# The theory of taxation (Stiglitz ch. 17, 18, 19; Gruber ch.19, 20; Rosen ch.13,14,15)

- Tax incidence
- Taxation and economic efficiency
- Optimal taxation

# Introduction

- Public intervention is sometime needed to correct market failures and redistribute income.

- However public intervention is costly and it is largely financed through *compulsory taxation*.

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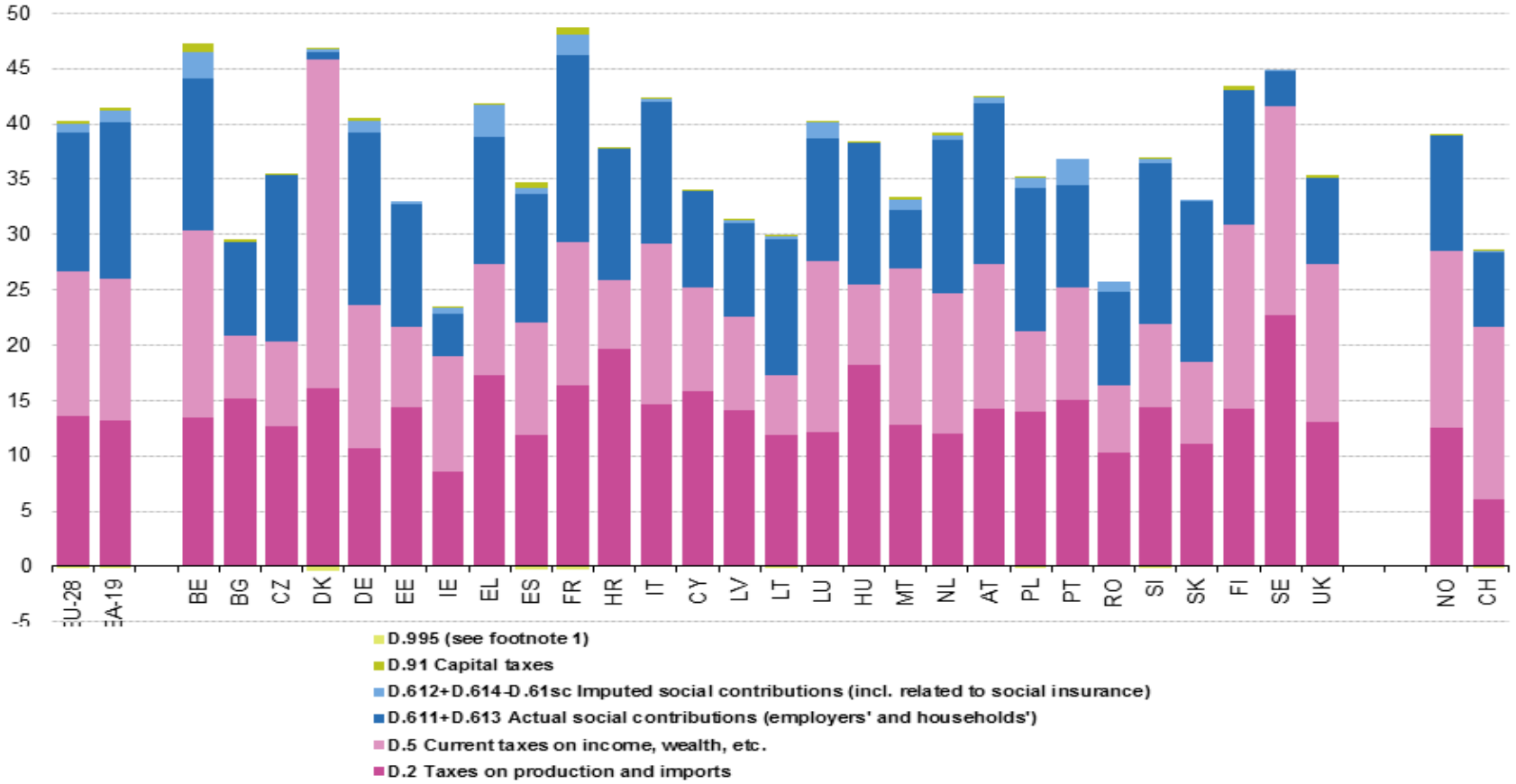
- There are two main forms of taxation:
  - ***Direct taxes*** on individuals and firms (example: income tax, payroll tax, tax on firms, tax on property, tax on capital gains)
  - ***Indirect taxes*** on goods and services (example: value added tax, customs duties on imports, excise tax)

# Tax structure in OECD countries

- All OECD countries tend to levy the biggest part of their revenue from taxes.
- In Nordic countries taxes on income-related levies hold more than half of tax revenues
- In Eastern European countries taxes on consumption (VAT) are predominant
- Taxes on property are relatively high in France, the USA, Canada, Spain and Switzerland.

## Breakdown of tax revenue by country and by main tax categories in 2017 (% of GDP)




Source: Eurostat (gov_10a_taxag)

eurostat

## Tax revenue of main headings as % of total taxation, 2014 (Source: Revenue Statistics 2016 - © OECD 2016)

| | Income & profits | Social security | Payroll | Property | Goods and services |
|---|---|---|---|---|---|
| Austria | 29,5 | 34,2 | 6,9 | 1,4 | 27,3 |
| Belgium | 35,8 | 31,6 | 0,0 | 7,9 | 23,9 |
| Czech Republic | 21,4 | 43,8 | 0,0 | 1,3 | 32,9 |
| Denmark (1) | **64,9** | **0,1** | 0,7 | 3,7 | 30,2 |
| Estonia | 22,8 | 33,6 | 0,0 | 0,9 | 42,1 |
| Finland | 35,0 | 28,9 | 0,0 | 3,0 | 32,8 |
| France (1) | 23,8 | 37,4 | 3,5 | 8,5 | 24,1 |
| Germany (2) | 31,1 | 38,1 | 0,0 | 2,6 | 27,7 |
| Greece | 23,7 | 28,7 | 0,0 | 4,0 | 43,4 |
| Hungary | **17,7** | 32,7 | 1,5 | 3,4 | **44,0** |
| Ireland | 40,3 | 17,3 | 0,6 | 7,7 | 33,6 |
| Italy | 32,0 | 29,8 | 0,0 | 6,6 | 27,0 |
| Latvia | 25,9 | 29,1 | 0,0 | 3,6 | 40,9 |
| Luxembourg | 34,6 | 28,7 | 0,0 | 7,8 | 28,8 |
| Netherlands | 25,6 | 39,6 | 0,0 | 3,9 | 29,6 |
| Poland | 19,7 | 38,1 | 0,7 | 4,4 | 36,1 |
| Portugal | 30,8 | 26,2 | 0,0 | 3,6 | 38,2 |
| Slovak Republic | 21,0 | 42,9 | 0,0 | 1,4 | 34,2 |
| Slovenia | 17,9 | 39,4 | 0,1 | 1,7 | 40,4 |
| Spain (1) | 28,7 | 34,4 | 0,0 | 7,0 | 28,5 |
| Sweden | 34,9 | 23,2 | **10,6** | 2,5 | 28,4 |
| United Kingdom | 34,9 | 18,7 | 0,0 | **12,7** | 33,2 |
| United States | 47,7 | 24,1 | 0,0 | **10,8** | **17,4** |

# Effects of taxation

- With the exception of **lump sum taxes** (2° fundamental theorem of welfare economics), all other taxes **alter the relative prices** of goods, services and production factors

and

- **introduce distortions in the economic behaviour of individuals and firms**, affecting labour supply, consumption, savings and investment decisions and have impacts on financial and organisation structures.

# Who really bears the burden of a tax?- Tax incidence/1 (Stiglitz ch.18, Gruber ch.19)

- The **tax burden** is the difference between the individual's available resources **before and after the tax**, taking full account of changes in relative prices (and wages).

- The **incidence of a tax** assess who actually pays the tax: i.e. who has his/her income lowered by the tax.

- Those who bear the burden of a tax **may differ** from those on whom a tax is imposed or levied (statutory incidence):
  - **statutory incidence:** The burden of a tax borne by the party that sends the check to the government.
  - **economic incidence:** The burden of taxation measured by the change in the resources available to any economic agent as a result of taxation.

# Tax incidence: commodity tax

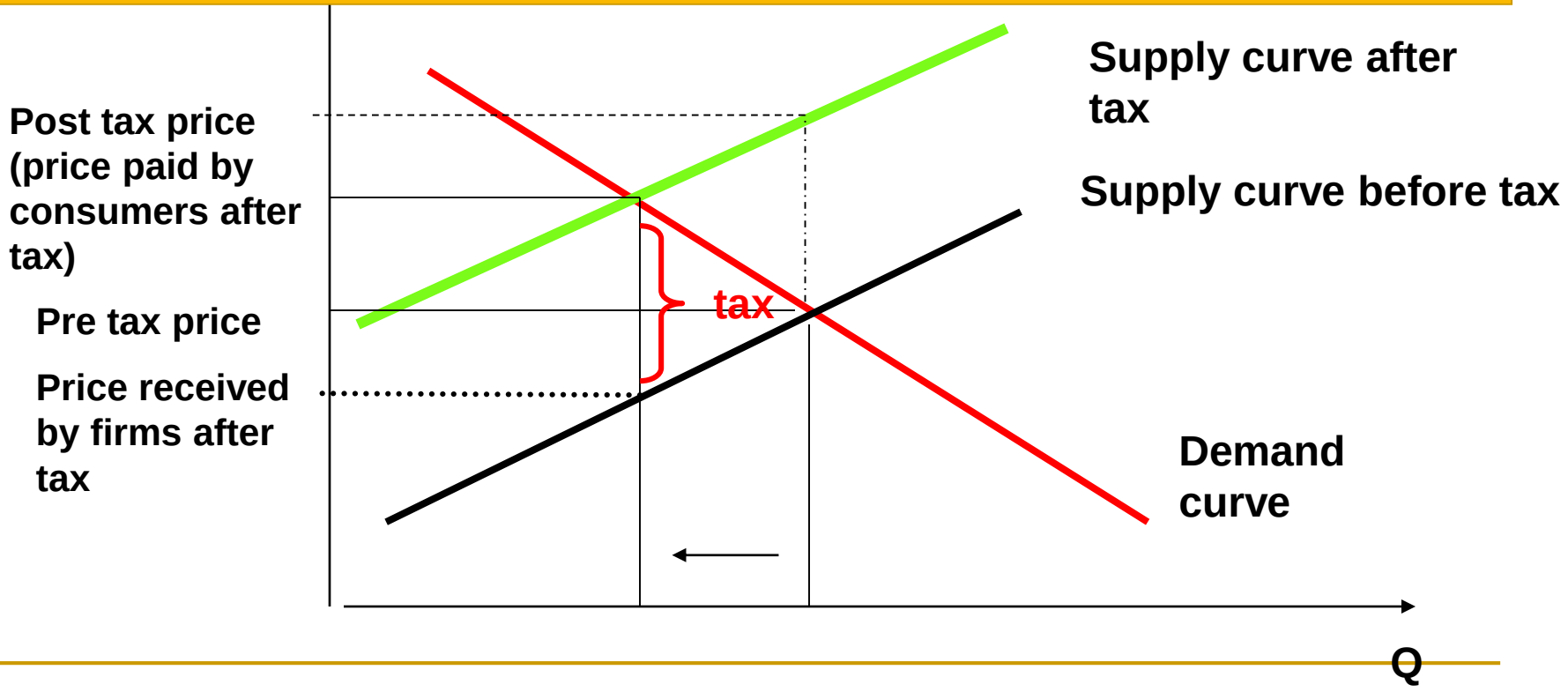
- **It makes no difference** whether a commodity tax is levied on consumers or on producers or whether a payroll tax is paid half by the employers and half by workers or entirely paid by one or the other.

- What is relevant to assess who really pays the tax is the **demand and supply elasticities** and whether the market is **competitive or not**

- The same reasoning applies to **subsidies**.

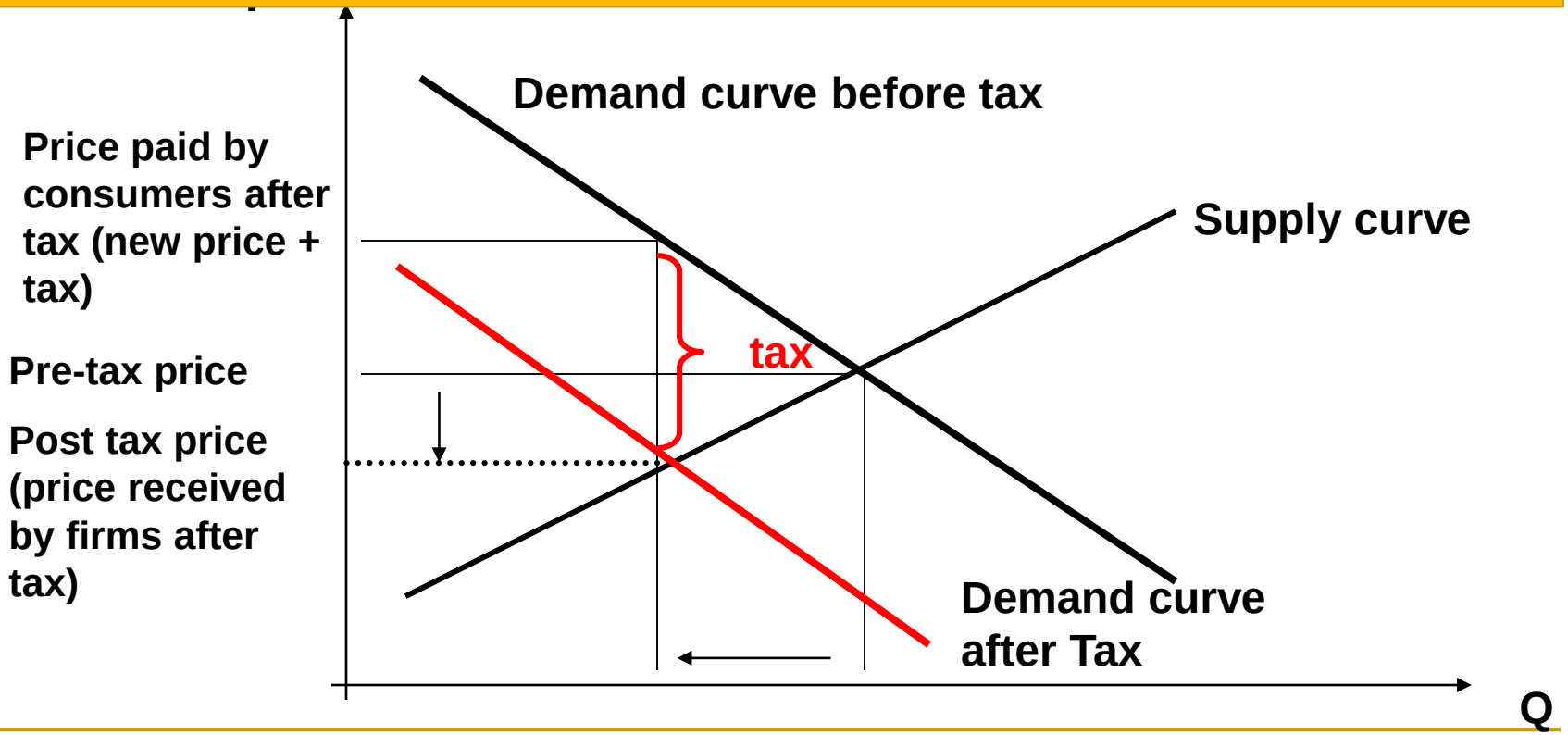
# Tax on commodities: commodity tax on producers (supply side)

**The tax on producers** may be thought as an increase in marginal production costs which requires a higher price for each production level: the supply curve shifts upward by the amount of the tax. The increase in prices lowers the quantity consumed and at the end the tax incidence is shared by consumers and producers.



# Commodity tax on consumers (demand side)

**The tax on the consumers shifts the demand curve downward by the amount of the tax. This lowers the quantity consumed and increases the price paid by consumers (the same effect as a tax levied on producers), but reduces the price received by producers. Again the burder is shared by consumers and producers.**



# Commodity taxes: Consumer and producer tax burden

consumer tax burden

= (post-tax price − pre-tax price) + per-unit tax payments by consumers.

producer tax burden

= (pre-tax price − post-tax price) + per-unit tax payments by producers.

# Prices, elasticities and tax incidence

- Taxes and subsidies **induce changes in relative prices** and it is this market response that determines who pays the tax

- Price changes depend on the shape of the supply and demand curves, which are measured by their **elasticities**

- The **elasticity of demand** measures the percentage change in the quantity of good consumed due to a percentage change in its price.
- **The elasticity of supply** gives the change in the amount of a good produced, given a percentage change in its price.

# Tax incidence and tax revenues in competitive markets/1

**Inelastic sides/factors bear taxes**

**Elastic sides/factors avoid taxes**

- The **economic incidence of a tax depends on the relative elasticities of demand and supply.**
- **The elasticities** of demand and supply also **affect the amount of tax revenue raised: tax revenues are greater the lower are the elasticities.**
- Vice versa, the g**reater are the elasticities, the lower the tax revenue,** because of the greater reduction in the quantity traded.

# Tax incidence in competitive markets/2

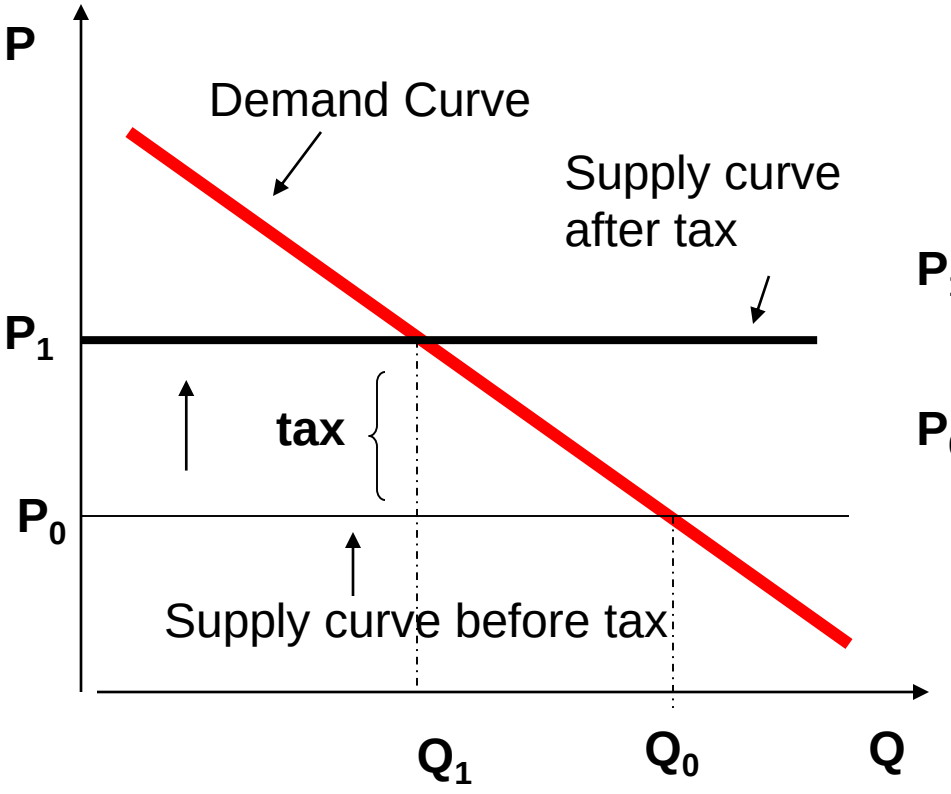
- The *more elastic is the demand curve and the less elastic the supply curve, the more the tax will be borne by producers and vice versa.*

- There is **full shifting** when **one part bears all the burden** of the tax

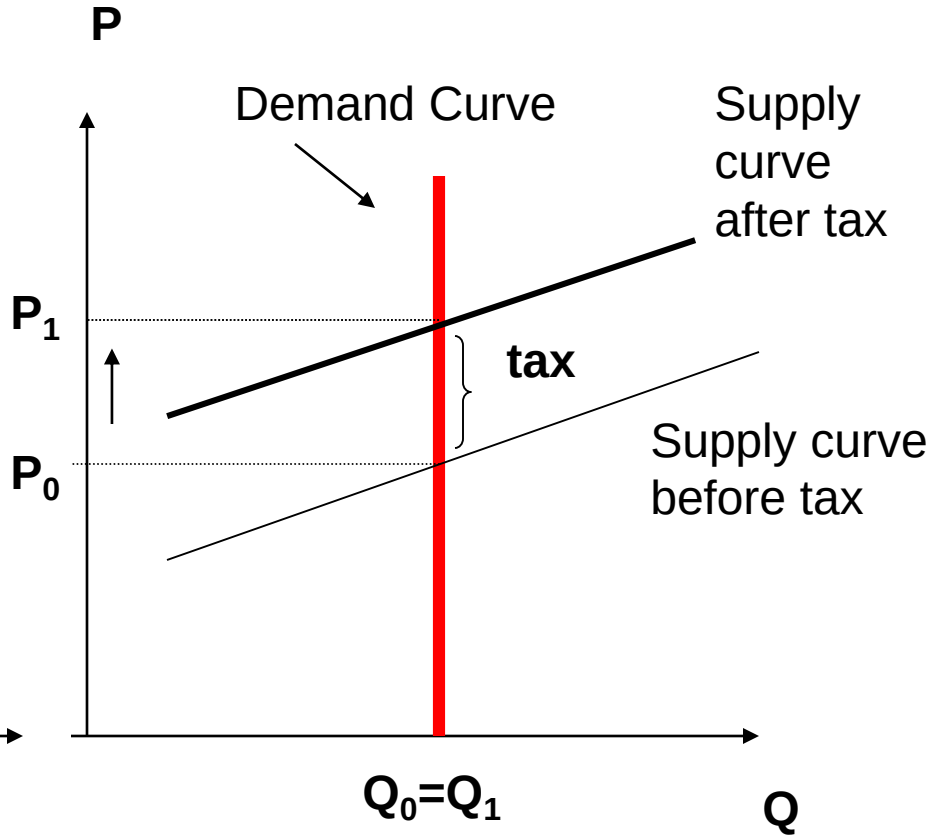
- The same reasoning applies to taxes on factors of productions.

# Relative elasticity of supply and demand: full shifting of commodity tax on consumers

With perfectly elastic supply the price rises by the full amount of the tax, the entire burden of the tax is on consumers



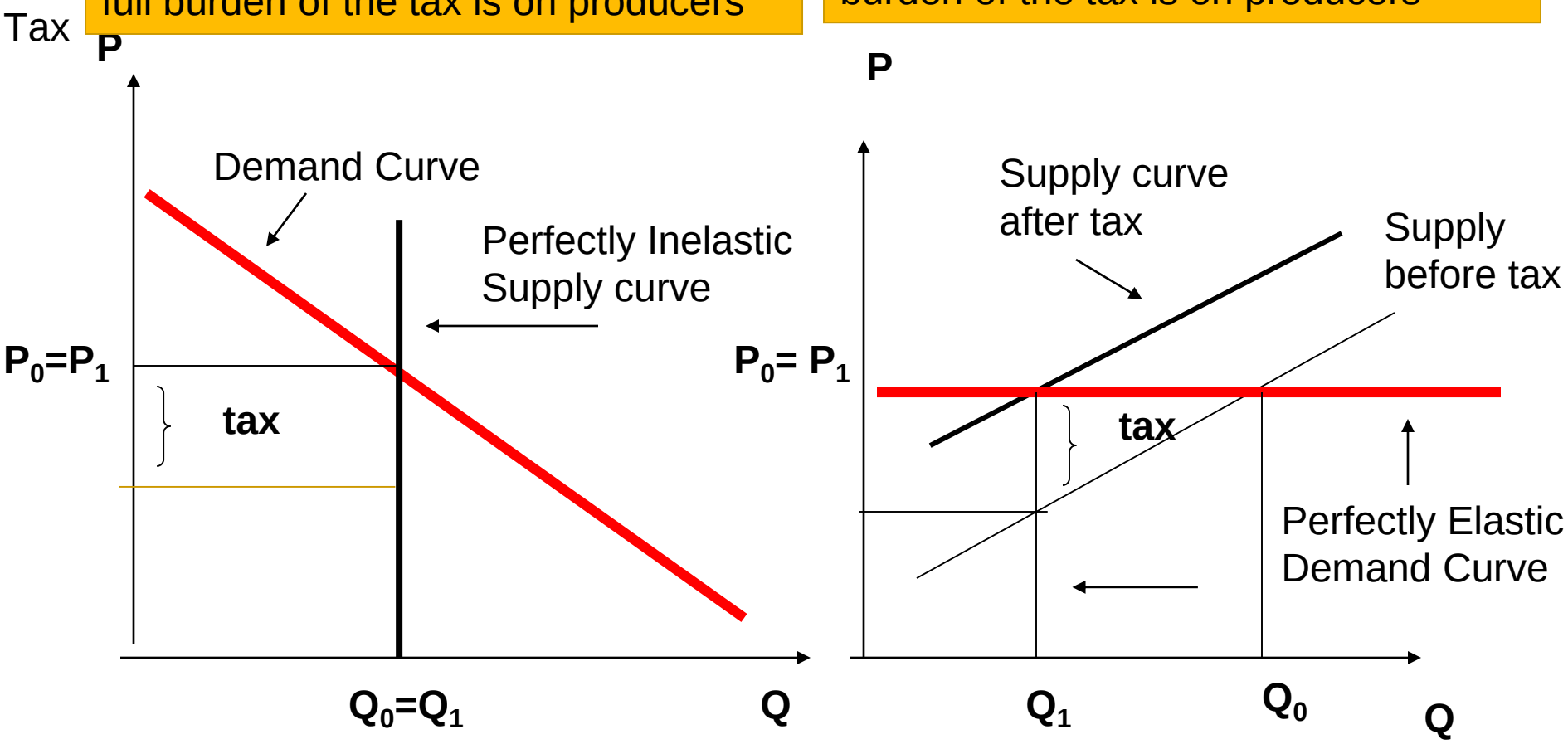

With perfectly inelastic demand, the price rises by the full amount of the commodity tax and the entire burden is on consumers



# Relative elasticity of supply and demand: full shifting of commodity tax on producers

With perfectly inelastic supply curve, the price does not rise at all and the full burden of the tax is on producers

With perfectly elastic demand, the price does not rise at all and the entire burden of the tax is on producers

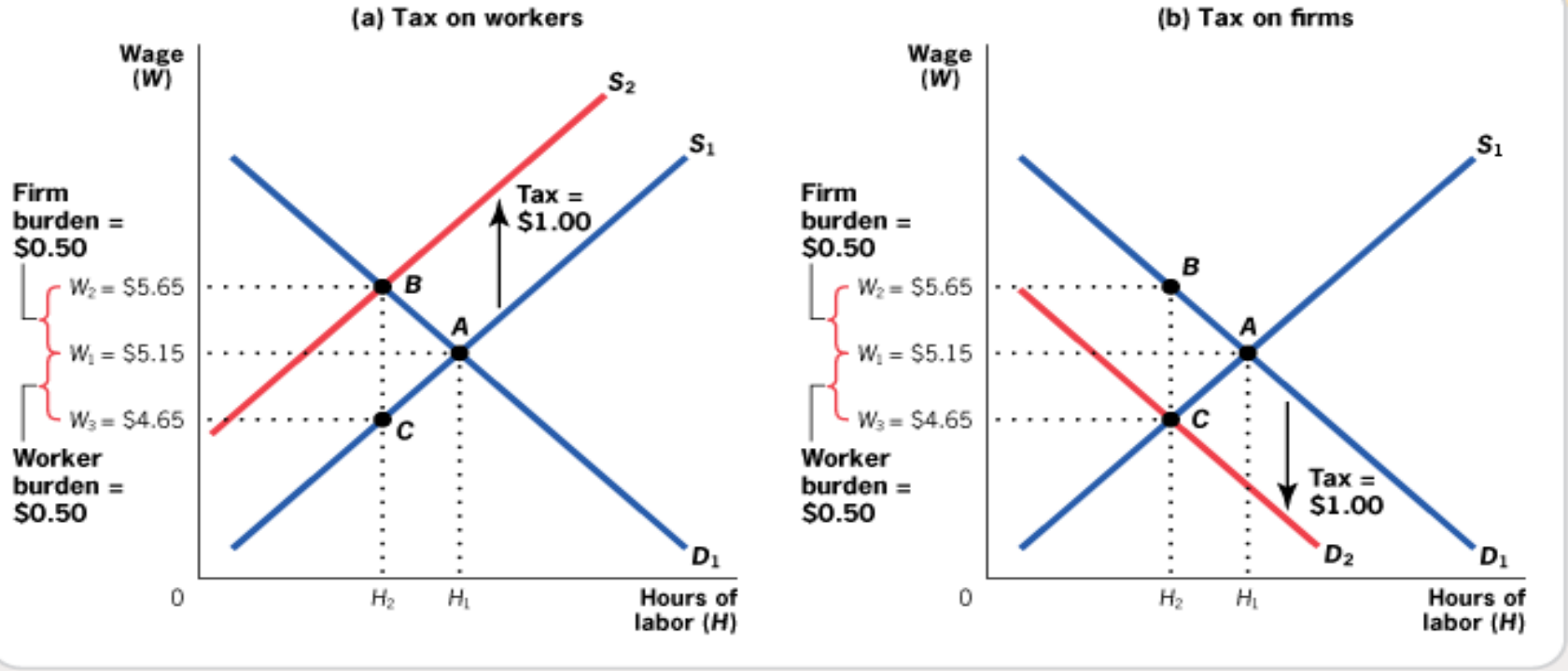


# Tax incidence: extensions

- Tax incidence in factor markers
- Tax incidence in imperfectly competitive markets
- Tax incidence in partial and in general equilibrium
- Tax incidence in short and long run

# Tax Incidence in factor markets

■ FIGURE 19-7

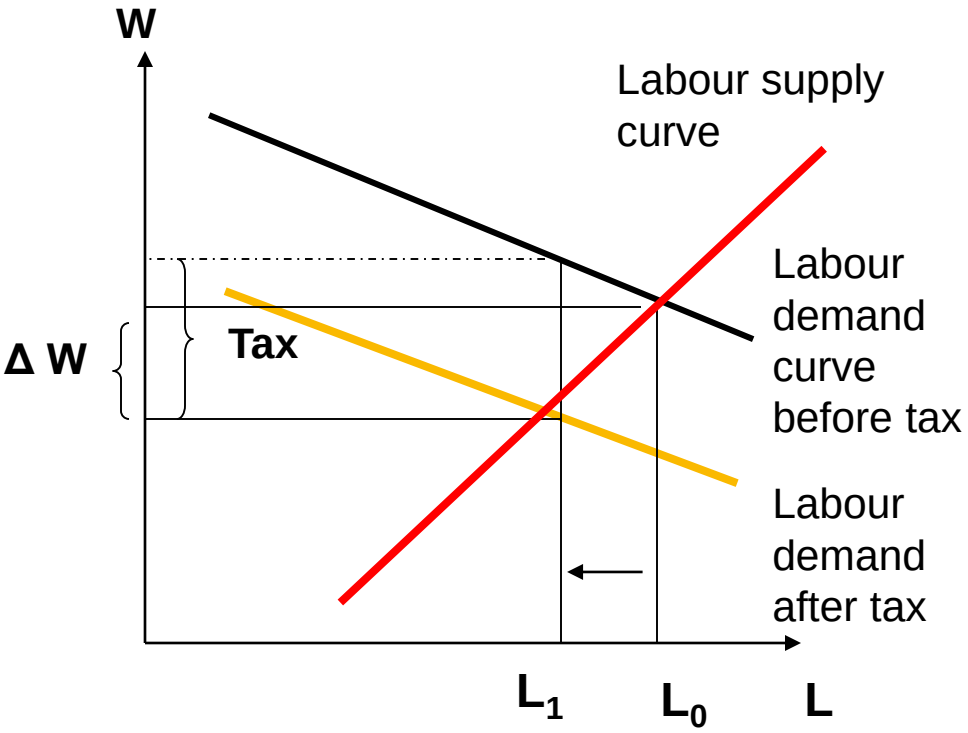


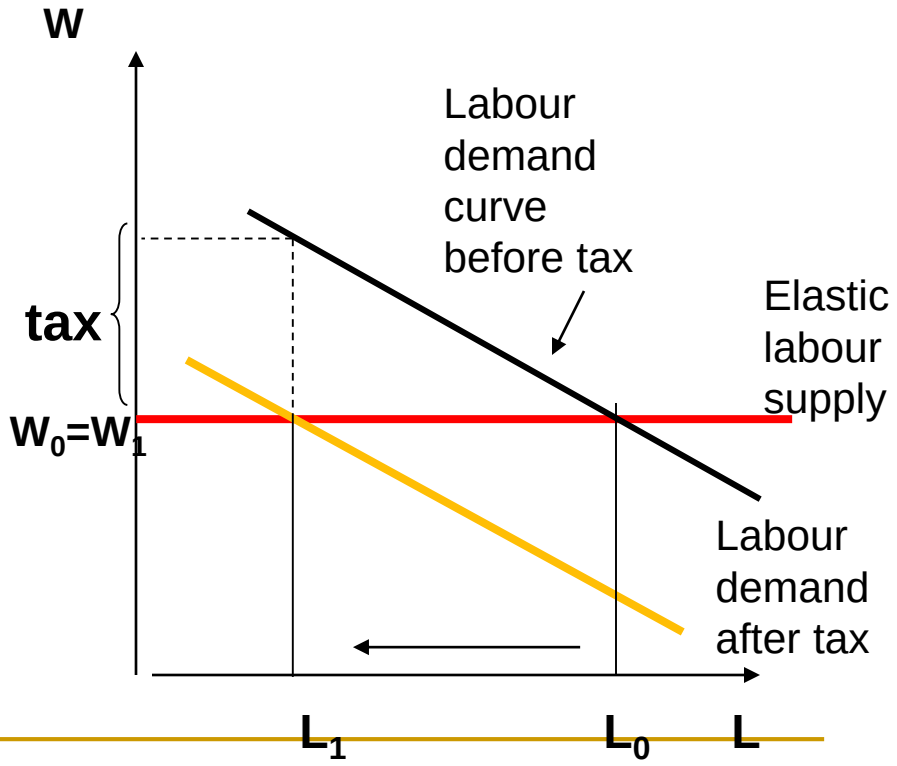

**Incidence Analysis Is the Same in Factor Markets** • These figures show the market for labor where firms are the consumers and workers are the producers of hours worked at a wage rate *W*. A $1.00 tax per hour worked that is levied on workers, shown in panel (a), leads the supply curve to rise from $S_1$ to $S_2$ and the wage to rise from its initial equilibrium value of $5.15 (point *A*) to a higher value of $5.65 (point *B*). A tax of $1.00 per hour worked that is levied on firms, shown in panel (b), leads the demand curve to fall from $D_1$ to $D_2$ and the wage to fall from $5.15 to $4.65 at point *C*. Thus, regardless who pays the tax, workers and firms each have a burden of 50¢ per hour.

Source: Gruber textbook

# Tax incidence in factor markets and elasticity of supply: tax on labour (payroll tax) levied on firms

A tax on labour levied on firms shifts the demand for labour downward, reducing wages and employment. The incidence of the tax depends on the elasticity of demand and supply. If labour supply is relatively inelastic, most of the burden of the tax will fall on workers. If labour supply is perfectly elastic the tax burden is completely shifted on labour demand (employers)

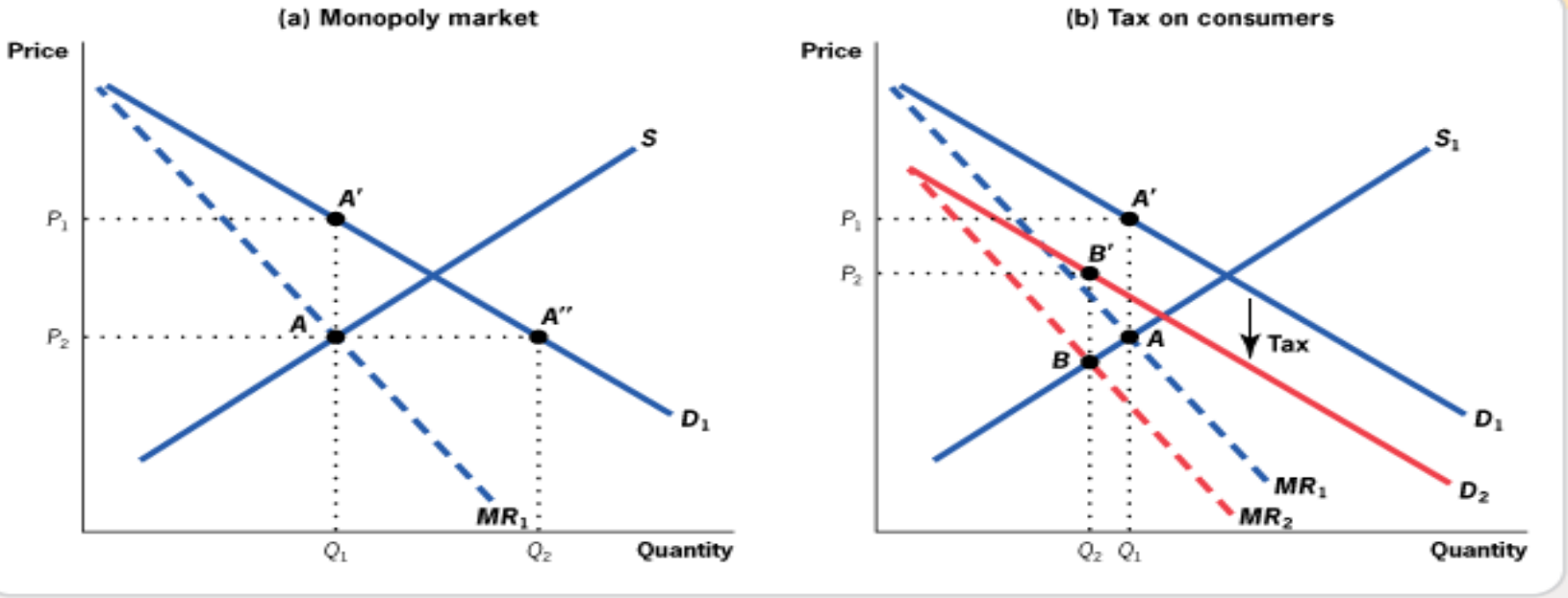


# Tax Incidence in Imperfectly Competitive Market

Although the monopolist has market power, a tax on either side of the market results in the same sharing of the tax burden. Monopolists cannot "use their market power" to avoid the rules of tax incidence.

■ FIGURE 19-9




**Tax Incidence in Monopoly Markets** • Panel (a) shows the equilibrium in a monopoly market. The monopolist sets quantity produced where the marginal revenue curve intersects the supply curve (at $Q_1$) and then sets the price using the demand curve for that quantity (at $P_1$). When a tax is imposed on consumers in this market, as in panel (b), the demand curve shifts downward from $D_1$ to $D_2$, leading the marginal revenue curve to also shift downward from $MR_1$ to $MR_2$. The new equilibrium quantity is $Q_2$, with a new price of $P_2$.

Source: Gruber textbook

# Tax incidence and general equilibrium

- The **general equilibrium** incidence may differ from the partial equilibrium:
  - **partial equilibrium tax incidence:** considers the impact of a tax on a market in isolation.
  - **general equilibrium tax incidence**: considers the effects on related markets of a tax imposed on one market.

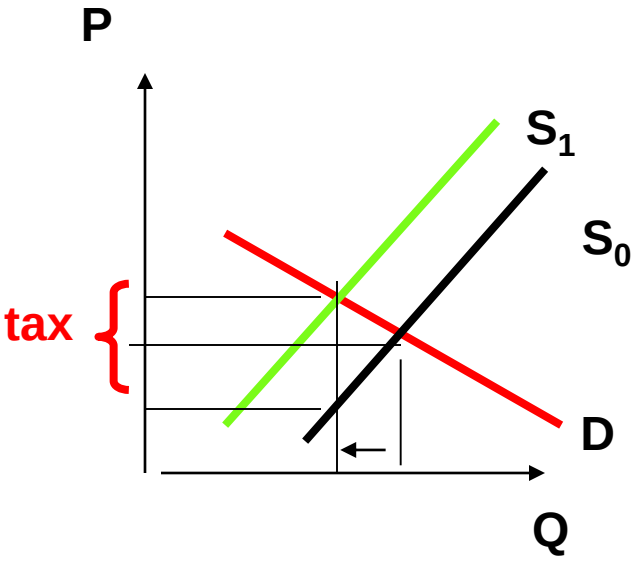
# Tax incidence in general equilibrium an example:

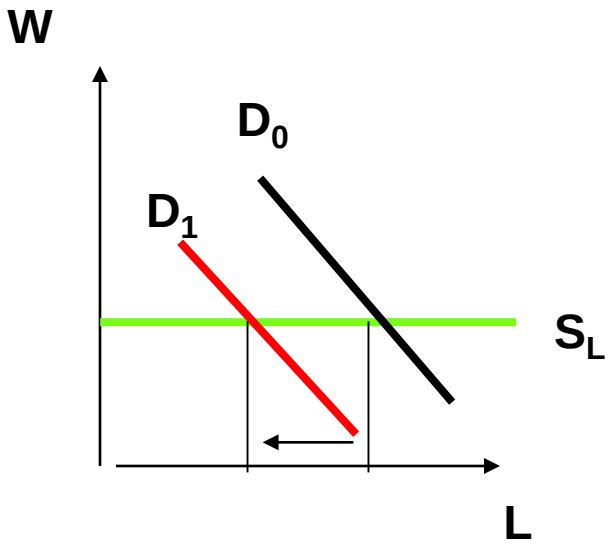
**General equilibrium effects of a tax on wine production**

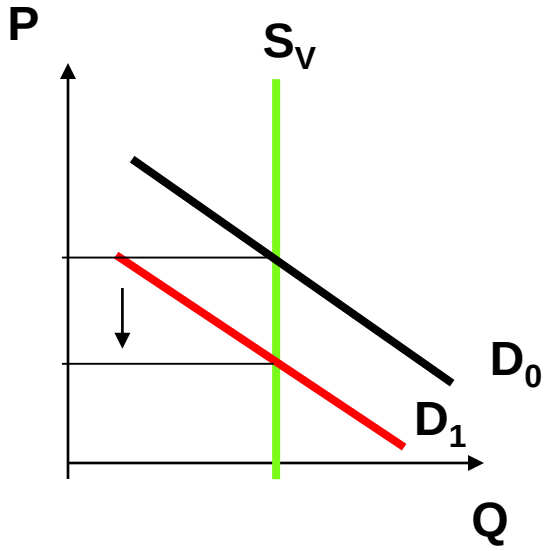
**Wine market**
The tax increases prices and lowers wine consumption and production

**Labour market:** lower wine production reduces labour demand, since labour supply is perfectly elastic no effect on wages

**Vineyards:** lower production reduces demand for vineyards. Land supply is unelastic, no effects on quantity, but reduction in land prices. Land owners bear the producers'burden of the tax

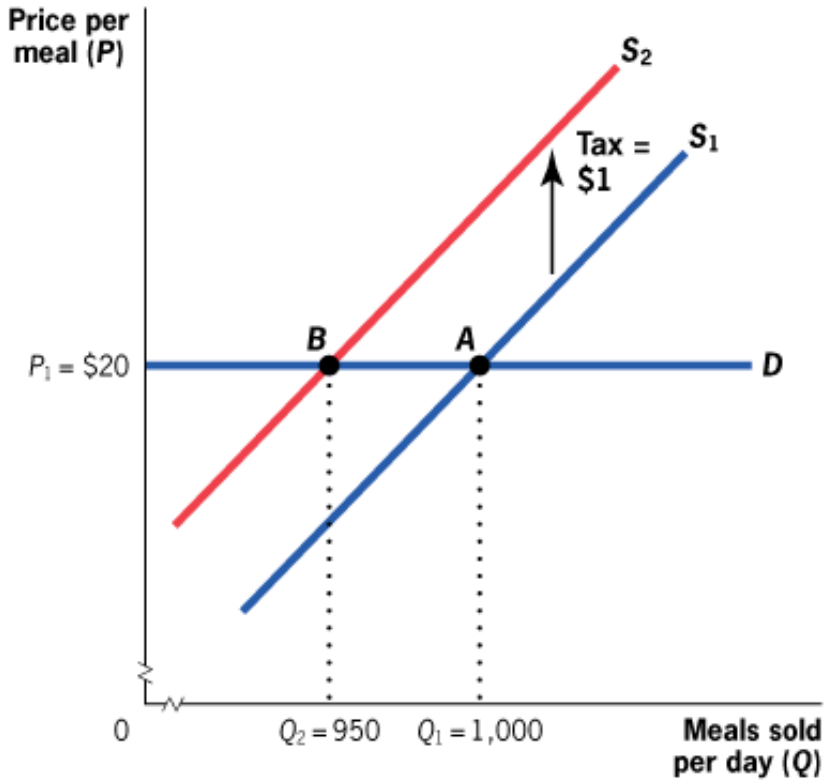


# Effects of a Restaurant Tax: A General Equilibrium Example
## (Source: Gruber textbook)

■ FIGURE 19-10



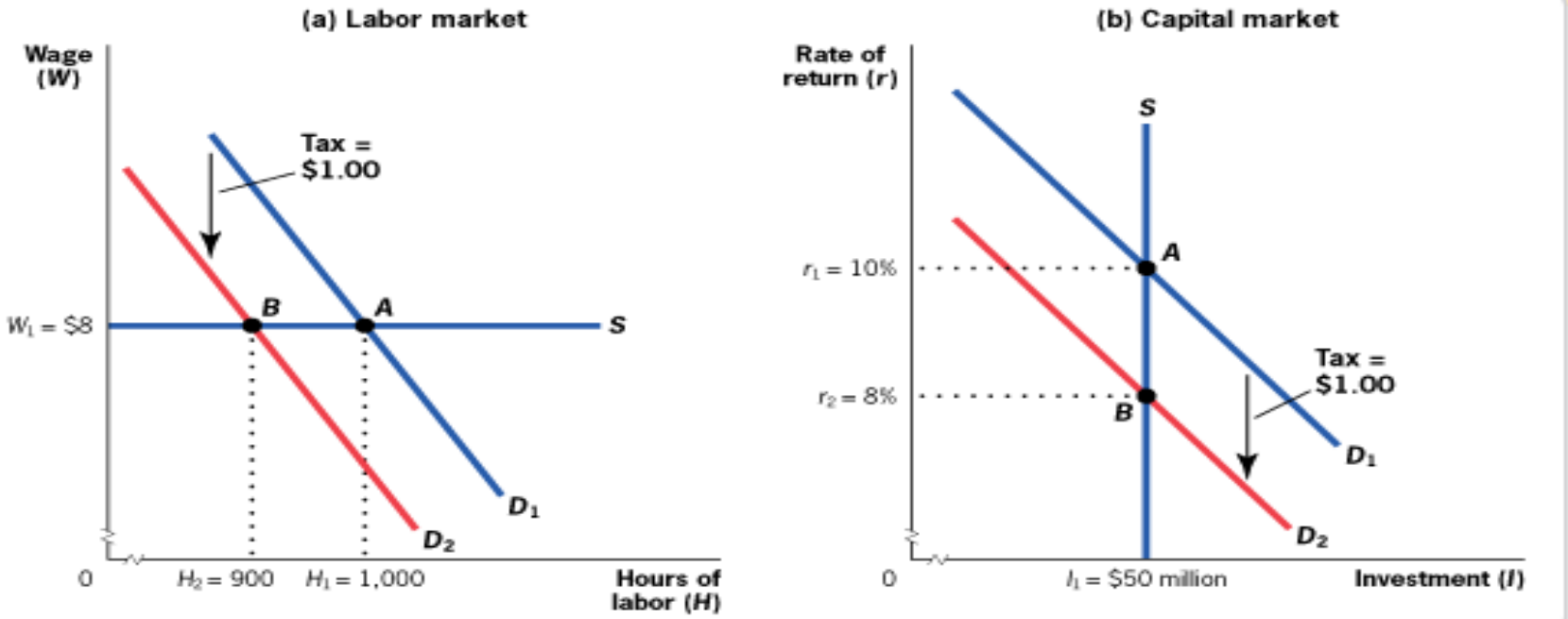

**The Incidence of a Tax on Lexington Restaurants** • The demand for restaurants in Lexington is perfectly elastic, so prices cannot increase when they are taxed; as a result of a $1.00 tax on restaurant meals, the supply of meals falls from $S_1$ to $S_2$, and the quantity of meals demanded and supplied falls to $Q_2$ (950). The price of a restaurant meal remains at $20, so the restaurant, which is paying the tax, bears its full burden.

# General Equilibrium Tax Incidence

## Effects of a Restaurant Tax: A General Equilibrium Example

**(Source: Gruber textbook)**

■ FIGURE 19-11




**The Incidence of a Lexington Restaurant Tax on Labor versus Capital** • If the burden of a tax on restaurants is borne by the restaurants, it must be borne by the factors of production used by the restaurants. In panel (a), the supply of labor to restaurants in Lexington is perfectly elastic, so when demand for labor falls to $D_2$, it cannot be reflected in lower wages; the wage is unchanged and workers do not bear any of this tax. In panel (b), the supply of capital to restaurants in Lexington is perfectly inelastic, so when demand for capital falls to $D_2$, the rate of return to capital falls by the full amount of this tax to $r_2$.

# Effects of the time period on tax incidence

- **Short-run and long-run elasticities usually differ**: in the long run supply and demand elasticities are usually higher than in the short run. Factors that are inelastically demanded or supplied in both the short and the long run bear taxes also in the long run
- **Open economies:** demand and supply curves are usually more elastic than in closed economies
- **Scope of the tax**: taxes that are broader based are harder too avoid than taxes that are narrower, e.g. the demand and supply will be less elastic

# Tax incidence and spillover effects on other markets

Consider a tax on restaurant meals in Castellanza. A higher after-tax price has three effects on other goods as well:

1. Consumers have lower incomes and may therefore purchase fewer units of all goods **(the income effect).**
2. Consumers may increase their consumption of goods and services (such as movies) that are substitutes for restaurant meals because they are now relatively cheaper than the taxed meals (**the substitution effect**).
3. Consumers may reduce their consumption of goods or services (such as parking services) that are complements to restaurant meals because they are consuming fewer restaurant meals (**the complementary effect).**

# Summing up: Incidence of taxation

- Incidence is about prices not quantities
- Statutory burdens are not real burdens
- Side of the market on which the tax is levied is not relevant
- Parties with inelastic supply or demand of market bear taxes; parties with elastic supply or demand avoid taxes.
- Monopolists cannot exploit their market power to avoid tax incidence. A tax on either side of the market results in the same sharing of the tax burden
- Short-run and long-run elasticities may differ. Factors that are always in-elastically demanded or produced in both short and long run bear taxes in the long run
- Scope of tax is important (i.e. taxing restaurants in Castellanza vs. taxing restaurants in Lombardy)