

## Lecture 6: Tax Incidence

September 29, 2026

# Course Administration

## ① Reminder: Midterm October 20

- Last year's midterm posted
- Midterm review: Thursday October 15, 6:00 to 8:00 in MPA 305
- Tanya will record if you cannot make it
- Will work through old midterm

## ② Any questions?

## Next Week: Ripped from the Headlines

Presenters should send an article by Wednesday midnight

### Afternoon

| Finder | Presenter |
|--------|-----------|
| Lily   | Alex      |
| Nash   | Saniya    |

### Evening

| Finder | Presenter                     |
|--------|-------------------------------|
| Katy   | Sarah J.<br>Kubra<br>Sarah T. |

## Ripped from the Headlines

This week

### Afternoon

| Finder | Presenter | Summarizer |
|--------|-----------|------------|
| Alex   | Toni      | Angel      |
| Angel  | Lily      | Nash       |

### Evening

| Finder   | Presenter | Summarizer |
|----------|-----------|------------|
| Sophia   | Katy      | Emma       |
| Emily G. | Tucker    | Dejau      |
| Joshua   | Emily S.  | Sarah J.   |

# Today on Taxation

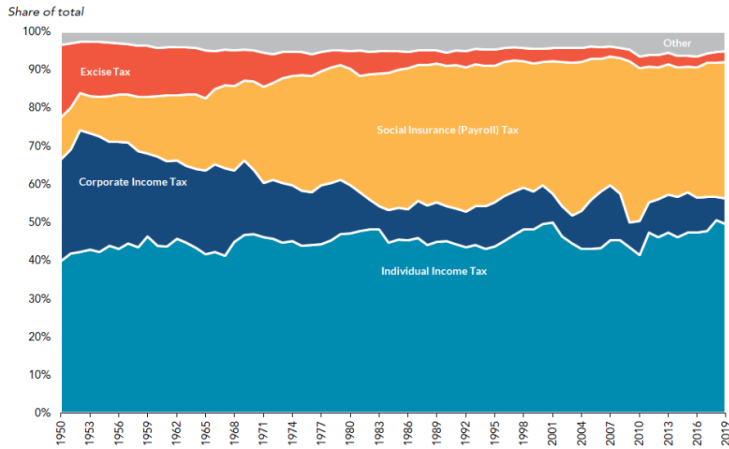
- ① Taxation overview
- ② Three rules of tax incidence
- ③ Tax incidence extensions
- ④ General equilibrium tax incidence
- ⑤ Empirical evidence on tax incidence

# Taxation Overview

# Many Types of Taxation

- Payroll tax
- Income tax
- Corporate tax
- Wealth taxes
  - Property tax
  - Estate tax
- Consumption tax
  - Sales tax
  - Excise tax – sales tax applied only to certain goods
  - Value added tax

# Method of Taxation Has Shifted Dramatically in US



With thanks to the Tax Policy Center, and the OMB for data. [See here.]

Does this change matter  
for who actually pays  
taxes?

# Three Rules of Tax Incidence

# You Levy a Tax – Who Pays?

“Who pays?” = tax incidence

# You Levy a Tax – Who Pays?

“Who pays?” = tax incidence

Study the three rules of tax incidence

- ① Statutory burden of tax  $\neq$  economic incidence of tax
- ② Side of the market on which tax is imposed is irrelevant to distribution of tax burdens
- ③ Parties with inelastic supply or demand bear taxes

# Types of Taxation

- specific excise tax: per unit tax
- ad valorem tax: tax that is a fixed percentage of the sale price

We will present everything with a specific excise tax. Results are equally applicable to an ad valorem tax.

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## U.S. excise tax examples

- federal tax on bows, archery equipment and arrow shafts
- gasoline
- wine, varying by type, highest on “naturally sparkling”

## Key Phrases

Incidence  $\equiv$  who pays the tax, or who “bears the burden” of the tax.

- Statutory incidence: determined by who pays the tax to the government
- Economic incidence: determined by whose economic resources change due to the tax

## Example: Taxes on Steel, Copper and Aluminum

- US levies import tax – tariff – on steel, copper and aluminum
- Rate of 50%
- Who bears the statutory incidence?

# Measurement of Incidence

- We measure incidence in price terms
- This assumes that changes in quantities are small

## Where to Look for Incidence

Tax incurs an additional cost to consumers or producers. Who pays this cost?

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|                | Consumers | Producers |
|----------------|-----------|-----------|
| Price increase |           |           |

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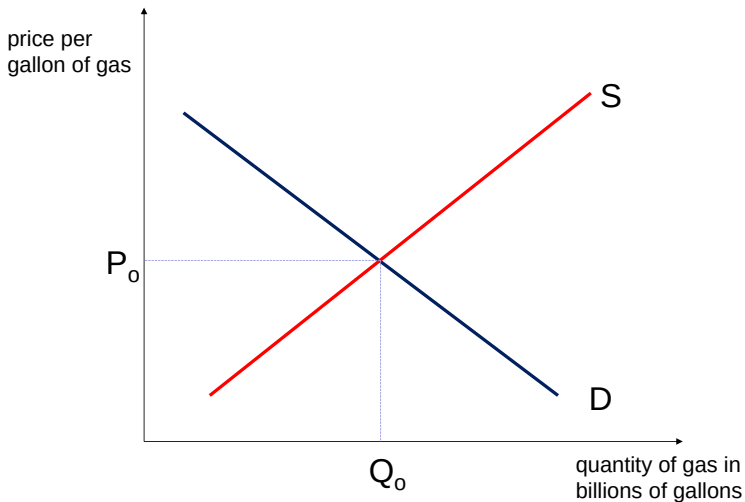
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Rule 1: Statutory Incidence  $\neq$  Economic Incidence

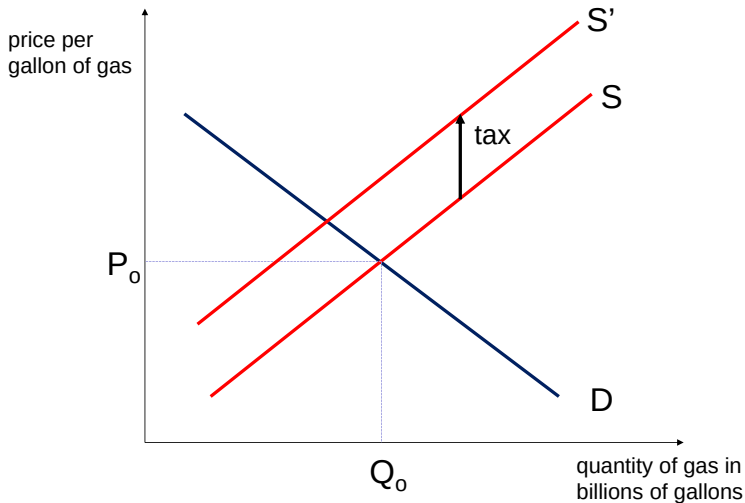
# 1. Statutory Incidence $\neq$ Economic Incidence

What Happens When you Levy a Tax on the Producer?



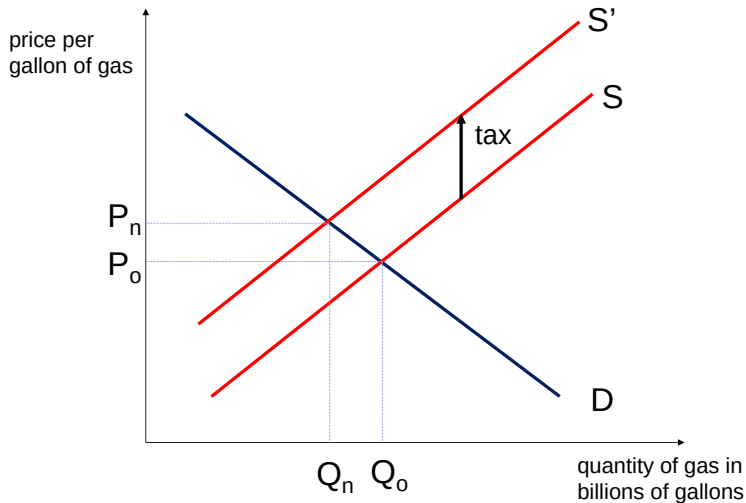
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What Are the New Equilibrium Price and Quantity?



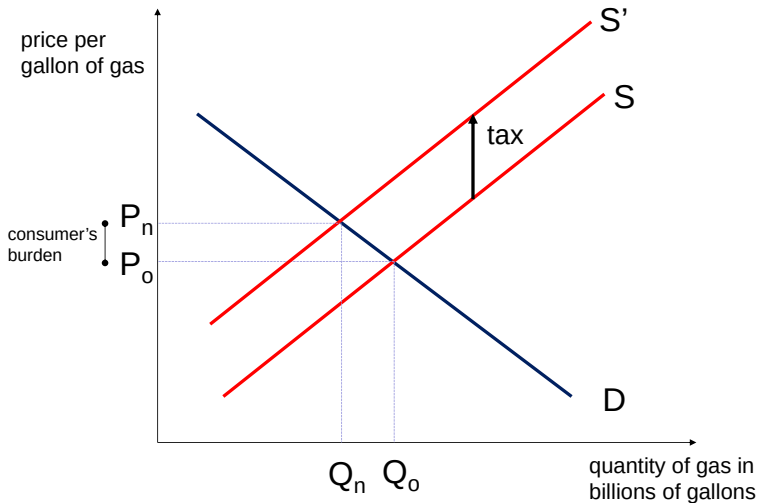
# 1. Statutory Incidence $\neq$ Economic Incidence

How Much Extra is the Consumer Paying?



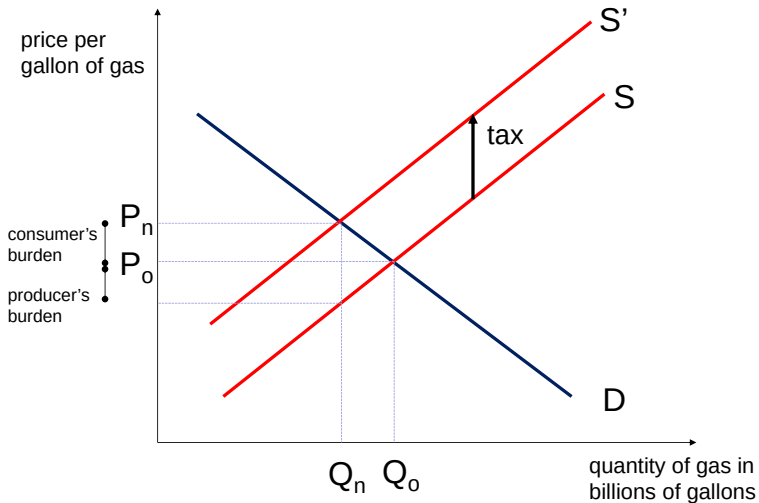
# 1. Statutory Incidence $\neq$ Economic Incidence

How Much Does the Producer Sell for? And What Does He Keep?



# 1. Statutory Incidence $\neq$ Economic Incidence

Producer and Consumer Share the Burden of the Tax



## Defining Tax Burdens

- a burden is a bad thing for producers or consumers
- burden is expressed as a positive number
- think of it as the net effect of positive and negative price changes from the tax
- from the producer and consumer viewpoint separately
- producer and consumer tax burden sum to the amount of the tax

## Defining Tax Burdens, Tax on Producer

- consumer tax burden  
= (post-tax price - pre-tax price) + per-unit tax payment by consumer

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- consumer tax burden
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  - = benefit/loss in price change to consumer + per-unit tax payment by consumer
  - =  $(P_n - P_o) + \text{per-unit tax payments by consumers}$
  - =  $P_n - P_o$
- producer tax burden
  - = (pre-tax price - post-tax price) + per-unit tax payment by producer
  - = per-unit tax payment by producer + benefit/loss in price change to producer
  - = per-unit tax payments by producers  $-(P_n - P_o)$
  - = tax  $-(P_n - P_o)$

## Writing the New Supply Curve

- Suppose that the supply curve before the tax is  $Q = 2P - 2$ .
- What is the new supply curve that includes a tax of \$2/unit?

## Writing the New Supply Curve

- Suppose that the supply curve before the tax is  $Q = 2P - 2$ .
- What is the new supply curve that includes a tax of \$2/unit?
- Note that  $P$ -intercept on the new supply curve shifts upward by the amount of the tax

## Writing the New Supply Curve: Equations

- The original supply curve is  $Q = 2P_{bt} - 2$ 
  - re-write in terms of  $P$ :  $P_{bt} = 1 + (1/2)Q$
- Note that  $P_{at} = P_{bt} + 2$ 
  - supply curve shifts up by 2
- So we can write the after-tax supply curve as

$$\begin{aligned}P_{at} &= P_{bt} + 2 \\&= 1 + (1/2)Q + 2 \\&= 3 + (1/2)Q\end{aligned}$$

- Solve this equation for  $Q$  to get  $Q = 2P_{at} - 6$

## An Alternative Method to Finding New Supply

- The same original supply curve:  $Q_S = 2P_{bt} - 2$ .
- How does the supplier perceive a tax of \$2/unit?
  - $P_{at} = P_{bt} + 2 \rightarrow P_{bt} = P_{at} - 2$
  - where  $at$  denotes the after tax price  $bt$  the before tax price in the supply curve

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  - $P_{at} = P_{bt} + 2 \rightarrow P_{bt} = P_{at} - 2$
  - where  $at$  denotes the after tax price  $bt$  the before tax price in the supply curve
- We'd like to know market supply as a function of the taxed price:  $Q_S^{tax} = f(P)$

$$Q_S^{tax} = 2P_{bt} - 2$$

$$Q_S^{tax} = 2(P_{at} - 2) - 2$$

$$Q_S^{tax} = 2P_{at} - 4 - 2 = 2P_{at} - 6$$

Rule 1: Statutory Incidence  $\neq$  Economic Incidence

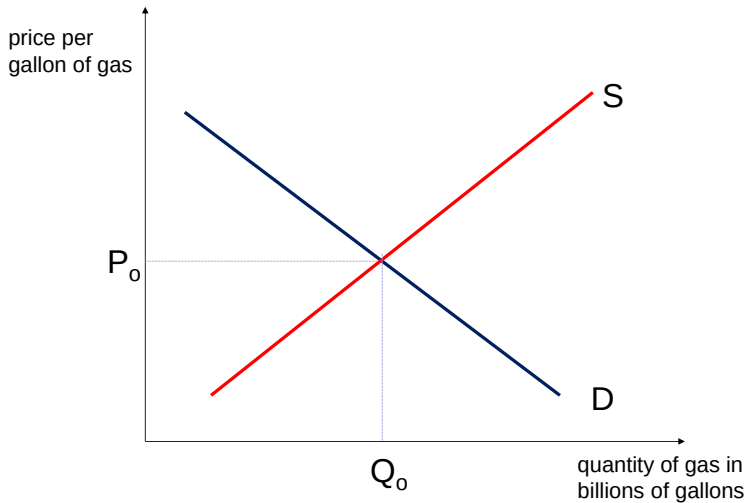
Rule 2: Side of the Market on Which Tax is  
Imposed Irrelevant to Distribution of Tax Burden

## 2. Side of the Market on Which Tax is Imposed Irrelevant to Distribution of Tax Burden

- Suppose that the gasoline tax is levied on the consumer, not the producer
- This means you buy some gas and send a check to the government

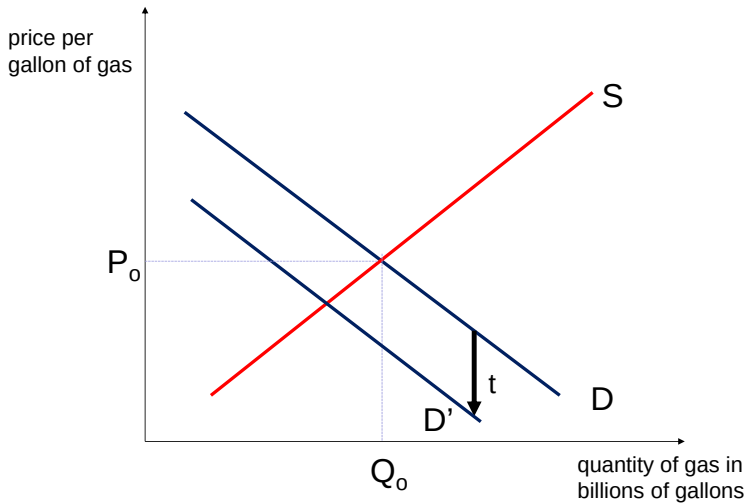
# Consumer Pays Tax

What Happens When you Levy a Tax on the Consumer?



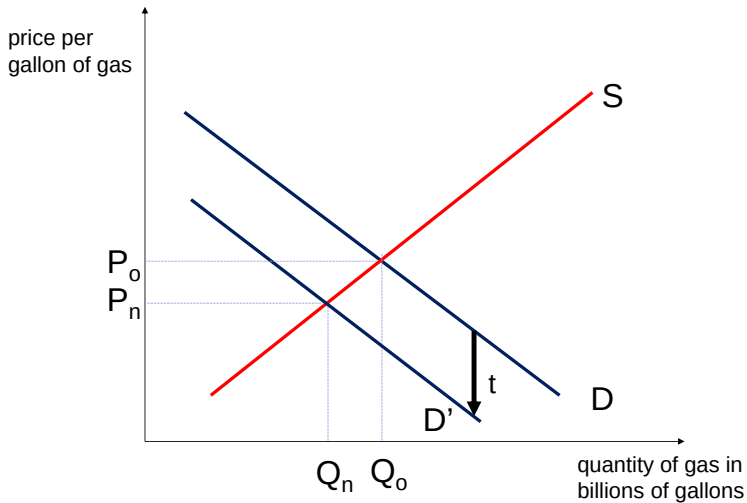
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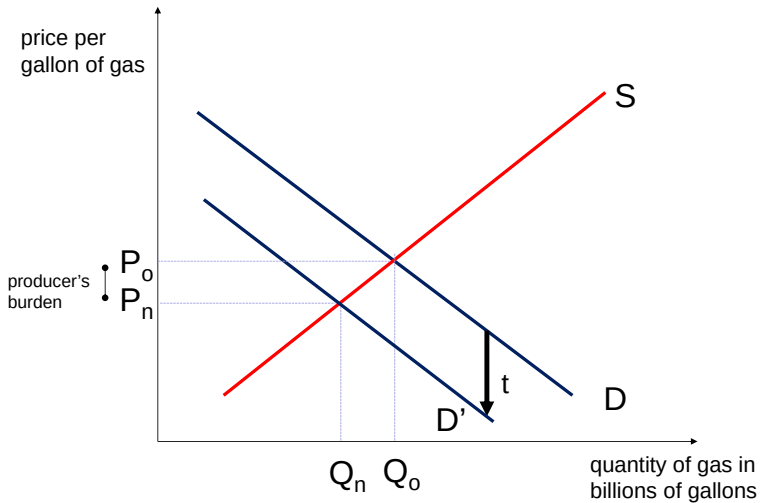
# Consumer Pays Tax

How Much Lower Price Does the Producer Suffer?



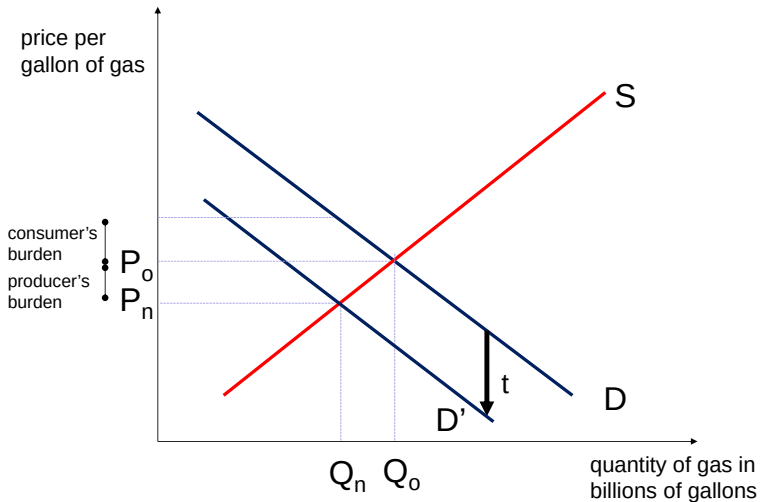
# Consumer Pays Tax

How Much Does the Consumer Pay?



# Consumer Pays Tax

Producer and Consumer Share the Burden of the Tax



## Consider Burdens

- When tax is levied on consumers
  - consumer burden

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- When tax is levied on producers
  - consumer burden =  $P_n - P_o$
  - producer burden =  $t - (P_n - P_o)$
  - total burden =  $P_n - P_o + t - (P_n - P_o) = t$

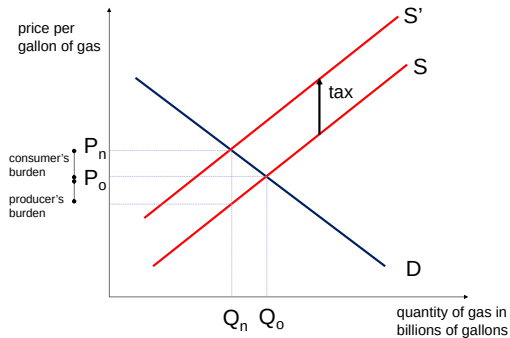
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  - total burden =  $P_n - P_o + t - (P_n - P_o) = t$
- Note that
  - In both cases, total burden is tax.  $t$
  - The total price change faced by producers and consumers is equal regardless of the side of the market with the tax

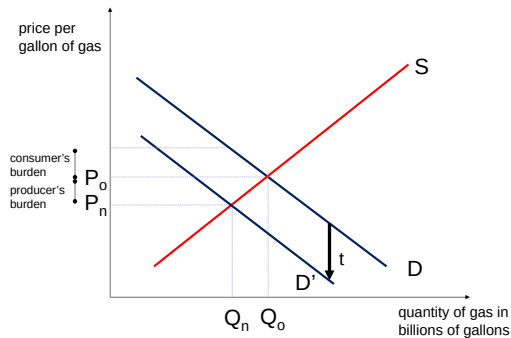
# Visual Comparison of Burdens

Statutory incidence falls on

Producers



Consumers



## In-Class Problem

The demand for rutabagas is  $Q = 1,900 - 100P$ , and the supply of rutabagas is  $Q = 300P - 100$ .

- 1 Find the original equilibrium price
- 2 Re-write one of the curves if the producer bears the statutory incidence of a \$4/unit tax on the sale of rutabagas.
- 3 Find the post-tax equilibrium price.
- 4 Find the consumer burden.
- 5 Find the producer burden.
- 6 Describe who bears the economic incidence of this tax.

## In-Class Problem Answer, Part 1

- ① Original equilibrium is

$$1900 - 100P = 300P - 100$$

$$2000 = 400P$$

$$P = 5$$

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② A tax on the sale means that the producer's price is now 4 above the market price

- $P_{at} = P_{bt} + 4$
- Original supply curve is  $Q_s = 300P_{bt} - 100$
- Re-write supply as

$$Q_s = 300P_{bt} - 100$$

$$Q_s = 300(P_{at} - 4) - 100$$

$$Q_s = 300P_{at} - 1200 - 100$$

$$Q_s = 300P_{at} - 1300$$

## In-Class Problem Answer, Part 2

- ③ The new equilibrium sets the new supply equal to new demand
- Put the demand and supply together:  $300P - 1300 = 1900 - 100P$ , or  $P = 8$ .

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- ⑤ Producer burden: tax of \$4, minus price increase of \$3:  $4 - 3 = 1$

## In-Class Problem Answer, Part 2

- ③ The new equilibrium sets the new supply equal to new demand
  - Put the demand and supply together:  $300P - 1300 = 1900 - 100P$ , or  $P = 8$ .
- ④ Consumer burden: price increase of \$3
- ⑤ Producer burden: tax of \$4, minus price increase of \$3:  $4 - 3 = 1$
- ⑥ Economic incidence of tax is shared

Rule 1: Statutory Incidence  $\neq$  Economic Incidence

Rule 2: Side of the Market on Which Tax is Imposed Irrelevant to Distribution of Tax Burden

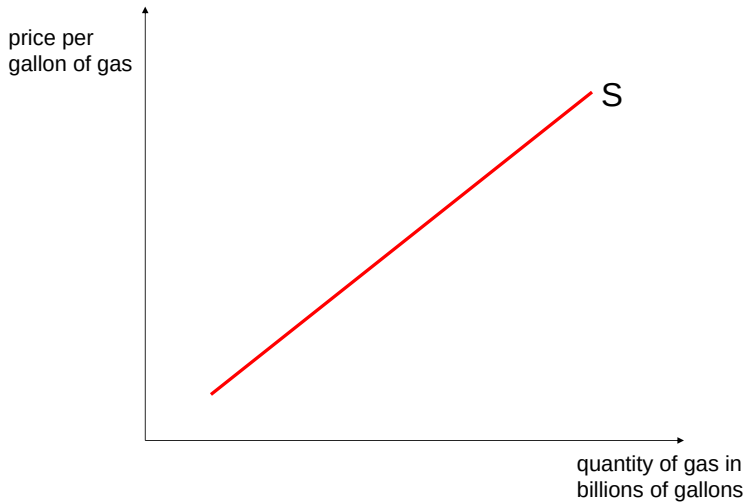
**Rule 3: Inelastic Party Bears Tax Burden**

### 3. Inelastic Party Bears Tax Burden

- Return to statutory tax levied on producers
- Consider inelastic demand
- Consider elastic demand

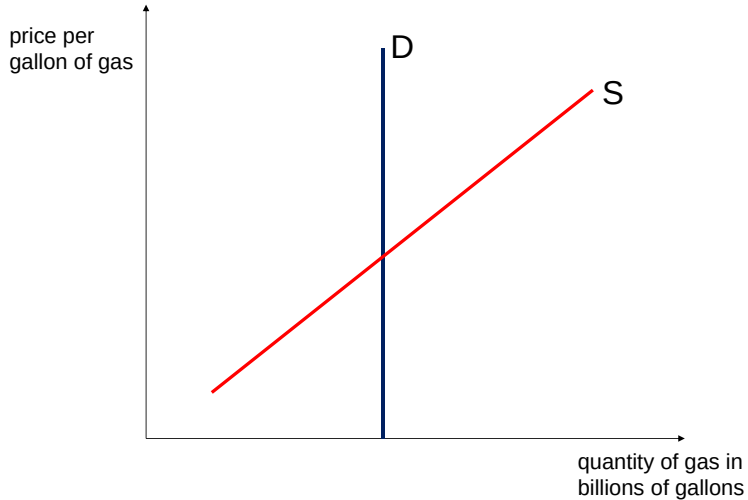
# Inelastic Demand

What Does Inelastic Demand Look Like?



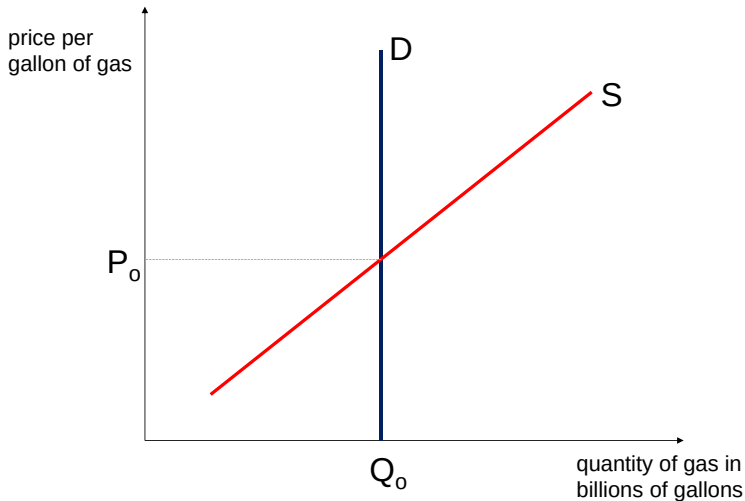
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What is the Original Equilibrium  $P$  and  $Q$ ?



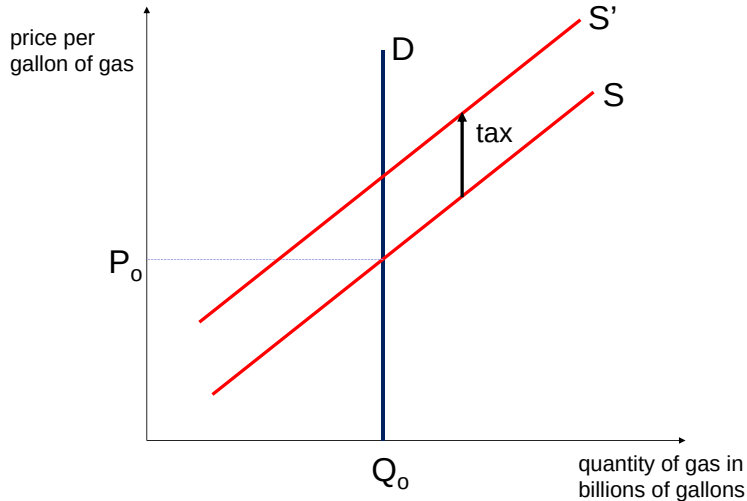
# Inelastic Demand

How Does the Tax Shift Production?



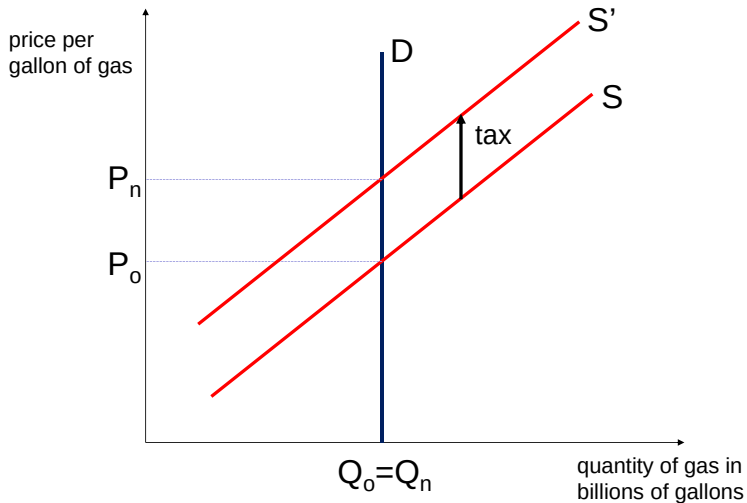
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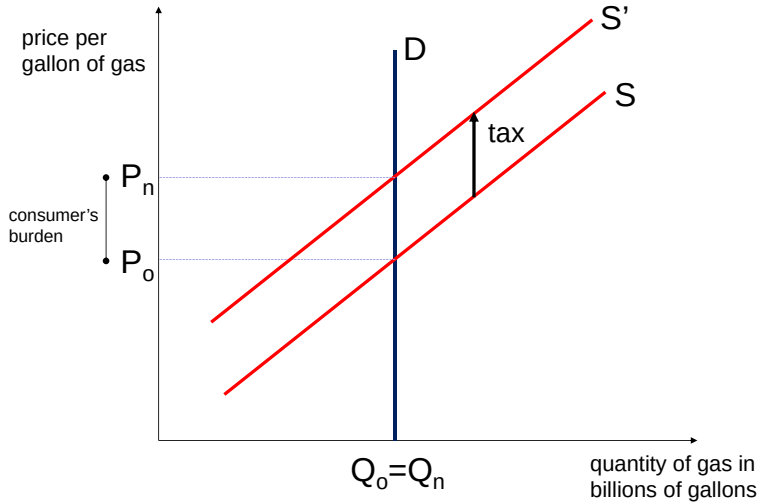
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What is the Consumer's Burden?



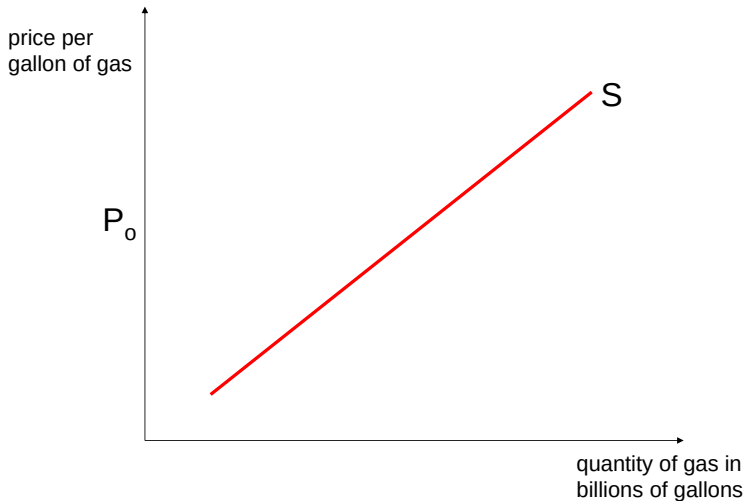
# Inelastic Demand

Consumer Cannot Run Away From Tax



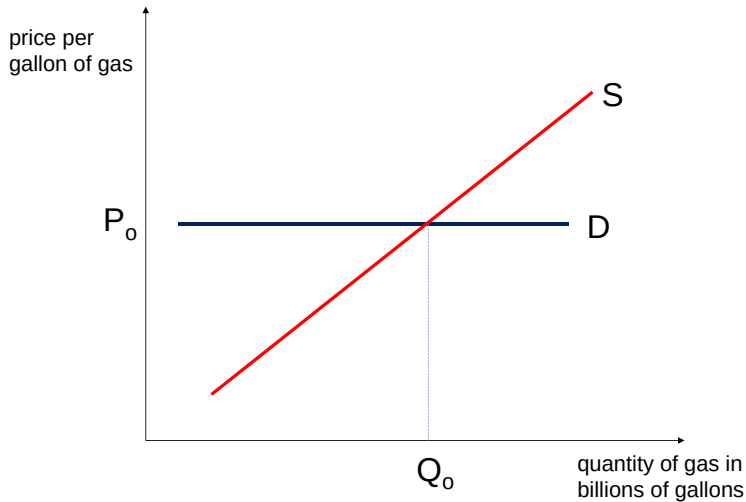
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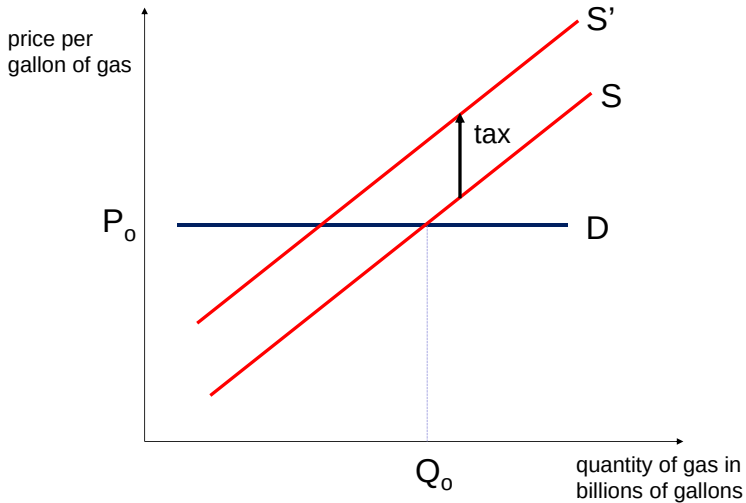
# Elastic Demand

How Does Tax on Producer Shift Supply?



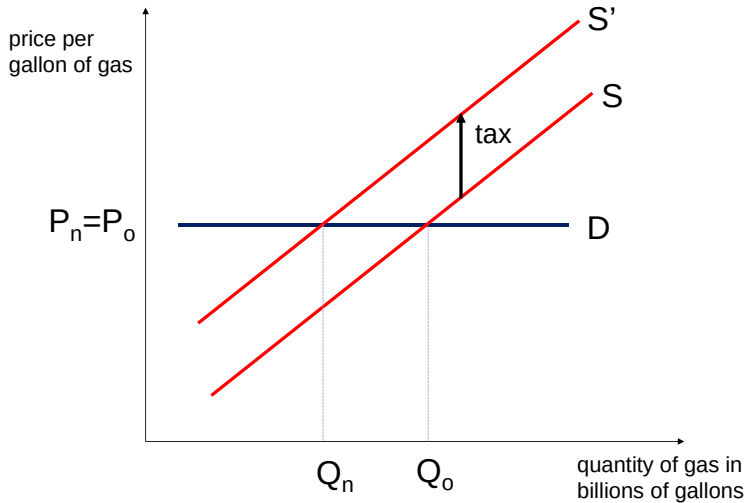
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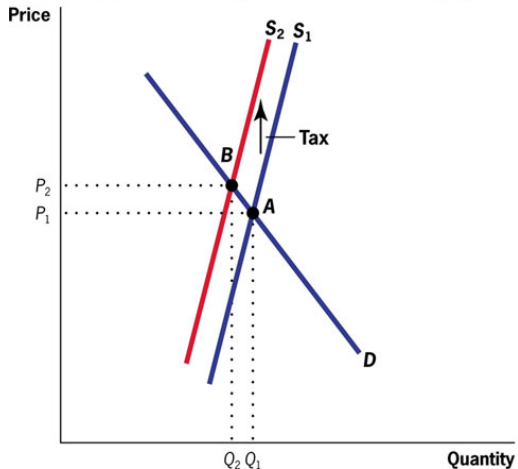
# Elastic Demand

Producer Bears Entire Burden

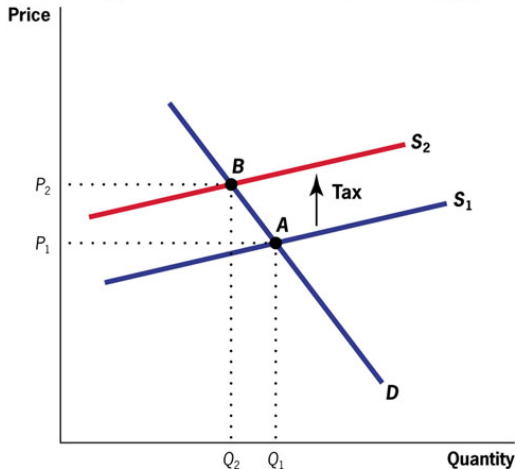


## And the Same is True for Supply

(a) Tax on steel producers (inelastic supply)



(b) Tax on sidewalk vendors (elastic supply)



# Tax Incidence Extensions

## Three Extensions

- ① Tax incidence in factor markets
- ② (skip) Tax incidence in imperfectly competitive markets
- ③ (skip) Balanced budget tax incidence

# Tax Incidence in Factor Markets

- Suppose a tax is levied on a factor of production
  - tax on labor
  - tax on capital, such as land or steel

# Tax Incidence in Factor Markets

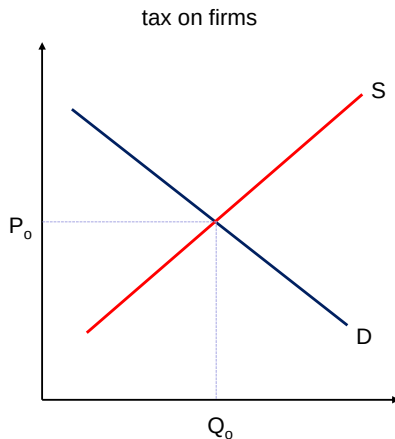
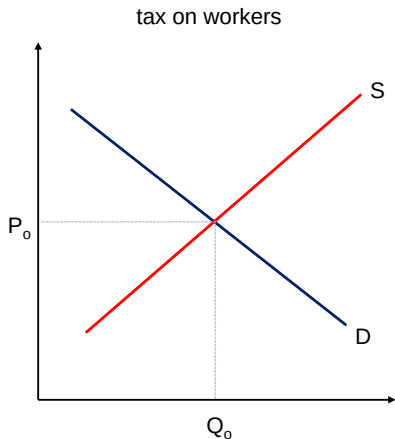
- Suppose a tax is levied on a factor of production
  - tax on labor
  - tax on capital, such as land or steel
- Do wages decrease? Or do product prices increase?
- Who bears the burden of the tax?

# Tax on Workers

- Suppose the government decides to levy a tax on workers
- It can either charge workers via a payroll tax
- Or it can charge employers via a payroll tax
- Does it matter?

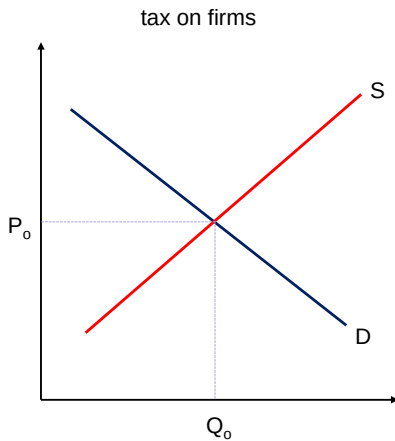
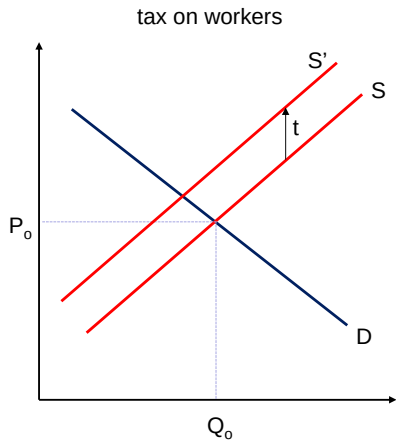
# Tax on Workers (Producers) vs. Tax on Firms (Consumers)

How Does Tax on Workers (=Producers) Shift Supply?



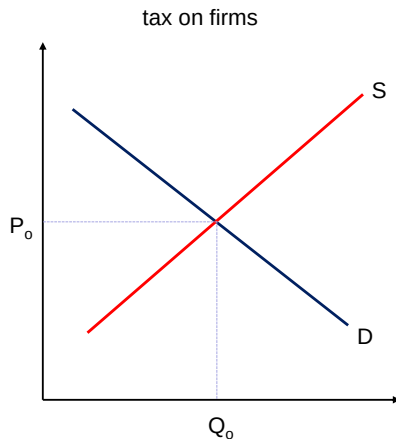
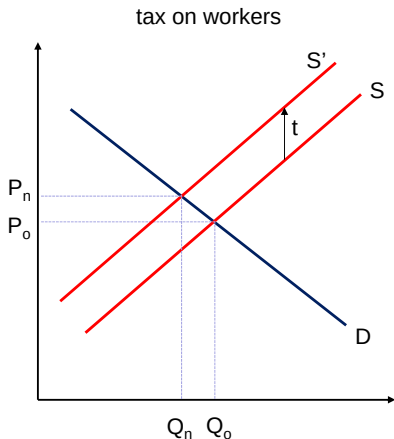
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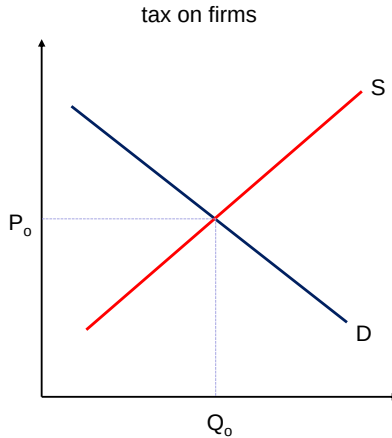
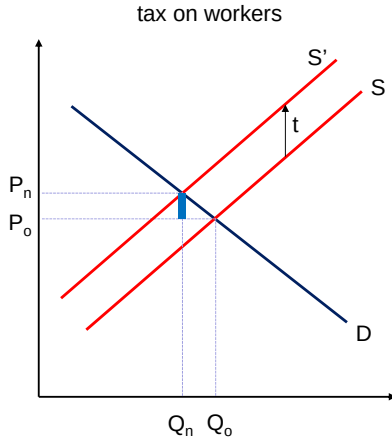
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What is the Consumer (Labor Purchaser) Burden?



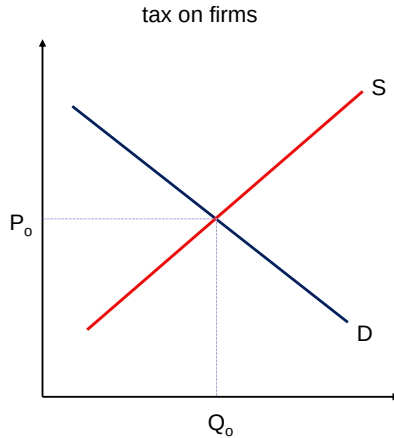
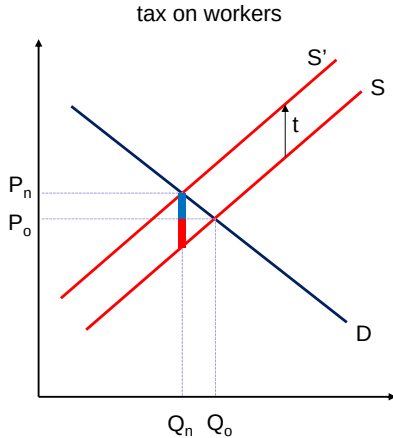
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What is the Producer (Worker/Supplier) Burden?



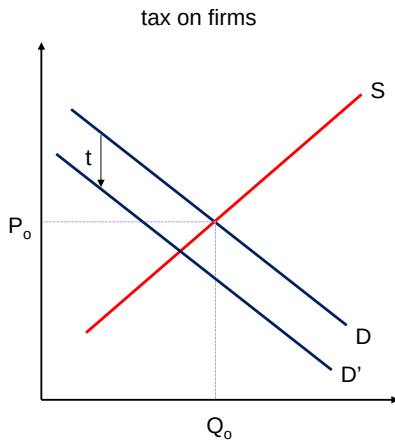
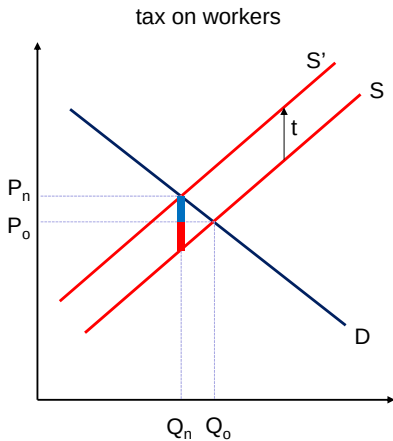
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What if Firms Pay the Payroll Tax?



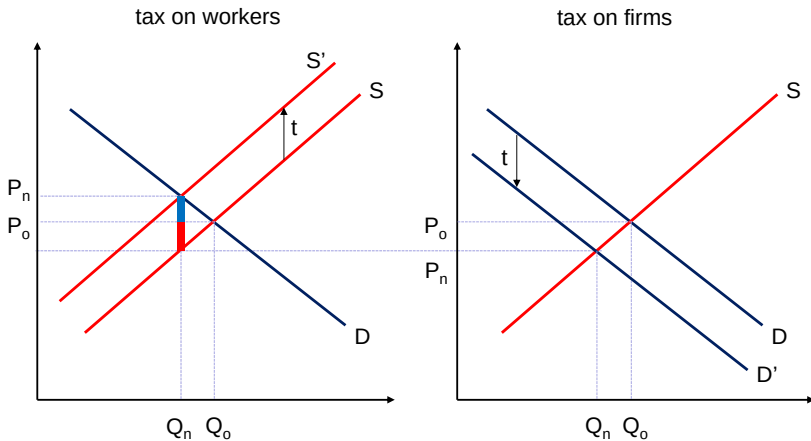
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New Equilibrium  $P$  and  $Q$ ?



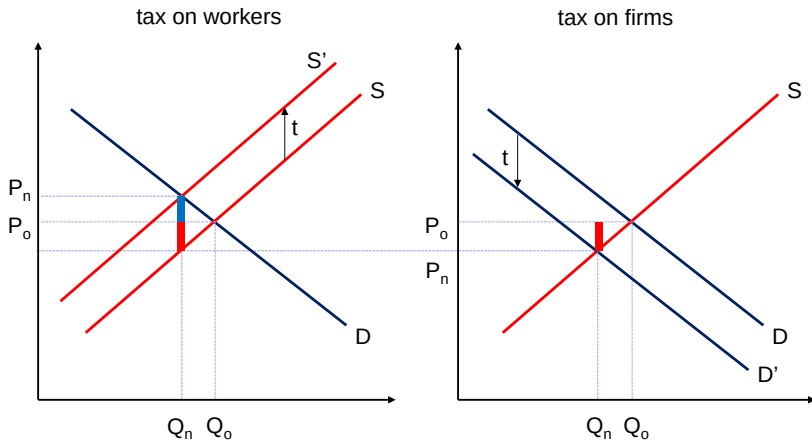
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Producer (Worker) Burden?



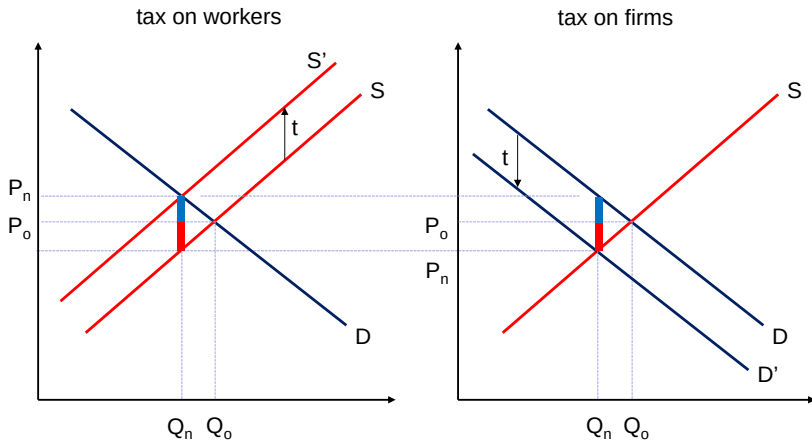
# Tax on Workers (Producers) vs. Tax on Firms (Consumers)

Consumer (Labor Purchaser) Burden?



# Tax on Workers (Producers) vs. Tax on Firms (Consumers)

Doesn't Matter Who Pays the Tax

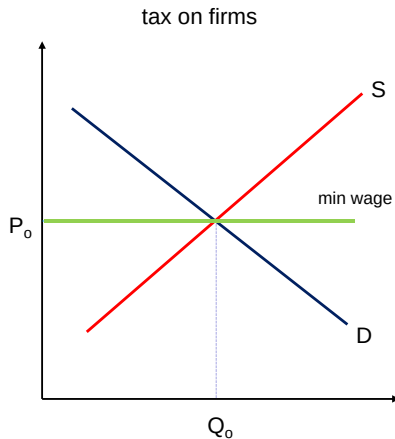
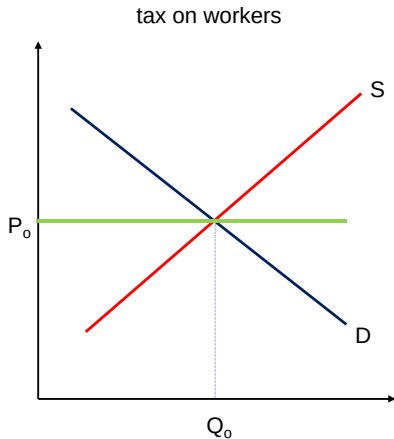


## But What If There is an Impediment to Adjustment?

- Suppose that there is a minimum wage
- Compare payroll tax levied on workers
- To payroll tax levied on employers

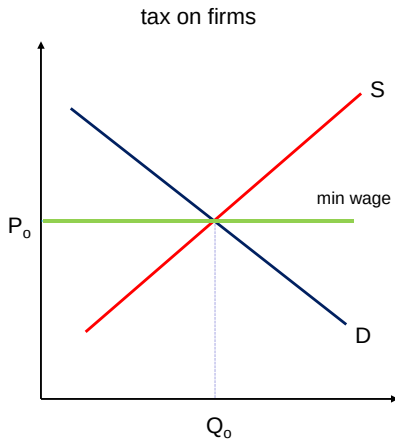
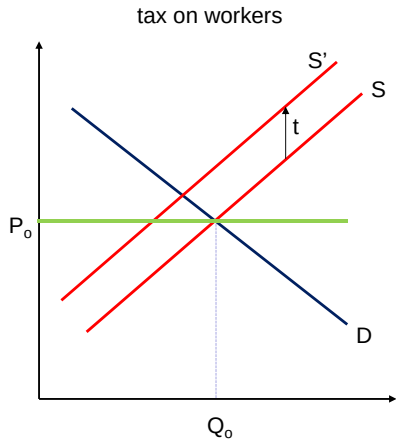
# Tax with a Minimum Wage

How Does Tax on Workers=Producers Shift Supply?



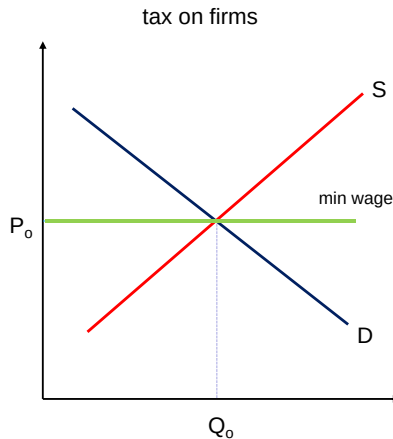
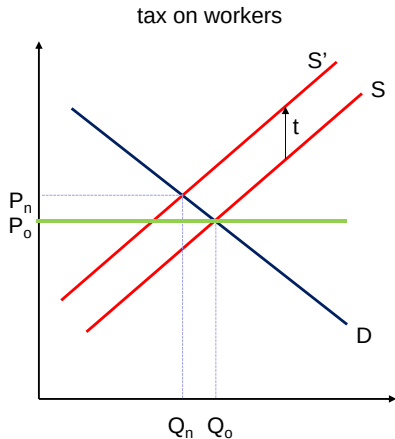
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What Are the New Equilibrium  $P$  and  $Q$ ?



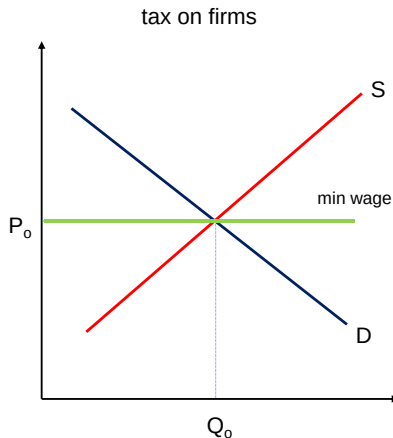
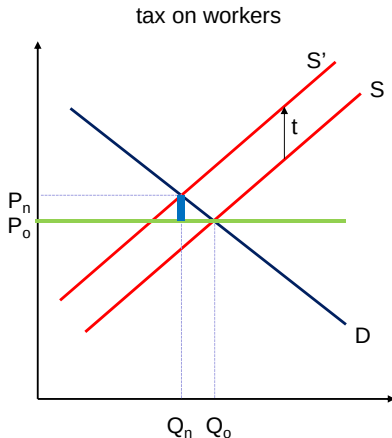
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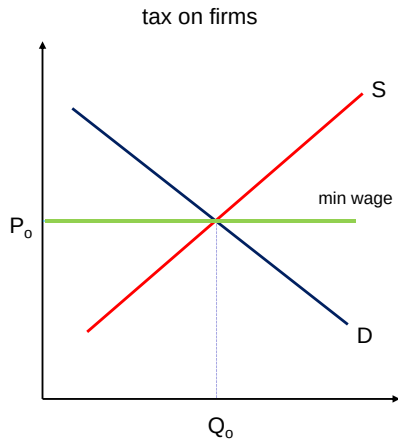
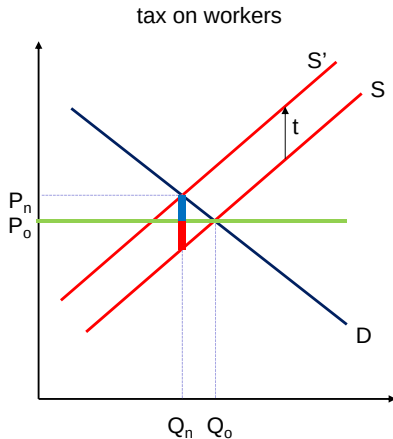
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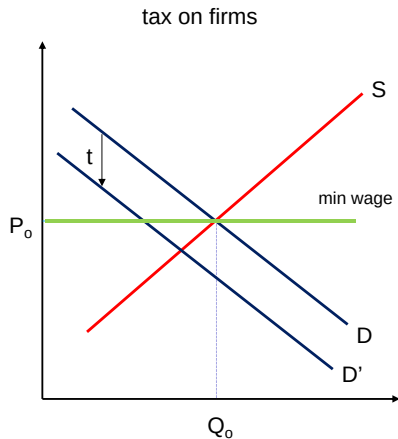
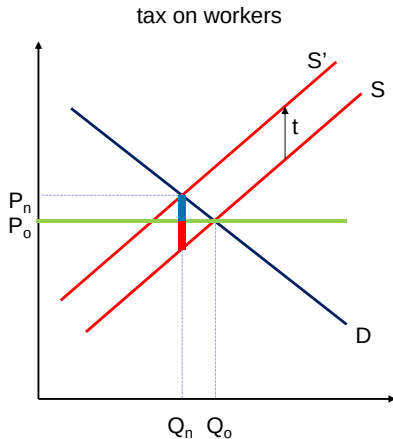
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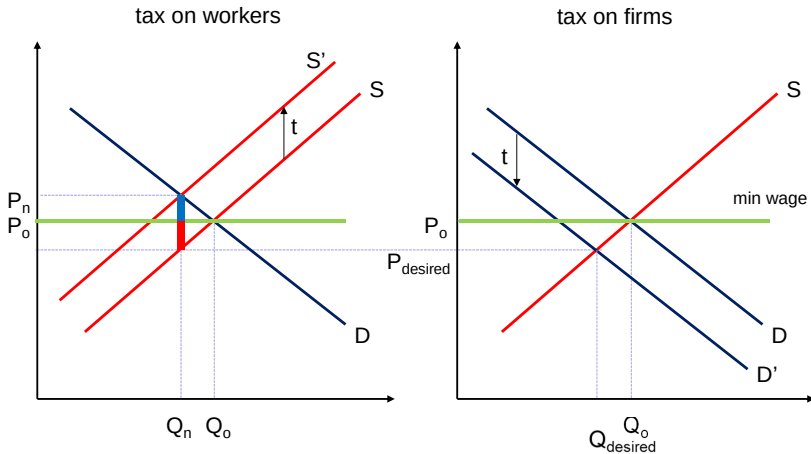
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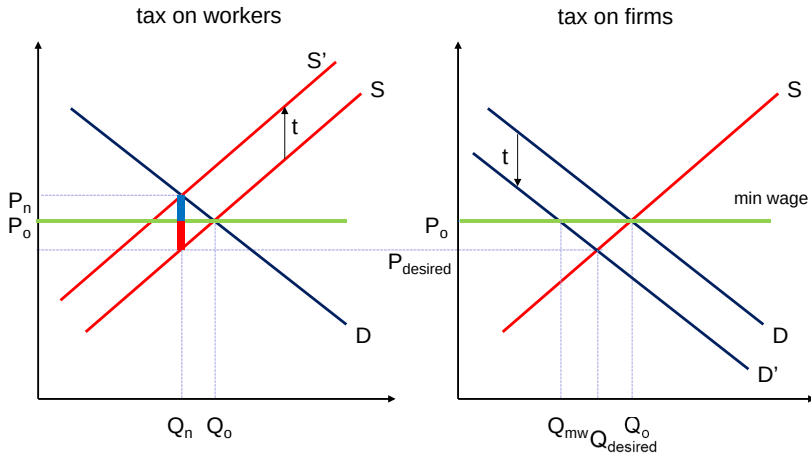
# Tax with a Minimum Wage

## What Quantity of Workers Can Firms Get?



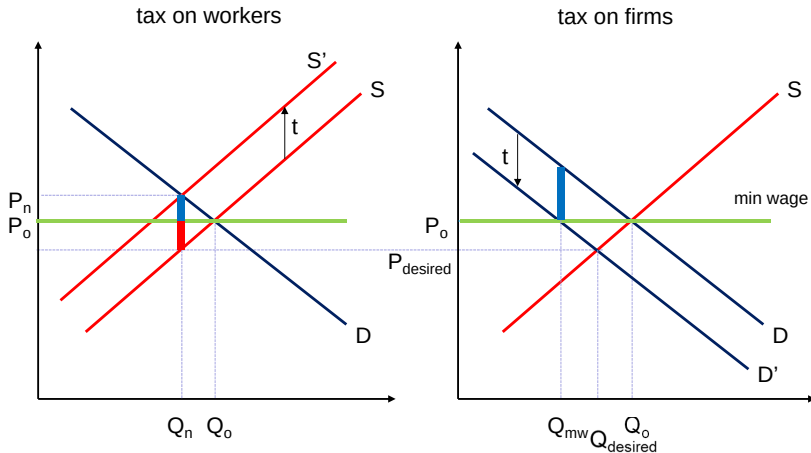
# Tax with a Minimum Wage

Who Bears the Burden?



# Tax with a Minimum Wage

Consumers of Labor (Firms) Bear the Burden



## Summary of Taxes on Inputs

- Barriers to reaching the competitive market equilibrium can matter for tax incidence
- Other barriers include workplace norms, such as norm for not cutting nominal wages
- More likely to see these features in input, rather than output markets
- Therefore, the party on whom the tax is levied may matter more in input than output markets

# General Equilibrium Tax Incidence

# General Equilibrium Considerations

- ① Illustrative example
- ② Issues to consider
  - time period
  - scope
  - spillovers between product markets

# Taxing Restaurants in Lexington, MA

- Suppose that the city of Lexington, MA passes a restaurant tax
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- In the long run?

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- Restaurants use capital and labor – who bears the burden?
- Perhaps in the short run, labor is more elastic than capital, so capital bears the burden  $\implies$  restaurant owner makes less money
- In the long run? restaurants leave, and landowners make less money
- In economics, land is the one absolutely fixed thing

## General Equilibrium Issues: Time Period

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Overarching rule for general equilibrium tax incidence is to follow the incidence until you get to a person.

- Long and short-run elasticities should differ – examples?
- In general, the longer the period, the more elastic all factors are
- Except for land!

## General Equilibrium Issues: Scope

- Scope of tax matters: elasticity of response to tax on restaurants in Lexington is different than tax on restaurants in Massachusetts
- Is the supply of workers for the state-wide tax more or less elastic?

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- Scope of tax matters: elasticity of response to tax on restaurants in Lexington is different than tax on restaurants in Massachusetts
- Is the supply of workers for the state-wide tax more or less elastic? less elastic
- Compare tax on soda to tax on sugar

# General Equilibrium Issues: Cross-Product Market Effects

- Tax from one market could spill over in another – examples?
- Textbook uses restaurant meals and babysitters
- Think tax on internet and Netflix usage

# Tax Incidence in the United States

# Distributional Analysis of Taxes Depends on Assumptions About Incidence

Here's what two major non-partisan organizations assume

| Tax Type  | Incidence                                                        |
|-----------|------------------------------------------------------------------|
| Income    | by households that pay them                                      |
| Payroll   | by workers (even the employer part)                              |
| Excise    | shifted to prices, so in proportion to consumption               |
| Corporate | shifted to owners of capital, so in proportion to capital income |

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- Bradley and Feldman: Airline ticket pricing
  - Before 2012, airlines were not required to immediately quote a tax-inclusive price
  - Before the rule, airlines pass on almost full tax increase
  - After, airlines pass along only about \$0.25 of each dollar of per-ticket tax

# Today: Tax Incidence

- Tax incidence: who bears the burden of the tax
  - ① Statutory incidence  $\neq$  economic incidence
  - ② Without impediments, side of the market on which the tax is levied does not impact incidence
  - ③ Less elastic factor bears the burden of the tax
- When there are impediments to reaching market equilibrium, which side of the market bears the tax matters
- General equilibrium tax incidence: the most inelastic factor bears the burden
- Rules of thumb for welfare analysis

## Next Class

- Firms!
  - GLS Chapter 6 – but not 6.5 or 6.6
- And then the midterm