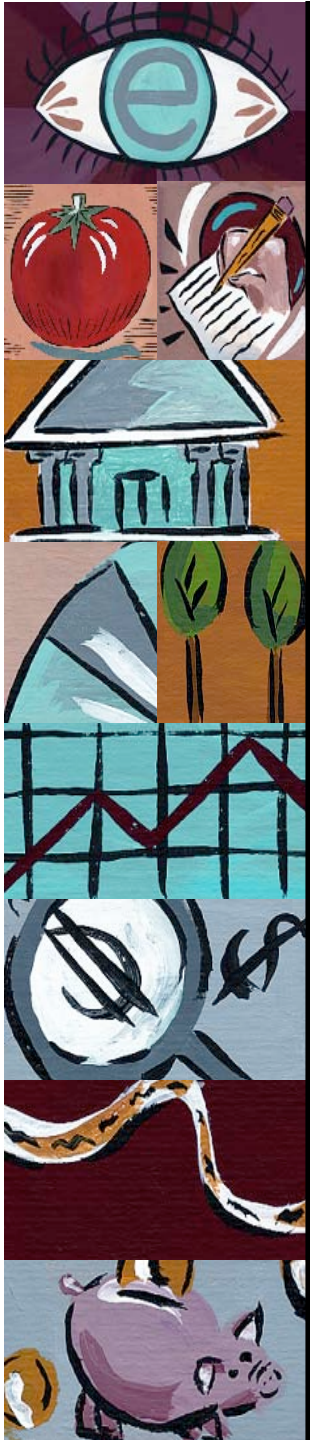




# Using supply and demand to explain interest rates, and exchange rates



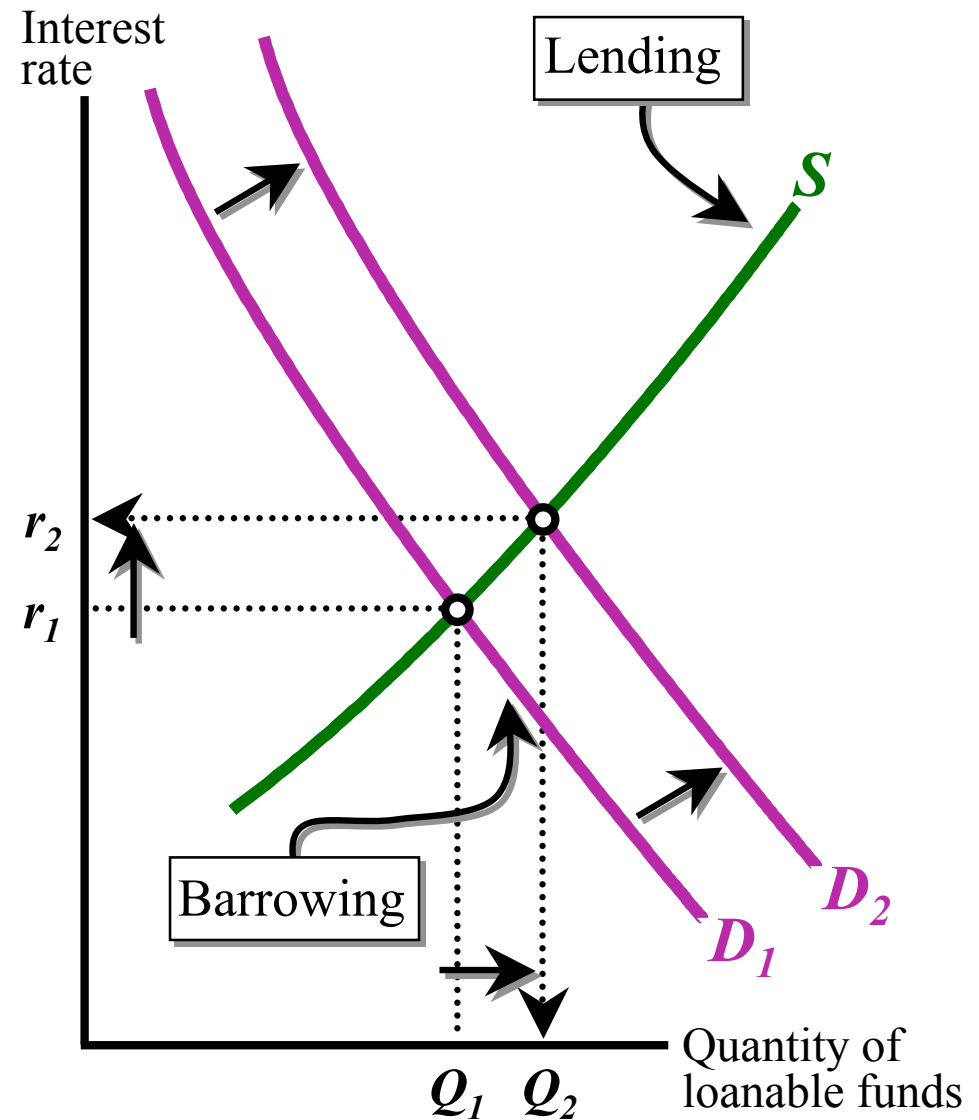
# Loanable Funds Market and the Interest Rate

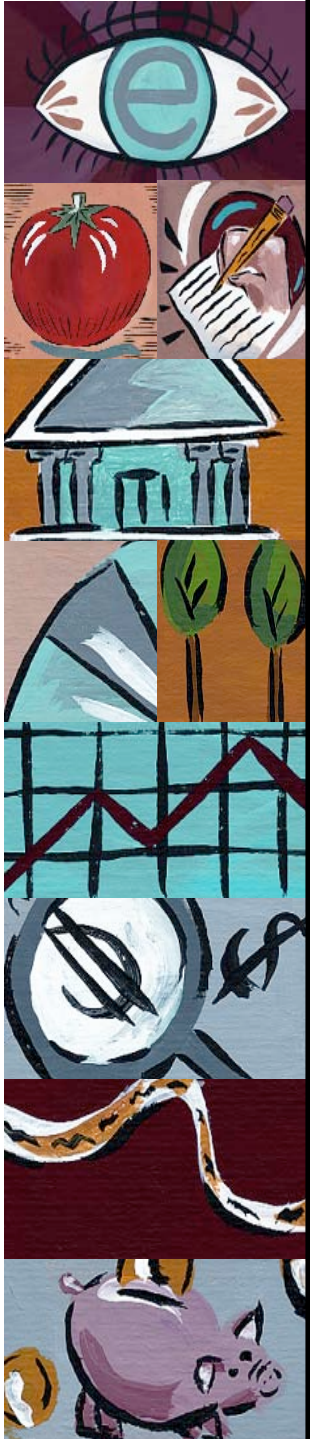
- The interest rate connects the price of goods today and their price in the future.
  - Borrowers wish to acquire goods now; savers are willing defer acquisition to a later date. The interest rate (or  $r$ ) is the price that must be paid for earlier availability. It is comprised of an inflation premium (or  $n$ ). Where there are more borrowers than savers, savers must be paid a further premium to defer consumption ( $k$ ) and to accept the un-diversifiable uncertainty of repayment ( $u$ ).



# Increase in the Demand for Loanable Funds

- Consider the market for *loanable funds* where the interest rate  $r$  will bring the quantity of loanable funds demanded by borrowers into balance with the quantity supplied by lenders.
- We begin in equilibrium at lending level  $Q_1$  and interest rate  $r_1$ .
- An increase in the demand for loanable funds will move  $D_1$  to  $D_2$  pushing the interest rate up from  $r_1$  to  $r_2$  and increasing borrowing from  $Q_1$  to  $Q_2$
- Higher interest rates encourage additional savings, making it possible to fund more borrowing.





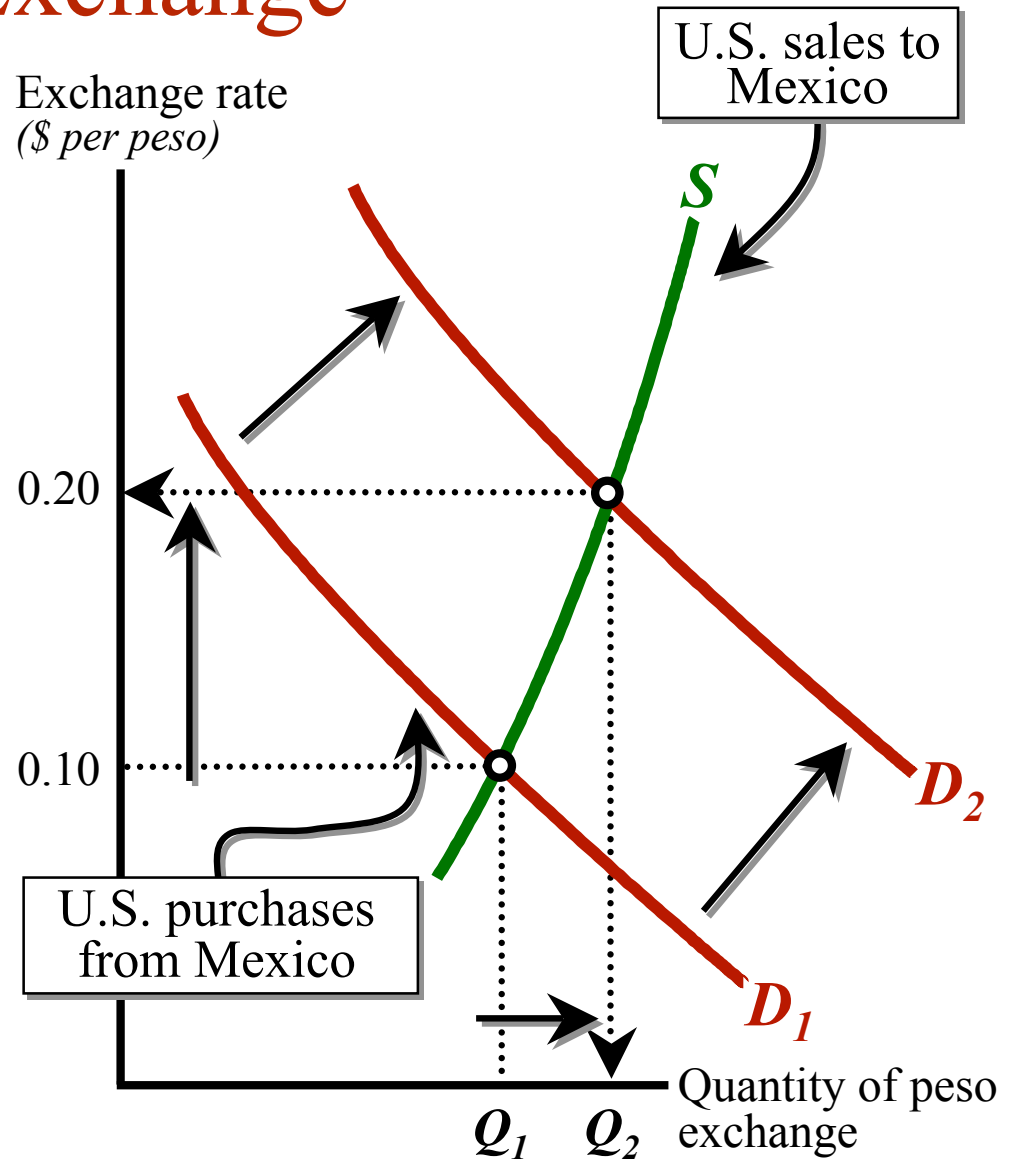
# Market for Foreign Exchange

- *Foreign exchange market* is where currency of one country is traded for another.
- The exchange rate is measured as the dollar price of foreign currency.
- *Changes in exchange rates* will alter the prices of internationally traded goods/services and assets
  - A lower dollar price of foreign currency will have two effects:
    - It will lower the price of foreign goods to U.S. residents and raise imports.
    - It will raise the price of U.S. goods to foreigners and lower exports.



# Increase in the Demand for Foreign Exchange

- Here we display the market for *foreign exchange* (specifically the Mexican peso) where the exchange rate (the dollar price per peso) will bring the quantity of pesos *demanded* into balance with the quantity *supplied*.
- Begin in equilibrium, where the dollar price of the peso is \$.10 (10 cents = 1 peso).
- An *increase in* American *demand* for Mexican oil will also increase the demand for pesos (with which American importers pay Pemex).
- Equilibrium occurs where the new demand for pesos  $D_2$  just equals the supply  $S$  – at \$.20 per peso with  $Q_2 > Q_1$  pesos clearing the market.





# The Economics of Price Controls

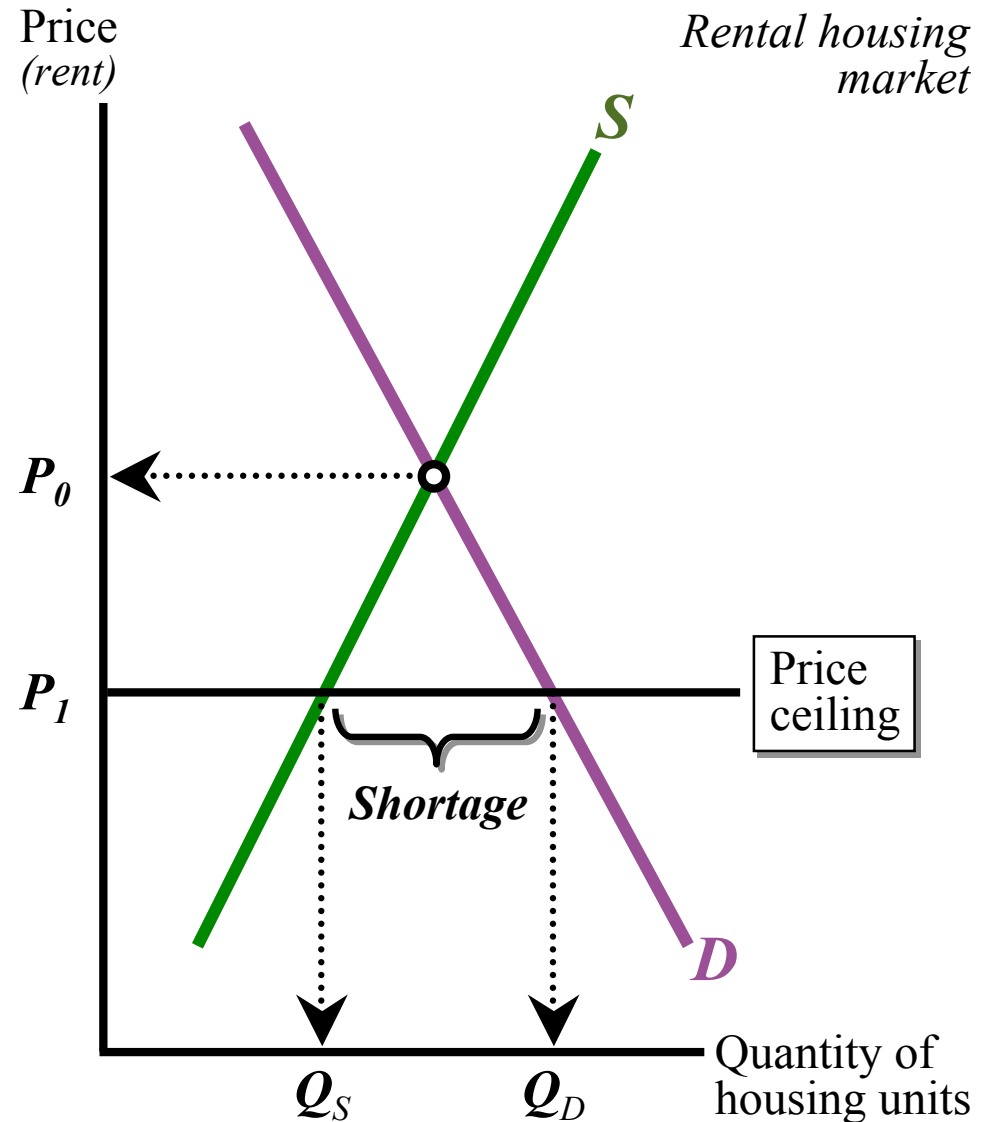


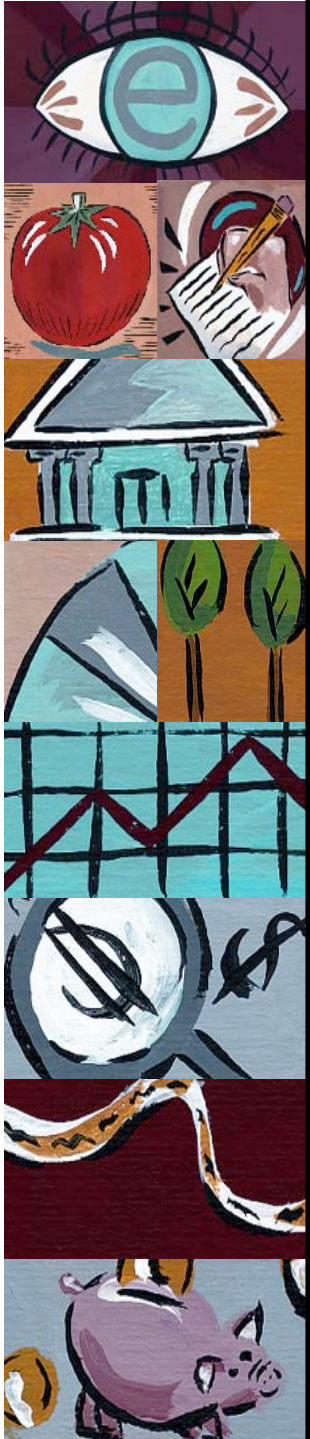
# Price Ceilings

- *Price ceiling* is a legally established maximum price that sellers may charge.
  - Example: rent control
- The direct effect of a price ceiling below the equilibrium price is a *shortage*: quantity demanded exceeds quantity supplied.

# The Impact of a Price Control

- Consider the *rental housing* market where the price (rent)  $P_0$  **would** bring the quantity of rental units **demanded** into balance with the quantity **supplied**.
- A **price ceiling** like  $P_1$  imposes a price below market equilibrium ... causing quantity demanded  $Q_D$  ... to exceed quantity supplied  $Q_S$  ... resulting in a **shortage**.
- Because prices are not allowed to direct the market to equilibrium, non-price elements will become more important in determining where the scarce goods go.





# Effects of Rent Control

- Shortages and black markets will develop.
- The future supply of housing will decline.
- The quality of housing will deteriorate.
- Non-price methods of rationing will increase in importance.
- Inefficient use of housing will result.
- Long-term renters will benefit at the expense of newcomers.

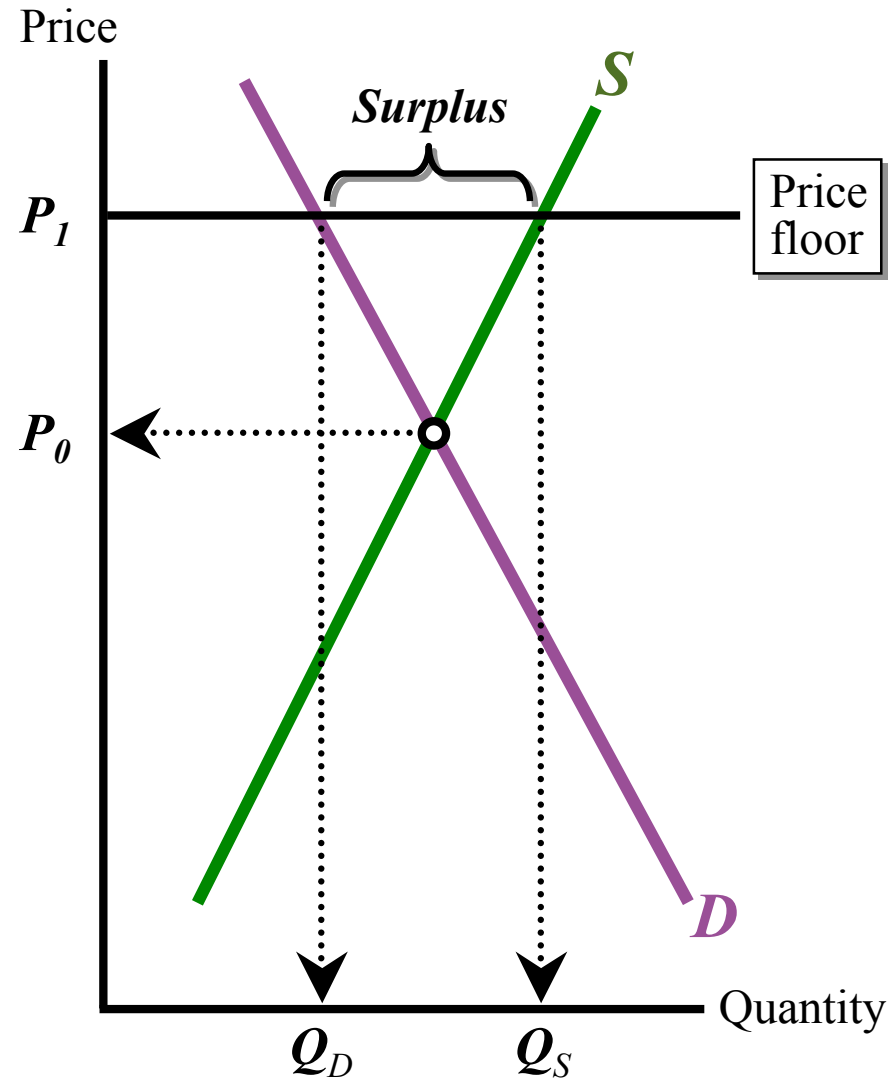


# Price Floor

- *Price floor* is a legally established minimum price that buyers must pay.
  - Example: minimum wage
- The direct effect of a price floor above the equilibrium price is a *surplus*: quantity supplied exceeds quantity demanded.

# The Impact of a Price Floor

- A *price floor* like  $P_1$  imposes a price above market equilibrium ... causing quantity supplied  $Q_D$  ... to exceed quantity demanded  $Q_S$  ... resulting in a *surplus*.
- Because prices are not allowed to direct the market to equilibrium, non-price elements of exchange will become more important in determining where scarce goods go.





# Price Fixing

**How do governments fix exchange rates?**

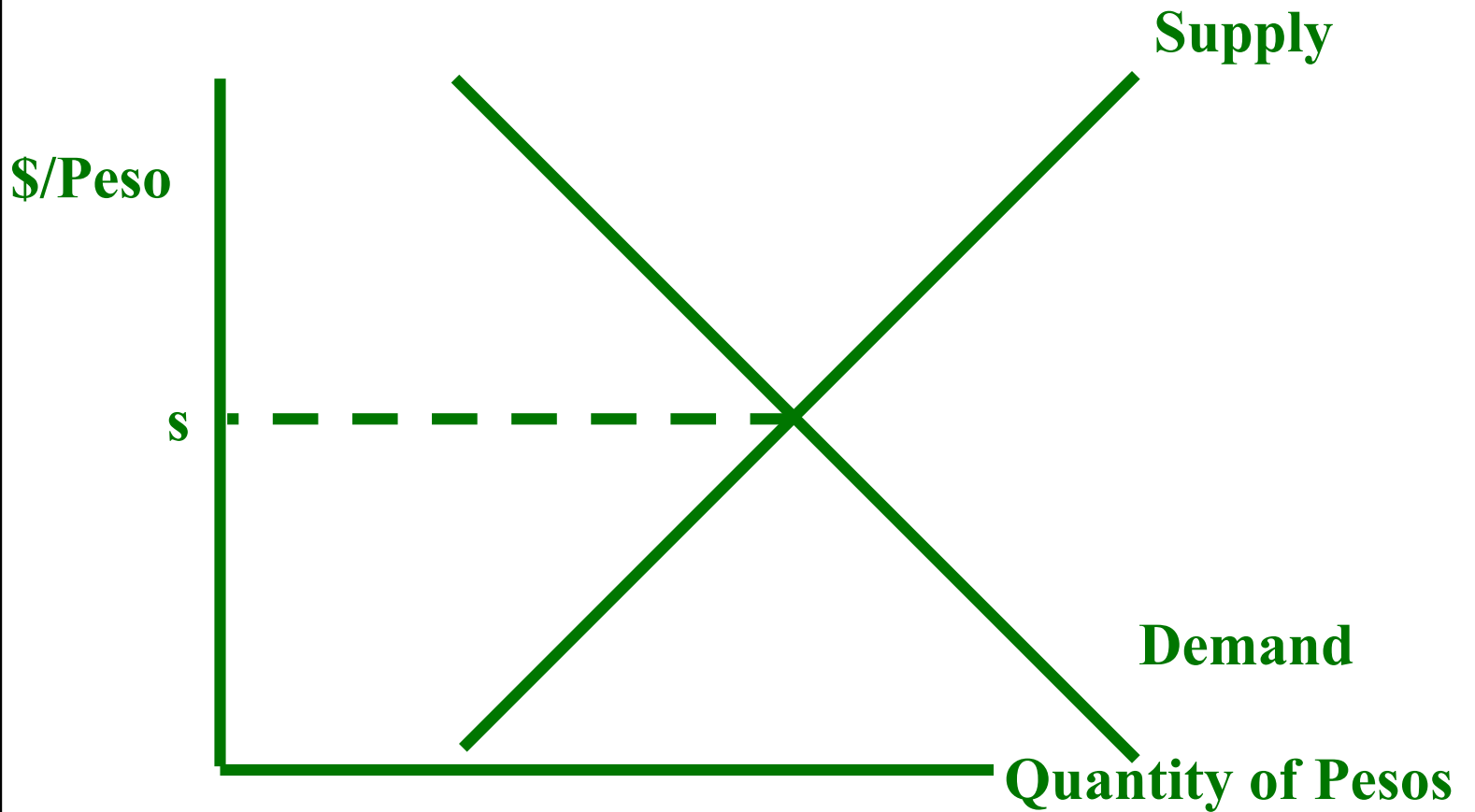
**The same way they fix any other price:**

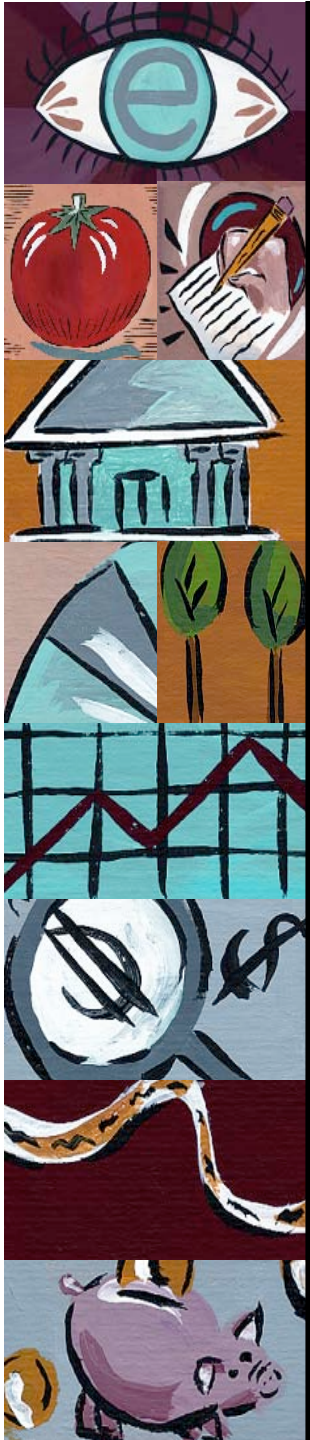
- 1. By controls (much like U.S. price controls in early 1970s). Make trade at a different price illegal.**
- 2. By intervention in the market (like sugar quotas and subsidies). By committing to buy/sell at a certain price.**



# 1. Exchange Rate Controls

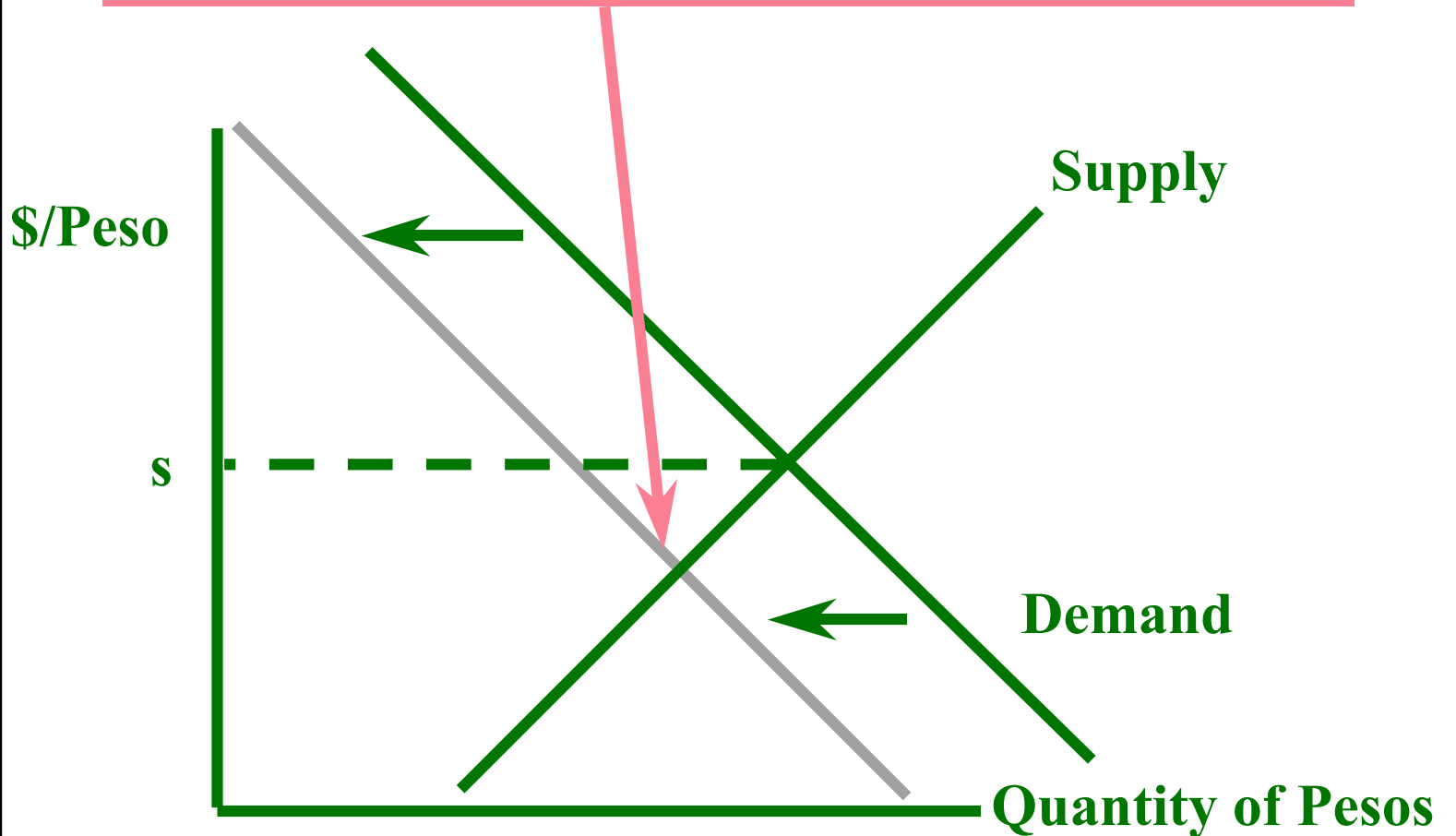
## Supply-demand graph for Mexican Pesos

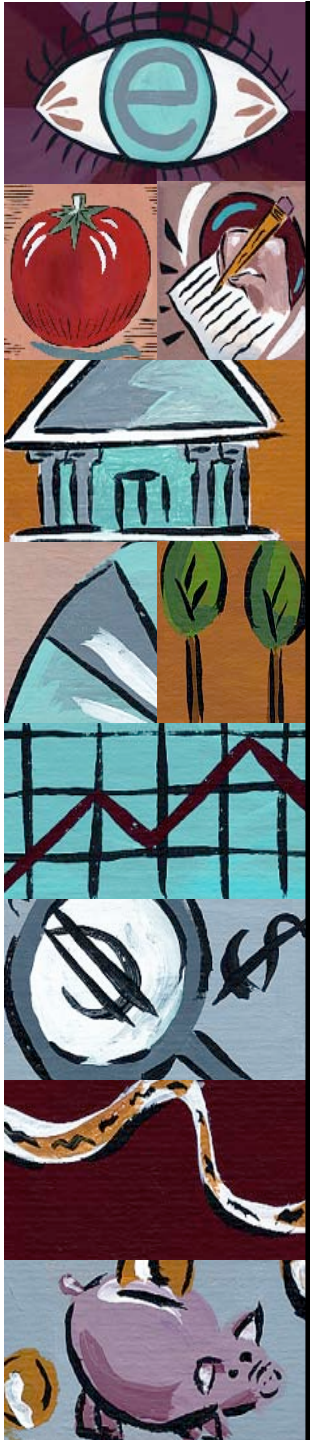




# 1. Exchange Rate Controls

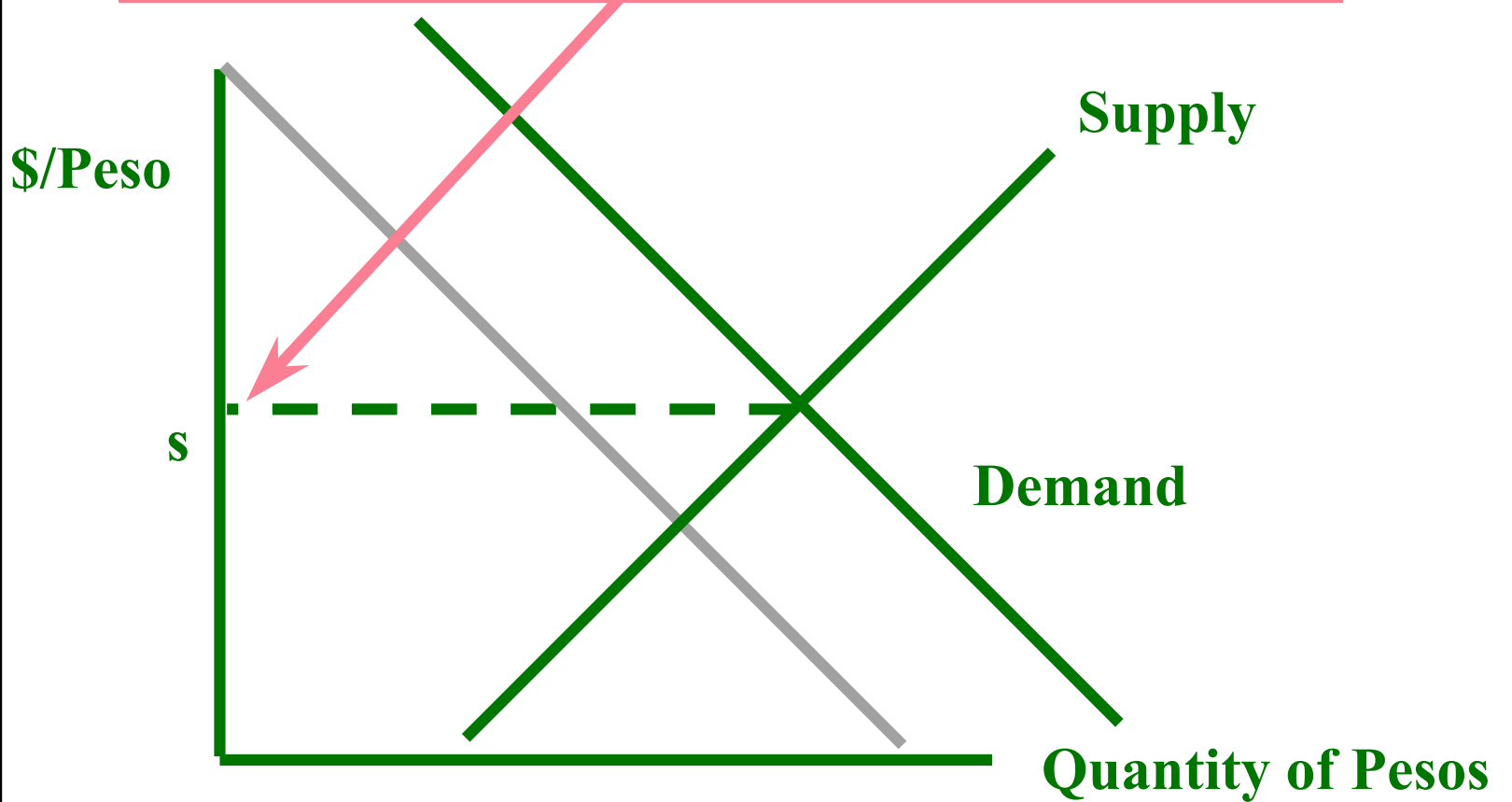
If demand for pesos decreases...

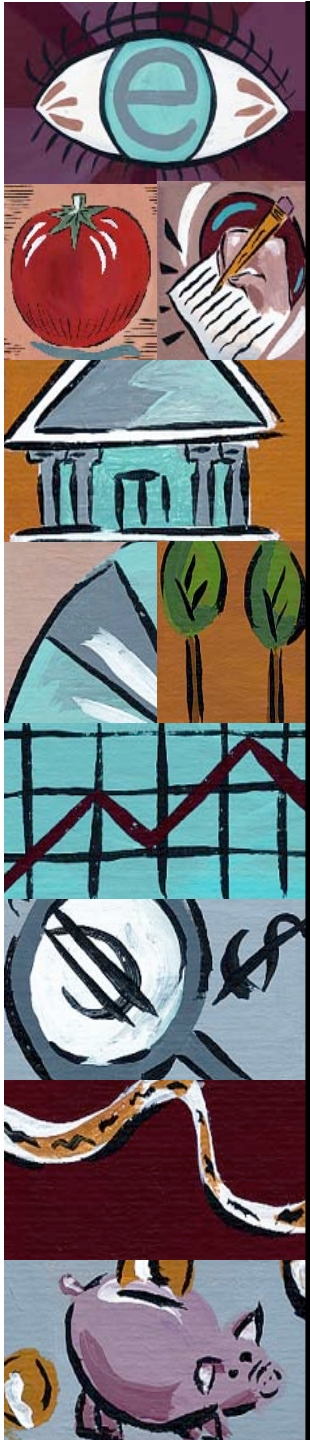




# 1. Exchange Rate Controls

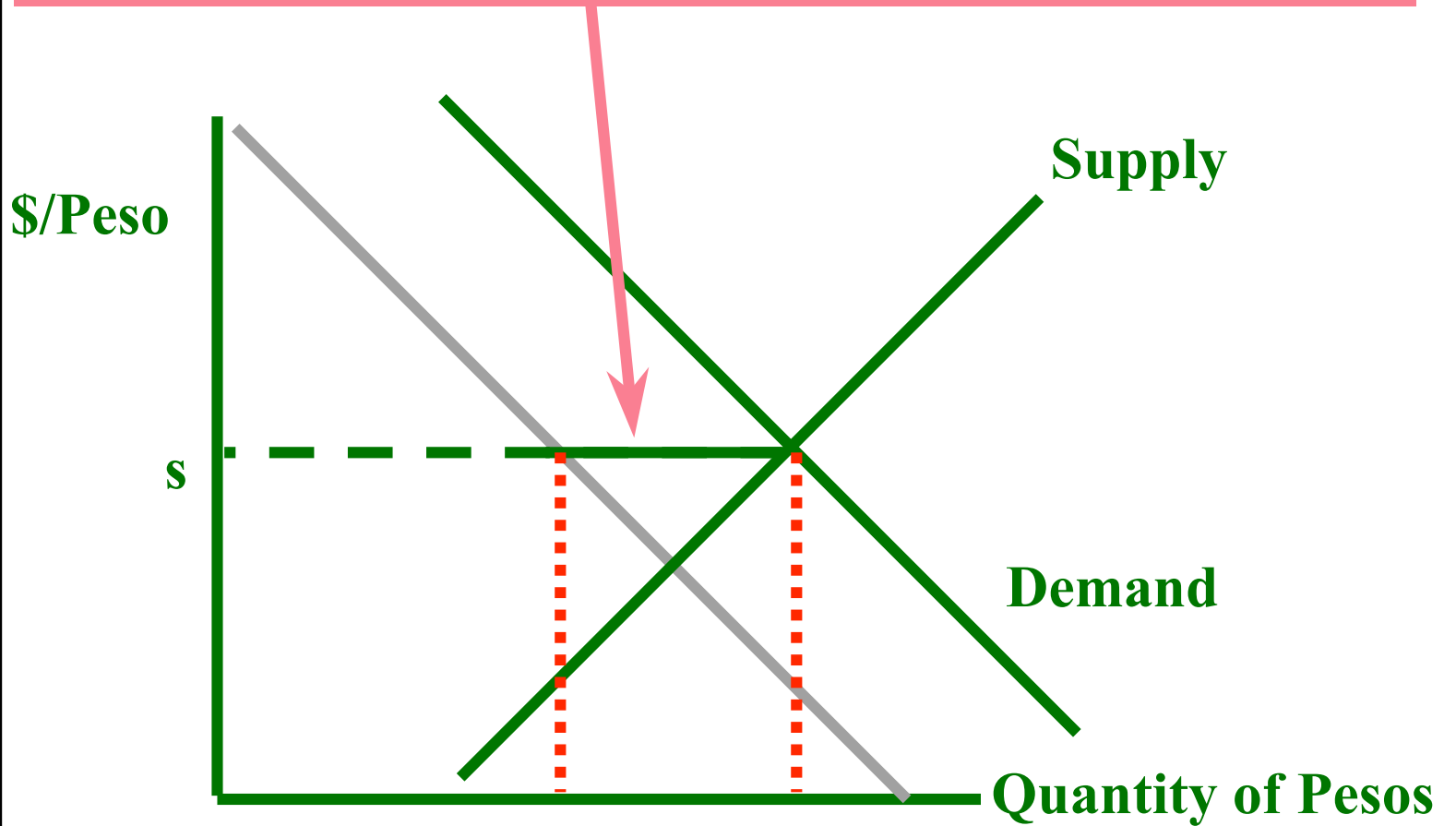
But the Banco Central makes exchanges of FX illegal at any rate other than s...

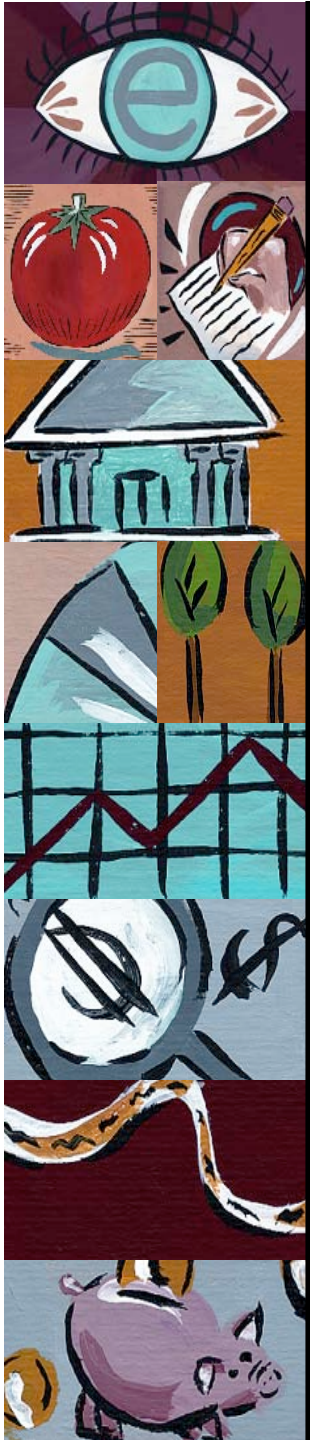




# 1. Exchange Rate Controls

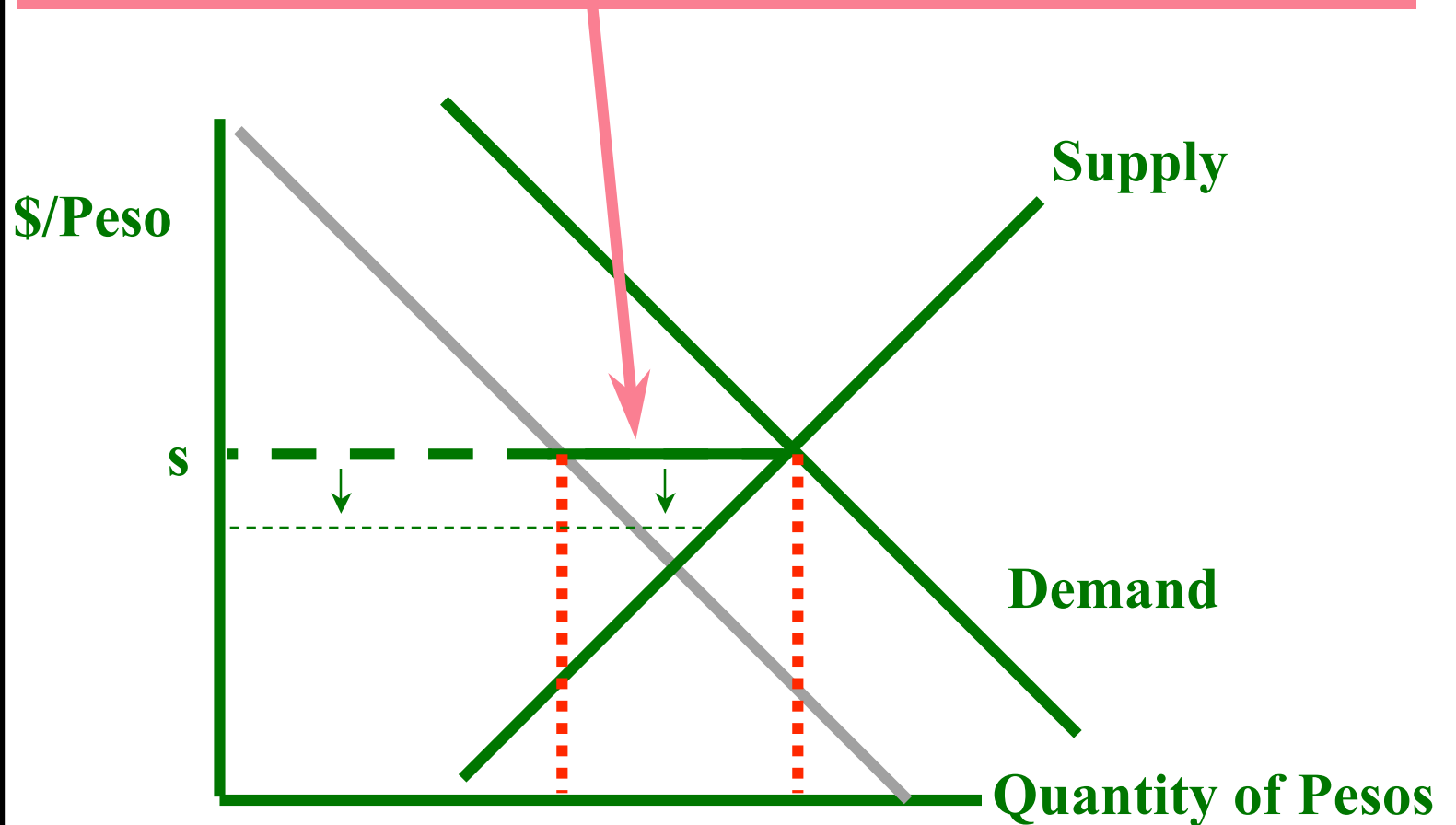
There will be excess supply of pesos (demand for \$) at the fixed exchange rate of s...





# 1. Exchange Rate Controls

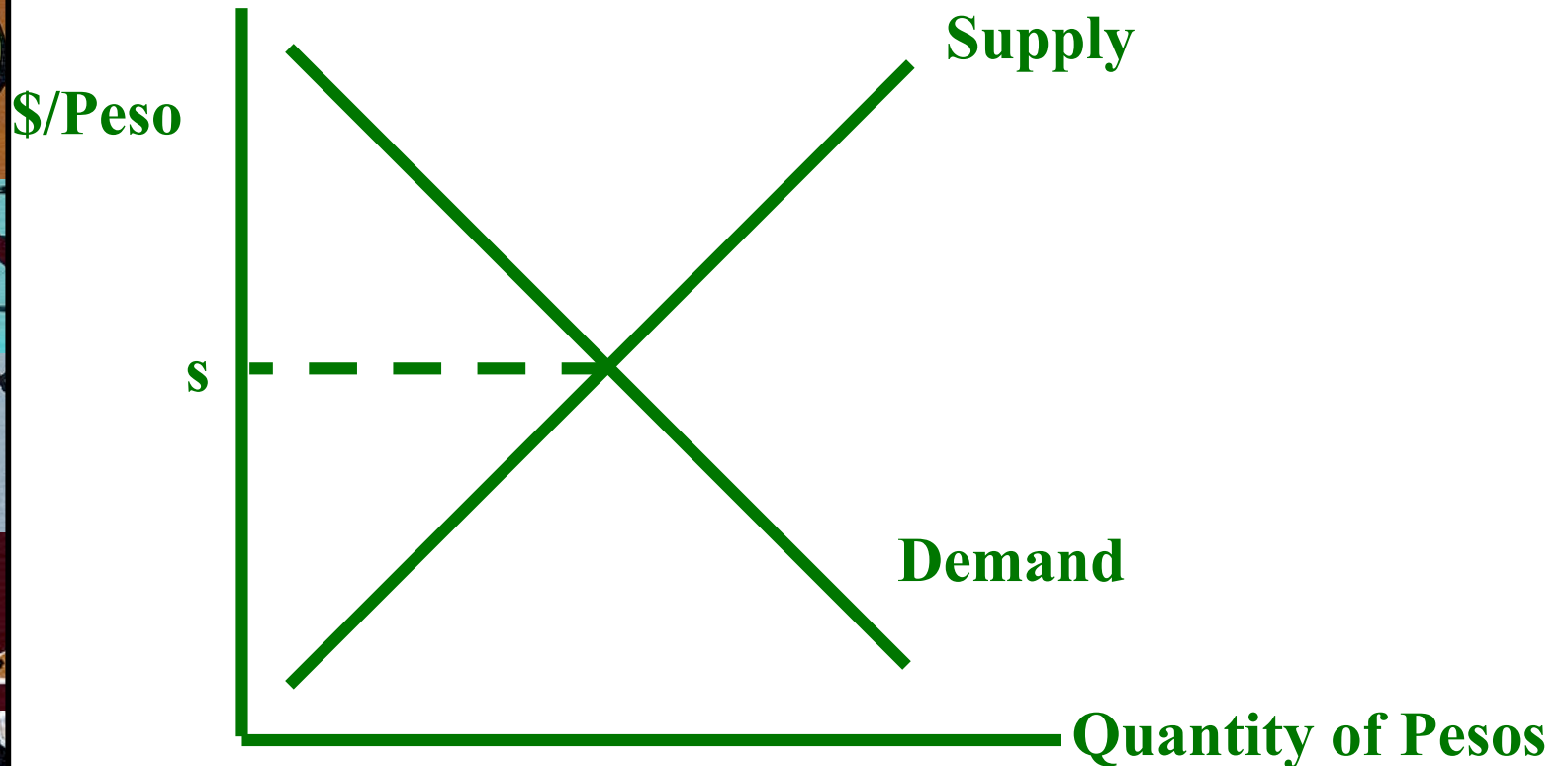
A black market will invariably emerge which trades pesos at a discount relative to the fixed rate.





## 2. Exchange Rate Intervention

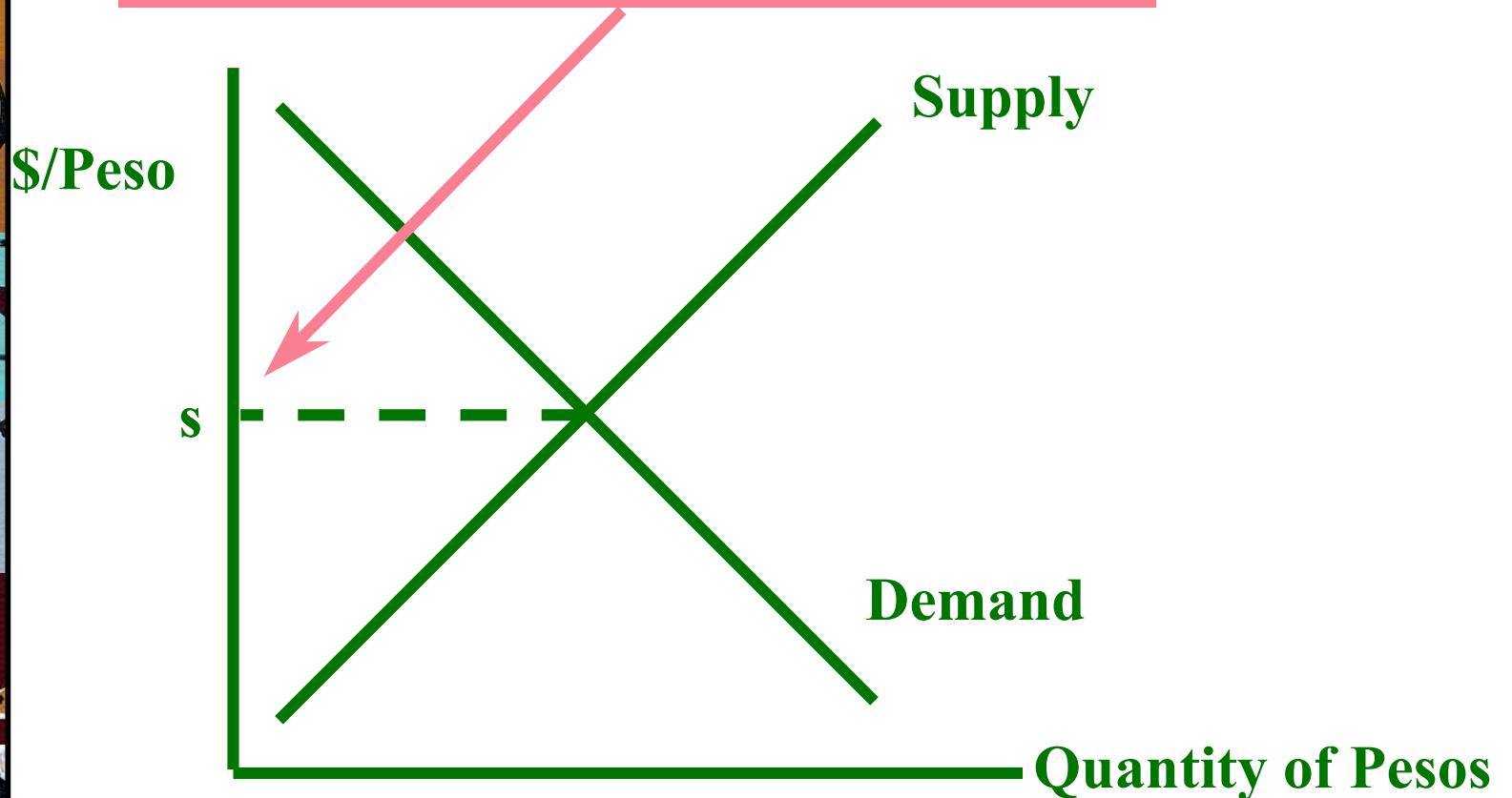
To insure that the exchange rate remains at a constant level, the central bank must purchase/sell FX to ensure supply intersects demand at the appropriate price:

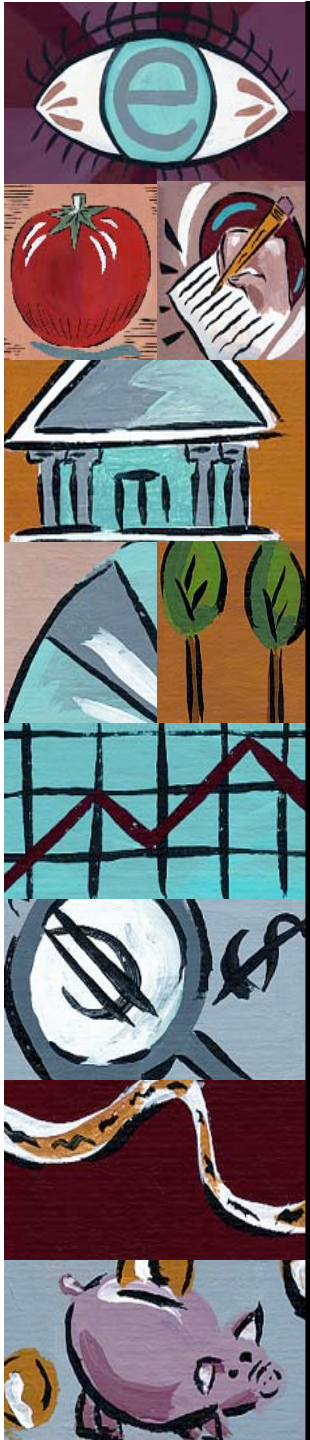




## 2. Exchange Rate Intervention

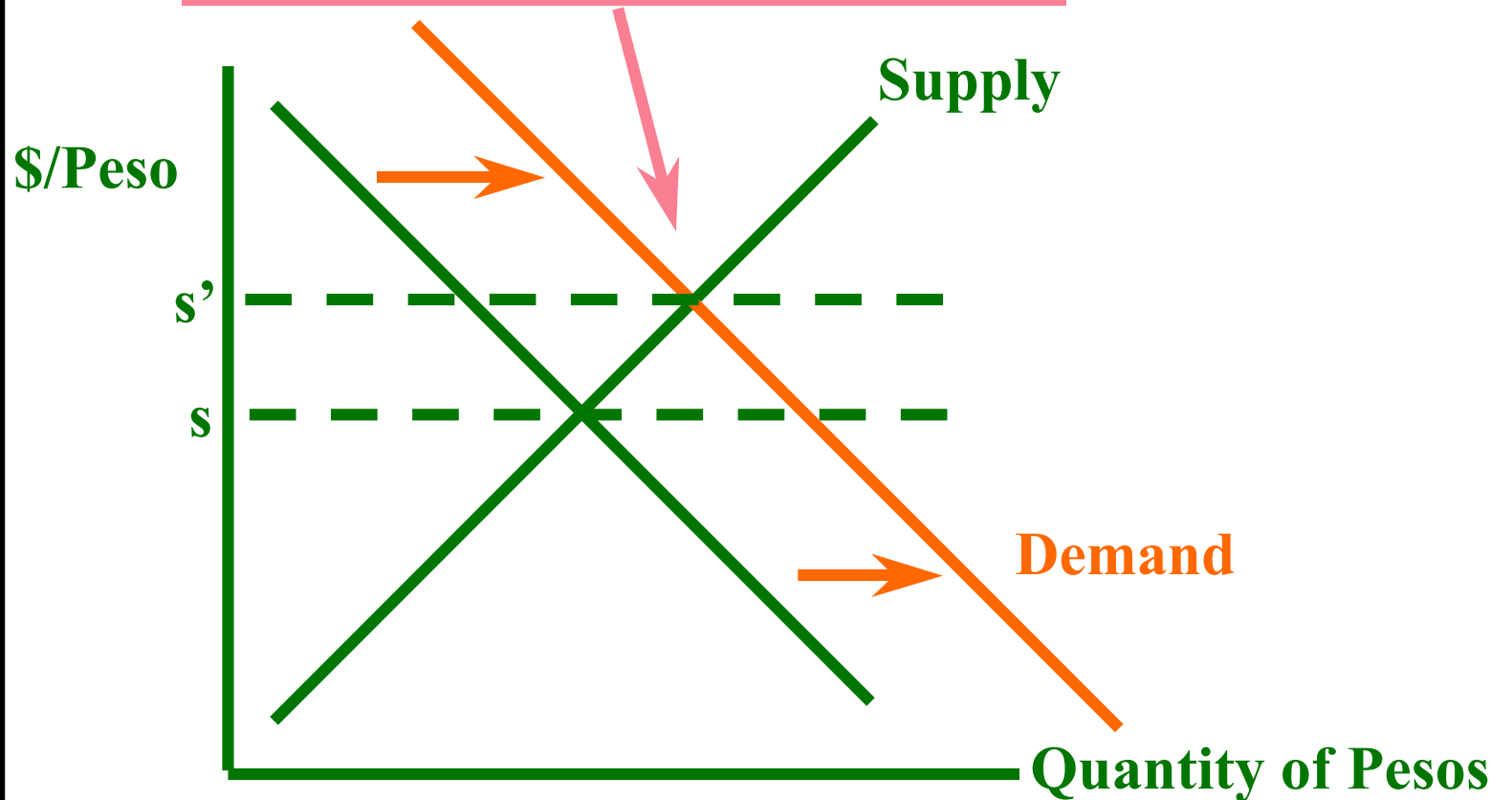
Suppose the central bank is trying to target an exchange rate of  $s$ .

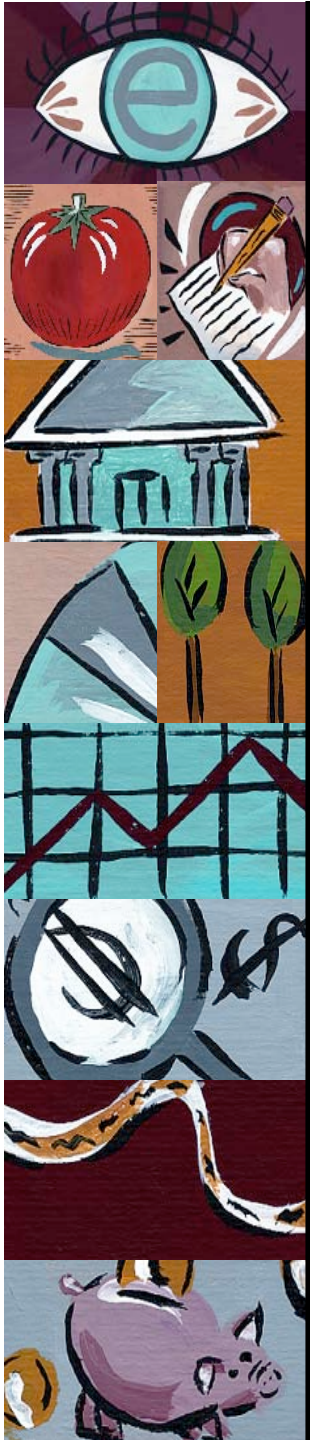




## 2. Exchange Rate Intervention

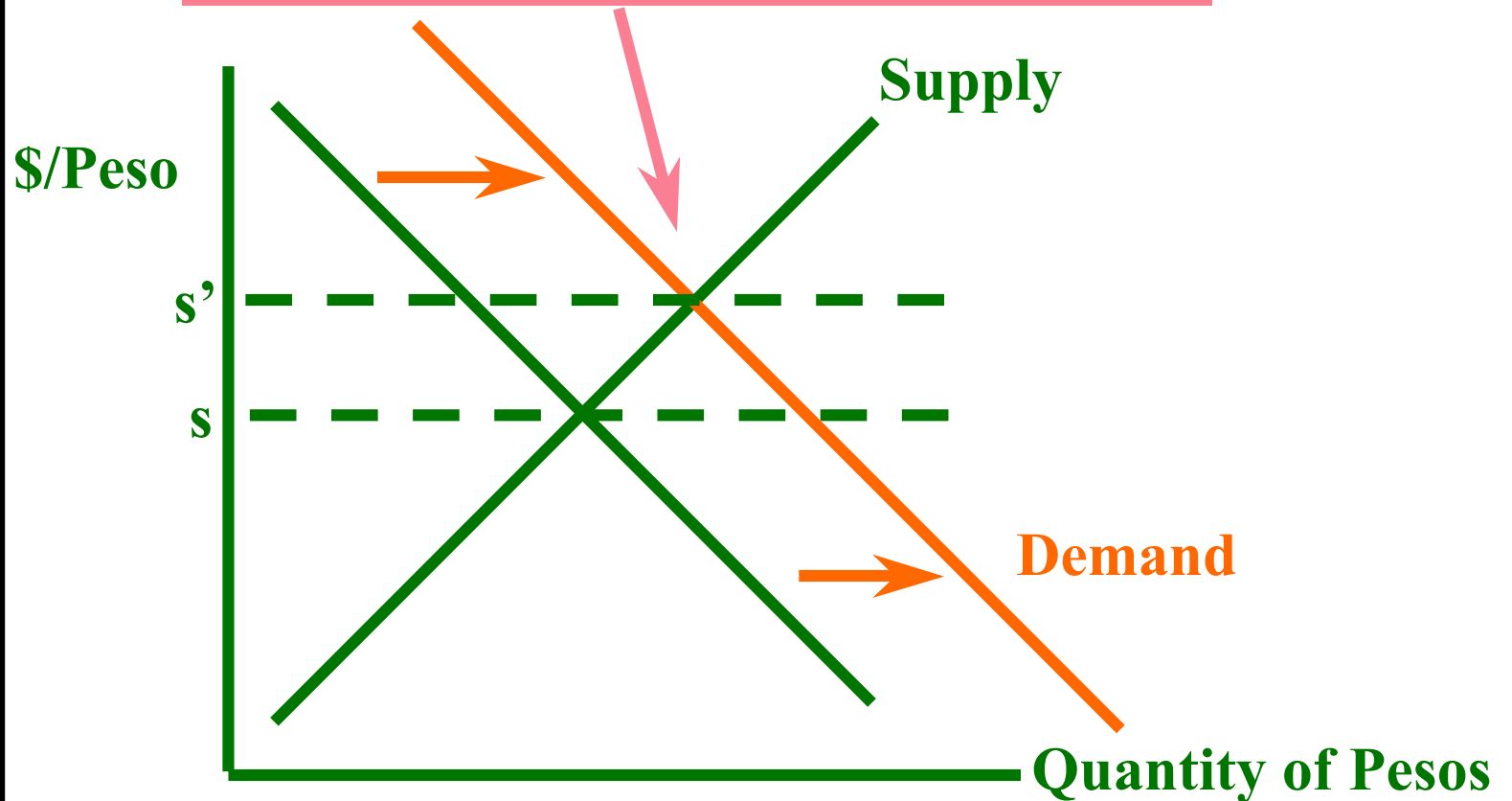
What happens if demand for Pesos increases?





## 2. Exchange Rate Intervention

Unless something is done, the exchange rate will appreciate to  $s'$ .

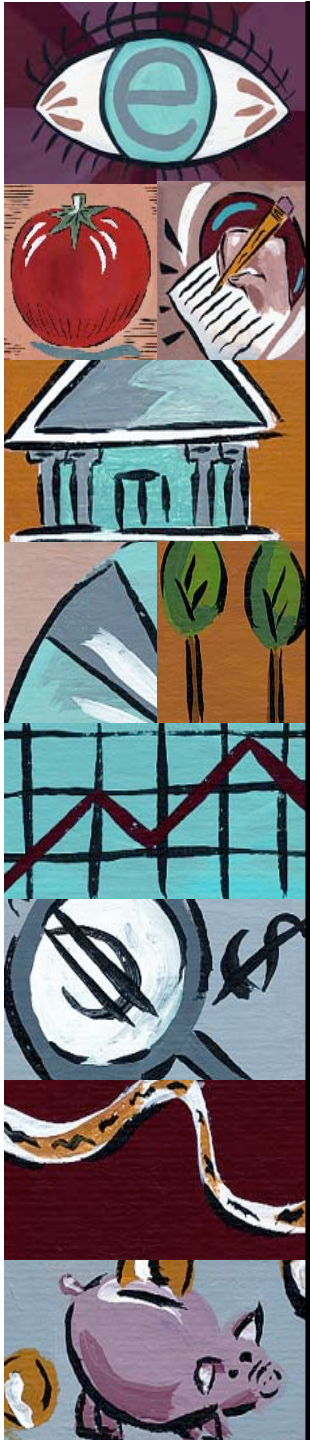




# What can the Banco Central do to keep the price of pesos from rising?

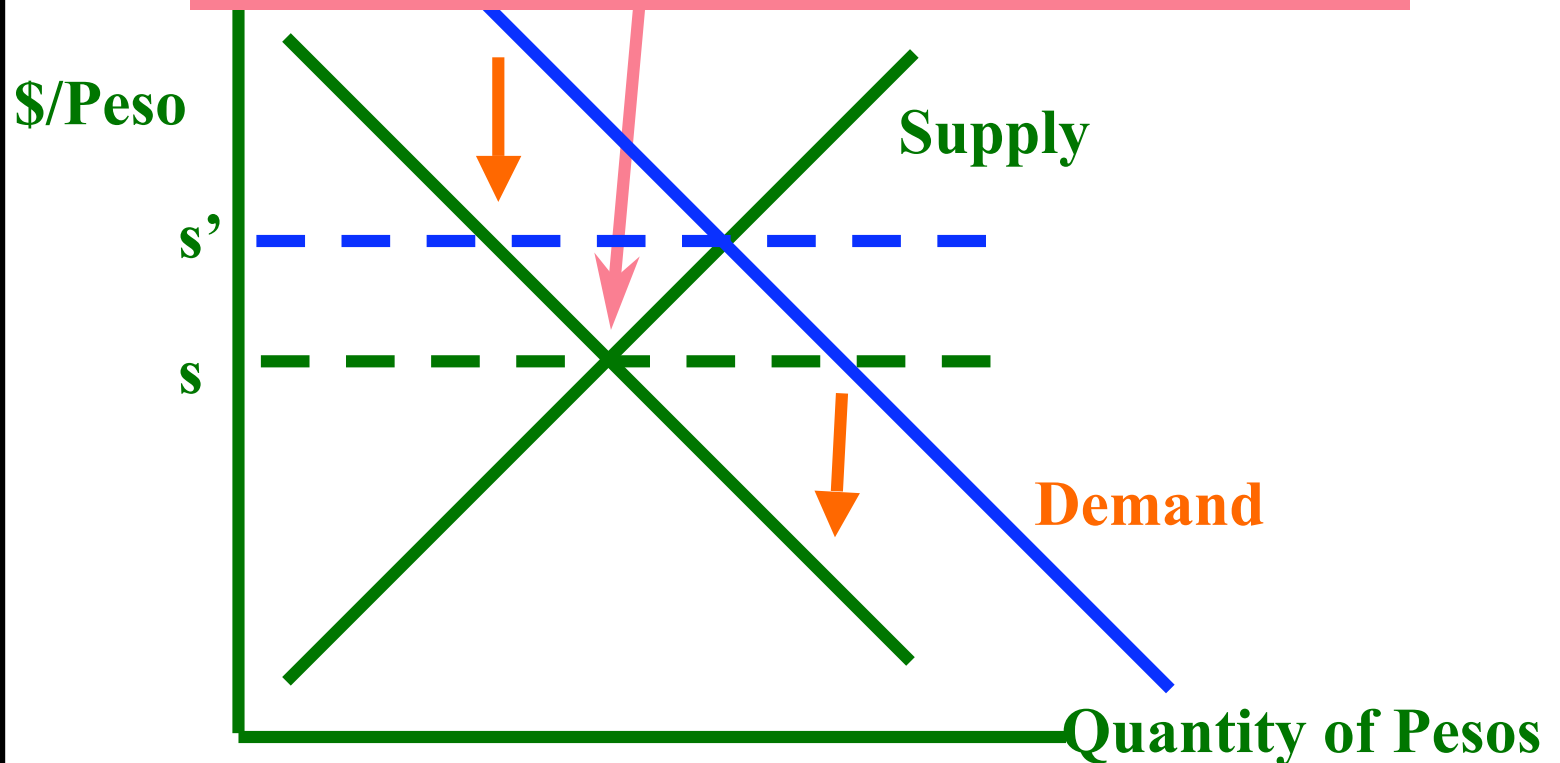
## 3 Options:

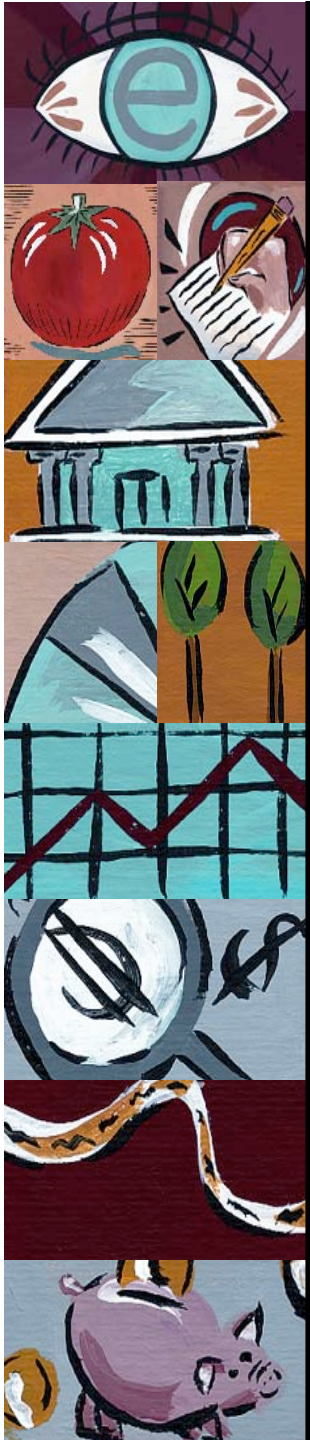
1. Discourage capital inflows. Curb demand.  
Example: Chile.



# Option 1. Discourage Inflows

Enact policies which curb demand for peso (i.e. 'Tobin Taxes') and push intersection back to original level.





# What can the Banco Central do to keep the price of pesos from rising?

## 3 Options:

1. **Discourage capital inflows. Curb demand.**  
**Example: Chile.**

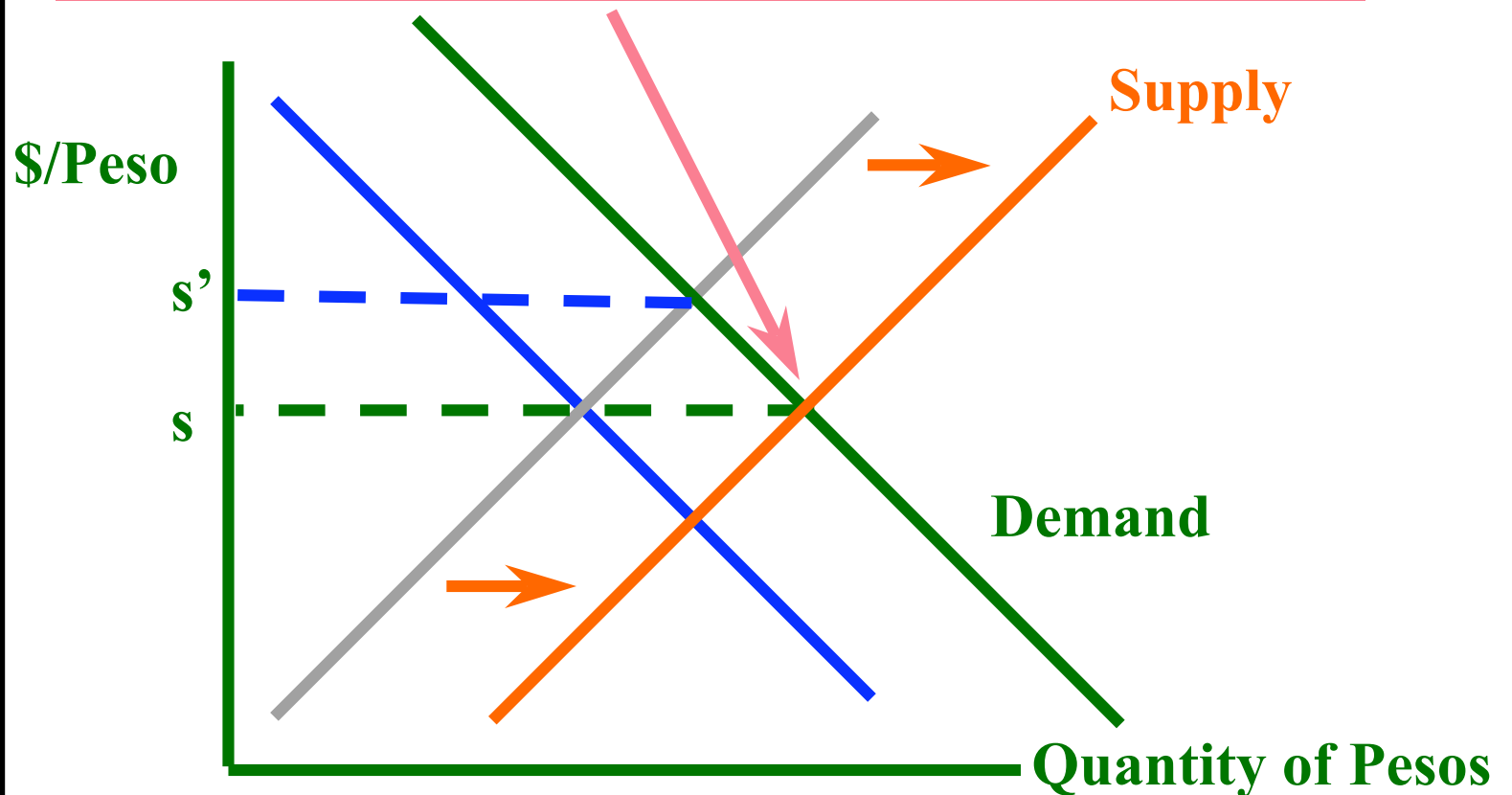
2. **Print Money: Unsterilized Intervention**

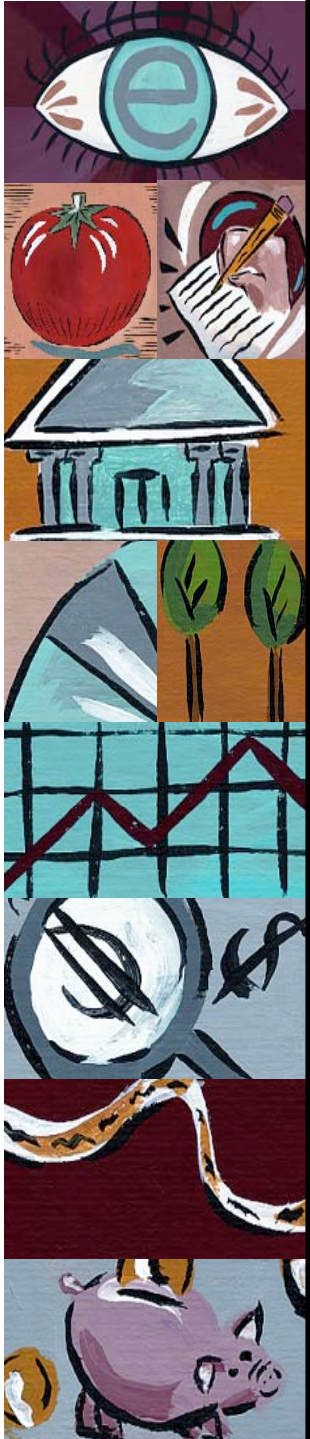
**Supply as many Pesos as the market wants at the fixed exchange rate.**



## Option 2: Unsterilized Intervention

Banco Central offers sufficient peso supply in the FX market to meet demand at  $s$





## Questions for Thought:

---

1. Which of the following can be expected to result from a price ceiling that keeps the price of a product below market equilibrium level?
  - a. A surplus of the product will result.
  - b. A shortage of the product will result.
  - c. Changes in non-price factors that will be favorable to buyers and unfavorable to sellers will occur.
  - d. Changes in non-price factors that will be favorable to sellers and unfavorable to buyers will occur.

**B**

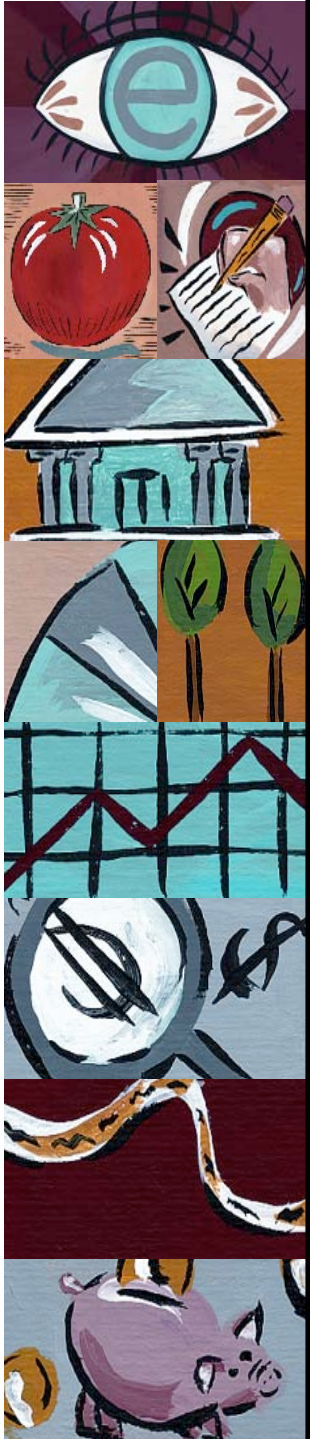


# Black Markets and the Importance of Legal Structure



# Black Markets

- ***Black market:***  
Markets that operate outside the legal system.
  - Either sell illegal items or items at illegal prices or terms.
- ***Black markets*** have a higher incidence of defective products, higher profit rates, and greater use of violence.



# Legal System

- A legal system that provides secure property rights and unbiased enforcement of contracts enhances the operation of markets.



## Questions for Thought:

---

1. How will the operation of black markets differ from the operation of markets when property rights are clearly defined and contracts legally enforceable?



# The Impact of a Tax

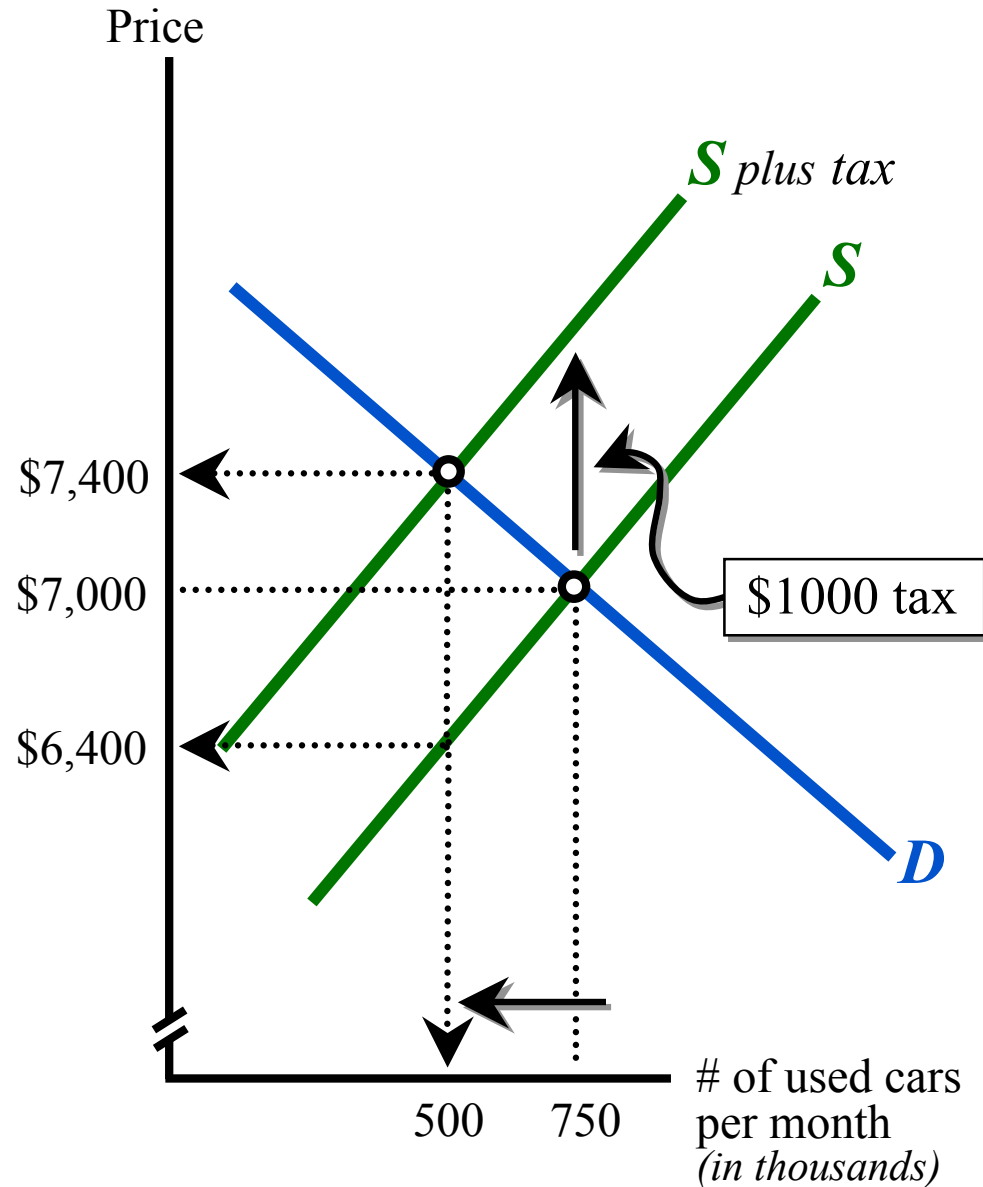


# Tax Incidence

- The legal assignment of who pays a tax is called the *statutory incidence*.
- The actual burden of a tax (*actual incidence*) may differ substantially.
  - The actual burden does not depend who legally pays the tax (statutory incidence).

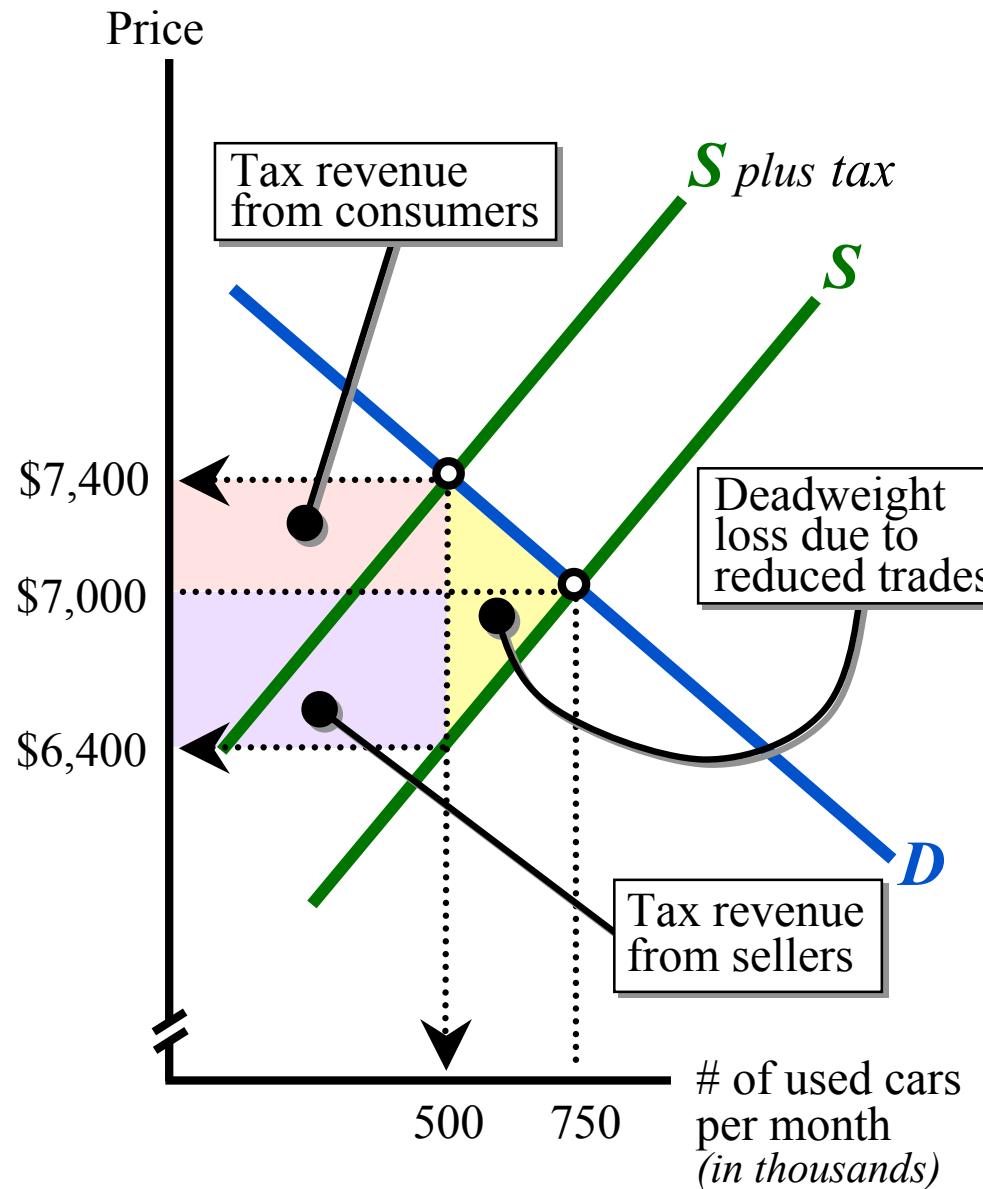
# Impact of a Tax Imposed on Sellers

- Consider the *used car* market where a price of \$7,000 *would* bring the quantity of used cars *demanded* into balance with the quantity *supplied*.
- When a \$1,000 tax is imposed on sellers of used cars, the *supply curve* shifts vertically by the amount of the tax.
- The new price for used cars is \$7,400 ... sellers netting \$6,400 (\$7,400 - \$1000 tax).
- Consumers end up paying \$7,400 instead of \$7,000 and bear \$400 of the *tax burden*.
- Sellers end up receiving \$6,400 (after taxes) instead of \$7000 and bear \$600 of the *tax burden*.



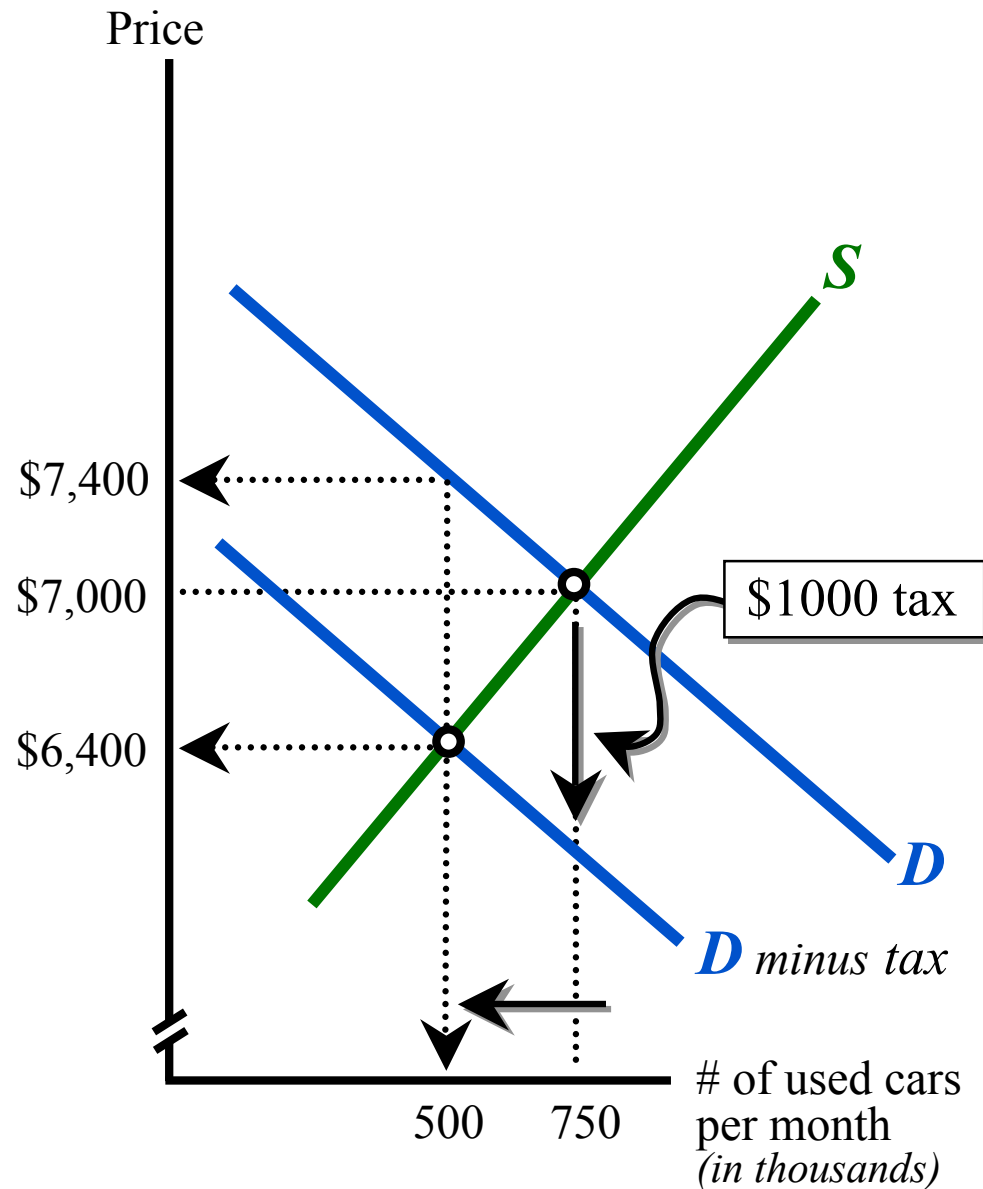
# Impact of a Tax Imposed on Sellers

- The new quantity of used cars that clear the market is 500.
- Consumers bear \$400 of the *tax burden* and so, as there are 500,000 units sold per month, tax revenues derived from consumers = \$200,000,000.
- Sellers bear \$600 of the *tax burden* and so, as there are 500,000 units sold per month, tax revenues derived from the sellers = \$300,000,000.
- As only 500,000 cars are sold after the tax (*instead of 750,000*), the area above the old supply curve and below the demand curve represents the consumer and producer surplus lost from the levying of the tax, called the *deadweight loss to society*.



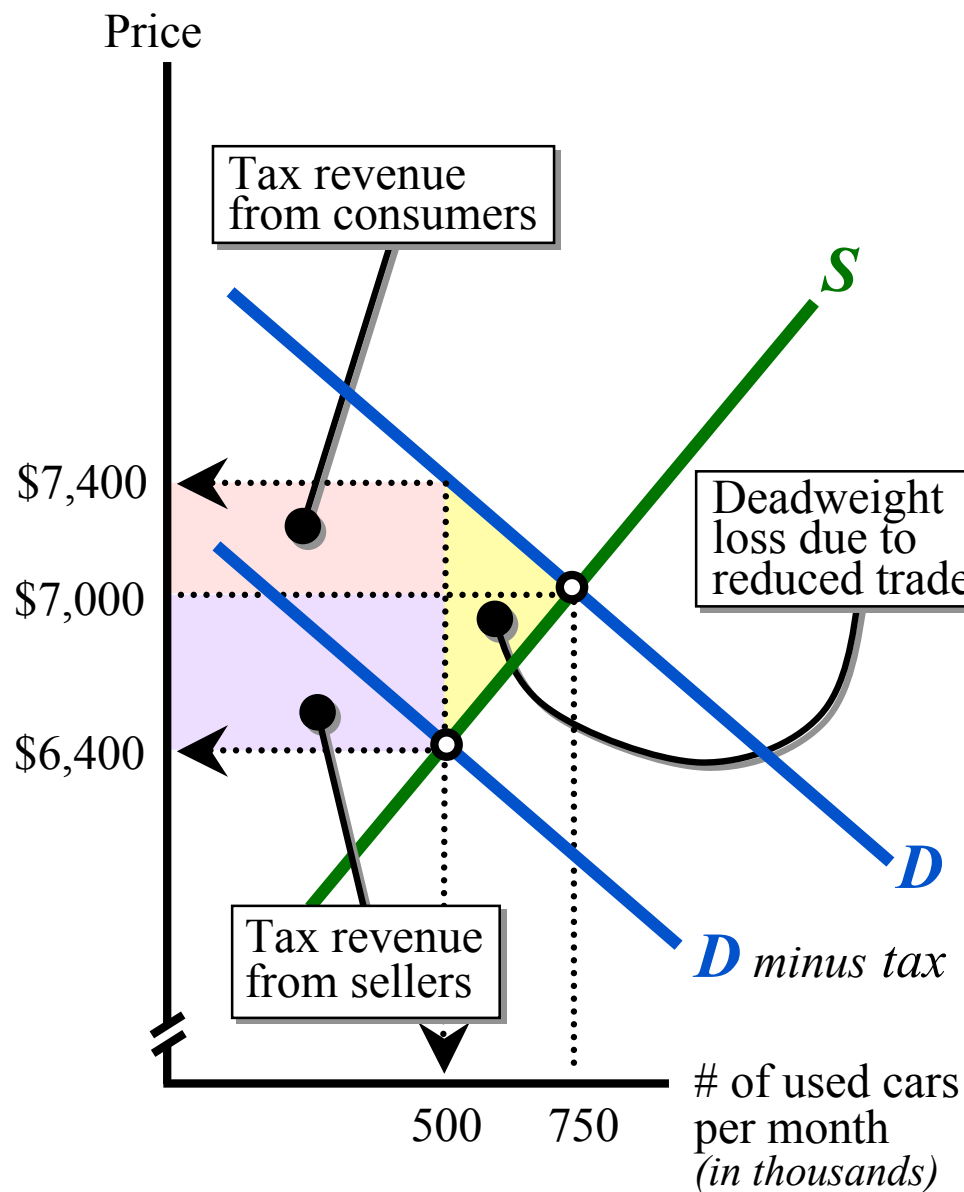
# Impact of a Tax Imposed on Buyers

- Consider the *used car* market where a price of \$7,000 *would* bring the quantity of used cars *demanded* into balance with the quantity *supplied*.
- When a \$1,000 tax is imposed on buyers of used cars, the *demand curve* shifts vertically by the amount of the tax.
- The new price for used cars is \$6,400 ... buyers then pay taxes of \$1000 making the total \$7,400.
- Consumers end up paying \$7,400 (*after taxes*) instead of \$7,000 and bear \$400 of the *tax burden*.
- Sellers end up receiving \$6,400 instead of \$7000 and bear \$600 of the *tax burden*.



# Impact of a Tax Imposed on Buyers

- The new quantity of used cars that clear the market is 500.
- Consumers bear \$400 of the *tax burden* and so, as there are 500,000 units sold per month, tax revenues derived from consumers = \$200,000,000.
- Sellers bear \$600 of the *tax burden* and so, as there are 500,000 units sold per month, tax revenues derived from the sellers = \$300,000,000.
- The area above the supply curve and below the old demand curve represents consumer & producer surplus lost due to the tax – the *deadweight loss to Society*.
- The *incidence of the tax* is the same regardless of whether it is imposed on buyers or sellers.





# Deadweight Loss

- The *deadweight loss of taxation* is the loss of gains resulting from the imposition of a tax.
  - It imposes a burden of taxation over and above the burden of transferring revenues to the government.
  - It is composed of losses to both buyers and sellers.

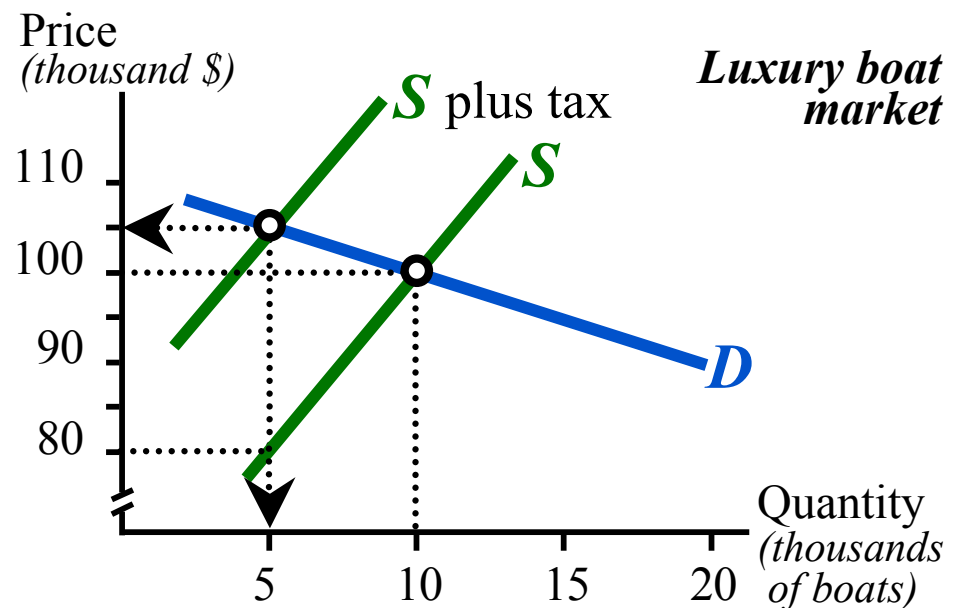
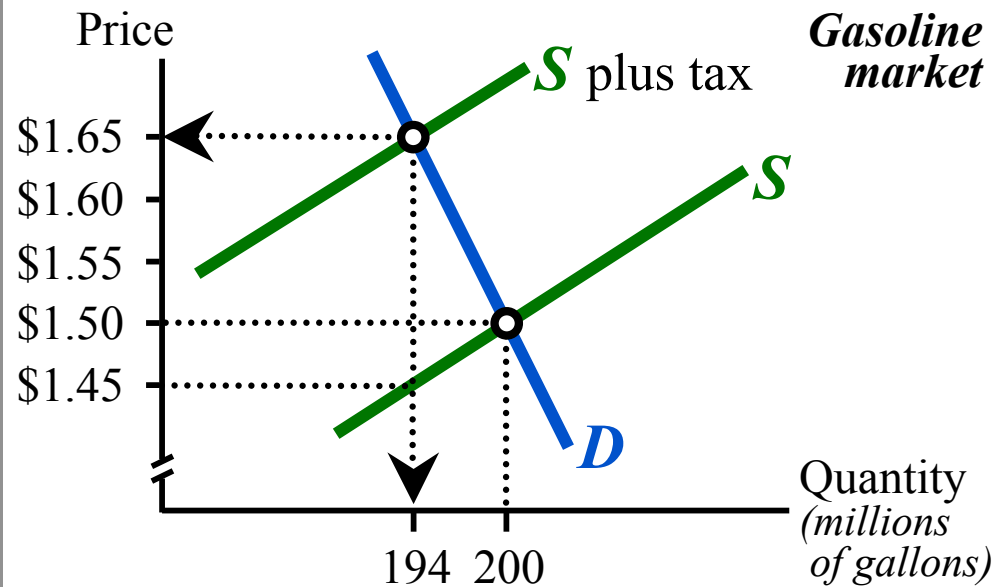


# Elasticity and Incidence of a Tax

- The actual burden of a tax depends on the elasticity of supply and demand.
  - As supply becomes more inelastic, then more of the burden will fall on sellers.
  - As demand becomes more inelastic, then more of the burden will fall on buyers.
- The deadweight loss rises as the elasticity of either the supply curve or the demand curve rises.

# Tax Burden and Elasticity

- Consider the market for *Gasoline* and *Luxury Boats* individually.
- We begin in equilibrium.
- If we impose a \$.20 tax on *gasoline* suppliers, the *supply curve* moves vertically the amount of the tax. Price goes up \$.15 and output falls by 6 million gallons per week.
- If we impose a \$25K tax on *Luxury Boat* suppliers, the *supply curve* moves vertically the amount of the tax. Price goes up by \$5K and output falls by 5 thousand units.
- In the *gas* market, the *demand* is *relatively more inelastic* than its *supply*; hence, buyers bear a larger share of the burden of the tax.
- In the *luxury boats* market, the *supply* curve is *relatively more inelastic* than its *demand*; hence, sellers bear a larger share of the tax burden.





# Tax Rates, Tax Revenues, and the Laffer Curve



# Average Tax Rate

- *Average tax rate* equals tax liability divided by taxable income.
  - *Progressive tax* is one in which the average tax rate *rises* with income.
  - *Proportional tax* is one in which the average tax rate *stays the same* across income levels.
  - *Regressive tax* is one in which the average tax rate *falls* with income.



# Marginal Tax Rate

- *Marginal tax rate:*  
calculated as the change in tax liability divided by the change in taxable income.



# Tax Rate and Tax Base

- ***Tax rate:***  
the rate (%) at which an activity is taxed.
- ***Tax base:***  
the level of the activity that is taxed.
  - The tax base is inversely related to the rate at which the activity is taxed

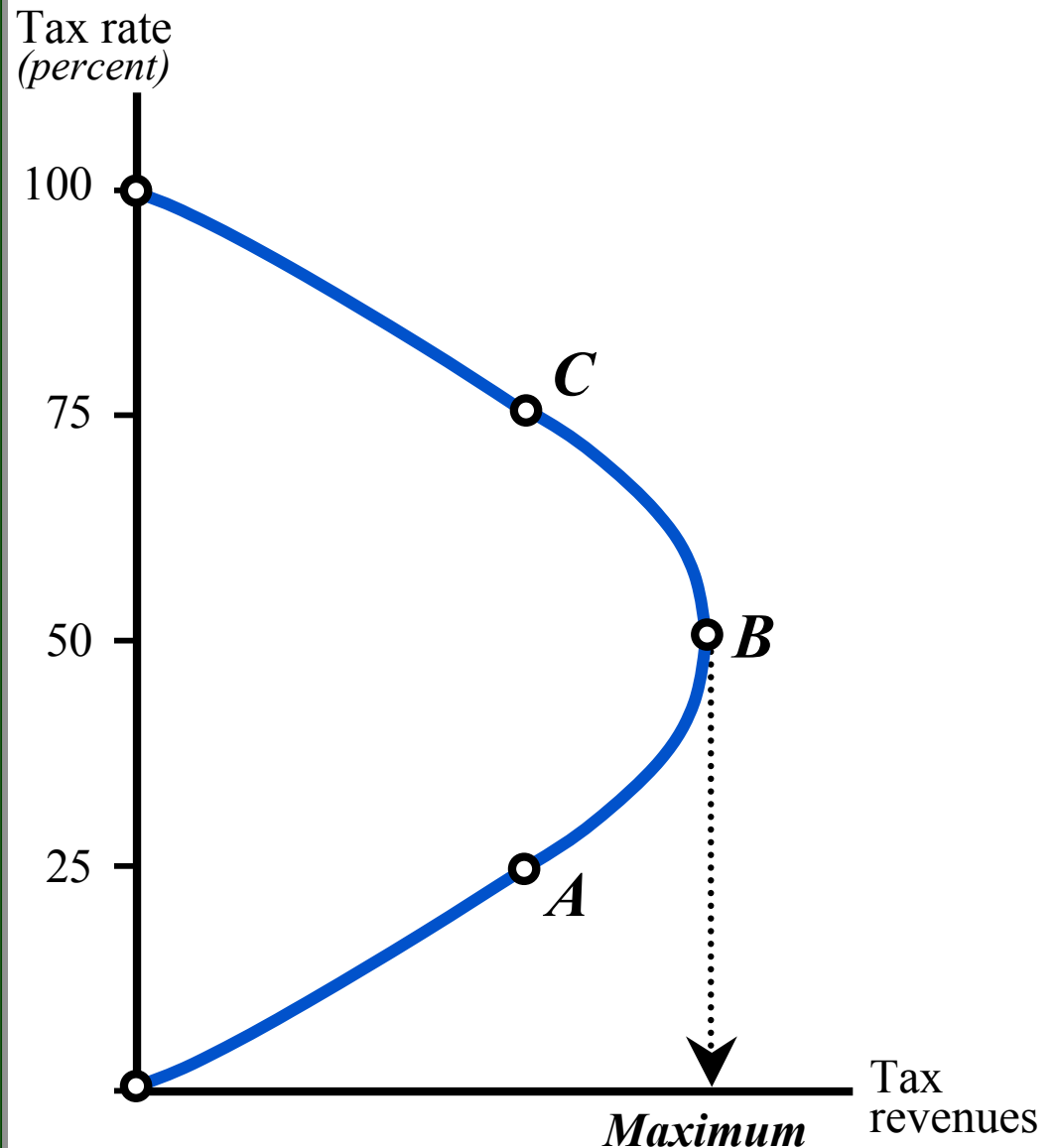


# Laffer Curve

- The *Laffer curve* illustrates the relationship between tax rates and tax revenues.
  - The Laffer Curve shows that tax revenues are low for both high and low tax rates.
  - The point of maximum tax revenue is not optimal because of high excess burden.

# The Laffer Curve

- At a tax rate of 0%, tax revenues would also be equal to \$0.
- At a tax rate of 100%, nobody would work, and thus, tax revenues would be equal to \$0.
- As the tax rates increase from 0% to some level *A*, tax revenues increase despite the fact some individuals choose not to work.
- After some level *B*, increases in tax rates actually cause tax revenues to fall.
- As tax rates approach level *C*, tax revenues continue to fall. This is because the tax base shrinks faster than the increased revenues from higher tax rates.
- There is no presumption that the level of taxes at *B* is the *ideal tax rate*, only that *B maximizes* the tax revenue in the current period.



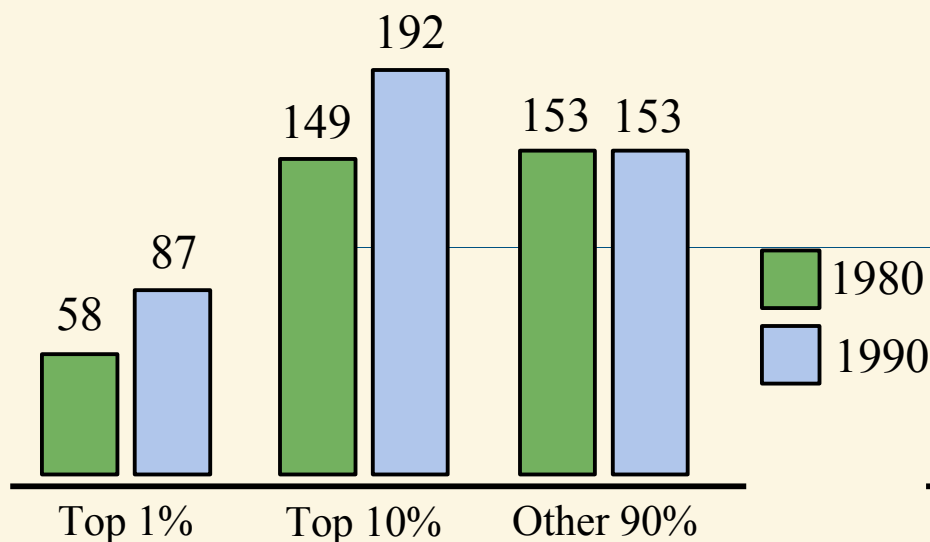


# Laffer Curve and Tax Changes in the 1980s

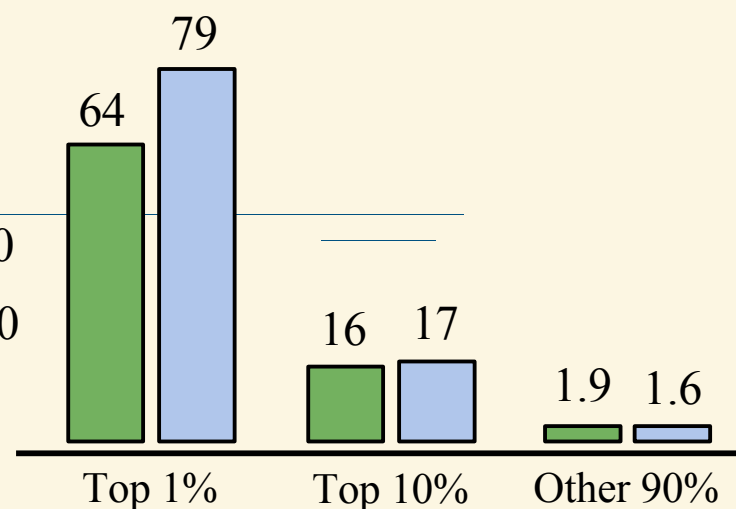
- During the 1980s, the top marginal income tax rate fell from 70% to 33%.
- Need to distinguish between changes in tax rates and changes in tax revenues.
  - Between 1980 and 1990 real income tax revenue collected from the top 1 percent of earners rose a whopping 51.4 percent

# Changes in Taxes Paid in the 1980s

*Personal Income Taxes Paid*  
(by group, billions of 1982-1984 \$)



*Tax Revenue per Return*  
(by group, thousands of 1982-1984 \$)



- Measured in 1982-1984 dollars, personal income taxes paid by the top 1 and 10 percent of income recipients increased between 1980 and 1990 even though their rates were reduced.
- In contrast, tax revenues collected from the other taxpayers was virtually unchanged during the decade.
- Per return, the revenue collected from the top 1% and 10% rose, while the revenue fell for the other taxpayers.



## Questions for Thought:

---

1. The Laffer Curve indicates that:
  - a. an increase in tax rates will always lead to an increase in tax revenues.
  - b. when tax rates are low, an increase in tax rates will generally lead to a reduction in tax revenues.
  - c. when tax rates are high, a rate reduction may lead to an increase in tax revenue.
  - d. the deadweight losses resulting from taxation are small at the tax rate that maximizes the revenues derived by the government.

C



## Questions for Thought:

---

2. The burden of an excise tax imposed on a product will fall primarily on buyers when
  - a. the demand for the product is highly inelastic and supply is relatively elastic.
  - b. the demand for the product is highly elastic and the supply is relatively inelastic.
  - c. the tax is legally imposed on the seller.
  - d. the tax is legally imposed on the buyer. A
  
3. "We should impose a 20 percent luxury tax on expensive automobiles (those with a sales price of more than \$50,000) in order to collect more tax revenue from the wealthy." Will the burden of this tax fall primarily on the wealthy?



# End Chapter 4

◀ [Jump to first page](#) ▶