

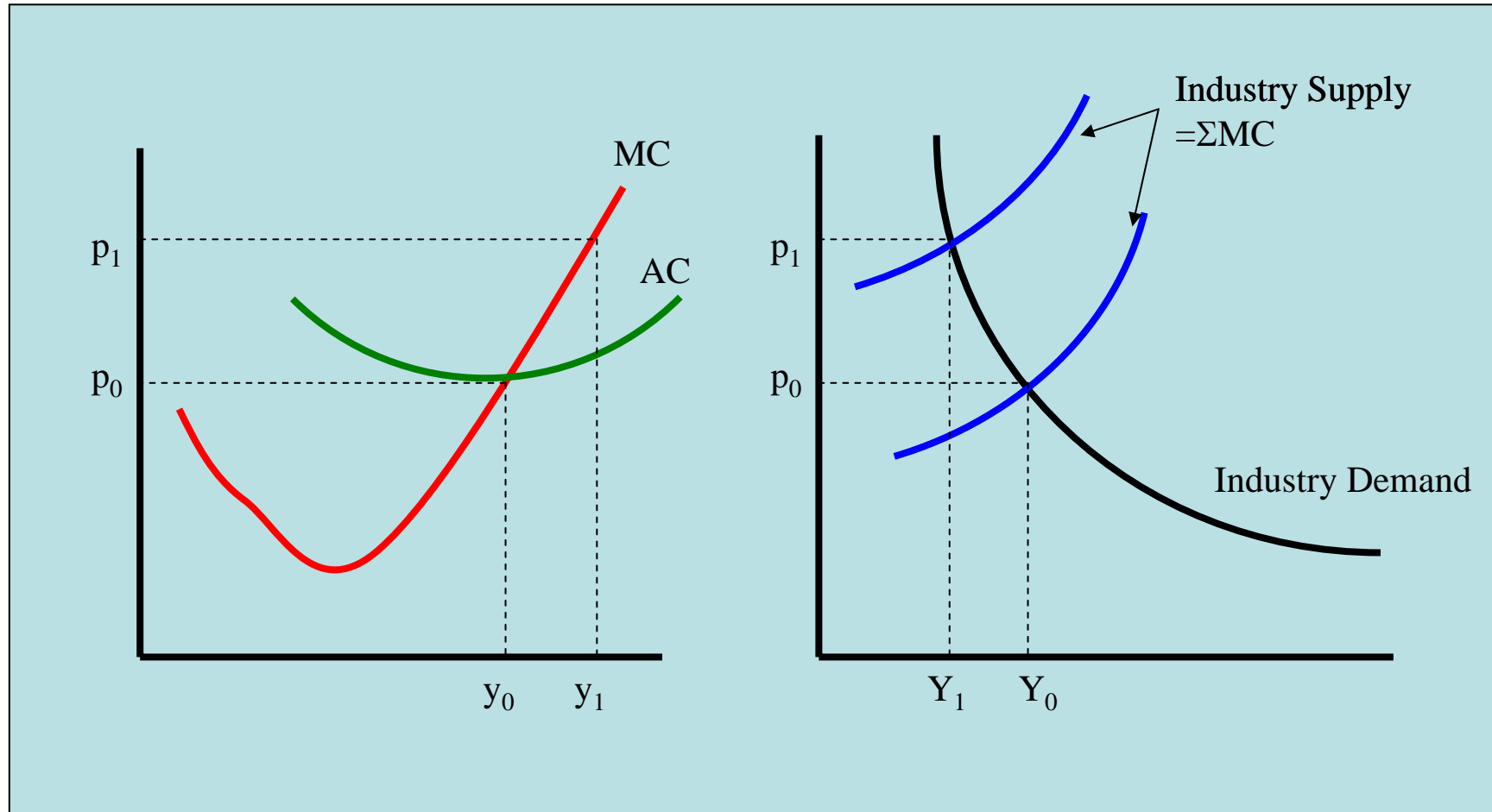
Imperfect Competition

Vani K Borooah

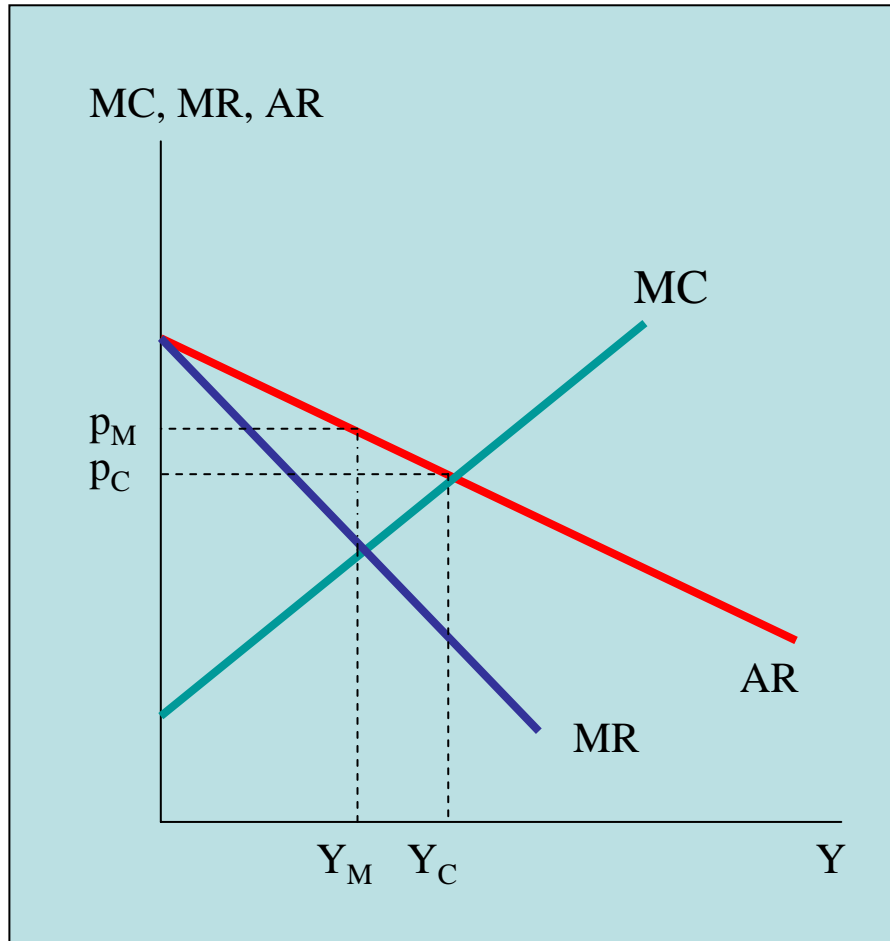
Price = Marginal Cost

- A competitive market is one in which there are many sellers and buyers of a homogenous product
- An important implication of this is that no buyer or seller has “market power” over price and output
- Economists regard such a market structure as the “ideal” since it leads to an efficient outcome
- Equilibrium in such markets occurs when price = marginal cost and this is the “gold standard” for judging the efficiency of markets

Competitive Equilibrium

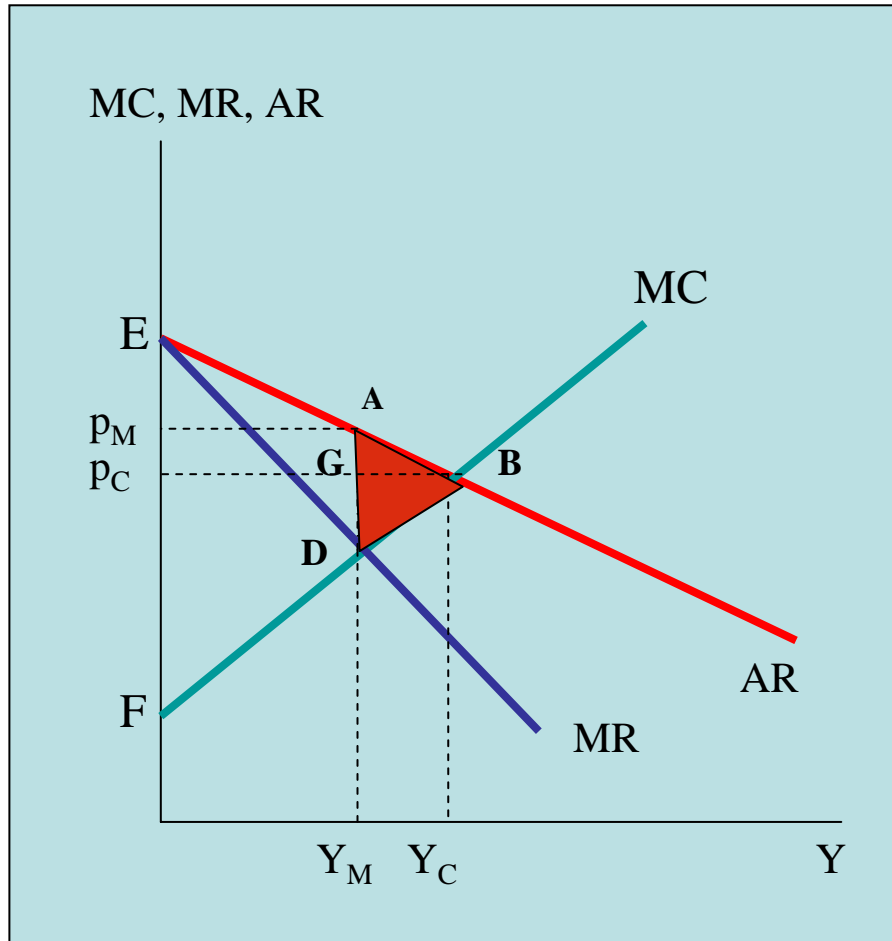


Monopoly and Competitive Equilibrium



- The monopolist in equilibrium equates MR to MC and produces Y_M at a price of p_M
- The competitive industry in equilibrium equates AR to MC and produces Y_C at a price of p_C

Deadweight Loss: the Harberger Triangle



- The loss in consumers' surplus is $p_M AB p_C = p_M A G p_C + A G B$
- The gain in producer's surplus is $F p_M A D - p_C B F = p_M A G p_C - D G B$.
- So, the *net loss due to monopoly* is $(p_M A G p_C + A G D) - (p_M A G p_C - D G B) = A G B + D G B = A B D$
- The area of the triangle $A B D$ – whose area measures the net loss from monopoly – is known as the *deadweight loss* from monopoly

Oligopoly: Cournot's Model

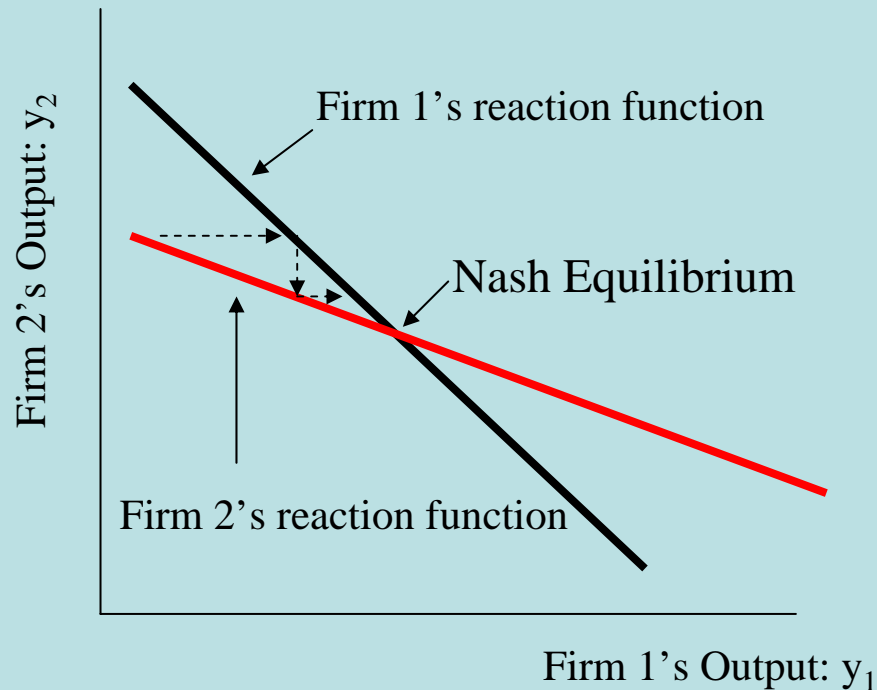
- $Y=y_1+y_2$ is industry output: price (p) depends on Y
- $\pi_1=p(Y)-C(y_1)=p(y_1+y_2)-C(y_1)$ is Firm 1 profits
- $\pi_2=p(Y)-C(y_2)=p(y_1+y_2)-C(y_2)$ is Firm 2 profits
- Each firm chooses its π -maximising output, **given the output of the other firm**
- This is the basic assumption of the Cournot-Nash model

Cournot-Nash Equilibrium

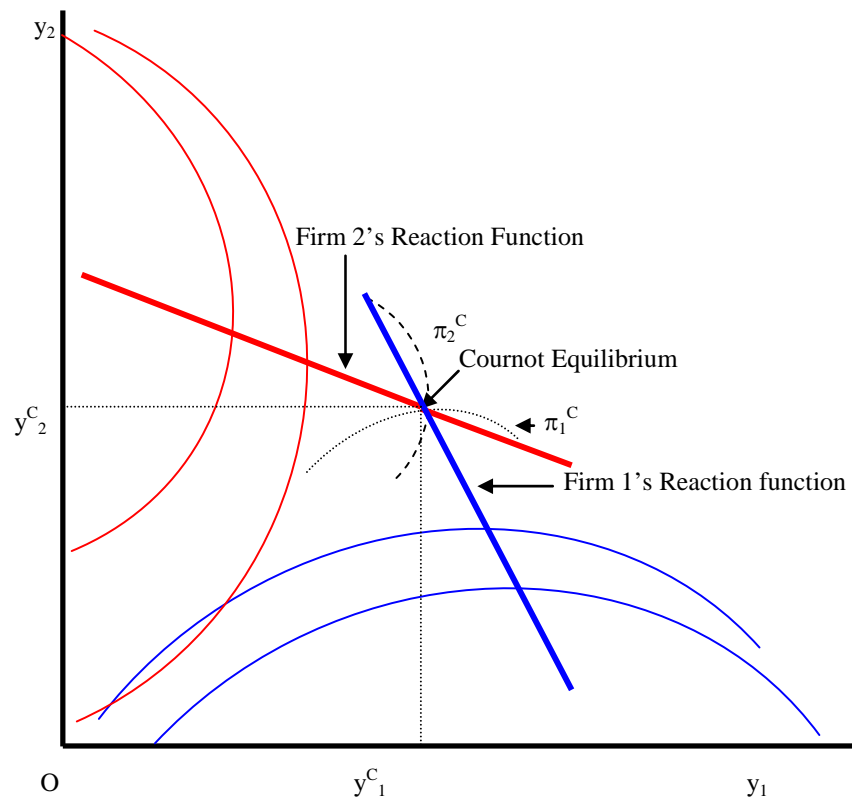
- Firm 1's reaction function shows firm 1's π -maximising y_1 , given y_2 : $R_1(y_2)$
- Firm 2's reaction function shows firm 2's π -maximising y_2 , given y_1 : $R_2(y_1)$
- Equilibrium will occur at the point where reaction functions intersect: this represents the Cournot equilibrium
- At this point, firm 1 will produce y_1^* and firm 2 will produce y_2^*

Cournot-Nash Equilibrium: A Picture

Two Firms



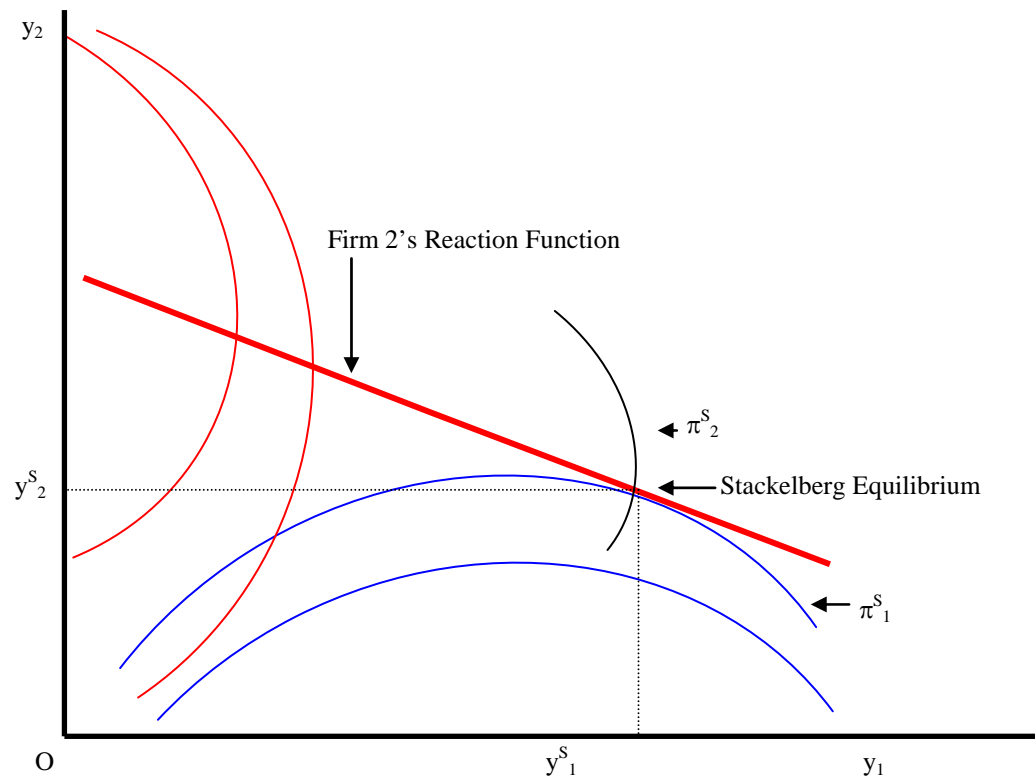
- The dashed arrows represent the path towards the Cournot-Nash equilibrium
- At the Cournot-Nash equilibrium, no firm has an incentive to change



Oligopoly: Cournot Equilibrium and Iso-profit curves

Notes to Preceding Diagram

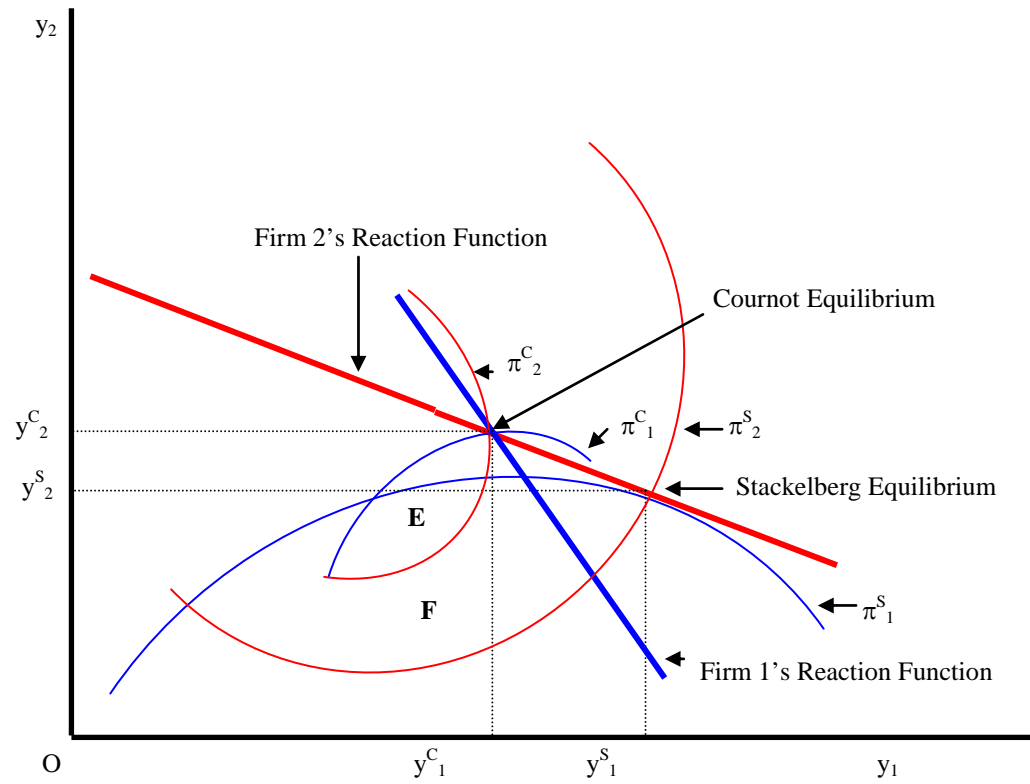
- The iso-profit curves for firm 1 are the y_1, y_2 combinations that yield the same π_1
- The iso-profit curves for firm 2 are the y_1, y_2 combinations that yield the same π_2
- *Lower* iso- π curves represent *higher* levels of profit
- $\pi_1 = p(Y) - C(y_1) = p(y_1 + y_2) - C(y_1)$ and $\pi_2 = p(Y) - C(y_2) = p(y_1 + y_2) - C(y_2)$
- Each firm chooses its π -maximising output, **given the output of the other firm.**
- This is the basic assumption of the Cournot model
- Firm 1's reaction function shows firm 1's π -maximising y_1 , given y_2 : $R_1(y_2)$
- Firm 2's reaction function shows firm 2's π -maximising y_2 , given y_1 : $R_2(y_1)$
- Equilibrium will occur at the point where reaction functions intersect: this represents the Cournot equilibrium
- At this point, firm 1 will produce y_1^C and earn profits π_1^C and firm 2 will produce y_2^C and earn profits π_2^C
- $Y = y_1 + y_2$ is industry output: price (p) depends on Y
- NB: For stability firm 1's reaction function *must be steeper* than that of firm 2 (as in diagram)



Oligopoly: Stackelberg Equilibrium and iso-profit curves

Notes to Preceding Diagram

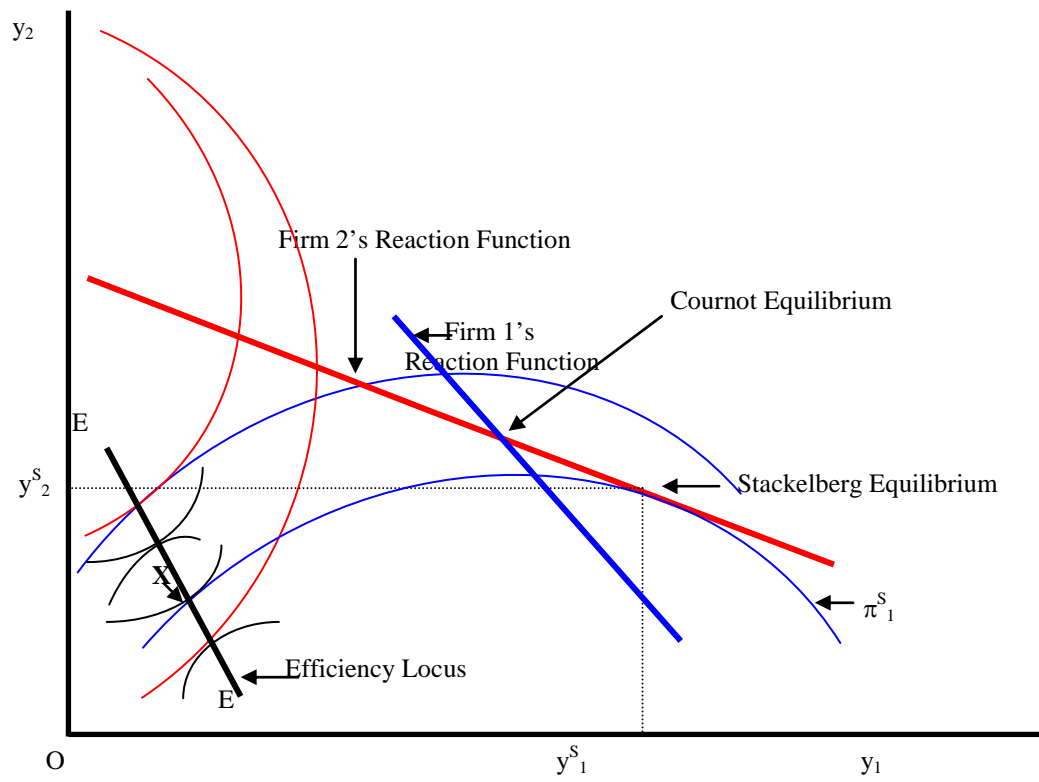
- $Y=y_1+y_2$ is industry output: price (p) depends on Y
- $\pi_1=p(Y)-C(y_1)=p(y_1+y_2)-C(y_1)$ and $\pi_2=p(Y)-C(y_2)=p(y_1+y_2)-C(y_2)$
- The iso-profit curves for firm 1 are the y_1, y_2 combinations that yield the same π_1
- The iso-profit curves for firm 2 are the y_1, y_2 combinations that yield the same π_2
- *Lower* iso- π curves represent *higher* levels of profit
- In the Stackelberg model, one firm is the **leader** (1) and the other firm is the **follower** (2)
- The leader knows that if it sets an output, y_1 then firm 2 will set output according to its reaction function: that is, $y_2=R_2(y_1)$
- Firm 1 chooses y_1 , its π -maximising output, **given the reaction function of the follower.**
- This is the basic assumption of the Stackelberg model
- Equilibrium will be where firm 2's reaction function is tangential to firm 1's iso- π curve.
- At this point, firm 1 will produce y_1^S and earn profits π_1^S and firm 2 will produce y_2^S and earn profits π_2^S



Inefficiency of Cournot and Stackelberg Equilibrium

Notes to Preceding Diagram

- All y_1, y_2 combinations in area **E** are more efficient than the Cournot equilibrium: every point in E offers both firms higher profits than at Cournot equilibrium.
- All y_1, y_2 combinations in area **F** are more efficient than the Stackelberg equilibrium: every point in F offers both firms higher profits than at Stackelberg equilibrium.



Oligopoly Collusion and the Efficiency Locus

Notes to the Preceding Diagram

- The Efficiency locus maps out the points of tangency between the iso- π curves: at a point on the locus (X) no firm can increase its profits without reducing the profits of the other firm. The location on EE will depend on the relative strength of the two firms.