Chapter 14. Taxation and equity

The **statutory incidence** of a tax indicates who is legally responsible for the tax. However, this tells us nothing about who really pays the tax, because prices may change in response to the tax. The **economic incidence** of a tax is the change in the distribution of private real income induced by a tax. It tells us who really bears the burden. The extent to which statutory and economic incidence differ is called the amount of **tax shifting**.

General remarks about tax incidence:

1.   Only people can bear taxes
From an economist's point of view only people can bear taxes. For the purpose of incidence analysis, there are different classifications:
- **Functional distribution of income –** the way income is distributed among people when they are classified according to the inputs they supply to the production process.
- **Size distribution of income –** the way that income is distributed across different income classes.

2.   Both sources and uses of income should be considered
Economists often ignore effects on the sources side when considering a tax on a commodity and ignore the uses side when analyzing a tax on an input.

3.   Incidence depends on how prices are determined
Different models of price determination may give quite different answers to the question of who really bears a tax. The question how taxes change prices is closely related to the time dimension of the analysis. It takes time for prices to change. This means that the short- and long-run incidence of a tax may differ.

4.   Incidence depends on the disposition of tax revenues
Depending on the policy being considered, one of the following incidences can be examined:
- **Balanced-budget incidence**
  It computes the combined effects of levying taxes and government spending financed by those taxes. However, taxes are usually not marked for particular expenditures. Some studies assume that the government spends the tax revenue exactly the same as the consumers would if they had received the money.
- **Differential tax incidence**
  It abstracts from how the government will spend the money. The idea is to examine how incidence differs when one tax is replaced with another, holding the government budget constant. The basis of the comparison ('the other tax') is often assumed to be a **lump sum tax –** a tax for which the individual's liability does not depend upon behaviour.
- **Absolute tax incidence**
  It examines the effects of a tax when there is no change in either other taxes or government expenditure.

- *Tax progressiveness can be measured in several ways*

Often a tax is characterized as proportional, progressive, or regressive.
- **Proportional:** the ratio of taxes paid to income (*average tax rate*) is constant regardless of income level.
- **Progressive:** an individual's average tax rate increases with income.
- **Regressive:** an individual's average tax rate decreases with income.

Confusion arises because some people think of progressiveness in terms of the **marginal tax rate** – the change in taxes paid with respect to a change in income. It equals the tax paid on the last euro.

Measuring the tax progressiveness is a hard task. We consider two simple options:
- **Progressiveness = (difference in average tax rate) / (difference in income)**
  The greater the increase in average tax rates as income increases, the more progressive the system.
- **Progressiveness = (% change in tax revenues) / (% change in income)**
  One tax system is more progressive than another if its elasticity of tax revenues with respect to income is higher.

Knowing how prices are determined is critical to the analysis of how taxes change the income distribution. We can apply two models: partial equilibrium models and general equilibrium models. **Partial equilibrium models** of price determination are models that only look at the market in which the tax is imposed and ignore the ramifications in other markets. We first assume that the market is perfect competitive. We study both the incidences of a **unit tax** (fixed amount per unit of a commodity) and an **ad valorem tax** (percentage of the commodity price).
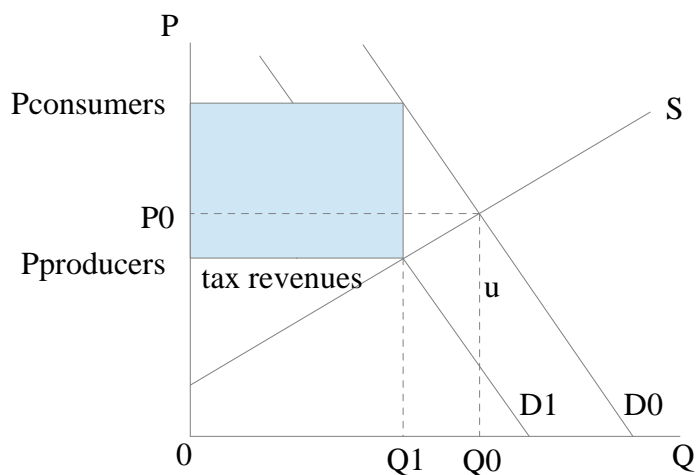
In the presence of a unit tax, the price paid by consumers (price gross of tax) and the price received by suppliers (price net of tax) differ. The conclusion of the model is the tax makes both producers and consumers worse off.

They split the tax in a sense that the increase in the consumer price (Pconumers – P0) and the decrease in producer price (P0 – Pproducers) just add up to $u.

The analysis has two important implications:
1. The incidence of a unit tax is independent of whether it is levied on consumers or producers. What matters is the size of the disparity the tax introduces between the price paid by consumers and the price received by producers. The tax-induced difference between the price paid by consumers and the price received by producers is referred to as the **tax wedge**.
2. The incidence of a unit tax depends on the elasticities of supply and demand. The more elastic the demand curve, the less the tax borne by consumers. Similarly, the more elastic the supply curve, the less the tax borne by producers. There are two extreme cases:
    • Inelastic demand: consumer bears the full burden
    • Inelastic supply: producers bear the full burden

The analysis of an ad valorem tax, a tax with a rate given as a proportion of the price, is very similar to that of unit taxes. Instead of moving the curve down by the same absolute amount for each quantity, the ad valorem tax lowers it by the same proportion.
Until now, we assumed that markets were competitive. There are other possibilities:
1. *Monopoly*
    The analysis for a monopoly is similar. Despite its market power, a monopolist is generally made worse off by a unit tax on the product it sells. As before, the precise share of the burden borne by the consumers depends on the elasticity of the demand schedule.
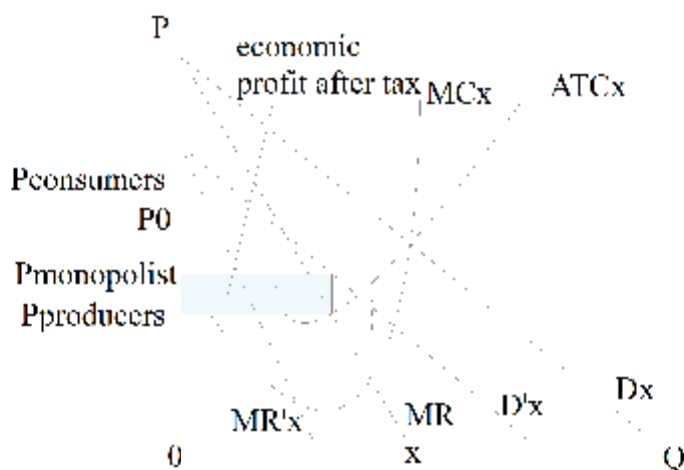
Oligopoly
There is no well-developed theory of tax incidence in an oligopoly, because relative price changes are unknown. We can only say that the ideal situation for firms is a **cartel solution** – firms jointly produce the output that maximizes the profits of the entire industry. However, each firm has an incentive to cheat that agreement. So the output in an oligopolistic market is often higher that the cartel solution.

The analysis of taxes on the factors of productions is similar to that of a commodity tax. A tax on **economic profits** cannot be shifted; it is borne only by the owners of a firm. In the short-run, a proportional tax affects neither marginal cost nor marginal revenues. There, the output and the price stay the same. Because the price paid by consumers doesn't change, the tax is completely absorbed by the firms. In the long-run, a tax on economic profits has no yield, because economics profits are zero.

One special case is examined: the tax on land. We can say that land is durable and fixed in supply. The price of land equals the net present value of future returns. At the time the tax is imposed, the price of land falls by the present value of all future tax payments. This process by which a stream of taxes becomes incorporated into the price of an asset in referred to as **capitalization**. It implies that the present owner pays the burden of the tax forever.

When a tax is imposed on a sector that is large relative to the economy, looking only at that particular market may not be enough. **General equilibrium analysis** takes into account the ways in which various markets are interrelated. These analyses often employ a two-sector (Manufacturing [M] +Food [F]), two-factor model (Capital [K] + Labor [L]).

This framework allows for nine possible taxes:
- Capital tax for either sector M or sector F (1+2)
- Labor tax for either sector M or sector F (3+4)
- Consumption tax on either good M or good F (5+6)
- Tax on either labor or capital (in both sectors) (7+8)
- General income tax (9)

The first 4 taxes are called **partial factor taxes** – levied on a factor is only one of its uses.
Any two sets of taxes that generate the same changes in relative prices have equivalent incidence effects:

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\begin{array}{ccccc}
tKF & + & tLF & = & tF \\
+ & & + & & + \\
tKM & + & tLM & = & tM \\
= & & = & & = \\
tK & + & tL & = & t \\
\end{array}
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The **Harberger model** is a prominent method for analysing tax incidence with general equilibrium models. The main assumptions of this model are:
- Perfect competition, profit maximization and prices are perfectly flexible.
- Constant returns to scale
- One sector capital intensive, another labor intensive
- Production technologies differ with respect to the ease with which capital can be substituted for labor (**elasticity of substitution**) and the ratio's in which capital and labor are employed.
1. Mobile production factors and the total supply of capital and labor are fixed.
2. No savings
3. All consumers have identical preferences
4. Differential tax incidence: study the effect of substituting one tax for another

We will use the Harberger model to analyse several different taxes:
- **Commodity tax** (on food) – the relative price of food increases. This leads to less food and more manufactures that are produced. If food is more capital-intensive than manufactures, the relative demand for capital decreases. This will decrease the relative price of capital. In other words, a tax on the output of a sector causes a decline in the relative price of the input used intensively in that sector.
- **Income tax** - equivalent to a set of taxes on capital and labor. Because factor supply is fixed the tax cannot be shifted and it is borne in proportion to people's initial incomes.
- **General tax on labor -** taxed in both sectors, so there are no possibilities to escape the tax by migration to the other sector. Because the total supply of factor supply is fixed, labor bears the entire burden.
- **Partial factor tax**
  When capital used in the manufacturing sector only is taxed, there are two effects:
    1. *Output effect*
       Price of manufactures rises, which decreases the quantity demanded.
    2. *Factor substitution effect*
       Capital becomes more expensive in the manufacturing sector, producers will use less capital and more labor.

The output effect is ambiguous with respect to the final effect on the relative prices of capital and labor. As long as factors are mobile between uses, a tax on a given factor in one sector ultimately affects the return to both factors in both sectors.
Changing some assumptions has important implications for the tax incidence:
- *Differences in individual's tastes*: When consumers don't have the same preferences, tax-induced changes in the distribution of income change aggregate spending decisions and hence relative prices and incomes.
- *Immobile factors*
  If a factor is immobile the taxed factor bears the whole burden, because the factor cannot escape taxation by migrating to another sector.
- *Variable factor supplies*
  Supplies to both capital and labor are variable in the long run. A general tax on capital decreases the capital-labor ratio, and the return to labor will fall (labor has less capital to work with). In this way, a general tax on capital can hurt labor.