The Impact of Baggage Fees on Passenger Demand, Airfares, and Airline Operations in the US

Martin Dresner
R H Smith School of Business
University of Maryland

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Introduction

• On May 1, 2008, American Airlines became the first major US carrier to introduce a fee ($15) for a first or second checked bag on a US domestic flight. Other major US carriers soon followed.

• In 2010, most major carriers increased their baggage fees to the $20-$25 range per bag allowing US carriers to generate $3.4 Billion in checked baggage revenues that year.

• By 2016, this had increased to $4.2 Billion, about 3.4% of total airline revenues.

• Clearly, checked baggage fees have become a major revenue source for US airlines.
Agenda

• Three research papers related to baggage fees:
• First paper – examines the impact of the fees on route-specific passenger demand and airfares.
• Second paper – examines the impact of the fees on airline operational performance.
• Third paper – studies the impact of the fees on the behavior of individual passengers.
Paper #1

Imposition of Baggage Fees

Southwest Airlines and JetBlue Airways are missing from the list.

<table>
<thead>
<tr>
<th>Airline</th>
<th>Initial 1st bag fee-2008</th>
<th>1st bag fee (online)-2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>American</td>
<td>$15</td>
<td>$25</td>
</tr>
<tr>
<td>United</td>
<td>$15</td>
<td>$23</td>
</tr>
<tr>
<td>US Airways</td>
<td>$15</td>
<td>$23</td>
</tr>
<tr>
<td>Northwest</td>
<td>$15</td>
<td>N/A</td>
</tr>
<tr>
<td>Continental</td>
<td>$15</td>
<td>$23</td>
</tr>
<tr>
<td>Delta</td>
<td>$15</td>
<td>$23</td>
</tr>
<tr>
<td>AirTran</td>
<td>$15</td>
<td>$20</td>
</tr>
<tr>
<td>Alaska Air</td>
<td>$15</td>
<td>$20</td>
</tr>
</tbody>
</table>
Holdout Airlines and Before/After Comparison

• The availability of data from the holdout airlines allows us the opportunity to better demonstrate the impact of the baggage fees on market outcomes.
• Moreover, we gathered data for the period (2007-2010) that spans the time when the fees were first imposed (2008), which again helps to allow us to isolate the impact of the fees.
Data

• Collected data on (approx.) 1,000 origin and destination routes for the first quarter of each year in our dataset.
• Chose routes in which at least one of the baggage fee-charging carriers competed with Southwest, the key non-fee airline.
Model

- Estimated a 2-equation simultaneous (3SLS) model:
- Demand Equation (Route Level):

\[
\text{PASS} = \delta_0 + \delta_1 \text{POP}_{\text{OD}} + \delta_2 \text{INC}_{\text{OD}} + \delta_3 \text{FARE} + \delta_4 \text{BAG\_FEE} + \delta_5 \text{TOURIST} + \delta_6 \text{MAS}_{\text{OD}} + \sum_{t=1}^{3} \text{YEAR}_t + \sum_{i=1}^{8} \text{AIRLINE}_i
\]

- Fare Equation (Route Level):

\[
\text{FARE} = \delta_0 + \delta_1 \text{DIST} + \delta_2 \text{PASS} + \delta_3 \text{BAG\_FEE} + \delta_4 \text{TOURIST} + \delta_5 \text{HHI} + \sum_{t=1}^{3} \text{YEAR}_t + \sum_{i=1}^{8} \text{AIRLINE}_i
\]
Trends in Passenger Traffic
Trends in Airfares
### Passenger Estimation Results

| Variable     | Coef.   | $P > |z|$ |
|--------------|---------|------|
| PASS         | 0.2642  | 0.000|
| POP$_{OD}$   | 0.9858  | 0.000|
| INC$_{OD}$   | -3.1132 | 0.000|
| FARE         | -0.0105 | 0.005|
| BAG_FEE      | -0.6819 | 0.000|
| MAS$_{OD}$   | 0.7342  | 0.000|
| TOURIST      |         | 0.000|
### Impact of Baggage Fees

<table>
<thead>
<tr>
<th>1% Increase in Baggage Fees</th>
<th>0.01% Decrease in Passenger Traffic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1% Increase in Airfares</td>
<td>3.30% Decrease in Passenger Traffic</td>
</tr>
<tr>
<td>1% Increase in Baggage Fees</td>
<td>0.004% Decrease in Airfares</td>
</tr>
</tbody>
</table>

Imposition of baggage fees resulted in only a small decline in passenger traffic and fares.
Impact of Baggage Fees

<table>
<thead>
<tr>
<th>$1 Increase in Baggage Fees</th>
<th>Decrease of 0.6 Passengers (from mean of 444)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1 Increase in Airfares</td>
<td>Decrease of 7 Passengers (from mean of 444)</td>
</tr>
<tr>
<td>$1 Increase in Baggage Fees</td>
<td>Decrease in Airfares of $0.11 (from mean of $197.80)</td>
</tr>
</tbody>
</table>

Imposition of baggage fees resulted in only a small decline in passenger traffic and fares.
Conclusions

• Reduction in passengers resulting from a $1 increase in airfares was about 9 times the reduction from a $1 increase in baggage fees.

• The unbundling of baggage fees from airfares appears to have provided airlines with an opportunity to raise ancillary revenues without much decline in ticketing revenues – representing a Win-Win for the fee-charging carriers.
Paper #2

Baggage Fees and Airline Operations

• Are there operational benefits or costs from the imposition of the baggage fees?
Motivation of the Baggage Fees

• Michael O’Leary, CEO of Ryanair:

  Paying for checked-in bags … wasn’t about getting revenue. It was about persuading people to change their travel behavior – to travel with carry-on luggage only … This helps us to significantly lower airport and handling costs (Allon et al. 2011).

• The purpose of this paper is to determine how service quality outcomes are affected by the checked baggage fees and to see what impact the fees have on customer satisfaction.
Baggage Fee Hold-Outs

• Although all the major network carriers in the US adopted baggage fees, two important low-cost carriers continued to allow free checked bags – Southwest Airlines and JetBlue Airways.

• Data on these two hold-out carriers can serve as a control group when examining the impact of the checked baggage fees.

Note, JetBlue subsequently began charging for bags in 2015.
Research Questions

• What is the impact of baggage fees on flight delays?
• What is the impact of baggage fees on customer complaints?
• What is the impact of baggage fees on mishandled baggage reports?
Baggage Fees and Flight Delays

• The imposition of baggage fees may have opposite impacts on flight delays:
  – Baggage fees may lead to fewer flight delays, since less baggage needs to be offloaded from or loaded onto aircraft.
  – On the other hand, baggage fees may lead to increased delays since the fees encourage more passengers to carry cabin baggage which can increase boarding time.
Trends in On-Time Flights

Implementation of Baggage Fees
Impact of Baggage Fees on Mishandled Baggage Reports

• Would expect fewer mishandled baggage reports after the imposition of the fee, since fewer passengers will check bags.
• Therefore, in this case, service failures should decrease.
Trends in Mishandled Baggage Reports

Implementation of Baggage Fees
Impact of Baggage Fees on Customer Complaints

• Since fewer passengers check bags after fees are imposed, there may be fewer complaints about mishandled bags.

• However, if passengers pay a fee to check their bags, they may have higher service expectations and be more likely to file complaints.
Trends in Customer Complaints Regarding Baggage

Implementation of Baggage Fees
Data and Model

- Collected quarterly data on 11 US carriers from 2004 to 2012.

Service Quality Measure (Lost Bag Reports; Customer Complaints, Airline Delays)

\[ = \beta_0 + \beta_1 \text{Baggage Fee} + \beta_2 \text{Industry Average OnTime Flights} \]

\[ + \sum_{j=1}^{10} \beta_{2+j} \text{Airline}_j + \sum_{y=1}^{8} \beta_{12+y} \text{Year}_y \quad (1) + \sum_{q=1}^{3} \beta_{20+q} \text{Quarter}_q + e \]
Dependent Variables

- *Mishandled Baggage Reports* – Reports per 1,000 passengers
- *Customer Complaints* – Complaints related to baggage per 100,000 passengers
- *Airline Delays* – Number of airline-caused delays divided by total airline flights
Independent Variables

• *Baggage Fee* – Online fee charged by an airline for the first checked bag

• *Industry Average On-Time Flights* – Average ratio of on-time flights during a quarter (measure of industry-wide congestion)

• *Airline, year, and quarter* dummies
## Results

<table>
<thead>
<tr>
<th></th>
<th>Mishandled Baggage Reports</th>
<th>Customer Complaints</th>
<th>Airline Delays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>15.79^</td>
<td>0.67^</td>
<td>0.42^</td>
</tr>
<tr>
<td>Baggage Fee</td>
<td>-0.055^</td>
<td>-0.003^</td>
<td>-0.001^</td>
</tr>
<tr>
<td>Industry Avg. On-time Flights</td>
<td>-13.60^</td>
<td>-0.42</td>
<td>-0.39^</td>
</tr>
<tr>
<td>No. of Observations</td>
<td>357</td>
<td>357</td>
<td>357</td>
</tr>
<tr>
<td>Pseudo R-Squared</td>
<td>0.75</td>
<td>0.54</td>
<td>0.43</td>
</tr>
</tbody>
</table>

Airport dummies, Year dummies, and Quarter dummies included.

* = p < 0.01; ^ = p < 0.05
Predicted Operational Improvements with Baggage Fees

<table>
<thead>
<tr>
<th>Baggage Fee for First Checked Bag</th>
<th>Mishandled Baggage Reports (per 1,000 passengers)</th>
<th>Customer Baggage Complaints (per 100,000 passengers)</th>
<th>Flight Delays (divided by total flights)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0</td>
<td>4.60</td>
<td>0.24</td>
<td>0.13</td>
</tr>
<tr>
<td>$15</td>
<td>3.78</td>
<td>0.19</td>
<td>0.11</td>
</tr>
<tr>
<td>$23</td>
<td>3.34</td>
<td>0.16</td>
<td>0.10</td>
</tr>
</tbody>
</table>
Conclusions and Implications

• Baggage fees not only generate revenues for carriers, but they appear to result in operational improvements and fewer customer complaints – Michael O’Leary from Ryanair appears to be correct.

• Airlines may be able to improve their operations and increase customer satisfaction by imposing baggage fees.
Paper #3

Research Questions

• What is the impact of the imposition of the baggage fees on passenger choice of airline?
• How do passenger and trip characteristics moderate this impact?
Contribution

• We use data on individual passengers so that we are better able to assess passenger response to the baggage fees by class of passengers.
  – Trip purpose – leisure vs. business
  – Trip length and distance
Models and Data

• Estimate conditional logit and mixed logit models with the dependent variable coded 1/0 depending on whether the passenger chose to fly with Southwest or JetBlue.

• Primary source of data comes from surveys of 6,192 originating passengers from the three Washington-Baltimore area airports in 2007 (year before the imposition of the fees) and 2009 (year after the imposition of the fees) across 169 competitive O&D routes.
### Impact of BFW – Segmented by Trip Length

<table>
<thead>
<tr>
<th>Dep. Var. = Airline Choice</th>
<th>Sample 2a (&gt;= 3 nights)</th>
<th>Sample 2b (&lt; 3 nights)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NONSTOP</td>
<td>1.537 ***</td>
<td>1.544 ***</td>
</tr>
<tr>
<td>FLIGHTFREQ</td>
<td>0.035 ***</td>
<td>0.037 ***</td>
</tr>
<tr>
<td>ONTIME</td>
<td>2.819 ***</td>
<td>2.108 ***</td>
</tr>
<tr>
<td>FARE</td>
<td>-0.011 ***</td>
<td>-0.008 ***</td>
</tr>
<tr>
<td>FARE_NonLCC</td>
<td>0.007 ***</td>
<td>0.006 **</td>
</tr>
<tr>
<td>MARKETprsnc</td>
<td>0.148</td>
<td>0.383</td>
</tr>
<tr>
<td>BFW</td>
<td><strong>0.452</strong>*</td>
<td><strong>-0.373</strong></td>
</tr>
</tbody>
</table>

Note: Airline dummies included in estimation.

The baggage fee waiver attracts passengers traveling for longer periods to SW and JetBlue; i.e., passengers more likely to check bags.
Both long trip and short trip passengers reduced checked bags after fees were introduced. 
Decline was proportionately higher for short trip passengers.
Little change in bag checking behavior on Southwest and JetBlue for short-trip or long-trip passengers.
# Impact of BFW Segmented by Trip Purpose

<table>
<thead>
<tr>
<th>Dep. Var. = Airline Choice</th>
<th>Sample 4a (Leisure)</th>
<th>Sample 4b (Business)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 = SW or JetBlue</td>
<td>1.895 ***</td>
<td>1.113 ***</td>
</tr>
<tr>
<td>0 = Other Carriers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONSTOP</td>
<td>0.032 ***</td>
<td>0.041 ***</td>
</tr>
<tr>
<td>FLIGHTFREQ</td>
<td>0.041 ***</td>
<td></td>
</tr>
<tr>
<td>ONTIME</td>
<td>3.740 ***</td>
<td>0.972</td>
</tr>
<tr>
<td>FARE</td>
<td>-0.018 ***</td>
<td>-0.002</td>
</tr>
<tr>
<td>FARE_NonLCC</td>
<td>0.007 ***</td>
<td>0.005 **</td>
</tr>
<tr>
<td>MARKETprsnc</td>
<td>0.406 *</td>
<td>-0.174</td>
</tr>
<tr>
<td>BFW</td>
<td>0.347 ***</td>
<td>-0.006</td>
</tr>
</tbody>
</table>

The baggage fee waiver attracts passengers traveling for leisure to SW and JetBlue; i.e., passengers more likely to check bags.

Note: Airline dummies included in estimation.
• Both leisure and business passengers reduced checked bags after fees were introduced.
• Decline was proportionately higher for leisure passengers.
• Little change for either leisure of business passengers on the BFW carriers (chart not shown).
Results (so far)

• Baggage Fees:
  – Influenced passengers to check fewer bags.
  – Is proportionately more important for long trip passengers (more likely to check bags).
  – Is proportionately more important for leisure passengers (more likely to check bags).
Putting it all Together

• What happened to the baggage-checking passengers when the major carriers imposed baggage fees?

• Did these passengers stick with the fee-charging carriers and just choose not to check bags?
  – In this case, one would expect a decline in baggage checking at the fee-charging carriers from 2007 to 2009 and little change in the percent of passengers at the BFW carriers checking bags.

• Did these passengers divert to the BFW carriers?
  – In this case, one would expect an increase in the percent of passengers checking bags at the BFW carriers from 2007 to 2009, along with a decline in baggage checkers at the fee-charging carriers.
No increase in bag checkers at the BFW carriers. Baggage checkers appear to have chosen to remain loyal to the fee-charging carriers and to just not check bags.
Conclusions

• Baggage fees changed the behavior of passengers on carriers that began assessing the fees in 2008.
• Fewer passengers on the fee-charging carriers checked bags.
  – Proportionately greater for leisure passengers.
  – Proportionately greater for long-trip passengers.
• Passengers appeared to stick with the fee-charging carriers and change their behavior, rather than defect to the BFW carriers.
Implications

• The baggage fees seem to have produced a Win-Win-Win (Triple Win!!!) result for the fee-charging carriers:
  – Win 1 – Produced extra revenue for the carriers.
  – Win 2 – Resulted in fewer checked bags (reduced baggage handling costs and reduced customer complaints).
  – Win 3 – Did not appear to result in passengers defecting to the BFW carriers.
Thank You!!!