

Handout 4: Supply, Demand, and Government Policies

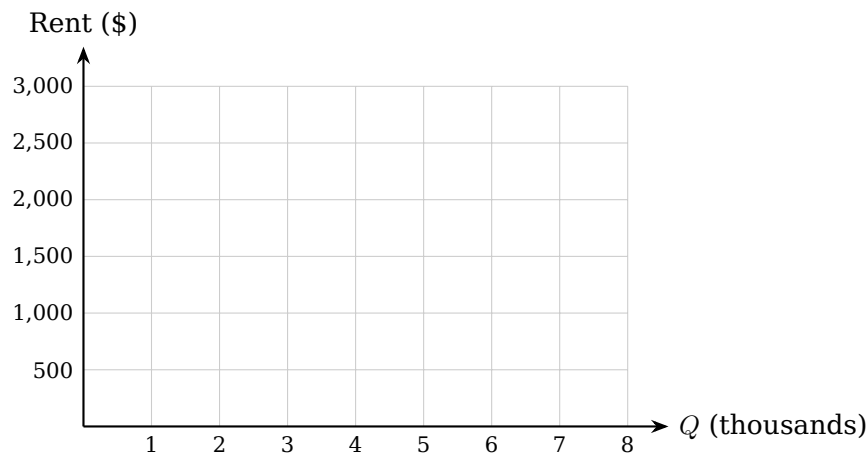
Mankiw Ch 6

Problem 1. Rent control near campus

The market for one-bedroom apartments near campus is described by

$$Q_d = 12,000 - 4P \quad Q_s = 2P$$

where P is the monthly rent in dollars and Q is the number of apartments.



- Draw both curves on the grid. Find the equilibrium rent and number of apartments rented.
- The city caps rents at \$2,500. What happens?
- The city caps rents at \$1,500 instead. Is the cap binding? Find the quantity supplied, the quantity demanded, the shortage or surplus, and the number of apartments actually rented.

- d) The rent can no longer decide who gets the 3,000 apartments. Name two things that will decide it instead. Who gains from the cap, and who loses?

- e) Over several years both curves change to

$$Q_d = 16,000 - 6P \quad Q_s = 4P - 4,000.$$

Check that without the cap the equilibrium is the same as in (a). With the \$1,500 cap, find the shortage and the number of apartments rented now. Why did the curves change this way?

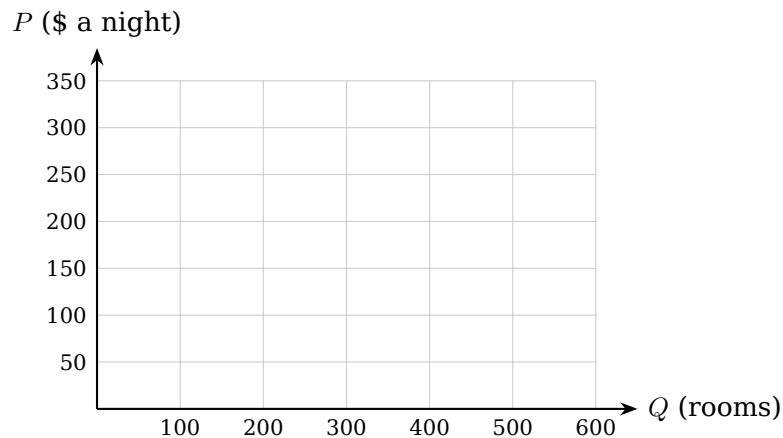
- f) Suppose the city drops the cap and instead gives every renter a \$600 monthly housing voucher, using the short-run curves. Demand shifts up by \$600: $Q_d = 12,000 - 4(P - 600)$, where P is the rent landlords receive. Find the rent landlords receive, what tenants pay out of pocket, and the number of apartments rented.

Problem 2. A hotel room tax

In a Cape Cod town on a summer night, the market for hotel rooms is

$$Q_d = 1,000 - 3P \quad Q_s = 2P - 100$$

where P is the price of a room for one night.



- a) Draw both curves on the grid. Find the equilibrium price and number of rooms.

- b) The town levies a \$50 tax on each room-night, paid by the guest. Write the new demand curve in terms of the price hotels receive. Find the number of rooms rented, the price guests pay, the price hotels keep, and the town's tax revenue per night.

- c) How much of the \$50 do guests bear, and how much do hotels bear?

- d) Now suppose the law puts the \$50 tax on the hotels instead. Show that nothing changes.

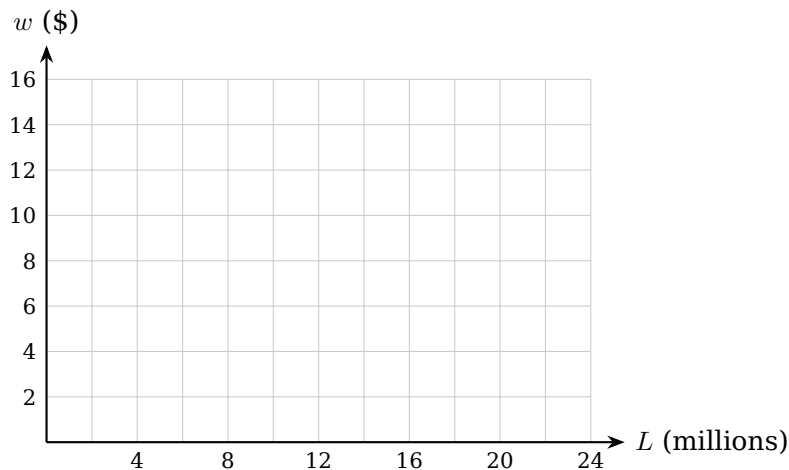
- e) On the slides (\$40 tax, $Q_d = 400 - P$, $Q_s = 3P$) buyers bore \$30 of \$40. Here guests bear only \$20 of \$50. Compute the price elasticities of demand and supply at the equilibrium, and explain the difference.
- f) The town doubles the tax to \$100. Does its revenue double?

Problem 3. Minimum wage or wage subsidy?

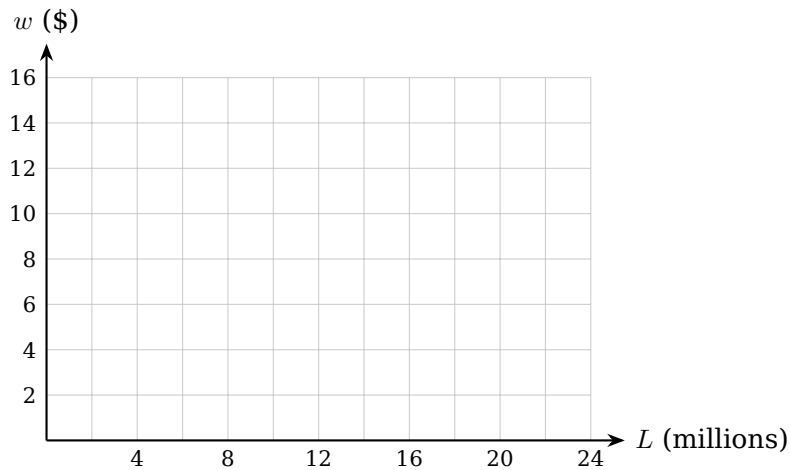
The labor market for unskilled workers is described by

$$L_D = 60 - 4w \quad L_S = 2w - 12$$

where L_D is the number of workers (in millions) firms want to hire, L_S the number who want to work, and w the hourly wage in dollars. The number unemployed is $L_S - L_D$, and the unemployment rate is (number unemployed)/ L_S .



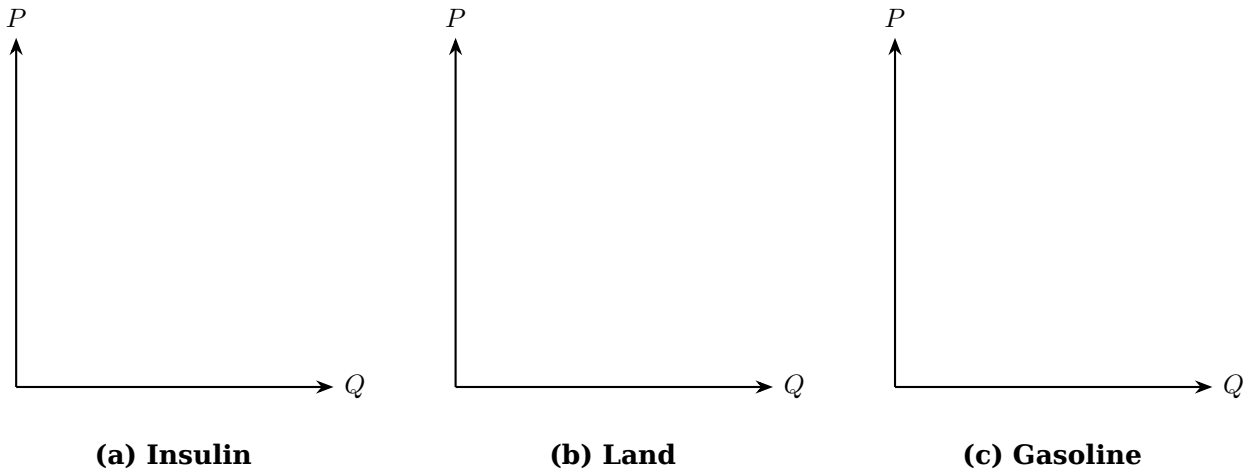
- Draw both curves on the grid, marking where each meets the wage axis. Find the equilibrium wage and employment.
- The government sets a minimum wage of \$12.50. Is it binding? Find labor demanded, labor supplied, the number unemployed and the unemployment rate.
- Using the equilibrium and the point in (b), compute the midpoint wage elasticities of labor demand and of labor supply. Which one decides how many jobs the minimum wage destroys?
- In the long run, would you expect the number unemployed at a \$12.50 minimum to rise or fall? The unemployment rate? Explain using elasticity.



- e) The minimum wage is raised to \$13. Find employment, the number unemployed, and the unemployment rate. Compare total wage income of unskilled workers ($w \times \text{employment}$) with the no-minimum equilibrium.
- f) Instead of a minimum wage, the government pays workers \$1.50 for every hour they work (a wage subsidy, roughly like the Earned Income Tax Credit). A subsidy is a tax in reverse: workers now need \$1.50 *less* from the employer to supply the same labor, so labor supply shifts *down* by \$1.50: $L_S = 2(w + 1.5) - 12$, where w is the wage firms pay. Find the wage firms pay, what workers take home, employment, and the cost to the government.
- g) Workers take home \$13 an hour under both policies. Compare them: how many work, and who pays?

Problem 4. Who really pays?

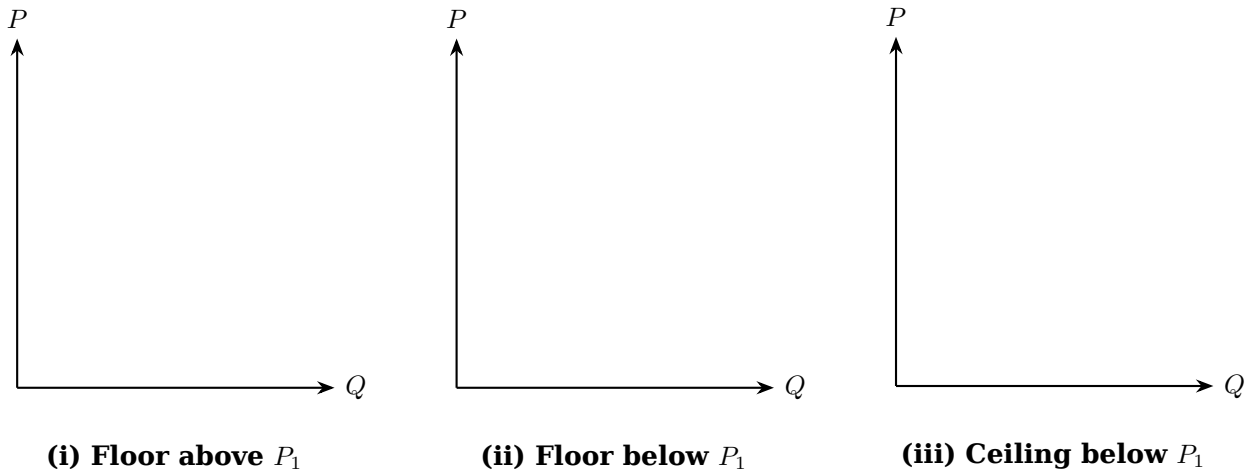
For (a)–(c), draw the market with the tax, say which side is less elastic, and say who bears most of the tax.



- a) A \$20 tax on each vial of insulin, sent to the government by pharmacies.
- b) A tax on land in a city, paid by landowners. The amount of land cannot change.
- c) A town adds a 20-cent tax on each gallon of gasoline. The next town, five minutes away, does not.
- d) Congress moves the whole 15.3% payroll tax onto employers, so workers' paychecks no longer show a deduction. Will workers' take-home pay rise?
- e) In the Fenway example on the slides (25,000 seats, a \$10 tax on fans, who paid \$60), Boston moves the tax to the Red Sox. What happens to the price fans pay, the price the Red Sox keep, and the number of tickets sold?

Problem 5. Legalizing cannabis

A state legalizes cannabis: licensed shops may now sell it. Illegal dealers still operate and sell the same product, and the two are close substitutes: many buyers switch when legal cannabis costs more or is out of stock. Let P_1 be the equilibrium price in the legal market.



- a) The state sets a minimum price (a price floor) for legal cannabis. Show its effect on the legal market when (i) the floor is above P_1 and (ii) the floor is below P_1 . What happens to legal consumption in each case?
- b) With a binding floor, what happens to the illegal market?

- c) The state instead sets a binding maximum price (a price ceiling). Show its effect in (iii). What happens in the legal market and in the illegal market, in the short run and in the long run?
- d) States that legalize cannabis tax it rather than fix its price. Using your answers, explain why a tax is a better tool than a floor or a ceiling if the goal is to move buyers out of the illegal market.