Ames Research Center

Air Traffic Control: Economics of Flight

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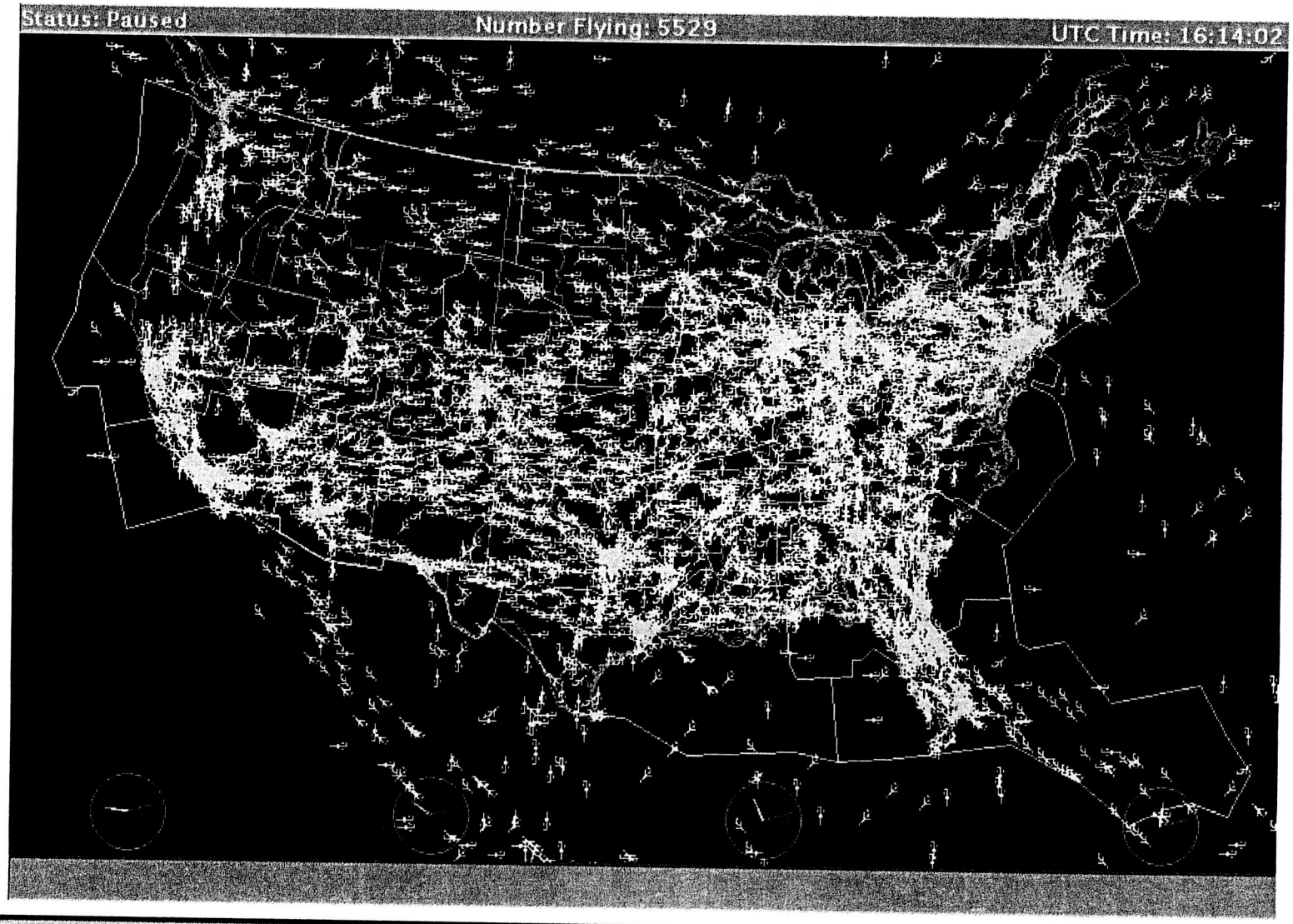
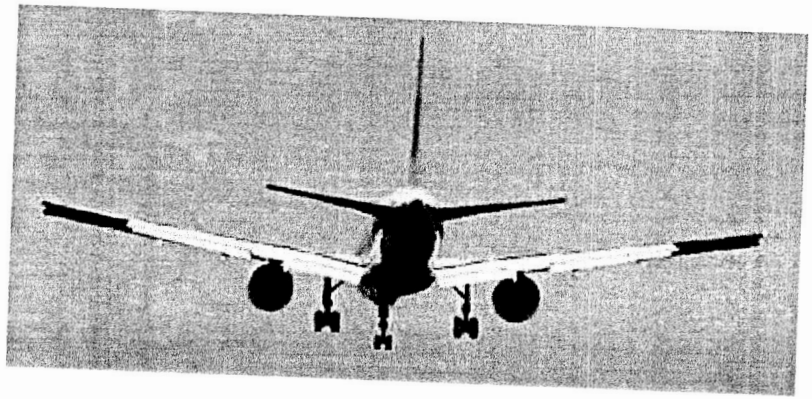
Typical Day in the Skies



Air Traffic Control: Economics, Murphy

Commercial Flight

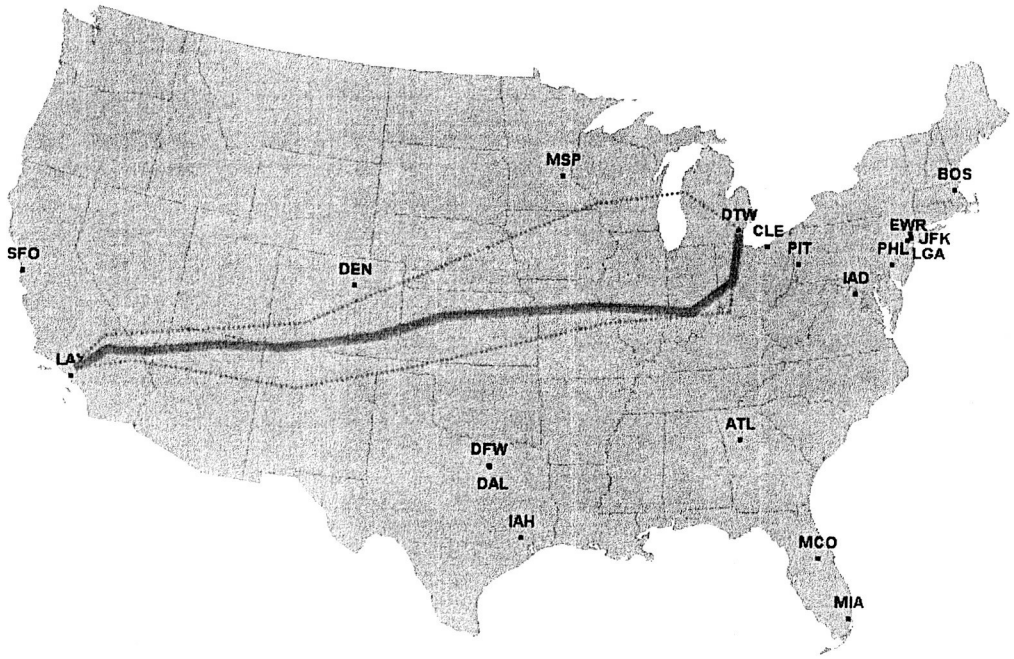
- Partnership
  - Pilots
  - Airlines
  - Air Traffic Controllers



Air Traffic Control: Economics, Murphy

Typical Flight Plan

- Airlines determine the route
  - Weather
  - Congestion
- Pilots fly the plans
- Controllers keep the skies safe and orderly



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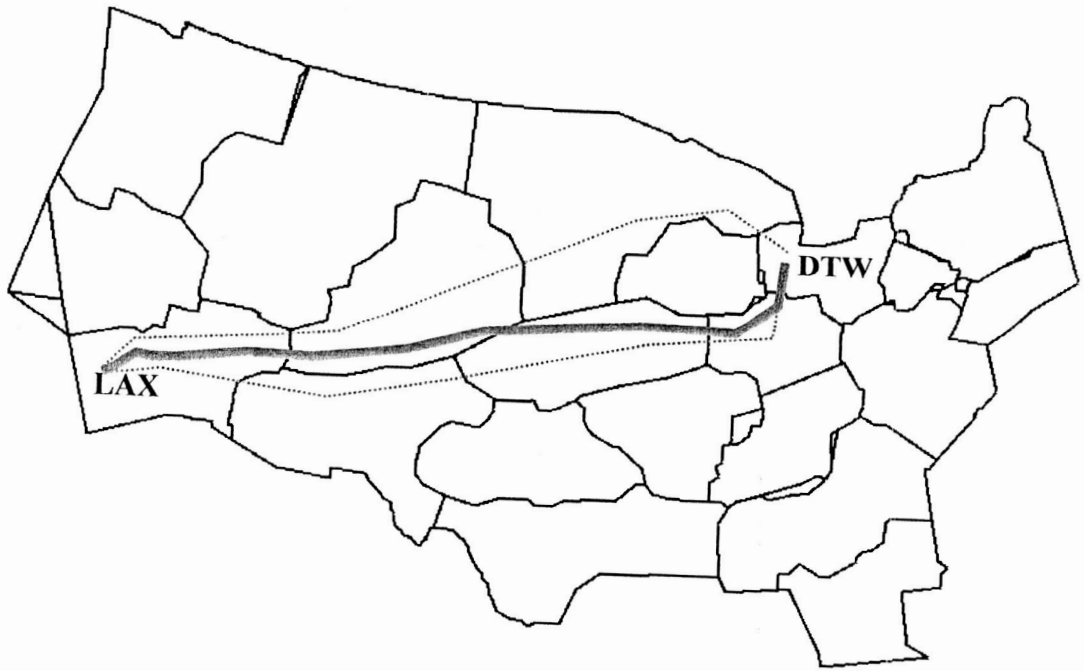
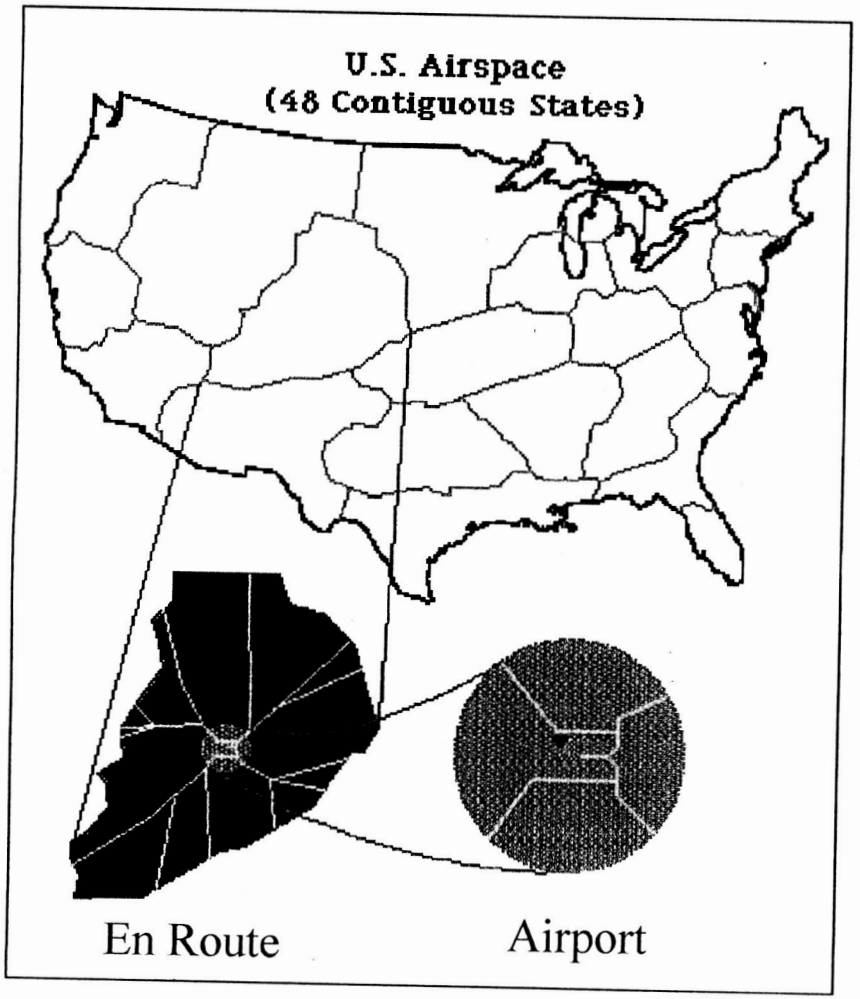
Controller's Point of View

- Airlines determine the route
  - Weather
  - Congestion
- Pilots fly the plans
- Controllers keep the skies safe and orderly

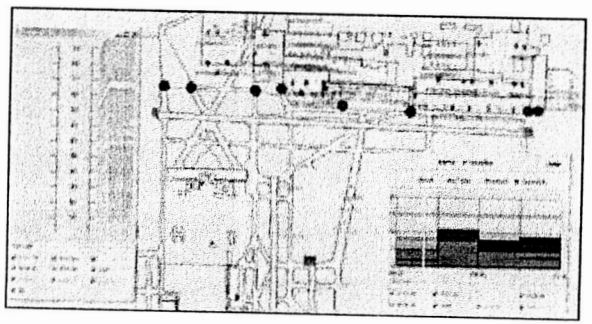


Airspace



Airplanes are constantly monitored by air traffic controllers: Each covering a different airspace

- En Route: 12,000 – 35,000 ft
- Airport: ~500 to 12,000 ft
- Tower: takeoff/landings and on the ground



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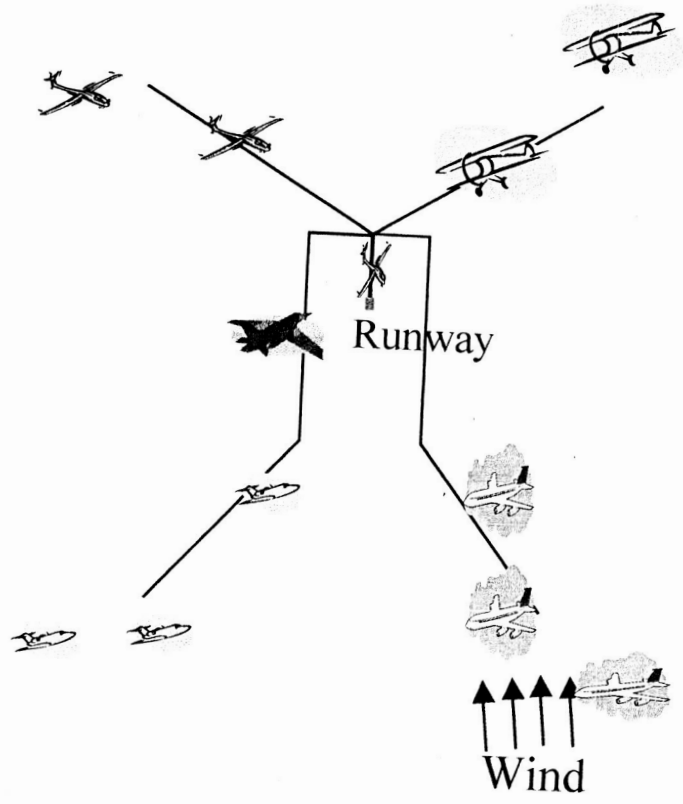
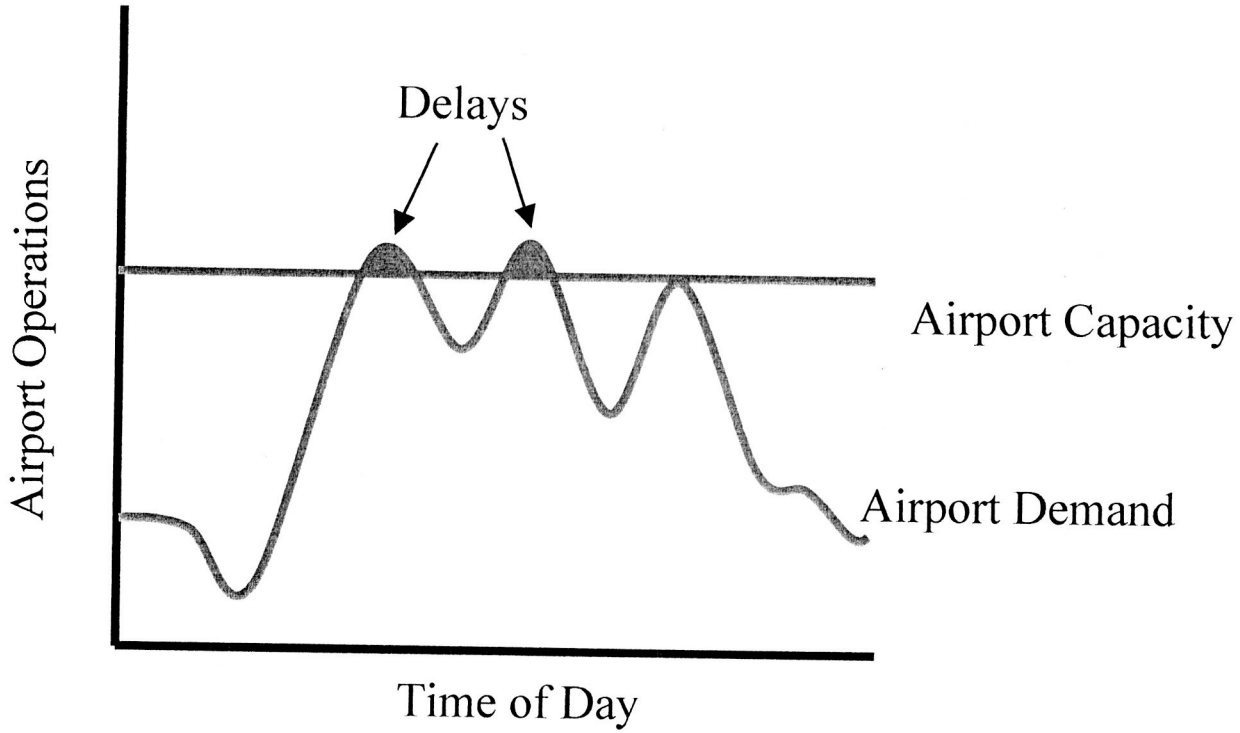
At the Airport

- Airplanes land/takeoff against the wind
- Why are airplanes delayed?
  - Constraints on landing aircraft:
    - Number of runways
    - Separation
    - Weather

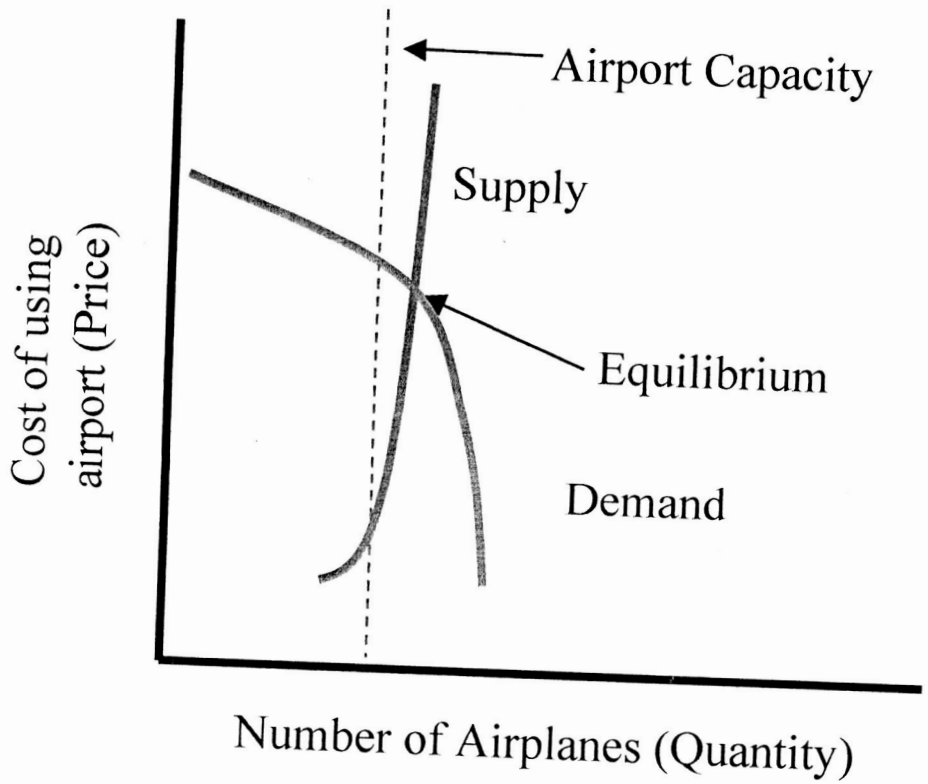


Economics at the Airport



- The airport is busy based on time of day.
  - Slows down overnight
- Many airports have built in "Delays"
  - The airlines have scheduled more aircraft then the airport can handle for a given time
  - Some delay is OK, as long as the airline schedule is not disrupted

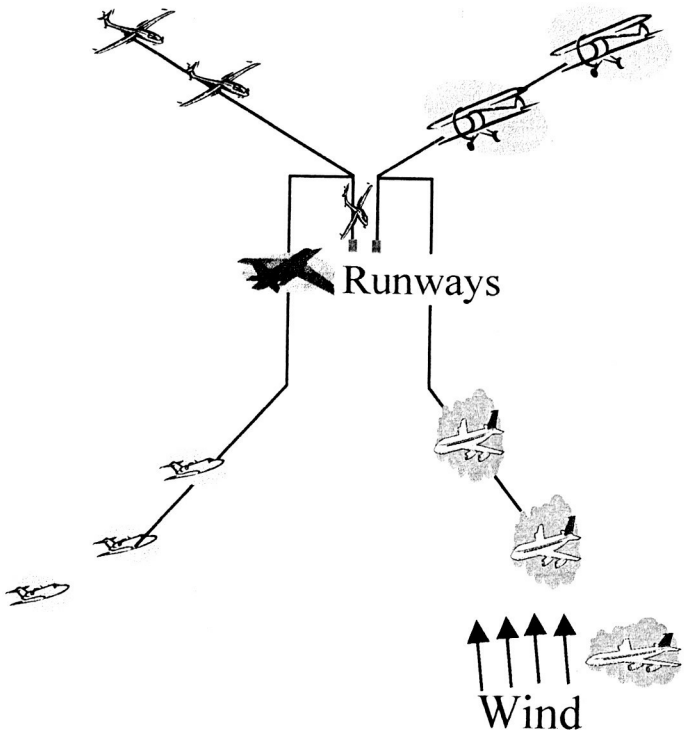
Economics at the Airport



- Supply/Demand curves during "busy" times of day
  - The demand for the airport is slight greater then airport capacity
  - Airlines: Some delay is acceptable (worth the price)

Improving Arrival Delays

- Increase the number of Runways
  - This can be difficult
- Improve the flow / spacing of aircraft
  - Decision support tools
- i.e. Increase the airspace "Supply"



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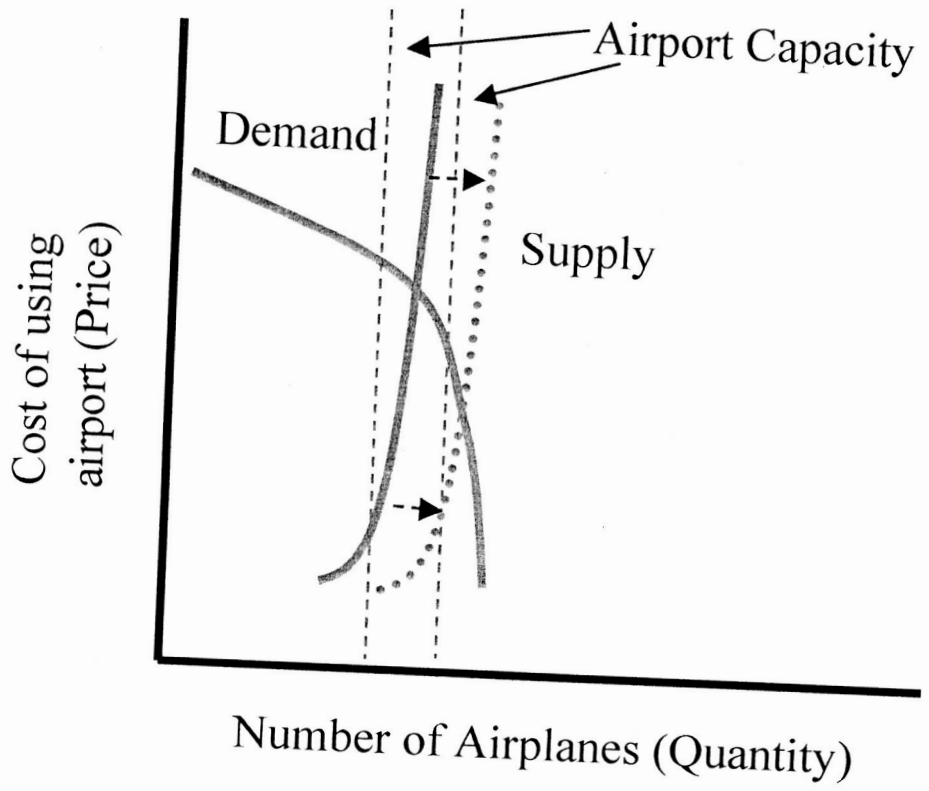
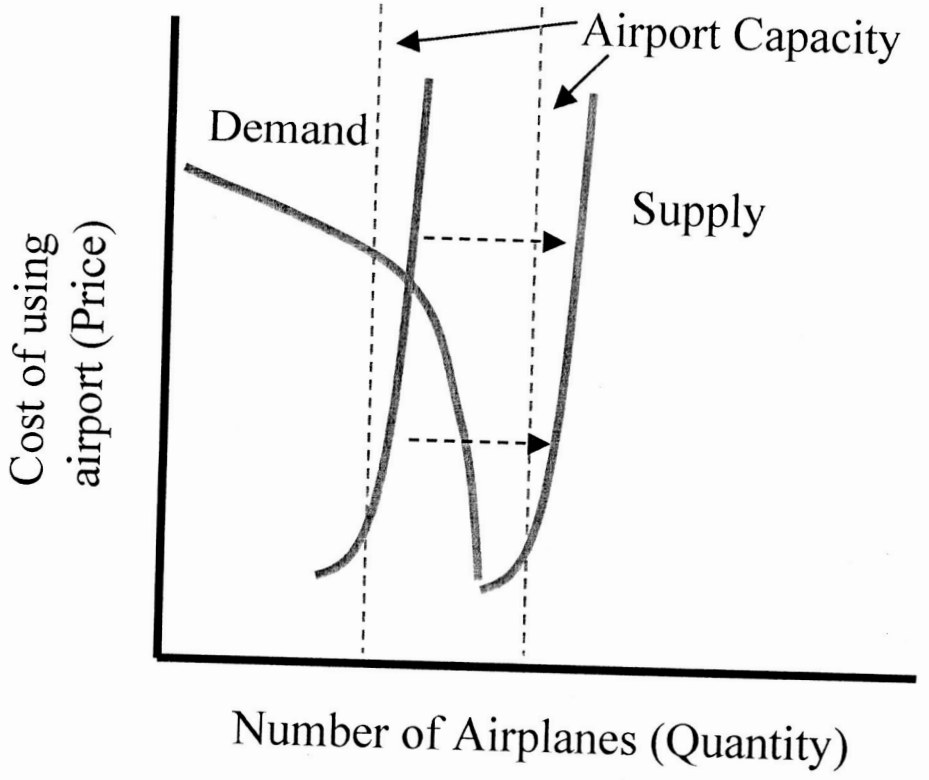
Economics at the Airport



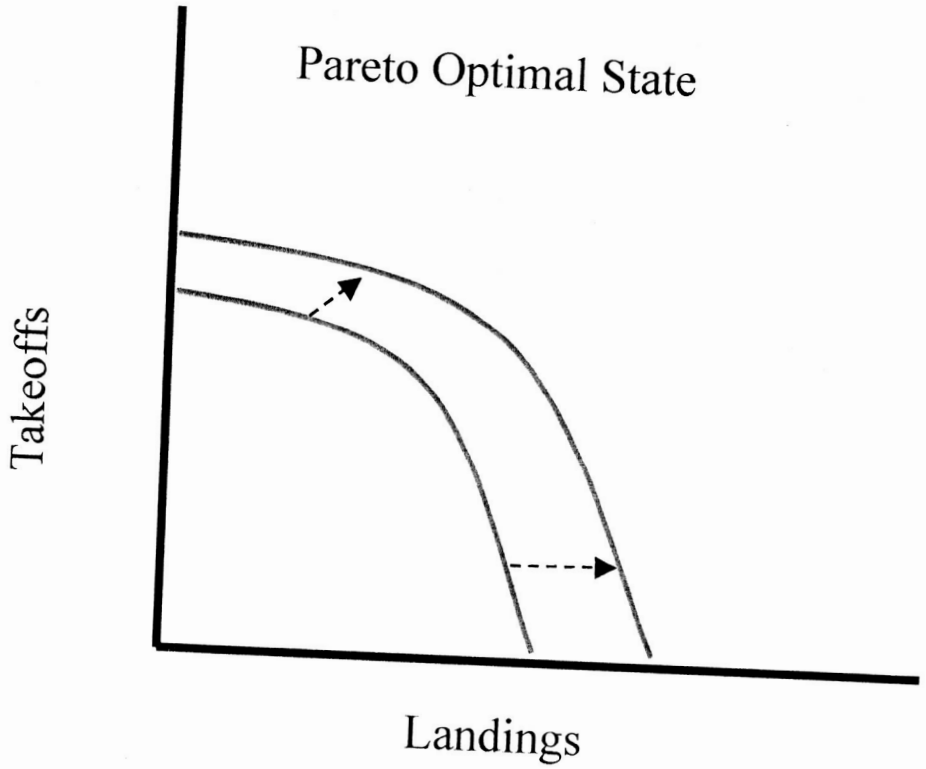
- What happens when we increase the supply?
  - New runways/improved technology
  - Capacity increases, but we may still have delays

Economics at the Airport



- Can we remove delay?
  - Increase airport capacity beyond demand curve
  - Depends on the demand curve

Economics at the Airport



- If delays will still occur, are supply increases valuable?
  - Shift in Pareto Optimal airport curve. (This is good.)
  - Only if benefits of supply increase outweigh the costs

Summary

- Commercial flight is a partnership
  - Airlines
  - Pilots
  - Air Traffic Control
- Airline schedules and weather problems can cause delays at the Airport
  - Delays are inevitable in in de-regulated industry due to simple economics
- Delays can be mitigated
  - Build more runways/Technology
  - Increase airspace supply
- Cost/Benefit analyses determine justification