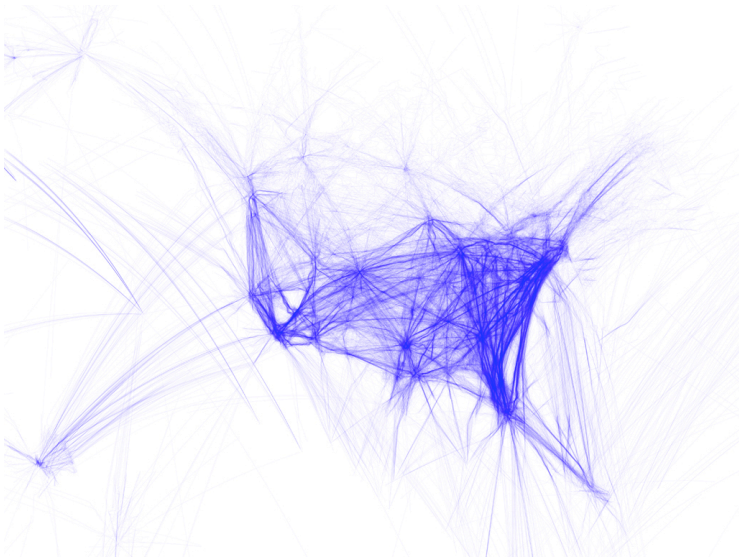## Project 2: The Plight of the Late Flight

Andrew Bernath, Heather Kitada, Ethan Edwards

Oregon State University

May 15, 2014

## Contents

Overview and Question of Interest   Population-Based Findings   Sample-based Findings   Discussion, Obstacles and Solutions   Future

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## Overview

- Data: Bureau of Transportation Statistics (BTS)
- Last 25 years
- 30 Unique carriers
- 376 Unique origins

Overview and Question of Interest  Population-Based Findings  Sample-based Findings  Discussion, Obstacles and Solutions  Future

○                                                                              ○
○                                                                              ○○

Question of Interest

# Question of Interest

Are there any airlines that have shown consistent improvement in delays, across the entire country, over the 25 years of flight data?

Overview and Question of Interest Population-Based Findings Sample-based Findings Discussion, Obstacles and Solutions Future

Choosing A Metric

# How do we define "improvement" in delay?

Improvement is defined as negative change in delay time, where delay can be measured using the folling metrics:

- Arrival delay
  - What customers about

  OR

- Carrier + Late Aircraft delays
  - What carries are able to control

Overview and Question of Interest  Population-Based Findings  Sample-based Findings  Discussion, Obstacles and Solutions  Future

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Narrowing Scope

# Narrowing Scope

- Ran all airline and years
- Only kept airlines with $10+$ years of service
    - $10+$ is enougth to discern a pattern
- Aggregating to creating yearly averages
    - Average over seasonal effects to compare year to year

## Population-Based Findings

- WAITING FOR WORK FROM ETHAN AND ANDREW

## Sample-based Findings

1. Stratify by unique carrier
2. Stratify by year (1989-2013)
3. Stratify by origin airport size
   (as determined by flight traffic volume)
   - Proportional sample from strata based on number of flights

Overview and Question of Interest   Population-Based Findings   **Sample-based Findings**   Discussion, Obstacles and Solutions   Future
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Sample Frame

# Sample Frame

Assumption: Due to coordination of air traffic control efforts, flights originating from airports of similar traffic volume would have similarities in delay patterns

- Found traffic volume for each origin over 25 years
- Found average traffic volume
- Ordered and stratified based on size
    - Create subsets of carriers
    - Used %*in*% when filtering

Findings

# Findings



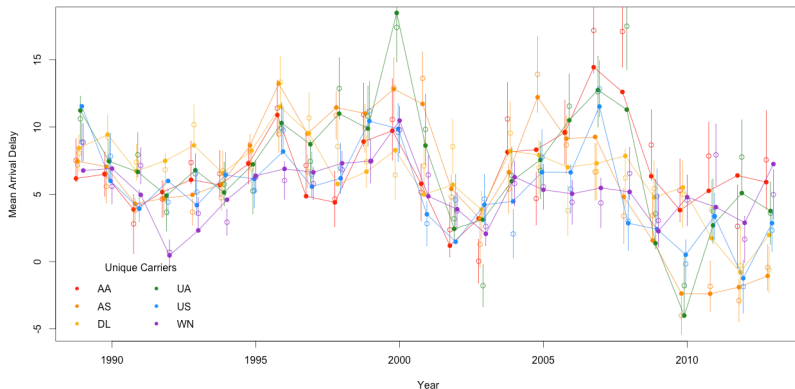Change in Sample Mean Delay for Airlines Existing Over the Past 25 Years
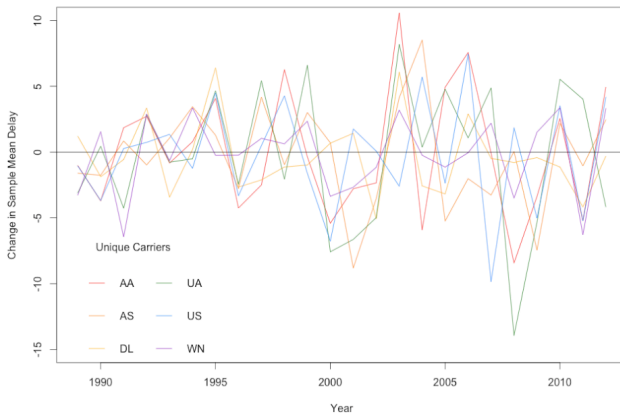
| Carrier | Median Change in Delay | IQR |
|---|---|---|
| MQ | -1.688 | (-3.85, 8.35) |
| TW | -1.212 | (-2.86,1.23) |
| CO | -1.155 | (-2.31,2.28) |
| FL | -1.073 | (-3.79,5.45) |
| DL | -0.679 | (-2.23,0.81) |
| AA | -0.595 | (-3.46,3.06) |
| AS | -0.463 | (-2.21,2.25) |
| NW | -0.218 | (-2.33,2.94) |
| B6 | -0.178 | (-4.39,8.11) |
| WN | -0.145 | (-1.54,2.23) |
| UA | -0.066 | (-4.19,4.68) |
| US | 0.171 | (-2.78,2.27) |
| HP | 0.702 | (-3.90,3.66) |
| HA | 0.864 | (-0.47,1.11) |
| OO | 1.478 | (-2.76,2.66) |
| EV | 2.878 | (-4.35,6.33) |

Overview and Question of Interest   Population-Based Findings   **Sample-based Findings**   Discussion, Obstacles and Solutions   Future

Sampling Performance

# Sampling Performance: 76% Coverage



Comparing Population Mean and Stratified Sampling Mean Estimates

Overview and Question of Interest   Population-Based Findings   Sample-based Findings   Discussion, Obstacles and Solutions   Future
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Sampling Performance

# Bias



**Frequency Distribution of Sampling Bias
for Mean Arrival Delay per Year per Airline**

# Discussion, Obstacles and Solutions

■

## Future Work

■
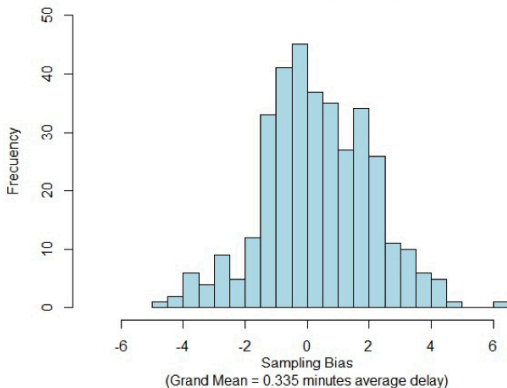
## Questions

*Google? Which airline is sexy?*