Indirect Effects of Price Changes

[C&B Ch. 7; S&W Ch. 10]

indirect effects : difficulties? It depends:

→ (1) difficult to predict or identify

(2) how to evaluate?

(avoid double counting)

Example: a branch line railway is closed [C&B pp. 152–158]

Model this by a rise in price above the choke price.

→ changes in demand for other goods

- **other transport modes e. g. bus**
- **housing *etc*.**

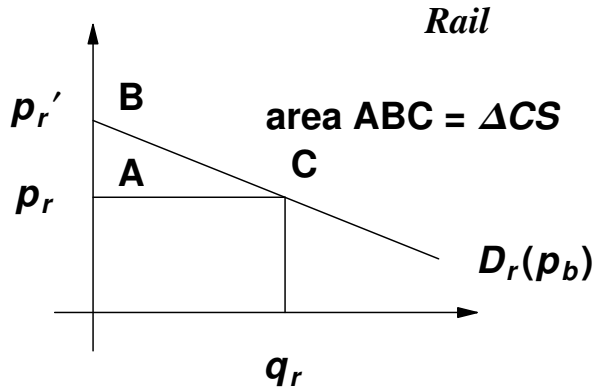
and → possible change in prices.

∴ Loss of consumer's surplus.

Graphically:

$\Delta Q \neq 0$

$\Delta P = 0$



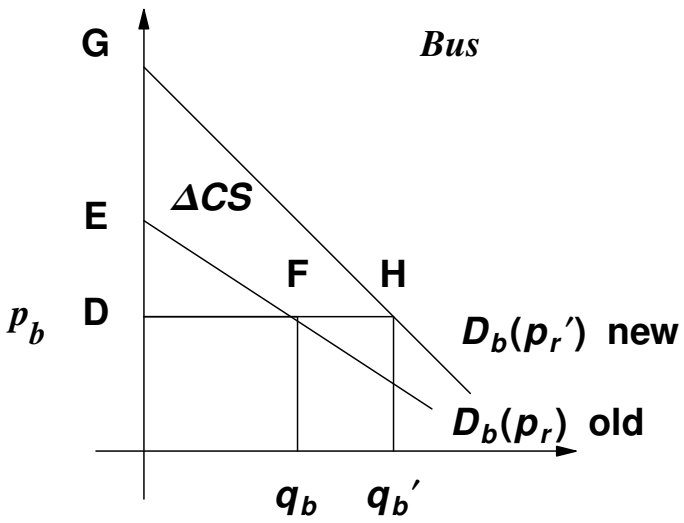
$D_r(p_b)$ = demand for rail trips, given price of bus p_b

- initially (p_r, q_r) at C
- finally $(p_r', q_r' = 0)$ at B as if price > p_r' (choke price)

$\therefore$ zero demand

$\therefore$ area ABC is the loss of Consumer Surplus, ΔCS.

But what happens in the bus market?



New demand for bus trips $D_b(p_r')$

Then ΔCS = area EFHG is *not* a social benefit of rail closure—consumers' surplus measures what consumers are willing to pay, in excess of what they are actually called on to pay, to consume a good.

Change in CS measures consumers' loss.

$\therefore$ ΔCS measures their loss if they have lost the opportunity to buy that good, area ABC (on the Rail diagram above).

This is the only element of social loss to consumers.
That the consumers' surplus from bus trips has increased indicates that the closure of the rail service increases consumers' willingness to pay for bus trips. (Nothing more.)

Remember: the demand curve for railway travel already included the rail passengers' realisation of the alternative travel opportunity of using the bus instead.

Or, the social loss that would be caused by closing the *bus* service would be greater if there were no alternative rail service than if there were such a service.

Two increases:

1. those who travelled by bus before now value bus more highly (∵ no alternative) (but they are not better off)

2. those who travelled by train *were* not even prepared to pay p_b for the bus; now at least p_b for some (∵ $q'_b - q_b$ extra bus trips by displaced rail travellers) (note: $q'_b - q_b < q_r$)

DGH, the amount of CS for buses, merely measures how much worse off the bus travellers would be if the bus were closed down too.

Δ CS with a good measures a change in consumers' welfare only if the change in surplus is caused by a change in that good's price or availability,* not *changes in a substitute's or a complement's price or availability.

Price Changes and ΔCS: Conclusion

The increase of the area of consumers' surplus in the other good (bus) (P_y = constant) is *not* to be regarded as a gain of consumers' surplus consequent upon the rise in P_x, the train.

This increase is simply the consequence of consumers' bettering themselves by switching from the higher priced good x to substitute good y.

Provided supply prices are constant, then the ceteris paribus conditions are met, and the partial analysis depicts the consumers' gains wholly within the area of the demand curve of the good whose price has risen—irrespective of the resulting magnitude and direction of the shifts in demand for all other goods in the economy.

Multipliers are Misleading.

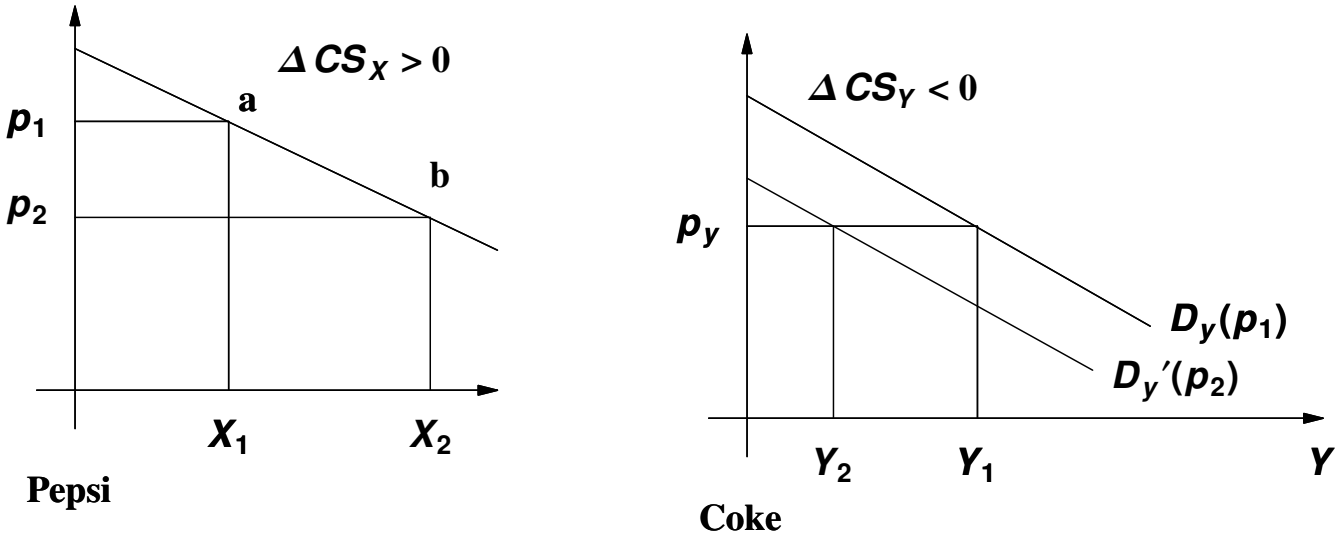
$\therefore$ ***"Multipliers" are misleading, so long as markets are competitive.***

Multipliers are measures of the impacts on other markets, but are wrong for two reasons:

- **They may lead to double counting of benefits, which should be net of costs, not gross.**
- **They may measure transfers, as seen above.**

[See DoF 3.11; see also C&B Ch. 13, on Economic Impact Analysis]

A fall in the price of X results in a contraction of the demand for Y:
The goods X and Y are substitutes: Pepsi and Coke?



$$p_1 X_1 + p_y Y_1 = \bar{M}$$

$$p_2 X_2 + p_y Y_2 = \bar{M}$$

ΔCS?
Δ social welfare? = ΔCS_X only. (Pepsi)
Ignore the induced change in CS_Y. (Coke)

1. Pecuniary External Effects

Consumers' Surplus **measures what consumers are willing to pay, in excess of what they are actually called on to pay, to consume a good.**

A change in the consumers' surplus associated with a particular good measures a change in consumers' welfare *only* if the change in surplus is caused by a change in the price of that good. (Not by changes in *other* related prices.)

So long as *price* = *marginal cost*, and doesn't change in response to a project, then *indirect* (i.e. in another market) net marginal social cost or benefit equals zero.

Pecuniary External Effects **[C&B pp.134, 147, 155, 167–169; FP Ch. 11.2.2] occur—**

if the price change whose effects are being evaluated itself causes, as an indirect effect via market mechanisms, a change in some other price.

e.g. increase in railway prices (fares) $\rightarrow$ to a change in bus fares &/or quantities

– **then $\exists$ a *Pecuniary External Effect*.**

Example of indirect market effects (PEEs):

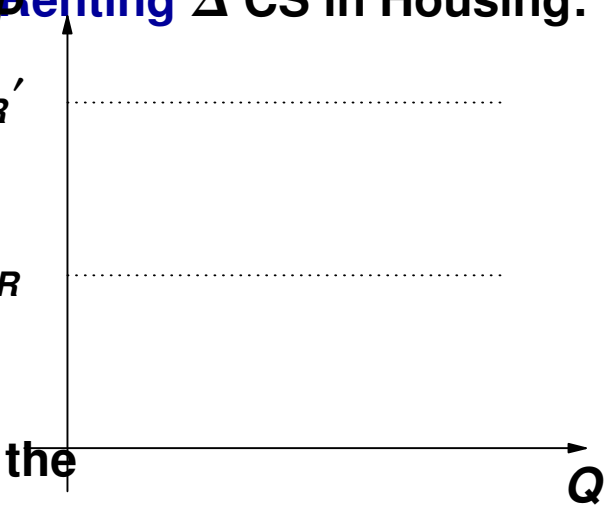
The price of commuting to Sydney from the Blue Mountains rises. The first effect is to reduce the number of train trips. The second effect is to make Katoomba less attractive as a dormitory suburb of Sydney's because of the higher travel costs. The third effect is to reduce the weekly rentals in Katoomba. The lower price of housing might slightly increase the number of renting commuters, which would partly offset the effect of higher fares on rail travel.

Katoomba Rail and Renting Δ CS in Housing:

e.g. Katoomba

rail: (P_R, Q_R)
housing: (P_H, Q_H)

considering raising the price of railway



(a) rail travel

$P_R \rightarrow P_R'$

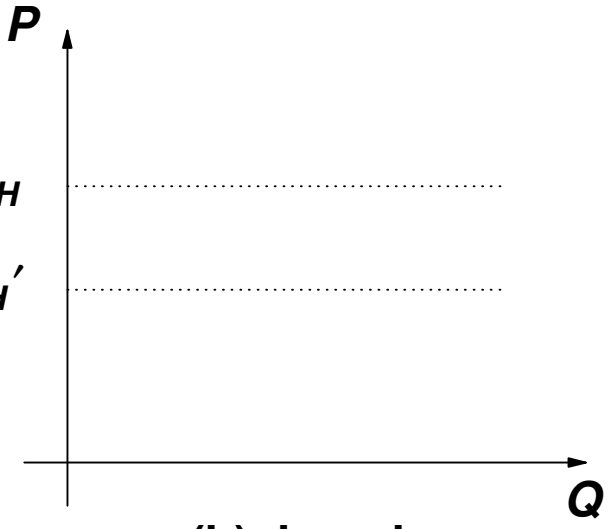
$\rightarrow$ reduction in $D_H P_H$

$\rightarrow$ fall in P_H

$\rightarrow P_H'$

fall in Q_H

$\rightarrow Q_H'$



(b) housing

Katoomba: Dynamics and Changer in Surplus

Fall in $P_H \rightarrow P_H' \rightarrow$ increase in $D_R \rightarrow D_R(P_H')$

$\rightarrow$ new quantity of trips Q'_R

Fall in consumers' surplus in railway market (/////)

Rise in consumers' surplus in housing market (\\\\\\)

$\therefore$ net effect on consumers is (/////) – (\\\\\\), a reduction in consumers' surplus

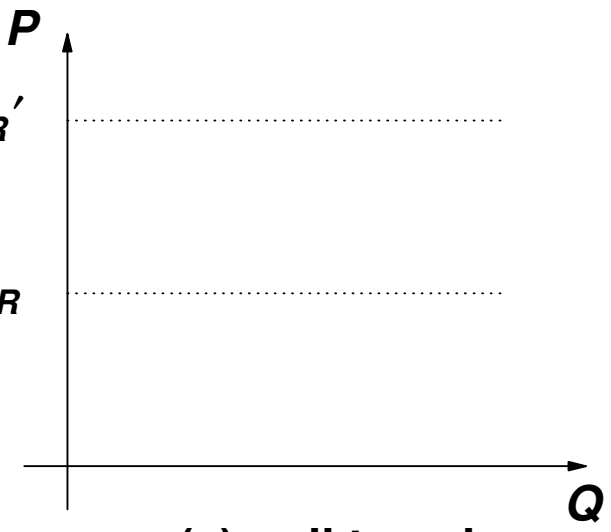
$\therefore$ net effect on society (cons. + prod.) = Δ CS in rail-travel market, since housing markets changes cancel.

Area \\\\ is a transfer: from landlords to tenants.

e.g. *Katoomba*

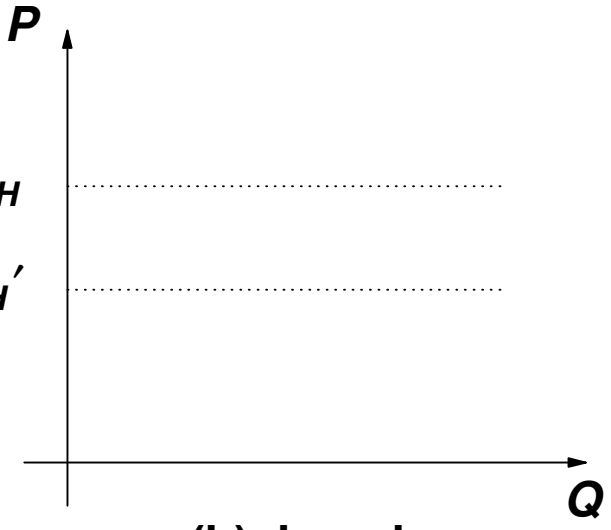
rail: (P_R, Q_R)
housing: (P_H, Q_H)

raising the
price of railway



(a) rail travel

$P_R \rightarrow P_R'$
$\rightarrow$ reduction in $D_H P_H$
$\rightarrow$ fall in P_H
$\rightarrow P_H'$
fall in Q_H
$\rightarrow Q_H'$



(b) housing

Katoomba: Dynamics

A: (P_R, Q_R) **&** (P_H, Q_H) **initial**
B: (P_R', Q_R') **&** (P_H', Q_H') **final**
C: (P_R, Q_R') **&** (P_H, Q_H') **old prices, new quantities**
D: (P_R', Q_R) **&** (P_H', Q_H) **new prices, old quantities**

A preferred to C $\Rightarrow$ **losses of A** $\to$ **B** $\geq$ **losses of C** $\to$ **B**
B preferred to D $\Rightarrow$ **losses of A** $\to$ **B** $\leq$ **losses of A** $\to$ **D**

$\therefore$ **losses of C** $\to$ **B** $\leq$ **losses of A** $\to$ **B** $\leq$ **losses of A** $\to$ **D**

$$\therefore Q_R'(P_R' - P_R) - Q_H'(P_H - P_H') \leq \text{losses of A} \to \text{B} \leq Q_R(P_R' - P_R) - Q_H(P_H - P_H')$$

Katoomba cont.

e.g. Initially

$$\left.\begin{array}{ll} P_R = & \$5/\text{trip} \\ P_H = & \$50/\text{week rent} \end{array}\right\} \rightarrow \begin{array}{l} 10{,}000 \text{ trips/week} = Q_R \\ 1{,}000 \text{ tenants} = Q_H \end{array}$$

Finally

$$P'_R \quad \$6/\text{trip} \quad \rightarrow \quad \begin{array}{l} 9{,}000 \text{ trips/week} = Q'_R \\ 980 \text{ tenants} = Q'_H \\ \$47.50/\text{week rent} = P'_H \end{array}$$

Then net *loss* to consumers:

$$= (6-5)\frac{(10{,}000+9{,}000)}{2} - (50-47.5)\frac{(1{,}000+980)}{2}$$
$$= \$9{,}500 - \$2{,}475 = \$7{,}025/\text{week}$$

Landlords also lose "." loss of rent, tenants = $2,475

shaded area in (*b*) measures the loss of producer's surplus because the only effect is the price fall.

Katoomba: Net losses

Thus $\therefore$ **net loss to *consumers & landlords***
$=$ **shaded are in (*a*) $=$ $9,500/week**

(Because shaded area in (*b*) cancels out—is a transfer from landlords to tenants
& is solely a price effect.)

Conclusion:

with *Pecuniary External Effects*, we need only consider the effect on Consumers' Surplus and Producers' Surplus in the primary market.

2. Induced Price Changes

A company hires labour, manufacturers output, & sells to customers.

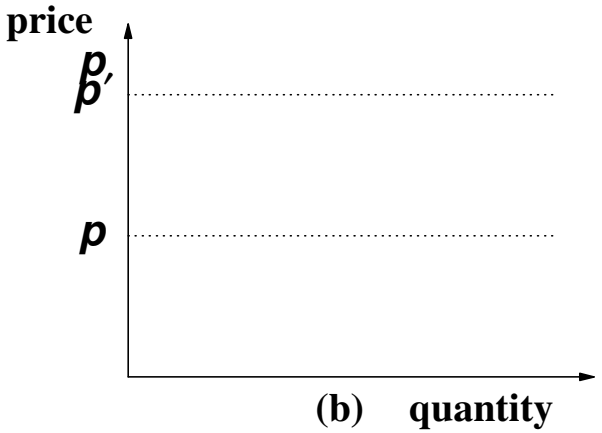
Company is a price-taker in the labour market.

Then wage increases $w \to w'$

net loss to firm
= shaded area (a)
– shaded area (b)

net loss to consumers
= shaded area (b)

$\therefore$ the social net loss
= shaded area (a)



If PPIC is sole criterion, then weight consumers = producers (a $ is a $) & need not look at induced price changes in competitive markets for Pecuniary External Benefit.

3. Valuing Benefits and Costs — Summary

[DoF 3.13]

- **Clearly *identify* benefits and costs. Distinguish them from transfer effects, which have no opportunity costs.**
- ***An externality:* when production or consumption "spills over" so that others receive a benefit for which they haven't paid, or suffer a loss for which they aren't compensated.**
- **Several techniques to value external costs or benefits: different values according to whether *willingness to pay* (to avoid a cost) or *willingness to accept* (in compensation), since different underlying property rights.**
- **For large projects, benefits should include *the change in consumer surplus*, which depends on the price elasticity of demand.**

- **With a *tax or subsidy* (a wedge between the sellers' values and the buyers' values), the correct valuation depends on whether the cost or benefit is incremental to the project, or displaces existing supply or output.**
  - **— Incremental *output* is valued at its actual (tax-inclusive) price, since that's the price consumers are willing to pay.**
  - **— Output that displaces other output should be valued at the economic cost (tax-exclusive) of the displaced output.**
  - **— Incremental project *input* is valued at its economic cost (tax-exclusive).**
  - **— Project input that is diverted from another project (because of higher prices) is valued at its market (tax-inclusive) price.**
  - **— If both incremental and displacement effects are present, then the *shadow price is a weighted average.***

- **With full employment in the labour market, labour should be valued as just another input subject to tax:**
  - **— When labour is lured from another employer, it should be valued at the gross-of-tax wage (the value to the other employer).**
  - **— When a project increases the supply of labour (increased participation rate), then the shadow price should be the net-of-tax wage (what the workers receive).**
- **When a project will employ the unemployed (and some rigidity exists in the labour market), then the opportunity cost of labour will be less than the wage.**
  The shadow price will lie between the higher net-of-tax wage, and the lower level of the dole, augmented by some amount for leisure forgone.
- **Beware the use of "multipliers": they seldom measure actual benefits or opportunity costs.**

  ∴ P.E.E. → double counting.
- **For valuing the costs and benefits of a project, markets provide much information at little cost. How justified is the need for the development of more accurate shadow prices? A CBA of a proposed CBA!**

Overriding principle:

Opportunity cost

transfers:	**no opportunity cost**
buyers:	**tax-inclusive price, what they pay**
sellers:	**economic cost (net-of-tax), what they get**

CBA always concerned with incremental costs and benefits, that is, with effects that would not have occurred in the absence of the project — DoF (1991).

Summary of Week 4

These lectures discussed the relevance of induced changes in other markets:

- **Why multipliers — numbers of additional jobs, etc. — are misleading.**
- **Ignore PEE: Pecuniary External Effects, usually involve winners and losers: and transfers.**
- **Examples of indirect price changes (in other markets), and why they should be ignored.**
- **Focus on opportunity costs.**