Vertical and Conglomerate Mergers

Introduction

- General Electric and Honeywell proposed to merge in 2000
  - GE supplies jet engines for commercial aircraft
  - Honeywell produced various electrical and other control systems for jet aircraft
- Deal was approved in the US
- But was blocked by the EU Competition Directorate
  - this was a merger of *complementary* firms
  - it is “like” a vertical merger
  - so can potentially remove inefficiencies in pricing
    - ***benefiting the merged firms and consumers***
  - so why block the merger?

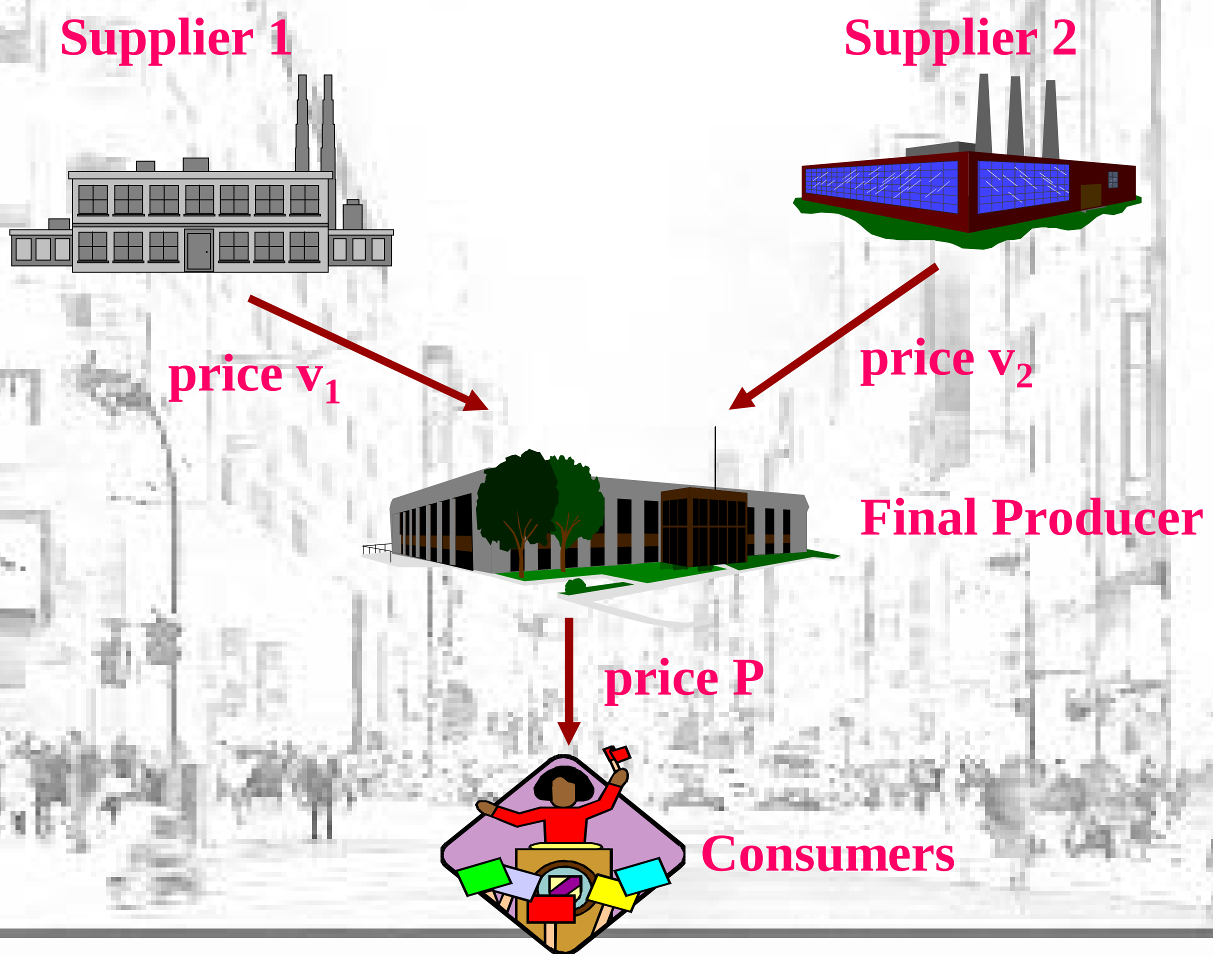
Introduction 2

- Vertical mergers can be detrimental
  - if they facilitate market foreclosure by the merged firms
    - ***refuse to supply non-merged rivals***
- But they can also be beneficial
  - if they remove market inefficiencies
- Regulators need to look for the balance these two forces in considering any proposed merger

Complementary Mergers

- Consider first a merger between firms that supply *complementary products*
- A simple example:
  - final production requires two inputs in fixed proportions
  - one unit of each input is needed to make one unit of output
  - input producers are monopolists
  - final product producer is a monopolist
  - demand for the final product is $P = 140 - Q$
  - marginal costs of upstream producers and final producer (other than for the two inputs) normalized to zero.
- What is the effect of merger between the two upstream producers?

Complementary mergers 2



Complementary producers

- Consider the profit of the final producer: this is

  $\pi^f = (P - v_1 - v_2)Q = (140 - v_1 - v_2 - Q)Q$

- Maximize this with respect to Q

  $\partial\pi^f/\partial Q = 140 - (v_1 + v_2) - 2Q = 0$

  Solve this for Q

  $\therefore\ Q = 70 - (v_1 + v_2)/2$

- This gives us the demand for each input

  $Q_1 = Q_2 = 70 - (v_1 + v_2)/2$

- So the profit of supplier 1 is then:

  $\pi^1 = v_1Q_1 = v_1(70 - v_1/2 - v_2/2)$

- Maximize this with respect to v_1

The price charged by each supplier is a function of the other supplier's price

...ementary producer...

... $- v_1/2 - v_2/2)$

Solve this for v_1

We need to solve these two pricing equations

- Maximize this with respect to v_1

$$\partial\pi^1/\partial v_1 = 70 - v_1 - v_2/2 = 0$$

$$\mathbf{v_1 = 70 - v_2/2}$$

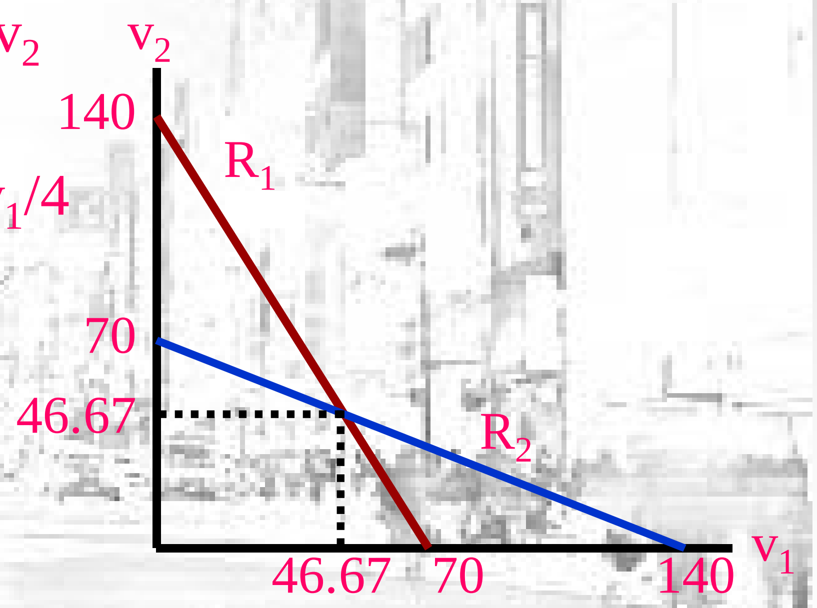
- We can do exactly the same for v_2

$$\mathbf{v_2 = 70 - v_1/2}$$

$v_1 = 70 - (70 - v_1/2)/2 = 35 + v_1/4$

so $3v_1/4 = 35$, i.e., $v_1 = \$46.67$

and $v_2 = \$46.67$



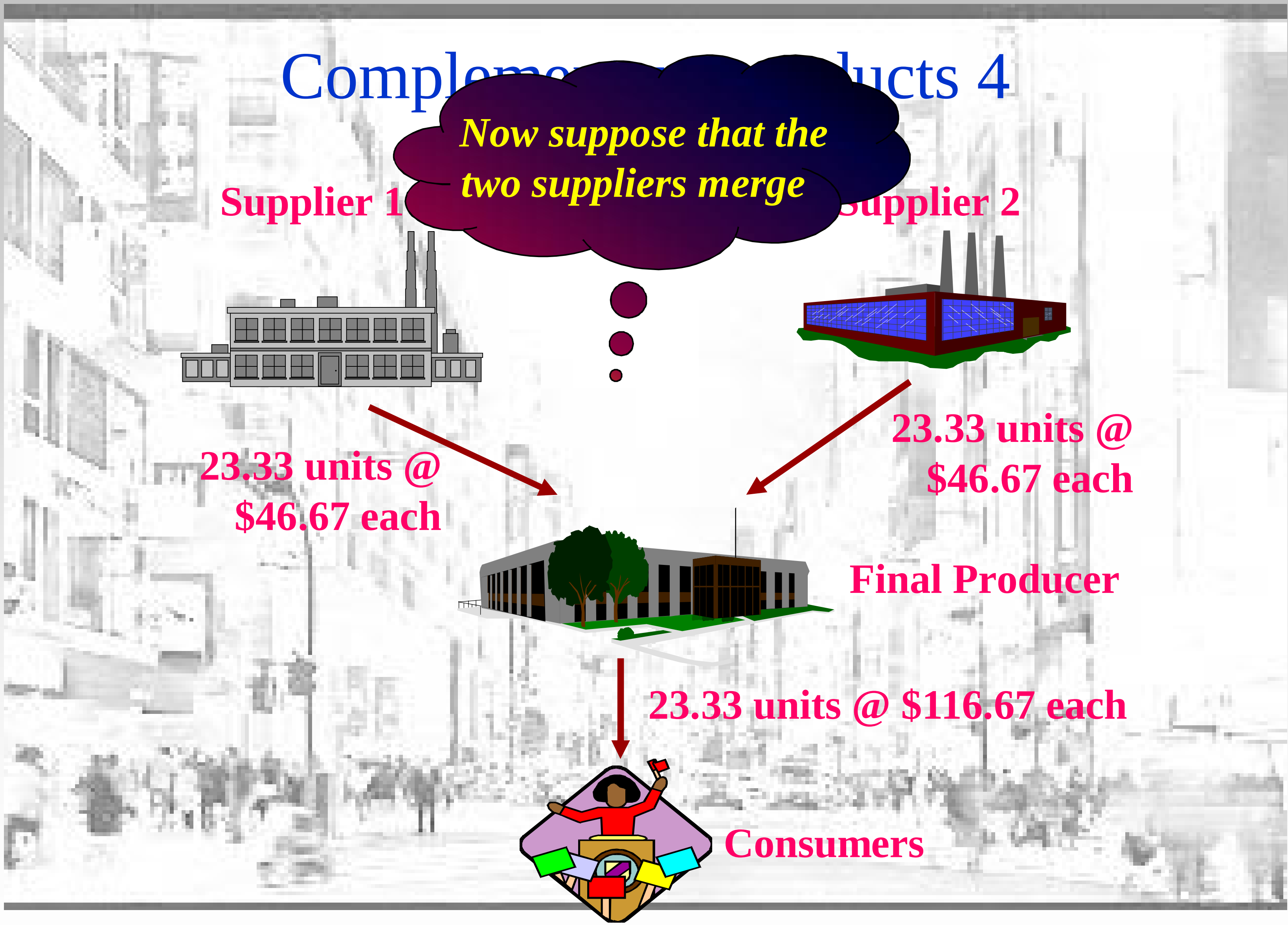
Complementary products 3

- Recall that $Q = Q_1 = Q_2 = 70 - (v_1 + v_2)/2$

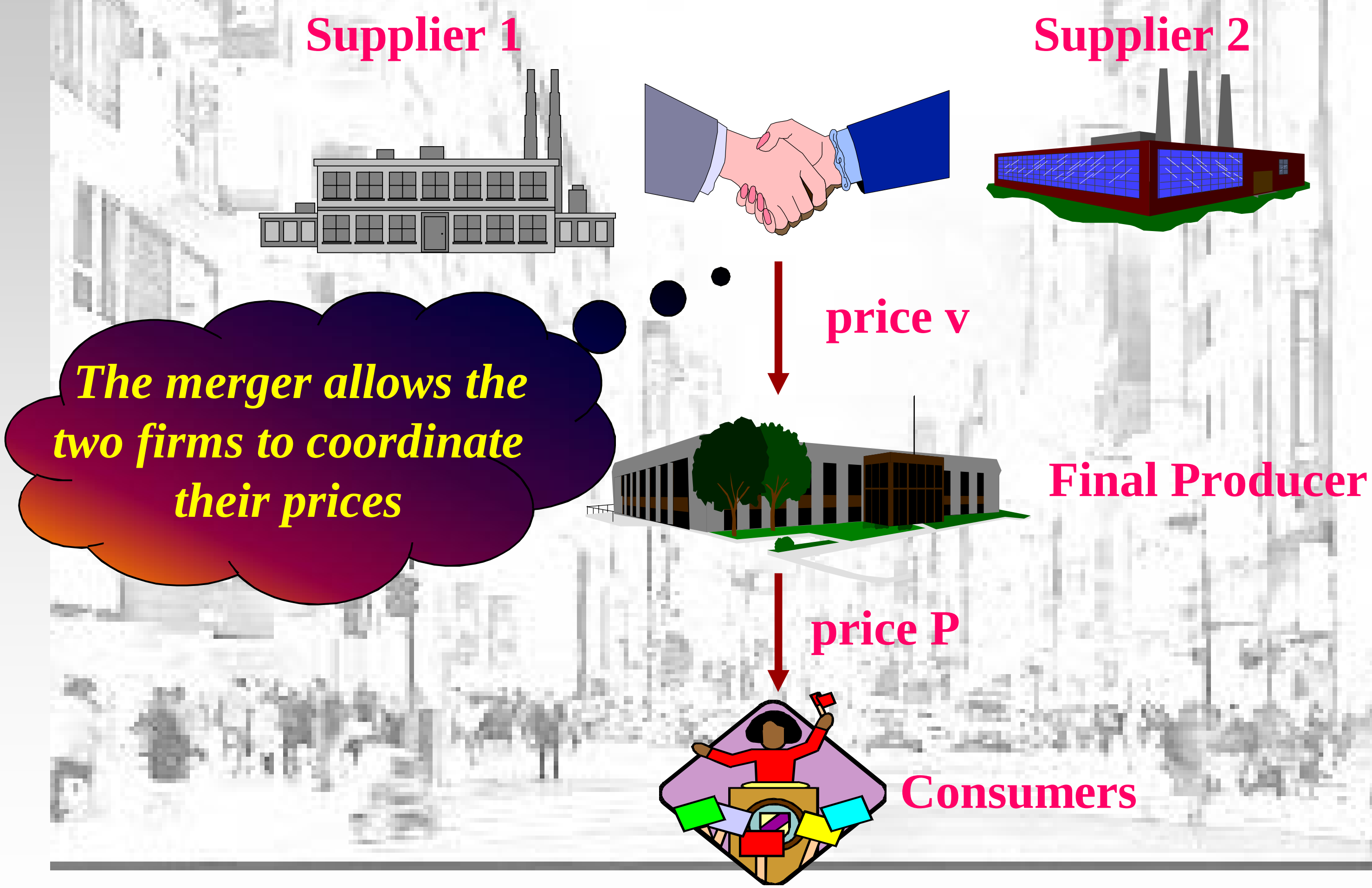
  so $Q = Q_1 = Q_2 = 23.33$ units
- The final product price is $P = 140 - Q =$ \$116.67
- Profits of the three firms are then:

  supplier 1 and supplier 2: $\pi_1 = \pi_2 = 46.67 \times 23.33 =$ \$1,088.81

  final producer: $\pi^f = (116.67 - 46.67 - 46.67) \times 23.33 =$ \$544.29


Complem
ucts 4
Now suppose that the two suppliers merge
Supplier 1
Supplier 2
23.33 units @ $46.67 each
23.33 units @ $46.67 each
Final Producer
23.33 units @ $116.67 each
Consumers

Complementary mergers 5



Complementary mergers 6

- Consider the profit of the final producer: this is

$$\pi^f = (P - v)Q = (140 - v - Q)Q$$

- Maximize this with respect to Q

$$\partial\pi^f/\partial Q = 140 - v - 2Q = 0$$

Solve this for Q

$$\therefore Q = 70 - v/2$$

- This gives us the demand for each input

$$Q_1 = Q_2 = Q_m = 70 - v/2$$

- So the profit of the merged supplier is:

$$\pi^m = vQ_m = v(70 - v/2)$$

- Maximize this with respect to v

Complement... 7

$\pi^m = vQ_m = v(70 - v/2)$

- Differentiate with respect to v

  $\partial\pi^m/\partial v = 70 - v = 0$

  so $v = \$70$
- Recall that $Q_m = Q = 70 - v/2$ so $Q_m = Q = 35$ units
- This gives the final product price $P = 140 - Q = \$105$
- What about profits? For the merged

  $\pi^m = vQ_m = 70 \times 35 = \$2{,}480$
- For the final producer:

  $\pi^f = (105 - 70) \times 35 = \$1{,}225$

This is the cost of the combined input: the m... costs to th...

The merger has reduced the final product price: consumers gain

This is greater than the combined pre-merger profit

This is greater than the pre-merger profit

Complementary mergers 8

- A merger of complementary producers has
  - increased profits of the merged firms
  - increased profit of the final producer
  - reduced the price charged to consumers

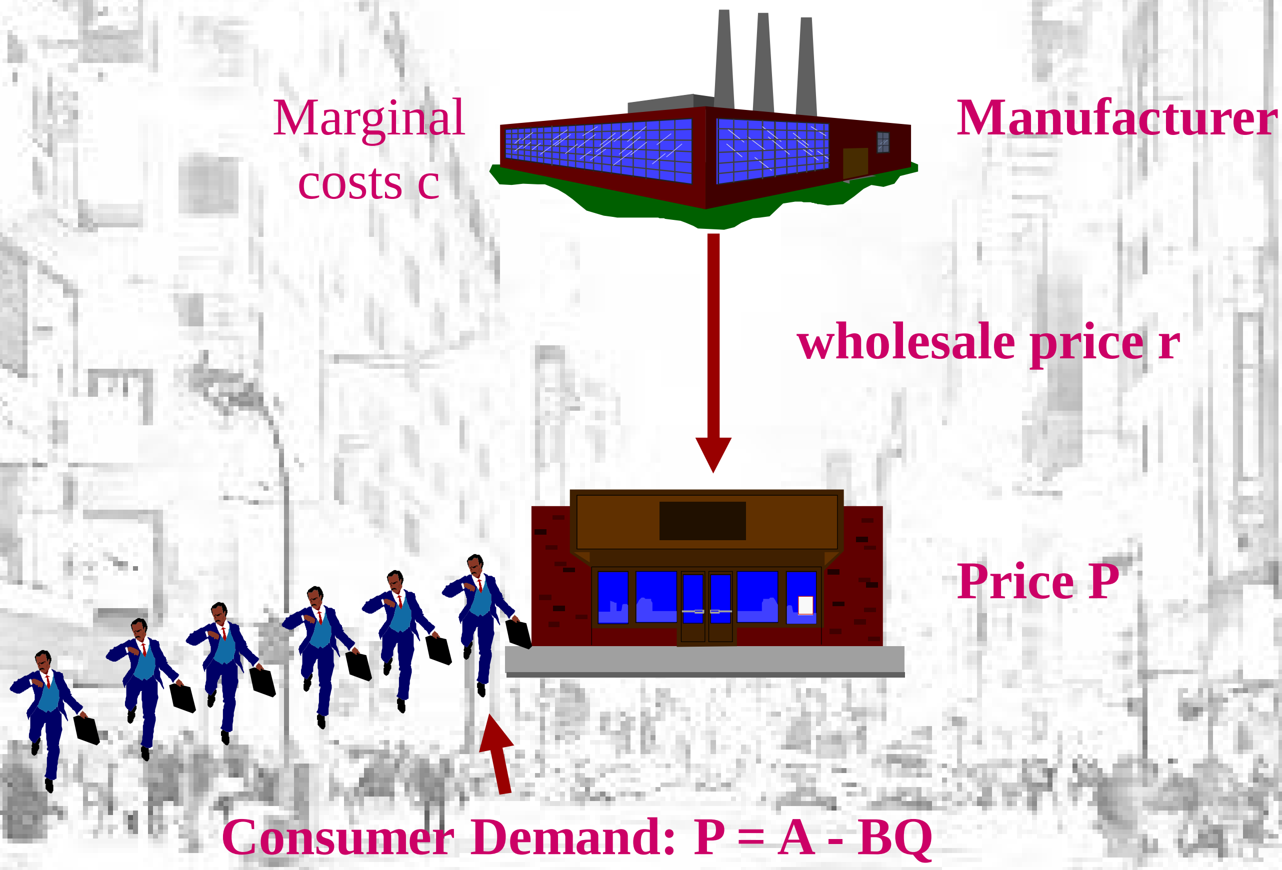
Everybody gains from this merger: a Pareto improvement! Why?

- This merger corrects a market failure
  - prior to the merger the upstream suppliers do not take full account of their interdependence
  - cut in price by one of them reduces downstream costs, increases downstream output and benefits the other upstream firm
  - but this is an **externality** and so is ignored
- Merger internalizes the externality

Vertical Mergers

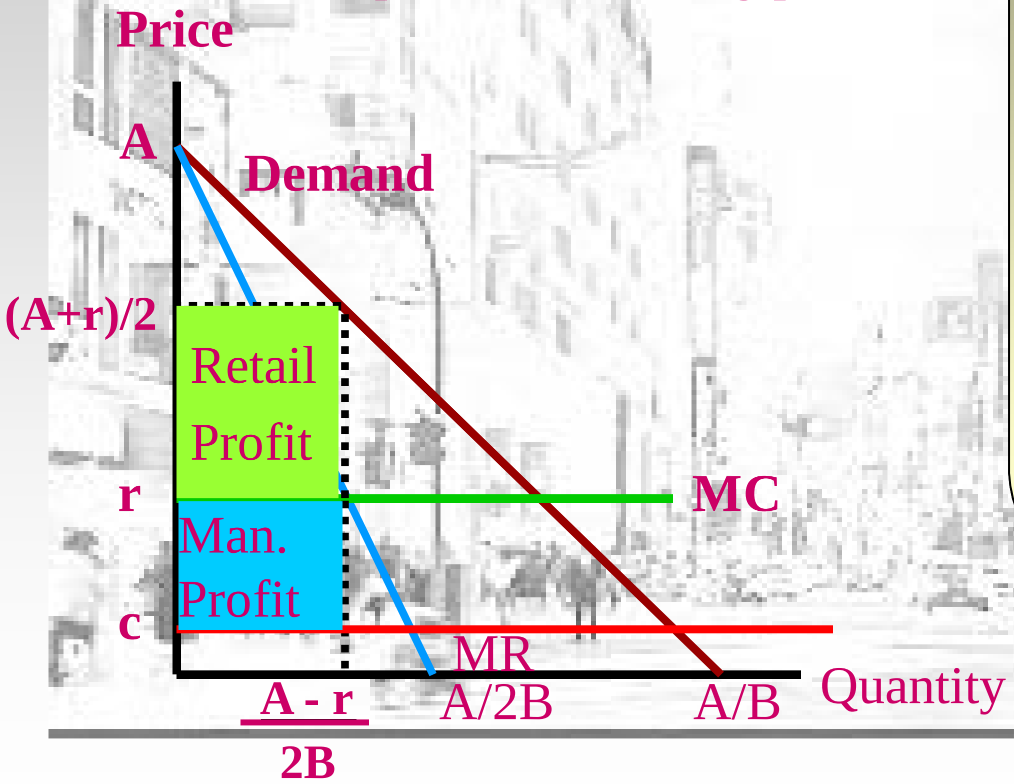
- The same result arises when we consider *vertical mergers*: mergers of upstream and downstream firms
- If the merging firms have market power
  - lack of co-ordination in their independent decisions
  - ***double marginalization***
  - merger can lead to a general improvement
- Illustrate with a simple model
  - one upstream and one downstream monopolist
    - ***manufacturer and retailer***
  - upstream firm has marginal costs c
  - sells product to the retailer at price r per unit
  - no other retail costs: one unit of input gives one unit of output
  - retail demand is P = A – BQ

Vertical merger 2



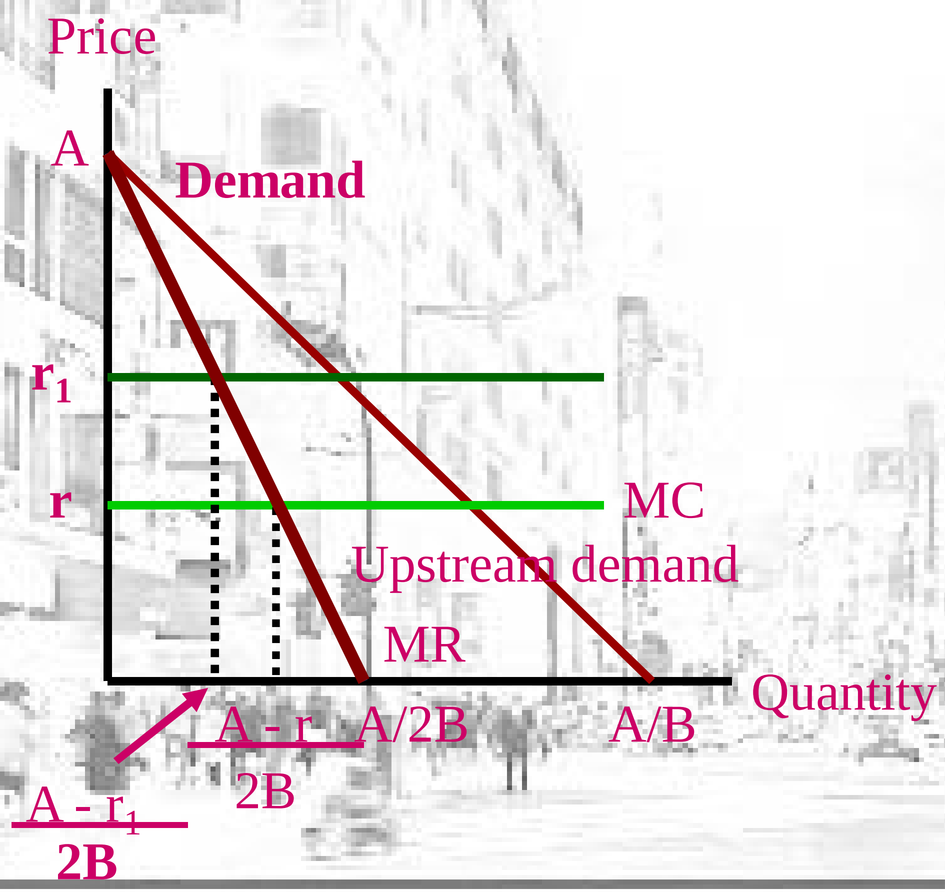
Vertical merger 3

- Consider the retailer's decision
  - identify profit-maximizing output
  - set the profit maximizing price



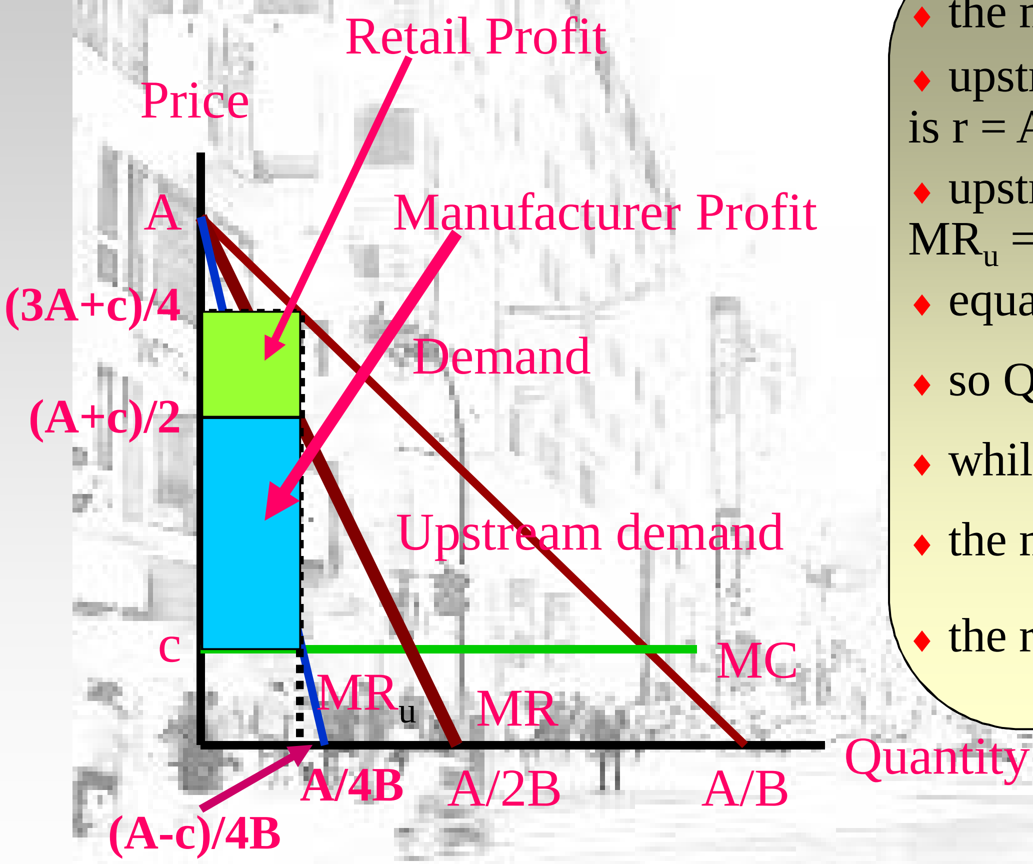
- marginal revenue downstream is $MR = A - 2BQ$
- retail marginal cost is r
- equate MC = MR to give the quantity $Q = (A - r)/2B$
- identify the price from the demand curve: $P = A - BQ = (A + r)/2$
- profit to the retailer is $(P - r)Q$ which is $\pi^D = (A - r)^2/4B$
- profit to the manufacturer is $(r-c)Q$ which is $\pi^M = (r - c)(A - r)/2B$

Vertical merger 4



- suppose the manufacturer sets a different price r_1
- then the downstream firm's output choice changes to the output $Q_1 = (A - r_1)/2B$
- and so on for other input prices
- demand for the manufacturer's output is just the downstream marginal revenue curve

Vertical merger 5



- the manufacturer's marginal cost is c
- upstream demand is $Q = (A - r)/2B$ which is $r = A – 2BQ$
- upstream marginal revenue is, therefore, $MR_u = A – 4BQ$
- equate $MR_u = MC$: $A – 4BQ = c$
- so $Q^* = (A-c)/4B$ the input price is $(A+c)/2$
- while the consumer price is $(3A+c)/4$
- the manufacturer's profit is $(A-c)^2/8B$
- the retailer's profit is $(A-c)^2/16B$

Vertical merger 6

- Now suppose that the retailer and manufacturer merge
  - manufacturer takes over the retail outlet
  - retailer is now a downstream division of an integrated firm
  - the integrated firm aims to maximize total profit
  - Suppose the upstream division sets an internal (transfer) price of r for its product
  - Suppose that consumer demand is P = P(Q)
  - Total profit is:
    - ***upstream division: (r - c)Q***
    - ***downstream division: (P(Q) - r)Q***
    - ***aggregate profit: (P(Q) - c)Q***

The internal transfer price nets out of the profit calculations

- Back to the example

Vertical merger 7

This merger has benefited the two firms

...erger has ...ied consumers

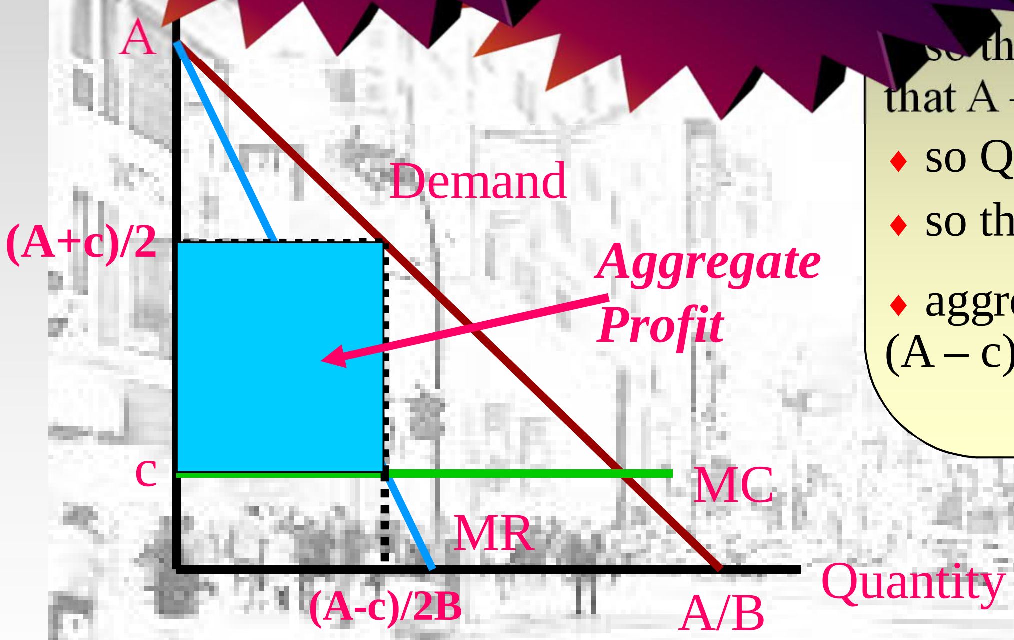
...grated demand is $P(Q) = A - BQ$

...l revenue is $MR = A – 2BQ$

...al cost is c

...so the profit-maximizing output requires that $A – 2BQ = c$

- so $Q^* = (A – c)/2B$
- so the retail price is $P = (A + c)/2$
- aggregate profit of the integrated firm is $(A – c)^2/4B$

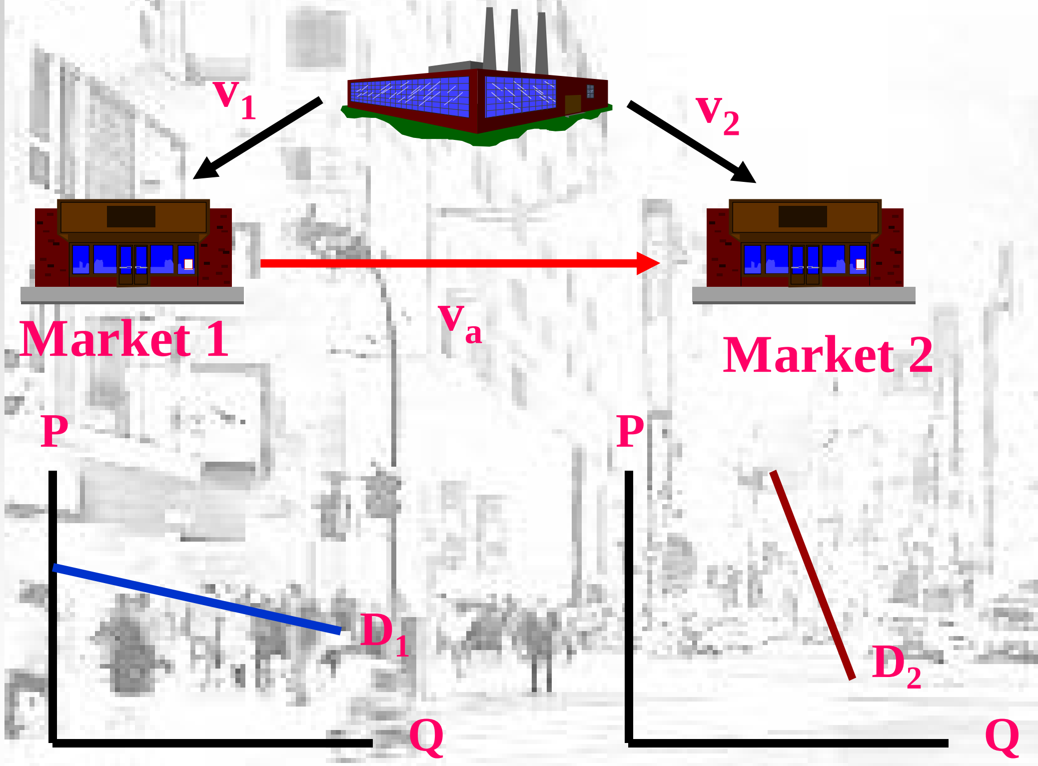


Vertical merger 8

- Integration increases profits *and* consumer surplus
- Why?
  - the firms have some degree of market power
  - so they price above marginal cost
  - so integration corrects a market failure: double marginalization
- What if manufacture were competitive?
  - retailer plays off manufacturers against each other
  - so obtains input at marginal cost
  - gets the integrated profit without integration
- Why worry about vertical integration?
  - two possible reasons
    - ***price discrimination***
    - ***vertical foreclosure***

Price discrimination

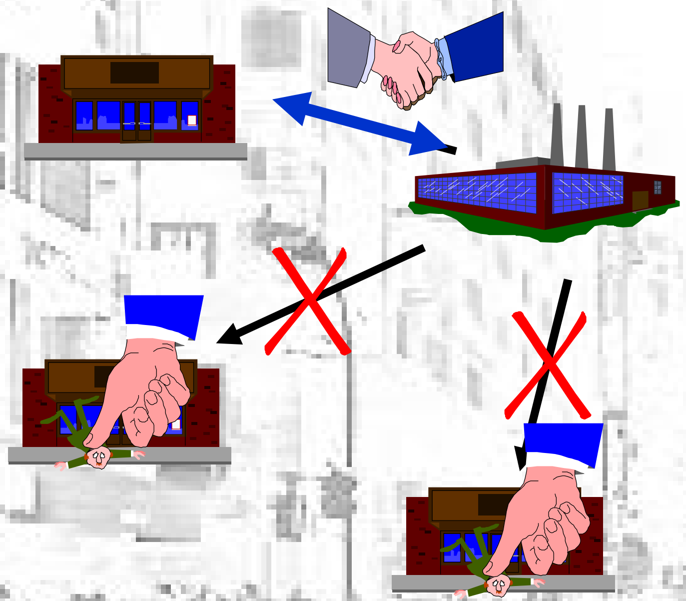
- Upstream firm selling to two downstream markets
  - different demands in the two markets



- the seller wants to price discriminate between these markets
- set $v_1 < v_2$
- but suppose that buyers can **arbitrage**
- then buyer 2 offers to buy from buyer 1 at a price v_a such that $v_1 < v_a < v_2$
- arbitrage prevents price discrimination
- if the seller integrates into market 1 arbitrage is prevented

Vertical foreclosure

- Vertically integrated firm refuses to supply other firms
  - so integration can eliminate competitors



♦ suppose that the seller is supplying three firms with an essential input

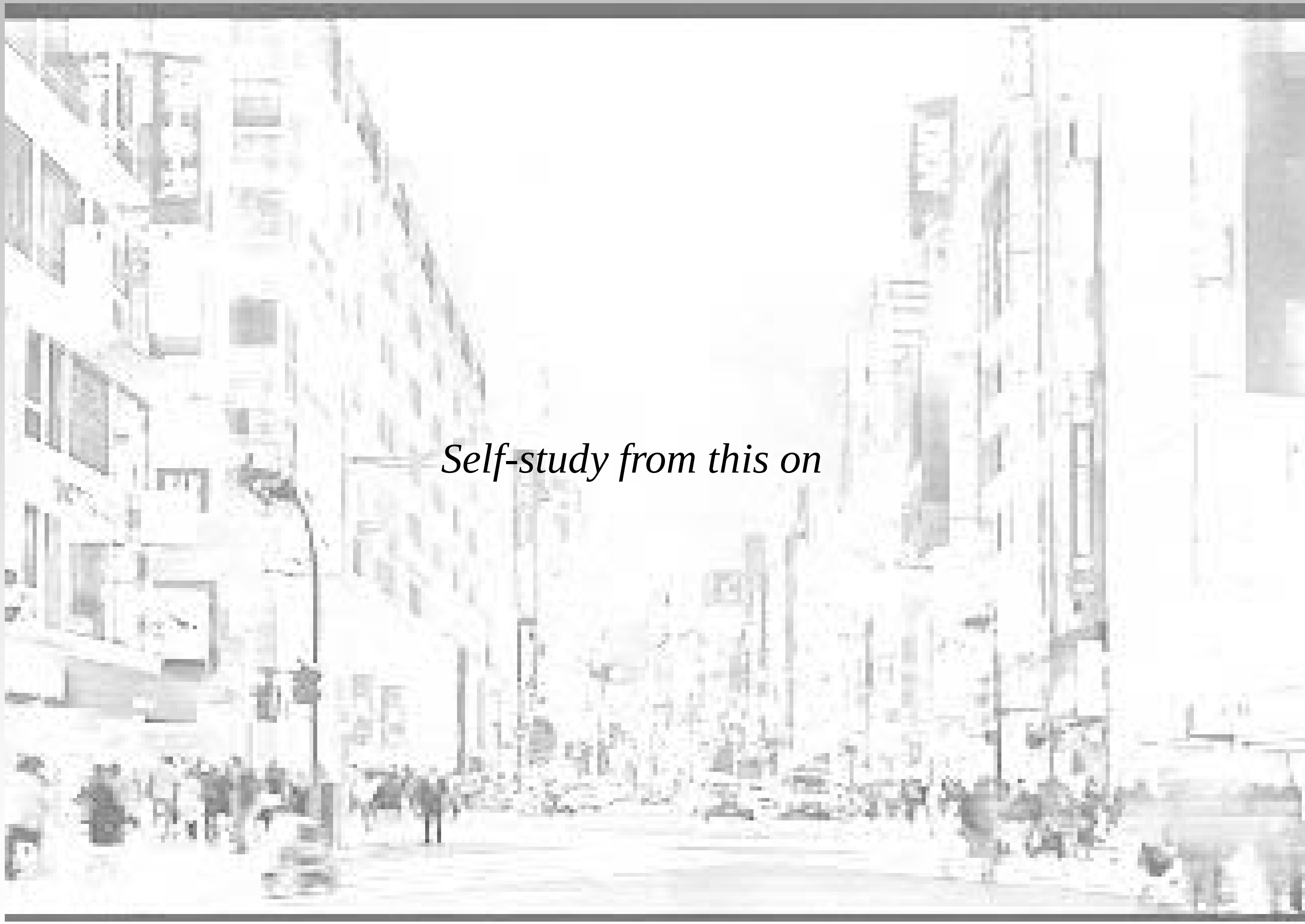
♦ the seller integrates with one buyer

♦ if the seller refuses to supply the other buyers they are driven out of business

♦ is this a sensible thing to do?

Vertical foreclosure 2

- Vertical foreclosure may reduce competition
  - offsets benefits of removing double marginalization
- But for this to work
  - foreclosure has to be a credible strategy for the merged firms
  - foreclosure must be ***subgame perfect***
- Consider a model of foreclosure
  - Salinger (1988) with Cournot competition



Self-study from this on

Vertical foreclosure 3

- Suppose that there are some integr
upstream and downstream producer

- Profit of an integrated firm is:

$$\pi^{\mathbf{I}} = (P^D - c_U - c_D)q_{\mathbf{Di}}$$

- Profit of an independent upstream f

$$\pi^{\mathbf{U}} = (P^U - c_U)q_{\mathbf{Un}}$$

- Profit of an independent downstream firm is:

$$\pi^{\mathbf{D}} = (P^D - P^U - c_D)q_{\mathbf{Dn}}$$

The integrated firm will not source on the independent market

The integrated firm will not sell on the independent market

Vertical foreclosure 4

- For the independent upstream firms to survive requires $P^U - c_U > 0$
- The downstream unit of an integrated firm obtains input at cost c_U
- Buying from an independent firm costs $P^U > c_U$

so the downstream divisions will not source externally

- N upstream division of an integr
selli wnstream firms it earns P^U
- D n: this lea
price un ged: it ear s unit div

$P^D - P^U - c$ > 0 for indep dent downstream firms to su

$P^D - c_U - c_D > P^U - c_U$ requires: $P^D - P^U - c_D > 0$

so the upstream divisions will not sell externally

Profit from selling internally

Profit from selling externally

But this is true: so diverting output from the external market increases profits

Vertical foreclosure 5

- Foreclosure happens
  - but is not necessarily harmful to consumers
    - ***reduces number of buyers in the upstream market***
    - ***increases prices charged by independent sellers to non-integrated downstream firms***
    - ***but integrated downstream divisions obtain inputs at cost***
    - ***puts pressure on non-integrated downstream firms***
  - provided there are “enough” independent upstream firms the anti-competitive effects of foreclosure will be offset by the cost advantages of vertical integration

Vertical merger – reappraisal 2

- Recall the proposed GE-Honeywell merger
  - if this is the only merger then the merged firm gains and the non-merged firms lose
    - appears to be this that guided the EU Competition Directorate
    - but consumers benefit even in this scenario
    - and rivals have a clear strategic response: merge
  - so the EU must have believed that merger by rivals was not possible
    - Or would be strategically prevented by GE-Honeywell
  - and that if the integrated GE-Honeywell gains a monopoly position price will rise
    - Many believe that this was unlikely
- So the decision remains questionable

Conglomerate Mergers

- Bring under common control firms whose products are neither substitutes nor complements
  - results in a diversified firm
  - period from 1960s to early 1980s is when many were forms
- Is there a convincing rationale for this type of merger?
  - if not then probably an accident of history
  - gradually corrected by downsizing and focus on "core competence"
- Possible rationales:

Conglomerate mergers 2

- Economies of scope
  - but these generally derive from use of common inputs
  - so merged firms should be related in some respect
    - similar markets
    - similar technologies
  - data do not support this hypothesis

Conglomerate mergers 3

- Economize on transactions costs
  - take a specialized machine can produce two goods A and B
    - markets for A and B are concentrated
    - if machine is used to produce only A there is spare capacity
  - then owner may wish also to produce B – conglomeration
  - the owner could also lease use of the machine to a specialized B producer to avoid conglomeration
    - but this has problems
      - ***negotiating and bargaining over the lease***
    - conglomeration avoids these problems
  - particularly important when the asset is knowledge intensive
  - so this motive is reasonable
    - but the assets are common to all the conglomerates products
    - not supported by the data

Conglomerate mergers 4

- Managerial motives
  - conglomeration suits interests of management but not shareholder
    - division of ownership and control of large public corporations
    - monitoring of management is far from perfect
    - so management can pursue its own agenda to some extent
  - suppose management compensation based on firm growth
    - easier to grow by acquisition than internally
    - horizontal merger may be blocked by regulators
    - so grow by conglomeration
  - conglomeration to reduce management risk
    - diversified firm has diversified risk
    - this diversifies the risk that management faces
- Seems to be supported by the evidence