Econ 301: Microeconomic Analysis

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Industry Supply

Motivation

- Last time we looked at supply decision of one firm
- Now we figure out what the supply decision of the whole industry will be
- For this section, we are still assuming a competitive market

The Industry Supply Curves in the Short Run

- Suppose there are n firms, each with supply curve $S_i(p)$
- Then the *industry supply curve* is

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- Note that individual supply curves add horizontally

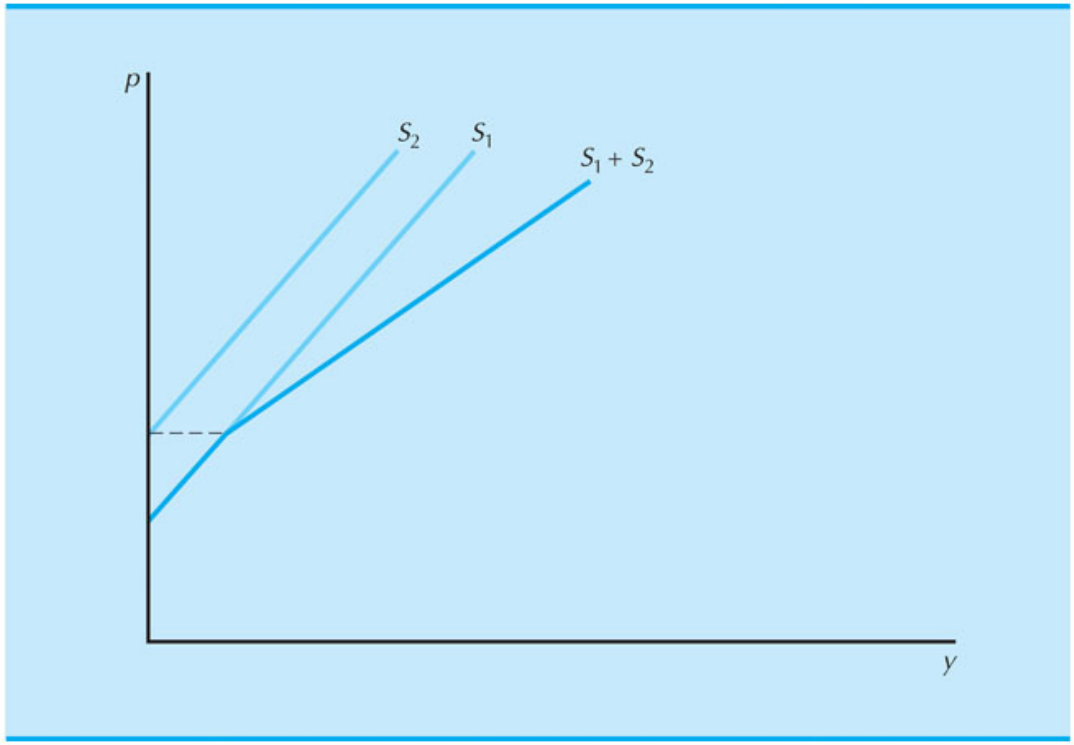

Figure 24.1

Industry Equilibrium in the Short Run

- We know that equilibrium price is derived from $y^* = S(p^*) = D(p^*)$
- What are the possible equilibrium profits for the firm in the short run?
  - Zero profits: $p^* = \frac{c(y^*)}{y^*} = AC(y^*)$
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    - Note that this means price is equal to the minimum of the AC curve
  - Positive profits: $p^* > AC(y^*)$
  - Negative profits: $p^* < AC(y^*)$
    - OK as long as we are not below shutdown condition
    - That is, must have $p^* > AVC(y^*)$, ie equilibrium price above the AVC curve

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  - Can't have negative profits in LR; otherwise firms would *exit* the market
  - Can't have positive profits in LR; otherwise firms would *enter* the market
- Thus firm profits must be zero in the long run
  - Note this just means industry is not growing
  - All inputs are still getting paid for
- One caveat: assuming *free entry into industry*
  - No *barriers to entry* put up by government or incumbent firms

The Long Run Supply Curve

- Suppose there are many firms with identical cost function $c(y)$
- Write p^* for the price equal to the minimum of the average cost curve for any one firm
- As firms enter one-by-one, industry supply curve moves out and becomes steeper
- Firms will enter until adding one more firm will lower equilibrium price below p^*
  - Beyond this point, profits for all firms will be negative
- If the number of firms entering is very large (which we are assuming anyways), then the **LR supply curve is flat (ie perfectly elastic) at price** p^*

Long Run Supply: Graphically, Part 1

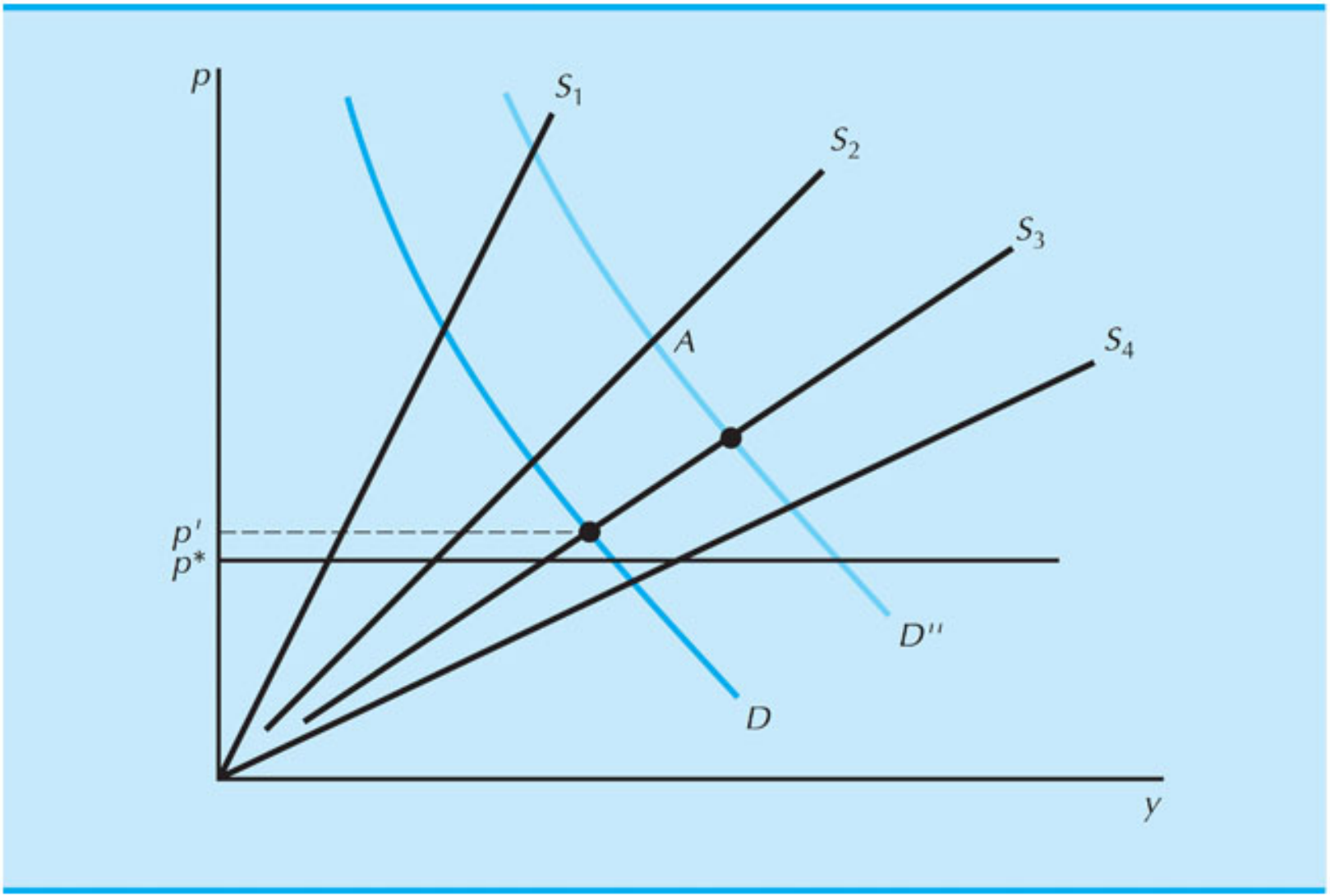

Figure 24.3

Long Run Supply: Graphically, Part 2

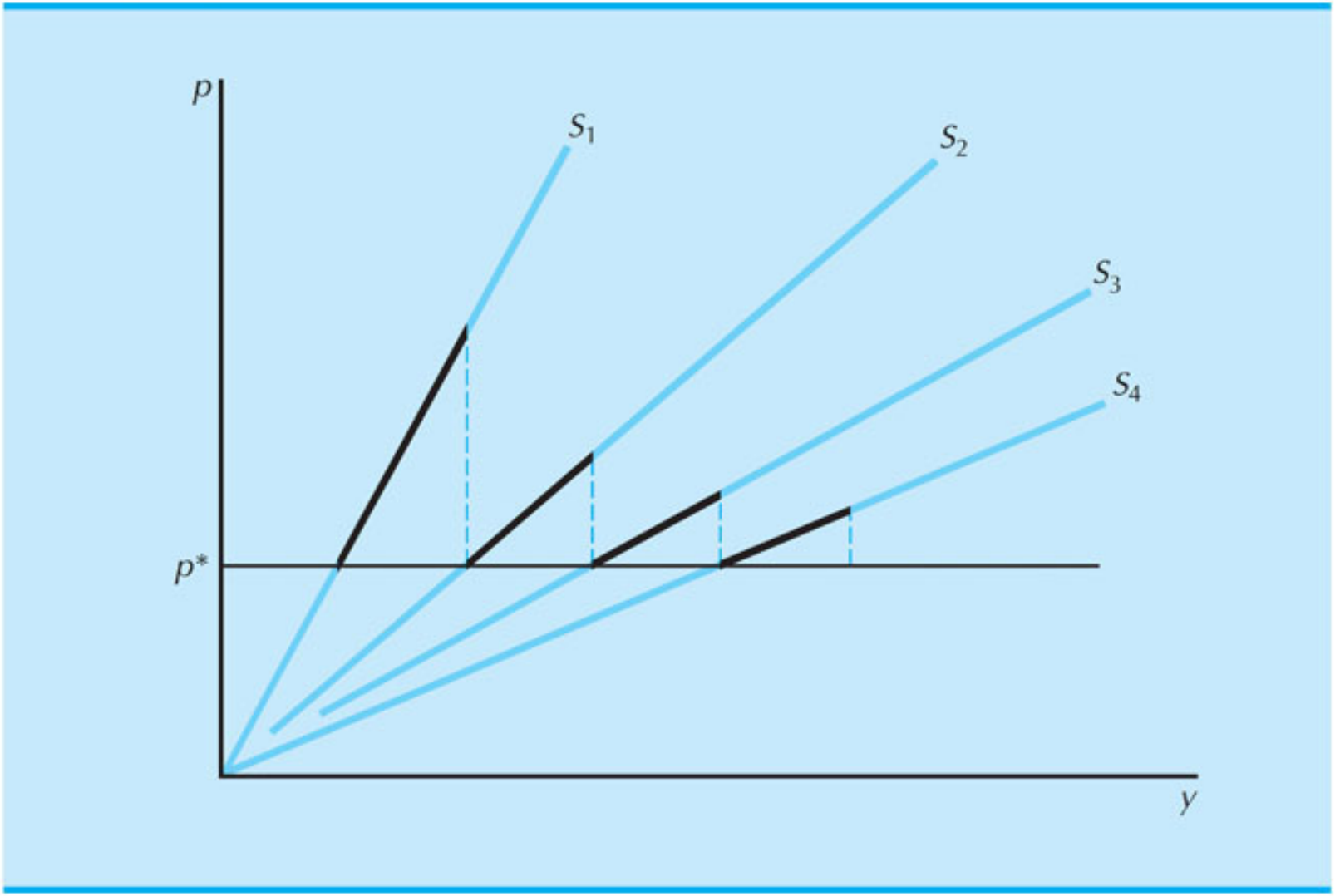

Figure 24.4

Long Run Supply: Graphically, Part 3

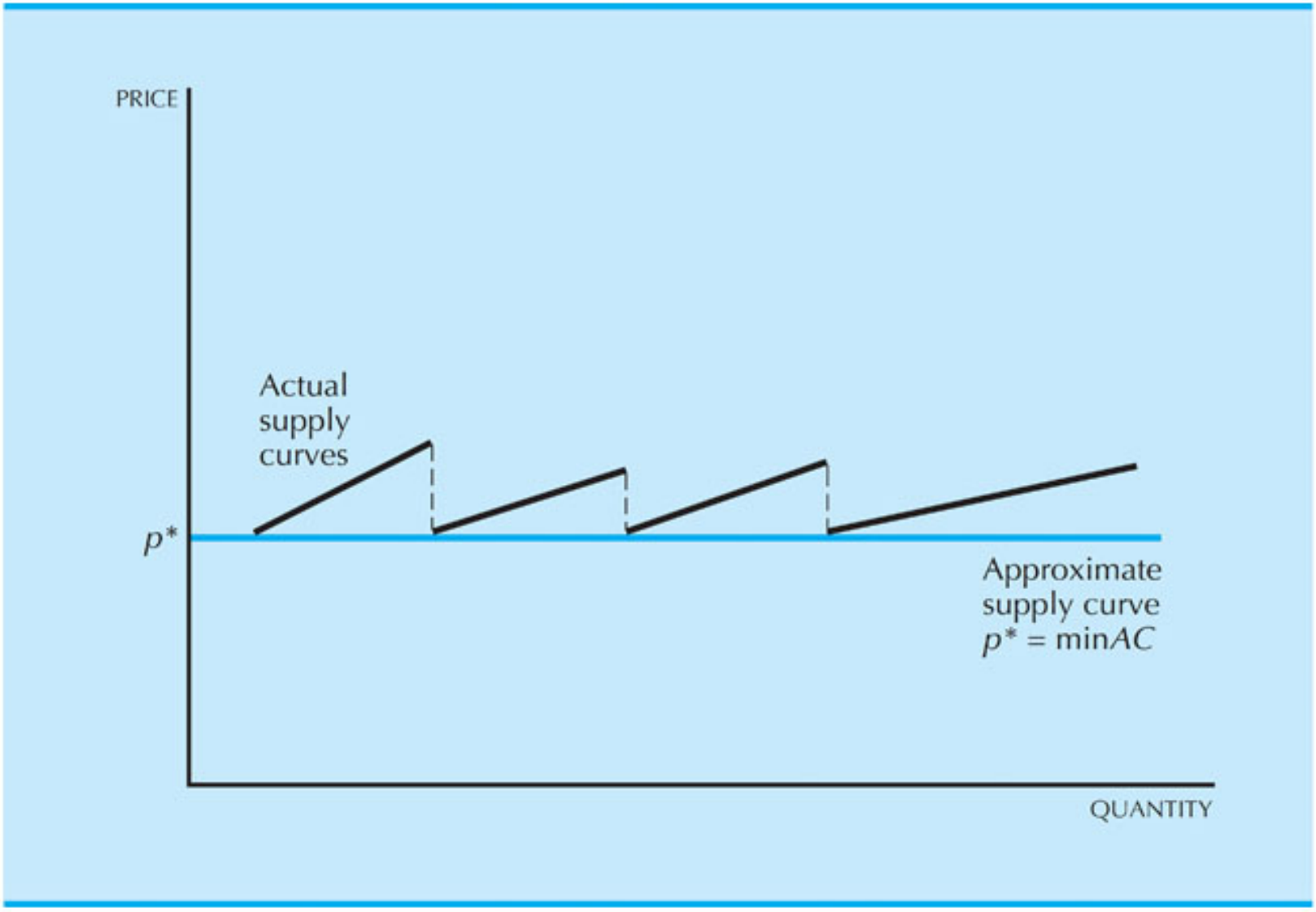

Figure 24.5

Taxes in the Long Run

- We have seen that in the short run, in general taxes affect both producer price and consumer price
- However, in the long run that same tax will fall entirely on the consumer
  - Producers will supply only at $p^* = \min AC$, so tax cannot affect producer price at all

Monopoly

Introduction

- So far our assumption has been that we have a very large number of firms in the market
- Now we go to the opposite extreme: one firm in the market, ie a *monopoly*
- Note that the demand curve the firm faces is now the market demand curve
  - Thus the firm can choose quantity y and price will be determined by inverse market demand $p(y)$

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- The monopolist solves

$$\max_{y} p(y)y - c(y)$$

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  where revenue is $r(y) = p(y)y$ and $p(y)$ is inverse demand
- First order condition:

$$MR(y) = p(y) + p'(y)y = c'(y) = MC(y)$$

- So as usual we have MR=MC, but the equation for marginal revenue is different because when the monopolist changes their output, price changes as well

Monopolisitic Equilibrium Graphically

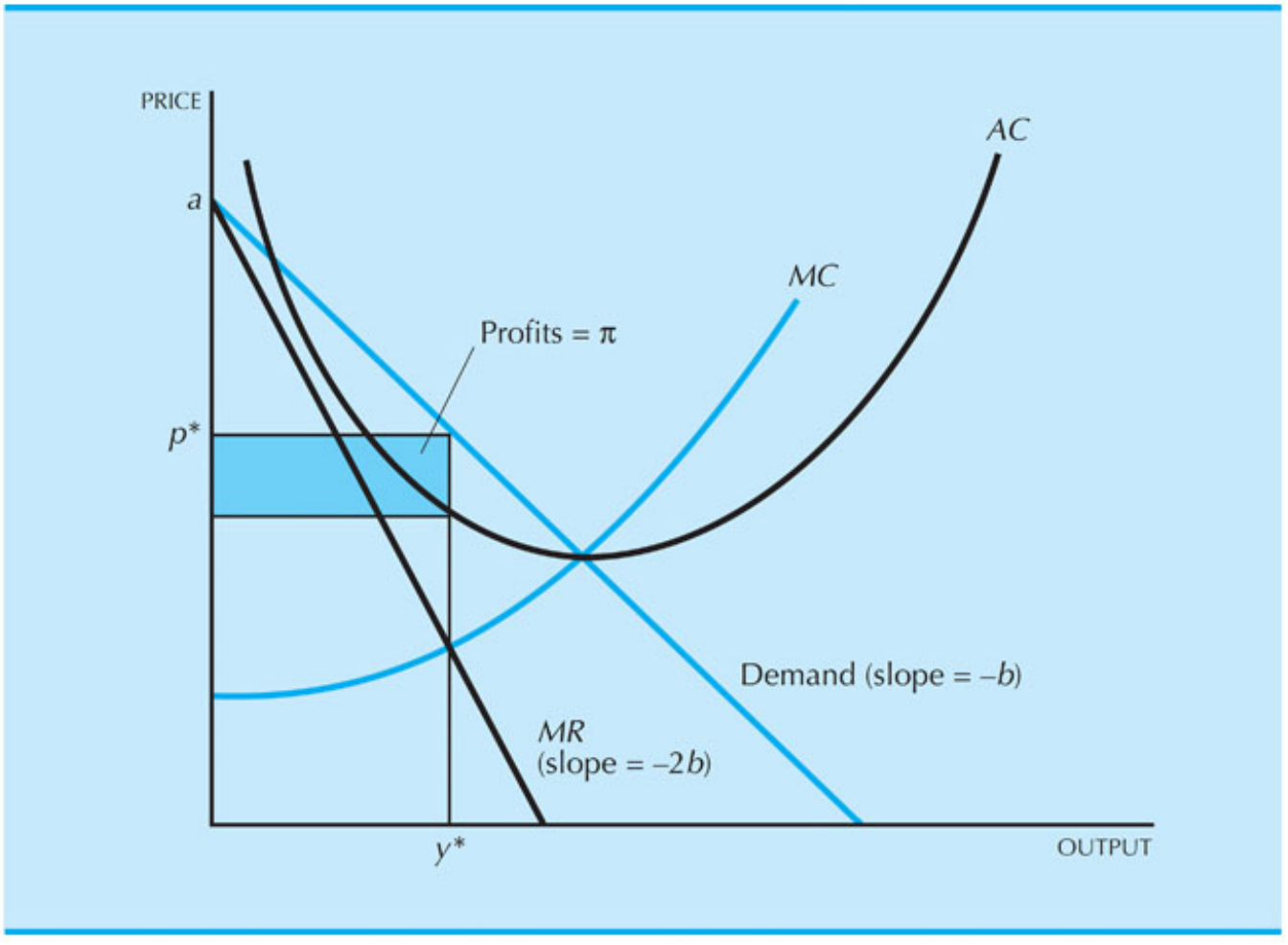

Figure 25.1

Elasticity

- Note that we can re-write the marginal revenue as

$$MR(y) = p(y)\left[1 + \frac{dp}{dy}\frac{y}{p(y)}\right]$$

- Recalling that $\frac{dy}{dx} = \frac{1}{\frac{dx}{dy}}$, we can write this as

$$MR(y) = p(y)\left[1 + \frac{1}{\epsilon}\right] = p(y)\left[1 - \frac{1}{|\epsilon|}\right]$$

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- Note ϵ is elasticity of *demand*
- Will monopolist produce if $|\epsilon| < 1$?
  - No, this implies $MR(y) < 0$, which is not possible
  - Thus a monopolist will only operate in part of demand curve where demand is elastic (if anywhere)

Markups

- Using the fact that $MR(y) = MC(y)$, re-arrange the FOC to get

$$\frac{p(y)}{MC(y)} = \frac{1}{\left(1 - \frac{1}{|\epsilon(y)|}\right)} > 1$$

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- What would the markup ratio be for competitive firm? $p = MC$, so markup = 1

Example: Linear Demand

- Let inverse demand be given by $p = a - by$ and cost function be given by $c(y) = cy$
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- What is markup ratio?
  - Note $MC = c$, so $\frac{p}{MC} = \frac{a+c}{2c}$

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- Monopolist's problem becomes

$$\max_y (a - by - t)y - cy = ay - by^2 - cy$$

  - By same approach as previous slide, $y^* = \frac{a-c-t}{2b}$ and $p_m^* = \frac{a+c-t}{2}$
  - Thus $\Delta p_m = -\frac{1}{2}\Delta t$

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- Given this argument, why is p_m, y_m still an equilibrium?
  - Because the firm would have to lower price for everyone, which is not profit maximizing

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