

Should Airlines Overbook?

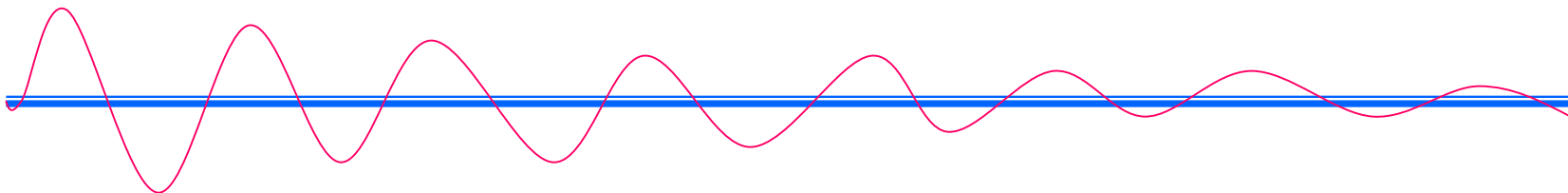
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Arnan Sipitakiat
Carla Gomez-Monroy*



May 12, 2003

Content

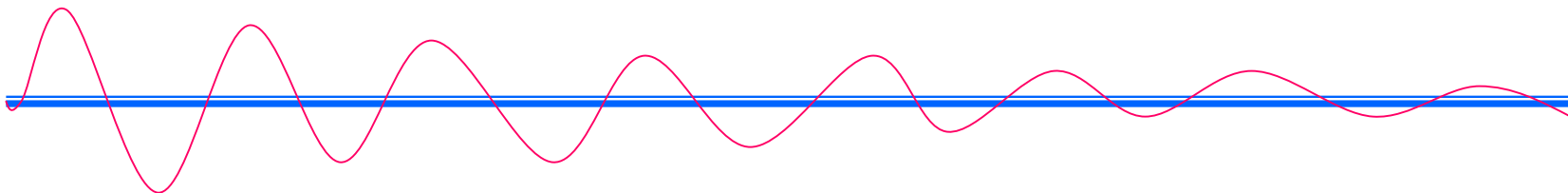
- Problem Statement and Motivation
- Modeling Goals
- Assumptions in the Model
- Behavior of airline with and without overbooking
- Finding an optimal overbooking policy
- Problems Encountered
- Lessons Learned
- Conclusion and Future Direction



Problem Statement and Motivation

We were concerned about whether or not overbooking leads to higher airline profit both in the short and long term.

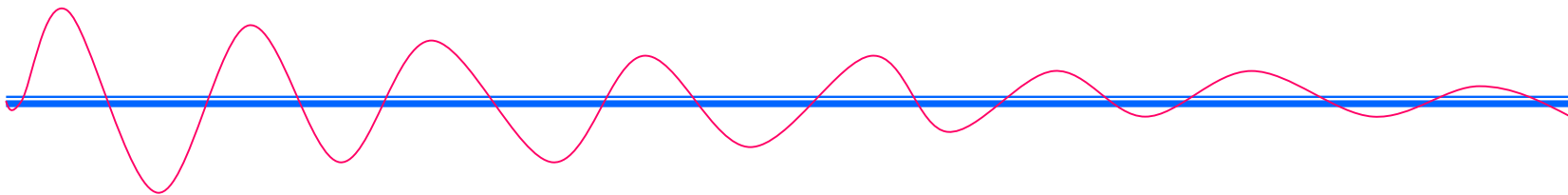
We set out to find out what influenced as well as was influenced by overbooking in the airline industry.



Modeling Goals

How does Overbooking affect:

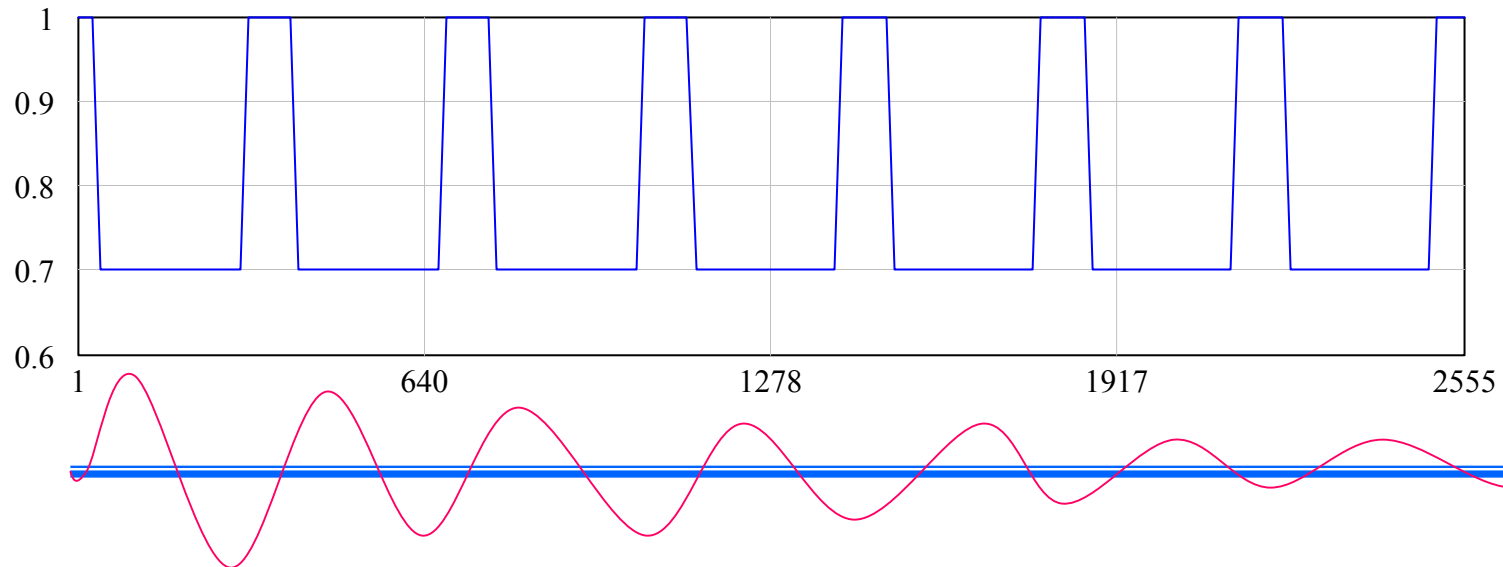
- Customer Satisfaction
- Profit
- Demand



General Assumptions

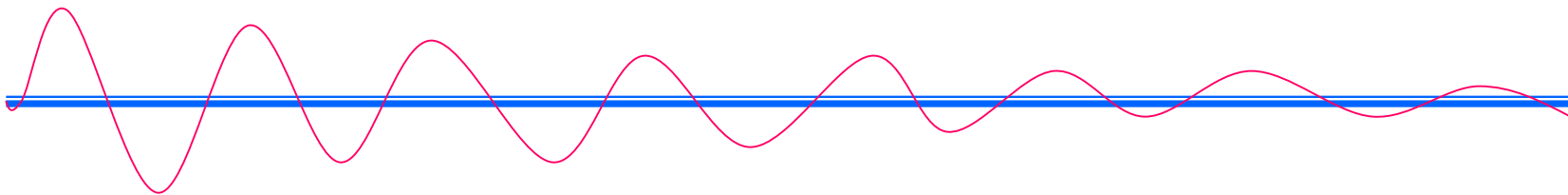
- The Model is over a period of 7 years
- The market demand is high for three months (Nov-Jan) and less than the full capacity for the rest of the year.

DemandLookUp



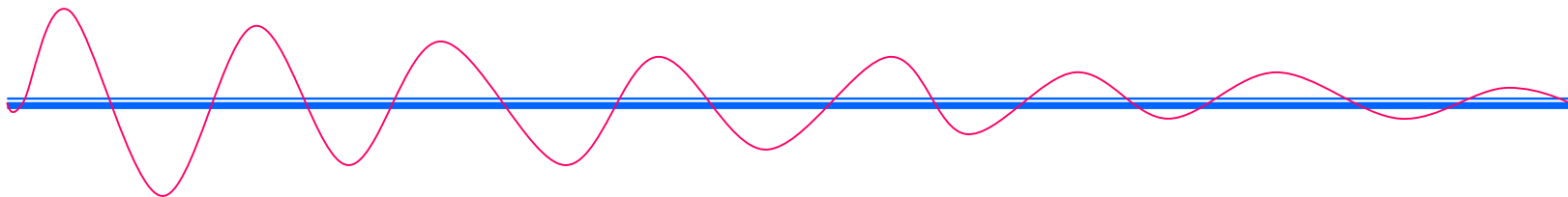
Assumptions/Figures for Customer Satisfaction

- Customer Satisfaction is only measured by Overbooking.
- Customer satisfaction is reduced only when passengers are involuntarily bumped.
- External Influences are not considered.



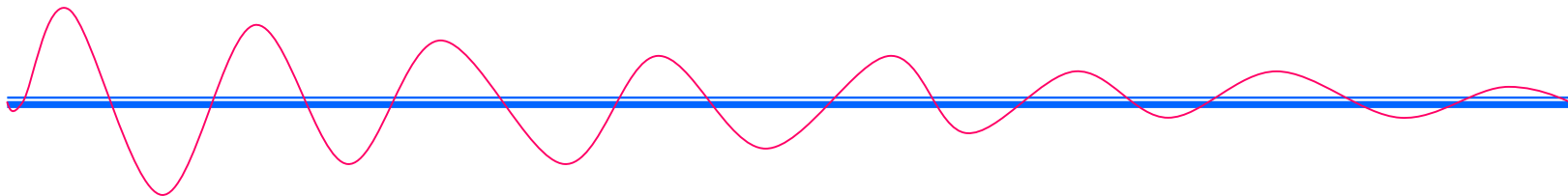
Assumptions/Figures for Profit Modeling

- There is a fixed cost of \$ 100,000 per flight
- There is a random no-show rate varying between 5% and 10%
- There are variable costs only from rescheduling of passengers and no others
- The cost of bumping a customer is \$100
- There are no increased costs levied on customers that do not show up
- The prices of all the tickets are \$600.00

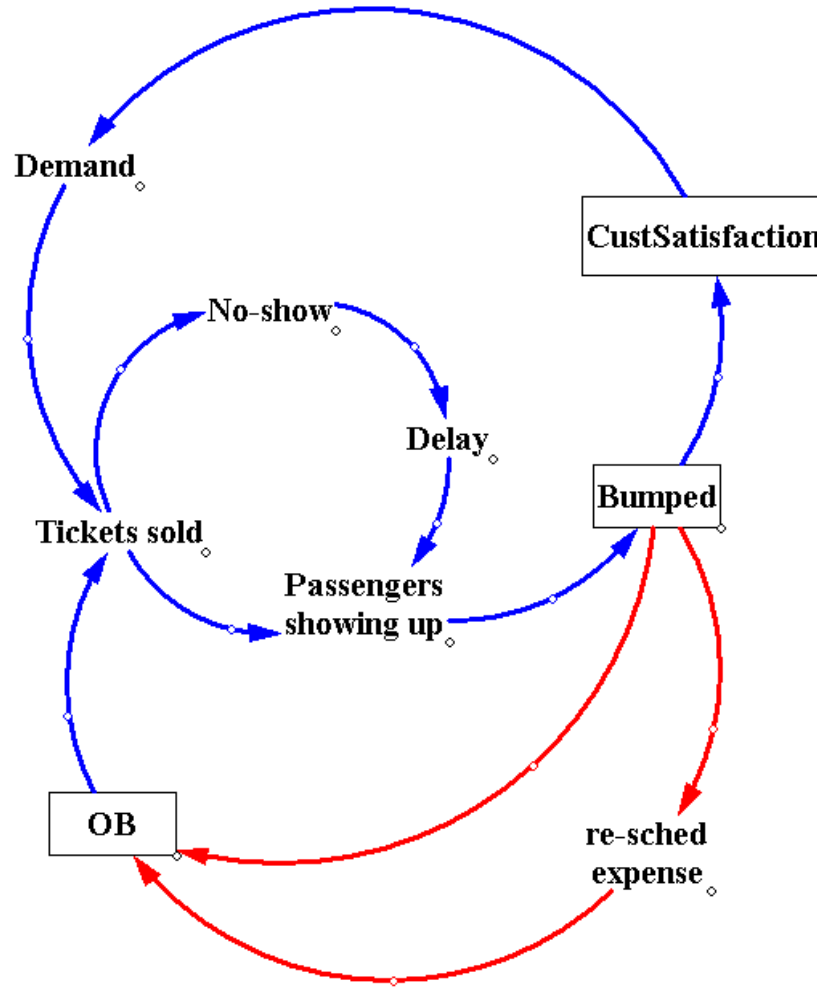


Assumptions/Figures for Demand Modeling

- Our plane capacity is 250 passengers
- There are no classes in the plane (All seats are economy)
- All passengers that pay for tickets will eventually travel



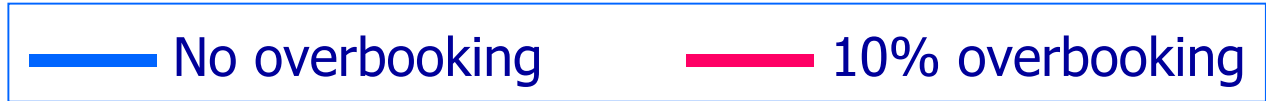
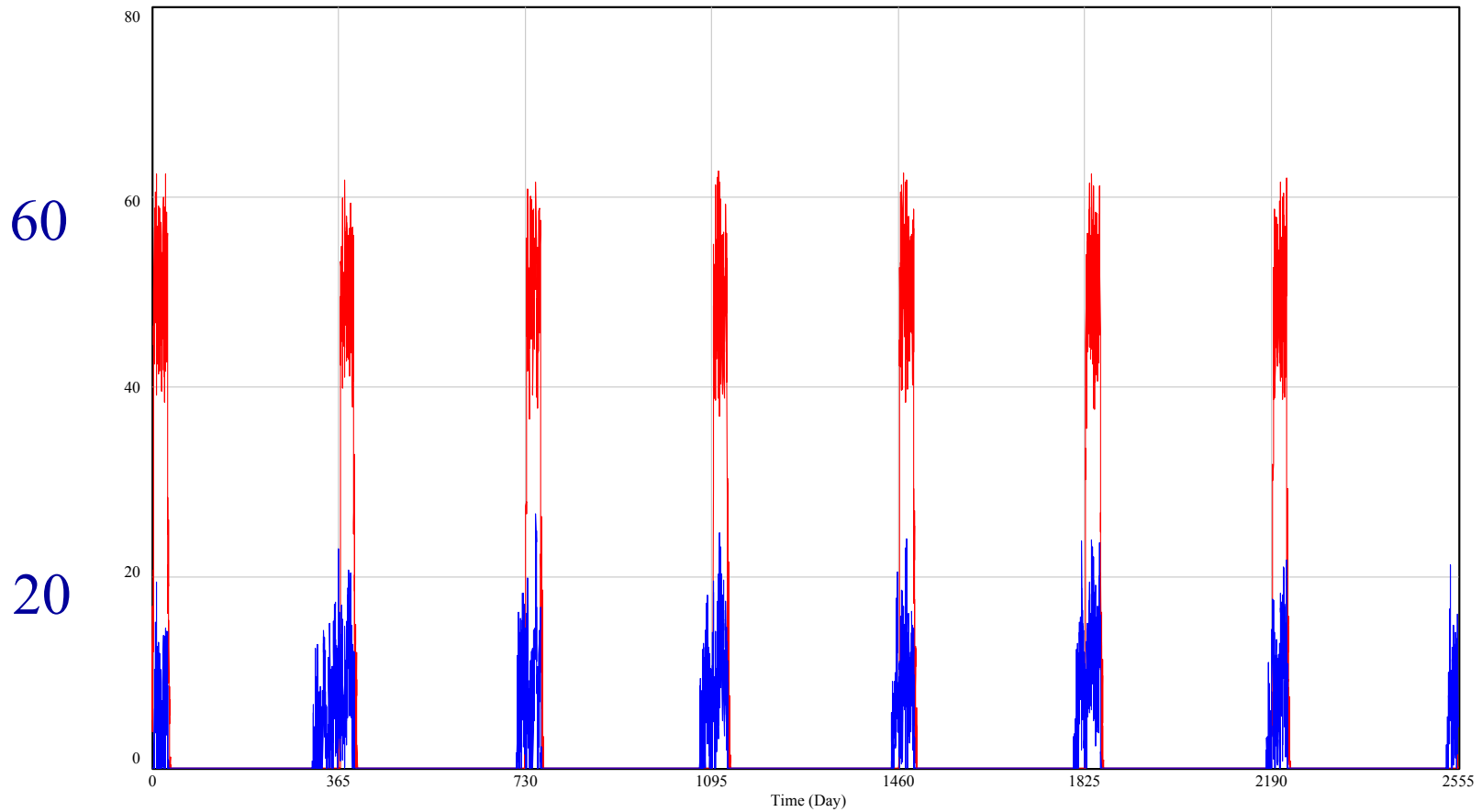
Simplified Model



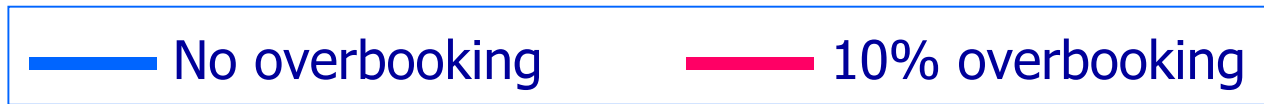
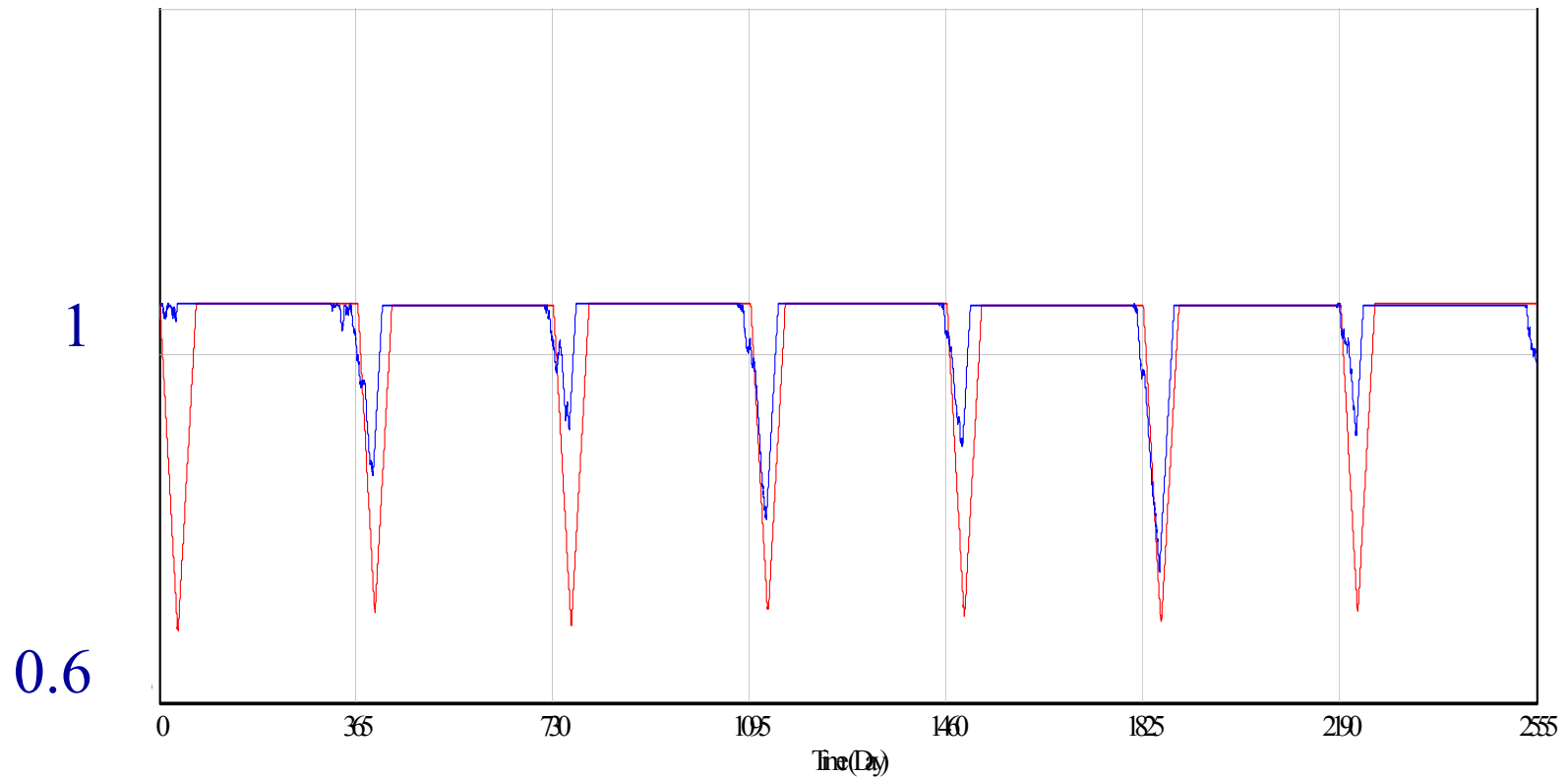
No overbooking
VS
10% overbooking

Stuck Passengers

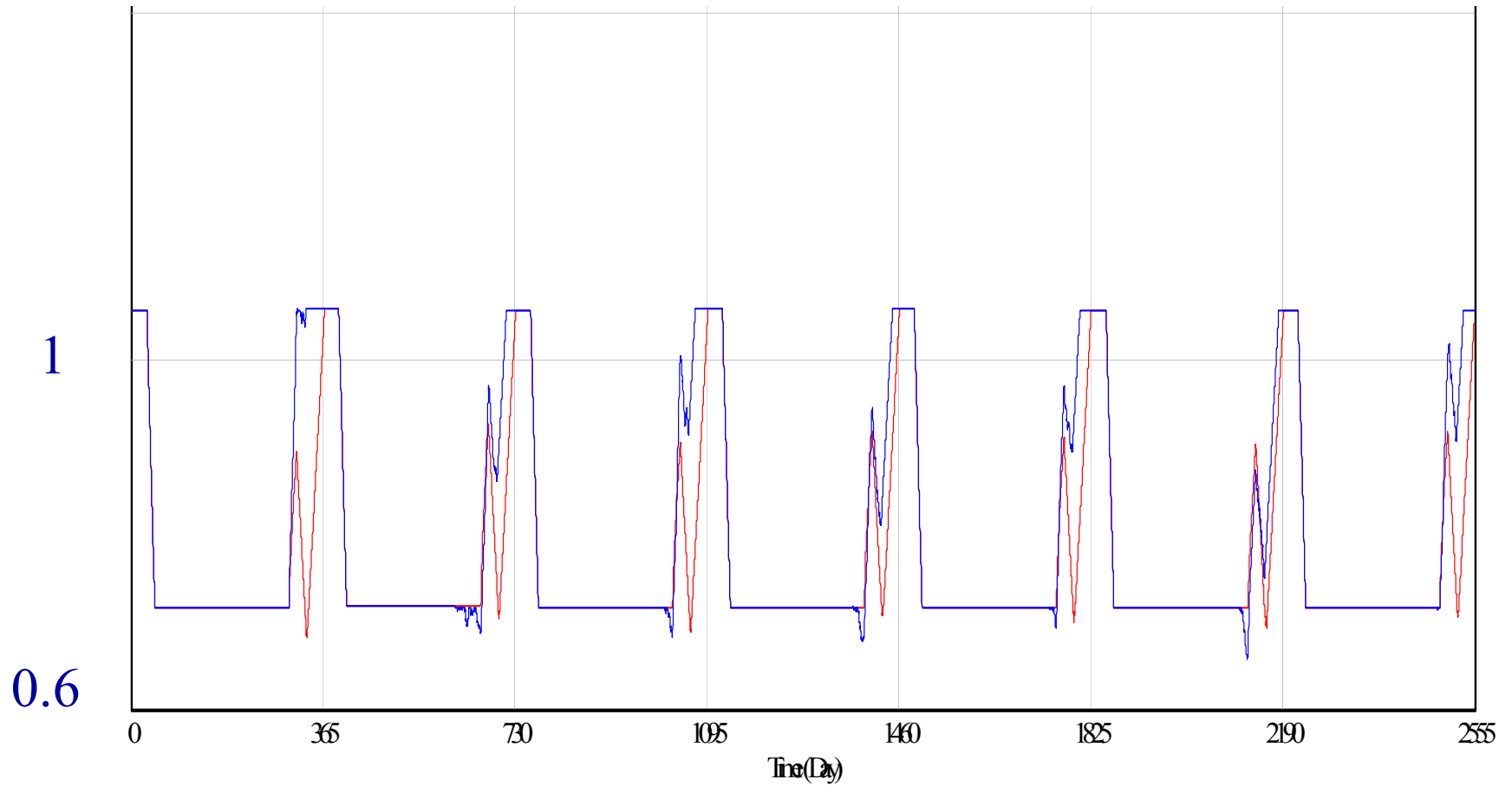
Stuck passenger on current flight



Passenger Satisfaction



Demand over seven years

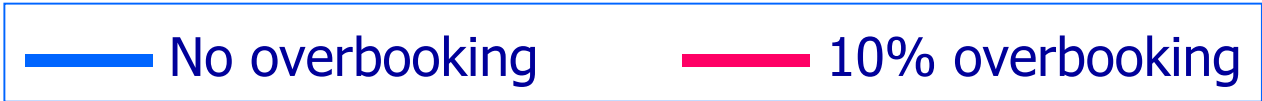
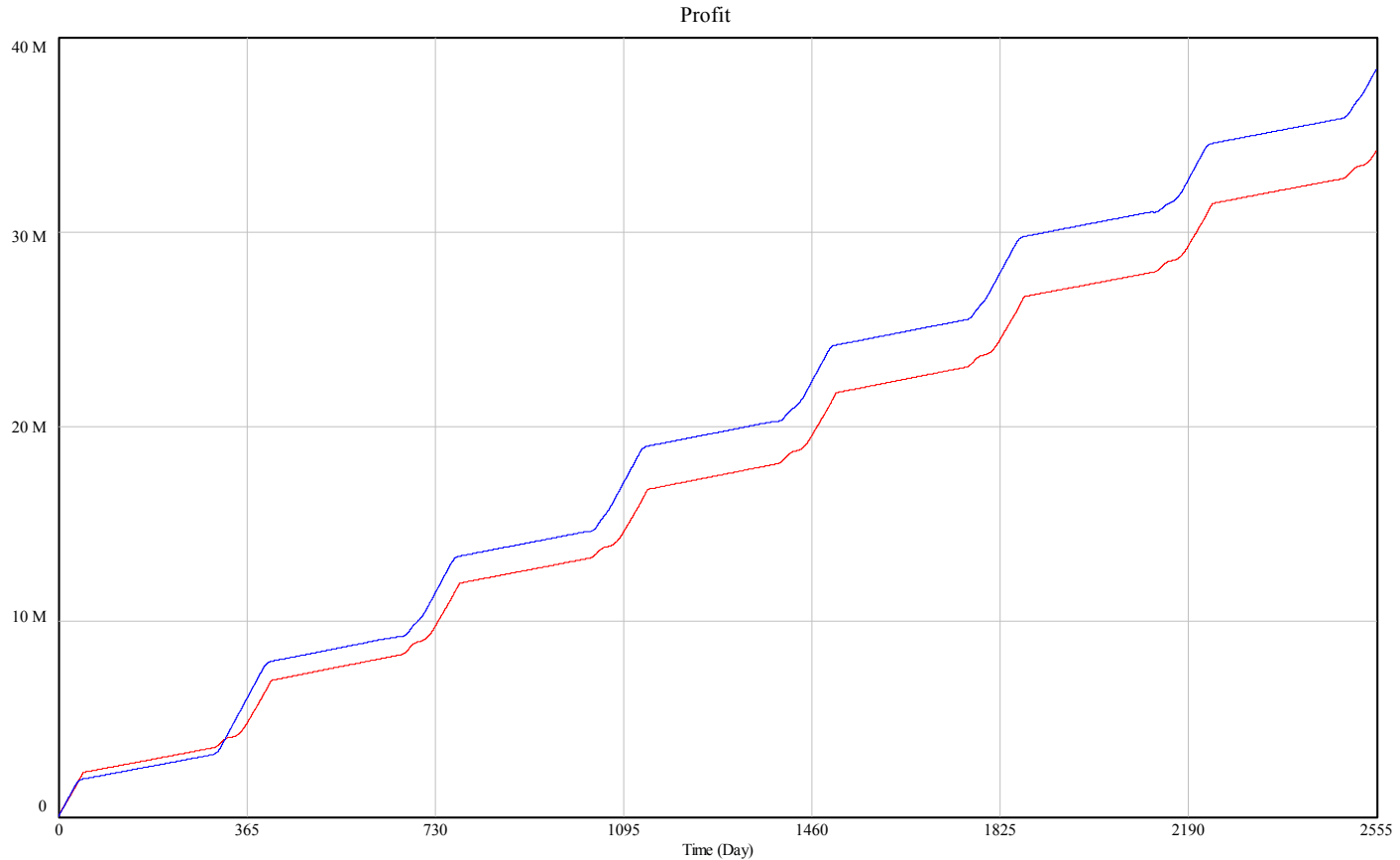


— No overbooking — 10% overbooking

Profit

40M

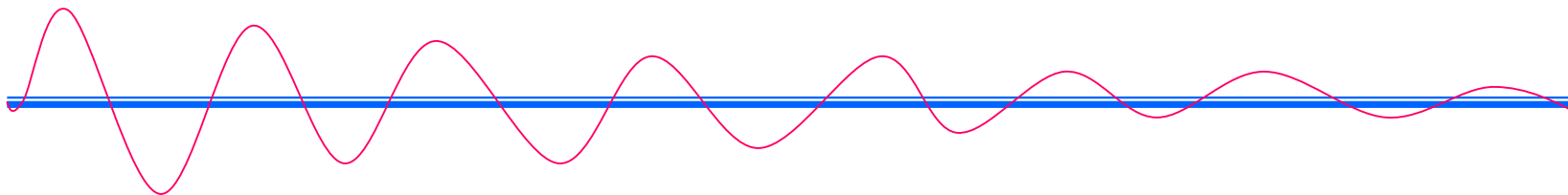
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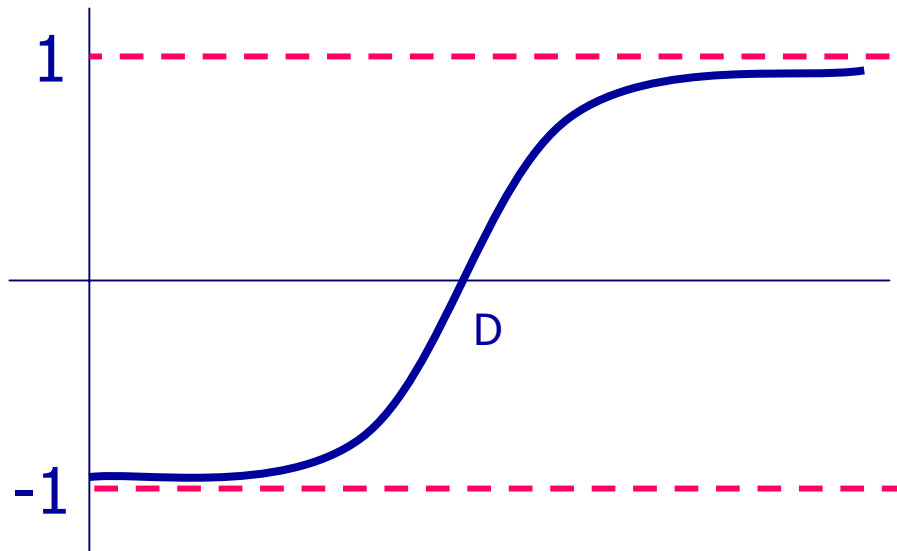
Finding an optimal overbooking policy

How important are these factors to managers?

- Re-Scheduling Expense
- Opportunity Loss
- Stuck Passengers

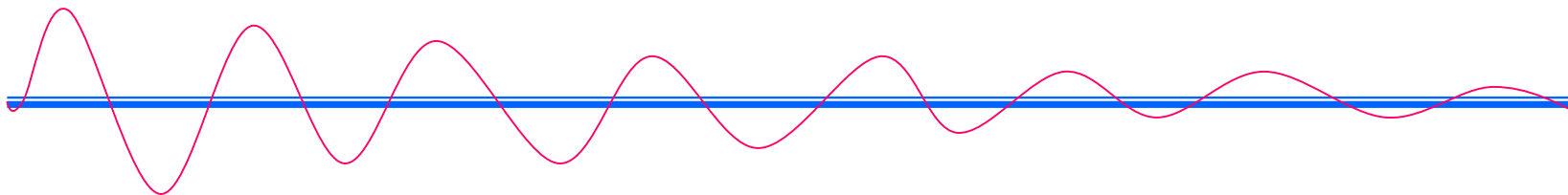


Quantifying Factors

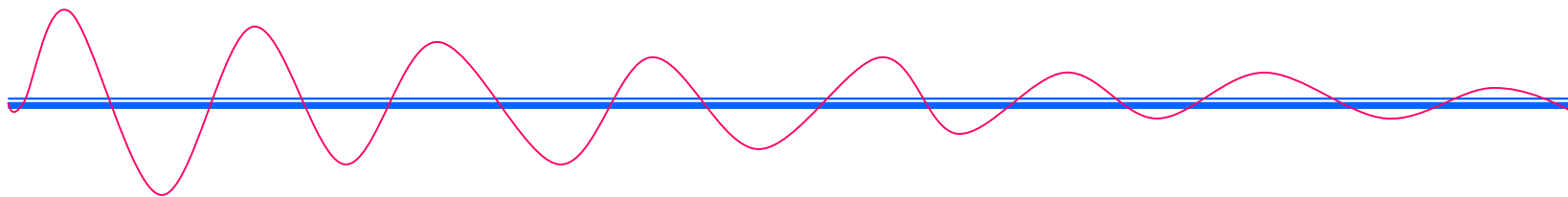
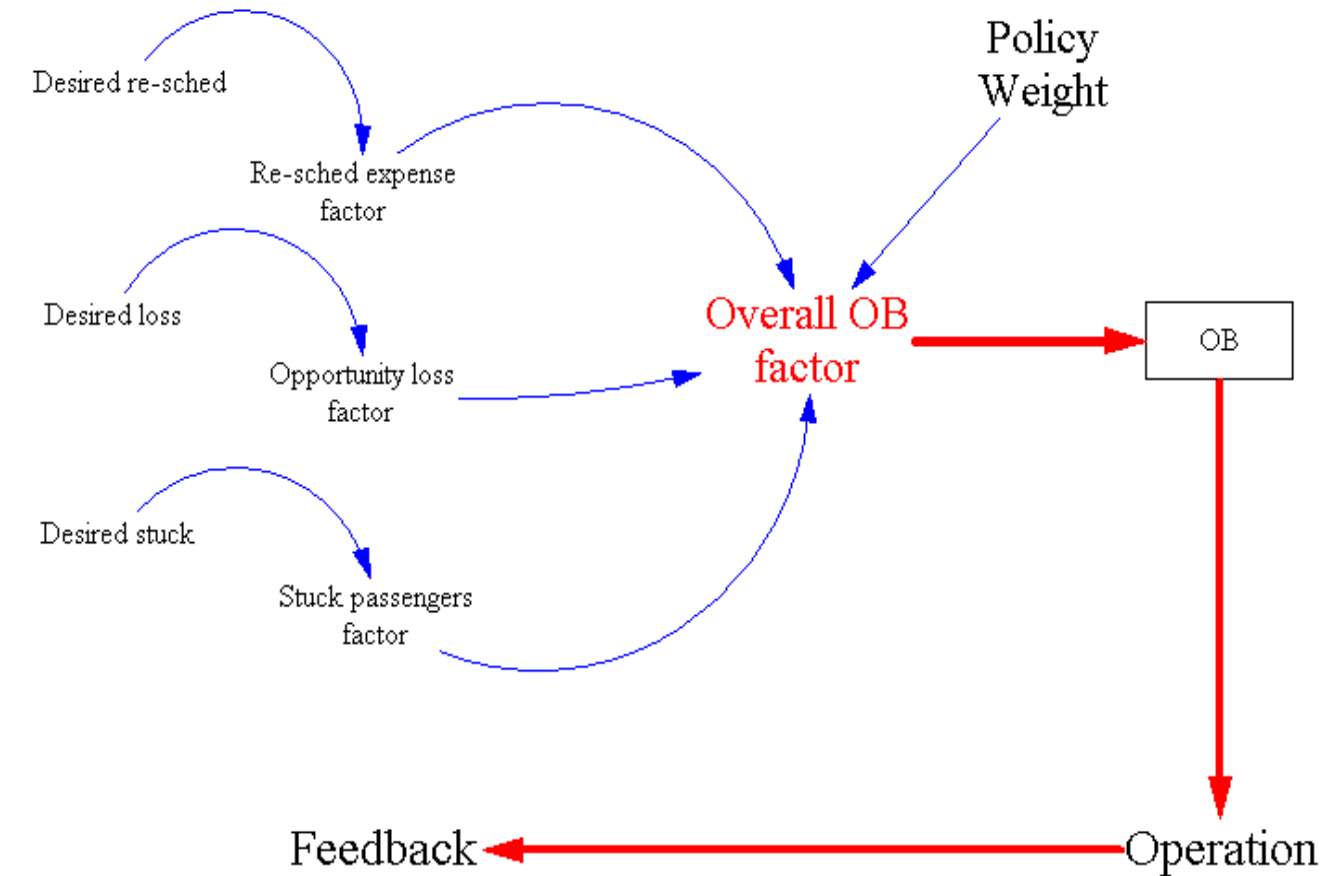


$$Factor = \frac{2}{\left[1 - C e^{\left(1 - \frac{A}{D}\right)}\right]} - 1$$

- A = Actual Input
- D = Desired Input
- C = Curve constant

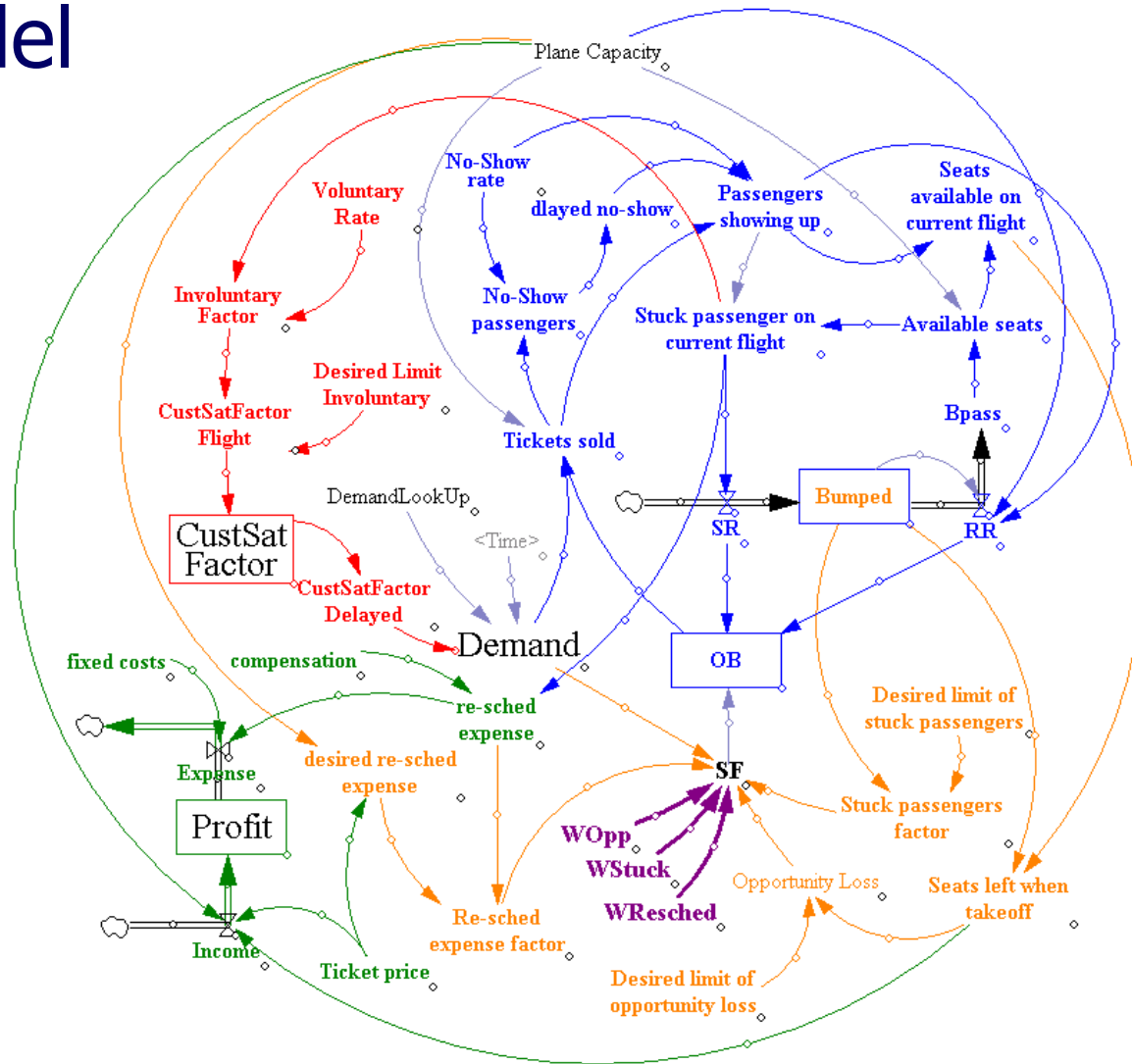


Should Airlines Overbook?

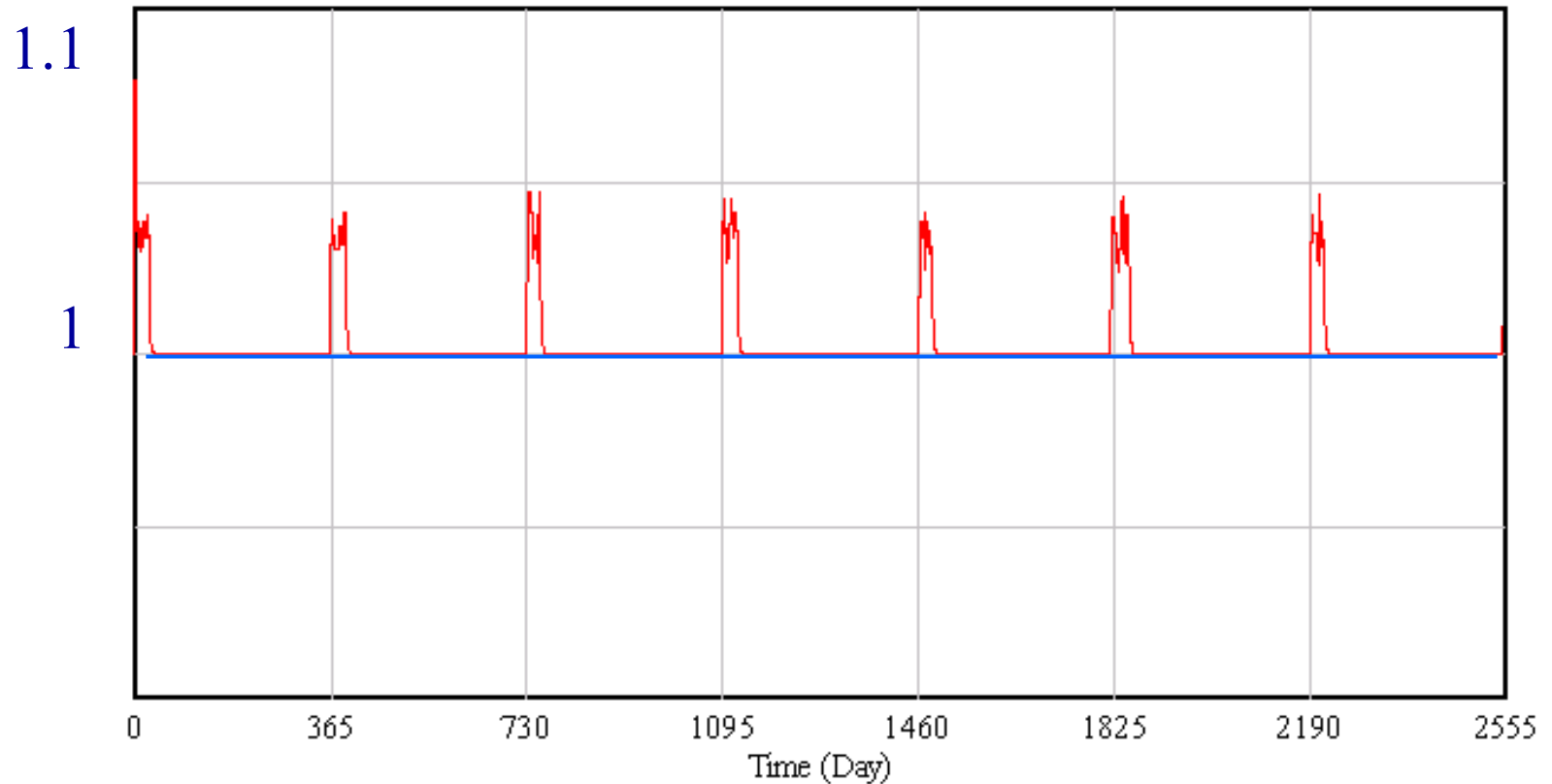


Should Airlines Overbook?

Model

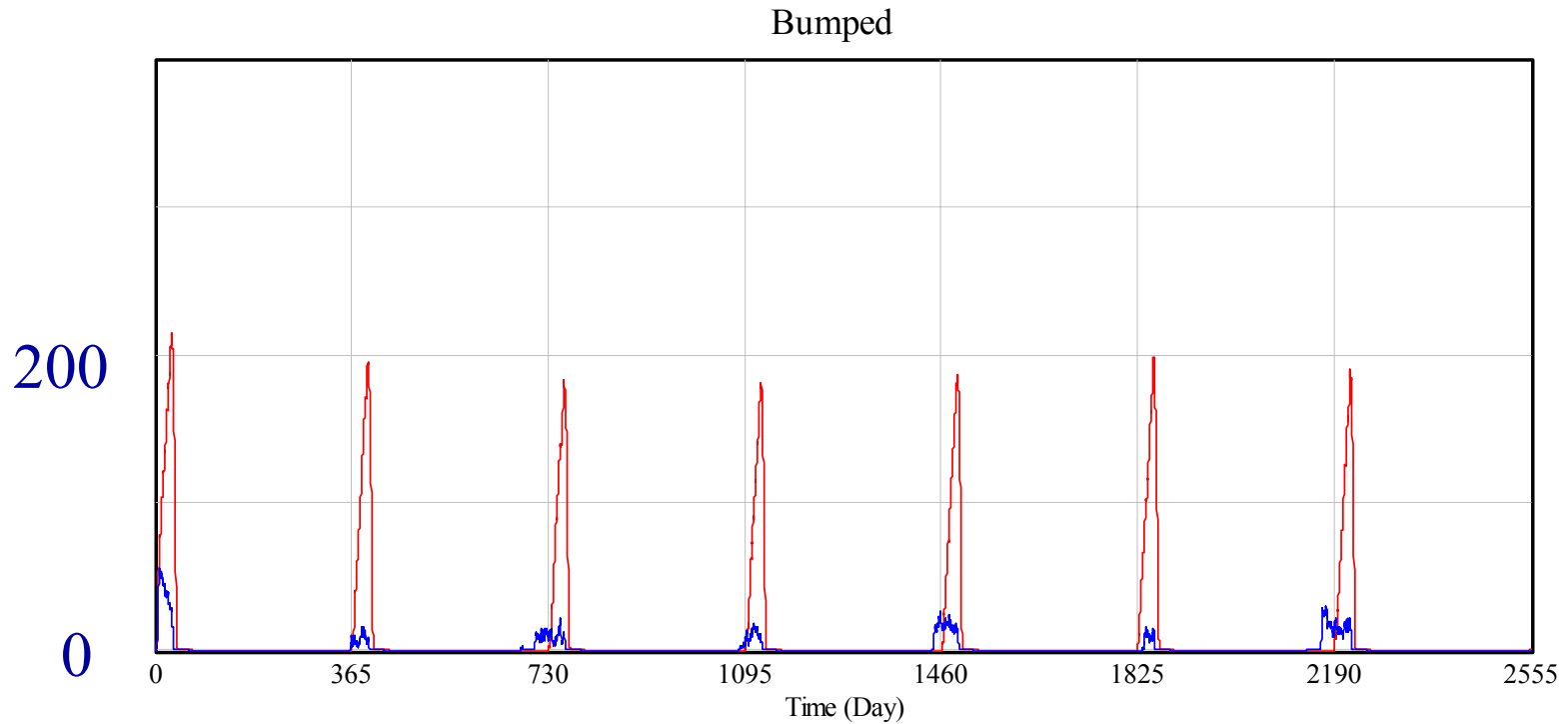


Overbooking factor



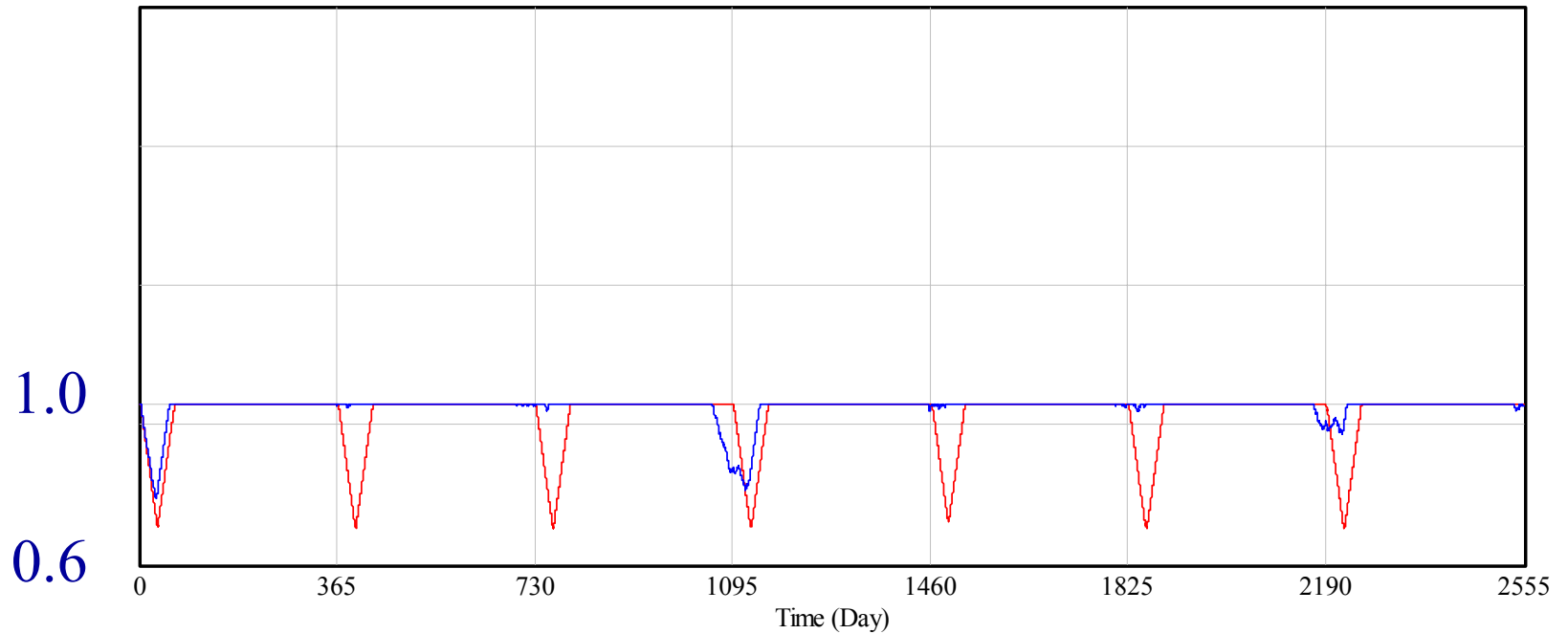
— Customer-centered policy — Company-centered policy

Bumped Passengers



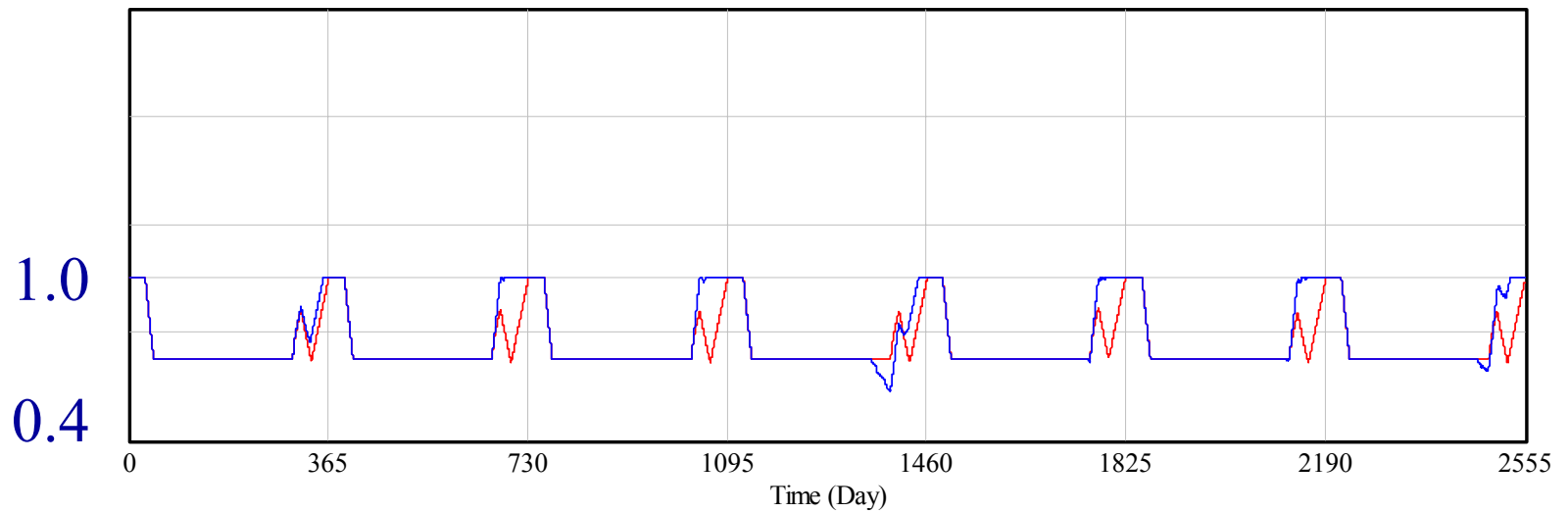
— Customer-centered policy — Company-centered policy

Passenger Satisfaction



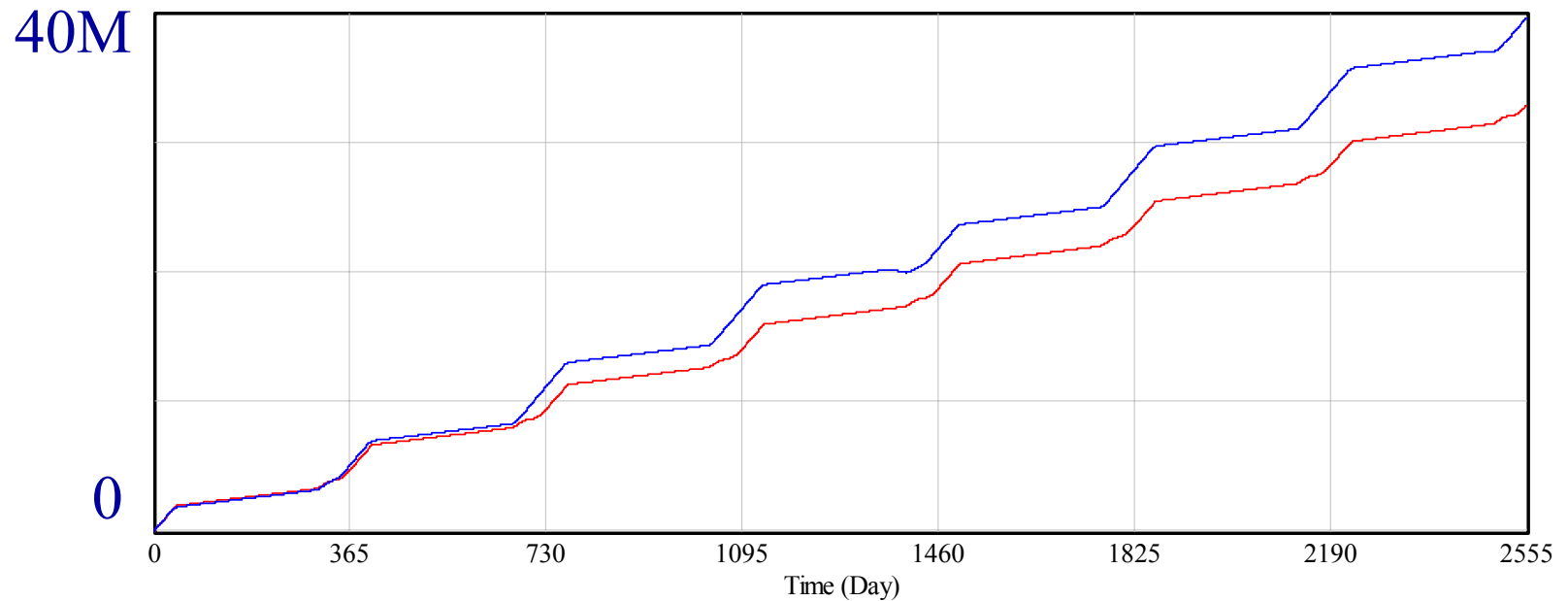
— Customer-centered policy — Company-centered policy

Ticket Demand



— Customer-centered policy — Company-centered policy

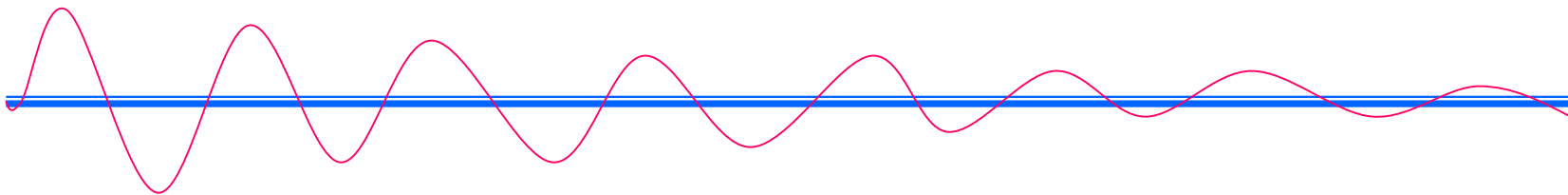
Profit



— Customer-centered policy — Company-centered policy

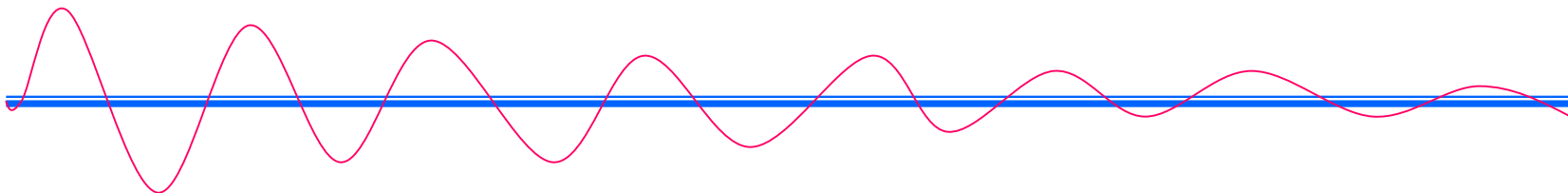
Problems encountered

- Information gathering of business strategy information is extremely difficult
- Modeling qualitative concepts such as customer satisfaction is very
- A myriad of external factors influence the industry
- Infinite loops exist between facets in the model



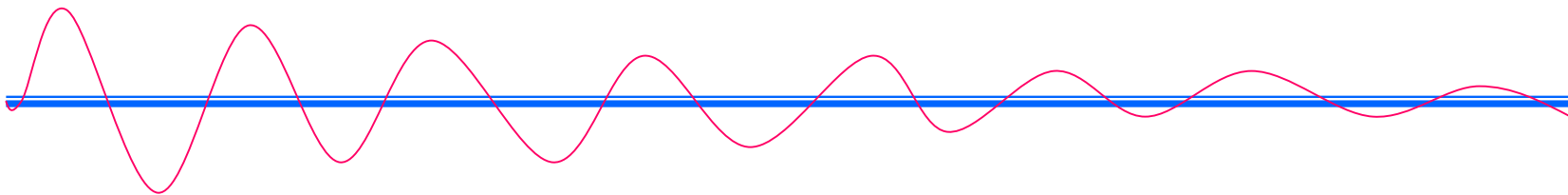
Lessons Learned

- The industry is extremely sensitive to minor changes due to the low profit margins
- Different approaches are adopted by airlines to ensure that repeat customers are gained



Conclusion and Future Directions

- While the actual amount of bumping is low the implications are huge to the profitability



Thank You !!!

