The Costs of Taxation

How do taxes affect the economic well-being of market participants?

It does not matter whether a tax on a good is levied on buyers or sellers of the good…the price paid by buyers rises, and the price received by sellers falls.

The Effects of a Tax

- A tax places a wedge between the price buyers pay and the price sellers receive.
- Because of this tax wedge, the quantity sold falls below the level that would be sold without a tax.
- The size of the market for that good shrinks.

Tax Revenue

\[ T = \text{the size of the tax} \]
\[ Q = \text{the quantity of the good sold} \]
\[ T \times Q = \text{the government’s tax revenue} \]
**Tax Revenue**

- **Price** buyers pay: $P_b$
- **Price** sellers receive: $P_s$
- **Price without tax**:
  - **Quantity sold (Q)**
  - **Size of tax (T)**
- **Quantities with and without tax**:
  - **With tax**: $Q_w$
  - **Without tax**: $Q_{wt}$

- **Tax Revenue**: $(T \times Q)$

**Demand**

- **Lost gains from trade**
- **Value to buyers**
- **Cost to sellers**
- **Reduction in quantity due to the tax**

**How a Tax Affects Welfare**

- **Price buyers pay**: $P_B$
- **Price sellers receive**: $P_S$
- **Tax revenue**: $(B+D)$
- **Deadweight Loss**: $(C+E)$

**Changes in Welfare from a Tax**

<table>
<thead>
<tr>
<th>Without Tax</th>
<th>With Tax</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consumer Surplus</td>
<td>$A + B + C$</td>
<td>$A - (B + C)$</td>
</tr>
<tr>
<td>Producer Surplus</td>
<td>$D + E + F$</td>
<td>$F - (D + E)$</td>
</tr>
<tr>
<td>Tax Revenue</td>
<td>none</td>
<td>$B + D$</td>
</tr>
<tr>
<td>Total Surplus</td>
<td>$A + B + C + D + E + F$</td>
<td>$A + B + D + F - (C + E)$</td>
</tr>
</tbody>
</table>

The area $C+E$ shows the fall in total surplus and is the **deadweight loss** of the tax.

**Deadweight Losses and the Gains from Trade**

Taxes cause deadweight losses because they prevent buyers and sellers from realizing some of the gains from trade.

**The Deadweight Loss**

- **Price without tax**: $P_s$
- **Price with tax**: $P_b$
- **Quantity sold (Q)**
- **Reduction in quantity due to the tax**

**How a Tax Affects Welfare**

- The change in total welfare includes:
  - The change in consumer surplus,
  - The change in producer surplus,
  - The change in tax revenue.
  - The losses to buyers and sellers exceed the revenue raised by the government.
  - This fall in total surplus is called the **deadweight loss**.
Determinants of Deadweight Loss

What determines whether the deadweight loss from a tax is large or small?

- The magnitude of the deadweight loss depends on how much the quantity supplied and quantity demanded respond to changes in the price.
- That, in turn, depends on the price elasticities of supply and demand.

Tax Distortions and Elasticities...

(a) Inelastic Supply

When supply is relatively inelastic, the deadweight loss of a tax is small.

(b) Elastic Supply

When supply is relatively elastic, the deadweight loss of a tax is large.

(c) Inelastic Demand

When demand is relatively inelastic, the deadweight loss of a tax is small.

(d) Elastic Demand

When demand is relatively elastic, the deadweight loss of a tax is large.

Determinants of Deadweight Loss

The greater the elasticities of demand and supply:

- the larger will be the decline in equilibrium quantity and,
- the greater the deadweight loss of a tax.
**The Deadweight Loss Debate**

Some economists argue that labor taxes are highly distorting and believe that labor supply is more elastic.

**Deadweight Loss and Tax Revenue as Taxes Vary**

With each increase in the tax rate, the deadweight loss of the tax rises even more rapidly than the size of the tax.

The reason for this is that the deadweight loss is an area of a triangle and an area of a triangle depends on the square of its size.

**Deadweight Loss and Tax Revenue...**

(a) Small Tax

(b) Medium Tax

(c) Large Tax
Deadweight Loss and Tax Revenue

- For the small tax, tax revenue is small.
- As the size of the tax rises, tax revenue grows.
- But as the size of the tax continues to rise, tax revenue falls because the higher tax reduces the size of the market.

Deadweight Loss and Tax Revenue Vary with the Size of the Tax...

(b) Revenue (the Laffer curve)

(a) Deadweight Loss

Deadweight Loss and Tax Revenue Vary with the Size of the Tax – Summary

- As the size of a tax increases, its deadweight loss quickly gets larger.
- By contrast, tax revenue first rises with the size of a tax; but then, as the tax gets larger, the market shrinks so much that tax revenue starts to fall.

The Laffer Curve and Supply-Side Economics

- The Laffer curve depicts the relationship between tax rates and tax revenue.
- Supply-side economics refers to the views of Reagan and Laffer who proposed that a tax cut would induce more people to work and thereby have the potential to increase tax revenues.

Taxes and Computer Games

- Has anyone played:
  - SimCity
  - Civilization
  - Master of Orion

- Success in these games require economic growth which can only be achieved by keeping taxes reasonably low.
A tax on a good reduces the welfare of buyers and sellers of the good. And the reduction in consumer and producer surplus usually exceeds the revenues raised by the government.

The fall in total surplus – the sum of consumer surplus, producer surplus, and tax revenue – is called the deadweight loss of the tax.

Taxes have a deadweight loss because they cause buyers to consume less and sellers to produce less. This change in behavior shrinks the size of the market below the level that maximizes total surplus.

As a tax grows larger, it distorts incentives more, and its deadweight loss grows larger. Tax revenue first rises with the size of a tax. Eventually, however, a larger tax reduces tax revenue because it reduces the size of the market.