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?

Review from Chapter 6

- A tax
  - raises the price buyers pay and lowers the price sellers receive.
  - 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

Without a tax,

Eq’m with no tax:
Price = \( P_E \)
Quantity = \( Q_E \)

Eq’m with tax = $T per unit:
Buyers pay \( P_B \)
Sellers receive \( P_S \)
Quantity = \( Q_T \)

Next, we apply welfare economics to measure the gains and losses from a tax.

We determine consumer surplus (CS), producer surplus (PS), tax revenue, and total surplus with and without the tax.

Tax revenue can fund beneficial services (e.g., education, roads, police) so...

Total surplus =
The Effects of a Tax

With the tax, $C + E$ is called the deadweight loss. Because of the tax, the units between $Q_T$ and $Q_E$ are not sold.
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.

Total surplus

Answers to A

Total surplus

Answers to B

A $100 tax on airplane tickets
What Determines the Size of the DWL?

- Which goods or services should govt tax to raise the revenue it needs?
- One answer:
- When is the DWL small vs. large? Turns out it depends on

Recall:
The price elasticity of demand (or supply) measures

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**DWL and the Elasticity of Supply**

When supply is inelastic,

![Graph showing the relationship between price (P) and quantity (Q) with supply being inelastic.]

The more elastic is supply,

![Graph showing the relationship between price (P) and quantity (Q) with supply being elastic.]

---
When demand is inelastic,

The more elastic is demand,

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

A. Breakfast cereal or sunscreen?
B. Hotel rooms in the short run or hotel rooms in the long run?
C. Groceries or meals at fancy restaurants?
A. Breakfast cereal or sunscreen

B. Hotel rooms in the short run or long run

C. Groceries or meals at fancy restaurants
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?

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.
- The tax on labor income is especially important; it's the biggest source of govt revenue.
- For the typical worker,
  - How big is the DWL from this tax?
    It depends on elasticity….

How Big Should the Government Be?

- If labor supply is inelastic,
  - Some economists believe labor supply is inelastic, arguing that
How Big Should the Government Be?
Other economists believe labor taxes are highly distorting because

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
Initially, the tax is $T$ per unit.

Tripling 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 the tax is small,
When the tax is larger, revenue and the size of the tax increase. The Laffer curve shows the relationship between tax size and tax revenue. The curve illustrates that when the tax is too low, additional revenue is generated by increasing the tax, but beyond a certain point, increasing the tax reduces revenue as the market adjusts.

Revenue and the Size of the Tax

The Laffer curve

<table>
<thead>
<tr>
<th>Tax size</th>
<th>Tax revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P_D$</td>
<td>$Q_1$</td>
</tr>
<tr>
<td>$P_S$</td>
<td>$2T$</td>
</tr>
</tbody>
</table>

APPLICATION: THE COSTS OF TAXATION