

# MICROECONOMICS AND POLICY ANALYSIS - U8213

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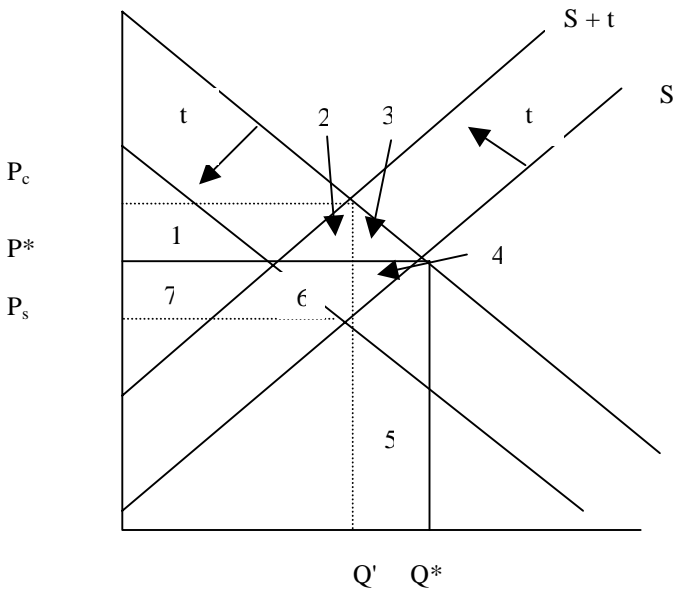
Class Notes - Spring 2001

## Taxes & Tax Incidence

February 14, 2000 and February 19, 2000

Reading: PR Chapter 9.5-9.6

### Who bears the burden of a tax?

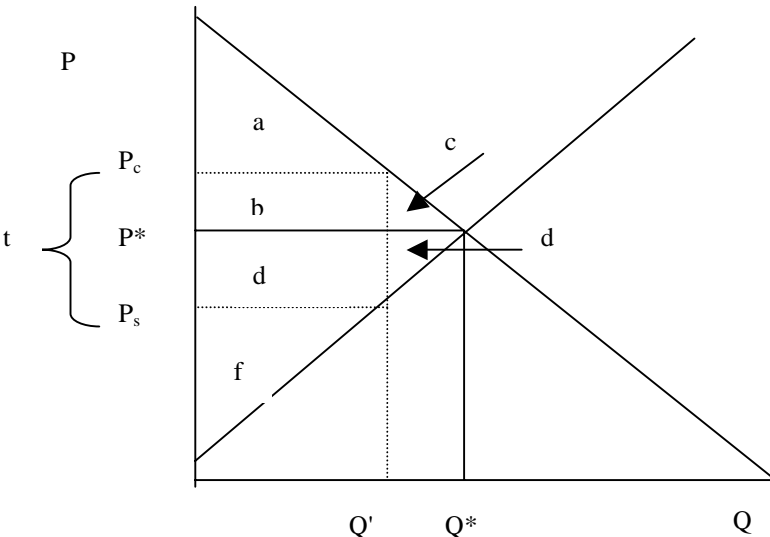


$P_c$  – Price paid by consumers  
 $P_s$  – Price paid by suppliers

If the sales tax is paid by suppliers the supply curve shifts to the left. If consumers are taxed the demand shifts downward. No matter which curve shifts the intersection will always be the same. The burden of the tax is shared between producers and consumers.

Change in CS	= -1 -2 -3	Government Gains	= 1 + 2 + 6 + 7
Change in PS	= -4 -6 -7	Deadweight loss	= 3 + 4

In general,

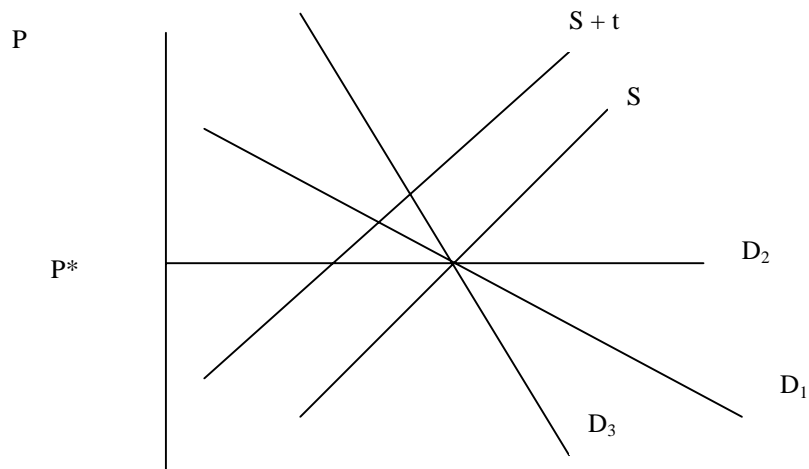


The change in surplus resulting from a tax:

Change in PS:	-b-c
Change in CS:	-d-e
Government Collections:	b + d
Deadweight Loss:	c + e

Is this efficient? Although there is a loss to society with a sales tax efficiency ultimately depends on alternatives.

## What determines how a tax burden is shared?



The Elasticity of Supply and Demand determine how the tax burden is shared.

Three possible demand functions:

D<sub>1</sub>: Burden is shared somewhat equally

D<sub>2</sub>: P<sub>c</sub> remains P\*. Consumers are inflexible about price and producers bear entire burden

D<sub>3</sub>: Steep Demand. The price paid by consumers increases a lot. Consumer surplus is influenced a lot while producer surplus remains relatively unchanged.

Elasticity varies consumer and producer surplus and must be considered when evaluating a policy.

### Numerical Example:

Consumers and Producers face new prices because of a tax.

$$Q_D = D(P_D, \alpha) \quad \alpha, \beta \text{ may be anything}$$

$$Q_S = S(P_S, \beta)$$

Total Derivative (Change in Quantity Demanded)

$$\delta Q_D = D_p * \delta P_D + D_\alpha * \delta \alpha$$

$$\underbrace{\frac{\delta D(P_D, \alpha)}{\delta P_D}}_{\text{Change in } \alpha}$$

$$\delta Q_S = S_p * \delta P_s + S_\beta * \delta \beta$$

$$\delta Q_S = \delta Q_D$$

A tax imposes a wedge between the price paid by consumers and the price received from suppliers. The difference is the amount of the tax.

$$P_D - P_S = t$$

$$\delta P_D - \delta P_S = \delta t \quad \text{The change between } P_c \text{ and } P_s \text{ is due to a change in the tax}$$

$$\delta Q_D = \Delta p * \delta P_D$$

$$\delta Q_S = S_p * \delta P_S = S_p(\delta P_D - \delta t) \quad \text{make substitution}$$

$$D_p * \delta P_D = S_p(\delta P_D - \delta t) \quad \text{change in producer price} = \text{change in consumer price}$$

$$S_p * \delta t = S_p * \delta P_D - D_p * \delta P_D \quad \text{expand and rearrange}$$

$$\frac{\delta P_D}{\delta t} \quad (\text{what is the change in } P_c \text{ because of the change in the tax})$$

$$\frac{\delta P_D}{\delta t} = \frac{S_p}{S_p - D_p} \quad \leftarrow \begin{array}{l} \text{Derivative of demand and supply with respect to price.} \\ \text{To convert to elasticity we need to multiply the top and bottom by } P/Q \end{array}$$

$$\frac{\delta P_d}{\delta t} = \frac{e_{S,P}}{e_{S,P} - e_{D,P}} \quad \leftarrow \begin{array}{l} \text{Elasticity of supply and demand with} \\ \text{respect to price} \end{array}$$

If  $e_D = 0$  then the ratio is equal to 1 and consumers pay all of the tax.

If  $e_D = \infty$  then the entire ratio goes to 0 and the producers pay all of the tax.

The same equation can be rewritten to apply to producers:

$$\frac{\delta P_S}{\delta t} = \frac{e_{D,P}}{e_{S,P} - E_{D,P}}$$

