2. The Direct Effects of Price Changes

[FP Ch. 8.4; S&W Ch 9]

Revise the definition of *consumer's surplus* (*CS*)

producer's surplus (*PS*)

What if the existence of the project will affect market prices?

This will affect the welfare of consumers, in addition to the *financial* effect. (= out-of-pocket)

To reiterate: costs are only included in CBA when they measure the use of resources, but not transfers from one person or group to another.

(Remember: a transfer is a one-sided allocation — something for nothing.)

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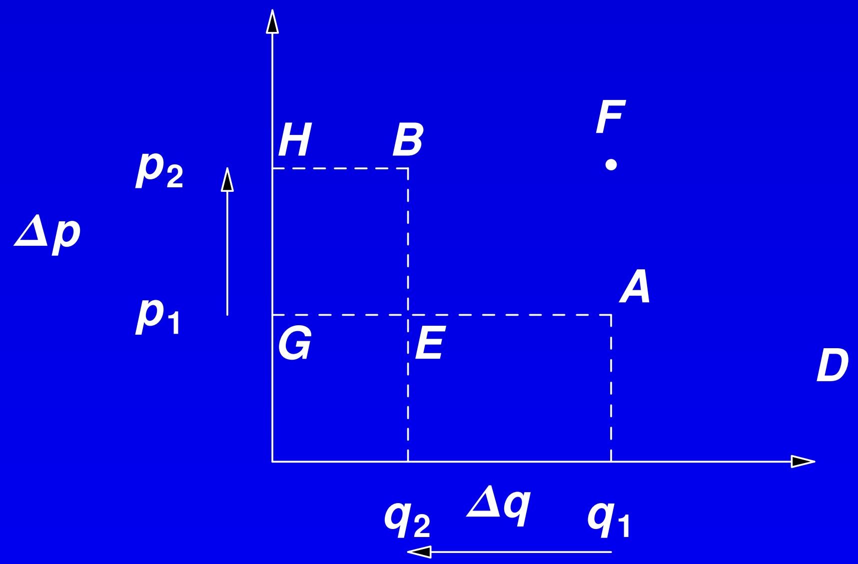

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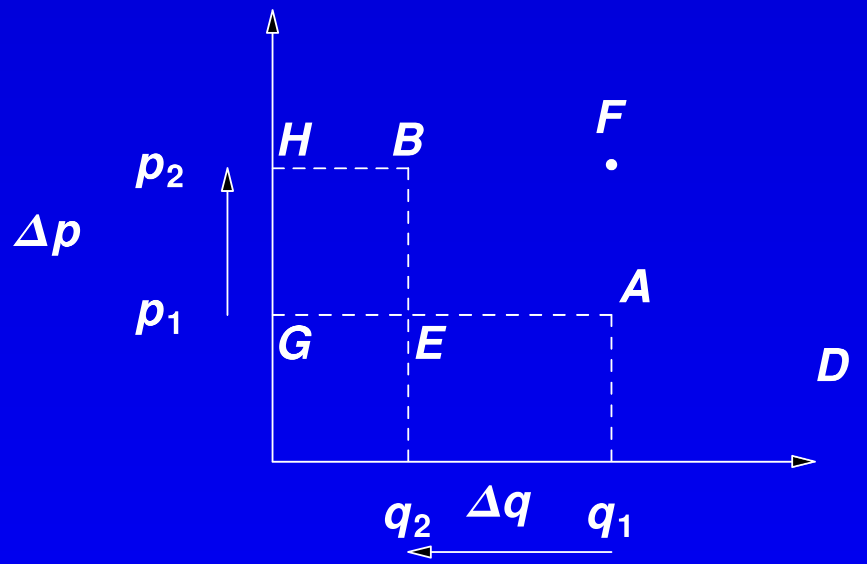

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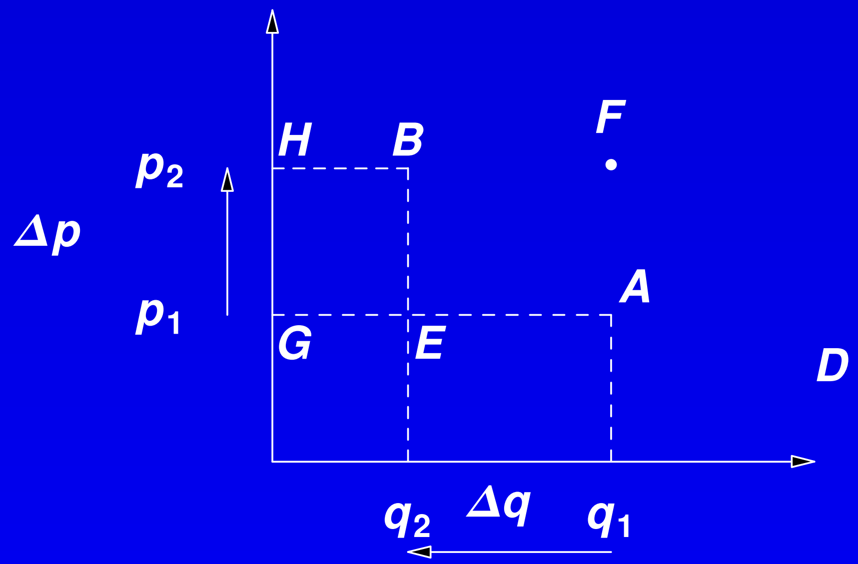

The financial gain to the sellers of gas = the financial loss to the gas buyers, but this is only a transfer payment, not a use of resources, a cost.

If the demand for gas is completely price inelastic, then this is straightforward.

But if the quantity of gas demanded falls, because of the higher price, how are consumers worse off above and beyond the higher price?

The Individual Consumer:

The amount of gas demanded is a function of the price of gas, the prices of substitutes and complements, and the consumer's income.

The question is: how much has the consumer lost with the increase in price? or: what increase in his money income would just compensate him for the price rise?

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Use a Revealed Preference Argument: Consider four states, two of which (*A* and *B*) are actual, and two of which (*E* and *F*) are hypothetical.

state A	initial	p_1, q_1
state B	final	p_2, q_2
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Since at the new price p_2 the consumer could choose q_1 but does choose quantity q_2, we can see that he prefers *B* to *F*. Similarly, at the old price p_1 the consumer could choose q_2 but does choose quantity q_1, we can see that he prefers *A* to *E*.

Note: When demand is completely price-inelastic (vertical), then ΔCS (negative) = ΔP (positive) = change in price $\times$ unchanging quantity.

The change in consumer surplus.

In the hypothetical move from *A* to *F*, spending would increase by the amount $(p_2 - p_1) \times q_1$ = area GHFA, so this amount would completely compensate for the move. In practice, the move is not to *F*, but to the preferred point *B*, so area GHFA more than compensates for the move from *A* to *B*: a maximum estimate of the loss.

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The true estimate of ΔCS, the *change in consumer surplus*, is between these two amounts:

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$$(p_2 - p_1)\times q_2 \le \Delta CS \le (p_2 - p_1)\times q_1$$

At the limit we see that the shaded area is the actual estimate of the change in consumer's surplus associated with the price rise.

e.g. A numerical example:

p_1 = 20¢/unit
∴ 100 units/month costs $20/month

If a fixed "connect" charge of $16/month is acceptable to the buyer, but any increase in this fee would result in the decision to disconnect, then we can conclude that the (net) consumer's surplus associated with a 20¢/unit usage charge is $16/month.

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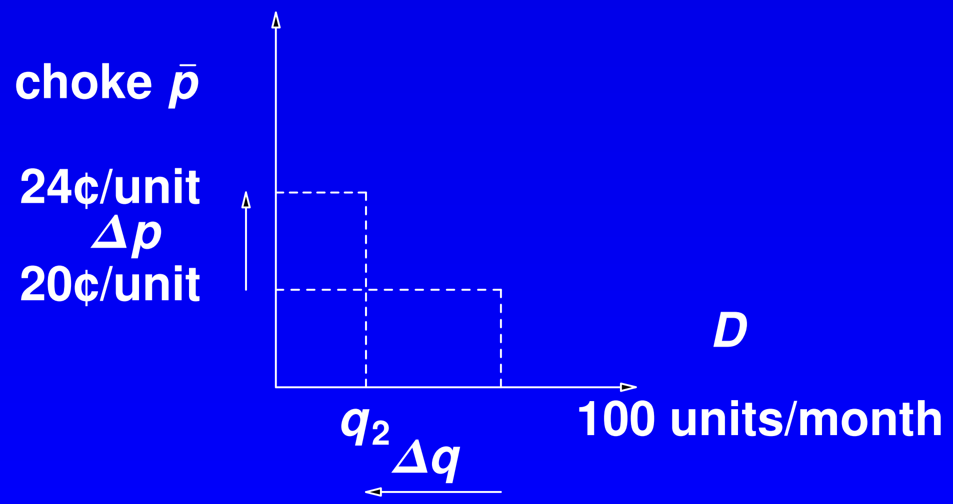


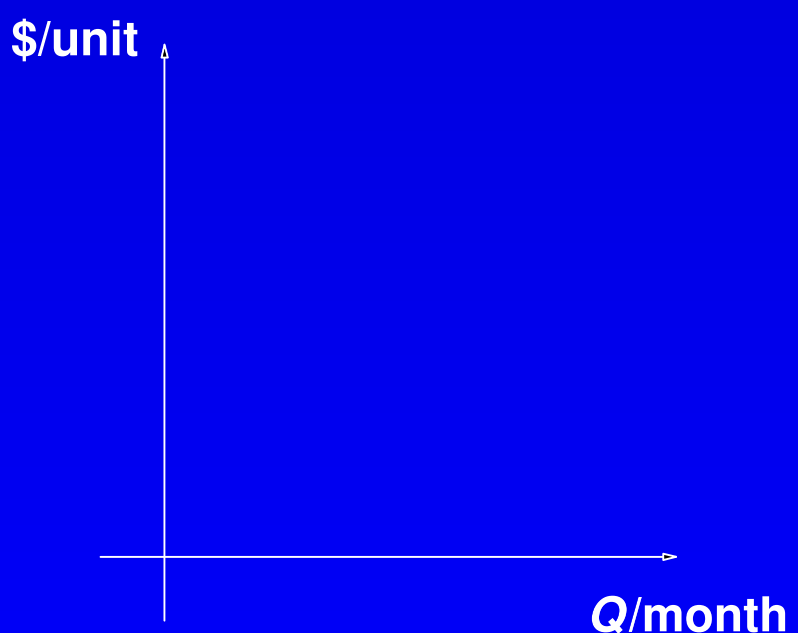
Example (cont.): Total Quantity

Since we construct the total demand function by horizontal summation of individuals' demand curves, the shaded area is the change in consumers' surplus for the market too.

The change in price results in a change in the welfare of all consumers, and is not merely reflected in the financial effect.

Ex: Consider a proposal to supply piped gas to a new rural area.

If the situation is as plotted below, then there exists no level of monthly output at which the average costs of the supplier will be covered by the price (or average revenue). From a purely financial standpoint this is the end: since the seller cannot supply profitably, the supply will not proceed.



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If CS > firm's loss = $Q_1(AC_1 - P_1)$, then OK (PPIC).

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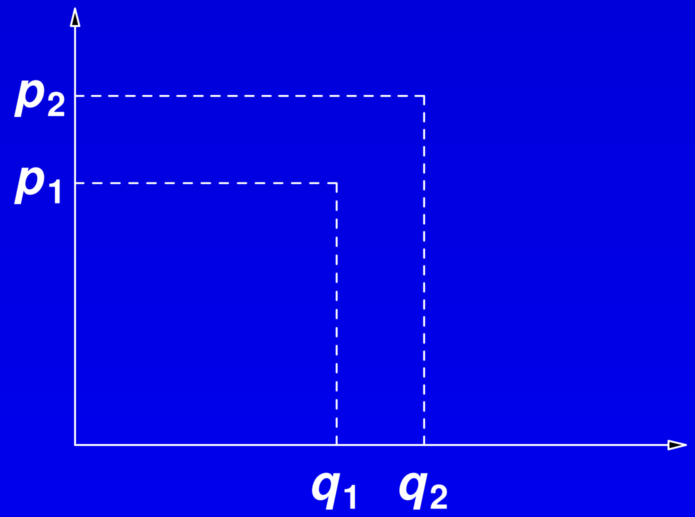
By analogy, the *change in producers' surplus PS* is the strip to the left of the supply curve, bounded by the lower and upper prices.



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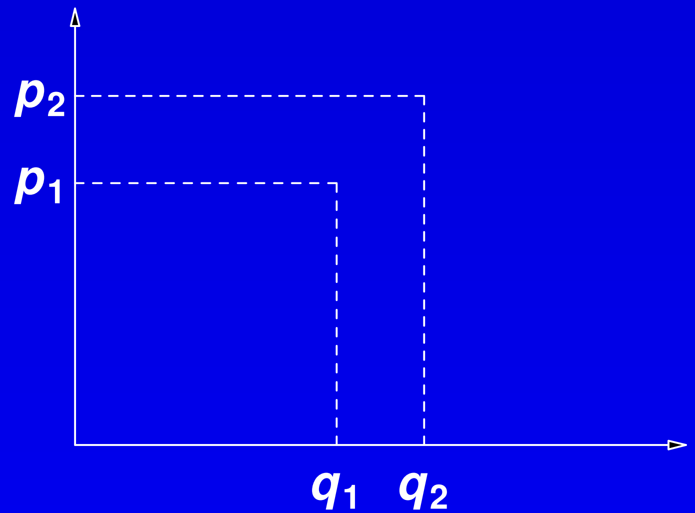

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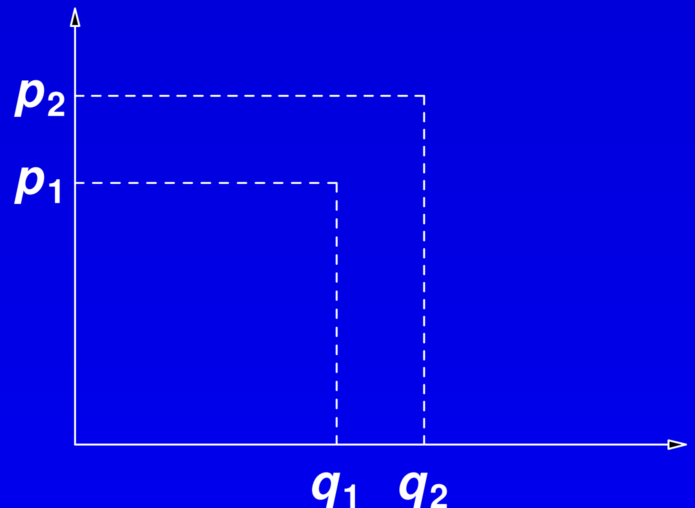

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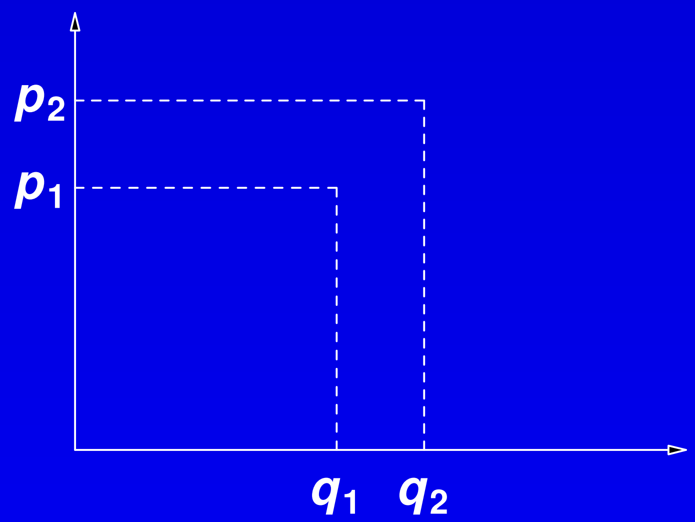

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- **a higher price for inputs with no change in the price for output will reduce producers' surplus, as the supply curve shifts to the left.**

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$\therefore$ Projects which increase employment are socially more attractive than an FA would indicate (and vice versa):

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Indeed, it is possible that a project:

with FA: NPV < 0, but
with CBA: NPV > 0

because of the external benefits of the project (reduced unemployment ...).

LTS: Financial Analysis v. Cost-Benefit Analysis

	Costs	*Benefits*
FA:	**staff costs \$/hr. facility (rent ...) equipment materials**	**Fee, payment What's the max society should pay?**

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Net benefits calculated with alternative assumptions:

Assumption I: no changes in skilled wages

Assumption II: fall in skilled wages.

2.3.1 LTS (cont.): No effect on skilled wages.

If an additional person being trained results in no changes to the welfare of others, then CBA and FA are identical.

But how might the scheme result in externalities whereby there are changes to the welfare of others?

Three possible spillovers:

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   No: payments to trainees are *transfer* payments, from taxpayers to trainees. *Only if resources are used does a cost occur.*
   But to the extent that the transfer payments are used by the trainees to cover their travel costs etc., then indirectly taxpayers are covering costs, and this should be counted as a cost under CBA, but *if prices are competitive*, then we should ignore these costs.

   Another cost is the costs of the program (lecturers, rents, etc.)

LTS: Possible Spillovers (cont.)

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3. **If income from wages is taxed,**
   and if there are higher wages after training,
   then higher tax revenues (cet. par.) and perhaps lower taxes for others, if the government has revenue targets.

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Consider a local training scheme, with unemployment amongst unskilled workers (implying “sticky,” uncompetitive wages), and no unemployment among skilled (“trained”) workers (implying competitively determined wages).

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***Assumption II*: wage in skilled market falls to w'' as successful trainees swell the supply of skilled labour.**

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The program *does affect* unskilled workers who don't enter, because there will be fewer rivals for the limited number of jobs available, as some enter the program and succeed in gaining skilled jobs later.

(Consider Work-for-the-Dole recipients as employed unskilled.)

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But CBA ignores transfer payments, (taxes & allowances) so the net effect = the *social benefit* = the total before-tax wages of the successful trainees, $w'(n' - n)$. (2)

(If previously employed, then the change in wages $\times$ change in the number.)

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So far we have only considered money incomes,
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The reduction of leisure may be considered a non-money cost of the program when previously unemployed workers find jobs or enter the training program.

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**The costs of the training program must be considered:
We have above considered the opportunity costs to trainees of forgoing earning opportunities;
We have above netted out the payment allowances (which cancel out);**

LTS: Social Costs

**So far we have only considered money incomes,
ie. we have assumed that workers are indifferent between:**

1. **working as unskilled**
2. **working as skilled**
3. **receiving training**
4. **being unemployed**

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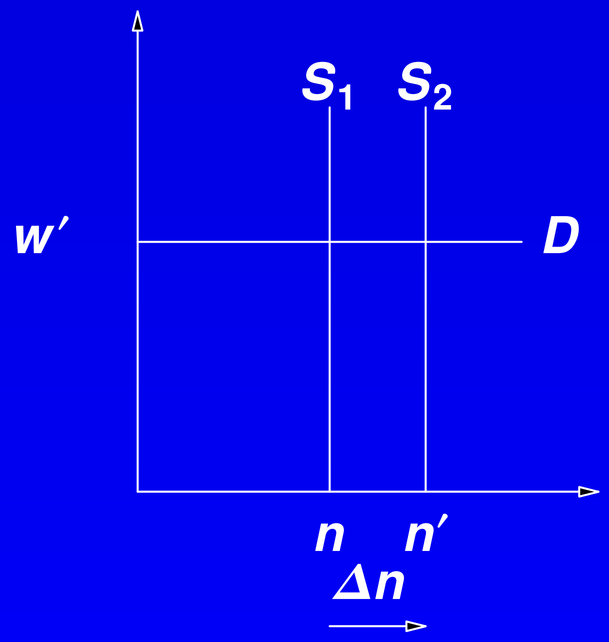
We have above netted out the payment allowances (which cancel out); — which leaves us with the wages of trainers, the rent, etc. as costs of the training program.**

LTS: Net Social Benefits

If workers are indifferent between working or not, then the *net social benefit* of the program

= the P.V. of before-tax future earnings of successful trainees

– the operating costs of the program.



The skilled labour market.

– costs of the program

2.3.2 LTS: Price changes in the skilled market.

Now relax the assumption that the program will have no effect on competitively determined wages in the skilled labour market.

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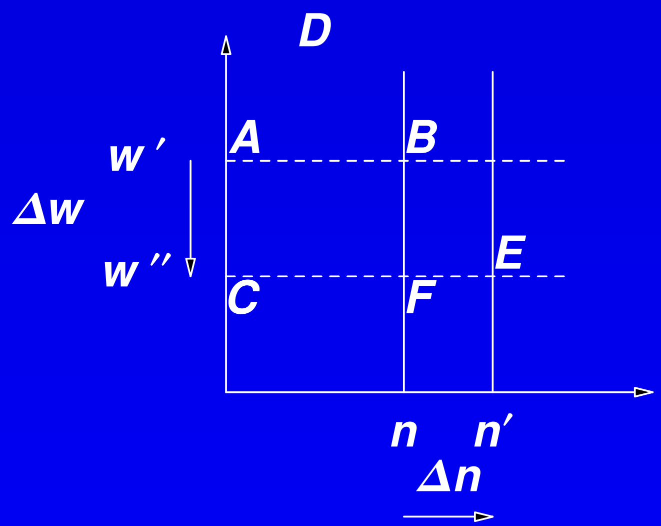
Consider the two groups: employers and workers in the skilled labour market.



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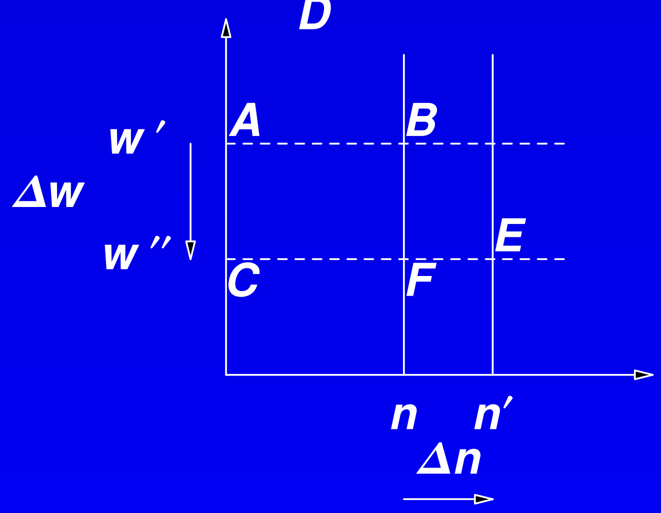

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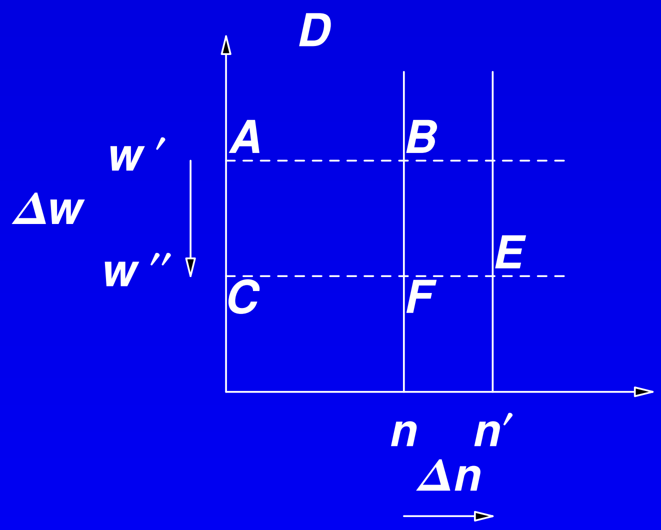

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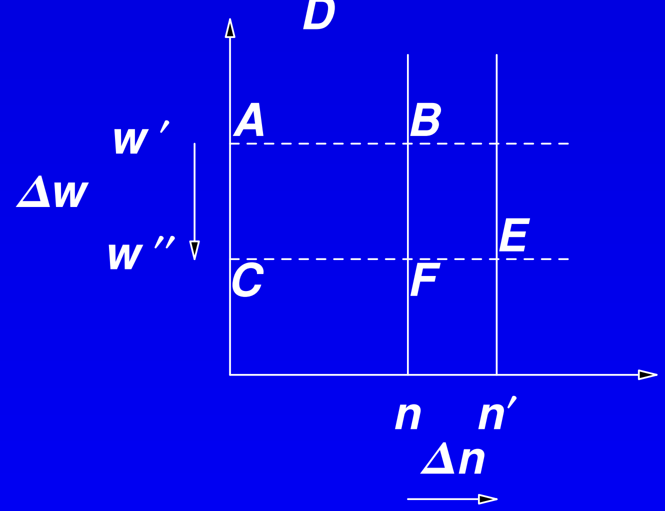

- **The derived demand for skilled labour is unchanged. (D unshifted.)**
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- **Skilled labour supply *S* is shown as completely price-inelastic (vertical).**

LTS: The Net Social Gain

The positive Δ Firms' (buying) surplus is area ABEC $= n(w' - w'') + \frac{1}{2}(n' - n)(w' - w'')$.

Existing skilled employees lose surplus area ABFC = $n(w' - w'')$ (a transfer)

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$\therefore$ The Sum Of The Net Benefits Of The Program (1)+(2), excluding the training-program costs:

= $\frac{1}{2}(n' - n)(w' + w'')$, which is the average of before and after wages times the number of successful trainees.

= $\frac{1}{2}(n' - n)(w' - w'') + (n' - n)w''$

2.3.3 LTS: Taxation Considerations

If income taxes are considered:

assume a uniform tax rate of t

then employers pay before-tax wages of w' and w'', and employees' after-tax wages fall from $w'(1-t)$ to $w''(1-t)$

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So the sum of the losses to workers and government is $n(w' - w'')$, as before; i.e., in this case, taxes cancel.

3. Welfare (i.e. efficiency) Economics

Gains (or losses) in welfare (i.e. efficiency) from moving from where we are to somewhere else.

Policy change $\rightarrow$ improved social welfare, greater efficiency, a larger economic pie

Changes in economic welfare to consumers: ΔCS

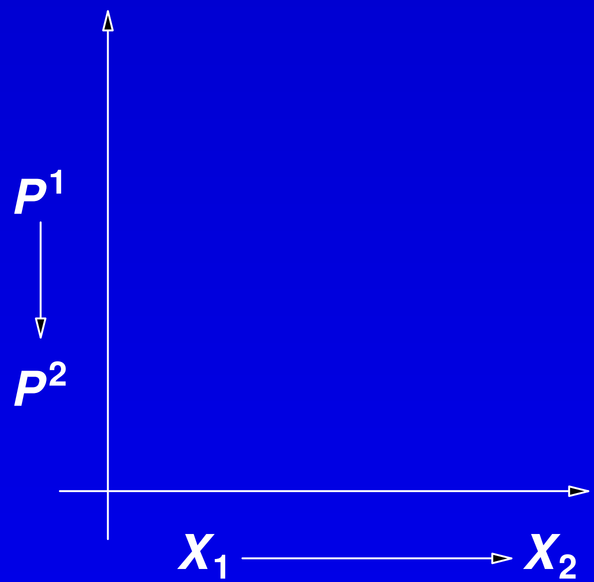
Changes in economic welfare to suppliers: ΔPS

$\therefore$ Net Δ social welfare = $\Delta CS + \Delta PS$

Prices ~ monetary measures of

marginal benefits to households

marginal costs to firms



units

total value of new sales

$\therefore$ net surplus to consumers'

& net surplus of old sales'

DD = demand curve

$\therefore$ P^1abP^2 = consumer's surplus associated with the price fall. (a gain)

Question.

The price *P* of a good *X* increases from *P_{low}* to *P_{high}*, cet. par., with a budget of *$\bar{M}$*. Plot purchases of good *X* against purchases of All Other Goods (price=$1).

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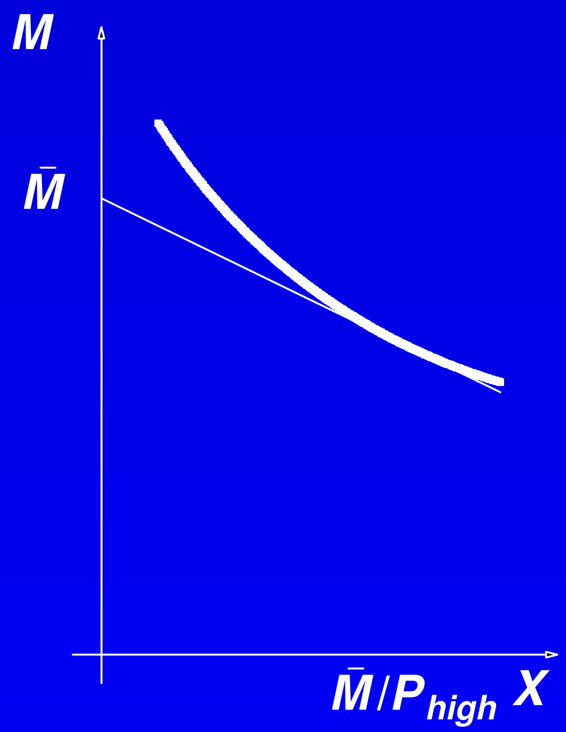

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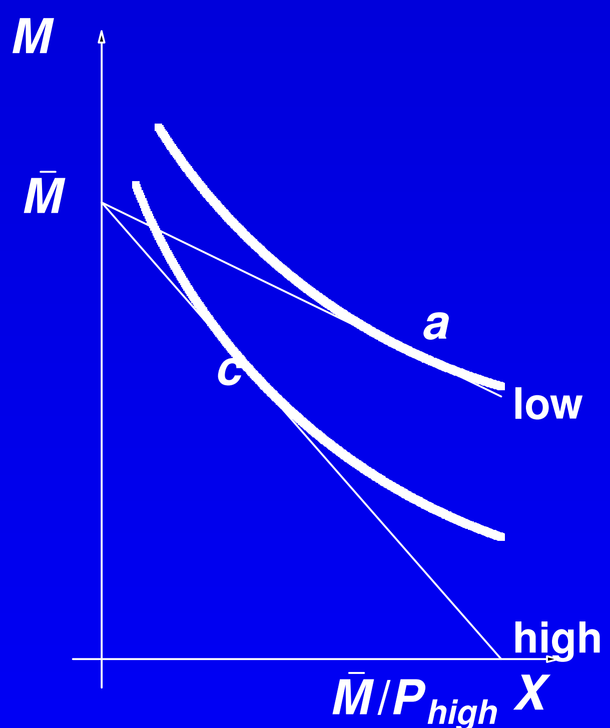

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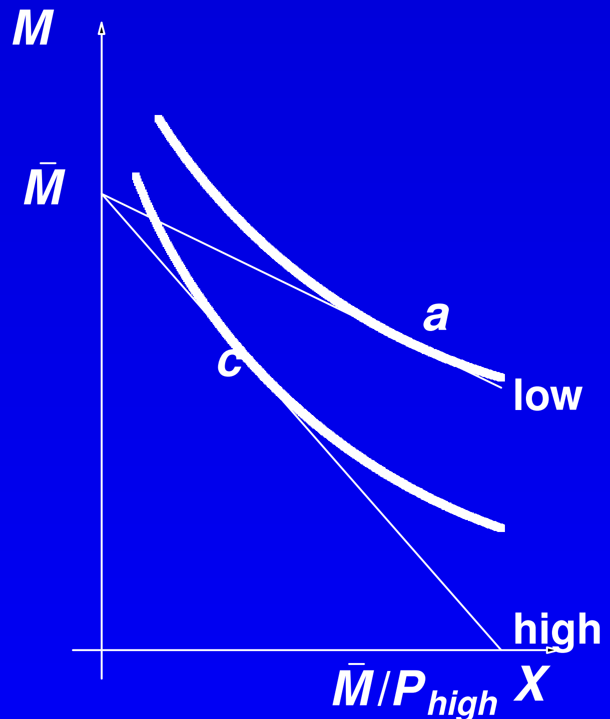

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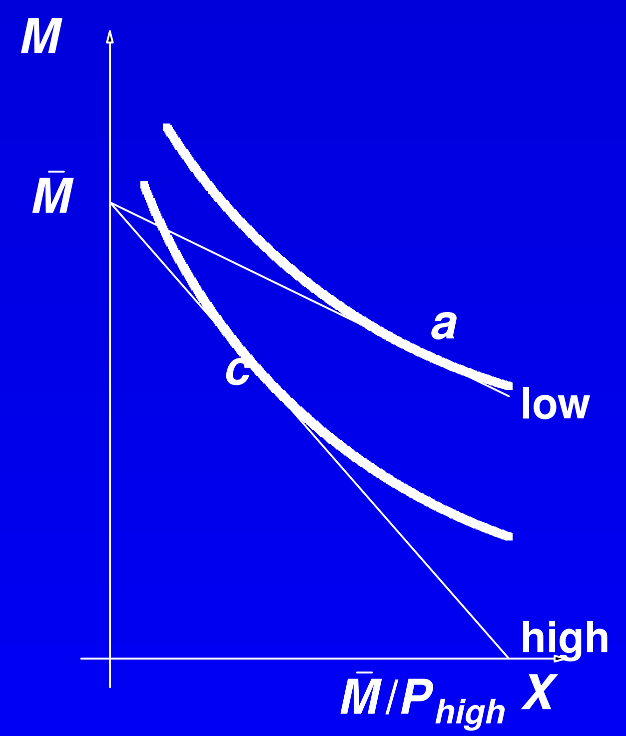

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A: An amount ΔM = the Equivalent Variation (EV).

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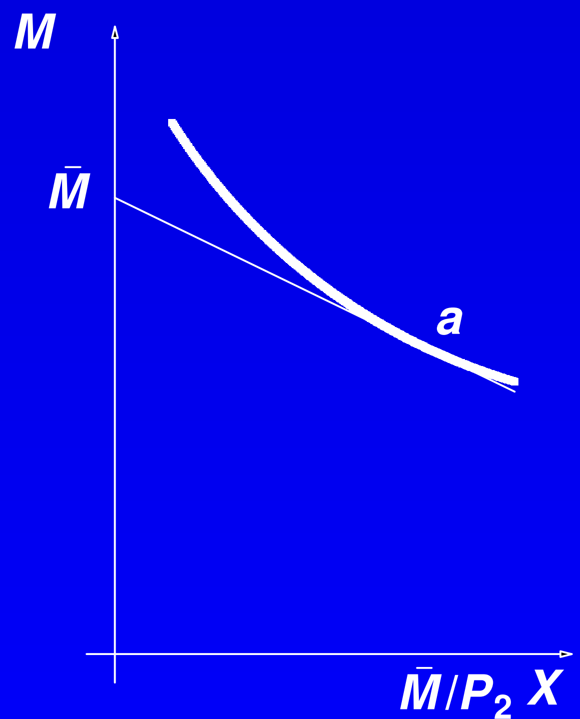

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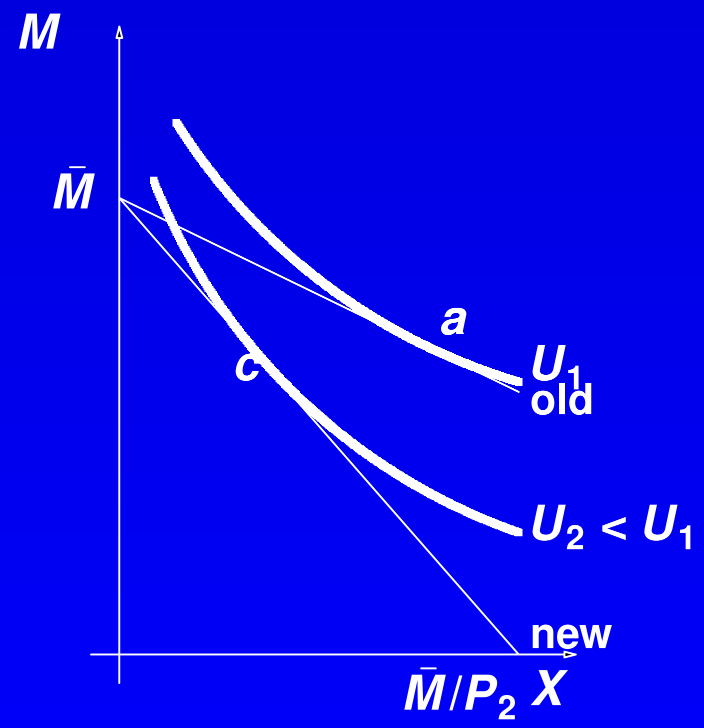

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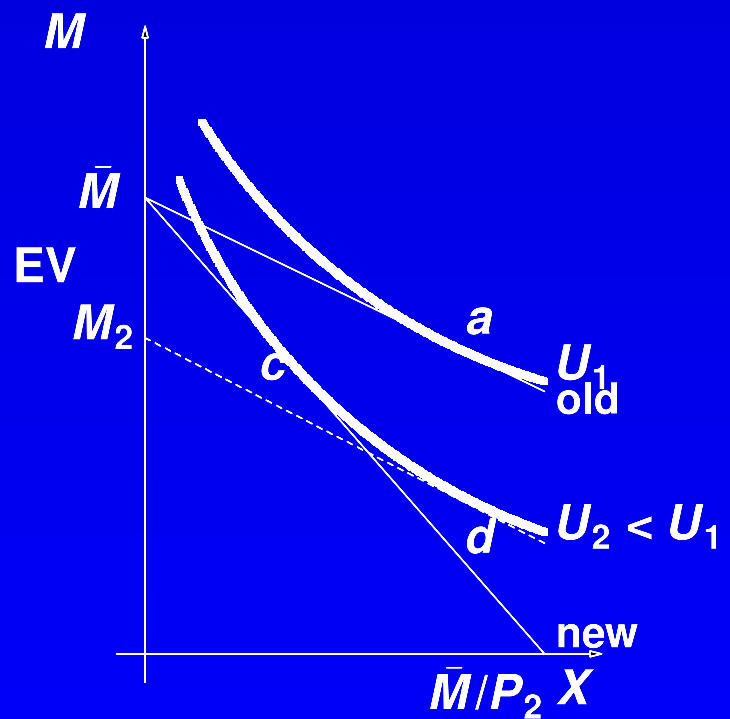

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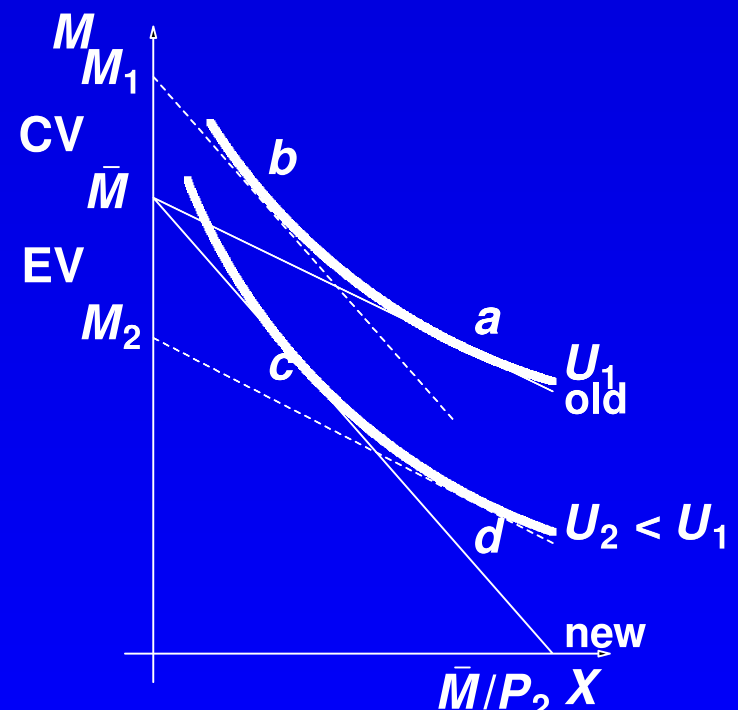
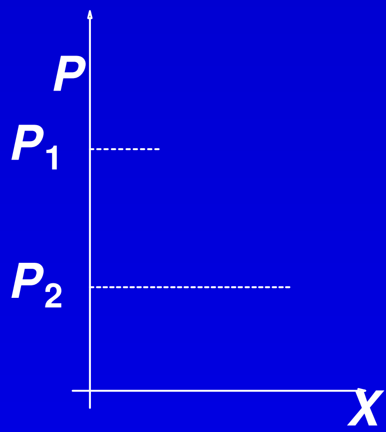


EV: Equivalent Variation (ΔM at old price)
CV: Compensating Variation (ΔM at new price)



Consumer's Surplus with a price change.

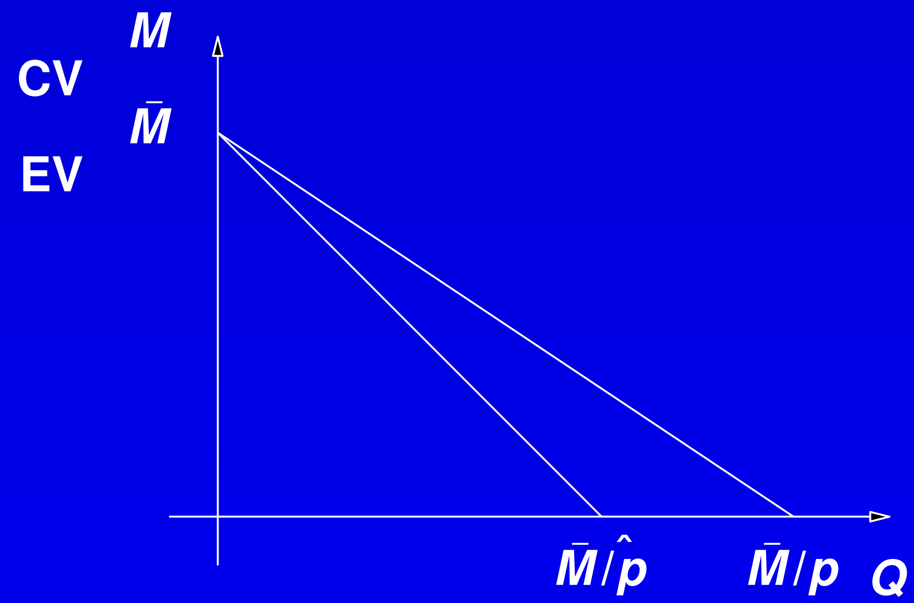
Equivalent Variation: **(EV) is thus the max. amount the consumer would pay for the project (of reducing the price from P_1 to P_2) = $\bar{M} - M_2$.**

Utility = function (quantity Q of good or service, money M spent on all else).

Maximise utility, s.t. budget constraint of $\bar{M}$.

Example: Imposition of a Tax (a price increase)

Consider a tax imposed on the product, which raises the price, from p to $\hat{p}$, and so makes the consumer worse off.



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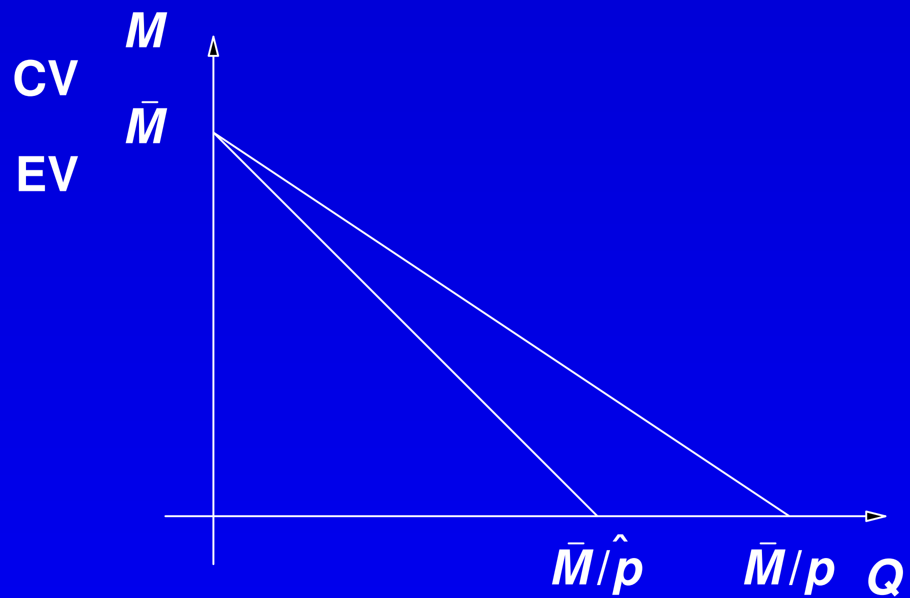

Equivalent Variation: **(EV) the maximum amount the consumer would pay to avoid the tax, i.e., to keep the price at p rather than have it change to $\hat{p}$ (at the old price p)**

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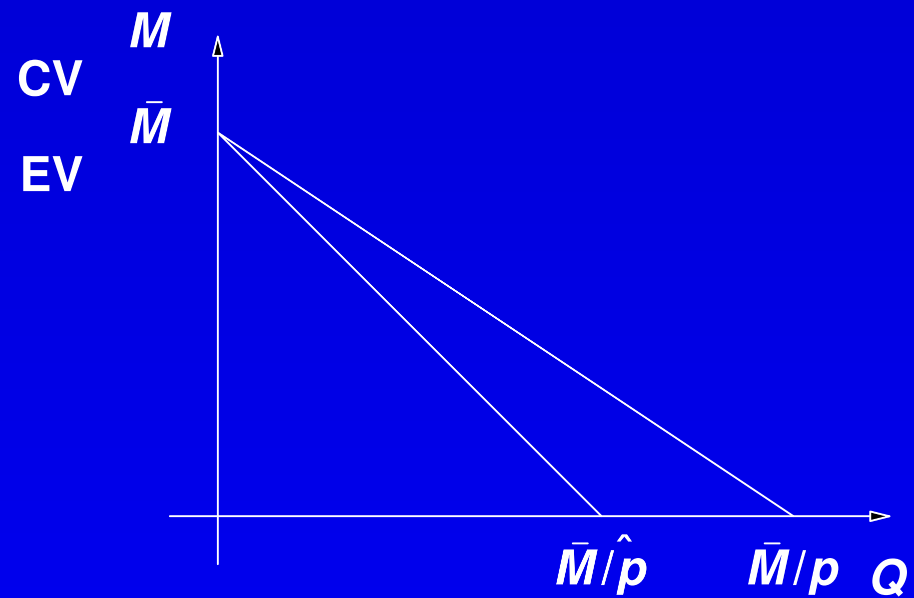

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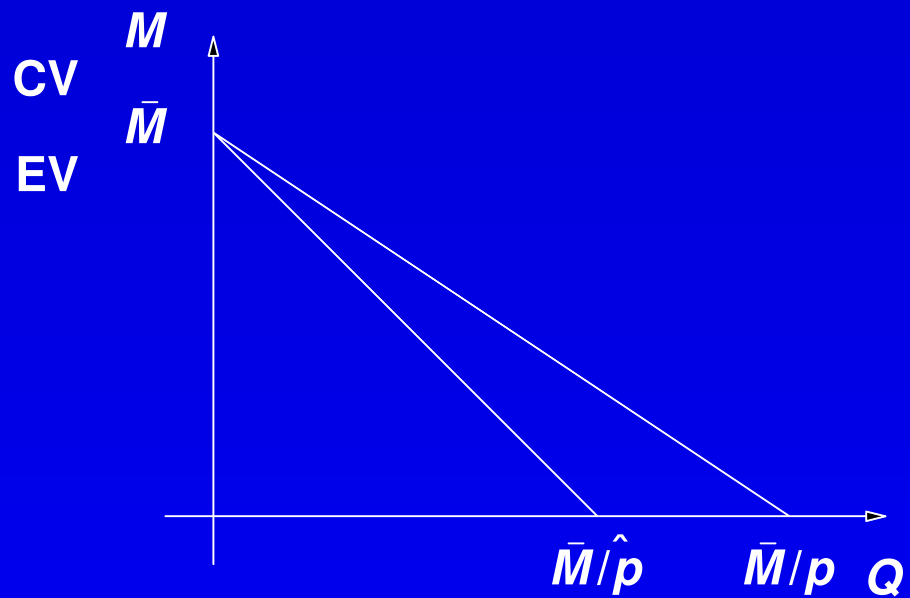

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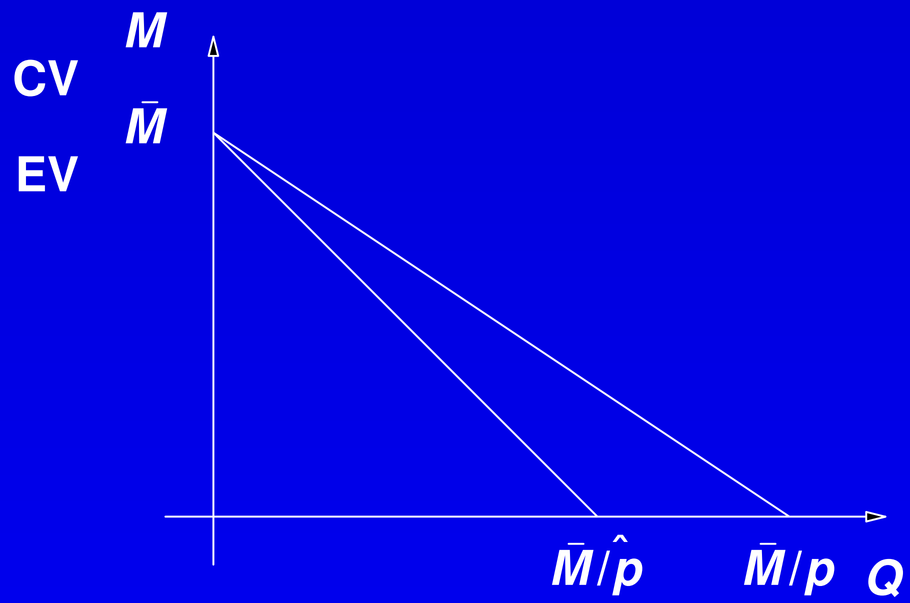

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∴ **A transfer from, say, consumers to producers in general will have no impact on social welfare overall: a transfer.**

- **How changes in utility can be expressed in money terms: so-called Equivalent Variation (WTP paying to avoid), and Compensating Variation (WTA being paid to accept).**