Pinciples of

Microeconomics

Sixth Edition

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Chapter : The Costs of Taxation

In this chapter, look for the answers to these questions:

- How does a tax affect consumer surplus, producer surplus, and total surplus?
- What is the *deadweight loss* of a tax?
- What factors determine the size of this deadweight loss?
- How does tax revenue depend on the size of the tax?

General overview of Tax

- A tax is a wedge between the price buyers pay and the price sellers receive.
- A tax raises the price buyers pay and lowers the price sellers receive.
- A tax reduces the quantity bought & sold.
- These effects are the same whether the tax is imposed on buyers or sellers, so we do not make this distinction in this chapter.

The Effects of a Tax

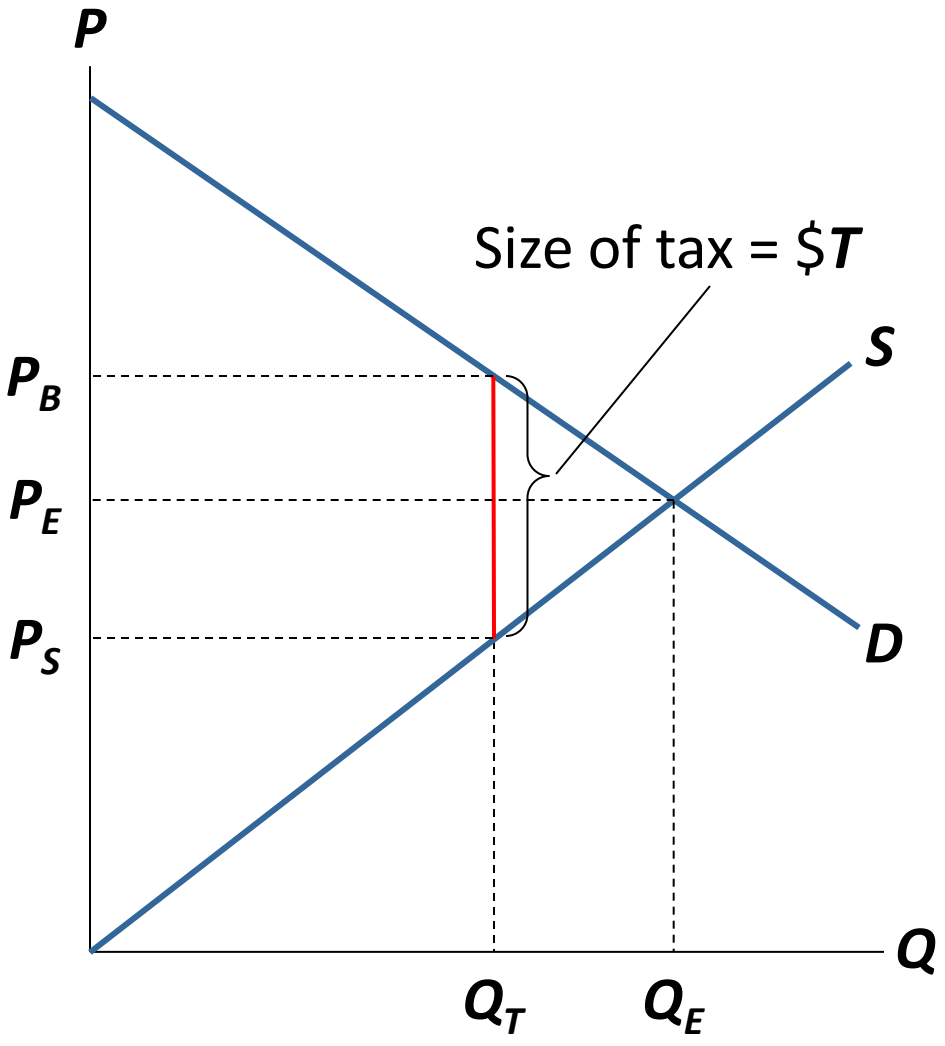
With no tax, eq'm price is P_E and quantity is Q_E.

Govt imposes a tax of \$$T$ per unit.

The price buyers pay is P_B,

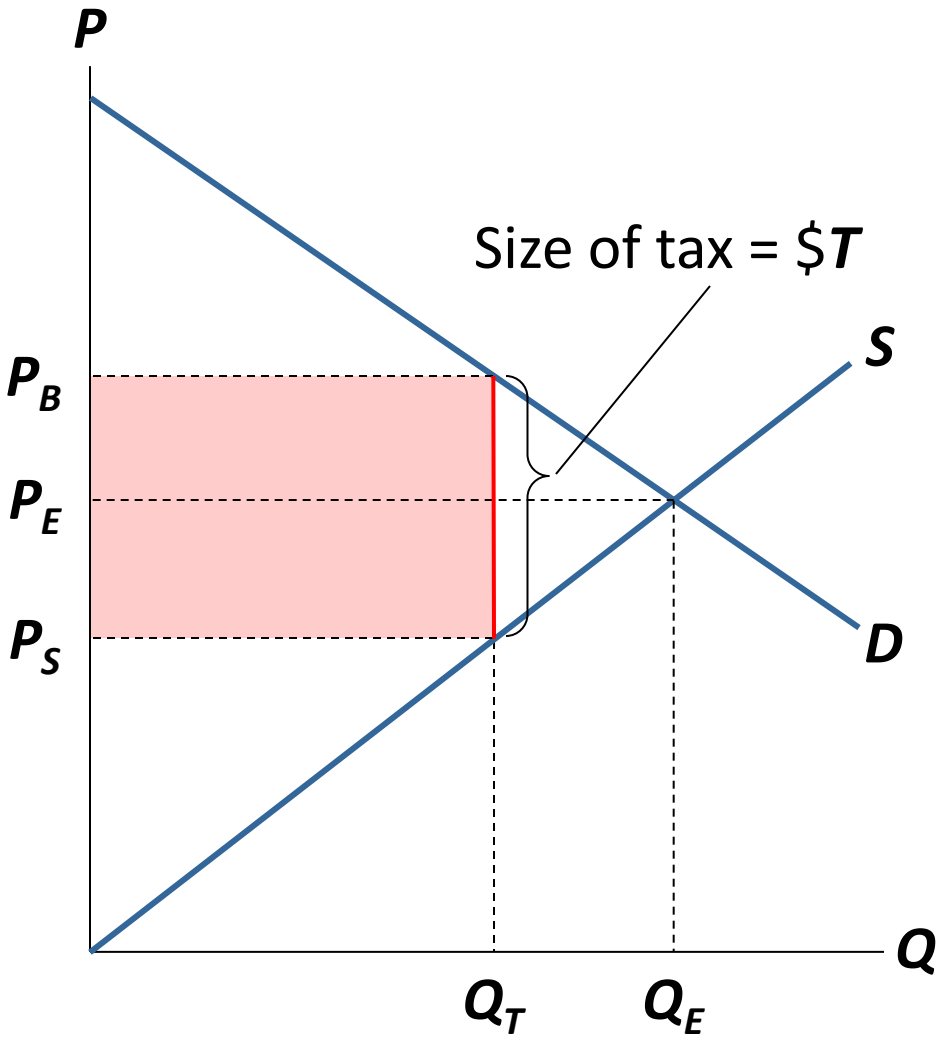
the price sellers receive is P_S,

and quantity is Q_T.



The Effects of a Tax

The tax generates revenue equal to $\$T$ x Q_T.



The Effects of a Tax

- Next, we use the tools of welfare economics to measure the gains and losses from a tax.
- We will determine consumer surplus (CS), producer surplus (PS), tax revenue, and total surplus with and without the tax.
- Tax revenue is included in total surplus, because tax revenue can be used to provide services such as roads, police, public education, etc.

The Effects of a Tax

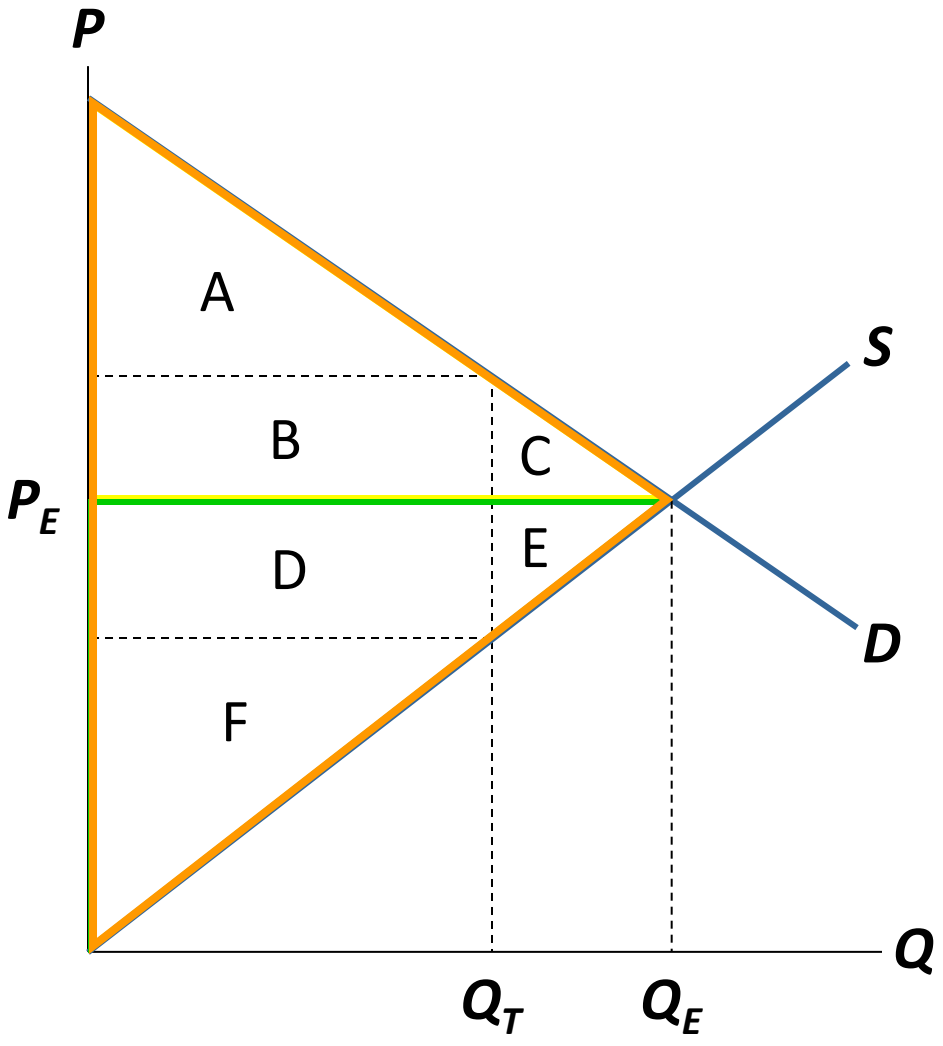
Without a tax,

CS = A + B + C

PS = D + E + F

Tax revenue = 0

Total surplus
= CS + PS
= A + B + C
+ D + E + F



The Effects of a Tax

With the tax,

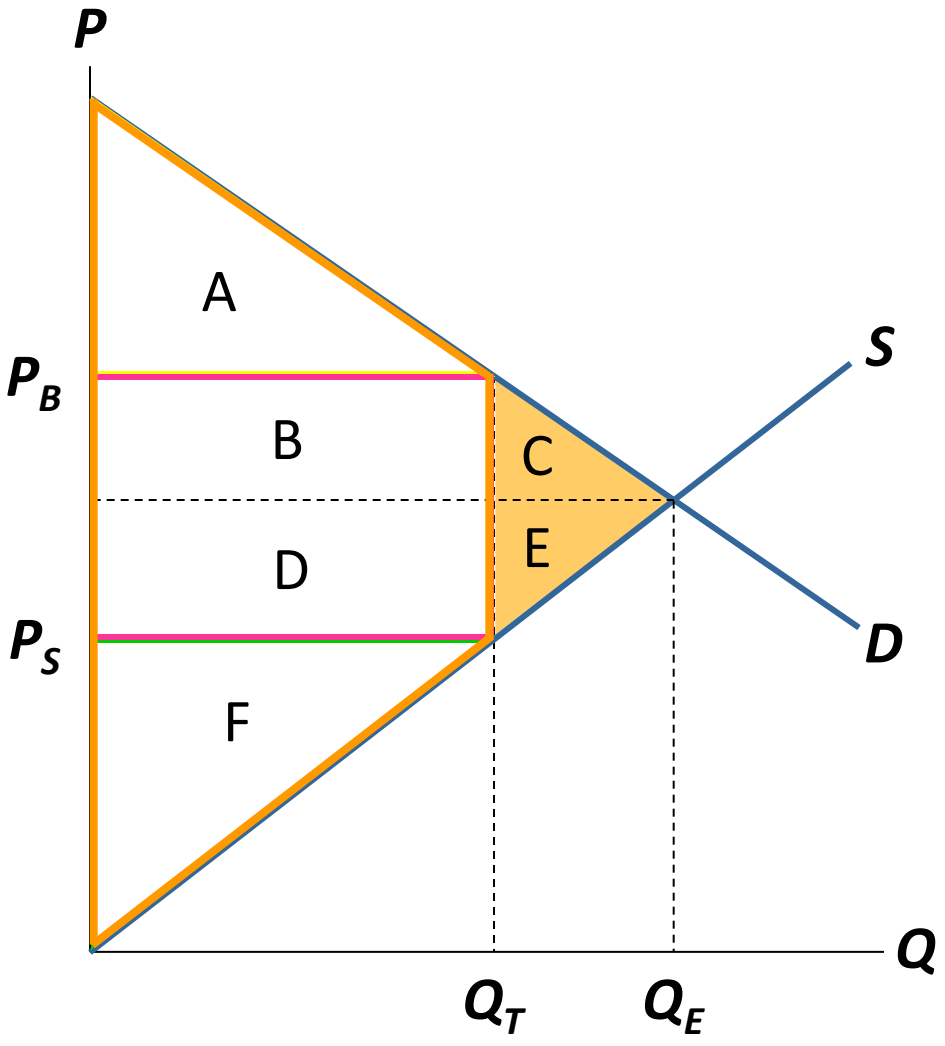
CS = A

PS = F

Tax revenue
= B + D

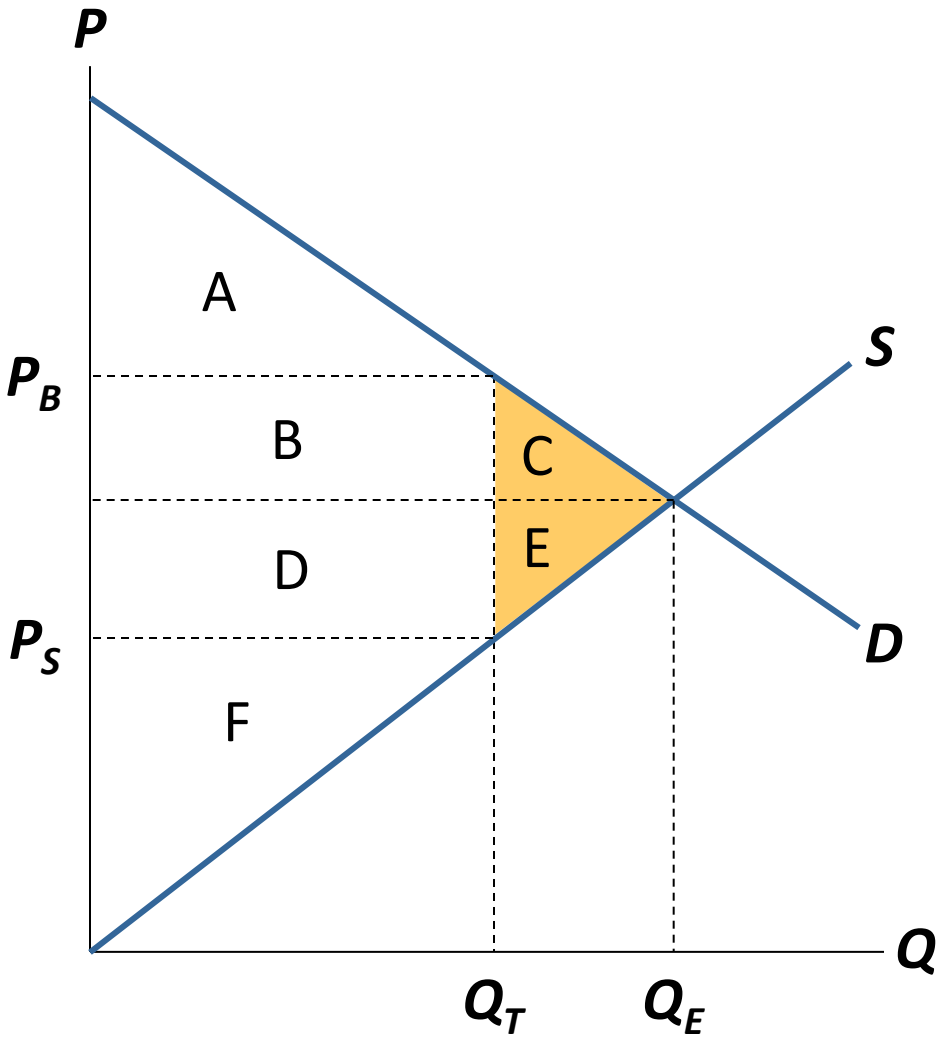
Total surplus
= A + B
+ D + F

The tax causes total surplus to fall by C + E



The Effects of a Tax

C + E is called the **deadweight loss** (DWL) of the tax, the fall in total surplus that results from a market distortion, such as a tax.

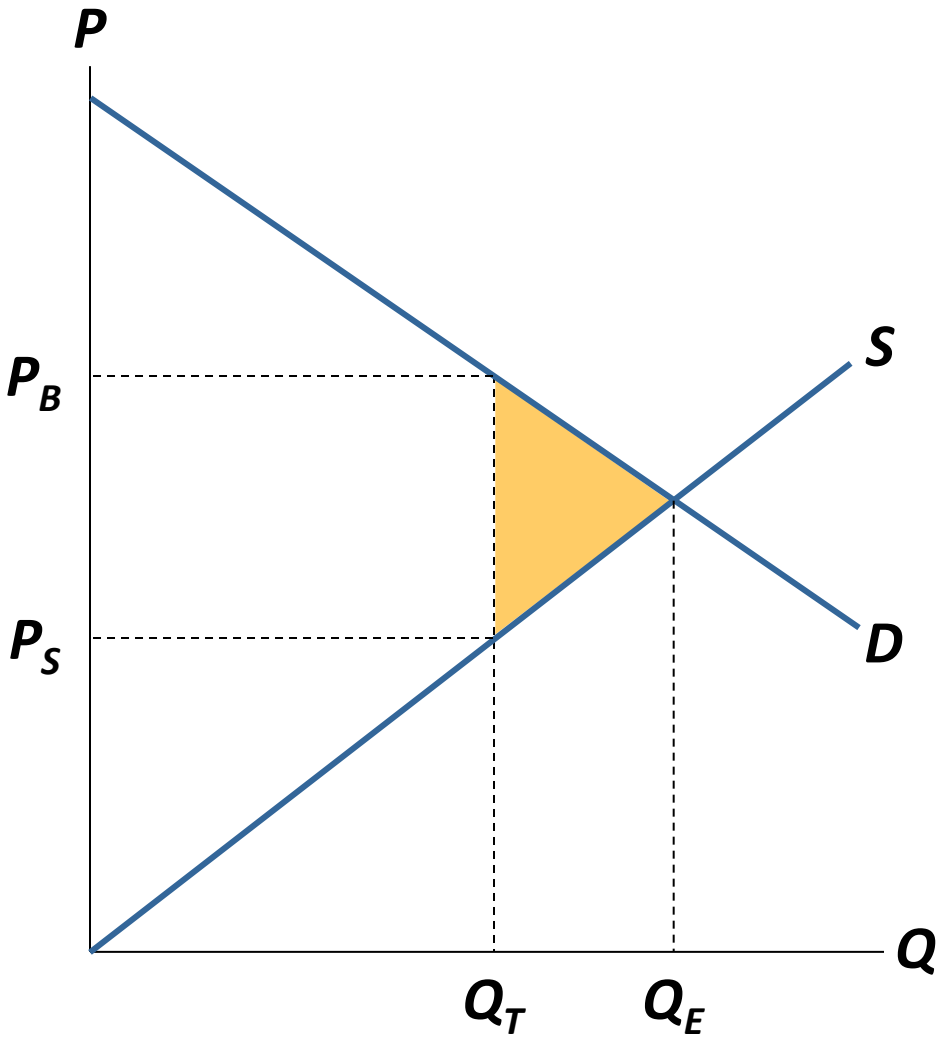


About the Deadweight Loss

Because of the tax, the units between Q_T and Q_E are not sold.

The value of these units to buyers is greater than the cost of producing them,

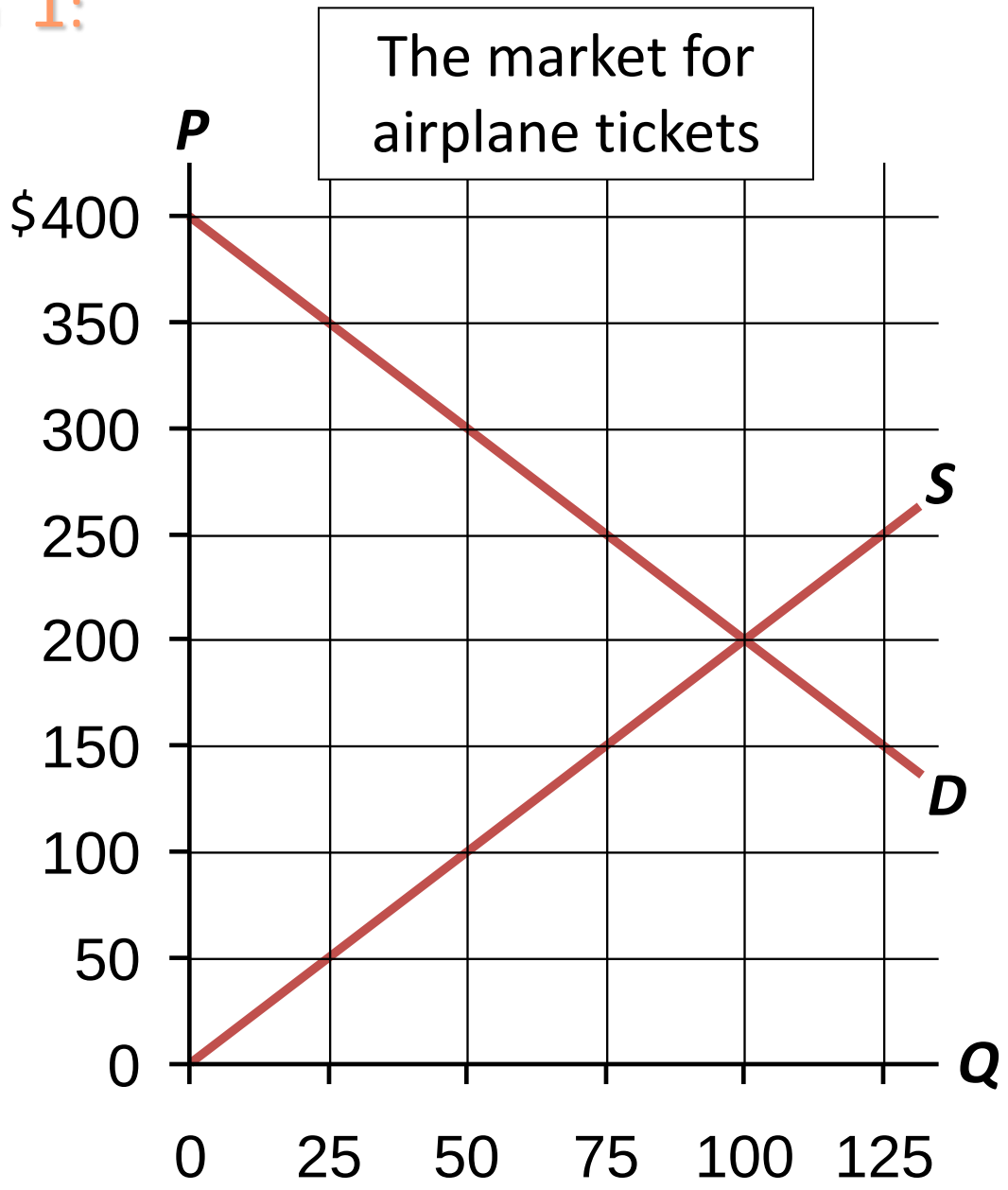
so the tax has prevented some mutually beneficial trades.



ACTIVE LEARNING 1:
Analysis of tax

A. Compute CS, PS, and total surplus without a tax.

B. If $100 tax per ticket, compute CS, PS, tax revenue, total surplus, and DWL.



ACTIVE LEARNING 1:
Answers to A

CS

= ½ x $200 x 100

= $10,000

PS

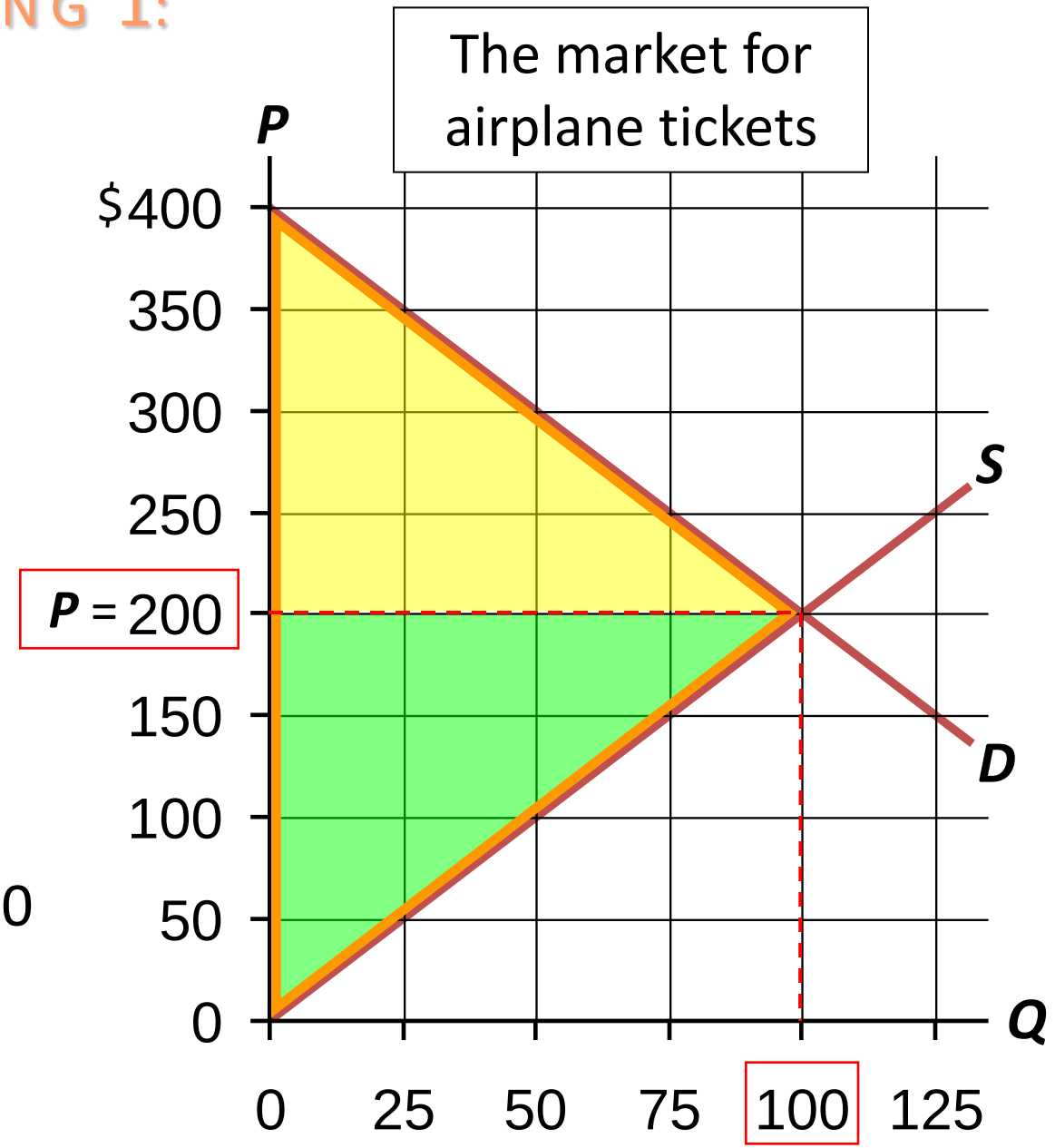
= ½ x $200 x 100

= $10,000

total surplus

= $10,000 + $10,000

= $20,000



ACTIVE LEARNING 1:
Answers to B

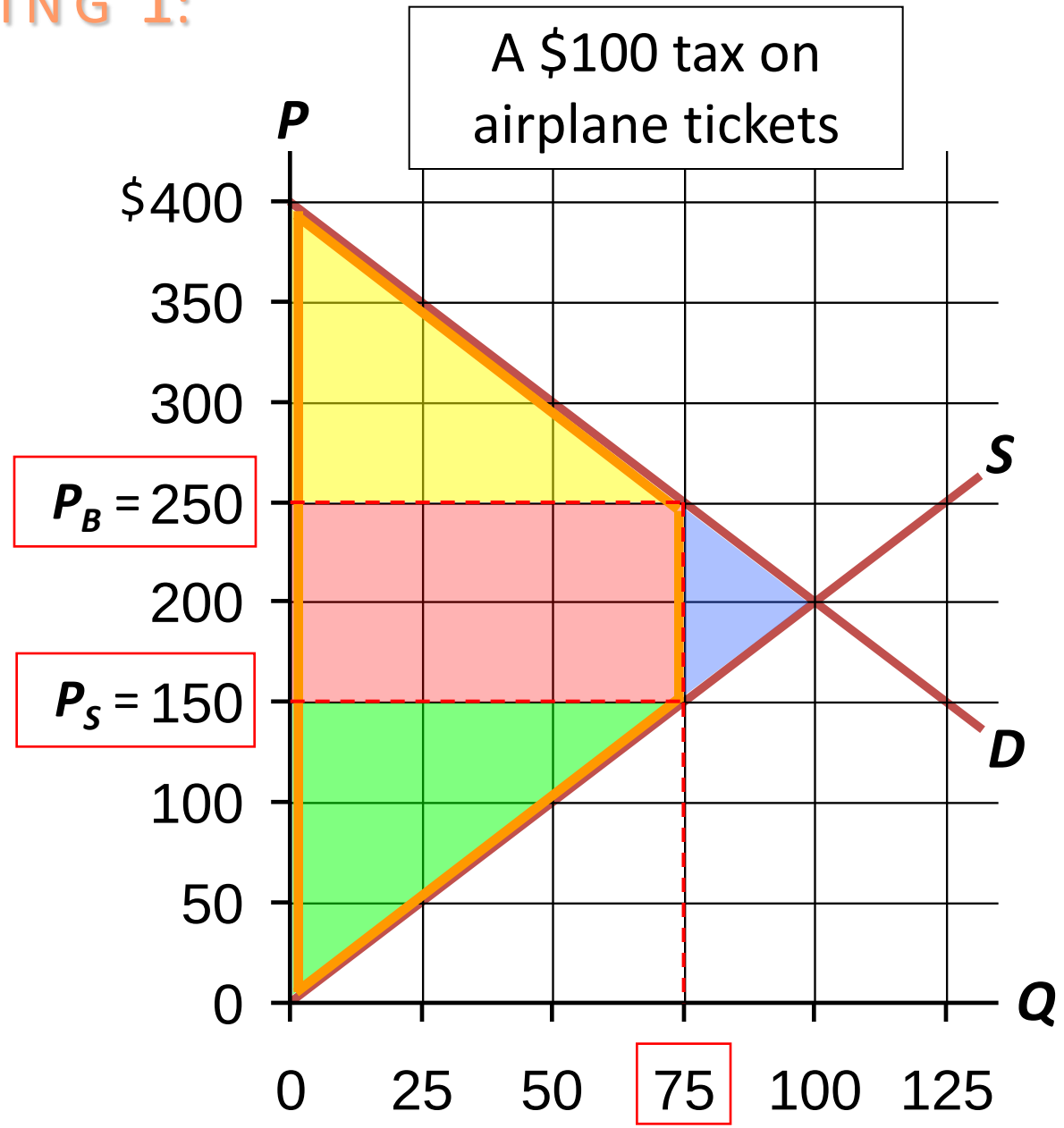
CS
= ½ x $150 x 75
= $5,625

PS = $5,625

tax revenue
= $100 x 75
= $7,500

total surplus
= $18,750

DWL = $1,250

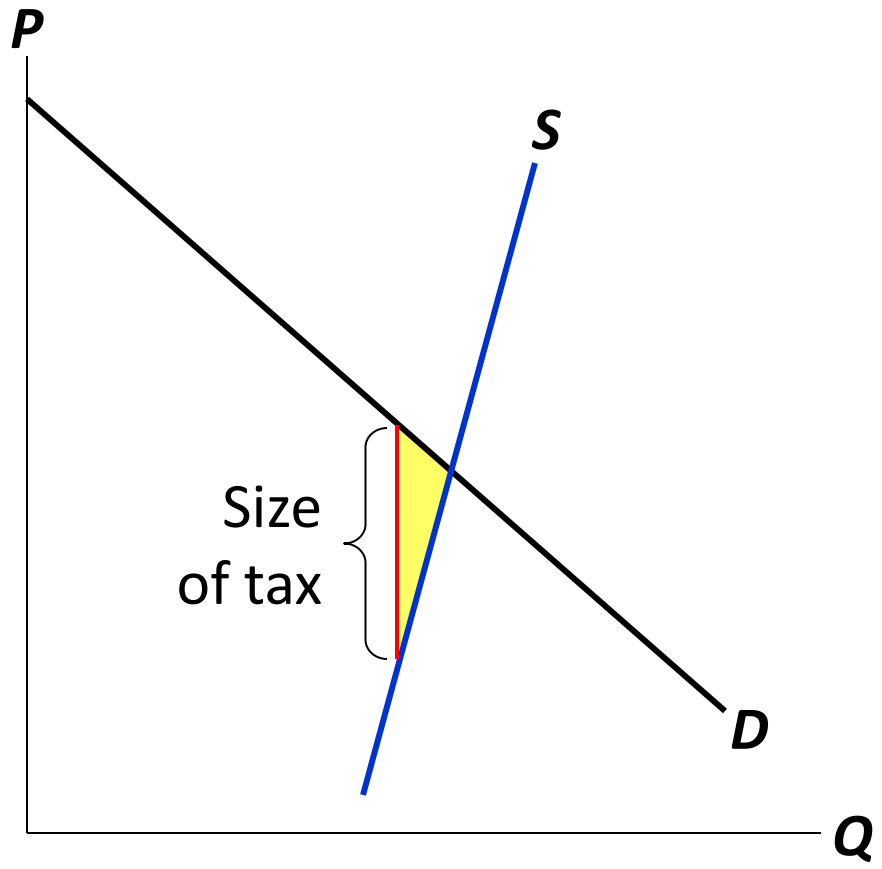


What Determines the Size of the DWL?

- The govt needs tax revenue to finance roads, schools, police, etc., so it must tax some goods and services.
- Which ones? One answer is that govt should tax the goods or services with the smallest DWL.
- So when is the DWL small vs. large? Turns out it depends on the elasticities of supply and demand.
- Recall: The price elasticity of demand (or supply) measures how much quantity demanded (or supplied) changes when the price changes.

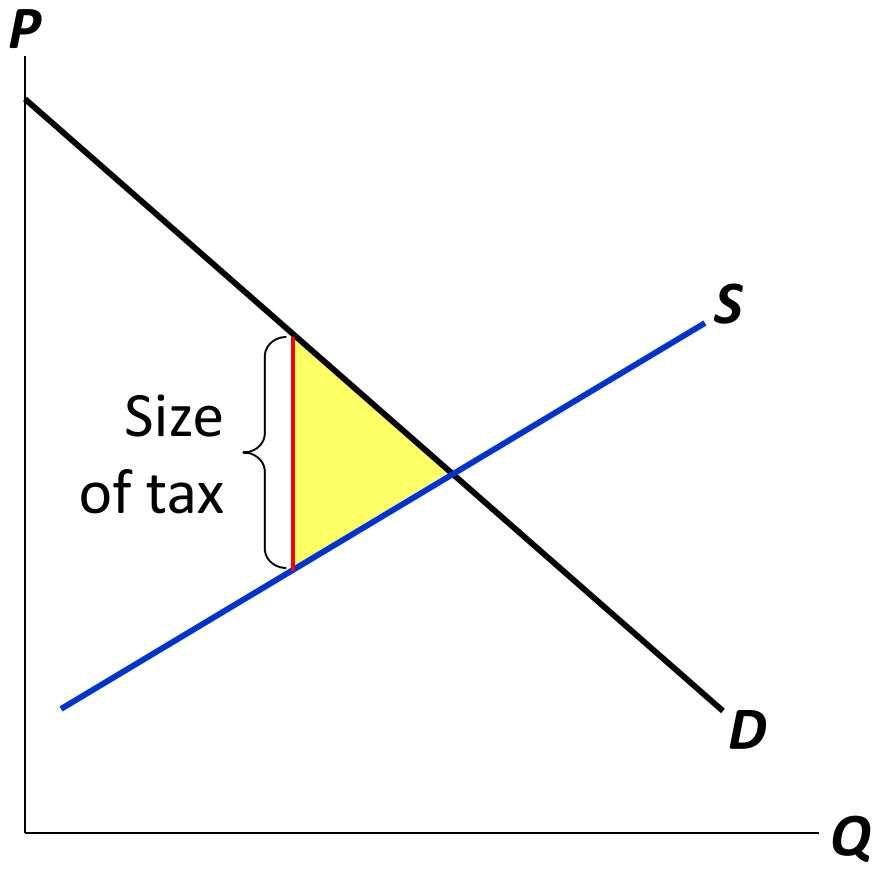
DWL and the Elasticity of Supply

When supply
is inelastic,
the DWL of a tax
is small.



DWL and the Elasticity of Supply

The more elastic is supply, the larger is the DWL.



DWL and the Elasticity of Supply

When demand
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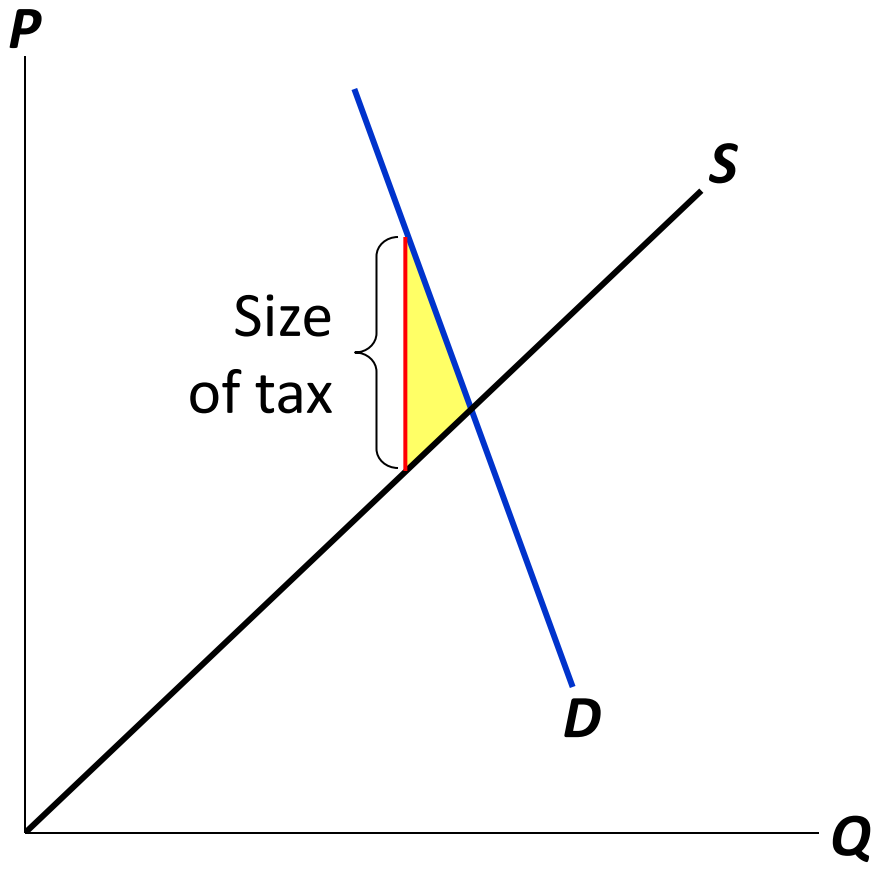
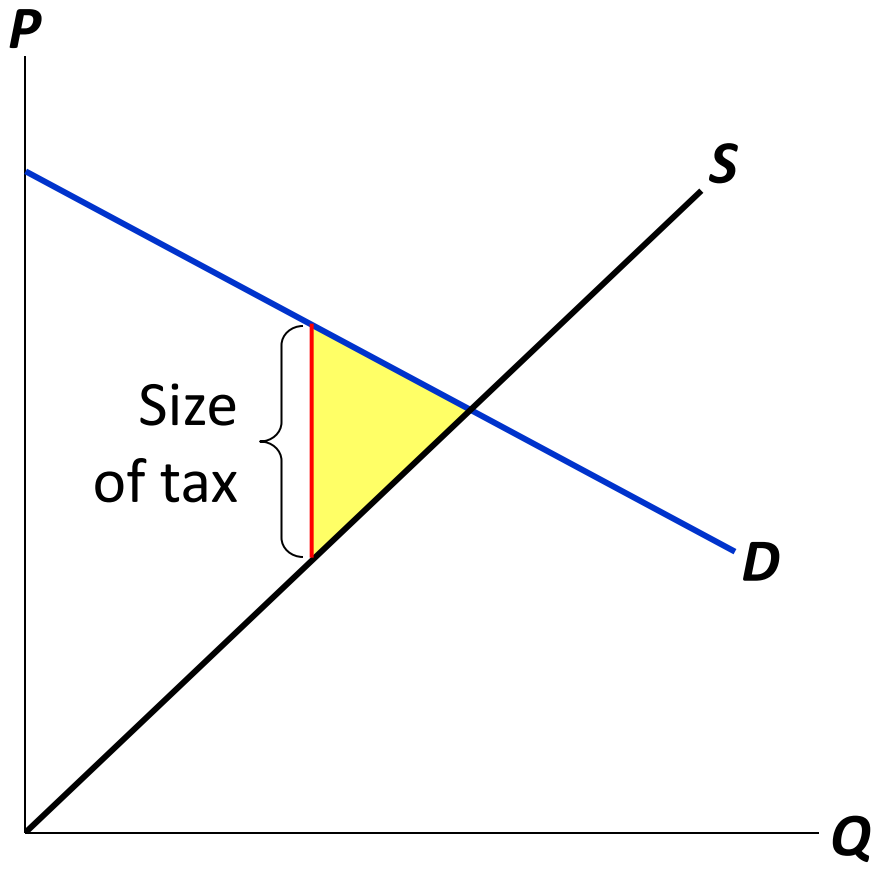


DWL and the Elasticity of Supply

The more elastic is demand, the larger is the DWL.



Why Elasticity Affects the Size of DWL

- A tax distorts the market outcome: consumers buy less and producers sell less, so eq'm ***Q*** is below the surplus-maximizing quantity.
- Elasticity measures how much buyers and sellers respond to changes in price, and therefore determines how much the tax distorts the market outcome.

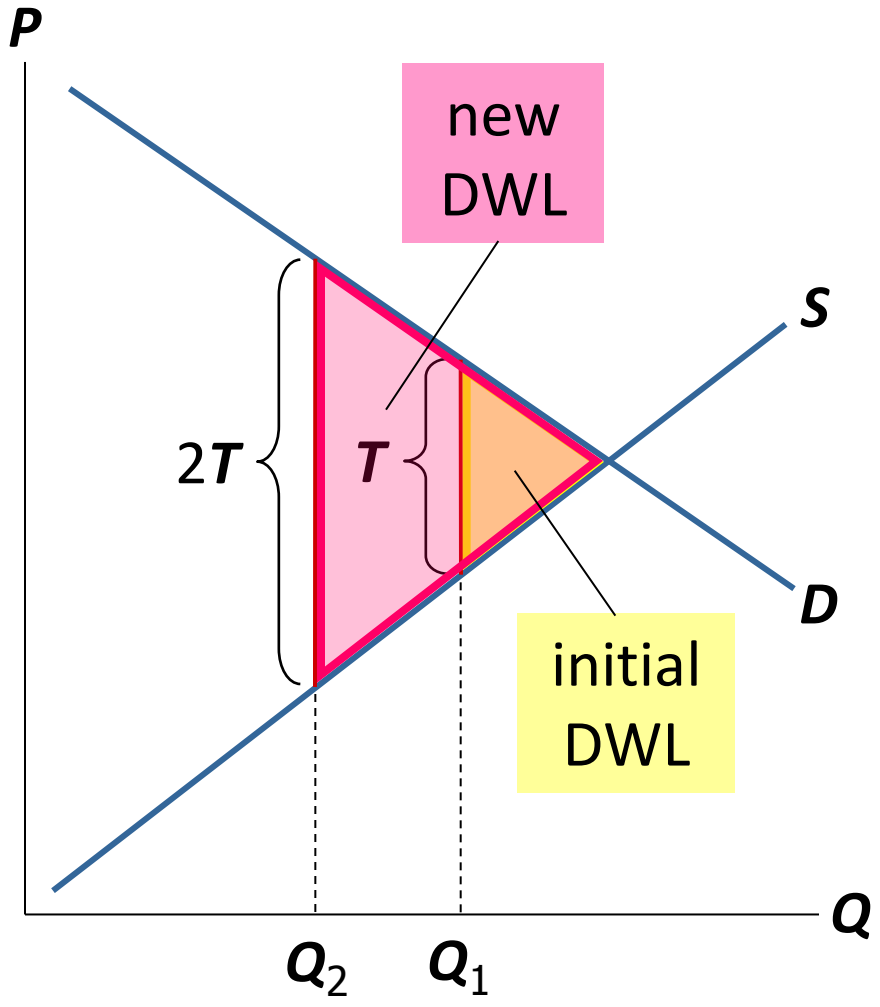
The Effects of Changing the Size of the Tax

- Policymakers often change taxes, raising some and lowering others.
- What happens to DWL and tax revenue when taxes change? We explore this next….

DWL and the Size of the Tax

Initially, the tax is ***T*** per unit.

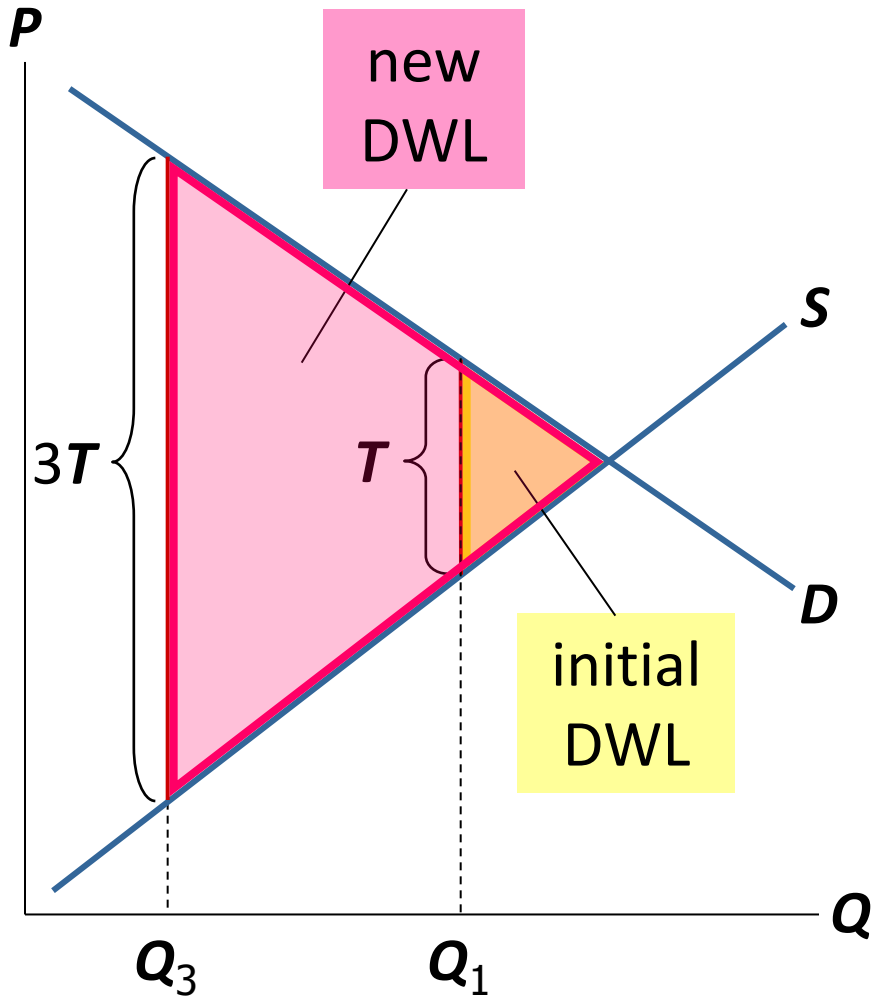
Doubling the tax causes the DWL to more than double.



DWL and the Size of the Tax

Initially, the tax is ***T*** per unit.

Tripling the tax causes the DWL to more than triple.



DWL and the Size of the Tax

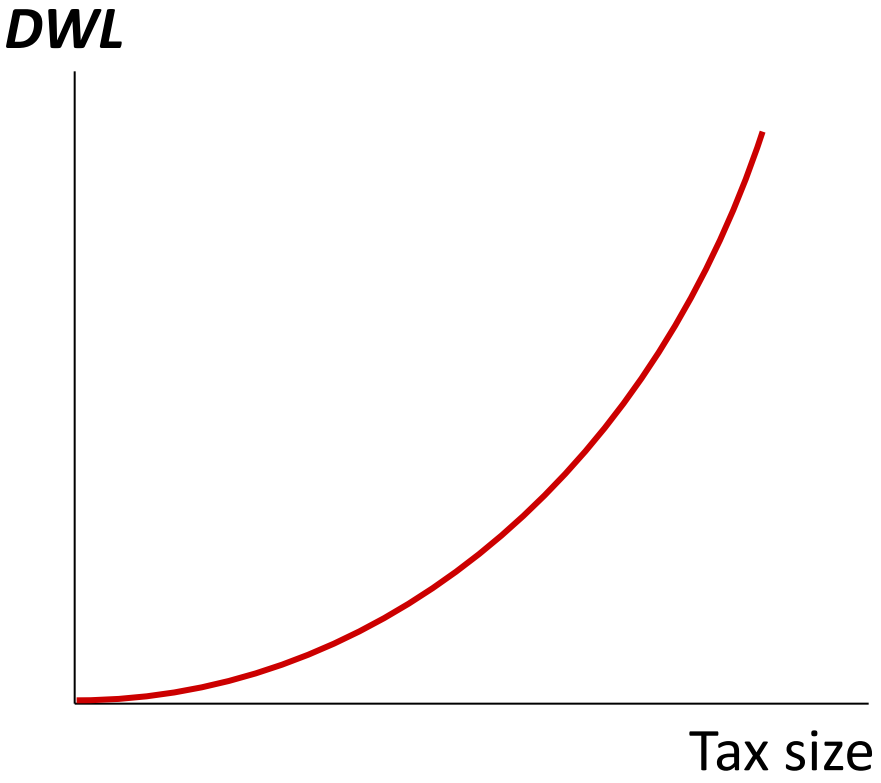
Implication

When tax rates are low, raising them doesn't cause much harm, and lowering them doesn't bring much benefit.

When tax rates are high, raising them is very harmful, and cutting them is very beneficial.

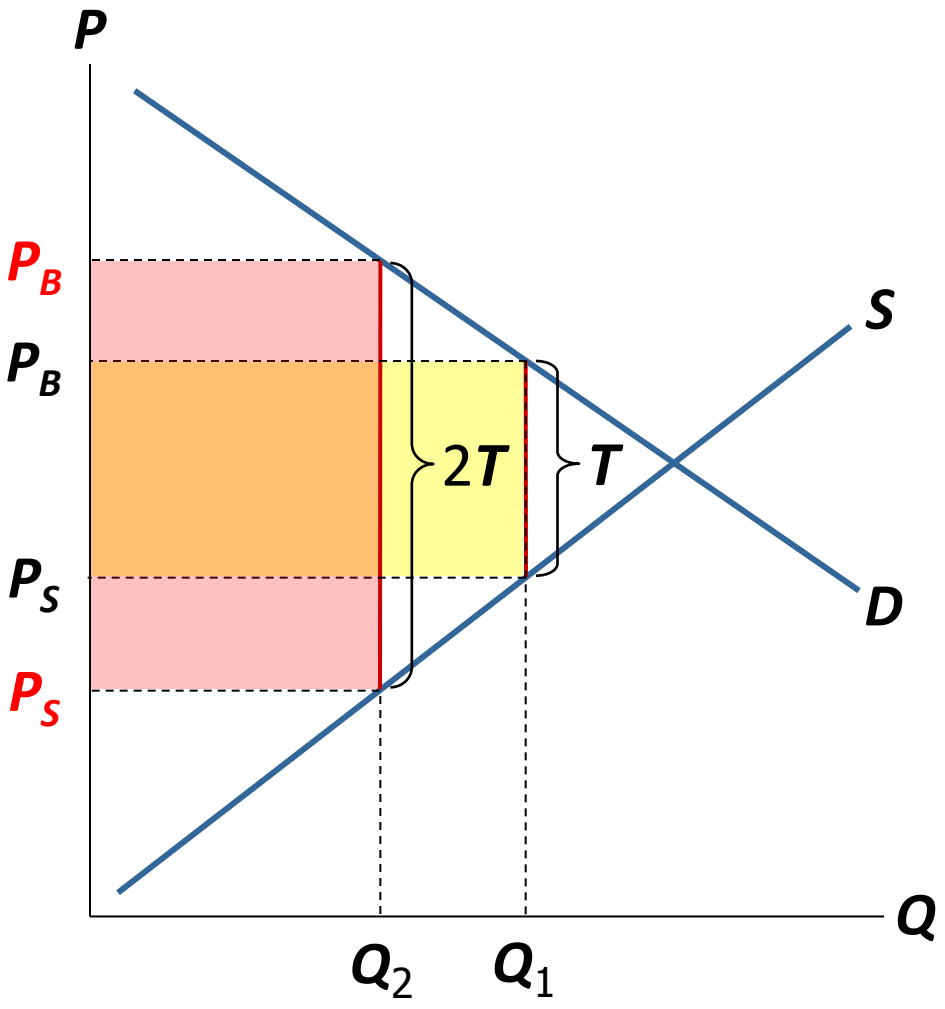
Summary

When a tax increases, DWL rises even more.



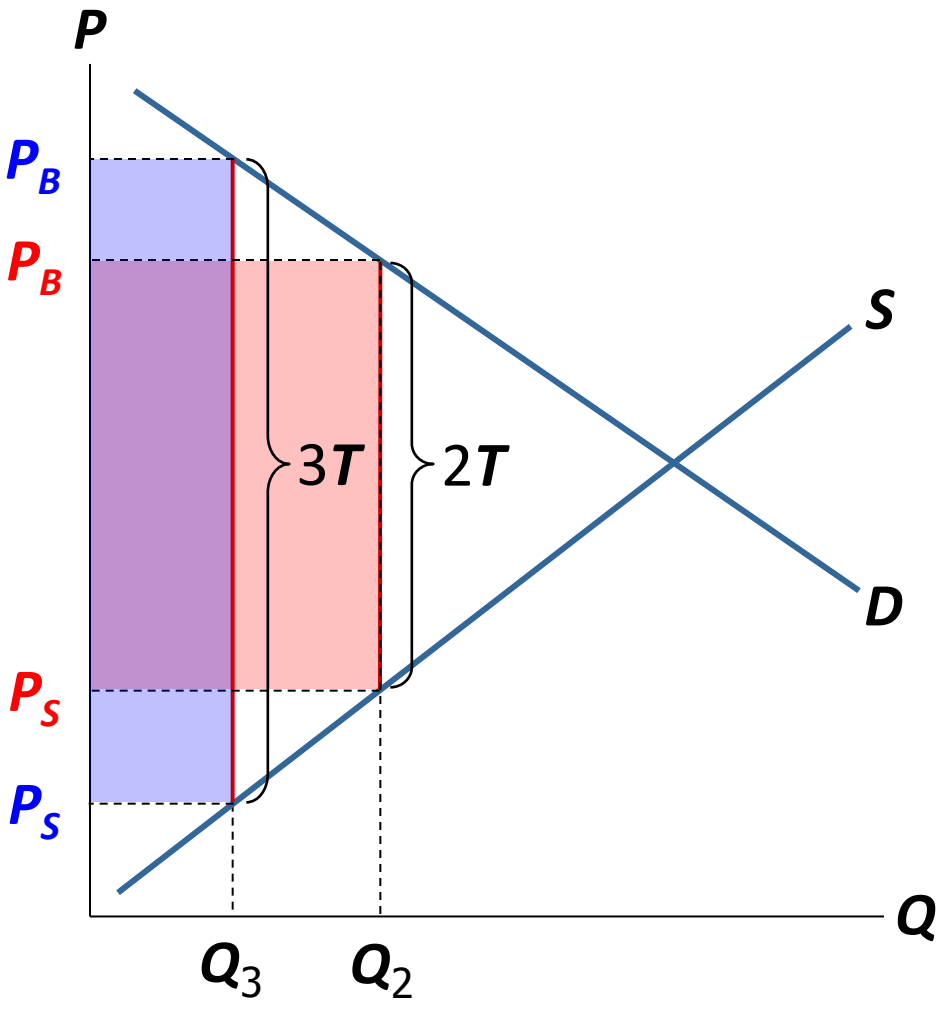
Revenue and the Size of the Tax

When the tax is small, increasing it causes tax revenue to rise.



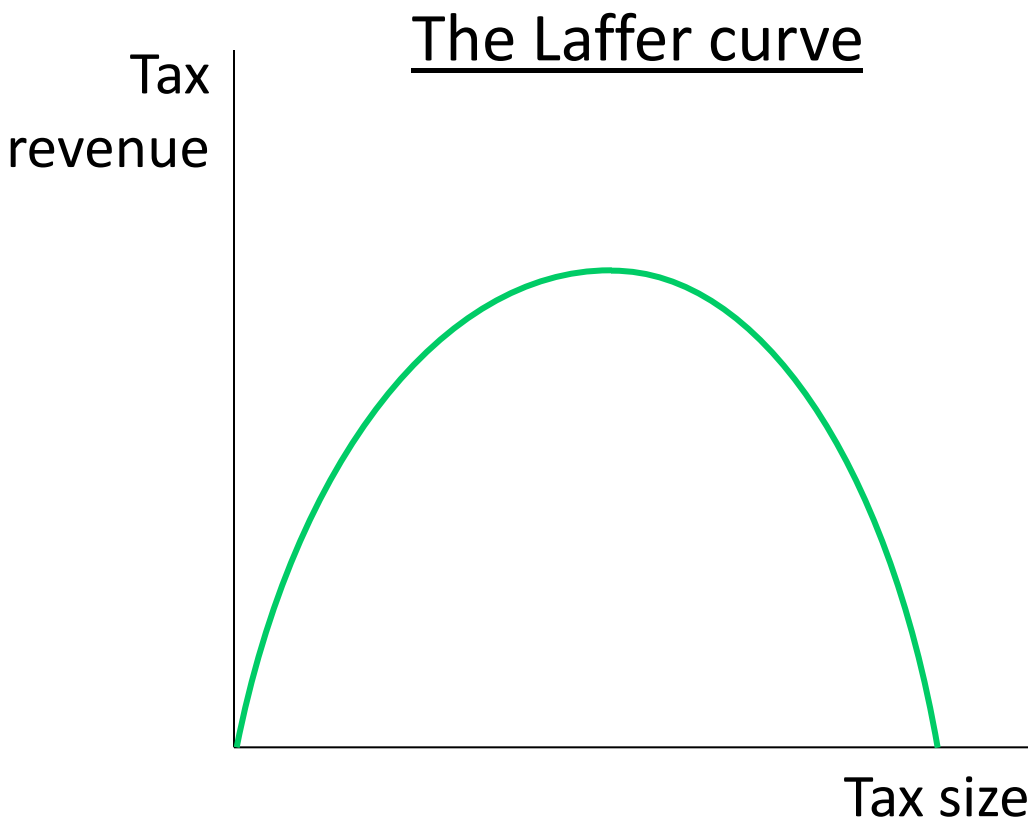
Revenue and the Size of the Tax

When the tax is larger, increasing it causes tax revenue to fall.



Revenue and the Size of the Tax

The **Laffer curve** shows the relationship between the size of the tax and tax revenue.



CHAPTER SUMMARY

- A tax on a good reduces the welfare of buyers and sellers. This welfare loss usually exceeds the revenue the tax raises for the govt.
- The fall in total surplus (consumer surplus, producer surplus, and tax revenue) is called the deadweight loss (DWL) of the tax.
- A tax has a DWL because it causes consumers to buy less and producers to sell less, thus shrinking the market below the level that maximizes total surplus.

CHAPTER SUMMARY

- The price elasticities of demand and supply measure how much buyers and sellers respond to price changes. Therefore, higher elasticities imply higher DWLs.
- An increase in the size of a tax causes the DWL to rise even more.
- An increase in the size of a tax causes revenue to rise at first, but eventually revenue falls because the tax reduces the size of the market.