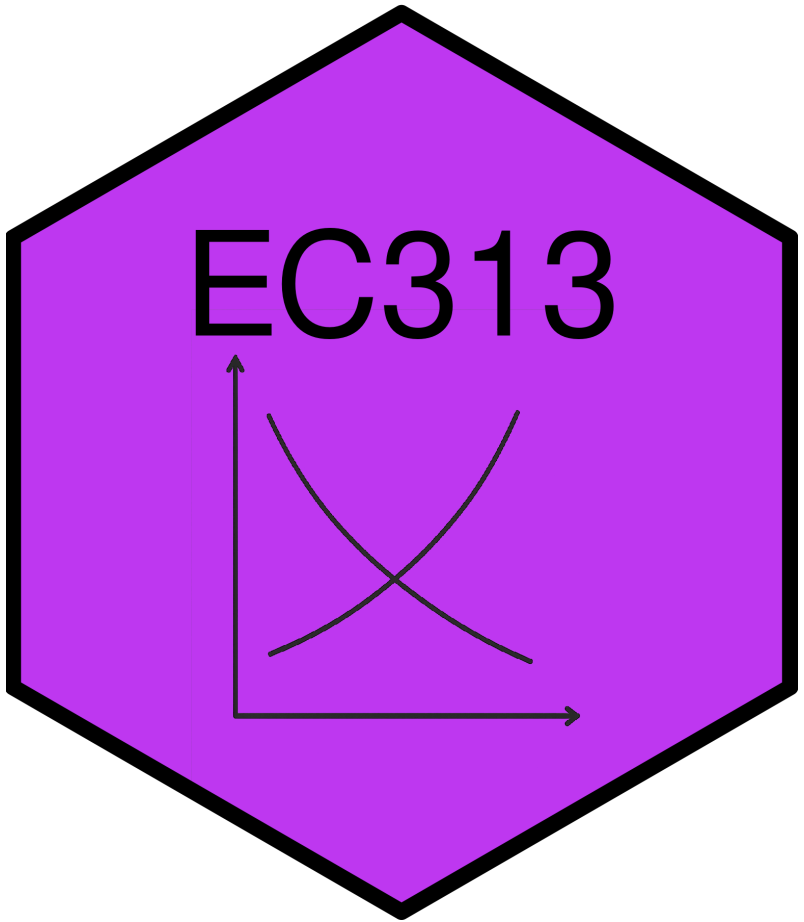
Tax Incidence

EC313 - Public Economics: Taxation

Justin Smith

Wilfrid Laurier University

Fall 2025



Goals of This Section

Goals of This Section

- Outline different types of taxes
- Discuss different between statutory and economic incidence of a tax
- Show how tax incidence depends on elasticities of supply and demand
- Expand on tax incidence in various markets

Types of Taxes

Introduction

- There are many different types of taxes
- Taxes can have different goals
  - Raise revenue for government spending
  - Change behaviour of individuals or firms
  - Redistribute resources
- They can also have different bases, structures, and rates
  - Base: what is being taxed (e.g. income, consumption, property)
  - Structure: how the tax is applied (e.g. progressive, regressive, flat)
  - Rate: how much is being taxed (e.g. percentage, fixed amount)
- Below we cover some of the most common types of taxes

Taxes on Income

- **Income Tax**: tax on income earned during the year
- Can be levied on individuals or corporations
- For individuals, includes but not limited to
  - Labour market earnings
  - Capital gains
  - Investment income (e.g. from dividends, interest, property)
  - Pensions and retirement income (e.g. RRSPs)
  - Some government benefits (e.g. employment insurance)
  - Other taxable benefits (e.g. premiums paid by employer for group life insurance)

Taxes on Income

- For corporations, includes but not limited to
  - Active business income from sales or goods and services
  - Investment income
  - Capital gains
  - Some government grants
  - Depends on the size of your business
    - Small business pay a lower rate

Payroll Taxes

- **Payroll Taxes**: taxes levied on employment income
  - Paid by both employers and employees
- Used to finance social insurance and public pension programs
  - Examples: Employment Insurance (EI), Canada Pension Plan (CPP), worker compensation
- Payroll taxes vary by province
  - Some charge a health tax (e.g. BC Employer Health Tax)
  - Manitoba charges a levy for health and postsecondary education
- These are different from the general income tax

Consumption Taxes

- **Consumption Tax**: a tax paid on consumption of goods and services
- Taxes generally charged by a seller at point of sale
  - They remit these funds to the government
- Examples:
  - Sales tax (e.g. GST, HST, PST)
  - Excise taxes (e.g. gasoline, alcohol, tobacco)
  - Tariffs (tax on imports)

Wealth Taxes

- **Wealth Taxes**: taxes on the value of an asset
- Typical wealth taxes include
  - Property tax (tax on value of land/buildings)
  - Estate tax (tax on value of estate at death)
  - General wealth tax (tax on total value of assets owned)
- Estate taxes and general wealth taxes are not used in Canada
- Property taxes are a major source of revenue for municipal governments

Statutory vs Economic Incidence of a Tax

Introduction

- The question of who “pays” a tax is more complicated than it seems
- Example: in Canada, there is a federal $0.10/litre tax on gasoline
  - Gasoline stations include this in their price
  - They remit the tax to the government
  - Does the seller or the consumer pay?
- This section will clarify who pays a tax
- Separate between **statutory** and **economic** incidence of a tax
- My view: this is the most important concept we teach in this program

Statutory vs Economic Incidence of a Tax

- **Statutory Incidence**: who is legally responsible for paying the tax to the government
  - In the gasoline tax example, the statutory incidence is on the gasoline station
    - They send a cheque to the government
- **Economic Incidence**: the change in real income brought about by the tax
  - In the gasoline tax example, the economic incidence can be shared between the gasoline station and the consumer
    - The gasoline station may less revenue per litre sold
    - The consumer may pay a higher price per litre purchased

Statutory vs Economic Incidence of a Tax

- Example: $0.10/litre tax on gasoline
  - Before tax is imposed, suppose price is $1.00/litre
    - Consumers pay $1.00/litre, gas station receives $1.00/litre
  - Then government levies $0.10/litre tax on gasoline station
    - Suppose gasoline station raises price to $1.10/litre
    - Consumer pays $1.10/litre
    - Gas station keeps $1.00/litre, remits $0.10/litre to government
  - In this case, the consumer bears the entire economic incidence of the tax
    - Gasoline station receives same revenue per litre as before tax
    - Consumer pays $0.10/litre more than before tax

Statutory vs Economic Incidence of a Tax

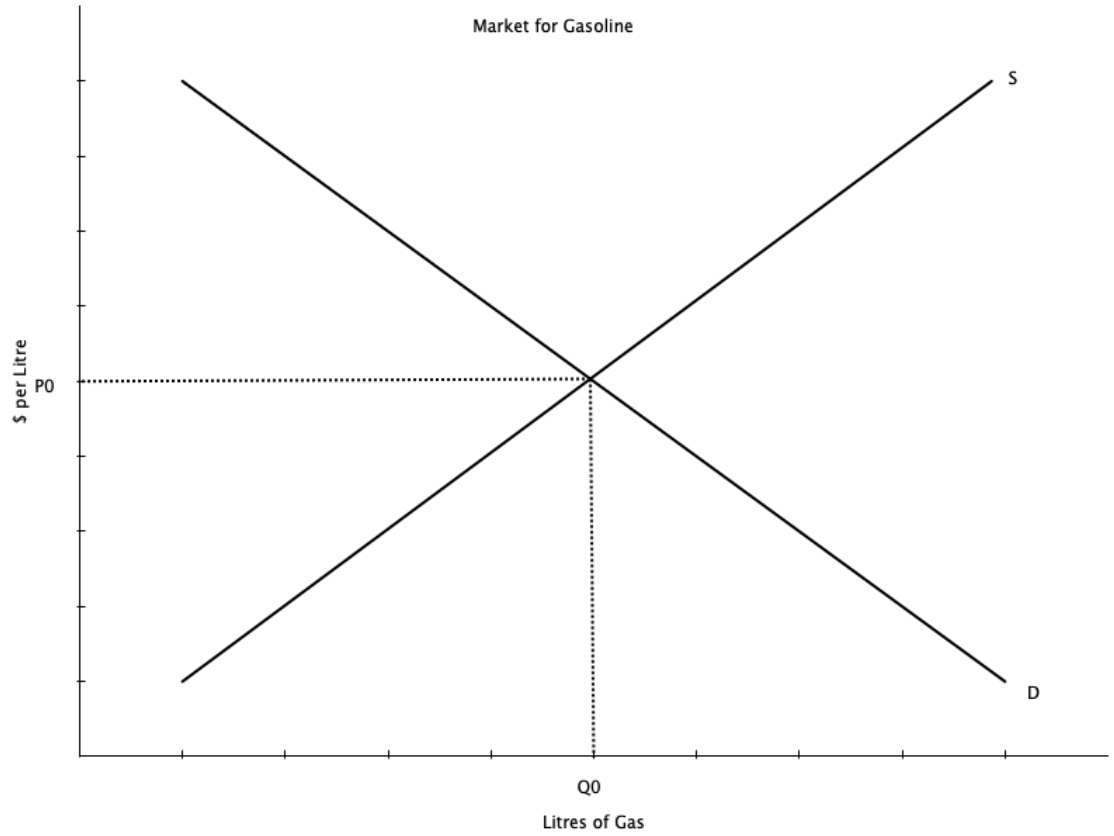
- Example 2: $0.10/litre tax on gasoline
  - Same $0.10/litre tax on gas station
    - Suppose gas station raises price to $1.05/litre
    - Consumer pays $1.05/litre
    - Gas station keeps $0.95/litre, remits $0.10/litre to government
  - In this case, the consumer and gas station share the economic incidence of the tax
    - Gas station receives $0.05/litre less than before tax
    - Consumer pays $0.05/litre more than before tax

Statutory vs Economic Incidence of a Tax

- Key lesson is that **statutory incidence does not determine economic incidence**
  - In example, statutory incidence is always on the gas station
  - Economic incidence depends on how much of the tax is passed on to consumers in the form of higher prices
  - Gas station could pass on all, some, or none of the tax to consumers
- Statutory incidence says nothing about economic incidence
- To determine economic incidence, we need to look at underlying economic forces

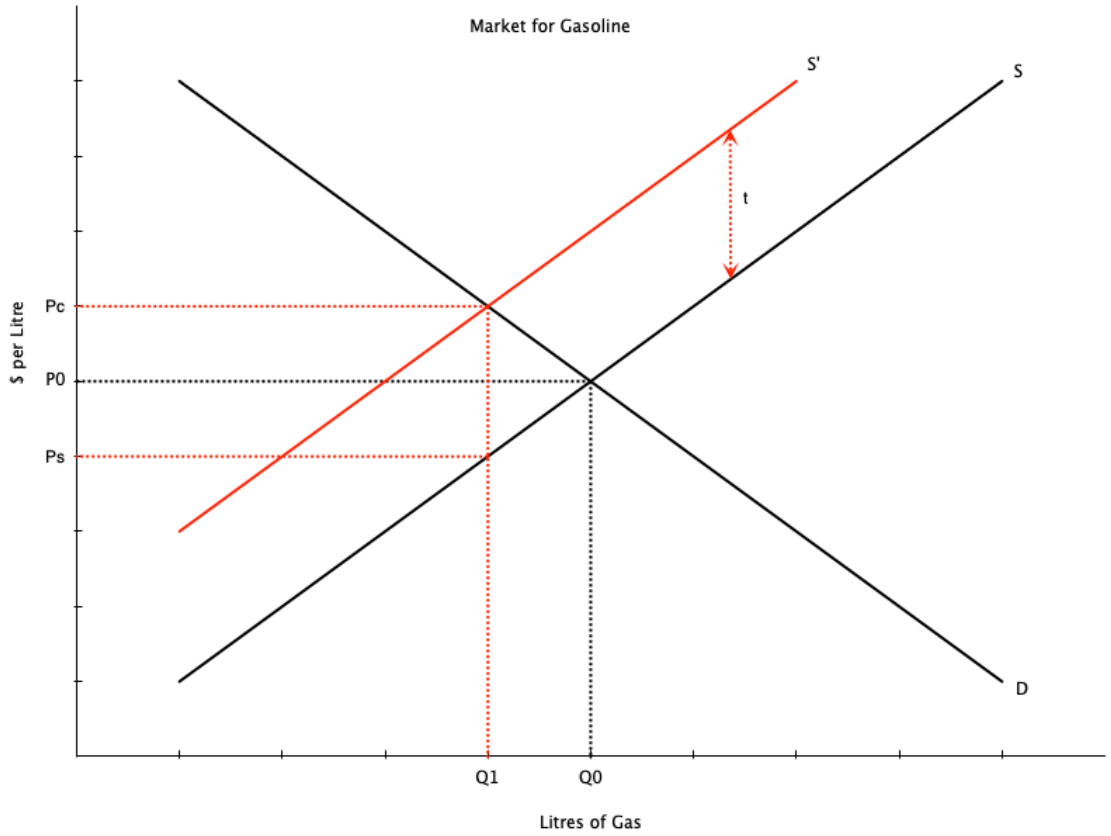
Commodity Taxes in Partial Equilibrium Models

Unit Tax on Sellers - Graphical



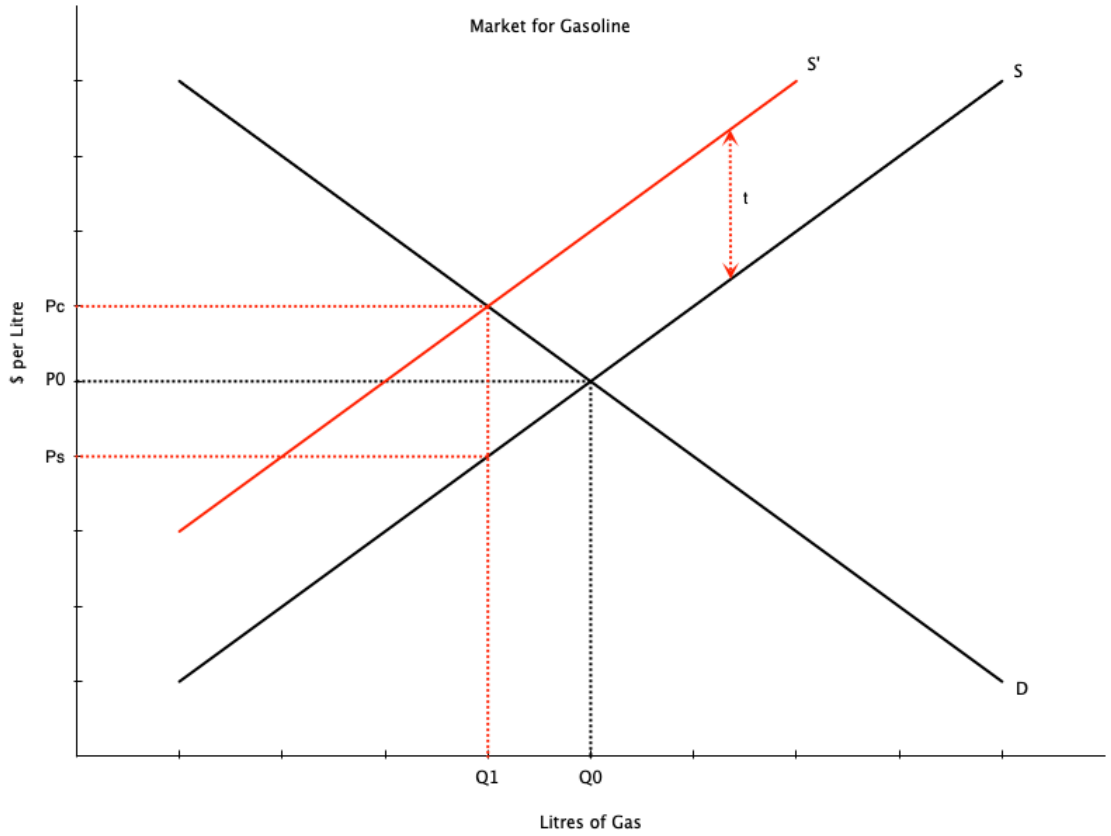
- Take gasoline tax example one more time
- On right is demand and supply of litres of gasoline
- Without tax, price and quantity are determined where demand and supply are equal
  - Price is P_0
  - Quantity is Q_0

Unit Tax on Sellers - Graphical



- Now government levies a per unit tax t (e.g. \$0.10/litre) on gasoline
- Tax is levied on **sellers** (statutory incidence)
- This shifts the supply curve up by the amount of the tax
  - New supply curve is S'
  - At each quantity, sellers want to charge t more to cover the tax
- New equilibrium is where S' intersects D
  - Determines price paid by consumers

Unit Tax on Sellers - Graphical

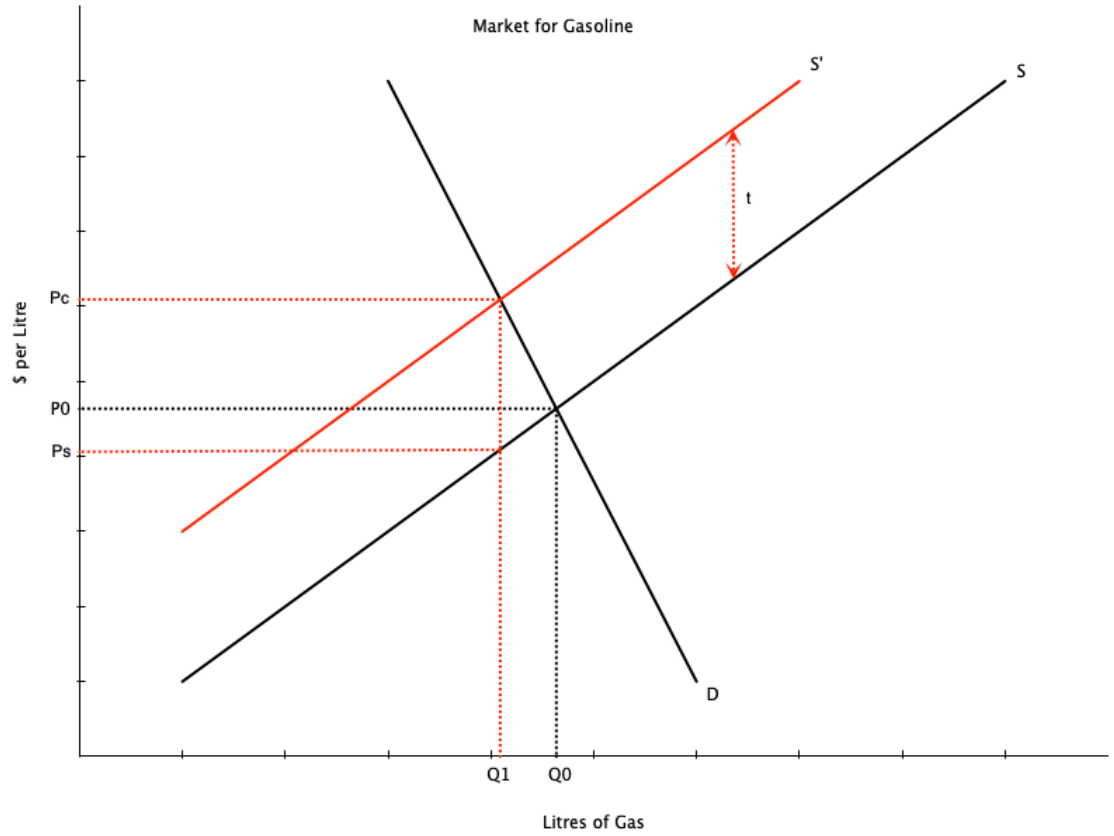


- The tax introduces a **tax wedge**
  - Difference between what consumers pay and what producers receive from a transaction
- Consumers pay the equilibrium price P_c
  - Price includes the tax
- Producers receive $P_s = P_c - t$
  - They remit t for every unit sold
- Quantity falls to Q_1

Unit Tax on Sellers - Graphical

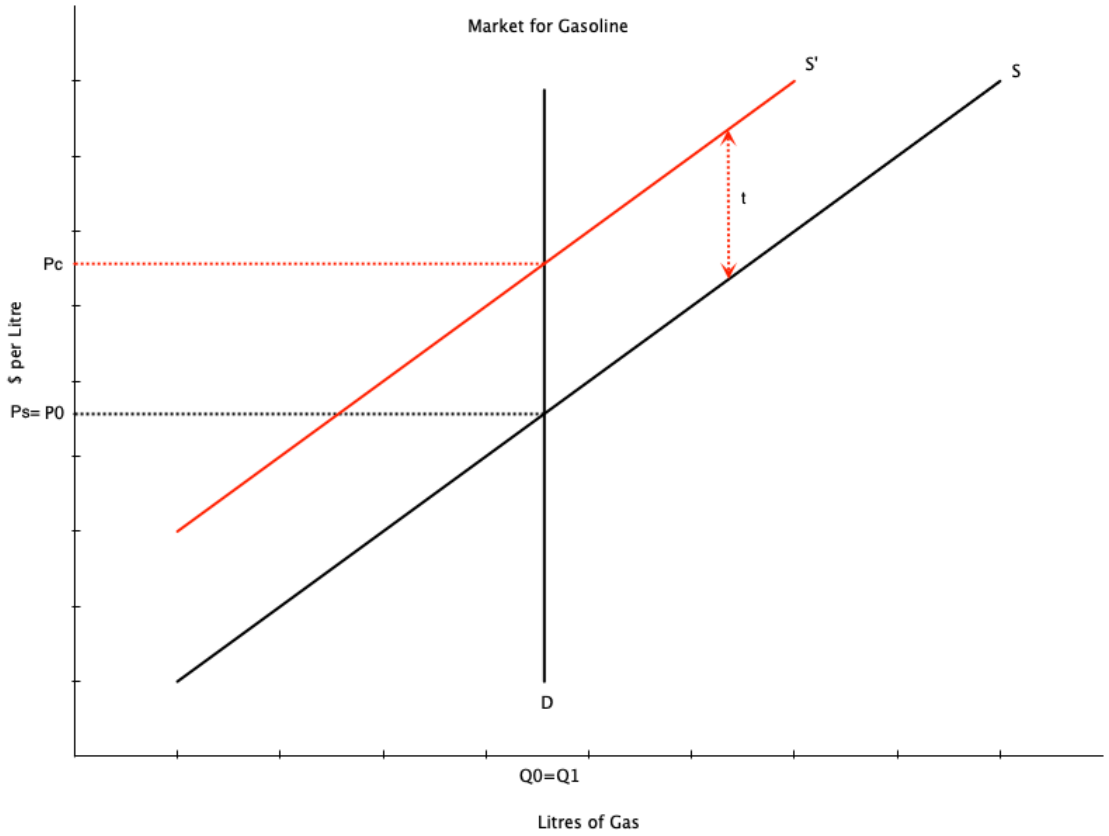
- In example above, economic incidence is shared equally between consumers and producers
  - Consumers pay $P_c - P_0$ more than before tax
  - Producers receive $P_0 - P_s$ less than before tax
  - These amounts are equal
- Equal economic incidence is specific to this example because supply and demand have the same slope
- In general, **economic incidence depends on the elasticities of supply and demand**
  - A more elastic demand curve means consumers bear less of the economic incidence
    - Higher elasticity means consumers can switch to other goods when price changes
  - A more elastic supply curve means producers bear less of the economic incidence
    - A firm with higher elasticity can alter production easily when prices change

Unit Tax on Sellers - Graphical



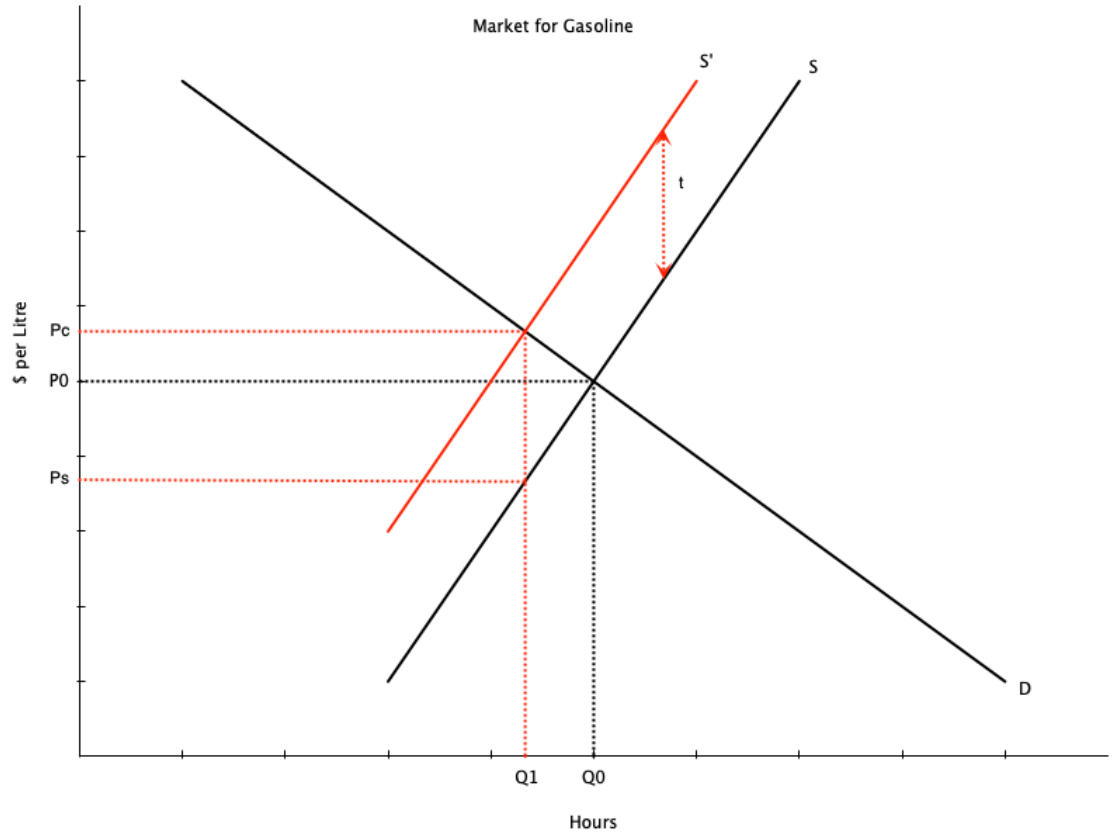
- Graph to the right shows a more inelastic demand curve
- After tax consumers pay P_c
- Producers receive $P_s = P_c - t$
- But $P_c - P_0$ is now larger than $P_0 - P_s$
  - Inelastic demand means consumers less able to substitute
  - They absorb more of the economic incidence

Unit Tax on Sellers - Graphical



- In extreme with perfectly inelastic demand, consumers bear entire economic incidence
  - Perfect inelastic demand means complete inability to substitute
- After tax consumers pay $P_c = P_0 + t$
- Producers receive $P_s = P_c - t = P_0$
- No change in quantity
  - Since consumers demand $Q_0 = Q_1$ at any price

Unit Tax on Sellers - Graphical



- Now imagine a more inelastic supply curve
  - Firms less able to adjust quantities when prices change
- After tax consumers pay P_c'
- Producers receive $P_s' = P_c' - t$
- $P_0 - P_s'$ is larger than $P_c' - P_0$
  - Firms absorb more of the economic incidence
  - They are less able to adjust production to avoid the tax

Unit Tax on Sellers - Math

- We can show the same result mathematically
- Use linear inverse demand and supply curves with clean numbers

$$\text{Demand: } P_c = 14 - Q_c, \quad \text{Supply: } P_s = 2 + Q_s$$

- Equilibrium without tax is where $P_s = P_c = P_0, Q_c = Q_s = Q_0$

$$14 - Q_0 = 2 + Q_0$$

$$12 = 2Q_0 \Rightarrow Q_0 = 6$$

- Sub Q_0 into either equation to get P_0

$$P_0 = 14 - 6 = 8$$

Unit Tax on Sellers - Math

- Now introduce a per unit tax $t = 4$ on sellers
- In equilibrium, $P_s + t = P_c$ and $Q_c = Q_s = Q_1$
  - There is a wedge between what consumers pay and what producers receive
- Substituting in the equations for demand and supply

$$14 - Q_1 = 2 + Q_1 + 4$$

$$14 - Q_1 = 6 + Q_1 \Rightarrow Q_1 = 4$$

- Sub Q_1 into either equation to get P_c or P_s

$$P_c = 14 - 4 = 10$$

$$P_s = 2 + 4 = 6$$

Unit Tax on Sellers - Math

- Key things to take away when the tax is introduced
  - Quantity falls from $Q_0 = 6$ to $Q_1 = 4$
  - Consumers pay $P_c = 10$, which is $10 - 8 = 2$ more than before tax
  - Producers receive $P_s = 6$, which is $8 - 6 = 2$ less than before tax
  - Economic incidence is shared equally between consumers and producers
- Example is specific to when demand and supply have the same slope
- In general, economic incidence with linear demand and supply and a unit tax depends on elasticities of supply and demand

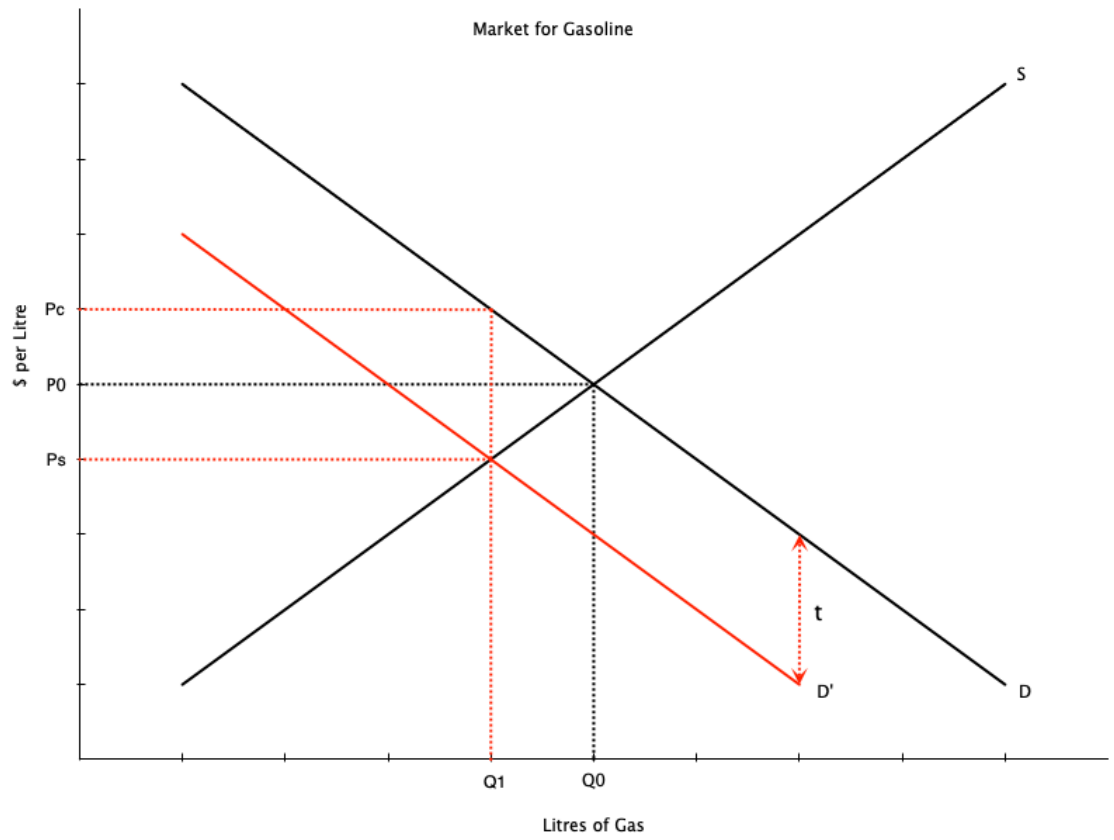
$$\Delta P_c = P_c - P_0 = \frac{\varepsilon_s}{\varepsilon_s + |\varepsilon_d|} t, \quad \Delta P_s = P_0 - P_s = \frac{|\varepsilon_d|}{\varepsilon_s + |\varepsilon_d|} t$$

- $\varepsilon_s = \frac{dQ_s}{dP_s} \frac{P}{Q}$ is elasticity of supply and $\varepsilon_d = \frac{dQ_c}{dP_c} \frac{P}{Q}$ is elasticity of demand

Unit Tax on Buyers - Graphical

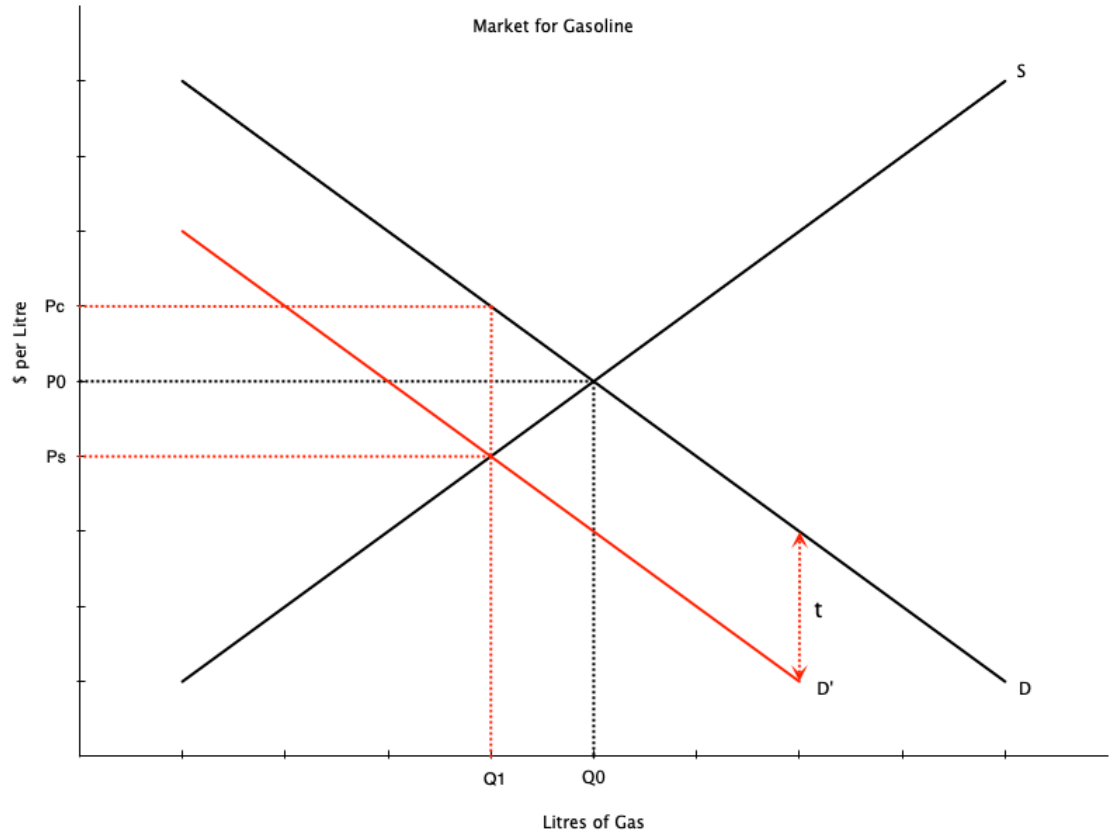
- More rarely, taxes are levied on buyers of goods and services
- We can use the same graphical tools to examine this case
- Key lesson is that **economic incidence does not depend on whether the tax is levied on buyers or sellers**

Unit Tax on Buyers - Graphical



- Now government levies a per unit tax t (e.g. \$0.10/litre) on gasoline
- Assume gas tax is levied on **buyers** (statutory incidence)
- This shifts the demand curve down by the amount of the tax
  - New demand curve is D'
  - At each quantity, buyers want to pay t less to cover the tax
- New equilibrium is where S intersects D'
  - Determines price received by the seller

Unit Tax on Buyers - Graphical



- Notice that P_s and P_c are the same as when the tax was levied on sellers
  - Producers receive P_s
  - Consumers pay $P_c = P_s + t$
  - Quantity falls to Q_1
- In this case, the slopes are equal so the burden is shared
- Changes in elasticities affect economic burden in the same way

Unit Tax on Buyers - Math

- The math is exactly the same as when the tax is levied on sellers

$$\text{Demand: } P_c = 14 - Q_c, \quad \text{Supply: } P_s = 2 + Q_s$$

- Tax is $t = 4$ on buyers
- In equilibrium, $P_s = P_c - t$ and $Q_c = Q_s = Q_1$
- Algebra is same as we did above, so we get the same results

$$P_c = 10$$

$$P_s = 6$$

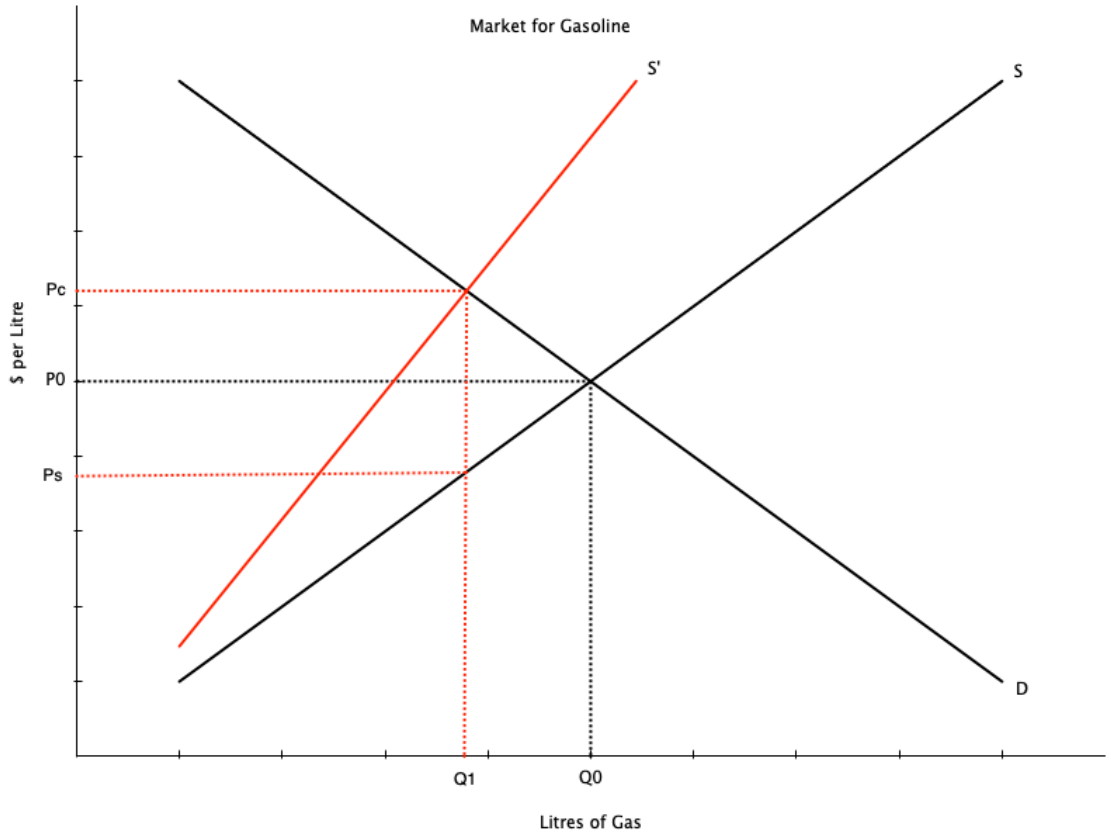
Unit Taxes - Takeaways

- Statutory incidence does not determine economic incidence
- Economic incidence depends on elasticities of supply and demand
  - More elastic demand means consumers bear less of the economic incidence
  - More elastic supply means producers bear less of the economic incidence
- Economic incidence does not depend on whether the tax is levied on buyers or sellers

Ad Valorem Taxes

- So far we have only considered unit taxes
  - A fixed amount per unit sold (e.g. $0.10/litre)
- More common are **ad valorem taxes**
  - A percentage of the price (e.g. 13% HST on most goods and services)
- Ad valorem taxes create a tax wedge that increases with the price
  - Higher priced goods have a larger tax wedge
- As before
  - Economic incidence depends on elasticities of supply and demand
  - Economic incidence does not depend on whether the tax is levied on buyers or sellers

Ad Valorem Taxes

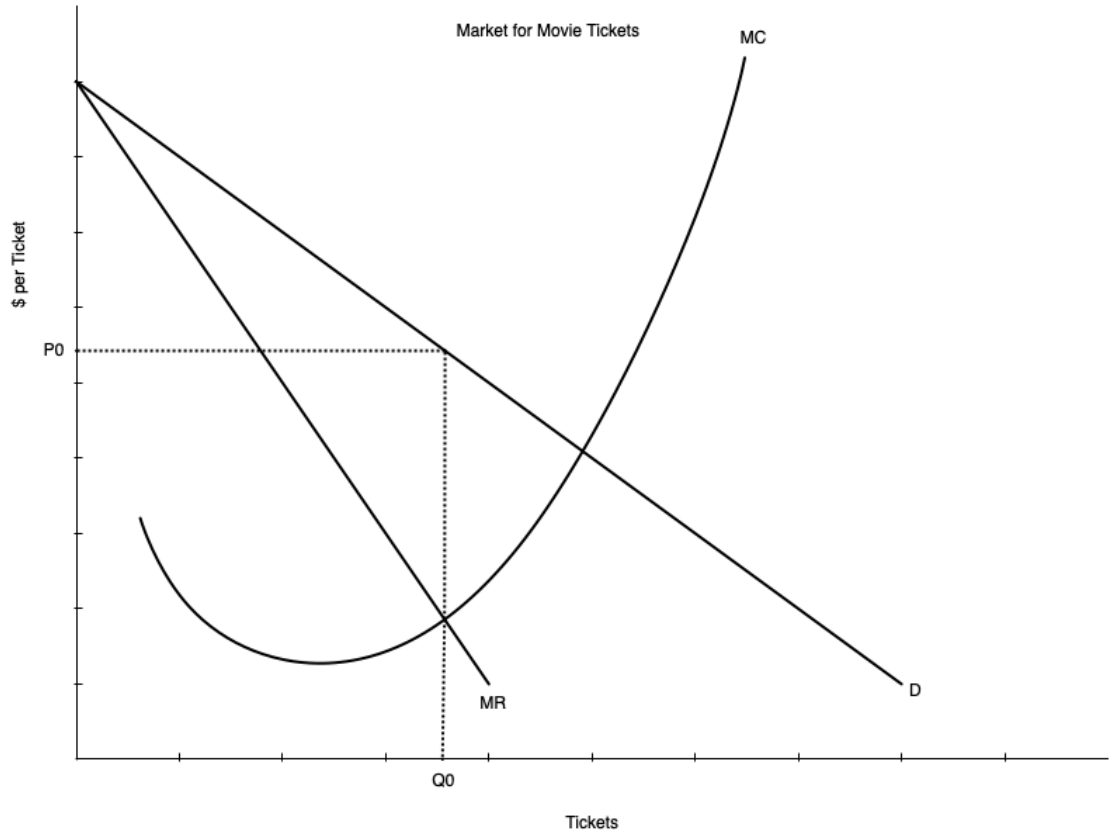


- Analysis is similar to unit tax except supply curve shifts up and becomes steeper
- If tax is levied on buyers, demand curve shifts down and becomes flatter
- Still a wedge between what consumers pay and what producers receive
- Economic burden on sellers decreases with supply elasticity
- Economic burden on buyers decreases with demand elasticity

Unit Tax on a Monopolist

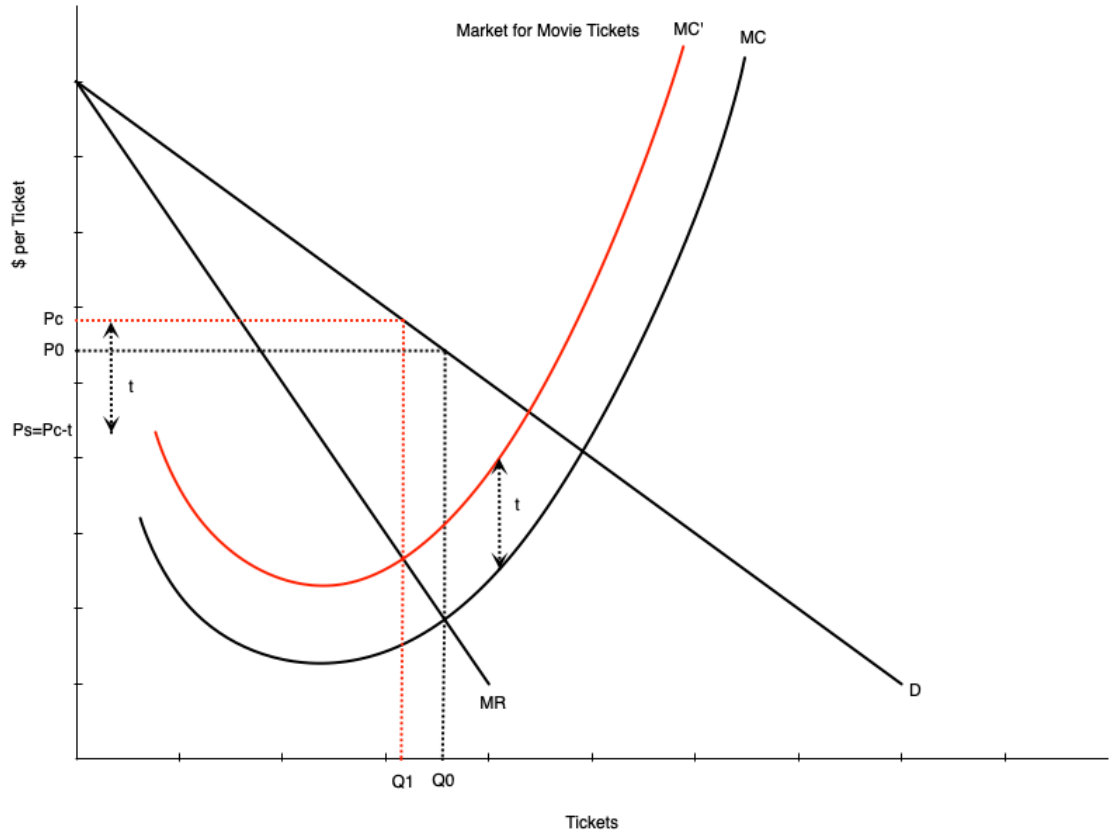
- So far we have only considered perfectly competitive markets
- What happens when there is only one seller in the market?
- A tax increases marginal cost, so the monopolist produces less
- Effects of the tax are potentially different from competitive markets
  - Quantity will fall
  - Price paid by consumers will rise
  - But, price received by the monopolist may rise or fall
    - Depends on cost structure and demand elasticity

Unit Tax on a Monopolist



- Graph shows pre tax equilibrium in a monopoly
- ATC curve omitted for graph clarity
- Example: market for movie tickets
  - Dominated by a couple of firms
  - Not strictly a monopoly but close enough
- Equilibrium is where $MR = MC$
  - Price is P_0
  - Quantity is Q_0

Unit Tax on a Monopolist



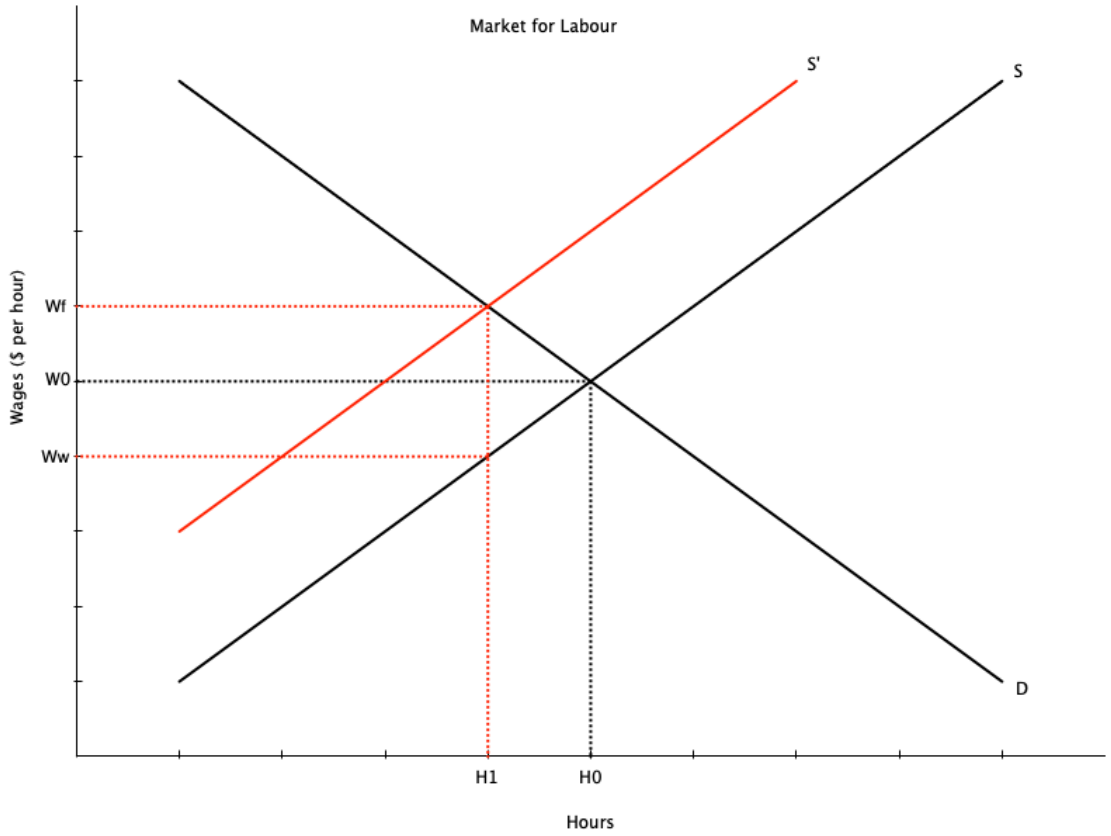
- Government levies a per unit tax t on each ticket sold
- This shifts the cost curves up by the amount of the tax
  - New marginal cost is MC'
- Equilibrium is where $MR = MC'$
  - Price paid by consumers is P_c
  - Price received by monopolist is $P_s = P_c - t$
  - Quantity is lower at Q_1
- Consumers bear more of the tax if
  - Demand is inelastic
  - Marginal cost is relatively flat

Taxes on Factor Markets in Partial Equilibrium Models

Introduction

- So far we have only considered taxes on goods and services
- Taxes can also be levied on factors of production
  - Labour
  - Capital
- Taxes affect prices paid for and received by those factors
  - Example: payroll taxes affect wages paid and received
- Taxes also affect quantities of factors employed
- Analysis is the same as taxes on goods and services
  - Only difference is that firms are buyers and households are sellers

Payroll Tax on Workers



- Suppose government levies a payroll tax t on workers
  - Example: Employment Insurance (EI) premiums paid by employees
- This shifts the supply curve of labour up by the amount of the tax
  - At each quantity, workers want to be paid t more to cover the tax
- Creates wedge between what workers are paid and what they keep
  - Firms now pay W_f
  - Workers receive $W_w = W_f - t$

Payroll Tax on Workers

- Incidence again depends on supply and demand elasticity
- A more inelastic supply curve means workers bear more of the economic incidence
  - They are less able to change work hours when wages change
  - Makes them stuck in a job, so they bear more of the tax
- A more inelastic demand curve means firms bear more of the economic incidence
  - They are less able to substitute between labour and other inputs
  - Makes number of workers inflexible, so they bear more of the tax
- Does not matter if tax is levied on workers or firms
  - In reality payroll taxes are often levied on both

References

References

- Rosen, Harvey S., and Lindsay M. Tedds, and Trevor Tombe, and Jean-Francois Wen, and Tracy Snoddon. Public Finance in Canada. 6th Canadian edition. McGraw-Hill Ryerson, 2023.
- Gruber, Jonathan. Public Finance and Public Policy. 7th edition. Worth Publishers, 2022.
- Finances of the Nation. https://financesofthenation.ca/