N. GREGORY MANKIW

PRINCIPLES OF

ECONOMICS

Eight Edition

CHAPTER 8

Application: The Costs of Taxation

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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?

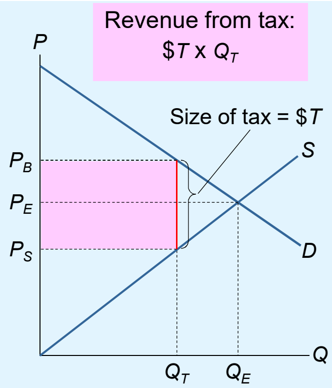
Review from Chapter 6

- A tax
  - Drives a wedge between the price buyers pay and the price sellers receive
  - Raises the price buyers pay and lowers the price sellers receive
  - Reduces the quantity bought and sold
- These effects are the same
  - Whether the tax is imposed on buyers or sellers

The Effects of a Tax

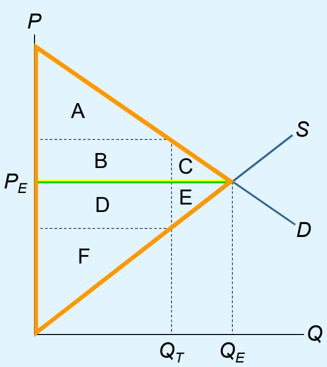
Equilibrium with no tax:
- Price = P_E
- Quantity = Q_E

Equilibrium with tax = $T per unit:
- Buyers pay P_B
- Sellers receive P_S
- Quantity = Q_T



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

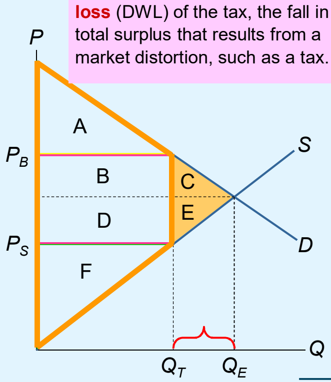


The Effects of a Tax

With the tax,
CS = A
PS = F
Tax revenue = B + D
Total surplus
= CS + PS
= A + B + D + F
The tax reduces total surplus by C + E

$Q_E – Q_T$ = units not sold because of the tax

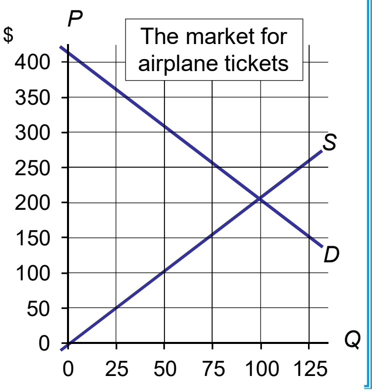
C + E is called the **deadweight loss** (DWL) of the tax, the fall in total surplus that results from a market distortion, such as a tax.



Active Learning 1 — Analysis of a 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.



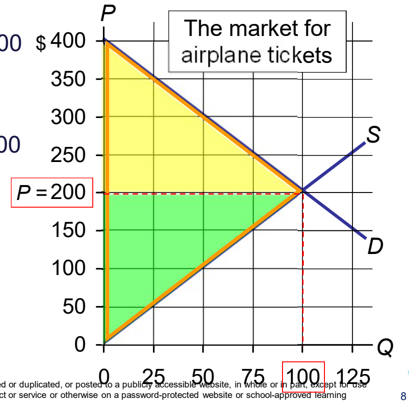
Active Learning 1 — A. Answers

A. Without tax:

CS = ½ x $200 x 100 = $10,000

PS = ½ x $200 x 100 = $10,000

TS = $20,000



Active Learning 1 — B. Answers

B. With tax:

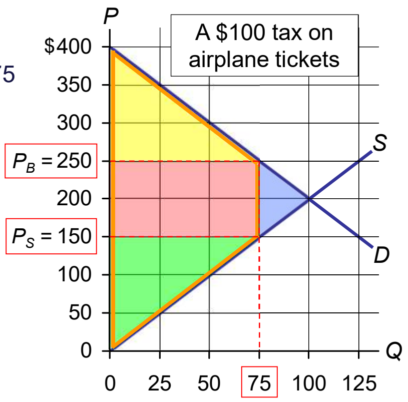
CS = ½ x $150 x 75 = $5,625

PS = $5,625

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

TS = $18,750

DWL = $1,250



Determinants of Deadweight Loss

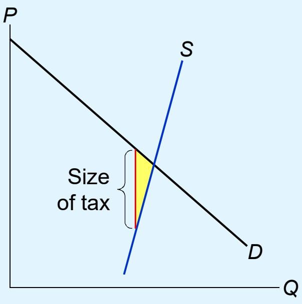
- Price elasticities of supply and demand
  - More elastic supply curve
    - Larger deadweight loss
  - More elastic demand curve
    - Larger deadweight loss
- The greater the elasticities of supply and demand
  - The greater the deadweight loss of a tax

DWL and the Elasticity of Supply

When supply is inelastic,

it's harder for firms to leave the market when the tax reduces P_S.

So, the tax only reduces Q a little, and DWL is small.



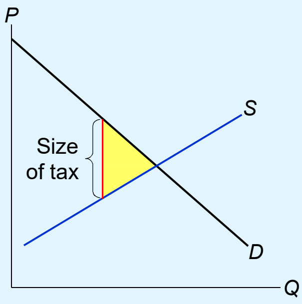
DWL and the Elasticity of Supply

The more elastic is supply,

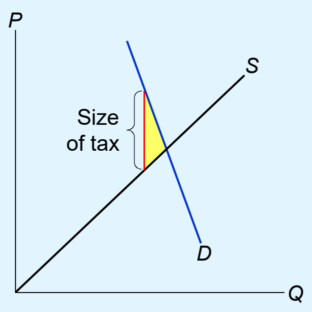
the easier for firms to leave the market when the tax reduces P_S,

the greater Q falls below the surplus-maximizing quantity,

the greater the DWL.



DWL and the Elasticity of Demand

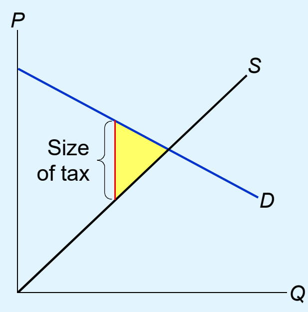


When demand is inelastic,

it's harder for consumers to leave the market when the tax raises P_B.

So, the tax only reduces Q a little, and DWL is small.

DWL and the Elasticity of Demand



The more elastic is demand,

the easier for buyers to leave the market when the tax increases P_B,

the more Q falls below the surplus-maximizing quantity,

and the greater the DWL.

Active Learning 2 Elasticity and the DWL

Would the DWL of a tax be larger if the tax were on:

A. Rice Burgers or sunscreen?

B. Hotel rooms in the short run or hotel rooms in the long run?

C. Groceries or meals at fancy restaurants?

Active Learning 2 Answers

A. Rice Burgers or sunscreen?

From Chapter 5:
Rice Burgers has more close substitutes than sunscreen, so demand for Rice Burgers is more price-elastic than demand for sunscreen.

- So, a tax on Rice Burgers would cause a larger DWL than a tax on sunscreen.

Active Learning 2 Answers

B. Hotel rooms in the short run or hotel rooms in the long run?

From Chapter 5:
The price elasticities of demand and supply for hotel rooms are larger in the long run than in the short run.

- So, a tax on hotel rooms would cause a larger DWL in the long run than in the short run.

Active Learning 2 Answers

C. Groceries or meals at fancy restaurants?

From Chapter 5:
Groceries are more of a necessity and therefore less price-elastic than meals at fancy restaurants.

- So, a tax on restaurant meals would cause a larger DWL than a tax on groceries.

Active Learning 3 — Discussion question

The government must raise tax revenue to pay for schools, police, etc.

To do this, it can either tax groceries or meals at fancy restaurants.

- Which should it tax?

CASE STUDY: How Big Should the Government Be?

- A bigger government
  - Provides more services, but requires higher taxes, which cause DWLs
  - The larger the DWL from taxation, the greater the argument for smaller government
- Tax on labor income - especially important
  - Biggest source of government revenue
- Marginal tax rate: about 40%
- How big is the DWL?

CASE STUDY: How Big Should the Government Be?

- 40% labor tax - Small or large deadweight loss?

"What's your position on the elasticity of labor supply?"

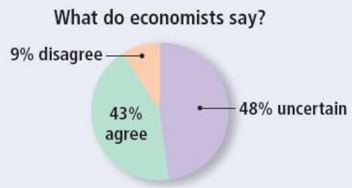
- Some believe labor supply is fairly inelastic
  - Almost vertical: most people would work full-time regardless of wage
  - Tax on labor: small DWL

CASE STUDY: How Big Should the Government Be?

- Others: labor supply is more elastic
  - Labor taxes are highly distorting: some groups of workers have elastic supply and can respond to incentives
  - Tax on labor: greater DWL
    - Many workers can adjust their hours
    - Some families have 2nd earners; some discretion over whether and how much to work
    - Many of the elderly can choose when to retire
    - Some people work in the "underground economy" to evade high taxes

ASK THE EXPERTS
The Laffer Curve

"A cut in federal income tax rates in the United States right now would lead to higher national income within five years than without the tax cut."



Effects of Changing the Size of the Tax

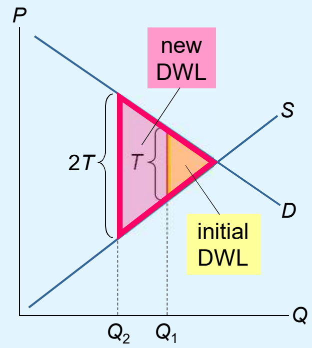
- As the tax increases
  - Deadweight loss increases
    - Even more rapidly than the size of the tax
  - Tax revenue
    - Increases initially
    - Then decreases
    - The higher tax: drastically reduces the size of the market

DWL and the Size of the Tax

Initially, the tax is T per unit.

Doubling the tax

causes the DWL to more than double.

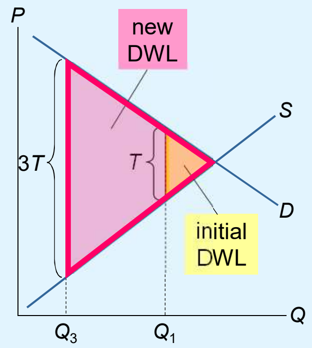


DWL and the Size of the Tax

Initially, the tax is T per unit.

Tripling the tax

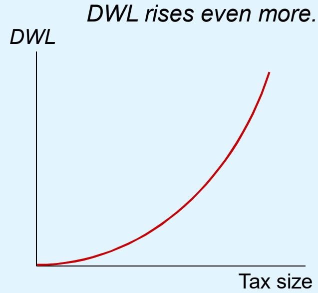
causes the DWL to more than triple.



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.

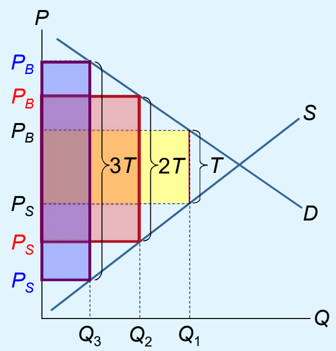
Summary
When a tax increases, DWL rises even more.



Revenue and the Size of the Tax

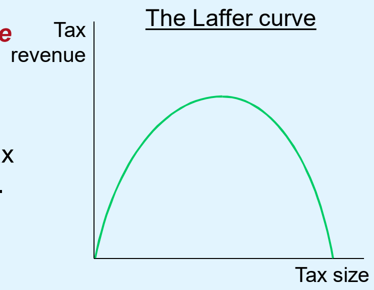
When the tax is small, increasing it causes tax revenue to rise.

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



Revenue and the Size of the Tax

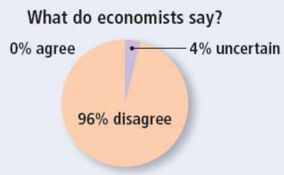
The ***Laffer curve*** shows the relationship between the size of the tax and tax revenue.



ASK THE EXPERTS

The Laffer Curve

"A cut in federal income tax rates in the United States right now would raise taxable income enough so that the annual total tax revenue would be higher within five years than without the tax cut."



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.

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.

Chapter 8: The Costs of Taxation

- Welfare Analysis of Taxation
- Deadweight Loss (Harburger Triangle)
- Homework:
  - Mankiw, Ch.8, Problem 2, 4, 5, 8, 10

Chapter 8: Challenge Questions/ex-Midterm

- 2007 - Essay Q3, Q4
- 2008 - Essay B (Multi-Choice Q8)
- 2009 - Essay A (Multi-Choice Q12)
- 2010 - Essay B
- 2012 - Essay A10-A12, B (True/False Q7-Q8)
- 2013 - Essay C, D (True/False Q9-Q10)
- 2014 - Essay A
- 2017 - Essay A