

## **Air Transportation Systems Field Exam**

### **January 2011**

**Note:** You have 60 minutes to prepare for this examination. The preparation is closed book, but you can bring any notes that you generate during the preparation period to use in the oral exam. The oral examination will be 45 minutes long.

Make any assumptions that you believe are reasonable, but be sure to state them while answering the questions.

***GOOD LUCK!***

The snowstorms last month were a major disruption to flight schedules and left a lot of holiday passengers stranded. Today, we are going to discuss the impact of weather disruptions on air traffic operations.

1. Briefly discuss some of the ways in which weather impacts aviation operations.
2. Suppose an airport is shut down because of a thunderstorm. At noon, the weather forecast predicts that there is a 25% chance that the storm will clear at 1PM, and that if it does not clear at 1PM, it will clear with certainty at 2PM. Assume that as soon as the storm clears, normal operations (with arrival capacity 60 aircraft/hour) will resume.
  - a. Sketch the expected capacity of the airport with time.
  - b. Suppose you have to decide how many arrivals to schedule into the airport between 1PM and 2PM. How would you go about making this decision? Comment on the advantages and disadvantages of different decisions that you may make.
  - c. You probably know that a similar decision is made during Ground Delay Programs (GDPs) to determine the Planned Airport Arrival Rates. Comment on the fairness of GDPs.
  - d. In practice, is the arrival demand deterministic? Explain why or why not.
3. Flight delays caused by airport and ATC congestion can have a negative impact on airline operating costs and productivity. This question focuses on Flight Operating Costs (FOC), also known as Aircraft Operating Costs.
  - a. In the very short term, a the delay of a single flight increases airline variable operating costs – what specific cost components of flight (aircraft) operating costs are directly affected by an ATC delay of, for example, 60 minutes? How does your answer differ depending on whether the delay occurs before gate departure, after gate departure, or after take-off?
  - b. In the longer term, persistent ATC delays have an impact on both fixed and variable operating costs as well as aircraft productivity. Explain the longer term impacts of an average 10 minute ATC delay per flight on the following aggregate airline measures (as compared to a perfect world in which there are no ATC delays). For each system-

wide measure, discuss the specific impacts of ATC delays that cause the measure to increase or decrease:

- i. Total flight (aircraft) operating costs
- ii. Unit flight (aircraft) operating costs
- iii. Aircraft utilization