

Econ 510

Horizontal Mergers

Plan of the lectures

- Welfare effects of **horizontal** mergers
- Unilateral effects
 - Absent efficiency gains
 - Variables which affects unilateral effects
 - Efficiency gains
- Pro-collusive effects
 - Variables which affect pro-collusive effects

Unilateral effects

Absent efficiency gains, a merger:

- Increases the insiders' market power (allows the insiders to **unilaterally** increase prices).
- Benefits outsiders.
- Hurts consumers and total welfare.

Modelling mergers

- Asset-base model (assets = product varieties)
 - Merger \Rightarrow richer portfolio of varieties.
- 3 single product firms, which compete in prices.
- Identical marginal cost: c .
- Demand functions derived from:

$$U = v(q_1 + q_2 + q_3) - \frac{3}{2(1+\gamma)} \left[(q_1)^2 + (q_2)^2 + (q_3)^2 + \frac{\gamma}{3} (q_1 + q_2 + q_3)^2 \right] + y$$

- $\gamma \in [0, \infty)$ captures the degree of substitutability among the 3 products.
- (Direct) demand functions:

$$q_i = \frac{1}{3} \left[v - p_i(1+\gamma) + \frac{\gamma}{3} (p_1 + p_2 + p_3) \right] \quad v > c$$

Properties of demand function:

- Both price and quantity competition can be studied
- Aggregate demand does not depend on γ and n .

Analytical strategy:

- One-shot Nash equilibrium before and after the merger.

Pre-merger situation (1)

- Firm 1 chooses p_1 in order to max its profits:

$$\max_{p_1} \left\{ (p_1 - c) \frac{1}{3} \left[v - p_1(1 + \gamma) + \frac{\gamma}{3} (p_1 + p_2 + p_3) \right] \right\}$$

- The FOC is given by:

$$\frac{\partial \pi_1}{\partial p_1} = \frac{1}{3} \left\{ \left[v - p_1(1 + \gamma) + \frac{\gamma}{3} (p_1 + p_2 + p_3) \right] + (p_1 - c) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) \right\} = 0$$

- The best reply of firm 1 is given by:

$$p_1 = \frac{3v + \gamma(p_2 + p_3) + c(3 + 2\gamma)}{2(3 + 2\gamma)}$$

Pre-merger situation (2)

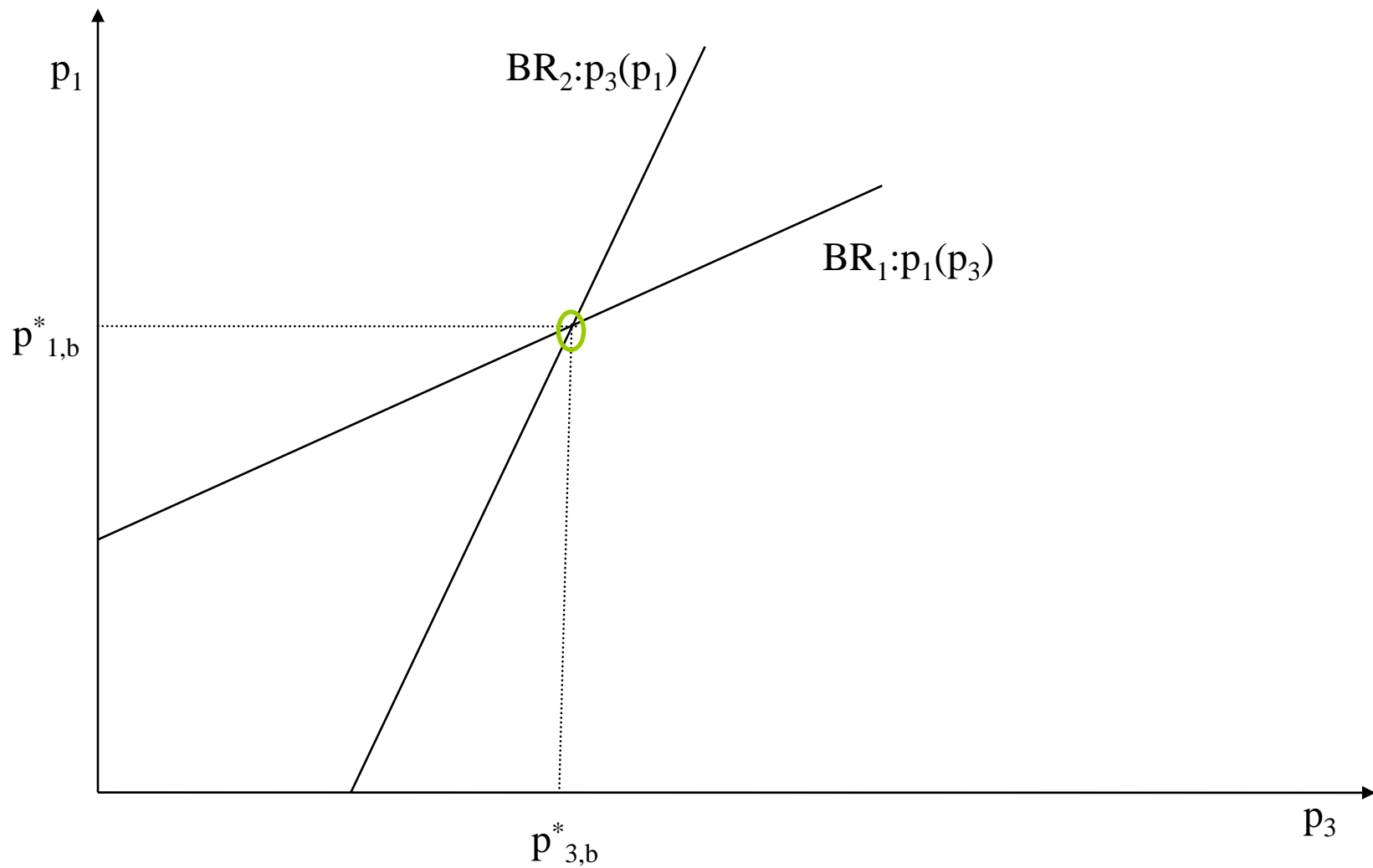
- NE given by the intersection of the best replies:

$$\begin{cases} p_1 = \frac{3v + \gamma(p_2 + p_3) + c(3 + 2\gamma)}{2(3 + 2\gamma)} \\ p_2 = \frac{3v + \gamma(p_1 + p_3) + c(3 + 2\gamma)}{2(3 + 2\gamma)} \\ p_3 = \frac{3v + \gamma(p_1 + p_2) + c(3 + 2\gamma)}{2(3 + 2\gamma)} \end{cases}$$

- By symmetry $p_1^* = p_2^* = p_3^* = p^*$:

$$p^* = \frac{3v + 2\gamma p^* + c(3 + 2\gamma)}{2(3 + 2\gamma)} \Rightarrow p_b^* = \frac{3v + c(3 + 2\gamma)}{2(3 + \gamma)}$$

Pre-merger situation (3)



Pre-merger situation (4)

- Equilibrium output and profits:

$$q_b^* = \frac{(v-c)(3+2\gamma)}{6(3+\gamma)} \qquad \pi_b^* = \frac{(v-c)^2(3+2\gamma)}{4(3+\gamma)^2}$$

- Consumer surplus:

$$CS_b = U(q_b^*) - 3p_b^*q_b^* = \frac{(v-c)^2(3+2\gamma)^2}{8(3+\gamma)^2}$$

- Total welfare:

$$W_b = CS_b + 3\pi_b^* = \frac{(v-c)^2(27+24\gamma+4\gamma^2)}{8(3+\gamma)^2}$$

Firm 1 and firm 2 merge

- The merged firm chooses p_1 and p_2 in order to max its profits:

$$\max_{p_1, p_2} \left\{ (p_1 - c) \frac{1}{3} \left[v - p_1(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_2 - c) \frac{1}{3} \left[v - p_2(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] \right\}$$

- The FOCs are given by:

$$\frac{\partial \pi_M}{\partial p_1} = \left[v - p_1(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_1 - c) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) + (p_2 - c) \frac{\gamma}{3} = 0$$

$$\frac{\partial \pi_M}{\partial p_2} = \left[v - p_2(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_2 - c) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) + (p_1 - c) \frac{\gamma}{3} = 0$$

- The best replies:

$$p_{1,M} = \frac{3v + c(3 + 2\gamma) + \gamma(p_2 + p_3) + \gamma(p_2 - c)}{2(3 + 2\gamma)}$$

$$p_{2,M} = \frac{3v + c(3 + 2\gamma) + \gamma(p_1 + p_3) + \gamma(p_1 - c)}{2(3 + 2\gamma)}$$

Firm 1 and firm 2 merge (2)

- Nothing changes for firm 3:

$$\max_{p_3} \left\{ (p_3 - c) \frac{1}{3} \left[v - p_3(1 + \gamma) + \frac{\gamma}{3} (p_1 + p_2 + p_3) \right] \right\}$$

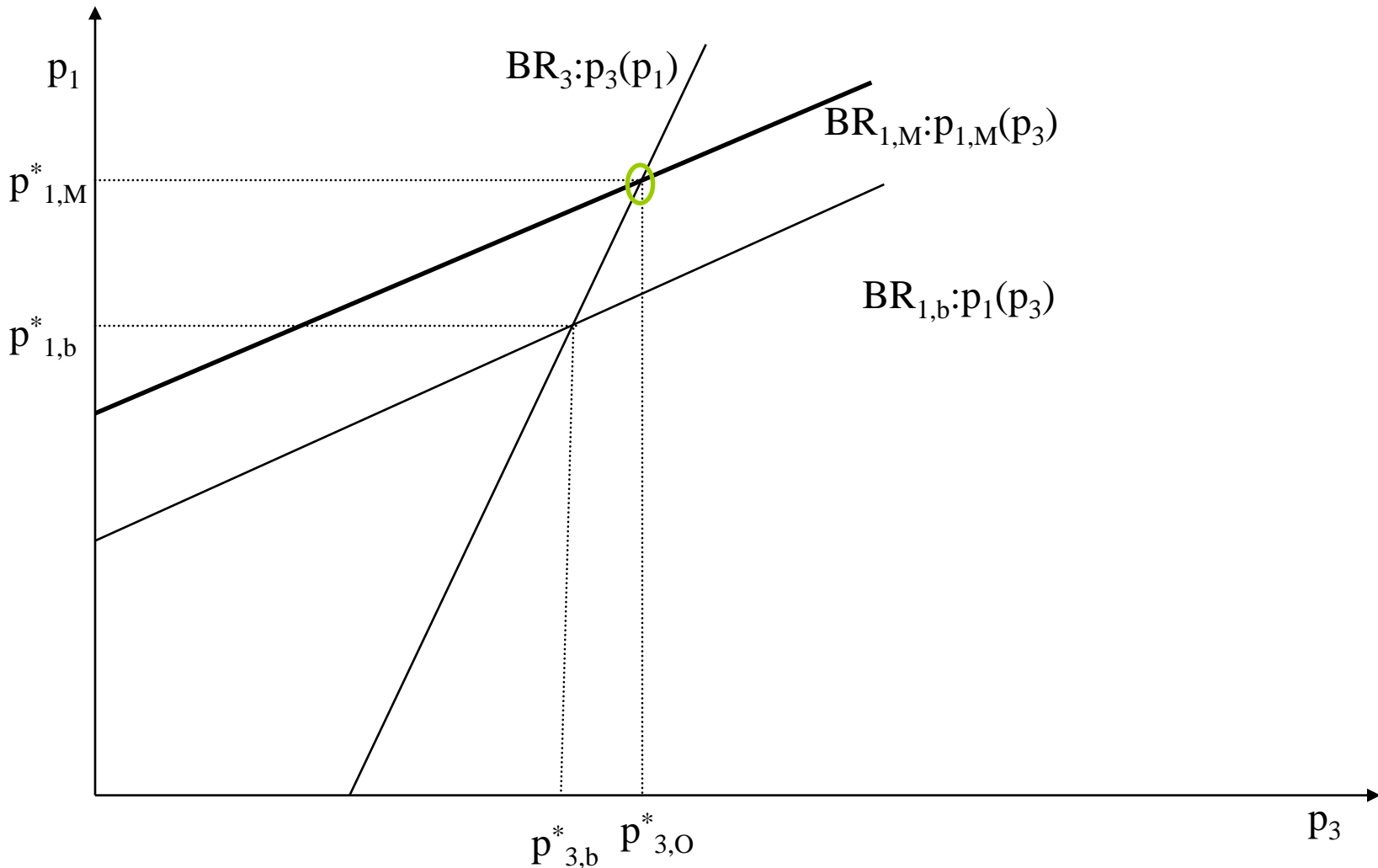
- The FOC is given by:

$$\frac{\partial \pi_3}{\partial p_3} = \frac{1}{3} \left\{ \left[v - p_3(1 + \gamma) + \frac{\gamma}{3} (p_1 + p_2 + p_3) \right] + (p_3 - c) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) \right\} = 0$$

- The best reply is given by:

$$p_3 = \frac{3v + \gamma(p_2 + p_1) + c(3 + 2\gamma)}{2(3 + 2\gamma)}$$

Firm 1 and firm 2 merge (3)



Firm 1 and firm 2 merge (4)

- The NE is identified by the intersection of the best replies:

$$\begin{cases} p_{1,M} = \frac{3v + c(3 + 2\gamma) + \gamma(p_2 + p_3) + \gamma(p_2 - c)}{2(3 + 2\gamma)} \\ p_{2,M} = \frac{3v + c(3 + 2\gamma) + \gamma(p_1 + p_3) + \gamma(p_1 - c)}{2(3 + 2\gamma)} \\ p_3 = \frac{3v + c(3 + 2\gamma) + \gamma(p_1 + p_2)}{2(3 + 2\gamma)} \end{cases}$$

- Equilibrium prices and quantities are as follows:

$$p_{1,M}^* = p_{2,M}^* = p_M^* = \frac{c(2 + \gamma)(3 + 2\gamma) + v(6 + 5\gamma)}{2(\gamma^2 + 6\gamma + 6)}$$

$$q_{1,M}^* = q_{2,M}^* = q_M^* = \frac{(v - c)(3 + \gamma)(6 + 5\gamma)}{18(6 + 6\gamma + \gamma^2)^2}$$

$$p_{3,0}^* = \frac{c(3 + \gamma)(1 + \gamma) + v(3 + 2\gamma)}{(\gamma^2 + 6\gamma + 6)}$$

$$q_{3,0}^* = \frac{(v - c)(3 + 2\gamma)^2}{9(6 + 6\gamma + \gamma^2)}$$

Firm 1 and firm 2 merge (5)

- The merger increases prices:

$$\begin{aligned} p_M^* - p_b^* &= \frac{c(2+\gamma)(3+2\gamma) + v(6+5\gamma)}{2(\gamma^2 + 6\gamma + 6)} - \frac{3v + c(3+2\gamma)}{2(3+\gamma)} \\ &= \frac{(v-c)\gamma(2\gamma+3)}{2(\gamma^2 + 6\gamma + 6)(3+\gamma)} > 0 \end{aligned}$$

$$\begin{aligned} p_{3,0}^* - p_b^* &= \frac{c(3+\gamma)(1+\gamma) + v(3+2\gamma)}{(\gamma^2 + 6\gamma + 6)} - \frac{3v + c(3+2\gamma)}{2(3+\gamma)} \\ &= \frac{\gamma^2(v-c)}{2(3+\gamma)(\gamma^2 + 6\gamma + 6)} > 0 \end{aligned}$$

- Hence, the merger harms consumers.

$$CS_M = U(q_M^*, q_{3,0}^*) - 2p_M^* q_M^* - p_{3,0}^* q_{3,0}^* = \frac{(v-c)^2(9+9\gamma+2\gamma^2)(18+26\gamma+9\gamma^2)}{36(\gamma^2+6\gamma+6)^2} < CS_b$$

Firm 1 and firm 2 merge (6)

- Equilibrium profits are given by:

$$\pi_M^* = \frac{(3+\gamma)(6+5\gamma)^2(v-c)^2}{18(6+6\gamma+\gamma^2)^2} \quad \pi_O^* = \frac{(3+2\gamma)^3(v-c)^2}{9(6+6\gamma+\gamma^2)^2}$$

- The merger benefits both the merging firms and the outsider:

$$\pi_M^* - 2\pi_b^* = \frac{(v-c)^2 \gamma^2 (27 + 63\gamma + 42\gamma^2 + 7\gamma^3)}{18(\gamma^2 + 6\gamma + 6)^2 (3+\gamma)^2} > 0$$

$$\pi_O^* - \pi_b^* = \frac{(v-c)^2 \gamma^2 (36 + 36\gamma + 7\gamma^2)(3+2\gamma)}{36(\gamma^2 + 6\gamma + 6)^2 (3+\gamma)^2} > 0$$

Firm 1 and firm 2 merge (7)

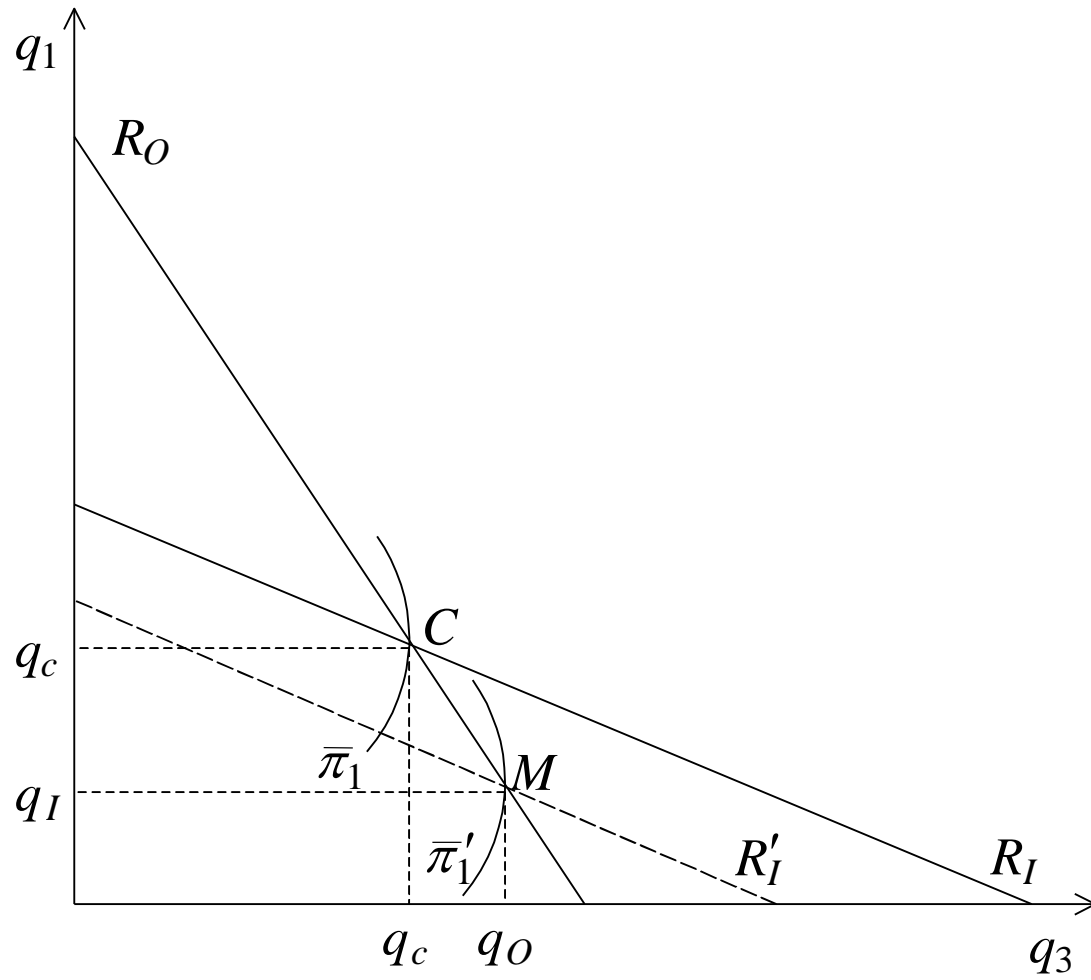
- Consumers' loss dominates, and total welfare decreases:

$$W_M = CS_M + \pi_M^* + \pi_O^* = \frac{(v-c)^2(486+1044\gamma+765\gamma^2+215\gamma^3+18\gamma^4)}{36(\gamma^2+6\gamma+6)^2}$$

$$W_M - W_b = \frac{-(v-c)^2(648+1242\gamma+738\gamma^2+129\gamma^3+2\gamma^4)}{72(\gamma^2+6\gamma+6)^2(3+\gamma)^2} < 0$$

Robustness

- The results that a merger always benefits the merging firms holds unless one assumes:
 - (i) quantity competition,
 - (ii) homogenous goods and
 - (iii) no efficiency gains.



Factors affecting unilateral effects

- **Concentration**

The lower the number of independent firms operating after the merger, the larger the increase of mkt. power.

For any existing level of concentration, the larger the increase in industry concentration triggered by a merger the larger the increase of mkt. power.

➔ Post-merger HHI and Δ HHI first screening device of unilateral effects

	Post-merger HHI			
		<1000	∈[1000,1800]	>1800
ΔHHI	<50	Approved	Approved	Approved
	[50,100]	Approved	Approved	Scrutinized
	>100	Approved	Scrutinized	Scrutinized

- **Market shares**

The lower the market shares of the merging companies the less detrimental the effect on mkt prices.

➔ Market shares as first screening device.

- **Capacities**

The larger unused capacity of rivals the weaker the merger's effect on prices.

- **Entry**

The easier entry, the lower the increase in prices triggered by the merger.

- **Demand variables**

The lower the elasticity of mkt demand the larger to scope for increasing prices.

- **Failing Firm Defence**

Merger less likely to be detrimental if, without it, one of the merging firms would not survive:

- the post-merger situation must be compared with the situation arising after the failing firm exits the industry.
- Assess the failing firm is not viable in the medium-long term.
- The proposed merger must be the only way to keep its assets in productive use.

Efficiency gains

- A merger, by combining firms' assets, may decrease their costs:
 - Economies of scale, economies of scope, synergies in R&D, managerial discipline.
- If efficiency gains affect **fixed costs**:
 - No impact on equilibrium prices.
 - However, higher welfare due to elimination of duplications.

- If efficiency gains affect variable costs and are **large enough**:
 - equilibrium prices decrease after the merger;
 - outsiders lose from the merger;
 - consumers and total welfare benefit from the merger.

N.B. The insiders benefit from the merger for any size of the efficiency gains.

Modelling efficiency gains

- After the merger, each variety is produced at the marginal cost ec with $e \leq 1$.
- The merged firm chooses p_1 and p_2 in order to max its profits:

$$\max_{p_1, p_2} \left\{ (p_1 - ec) \frac{1}{3} \left[v - p_1(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_2 - ec) \frac{1}{3} \left[v - p_2(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] \right\}$$

- The FOCs are given by:

$$\frac{\partial \pi_M}{\partial p_1} = \left[v - p_1(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_1 - ec) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) + (p_2 - ec) \frac{\gamma}{3} = 0$$

$$\frac{\partial \pi_M}{\partial p_2} = \left[v - p_2(1 + \gamma) + \frac{\gamma}{3}(p_1 + p_2 + p_3) \right] + (p_2 - ec) \left(-(1 + \gamma) + \frac{\gamma}{3} \right) + (p_1 - ec) \frac{\gamma}{3} = 0$$

Modelling efficiency gains (2)

- As $e \downarrow$, the best replies of the merged firm are shifted downwards:

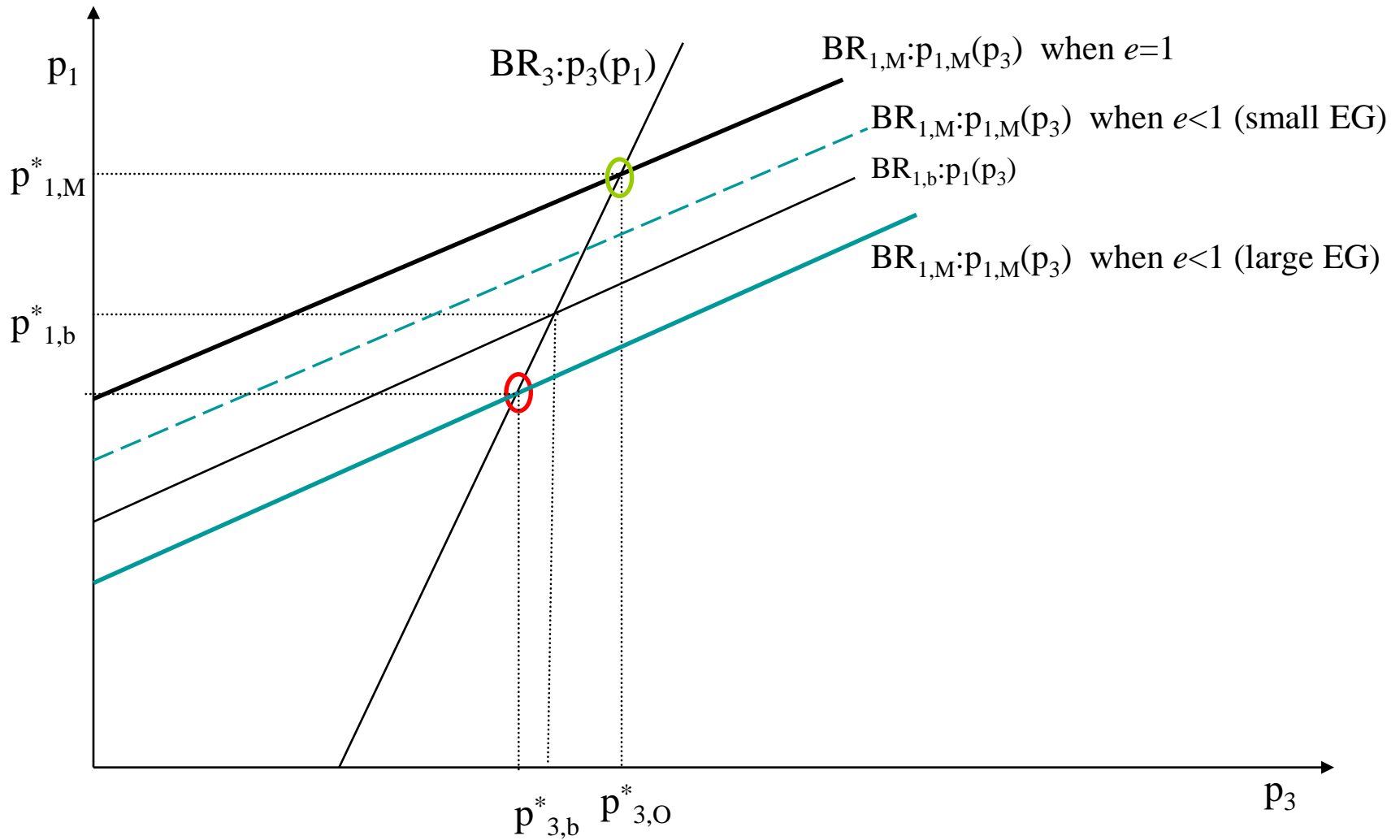
$$p_{1,M} = \frac{3v + ec(3 + \gamma) + 2\eta p_2 + \eta p_3}{2(3 + 2\gamma)}$$

$$p_{2,M} = \frac{3v + ec(3 + \gamma) + 2\eta p_1 + \eta p_3}{2(3 + 2\gamma)}$$

- The best reply of the outsider does not change:

$$p_3 = \frac{3v + \gamma(p_2 + p_1) + c(3 + 2\gamma)}{2(3 + 2\gamma)}$$

Modelling efficiency gains (3)



Assessment of efficiency gains

N.B. In order to favour the merger, efficiency gains must be **merger specific.**

- Asymmetric information between an anti-trust agency and firms operating in the industry:
 - Merging firms have an incentive to overstate efficiency gains.
 - Rival firms have an incentive to understate efficiency gains.
- ➡ Agencies should rely on independent studies in order to assess efficiency gains

Efficiency offence?

- If EG are very large, rival firms might be induced to **exit** the market.
 - The merger might be welfare detrimental!!!
- However,
 - Even if the merger leads to a monopoly, prices might decrease.
 - Capacity constraints might limit offence to rivals.
 - Synergies might be replicated by rivals (by merging in turn).
 - Exit may be caused by predatory practices adopted by the firm resulting from the merger.

➡ Efficiency offence quite unlikely.

Pro-collusive effects

- A merger can generate more favourable conditions for collusion:
 - It reduces the number of competitors.
 - It may give rise to a more symmetric distribution of assets.
- Pro-collusive effects more likely if:
 - High concentrated
 - High entry barriers
 - Frequent interactions
 - Stable demand
 - Transparent market

How to proceed in merger cases: a check-list

- *Unilateral effects*

- Market definition:

- Product market definition
- Geographic market definition

- Market power:

- Market shares and distribution of capacities; Elasticity of market demand; Elasticity of supply of the rivals (and their excess capacity); Potential entrants; Switching costs; Power of the buyers

- *If possible, econometric analysis.*

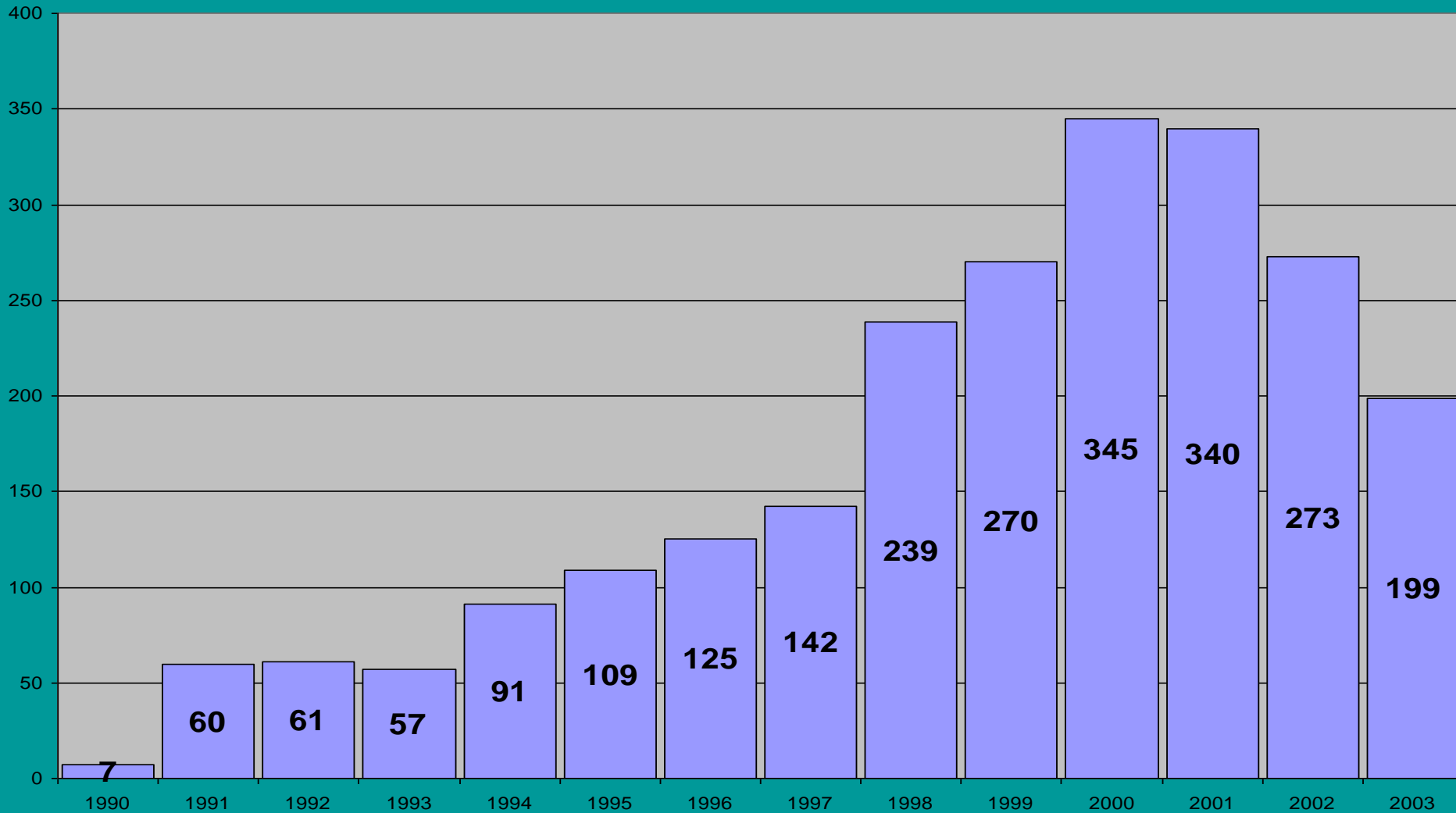
- Efficiency gains

- Two possible outcomes:
 1. The merger enables firms to significantly raise prices beyond the current level → Prohibition or remedies.
 2. Might collusion arise after the merger?
- ***Joint dominance***
 - Number of firms and concentration; Distribution of market shares and capacities; Potential entrants (and switching costs); Buyers' power; Observability of other firms' behaviour (exchange of information, competition clauses, resale price maintenance); Frequency of market transactions and magnitude of orders.

The EU Merger Policy

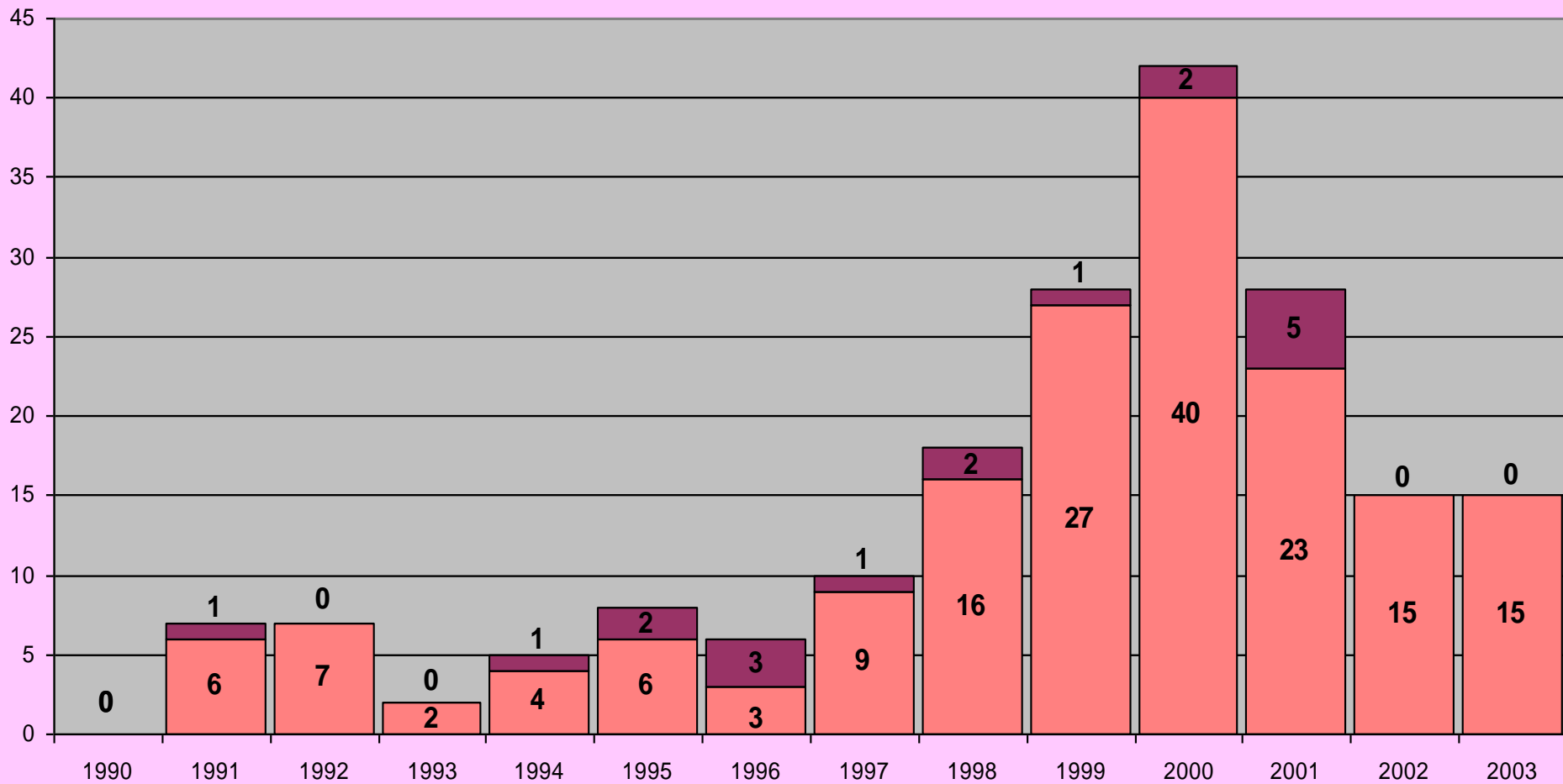
- Preventive authorisation system:
 - Report to MTF (Merge Task Force) of the Competition Directorate of the European Commission (DG-COMP)
- One-stop shop for mergers (subsidiarity principle).
- Reasonably quick and effective, with certain time horizon.

Final Decisions taken by the EC



Source: European Merger Control - Council Regulation 4064/89 - Statistics

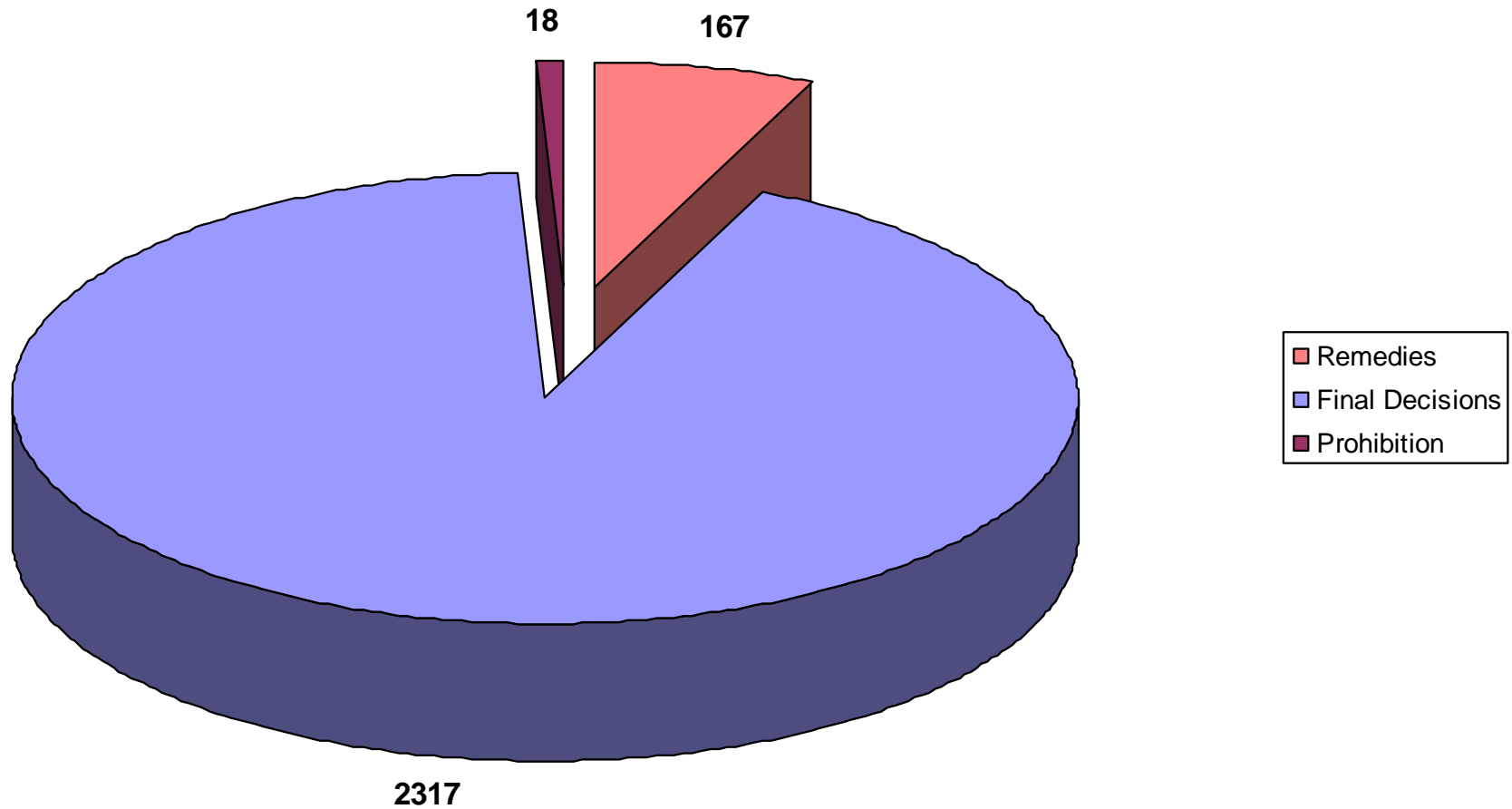
Remedies and Prohibition



Source: European Merger Control - Council Regulation 4064/89 - Statistics

Remedies Prohibition

Totals: 1990 - 30 Nov. 2003



Source: European Merger Control - Council Regulation 4064/89 - Statistics

The EU Merger Regulation

- *The EU Merger Regulation 4064/89 was a source of inefficient biases:*

1) Restricting attention to mergers which create dominance implies that some welfare detrimental mergers might be approved

- Joint dominance to cover unilateral effects: not a good approach. *Airtours* judgment.

2) Failure to consider efficiency gains might result in beneficial mergers being blocked by the EU authorities.

The new Merger Regulation

- Compromise between “dominance” and “SLC” test:
 - It prohibits mergers that “would significantly impede effective competition, in the common market or in a substantial part of it, in particular as a result of the creation or strengthening of a dominant position”.
- Merger guidelines (also 2004) clarify DG-COMP’s approach to mergers.
- They also include an efficiency defence.