

# Tax Incidence

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EC313 - Public Economics: Taxation

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# Goals of This Section

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- Outline different types of taxes
- Discuss difference 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

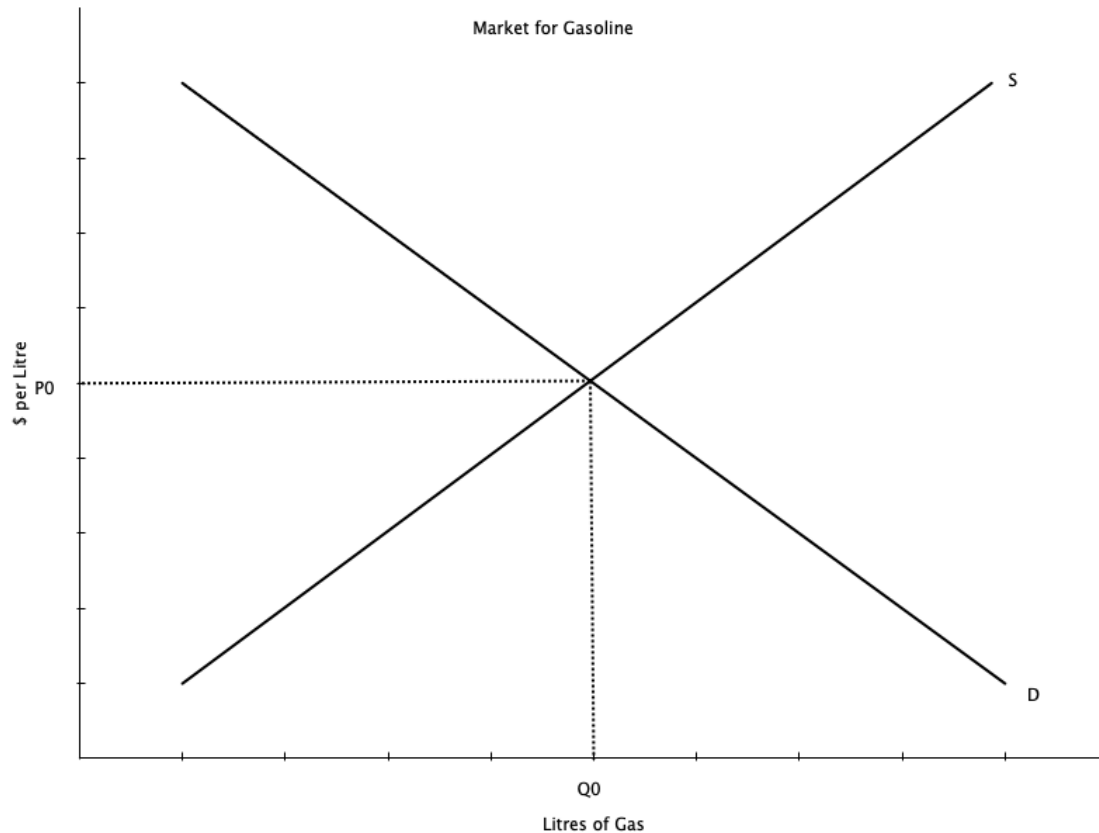
# Statutory vs Economic Incidence of a Tax

- 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



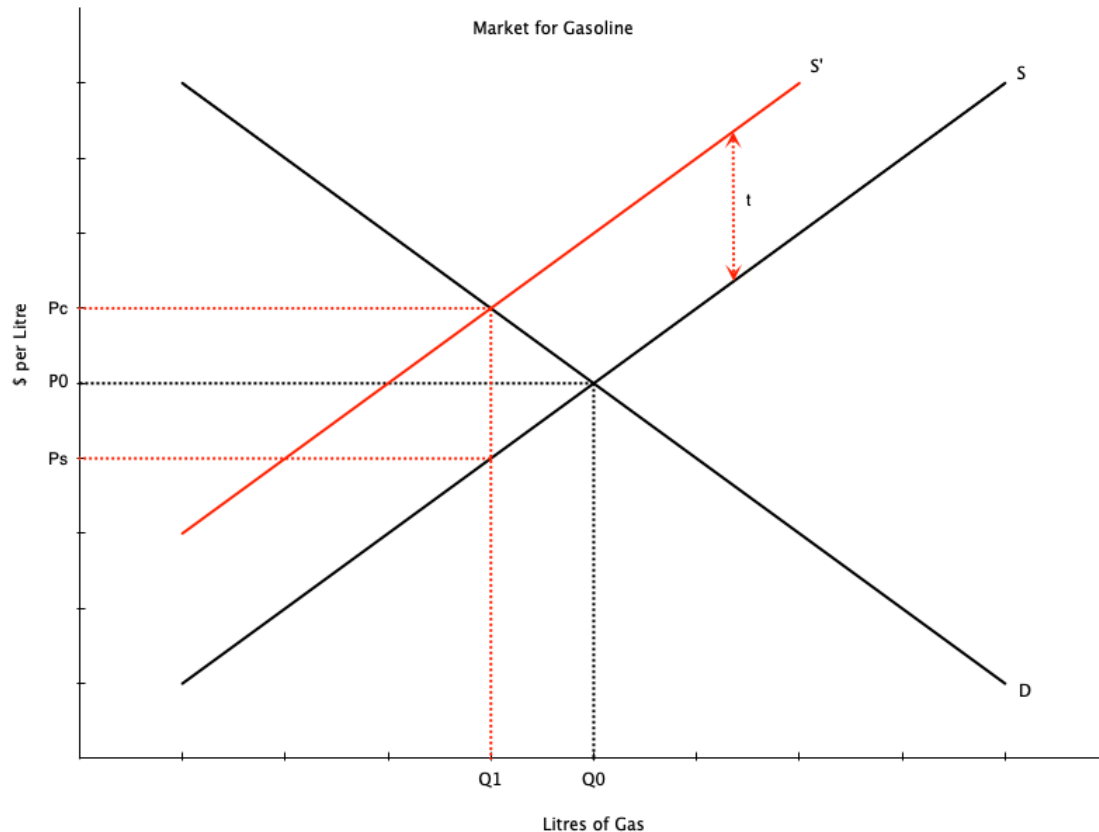
# Commodity Taxes in Partial Equilibrium Models

# Unit Tax on Sellers - Graphical



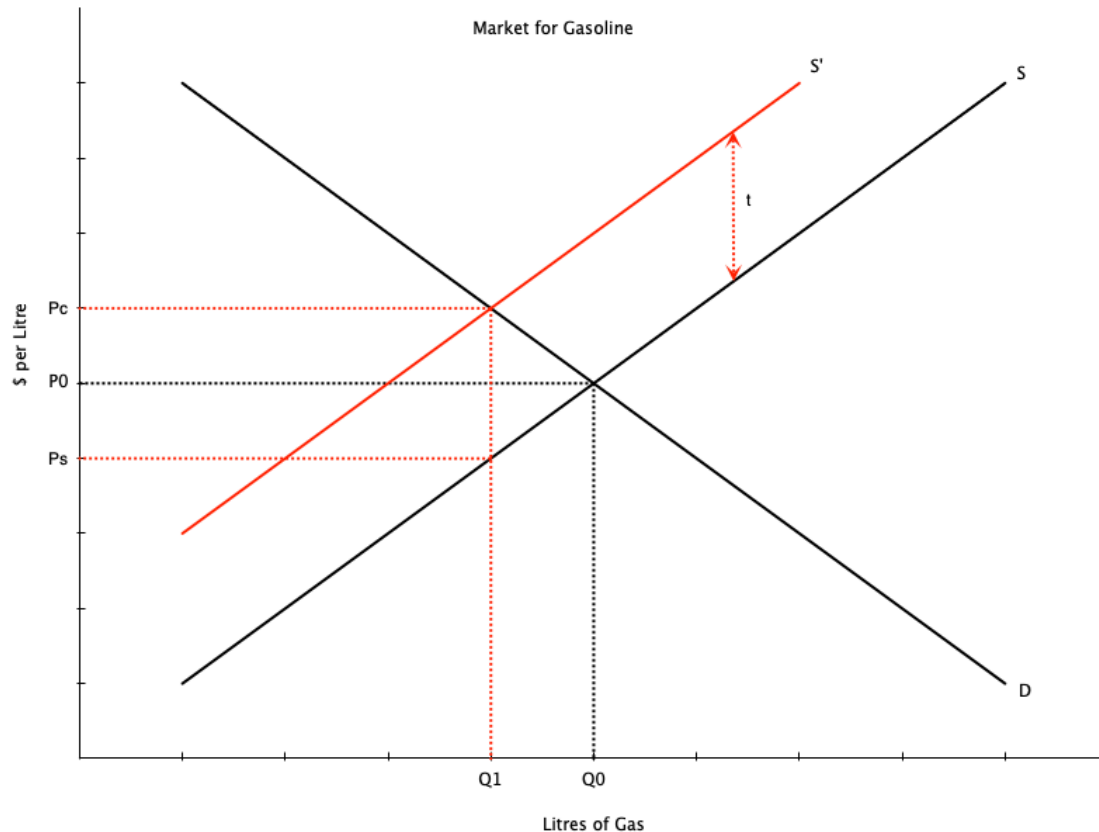
- Take gasoline tax example one more time
- On right is demand and supply of litres of gasoline
- Without tax, price and quantity are determined where demand and supply are equal
  - Price is  $P_0$
  - Quantity is  $Q_0$

# 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

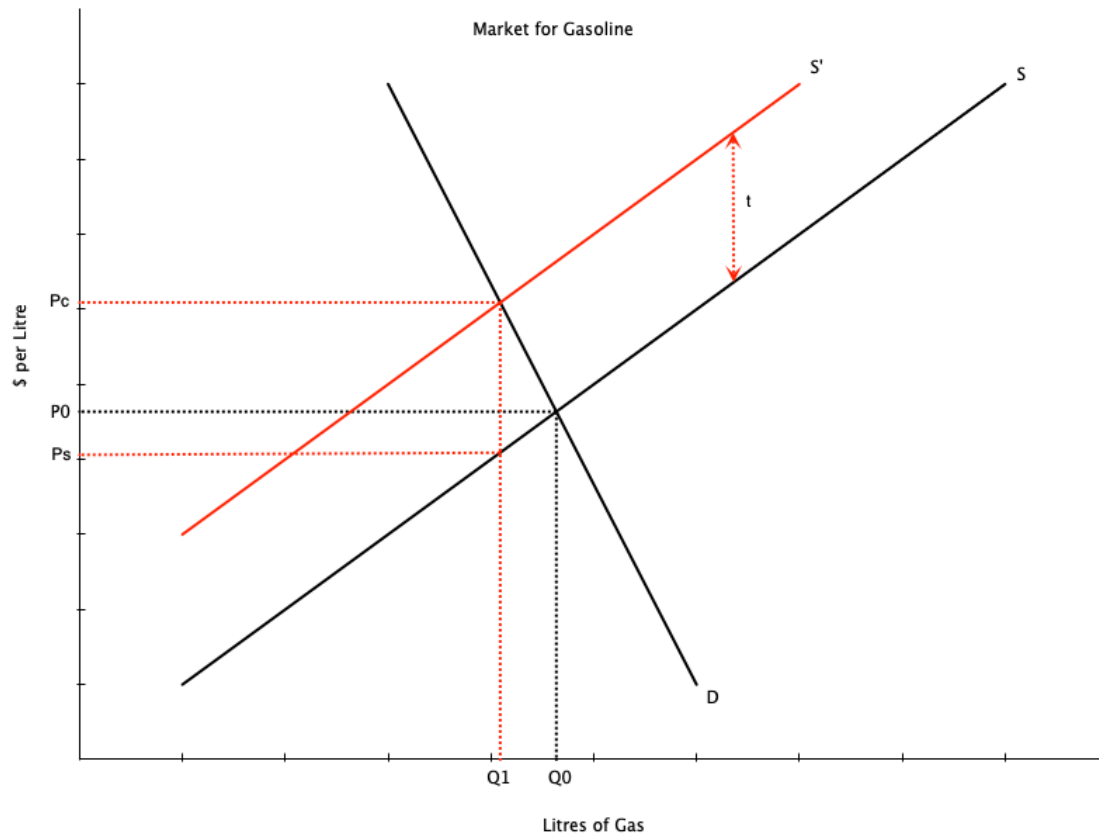


- The tax introduces a **tax wedge**
  - Difference between what consumers pay and what producers receive from a transaction
- Consumers pay the equilibrium price  $P_c$ 
  - Price includes the tax
- Producers receive  $P_s = P_c - t$ 
  - They remit  $t$  for every unit sold
- Quantity falls to  $Q_1$

# Unit Tax on Sellers - Graphical

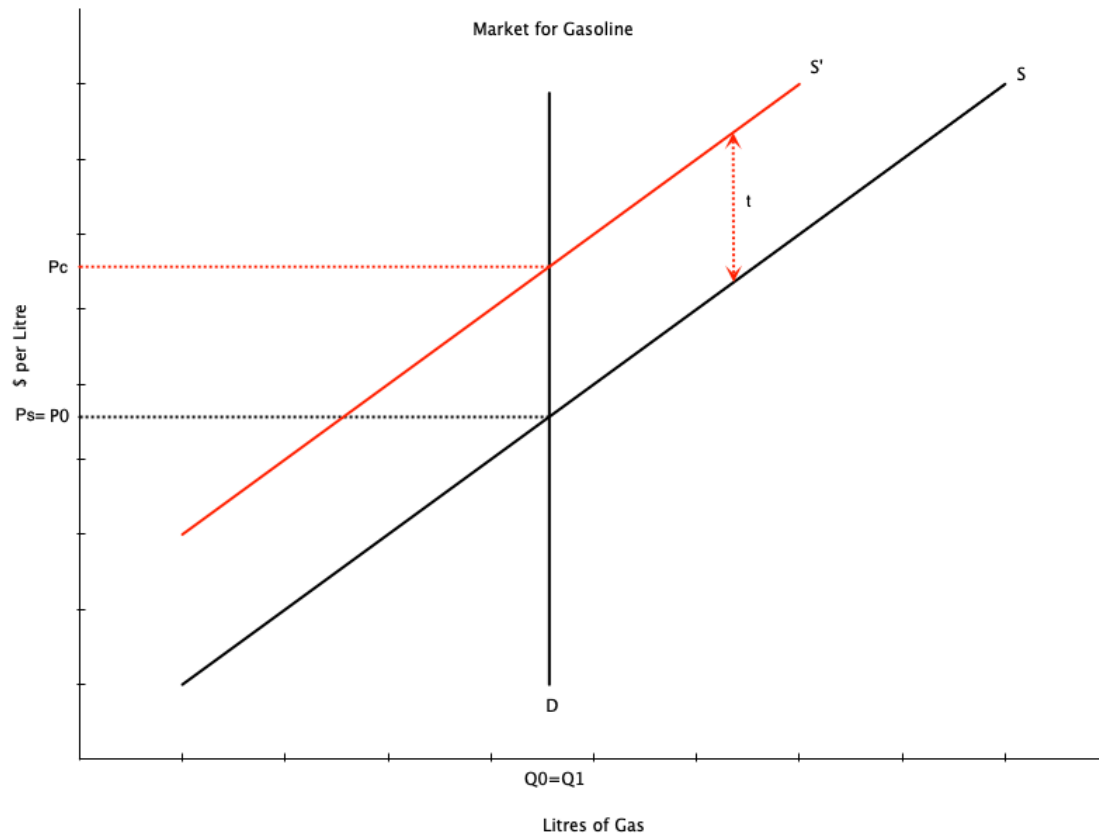
- In example above, economic incidence is shared equally between consumers and producers
  - Consumers pay  $P_c - P_0$  more than before tax
  - Producers receive  $P_0 - P_s$  less than before tax
  - These amounts are equal
- Equal economic incidence is specific to this example because supply and 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



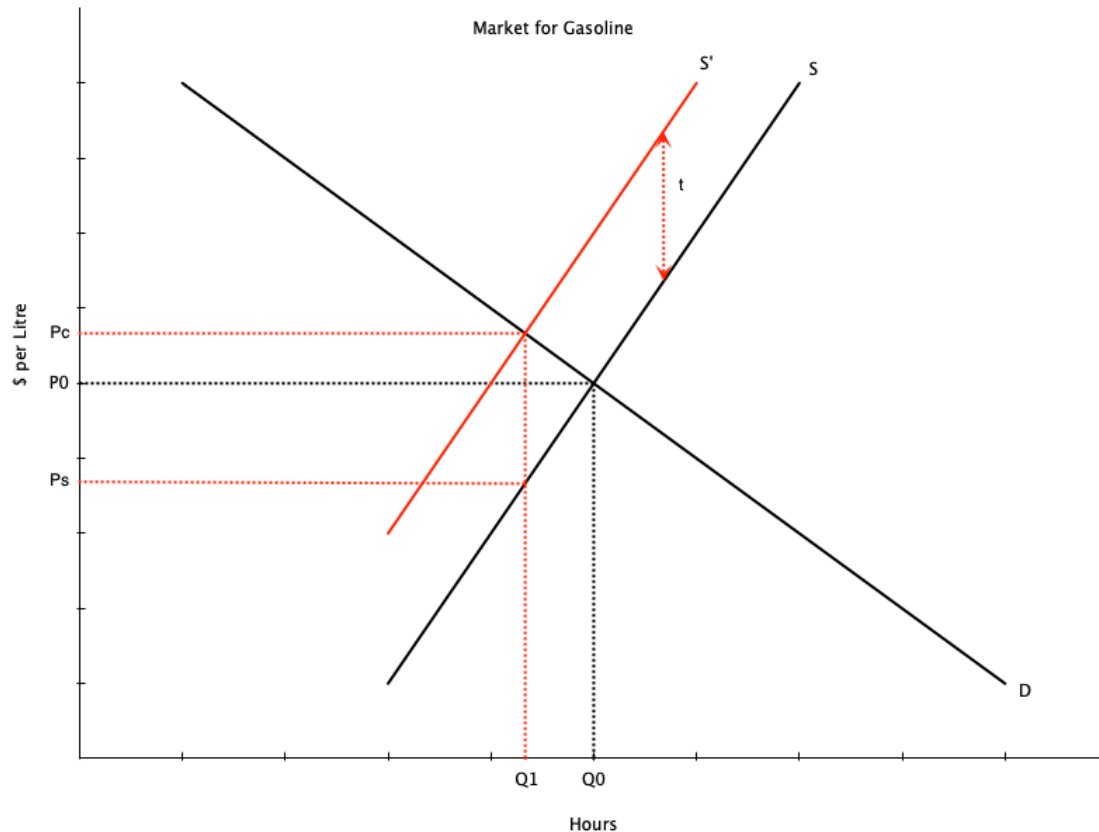
- Graph to the right shows a more inelastic demand curve
- After tax consumers pay  $P_c$
- Producers receive  $P_s = P_c - t$
- But  $P_c - P_0$  is now larger than  $P_0 - P_s$ 
  - Inelastic demand means consumers less able to substitute
  - They absorb more of the economic incidence

# 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

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

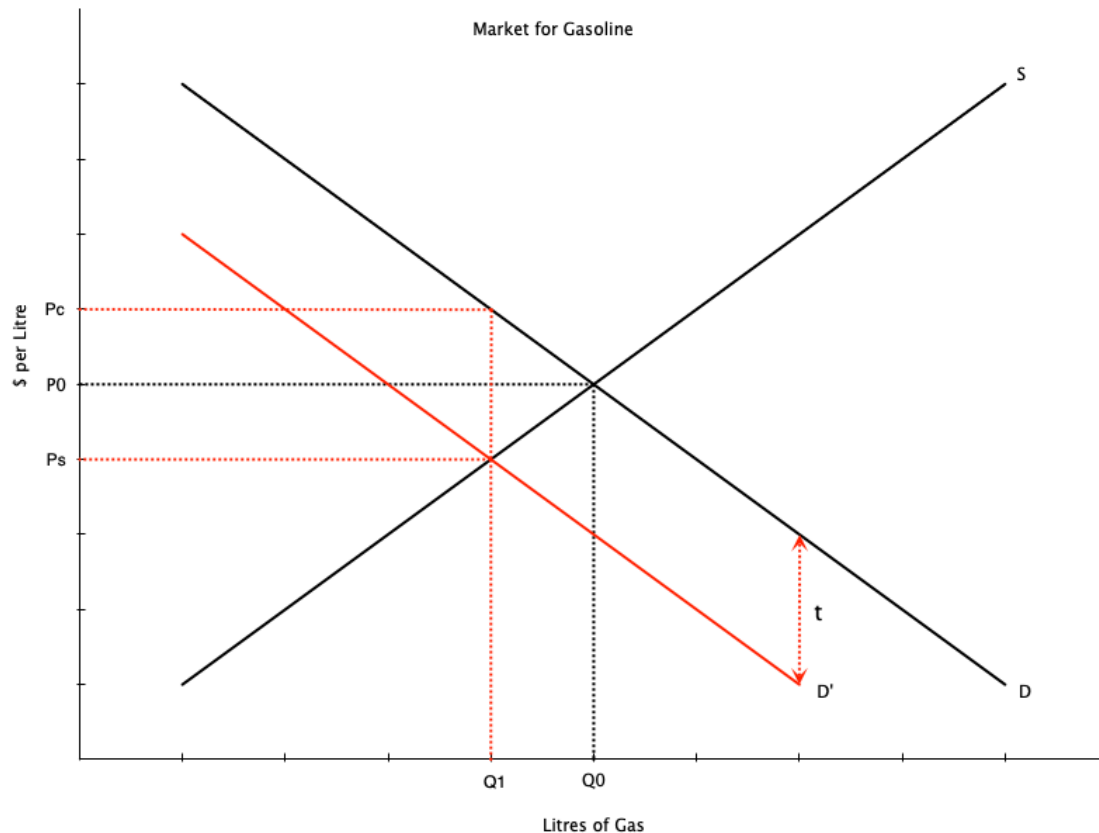
- $\varepsilon_s = \frac{dQ_s}{dP_s} \frac{P}{Q}$  is elasticity of supply and  $\varepsilon_d = \frac{dQ_c}{dP_c} \frac{P}{Q}$  is elasticity of demand



# Unit Tax on Buyers - Graphical

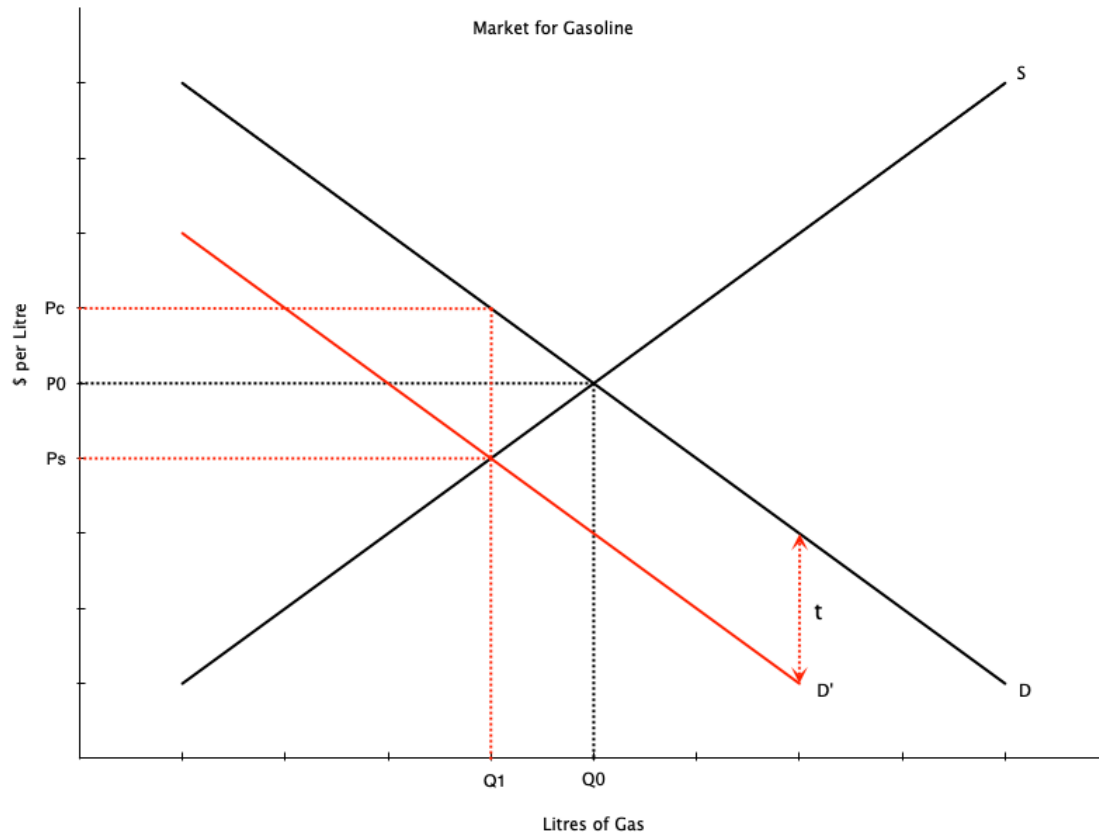
- More rarely, taxes are levied on buyers of goods and services
- We can use the same graphical tools to examine this case
- Key lesson is that **economic incidence does not depend on whether the tax is levied on buyers or sellers**

# 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

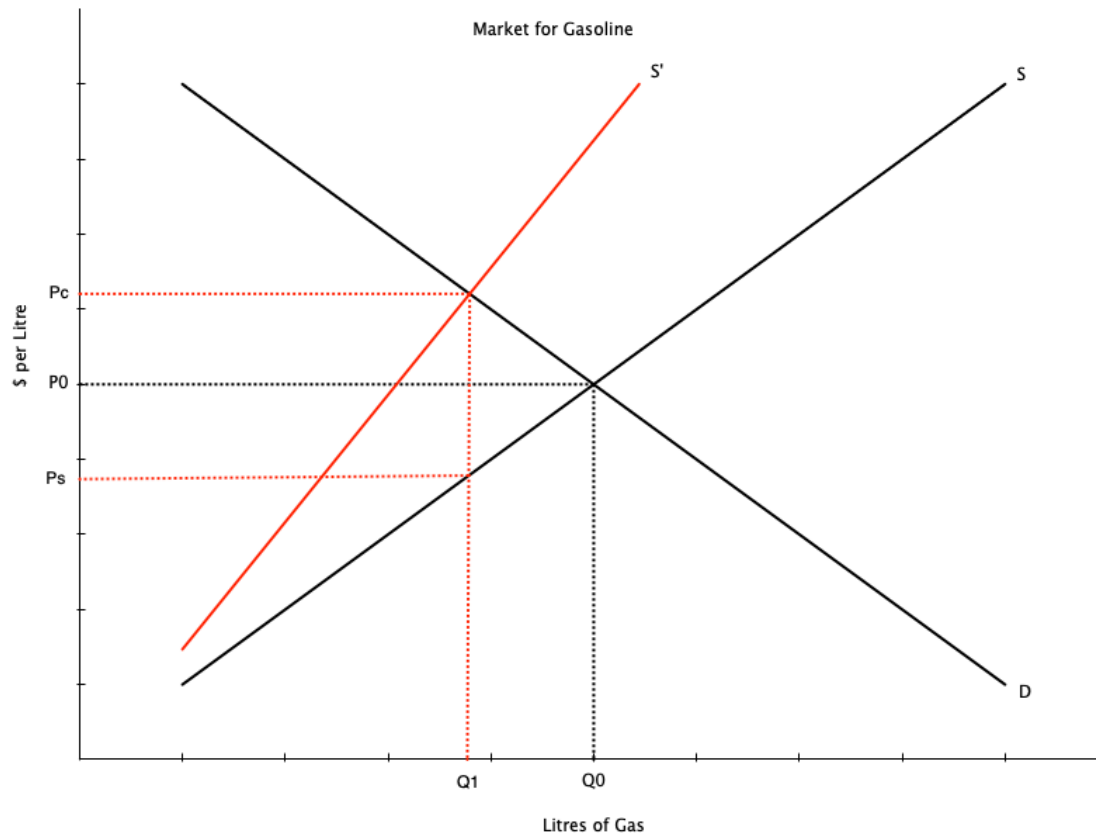
- Statutory incidence does not determine economic incidence
- Economic incidence depends on elasticities of supply and demand
  - More elastic demand means consumers bear less of the economic incidence
  - More elastic supply means producers bear less of the economic incidence
- Economic incidence does 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

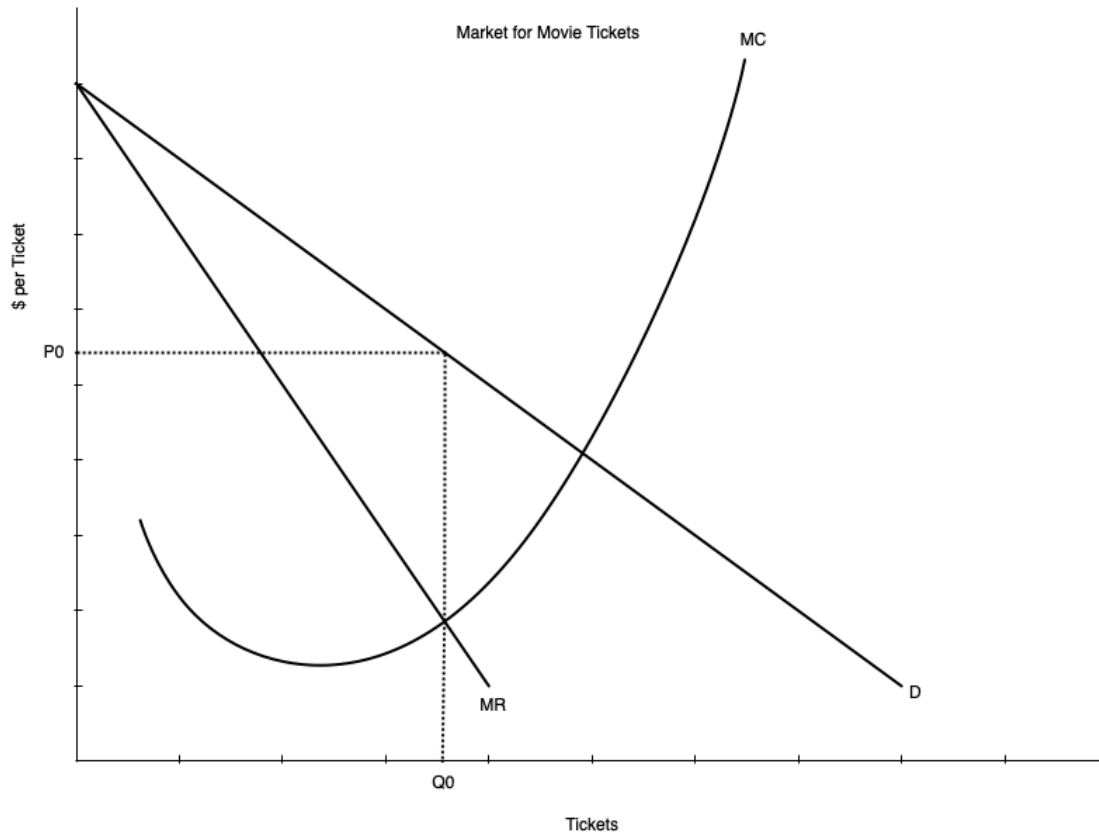


- Analysis is similar to unit tax except supply curve shifts up and becomes steeper
- If tax is levied on buyers, demand curve shifts down and becomes flatter
- Still a wedge between what consumers pay and what producers receive
- Economic burden on sellers decreases with supply elasticity
- Economic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

# Unit Tax on a Monopolist

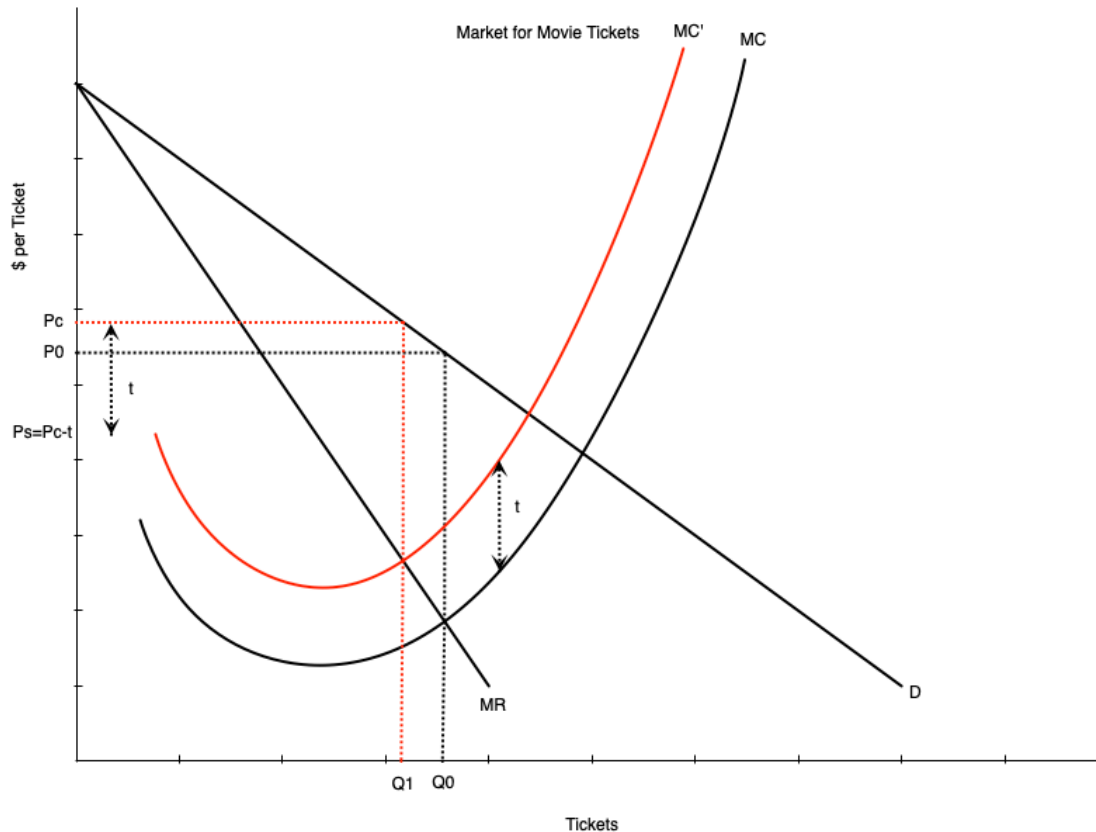
- So far we have only considered perfectly competitive markets
- What happens when there is only one seller in the market?
- A tax increases marginal cost, so the monopolist produces less
- Effects of the tax are potentially different from competitive markets
  - Quantity will fall
  - Price paid by 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



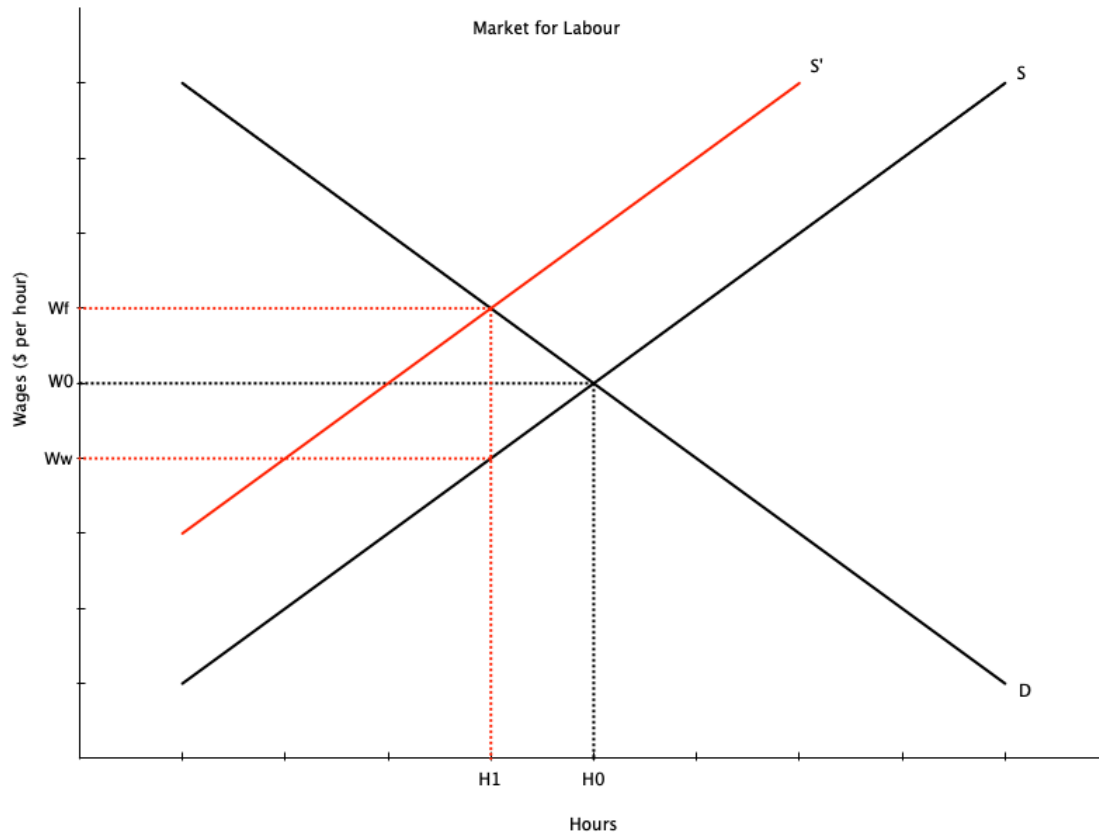
- Government levies a per unit tax  $t$  on each ticket sold
- This shifts the cost curves up by the amount of the tax
  - New marginal cost is  $MC'$
- Equilibrium is where  $MR = MC'$ 
  - Price paid by consumers is  $P_c$
  - Price received by monopolist is  $P_s = P_c - t$
  - Quantity is lower at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

# Capital Taxation

- Labour is not the only input into production
- Capital is also used
  - For this analysis, think of capital as the money used to finance machines, factories, etc
- Capital owners earn a return on investments, and that can be taxed
- The analysis of taxing capital is the same as for labour
  - Except that the rate of return ( $r$ ) is the price
  - Total investment (dollars) is the quantity
  - Firms are the buyers, people with money are the suppliers

# Capital Taxation

- A key consideration in the analysis is **capital mobility** across countries
  - The ease with which people can move money and invest around the globe
- If capital is perfectly mobile, the buyers of capital bear the entire burden
  - Perfect mobility means a perfectly elastic supply curve
  - The price is set at the global rate of return
  - When supply is perfectly elastic, buyers bear the whole tax burden
- In reality, capital is mobile but not perfectly
  - Buyers and sellers are likely to bear some of the burden of capital taxation

# Taxes on Profits and Land

- Governments can also levy taxes on economic profits
  - **Economic profits:** profits above a normal rate of return
- These types of taxes are borne entirely by firms
  - Maximizing untaxed profits and taxed profits yields the same prices and quantities
- Consider a monopoly (because this would be a market where economic profits happen)
- Without taxes, maximize

$$\Pi(q) = p(q)q - C(q) = (a - bq)q - cq = (a - c)q - bq^2$$

- Take the derivative with respect to  $q$

$$(a - c) - 2bq = 0$$

# Taxes on Profits and Land

- Solve for  $q$  to get the profit maximizing quantity

$$q^* = \frac{a - c}{2b}$$

- Price is then

$$p^* = a - bq^* = \frac{a + c}{2}$$

- With taxes, maximize

$$(1 - t)\Pi(q) = (1 - t)(p(q)q - C(q)) = (1 - t)((a - c)q - bq^2)$$

# Taxes on Profits and Land

- Take the derivative with respect to  $q$

$$(1 - t)((a - c) - 2bq) = 0$$

- Which leads to the same prices and quantities
- Means that the economic incidence of profit taxes is entirely on firms
  - Profits go from  $\Pi(q^*)$  to  $(1 - t)\Pi(q^*)$
- Problem with these taxes is that they are hard to implement in practice

# Taxes on Land

- Historically there were taxes on only land
  - As opposed to modern property taxes that also tax buildings
- When land is taxed the incidence is entirely on current owners
  - The value of the land drops by the amount of the current and future tax obligations
- Can see this by looking at the value for a piece of land
- Without taxes, the value of land is the present value of future rents

$$P_R = \sum_{t=0}^T \frac{R_t}{(1+r)^t}$$

# Taxes on Land

- If there is a tax  $u_t$  on land, the value becomes

$$P'_R = \sum_{t=0}^T \frac{R_t - u_t}{(1+r)^t} = \sum_{t=0}^T \frac{R_t}{(1+r)^t} - \sum_{t=0}^T \frac{u_t}{(1+r)^t}$$

- The difference between  $P_R$  and  $P'_R$  is the present value of all future tax obligations

$$P'_R - P_R = - \sum_{t=0}^T \frac{u_t}{(1+r)^t}$$

- When the tax is levied, the value of the land immediately drops by the tax obligation
  - So it is borne by the current owner

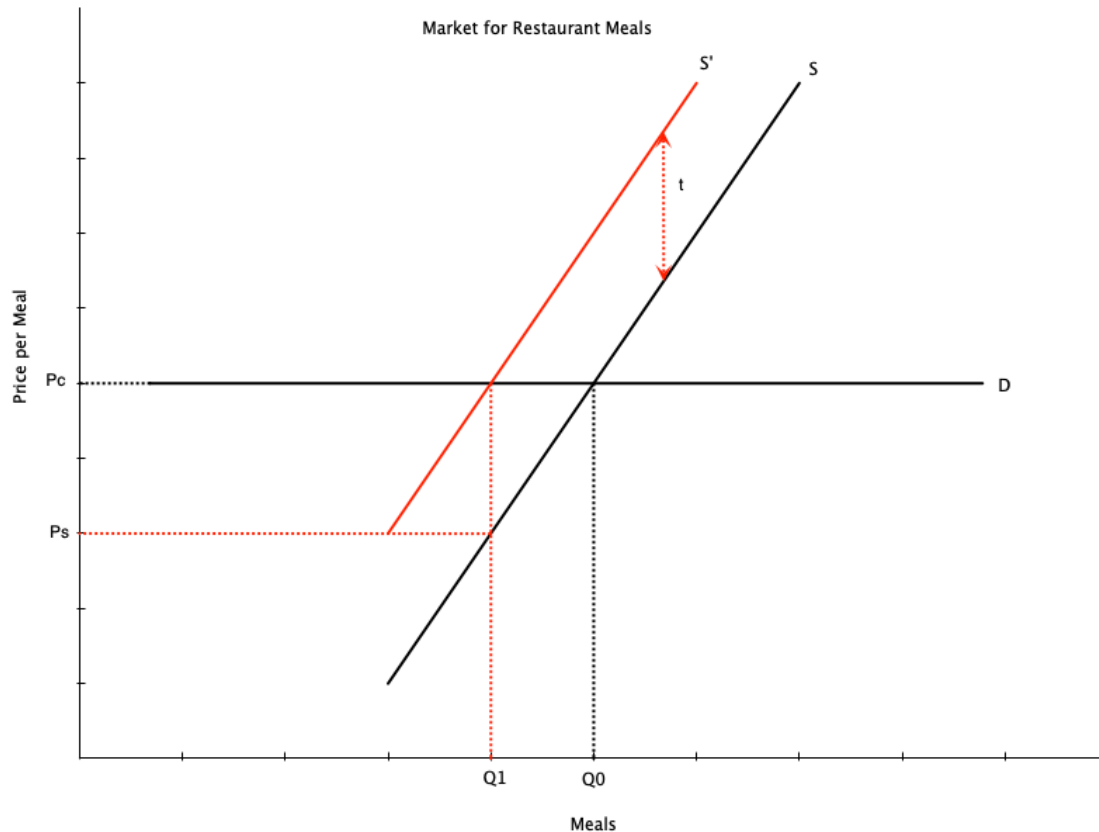


# General Equilibrium

# Introduction

- So far we have only considered partial equilibrium models
  - One market at a time
- It is informative, but incomplete
- In reality, markets are interconnected
  - A tax in one market can affect other markets
  - Example: a tax on goods can affect labour market
    - If people buy less, firms produce less
    - Firms hire fewer workers
    - Labour market is affected
- General equilibrium models consider all markets simultaneously

# A Tax on Goods and Services

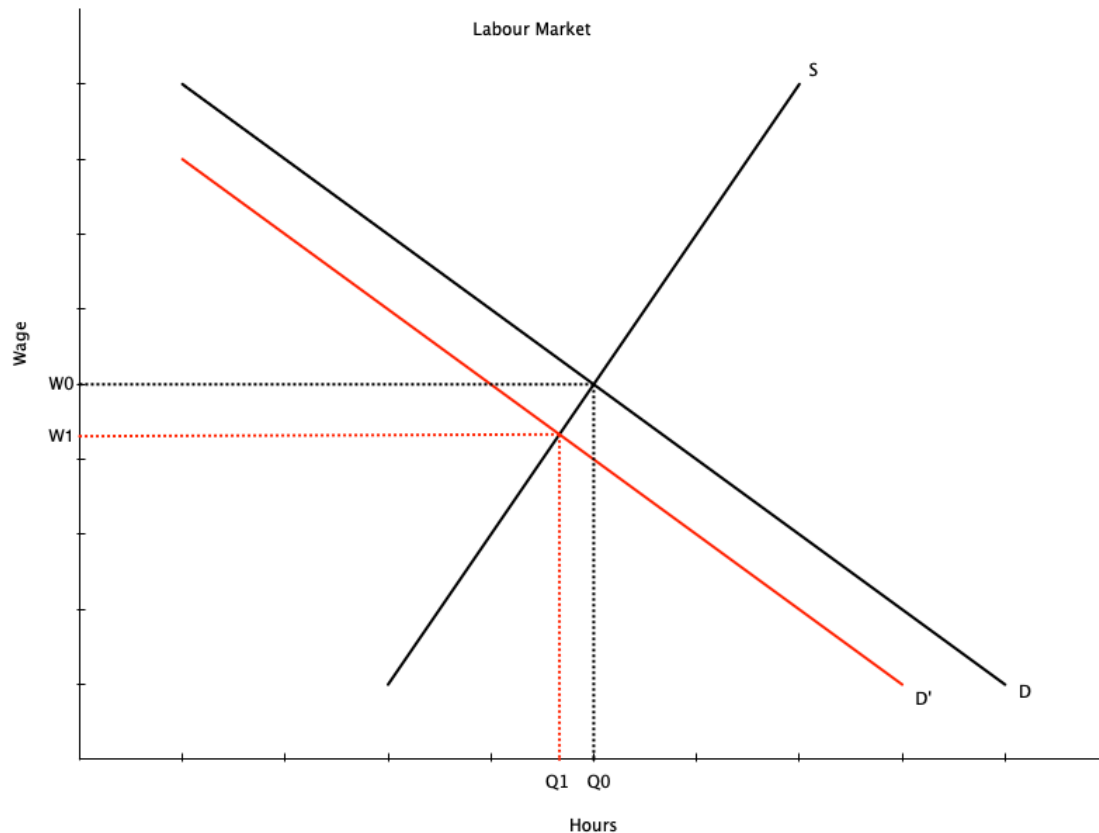


- Consider a unit tax on restaurants
- For simplicity, assume restaurant meals have perfectly elastic demand
  - People are very sensitive to the price and will cook at home if price rises
- The full burden of the tax is on the restaurants
- Quantity of meals falls because of the tax

# A Tax on Goods and Services

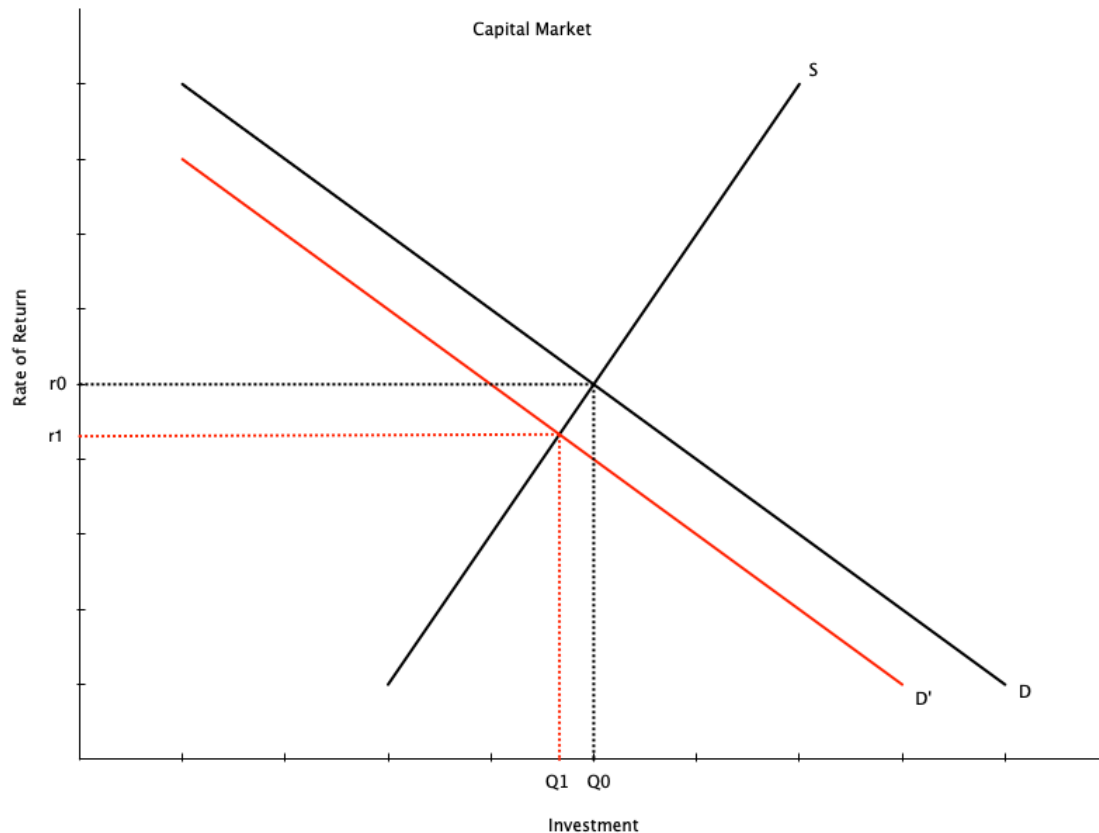
- But a restaurant cannot bear taxes
- A restaurant is really a production process that combines labour and capital
  - A production process cannot pay a tax
- It is ultimately the workers and owners of capital that pay the tax
- The tax on meals will filter down to the labour and capital markets
  - Workers will get paid less
  - Owners of capital will earn less

# A Tax on Goods and Services



- Consider the labour market for restaurant workers
- The tax on meals shifts the demand for restaurant workers to the left
  - Labour demand is derived partly from the demand for meals
  - Less demand for meals means less demand for workers
- The equilibrium wage falls and workers are paid less
- Part of the burden falls on workers in the form of lower wages

# A Tax on Goods and Services



- Similar things happen in the capital market
- The tax on meals shifts the demand for capital to the left
  - Less demand for meals means less demand for capital
- The equilibrium return to capital falls and owners are paid less
- Part of the burden falls on owners of capital in the form of lower returns

# A Tax on Goods and Services

- The degree to which workers and owners of capital bear the burden depends on elasticities
  - More elastic labour supply means workers bear less of the burden
  - More elastic capital supply means owners of capital bear less of the burden
- In our example, we assumed perfectly elastic demand for meals
  - This meant that restaurants bore the entire burden of the tax
- If consumer demand were less elastic
  - Consumers would bear some of the burden
  - Would affect other goods they consume
    - Increase consumption of substitutes
    - Decrease consumption of complements
    - Decrease consumption of all goods via an income effect

# A Tax on Goods and Services

- General equilibrium analysis can get very complicated
  - Many interconnected markets
  - Changes in one market affect many others
- Can affect markets vertically and horizontally
  - Vertically: factors of production
  - Horizontally: related goods (e.g. tax on coffee affects tea market)
- Main lesson is still the same: **statutory incidence does not determine economic incidence**



# Tax Equivalencies

- In general equilibrium, different types of taxes can have the same economic incidence
  - Example: a tax on labour income and a tax on consumption can have the same economic incidence
- A policy maker would have options when it comes to which tax to levy
- Consider an economy with
  - Two commodities, food ( $F$ ) and manufacturing ( $M$ )
  - Two factors of production, labour ( $L$ ) and capital ( $K$ )

# Tax Equivalencies

- A government could levy nine different types of taxes
  - Food: tax on capital ( $t_{KF}$ ), tax on labour ( $t_{LF}$ ), tax on consumption ( $t_F$ )
  - Manufacturing: tax on capital ( $t_{KM}$ ), tax on labour ( $t_{LM}$ ), tax on consumption ( $t_M$ )
  - Both: tax on capital ( $t_K$ ), tax on labour ( $t_L$ )
  - An income tax ( $t$ )
- Taxes levied on factors of production in one sector are **Partial Factor Taxes**
  - In this case  $t_{KF}$ ,  $t_{LF}$ ,  $t_{KM}$ ,  $t_{LM}$
- Combinations of these taxes can be equivalent to other taxes

# Tax Equivalencies

| TABLE 14.2   |     | Tax Equivalence Relations |                   |            |
|--|-----|---------------------------|-------------------|------------|
| $t_{KF}$   | and | $t_{LF}$                  | are equivalent to | $t_F$      |
| and  |     | and                       |                   | and        |
| $t_{KM}$   | and | $t_{LM}$                  | are equivalent to | $t_M$      |
| are  |     | are                       |                   | are        |
| equivalent   |     | equivalent                |                   | equivalent |
| to   |     | to                        |                   | to         |
| $t_K$  | and | $t_L$                     | are equivalent to | $t$        |
| Source: Charles E. McLure, Jr., "The Theory of Tax Incidence with Imperfect Factor Mobility," <i>Finanzarchiv</i> 30 (1971): 29. |     |                           |                   |            |

List of Equivalent Taxes

# Harberger Model

- Arnold Harberger studied tax incidence in general equilibrium
- Basics of his model
  - Technology
    - Capital and labour used in production
    - Constant returns to scale
    - Ease of substitution between capital and labour different between sectors
  - Factor suppliers
    - Capital and labour perfectly mobile
    - Returns to both are the same in both sectors
  - Market structure is perfectly competitive
  - Factors are in fixed supply
  - Consumers are all the same



# Harberger Model

- Suppose a tax on food ( $t_F$ ) is introduced
  - Price of food rises
  - Consumers buy less food, more manufacturing
  - Demand for labour and capital in food sector falls
  - As labour and capital move to manufacturing, their returns fall
- Strength of these effects depend on elasticities
  - If food elasticity is high, consumers shift more to manufacturing
    - Returns to labour and capital fall more for manufacturing to induce movement

# Harberger Model

- Suppose an income tax ( $t$ ) is introduced
  - Use equivalencies table
  - Income tax is equivalent to a combination of taxes on capital and labour
  - Both are in fixed supply (perfectly inelastic) so they bear the whole burden
- A tax on labour ( $t_L$ ) is introduced
  - Tax on labour in both sectors
  - Labour supply is perfectly inelastic so it bears the whole burden
  - No incentive to switch between sectors

# Harberger Model

- Finally, a partial factor tax on capital in manufacturing ( $t_{KM}$ )
  - Price of manufacturing rises
    - Use less capital and labour
    - As capital and labour leave, changes in their relative prices depend on how much is used
  - Producers of manufactured goods use less capital and more labour
    - Demand for capital falls, and so does relative price
    - Price of labour rises
  - Cannot tell what the ultimate effect is on capital or labour prices

# Summary

- Tax incidence is not necessarily contained to the market where the tax is levied
- In general equilibrium, taxes can have far reaching effects
  - Both vertically and horizontally
- A full analysis requires consideration of all markets simultaneously
- The key points to remember are
  - Statutory incidence does not determine economic incidence
  - Economic incidence depends on ability to substitute and avoid the tax

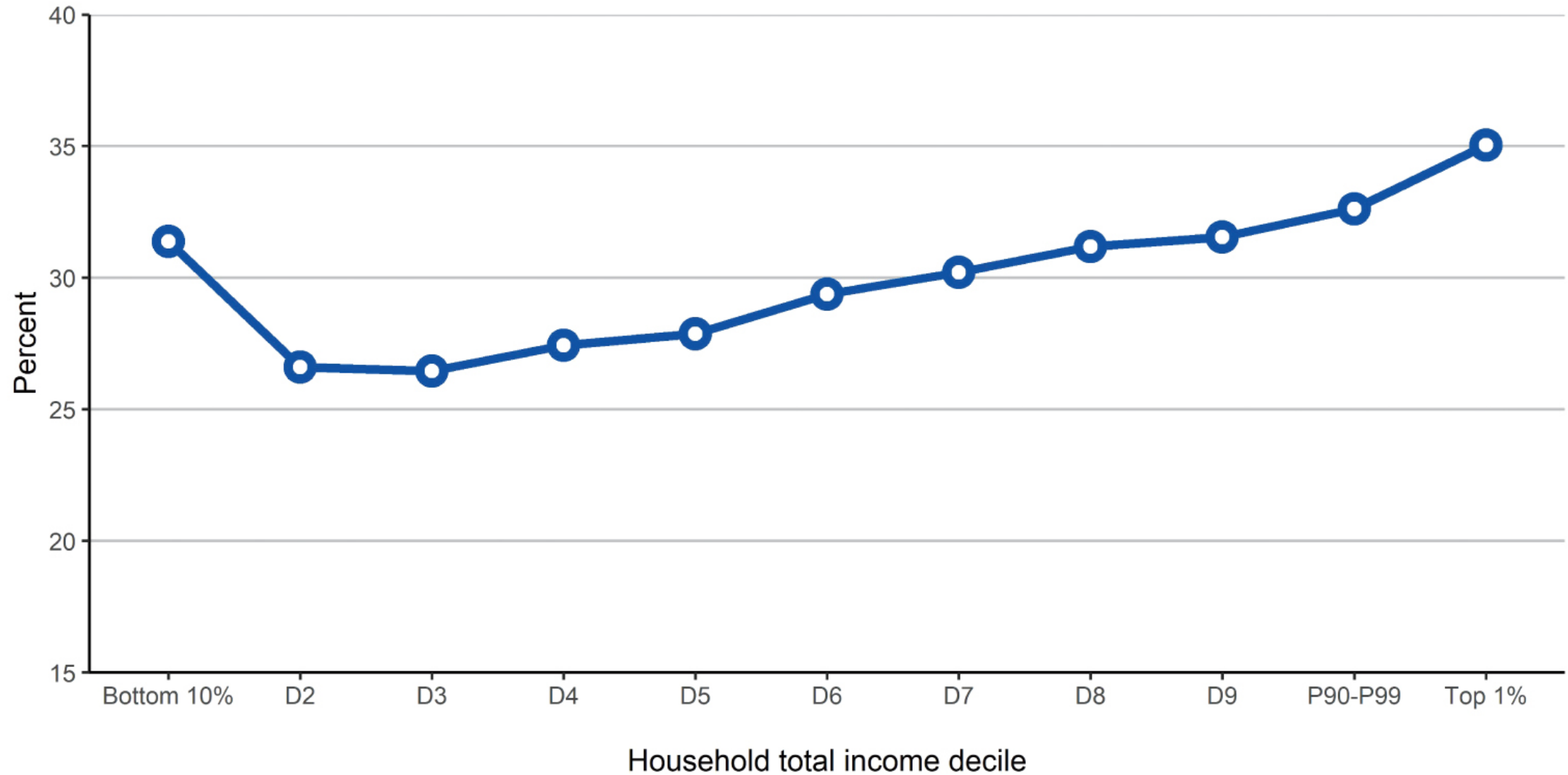


# Quantifying Tax Incidence

# Introduction

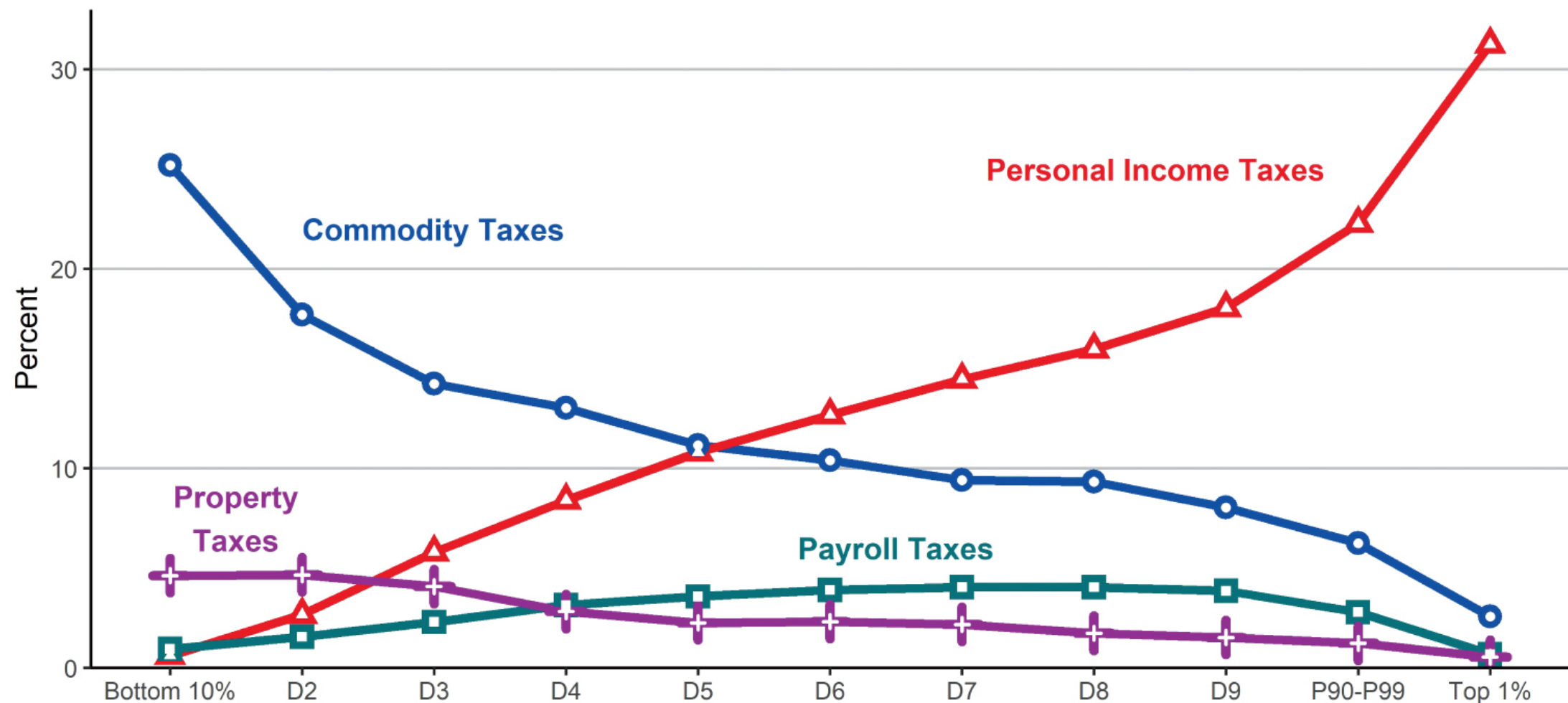
- We have gone through the theory of tax incidence
- Using data we can see who bears the burden of various taxes
- Could do this with tax data
  - Statistics Canada maintains the Longitudinal Administrative Databank (LAD)
  - Not easy to use because it is confidential microdata
- Can also use data from the SPSDM simulator
  - Program maintained by Statistics Canada
  - Snapshot of the Canadian tax and transfer system at a point in time

# Partial Equilibrium



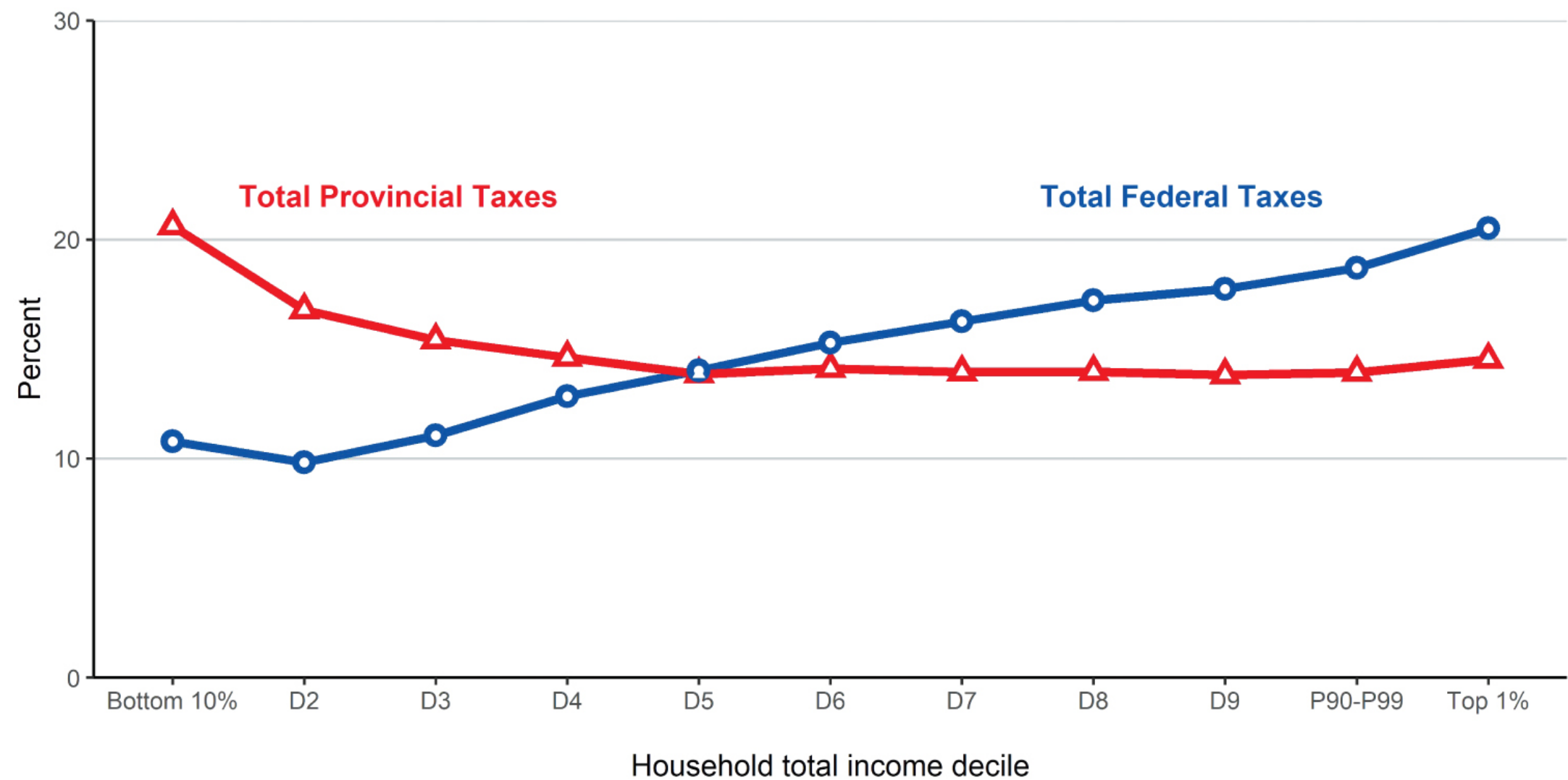
Average Tax Rates in Canada

# Partial Equilibrium



Household total income decile  
Average Tax Rates by Source

# Partial Equilibrium



Average Tax Rates by Level of Government

# Partial Equilibrium

- Canada maintains a progressive personal income tax system
  - So tax rates rise with income
- Commodity and property taxes are *on their own* regressive
  - A regressive tax is one where tax rates fall with income
  - Tax credits help offset the regressivity of these taxes (e.g. HST credit)
- Payroll taxes are initially progressive but turn regressive
- Federal taxes are more progressive than provincial taxes
  - Federal taxes mainly come from personal income taxes
  - Provincial taxes contain more commodity and property taxes

# Partial Equilibrium

- Progressivity in these graphs is based on *annual* income
  - Lifetime income might be more appropriate if people consume based on lifetime resources
- Redoing the graphs with lifetime income reduces regressivity

# General Equilibrium

- Evidence on the general equilibrium incidence of taxes is more limited
  - Analysis is more difficult
- Canadian researchers have looked at the tax incidence of the carbon tax in BC
  - Use a Computable General Equilibrium (CGE) model
  - A fancy model with many equations you need a computer to solve
- Find that a carbon tax
  - Lowers wages relative to capital income because labour supply is inelastic
  - Labour bears more of the burden than capital
  - Tax is progressive because wages are a higher share of income for higher income households



# Summary

# Summary

- Taxes are levied across the economy for various reasons
- Who “pays” the tax is determined by economic incidence and is complicated
  - Depends on ability to avoid the tax in both partial and general equilibrium
  - Can be spread widely in a general equilibrium setting
- Statutory incidence does not determine economic incidence

# References

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