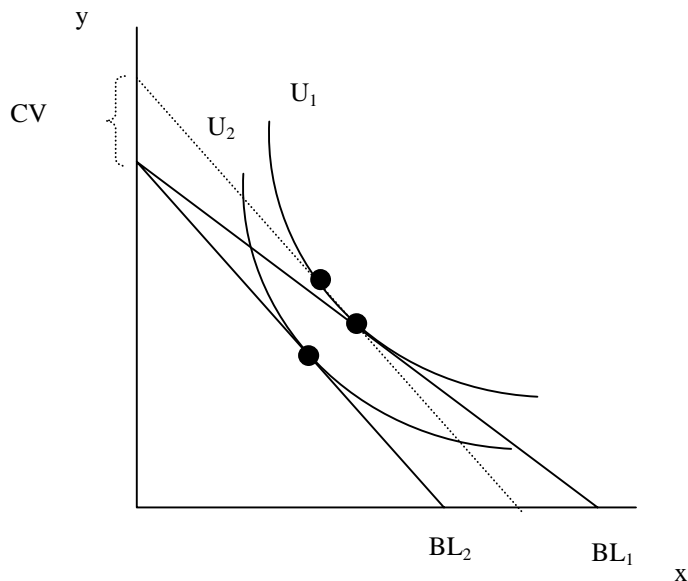
At the old prices what income transfer would it take to allow the individual to achieve the new utility? This is the **Equivalent Variation (EV)**. It is the minimal change in income that is equivalent to undergoing the change in price. In other words, The amount of money the consumer would be indifferent in lieu of a price change. **New Utility, Old Prices.**



There is also an alternative way of looking at the impact of a price change:

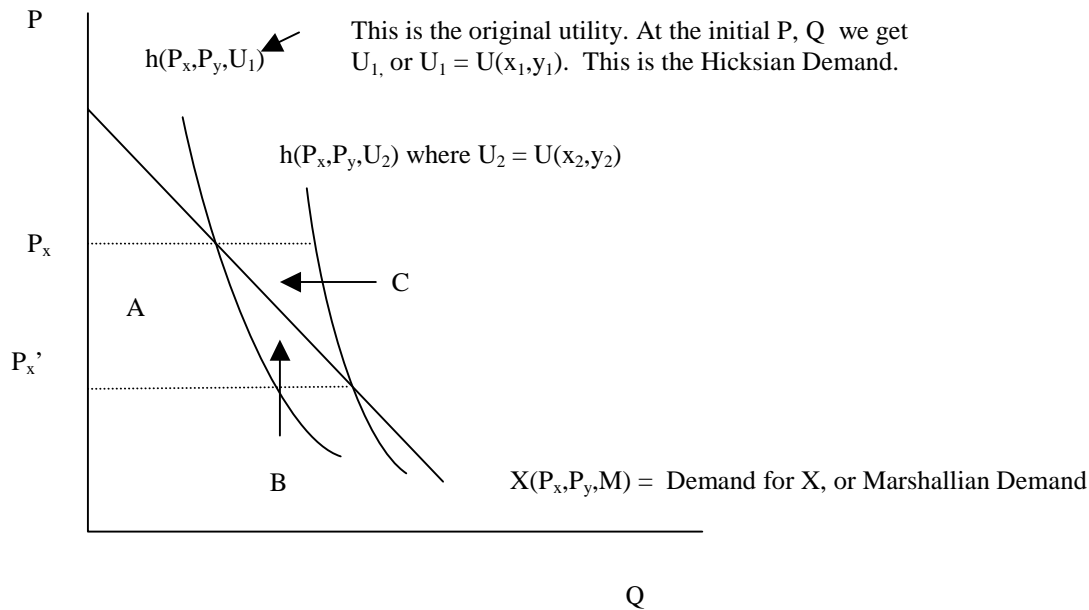
### (2) Measure at new prices

If the change in price has already occurred then what transfer is necessary to make the individual no better off instead of the policy change? The amount of wealth taken away to make the individual at the same utility as before the change is called the **Compensating Variation (CV)**. **New Prices, Old Utility.**



The EV and the CV will always give you the same answer.

EV and CV can be operationalized through the concept of **Consumer Surplus**. Because EV and CV are grounded by individual preferences the concept of Consumer Surplus is meaningful.



The Hicksian demand is steeper than the Marshallian Demand because the Hicksian Demand only accounts for substitution effects while the Marshallian Demand focuses on income and substitution effects.

In the above graph the CV is region A and the EV is region A, B and C. The EV and CE can be measured as the area under the Hicksian demand. The CV is how much the area under the Hicksian demand changes and the EV is how much the area changes at the new utility.

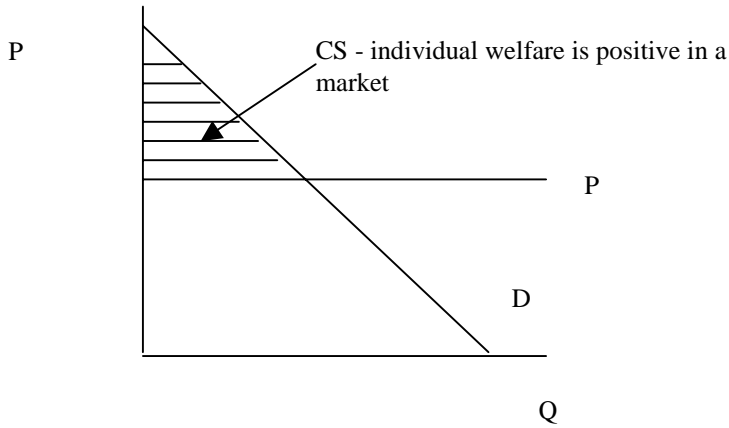
The change in **consumer surplus** equals area A plus B. This is the area under the Marshallian demand from a change in price.

For a normal good the Consumer Surplus is bounded between the CV and EV. The consumer surplus is greater than or equal to the CV and less than or equal to the EV.

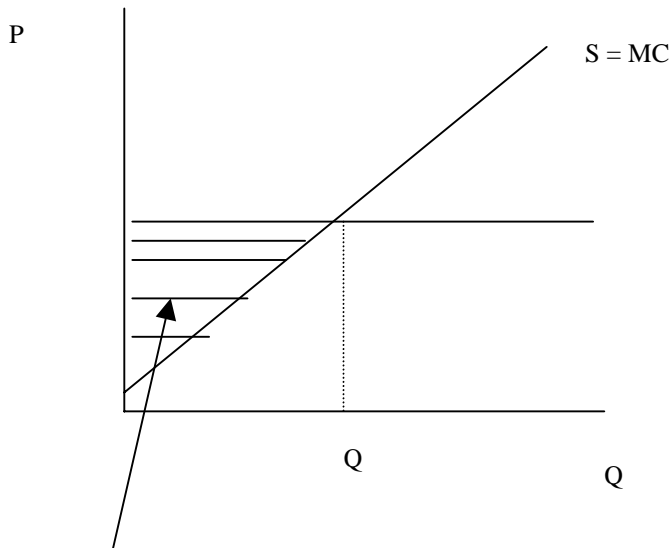
If the income effect is small the difference between the Hicksian and Marshallian demand is small and the difference between the CV, EV and consumer surplus is small.

Consumer Surplus is a more practical tool because the Marshallian Demand is easier to measure; prices and income are observable. The Hicksian Demand is based on utility, which is hard to measure.

**Consumer Surplus - The area above price and below the demand curve.**



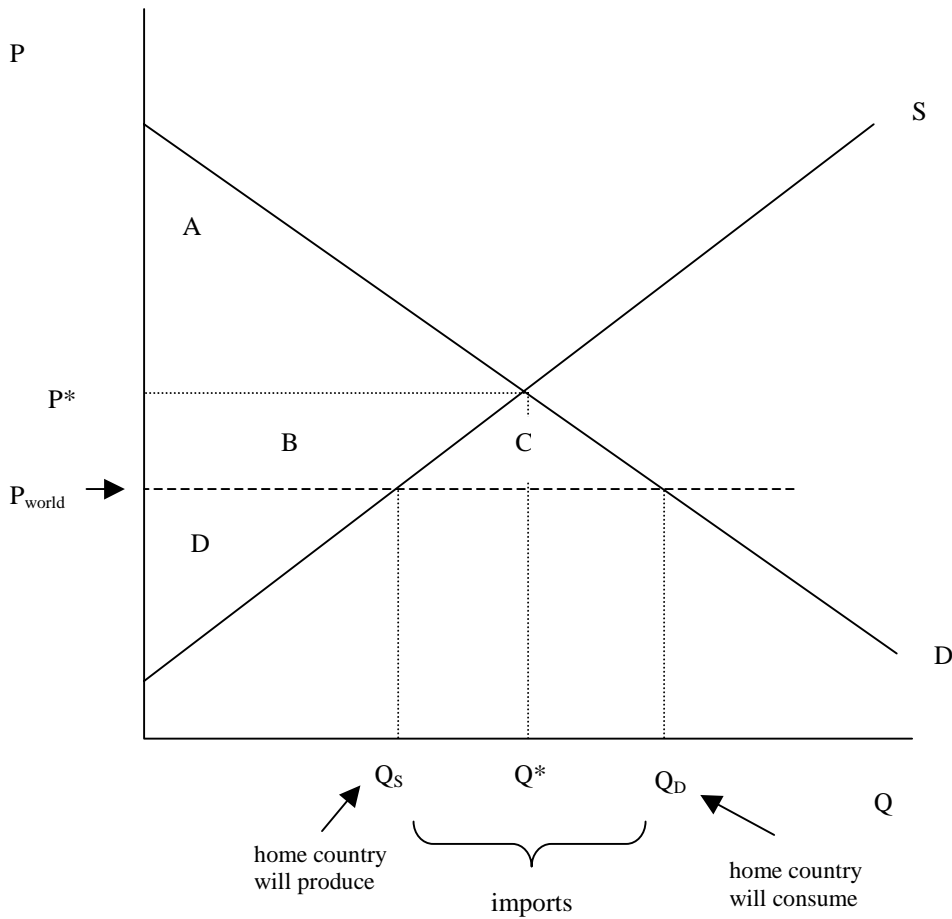
**Producer Surplus - The area above the supply curve below the price.**



Producer Surplus. This is the welfare of the firm or the firm's profit. This is in the short run because in the long run the supply curve is horizontal and there is no profit or producer surplus.

## Trade Example

Trade will occur if foreign price ( $P_{\text{world}}$ ) is lower than the domestic price.

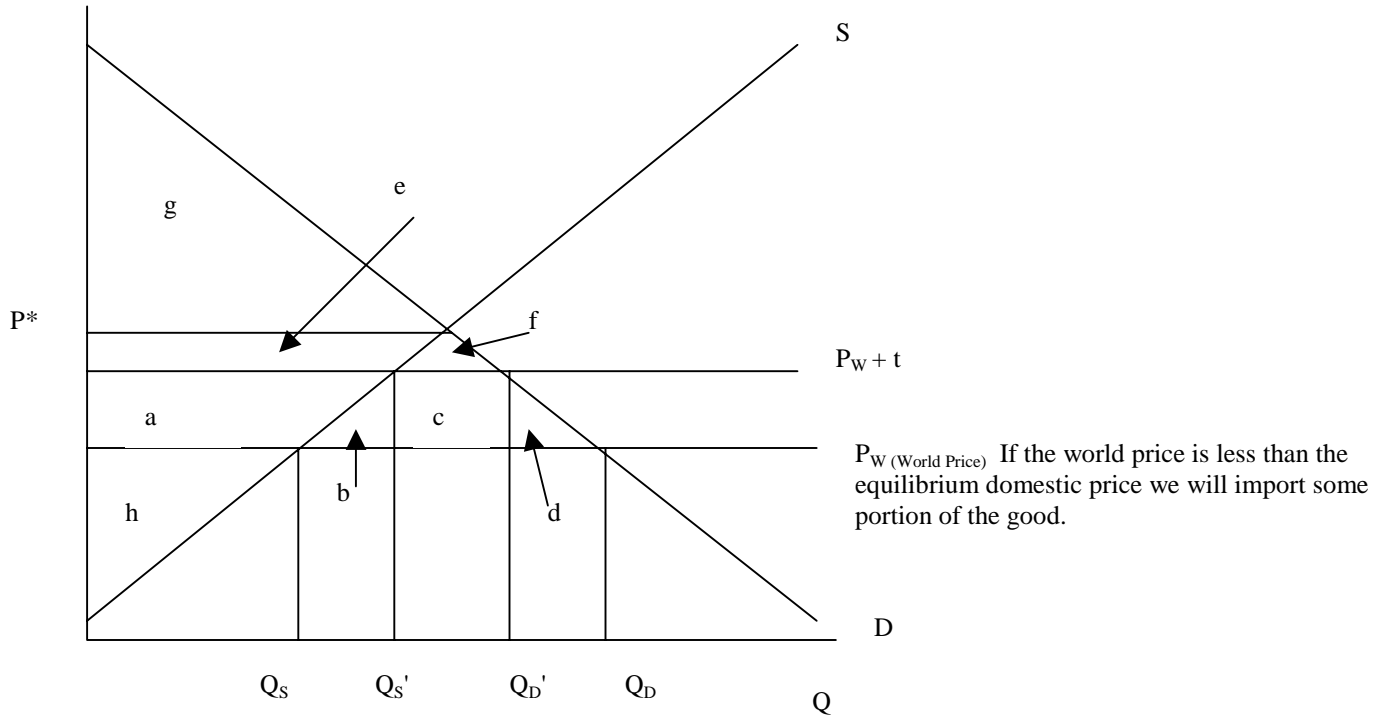


Consumer surplus without trade ( $P^*$ ) = A  
 Consumer surplus with trade ( $P_{\text{world}}$ ) = A + B + C  
 Change in consumer surplus = B + C so consumers are therefore better off

Producer surplus without trade ( $P^*$ ) = B + D  
 Producer surplus with trade ( $P_{\text{world}}$ ) = D  
 Change in producer surplus = - B so producers are therefore worse off

C is gained by consumers, but not lost by anyone  
 So, the net change is C – society as a whole is better off.

## Trade with Tariff Example



PS with world trade : h

CS with world trade: a + b + c + d + e + f + g

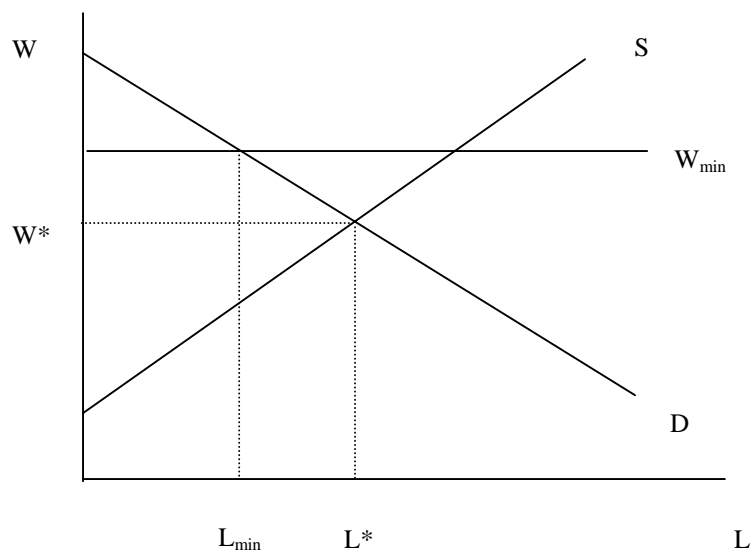
With the tariff (t) imposed domestically the world price is effectively increased to  $P_w + t$

Gains to Producers: Producers can charge  $P_w + t$  and produce at  $Q_s'$  therefore the producer surplus increases by a.

Loss to Consumers: Consumers lose a, b, c and d. The area a is transferred from consumers to producers, c is the amount of tariff revenue collected by the government.

The area b and d are the net loss to society. B is the loss to society of the inefficient production at world prices and d is the loss to consumers because they can consumer a smaller quantity.

## Minimum Wage Example



$$\begin{aligned}\text{Change in CS} &= -1 - 2 \\ \text{Change in PS} &= +1 - 3 \\ \text{Net effect} &= -2 - 3\end{aligned}$$

1 is a transfer from consumers (firms) to producers (workers). However, you lose more than you gain. The lower quantity and less labor is the cause of the loss.

In general, the social surplus is maximized at the market clearing price and quantity.