6. Tax Incidence – Theory

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Tax Incidence: definition

- Tax incidence: study of the effects of tax policies on prices
  - Who is better off and worse off after a tax change? By how much?
  - Incidence is an **equilibrium concept**
- What happens to market prices when a tax is introduced or changed?
  - Increase tax on cigarettes by \$1 per pack
  - Reduce the corporate income tax rate by 10%
  - Introduce a Working Tax Credit (WTC) for low income earners

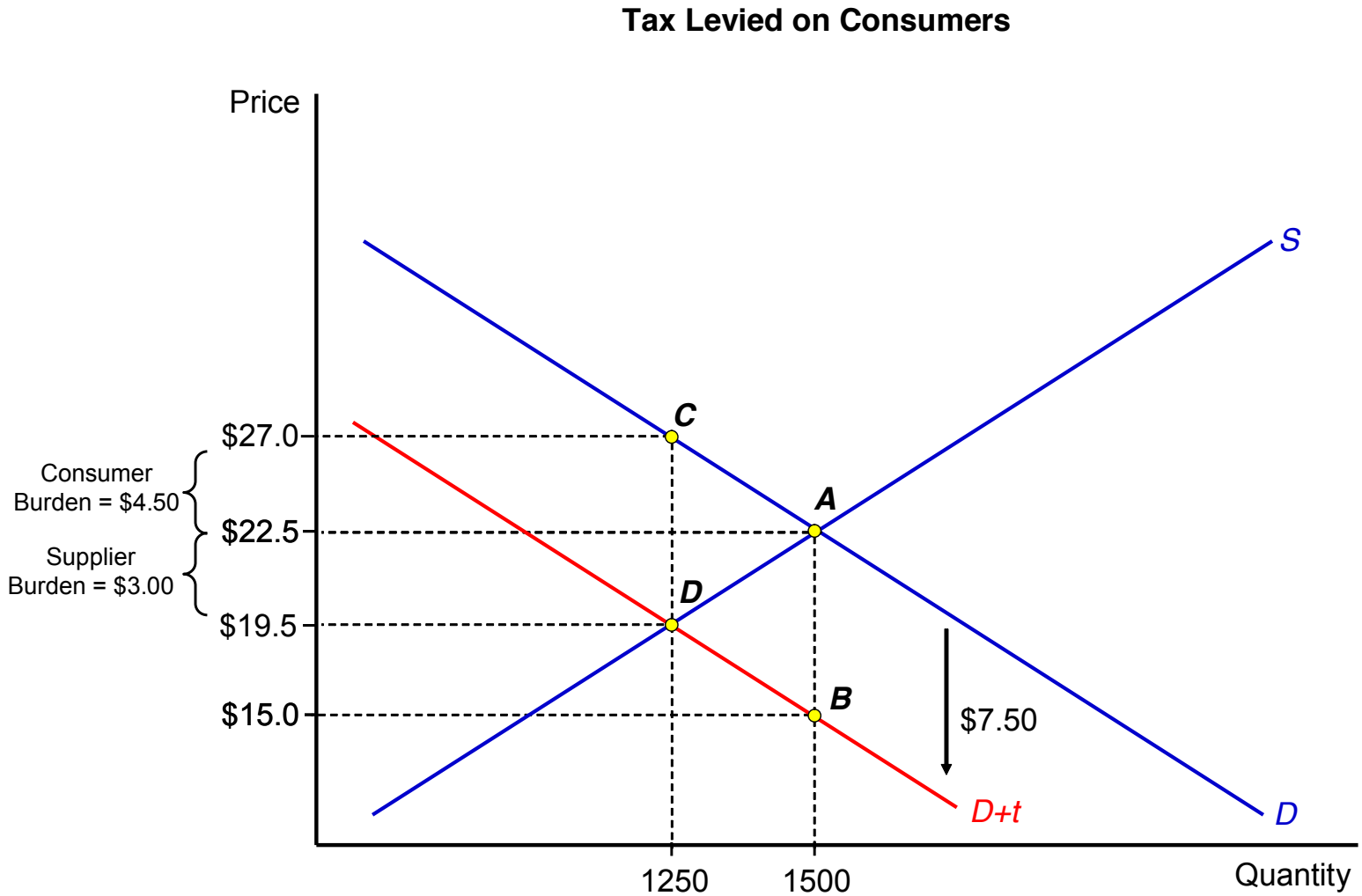
Economic vs Statutory incidence

- Statutory incidence: who pays the tax according to the law?
  - "companies will pay a 30% tax on profits"
- Economic incidence: how does this change affect shareholders, workers?
  - "the increase in the corporate income tax will be passed on to workers"
  - This is an **empirical question**
- If prices do not change, then statutory and economic incidence would be the same
  - However, prices usually respond to tax changes
  - Taxes create a **wedge** between the consumer price (P^c) and the producer price (P^p)

Tax incidence: Positive analysis

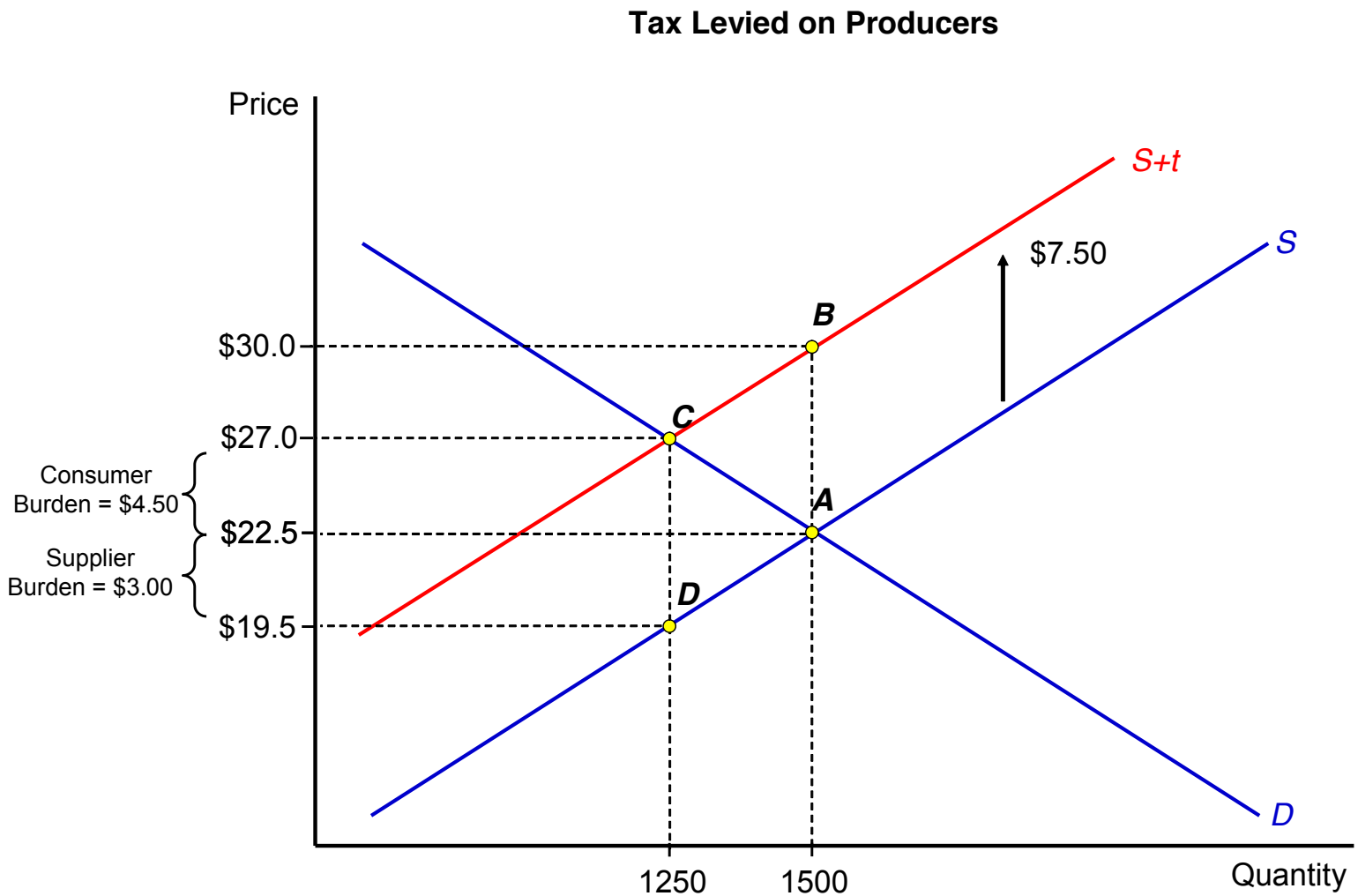
- Studying incidence is an example of positive analysis
  - First step in policy evaluation
  - Key input when thinking about policies that might increase social welfare
- Theory is informative about signs and comparative statics, but inconclusive about magnitudes
  - Incidence of cigarette tax: demand elasticity wrt price is crucial
  - Labor vs capital taxation: mobility of labor, capital are critical
  - We need **empirical evidence**

Tax Incidence: Graphical Analysis



Source: Chetty and Bruich (2012)

Tax Incidence: Graphical Analysis



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Tax Incidence formulas

- Let demand be $Q_D(P)$ and supply $Q_S(P)$
- Define the elasticities of demand and supply as:

$$\varepsilon_D = -\frac{\partial Q_D}{\partial P}\frac{P}{Q} \qquad \varepsilon_S = \frac{\partial Q_S}{\partial P}\frac{P}{Q}$$

  - Note: $\varepsilon_D \geq 0$ and $\varepsilon_S \geq 0$ by definition.
- Consider the introduction of an excise tax t to be paid by consumers
  - Now, we have to distinguish between the price faced by consumers (P^c) and by producers (P^p)
  - In this example, we now have $Q_D(P^c + t)$ and $Q_S(P^p)$

Excise vs. Ad valorem taxes

- Two types of tax:
  - Excise tax:

$$P^c = P^p + t$$

    (Revenue $= tQ$)

  - *Ad valorem* tax:

$$P^c = (1 + t)\, P^p$$

    (Revenue$=tP^p\,Q$)

- In the following examples we will consider excise taxes, but the same intuition applies to *ad valorem* taxes.

Tax Incidence formula for producers

- Start from market equilibrium: $Q^D\left(P^p + t\right) = Q^S\left(P^p\right)$
- Differentiate and solve for dP/dt:

$$\frac{\partial Q^D}{\partial P^P} \cdot \left(dP^p + dt\right) = \frac{\partial Q^S}{\partial P^P} \cdot dP^p$$

$$\left(\frac{\partial Q^D}{\partial P^P} \cdot \frac{P^p}{Q}\right) \cdot \left(dP^p + dt\right) = \left(\frac{\partial Q^S}{\partial P^P} \cdot \frac{P^p}{Q}\right) \cdot dP^p$$

$$-\varepsilon_D \cdot \left(dP^p + dt\right) = \varepsilon_S \cdot dP^p$$

$$\frac{dP^p}{dt} = \frac{-\varepsilon_D}{\varepsilon_S + \varepsilon_D} \in (-1, 0)$$

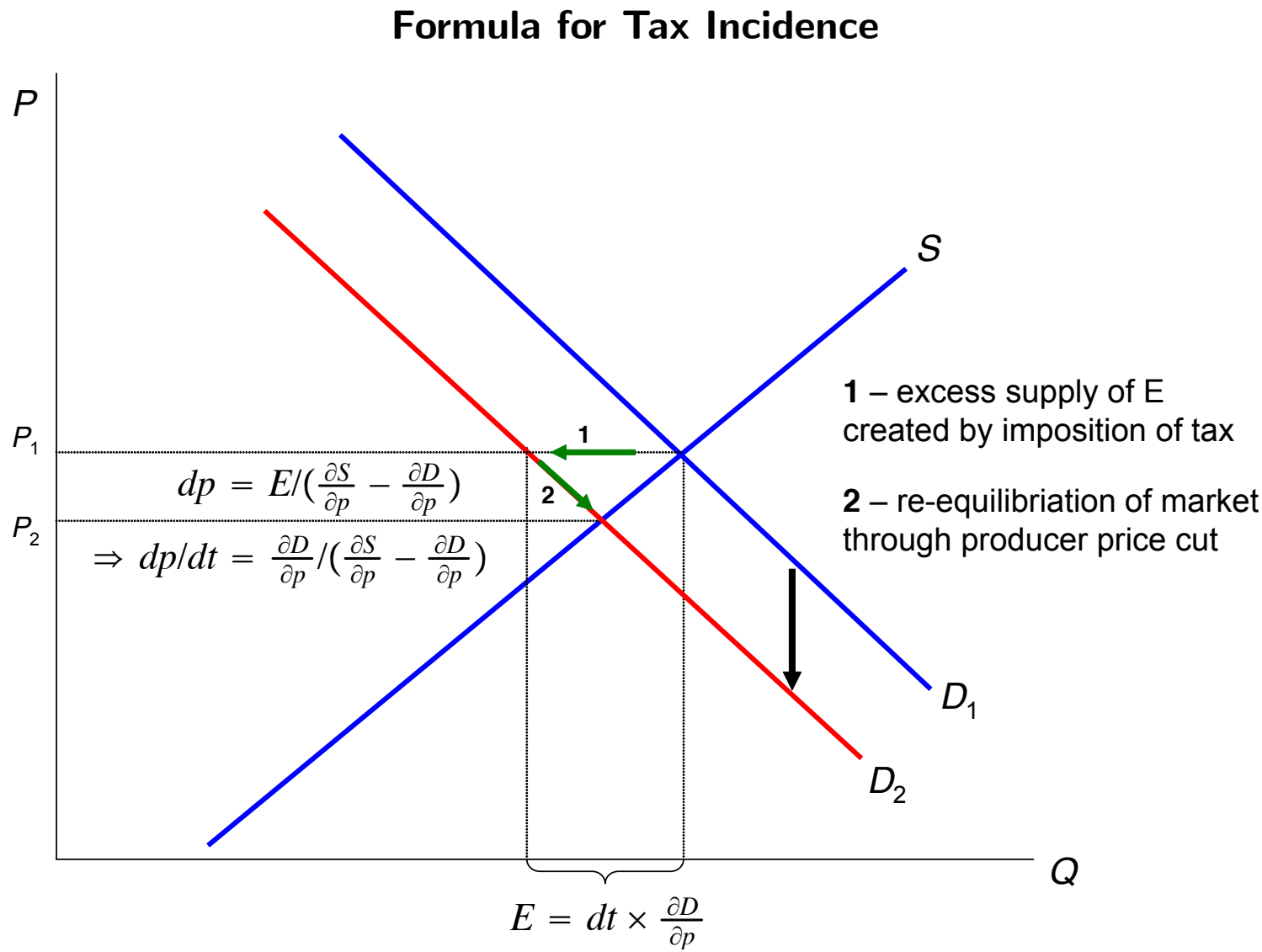
Homework: derive tax incidence formula for consumers

1. Continuing the example of an excise tax on consumers, show that the change in consumer price is

$$\frac{dP^c}{dt} = \frac{\varepsilon_S}{\varepsilon_S + \varepsilon_D} \in (0, 1)$$

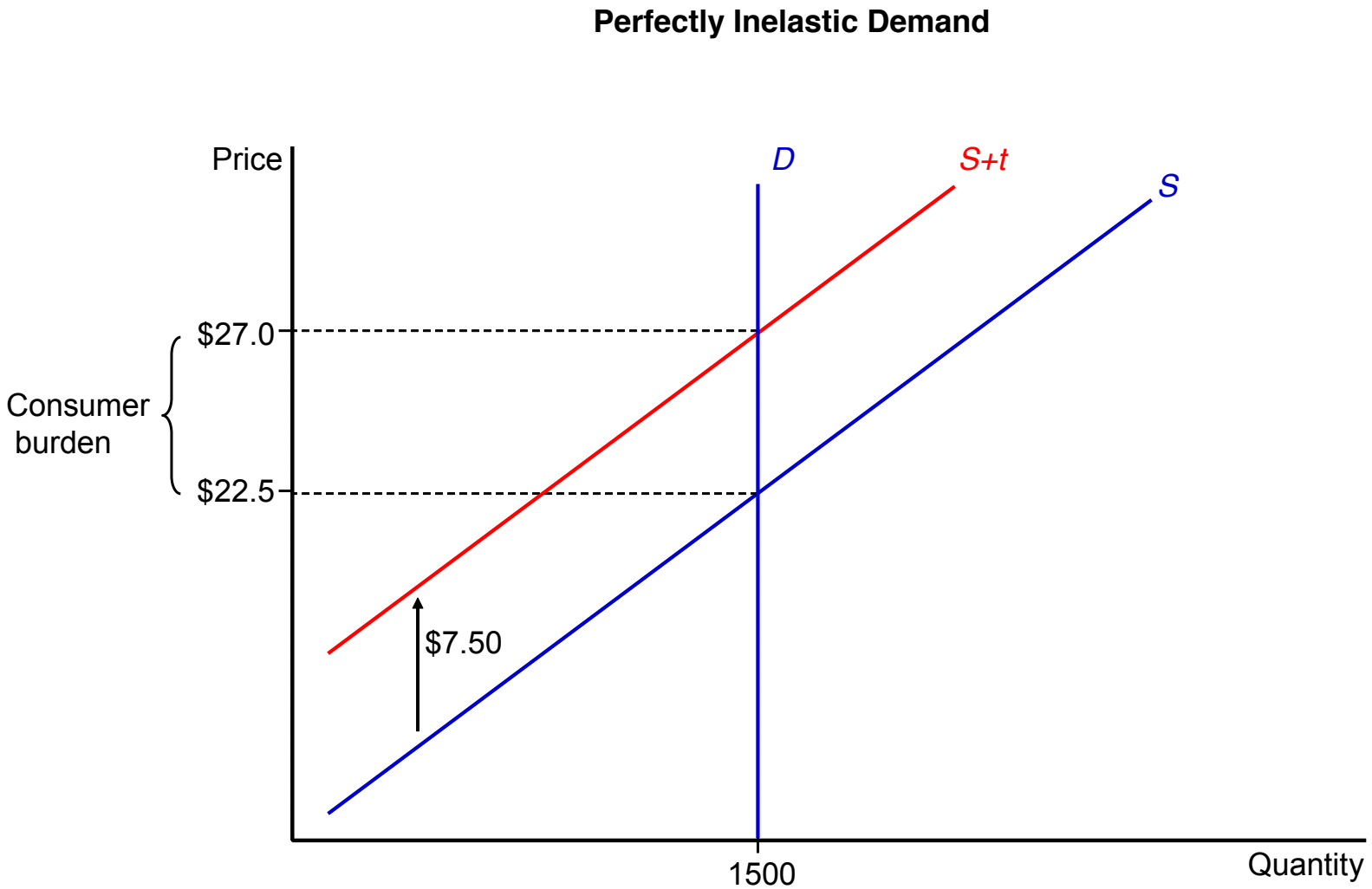
2. Now, consider an excise tax on producers. Derive the changes in prices (P^p, P^c) and show that they are exactly the same as in the previous case.
   - Statutory incidence does not matter for economic incidence!

Tax Incidence: Graphical Analysis



Source: Chetty and Bruich (2012)

Perfectly inelastic demand ($\varepsilon_D = 0$)



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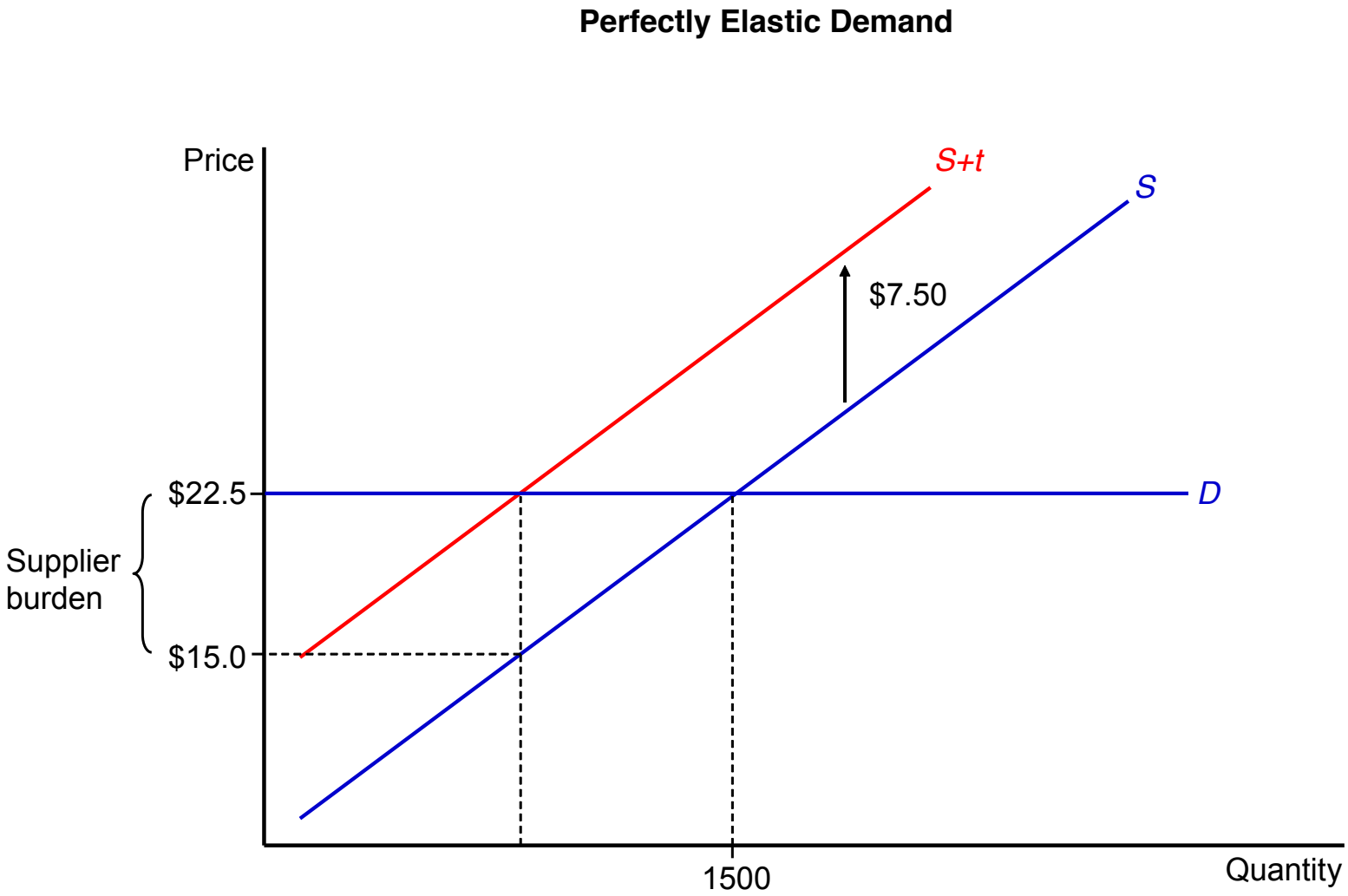
Perfectly elastic demand ($\varepsilon_D \to \infty$)



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Homework: elastic and inelastic supply

- Do the graphical analysis for the cases of perfectly elastic and inelastic supply
- Who bears the burden of the tax in each case?

Tax Incidence with Monopoly power

- So far, we have assumed that markets are competitive
- In the case of a **monopoly**, the producer will maximize profits by cutting down production until $MR = MC$
- When we introduce a tax, it is possible that $dP^c/dt > 1$, which was not possible under perfect competition
  - Under two assumptions: (1) ad valorem tax, and (2) $d\varepsilon_D/dP < 0$
  - See Salanie (chapter 1) for derivations of the monopoly case