Baggage Fees, Operational Performance and Customer Satisfaction in the US Air Transport Industry

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Abstract

In recent years, there has been a "de-bundling" trend in the US airline industry, where specific services that used to be included in a ticket fare are now priced separately. Although a major reason for these fees is to raise revenues for the airlines, the fees may also impact the operations of carriers. Among the new fees implemented by most US carriers is a payment for checked baggage. The aim of this paper is to analyze the impact of baggage fees on airline operational service, as measured by flight delays, mishandled baggage rates and the rate of customer complaints. We use data from the US domestic air transport market over the period 2004 – 2012 and estimate a system of seemingly unrelated regressions. Our results show that, on average, an increase in baggage fees leads to a decrease in the mishandled baggage rate, to a reduction in the percentage of delayed flights, and to a decline in the rate of customer complaints. These results are in line with the idea that the checked baggage fee has improved airline operations and, perhaps surprisingly, customer satisfaction.

KEYWORDS: Airline Performance, Baggage Fees, Customer Satisfaction

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Introduction:

On May 21, 2008, American Airlines made an announcement that dramatically changed the revenue position of US airlines. American announced that as of June 15th, it would begin collecting a fee of $15 per checked bag.[1] Although American Airlines was not the first US carrier to charge a fee for a first checked bag, it was the first "legacy carrier" to do so. The other major legacy carriers, United Airlines, US Airways, Northwest Airlines, Continental Airlines and Delta Airlines, quickly followed with baggage fees of their own. Within two years, the fees had been raised to the $20-$25 range for the first checked bag, with some carriers charging even more for a second checked bag (Barone et al. 2012). As a result, baggage fees as a percentage of US carrier operating income increased more than fourfold from 2007 to 2009 (Garrow et al. 2012). By 2010, US carriers were generating $3.4 Billion annually in baggage fees, up from less than $500 million in the year before American's initial announcement (Tuttle 2012; US Government Accountability Office 2010).[2]

Although the imposition of the baggage fees had a dramatic impact on US carrier revenues, this is not the focus of this paper. We focus, instead, on the impact of the fees on the operational performance of US carriers and on the satisfaction of their customers. As Michael O'Leary, the CEO of Ryanair, has stated (quoted in Allon et al. 2011, pp. 2-3): "[P]aying 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 significantly lower airport

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[1] See, for example, Barone et al. (2012). Up until American's initiative, only certain low-cost carriers (LCCs) (e.g., Spirit Airlines) charged fees on the first checked bag in the United States. Other LCCs, most notably Southwest Airlines and JetBlue, have continued to offer "free" checked bags.
[2] US carriers collected some baggage fee revenues prior to American's announcement; for example, for third checked bags and for overweight bags.

and handling costs." In particular, we examine the impact of the baggage fees on the rate of mishandled baggage reports, on the percentage of delayed flights, and on the rate of airline customer complaints.

If the baggage fees discourage passengers from checking their bags, then they should result in fewer mishandled baggage reports. Indeed, the US Government Accountability Office (2012) reports a steady decline in the number of mishandled baggage reports beginning in 2008. We examine the per dollar impact of baggage fees on the number of mishandled baggage reports per 1,000 passengers.

The imposition of baggage fees can also have an effect on the rate of delayed flights. The loading, offloading, and transfer from one flight to another of checked baggage takes time to perform and may lead to operational delays. In addition, as Wu (2005) states, late arriving baggage disrupts the operations of an airline causing delays that may be propagated throughout the airline's network; for example, inbound aircraft may be forced to wait for delayed departing aircraft to clear gates, and thus may be delayed as well. To the extent that the baggage fees reduce the number of checked bags, then they may also contribute to fewer delayed flights. However, on the other hand, the fees have resulted in more carry-on (cabin) baggage (US Government Accountability Office 2010; Halsey III 2012) and the increased amount of cabin baggage can prolong passenger loading of aircraft, thus contributing to delays. Thus, it is an empirical question as to whether the baggage fees have led to an increase or decrease in flight delays.

Finally, anecdotal evidence suggests that airline passengers dislike baggage fees (e.g., Waters 2011). This dislike may lead to greater numbers of customer complaints. On the other hand, if operational efficiency increases due to fewer checked bags, customer complaints may

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decrease. Therefore, again, it is an empirical question as to whether the baggage fees have led to greater or fewer customer complaints.

In order to examine the impact of baggage fees on mishandled baggage reports, flight delays and customer complaints, we use data from the US domestic air transport market over the period 2004 – 2012 and estimate a system of seemingly unrelated regressions (SUR). This period covers four years prior to the first baggage fee announcement and four years following the initial imposition of baggage fees by the legacy carriers. In addition, we include observations from both carriers that have imposed the fees (e.g., the legacy carriers) and carriers that have not imposed the fees (Southwest Airlines and JetBlue Airways). Our results show that, on average, an increase in baggage fees leads to a decrease in the mishandled baggage rate, to a reduction in the percentage of delayed flights, and to a decline in the rate of customer complaints. These results thus support the finding that the checked baggage fees have improved airline operations and led to improved customer satisfaction.

Literature Review:

Given the relatively recent imposition of airline baggage fees (at least by the larger, legacy carriers), there has been little research conducted on their impact on operational and financial outcomes. Allon et al. (2011) examine the imposition of the baggage fees from a public policy perspective. They ask whether the fees make society better or worse off. Using a theoretical modeling approach, they conclude that to the extent that the unbundling of the baggage fees from the airline fares can better match desired services with the willingness of customers to pay for those services, then society is better off. The fees allow those customers that do not require the baggage service to avoid paying for the service, so these individuals are

undoubtedly better off. In addition, since the number of checked bags declines, airlines can enjoy lower costs and pass some of these savings onto all of their customers in the form of lower fares.

Hamilton et al. (2010) view the issue of baggage and other ancillary fees from a managerial perspective. They suggest a number of advantages to unbundling ancillary services or products from the primary product: First, a firm can charge a lower price for the primary product, and this is the price on which customers may focus. Thus, the product will appear to be more attractive from a pricing standpoint. Second, the lower price may help the firm when consumers comparison shop; for example, on websites that aggregate offerings from multiple firms. Third, the unbundling of the ancillary services or products makes the pricing policy of the firm more transparent, and transparency is a desired trait for some customers. On the other hand, the authors point out that customers may be annoyed by the additional fees and that the fees may discourage purchases. Along these lines, Southwest Airlines, which does not charge baggage fees, claims that the company generated $1 billion in additional revenues in 2009 from former customers of baggage-fee charging competitors (Garrow et al. 2012).

Barone et al. (2012) use an event study to examine the effect of newly announced baggage fees on airline stock prices. Surprisingly, they find that the initial baggage fees announced by the airlines actually resulted in an average 10% decline in stock prices (i.e., mean negative "abnormal" returns of 10%, after accounting for the overall market movement). On the other hand, subsequent fee announcements produced, on average, positive 2.5% mean abnormal returns. When the authors examined all of the announcements together, they found that legacy carriers experienced a small, negative mean abnormal return of 1.1%, while the LCCs did not experience significant abnormal returns from their baggage fee announcements. Finally,

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competing airlines also experienced negative abnormal returns when the initial baggage fees were announced. The authors attribute these negative returns to general investor unease with the airlines' financial conditions; that is, the need to impose baggage fees was initially perceived by investors as a weakness in the airline industry. Subsequently, investors may have realized the potential revenue gains to be realized from the fees and rewarded the carriers with positive returns when the later fees were announced.

Finally, Henrickson and Scott (2012) examine the impact of baggage fees on airline ticket prices. They find that ticket prices are negatively correlated with baggage fees, leading to the conclusion that airlines substitute baggage fees for higher ticket prices. They also find that Southwest Airlines, which does not impose baggage fees, increased their fares on routes in which they compete with the legacy carriers after the legacy carriers imposed their baggage fees.

In summary, research on baggage and related ancillary fees has found that the fees have a positive impact on societal welfare, are generally not liked by consumers, have a number of advantages to the airlines, initially resulted in a decline in stock price but more recently have been associated with higher stock returns, substitute for higher ticket fares, and allow competing airlines that do not charge the fees to increase their prices. In the next section, we discuss the data and methodology used to analyze the impact of the baggage fees on operational outcomes and customer satisfaction.

Data and Methodology:

The setting for our analysis is the US airline industry where baggage fees were first introduced by the legacy carriers in 2008. Quarterly data were collected for the period 2004 to

2012.[3] When monthly data were available, the data were aggregated or averaged over the three months in the quarter. Data for our three dependent variables, mishandled baggage reports (per 1,000 passengers), customer complaints (per 100,000 passengers), and flight delays (ratio of delayed flights to total flights) were gathered for each airline in our dataset from the US Department of Transportation's Air Travel Consumer Report, issued monthly. Information on our major independent variable of interest, baggage fees, was collected from Barone et al. (2012).[4] Table 1 contains a list of the airlines in our dataset and the fees charged for checked bags.

<div align="center"><<Insert Table 1 about here>></div>

In order to determine the impact of the checked baggage fees on mishandled baggage claims, flight delays, and customer complaints, a 3-equation SUR model was estimated as follows in Equations (1, 2 and 3):

$Mishandled\ Baggage\ Reports$

$$= \beta_0 + \beta_1\ Baggage\ Fee + \beta_2\ Industry\ Average\ OnTime\ Flights$$

$$+ \sum_{j=1}^{10} \beta_{2+j}\ Airline_j + \sum_{y=1}^{8} \beta_{12+y}\ Year_y \quad (1) + \sum_{q=1}^{3} \beta_{20+q}\ Quarter_q + e$$

$Customer\ Complaints$

$$= \alpha_0 + \alpha_1\ Baggage\ Fee + \alpha_2\ Industry\ Average\ OnTime\ Flights$$

$$+ \sum_{j=1}^{10} \alpha_{2+j}\ Airline_j + \sum_{y=1}^{8} \alpha_{12+y}\ Year_y \quad (2) + \sum_{q=1}^{3} \alpha_{20+q}\ Quarter_q + e$$

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[3] Due to data availability at the time our model was estimated, only the first and second quarters of 2012 data were collected.

[4] Some airlines charge a slightly higher fee when checked baggage service is purchased at an airline counter rather than online. We use the online baggage fee in our baseline analysis but conduct a sensitivity analysis using the higher airport baggage fee. In addition, when charges vary between the first checked bag and the second checked bag, we use the charge for the first checked bag.

Airline Delays

$$= \gamma_0 + \gamma_1 \; Baggage \; Fee + \gamma_2 \; Industry \; Average \; OnTime \; Flights$$

$$+ \sum_{j=1}^{10} \gamma_{2+j} \; Airline_j + \sum_{y=1}^{8} \gamma_{12+y} \; Year_y \quad (3) + \sum_{q=1}^{3} \gamma_{20+q} \; Quarter_q + e$$

where:

- *Mishandled Baggage Reports* is the first dependent variable and is measured as mishandled baggage reports per 1,000 passengers.

- *Customer Complaints* is the second dependent variable and is measured as the number of customer complaints related to baggage per 100,000 passengers for an airline. These complaints are filed with the US Department of Transportation.

- *Airline Delays* is the third dependent variable and is measured as the number of airline-caused flight delays divided by total airline flights for a given airline.[5]

- *Baggage Fee* is our main explanatory variable of interest. It is measured as the on-line fee charged in dollars by a carrier for the first checked bag at the time of the flight.

- *Industry Average OnTime Flights* is the average ratio of on-time flights for all airlines during a quarter. This variable is used as a control variable to proxy for the general congestion in the air system during a given quarter.

- *Airline$_j$* are dummy variables for all but one airline in our dataset. The base carrier is American Airlines. These variables are included in the model in order to control for airline operational characteristics (e.g., length of haul; hubs served) that may impact the performance outcomes.

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[5] The US Department of Transportation classifies flight delays into five categories: Air carrier delay, aircraft arriving late, security delay, national aviation system delay, and extreme weather. We calculated our delay variable based on delays from the first two categories. Sensitivity analysis conducted using a wider definition of delays produces similar results to those reported for our base case estimations, as outlined below.

- *Year$_y$* are dummy variables for years 2005 to 2012. The base year is 2004. These

    variables are included in our model since performance outcomes may change from year

    to year due to environmental conditions, passenger demand, or other factors.

- *Quarter$_q$* are dummy variables for quarter 2, 3 and 4 (the first quarter of the year is the

    base case) to account for seasonal factors that may affect the performance outcomes.

Descriptive statistics for our dataset are presented in Table 2. There is a positive

correlation between mishandled baggage reports and customer complaints regarding baggage,

which is a reasonable result. Airline delays are also positively correlated with mishandled

baggage reports. On the other hand, baggage fees are negatively correlated with mishandled

baggage reports and with delays. Other descriptive statistics appear reasonable.

<<Insert Table 2 about here>>

Results:

Before we present the results from our SUR model, we provide trend analyses for our

three dependent variables. These analyses are shown in Figures 1, 2 and 3. Figure 1 shows a

noticeable decline in mishandled baggage reports since 2008, the year when the baggage fees

were initially imposed by the legacy carriers. However, mishandled baggage reports also

declined for Southwest Airlines and JetBlue Airways, the two airlines that did not impose the

baggage fees. Therefore, there could be other factors, such as the economic decline that also

began in 2008, that could be contributing to the reduced rate of mishandled baggage reports. It

should be noted, however, that although the rate of baggage reports declined for both JetBlue and

Southwest, as well as for the other carriers, up until 2010 Southwest and JetBlue had a lower rate

of mishandled baggage reports than their competitors. After 2010, the other carriers (i.e., those

carriers that charged baggage fees) had a lower rate. Thus, the decline in mishandled baggage

reports of the baggage-fee charging carriers relative to Southwest and JetBlue could be an

indication that the baggage fees have contributed to improved operating outcomes.

<<Insert Figures 1, 2 and 3 about here>>

Figure 2 shows the trends in baggage-related customer complaints for JetBlue and

Southwest versus the other US carriers. Both before and after the baggage fees were imposed,

JetBlue and Southwest had a lower rate of complaints than the other carriers. From the figure,

there does not appear to be a baggage fee impact on the rate of complaints. Finally, Figure 3

shows trends in the rate of on-time arrivals (i.e., 1 – the delay rate) for JetBlue and Southwest

versus the other carriers. Prior to 2010, JetBlue and Southwest had a better on time arrival than

their competitors. In more recent years, these carriers do not seem to enjoy an advantage in on-

time arrivals. Therefore, the baggage fees may have contributed to better on-time arrival rates

for the fee-charging carriers relative to Southwest and JetBlue.

Since there are many factors (other than baggage fees) that may contribute to changes in

rates of mishandled baggage reports, customer complaints and flight delays, it is best to estimate

an econometric model that can control for these other factors. Therefore, we have estimated a

SUR model with a number of control variables, as outlined above. The results from our SUR

model regressions are presented in Table 3. The key variable of interest is *Baggage Fee*. The

results show that an increase in baggage fees is associated with a significant decrease in

mishandled baggage reports, customer complaints and airline delays, after controlling for the

other variables in the model.

<<Insert Table 3 about here >>

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Based on the estimated coefficients from our model, we can predict the rate of mishandled baggage reports per 1,000 passengers, the rate of customer complaints (regarding baggage) per 100,000 passengers and the ratio of delayed flights to total flights at various levels of baggage fees. Table 4 presents these results. With no charge for checked baggage, the estimated rate of mishandled baggage reports per 1,000 passengers is 4.60. At a $15 fee, the rate falls 18% to 3.78. At a $23 fee, the decline is 27% to 3.34. At no fee for checked baggage, the rate of customer complaints (regarding baggage) is 0.24 per 100,000 passengers. This rate falls 21% to 0.19 at a $15 baggage fee and 33% to 0.16 at a $23 baggage fee. Finally, with no checked baggage charges, the estimated ratio of delayed flights to total flights is 0.13. At a $15 baggage charge, the estimated rate falls 15% to 0.11, while at a $23 baggage fee, the rate falls 23% to 0.10.

<<Insert Table 4 about here>>

The coefficients for the other variables in our model appear to be realistic. Overall increases in on-time arrival rates in the industry, a proxy for the general degree of congestion the industry is experiencing, are negatively related to mishandled baggage reports and airline delays. Compared to the base case, American Airlines, several of the airlines experienced significantly fewer mishandled baggage reports and customer complaints regarding baggage. Compared to the base year, 2004, there were several years with greater operational difficulties in terms of mishandled bags, customer complaints and airline delays. Finally, compared to the base quarter (January to March), there was significant variation in mishandled baggage reports and customer complaints across quarters, but not in airline delays.

Alternative Models:

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In order to test the robustness of our results, a number of alternate specifications of our model were estimated. First, since baggage fees paid at the airport may differ from the on-line baggage fees we used in our base case estimations, we re-estimated our model using the higher airport baggage fees. The general results from our re-estimated model were consistent with those reported above. Next, we re-estimated our model with an expanded definition of airline delays. In our base model, we only included delays specifically attributed to the airline and to late-arriving aircraft. In the re-estimated model, we included all delays except those specifically related to extreme weather conditions. Again, our results were consistent with those reported in our base case estimation. Third, we estimated our model with a wider definition of customer complaints. Instead of only including complaints related to baggage, we included all (i.e., total) airline complaints per 100,000 passengers. In this estimation, the results changed and we did not find a significant impact of the baggage fees on total airline complaints. Baggage complaints constitute, on average, just under one-quarter of the total complaints filed with the US Department of Transportation. Clearly, there is sufficient variation in complaints unrelated to baggage that renders the impact of baggage fees on total complaints to be insignificant. To verify this result, we estimated a final model with all complaints except for baggage complaints as a dependent variable. Again, the impact of baggage fees was not significant, supporting our finding that baggage fees only impact the rate of baggage-related customer complaints. They do not significantly affect the other categories of customer complaints.

Conclusions and Implications:

The imposition of checked baggage fees has generated billions of dollars in additional revenues for US airlines. However, the revenue effect underestimates the positive impact of the

fees on the airlines. In this paper, we show that the imposition of the baggage fees has contributed to improved operations and increased customer satisfaction for the airlines. In particular, the baggage fees are associated with fewer mishandled baggage reports, fewer customer complaints regarding baggage, and a lower rate of airline-caused flight delays.

The main managerial implication from this study is that, operationally, the baggage fees are good for the airlines. However, it is not possible to use the results from this study to conclude that baggage fees should be increased to further improve operational outcomes, or that Southwest Airlines and JetBlue should impose fees of their own in order to improve their performance. Although there are operational benefits and revenue gains from baggage fees, there may also be a downside from the imposition of the fees. Passengers could divert from the fee-charging carriers to carriers that do not charge baggage fees, notably Southwest Airlines and JetBlue Airways. Indeed, as outlined above, a Southwest manager claimed that Southwest gained $1 Billion in diverted revenue from other airlines in the year after its main competitors began to charge baggage fees (Garrow et al. 2012). Clearly, more research needs to be conducted to examine more fully the consequences from the imposition of the baggage fees on the profitability and financial performance of airlines.

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Table 1: Airlines and Baggage Fees in Dataset

Airline	Baggage Fee – 2008 (USD)	Baggage Fee – 2010 (USD)
AirTran	15	20
Alaska	15	20
American	15	25
Continental	15	23
Delta	15	23
Frontier	15	15
JetBlue	0	0
Northwest	15	N/A
Southwest	0	0
United	15	23
USAirways	15	23

Table 2: Descriptive Statistics

	Mean	Minimum	Maximum	Correlations				
				1	2	3	4	5
1. Mishandled Baggage Reports	4.24	1.38	13.37	1.0				
2. Customer Complaints	0.22	0.00	1.82	0.51	1.0			
3. Airline Delays	0.12	0.05	0.29	0.36	0.09	1.0		
4. Baggage Fees	6.62	0.00	25.00	-0.49	0.11	-0.46	1.0	
5. Industry Average On-Time Flights	0.78	0.72	0.86	-0.62	-0.15	-0.47	0.58	1.0

Table 3: Seemingly Unrelated Regression (SUR) Model Results

	Mishandled Baggage Reports	Customer Complaints	Airline Delays
Constant	15.79*	0.67^	0.42*
Baggage Fee	**-0.055***	**-0.003^**	**-0.001***
Industry Avg. On-time Flights	-13.60*	-0.42	-0.39*
Alaska Airlines	-0.99*	-0.26*	0.00
JetBlue Airways	-2.33*	-0.30*	-0.00
Continental Airlines	-1.46*	-0.12*	-0.03*
Delta Airlines	0.16	-0.00	-0.02*
Frontier Airlines	-1.35*	-0.28*	-0.02*
AirTran Airways	-2.78*	-0.20*	-0.00
Northwest Airlines	-1.63*	-0.15*	-0.02*
United Airlines	-0.64*	0.00	-0.00
USAirways	0.22	0.01	-0.02*
Southwest Airlines	-1.46*	-0.35*	0.01
2005	1.05*	0.07*	0.02*
2006	1.32*	0.02	0.01^
2007	1.52*	0.11*	0.02^
2008	0.43^	0.07^	0.01^
2009	0.20	0.09#	0.02*
2010	0.09	0.12*	0.02*
2011	0.08	0.11*	0.02*
2012	0.22	0.11^	0.02^
Quarter 2	-0.42*	-0.06*	0.00
Quarter 3	0.08	-0.03	0.01
Quarter 4	0.03	-0.05*	0.00
No. of Observations	357	357	357
Pseudo R-Squared	0.75	0.54	0.43

*$p < 0.01$; ^ $p < 0.05$; # $p < 0.10$

Table 4: Predicted Operational Results Based on Various Baggage Fees

Baggage Fee for First Checked Bag	Mishandled Baggage Reports (per 1,000 passengers)	Customer Baggage Complaints (per 100,000 passengers)	Flight Delays (divided by total flights)
$0	4.60	0.24	0.13
$15	3.78	0.19	0.11
$23	3.34	0.16	0.10

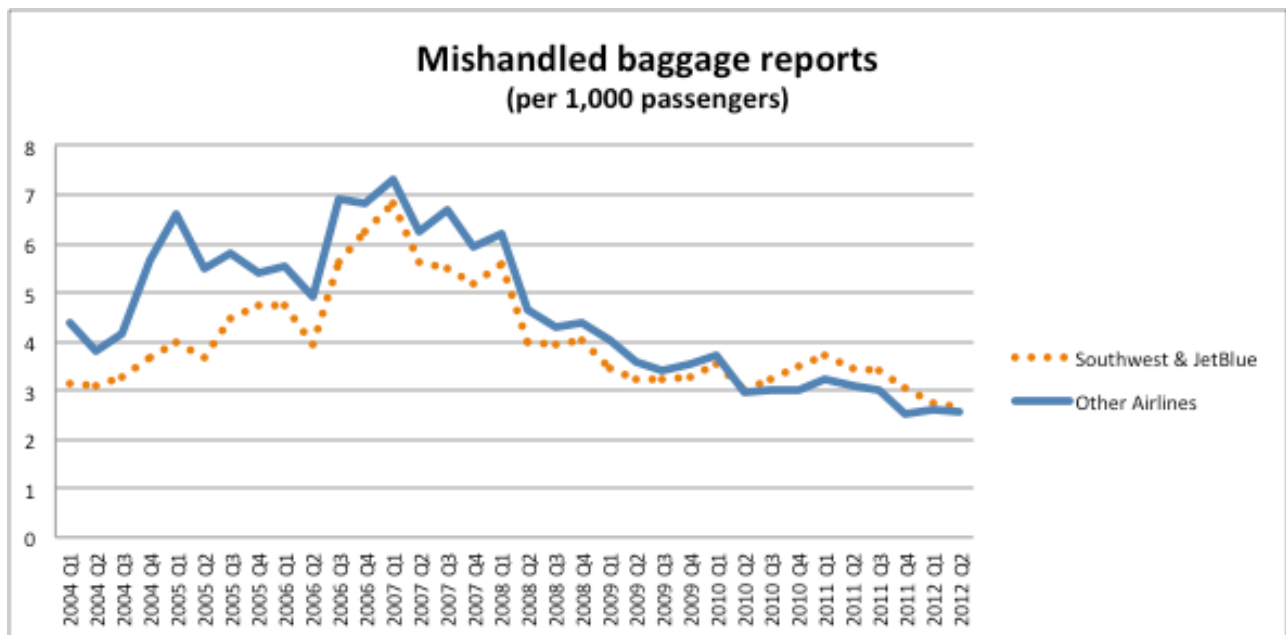**Figure 1: Trends in Mishandled Baggage Reports – Southwest and JetBlue vs. Other Carriers**

Figure 2 – Trends in Customer Baggage Complaints – Southwest and JetBlue vs. Other Carriers

Customer Complaints Regarding Baggage (per 100,000 passengers)

Figure 3 – Trends in On-Time Flights – Southwest and JetBlue vs. Other Carriers