**TOPIC 3**

1. **R&D COOPERATION AND SPILLOVERS**
2. **Motives for collaboration**

* Internalizing knowledge spillovers within the consortium
* Greater efficiency of R&D
* Greater amount of financial resources available
* Sourcing of complementary know-how
* Elimination of wasteful duplication in efforts
* Not only larger, but also more risky projects may become feasible

1. **Cooperation between**

* Horizontal
  + Competing firms
  + Non-competing firms
* Vertical
  + Customers and suppliers
* Universities and public research centers

1. **Innovative environment**

* Ideas are common knowledge
* R&D investments result immediately and for sure into an innovation
* R&D investments are a form of strategic commitment
* R&D leads to spillovers which benefit other firms
* Firms may cooperate on R&D decisions to internalize spillovers

1. **D’apresmont / Jacquemin**

Situation

* 2 firms compete a la Cournot in a 2nd stage of a game
* In the first stage they can decide to invest in R&D and how much
  + if they invest => MC decreases
  + Spillovers => competitor benefits also

Goal of the model

* Compare 2 situations
  + Firms behave completely non-cooperative
  + Firms are allowed to collaborate on R&D, but still compete on product market
* Question
  + What with total R&D in economy?
  + What with equilibrium profits and output

Calculations

* Inverse demand function

*D-1 = p = a - bQ = a - bq1 - bq2, with a, b > 0*

* Cost function

*Ci (qi, xi, xj) = [A – xi – β xj] qi,  
 with 0 < A < a, 0 < β < 1; xi + β xj ≤ A, Q <*

* + β = External effect = benefits from R&D of firm j that flow without payment to firm i.
* cost of R&D

*γ*

* + γ ≥ 1
* Profit function of firm 1

*π1 = [a - bq1 - bq2] q1– [A- x1 – β x2] q1 – γ*

* Non-cooperative behavior
* Firms are symmetric => q1\* = q2\*
  + Solve to profit
* With simplification :

*π1\*= [(a-A) + (2- β) x1 + (2β -1)x2]² – γ*

x1\* =

* Industry Output Q\* = q1\* + q2\*

*Q\* = []*

* Joint profits

*= π1\* + π2\*  
 =*

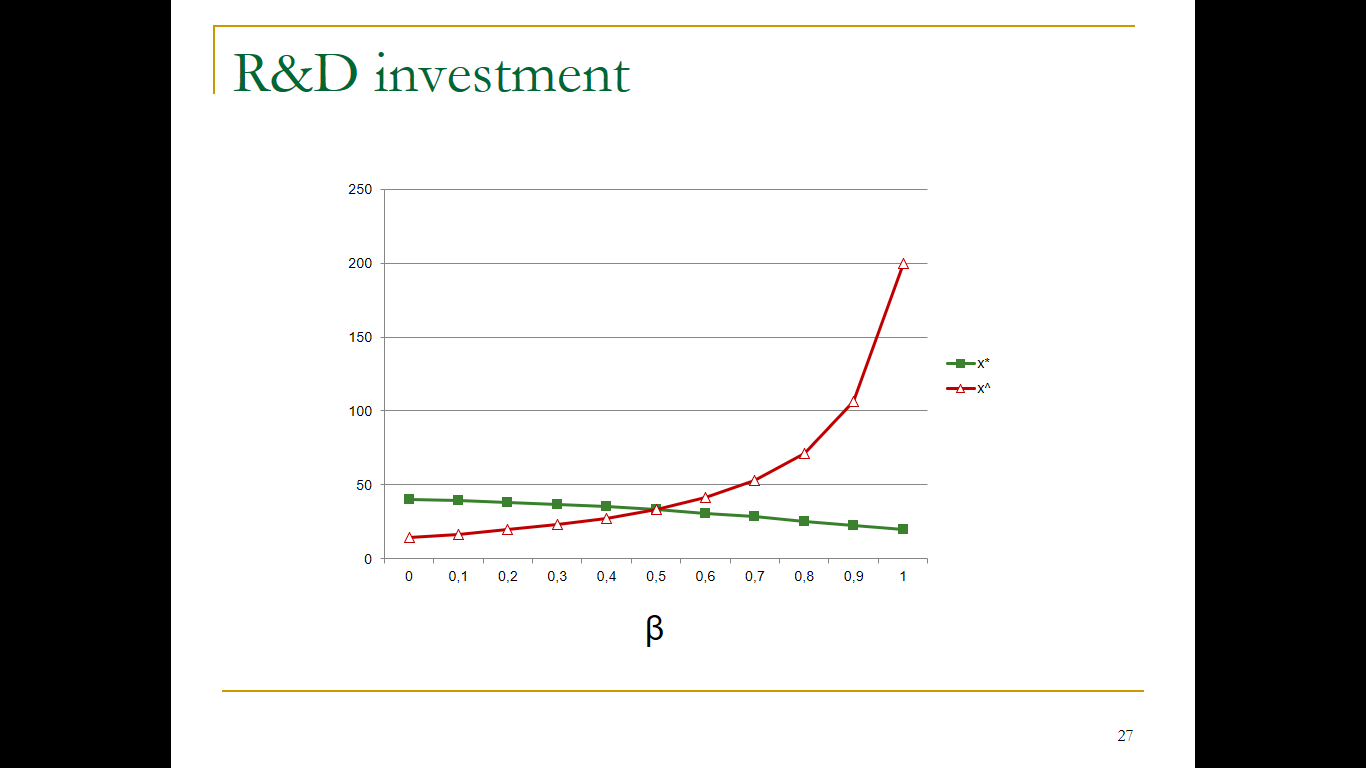
* = x1 = x2

*=*

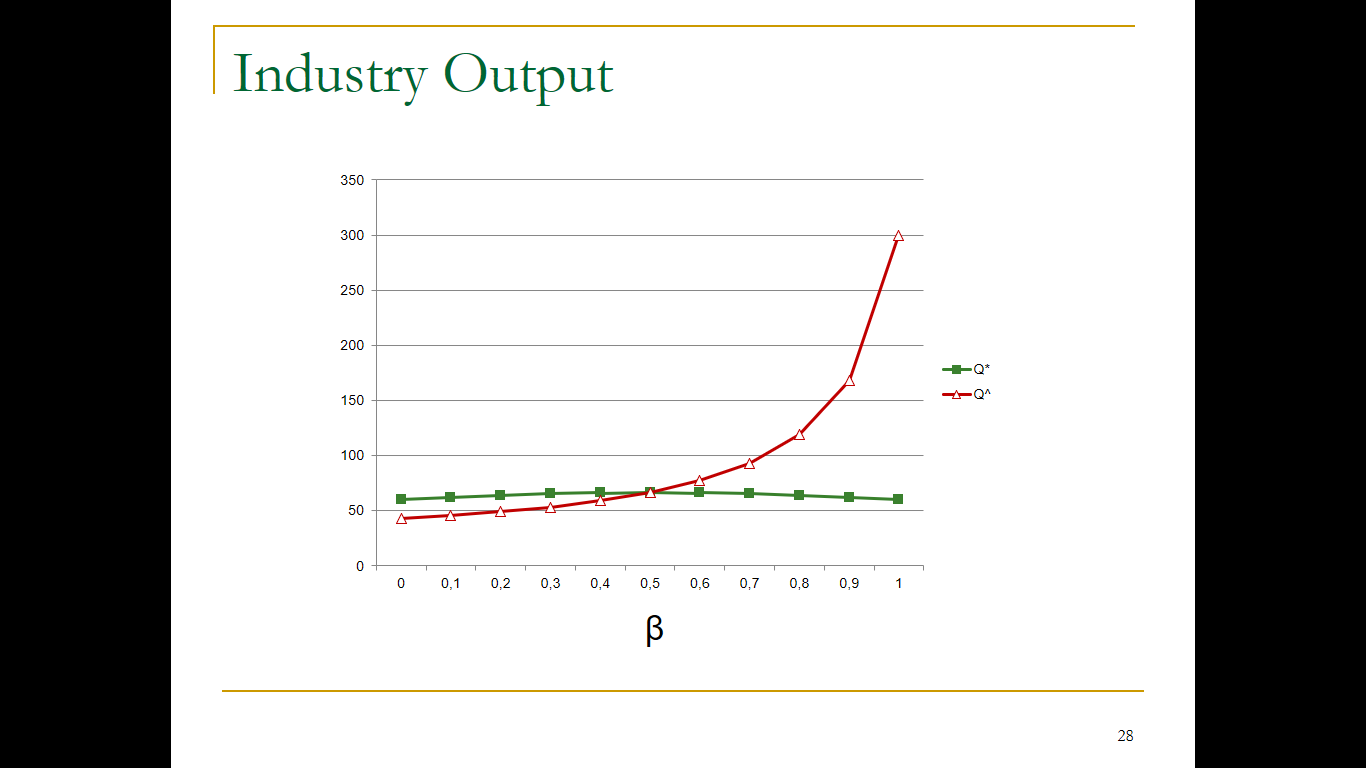
*[]*

Conclusion

* When firms can collaborate on R&D , they internalize the external effects through joint decision on R&D investment
* Comparison between x\* and shows that for large spillover , > 0.5, the level of R&D increases when firms cooperate ( > x\*)
  + Also > Q\*
* Higher industry output means lower consumer prices and higher consumer surplus
* R&D investment



* Industry Output



1. **Summary**

R&D activities with spillovers create 2 externalities

* R&D affects overall industry profits
  + Externality increases with level of spillovers
  + Ignored when firms choose R&D separately
  + Internalized when firms choose R&D cooperatively
* R&D affects a firm’s competitive advantage
  + Externality decreases with level of spillovers
  + Present when firms choose R&D separately
  + Internalized when firms choose R&D cooperatively

🡺 When firms behave strategically, R&D cooperation leads to more (less) R&D when spillovers are large (small)

1. **INNOVATION AND COMPETITION POLICY**

* Agreements between firms that contribute to technological progress may be permitted under EU competition law
* Block exemption for R&D cooperation if
  + The combined market shares of the firms involved <25%
  + No contractual restrictions on independent R&D
  + No restrictions on the use of jointly generated knowledge
* What if R&D cooperation promotes tacit collusion in the post-innovation market
* Threat to break up R&D collaboration could be part of a punishment strategy that creates incentives for firms to restrict output

1. **R&D cooperation and product market collusion**

* What if firms extend cooperation to the product market
  + R&D cooperation and information sharing should not necessarily be permitted
    - Public policy trade-off between market power and efficiency
    - Not clear how this trade-off balances out
* Antitrust authorities must make sure that cooperation is limited to R&D activities