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The impact of baggage fees on passenger demand on US air routes

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ABSTRACT

In recent years, US airlines have unbundled ancillary fees from base air fares. As a result, the carriers have implemented a variety of fees on a range of optional services. Among these, checked baggage fees now represent a significant source of airline revenues. This paper assesses the impact of baggage fees on passenger demand and airline fares. We study a sample of US domestic routes over the period 2007–2010 where passengers have a choice between carriers that charge fees for checked baggage and Southwest Airlines, which allows passengers one or two "free" checked bags. A system of simultaneous equations is estimated. Our results show that, on an average route, a $1 increase in baggage fee leads to a loss of 0.7 passengers and is associated with a $0.11 reduction in fare levels. Interestingly, an equivalent increase of $1 in fares results in a much greater decline in passengers (eight times greater). Therefore, our results support the idea that substituting additional baggage fees for higher fares may be a beneficial strategy for carriers in terms of generating revenues and maintaining market share.

1. Introduction

In recent years, airlines have increasingly separated their base charge for air travel from ancillary fees for supporting services, such as checked baggage, seat selection, in-flight meals, and early boarding. This unbundling practice allows airlines that operate in a very competitive industry to increase revenues and generate profits. The ancillary fees are determined on the basis of a range of factors, including the cost of providing the service, the level of competition, and consumer demand (United States Government Accountability Office, 2010). Worldwide, airlines were estimated to have earned $42.6 billion from ancillary fees in 2013, about 6 percent of total revenues (Davies, 2013). However, individual carriers generated a much greater percent of revenue from ancillary fees. One study found that Spirit Airlines, a US carrier, earned 38.5 percent of total revenue from ancillary fees, almost $49 per passenger (Trejos, 2013).

Among the ancillary fees collected by airlines around the world, the second largest revenue source comes from baggage fees (next to frequent flier plan revenues) at about 25 percent of total ancillary revenue (Lebeau, 2013). In the United States, major "legacy" carriers first introduced fees for passengers' first and second checked bags in 2008, and subsequently raised their fees in ensuing years (see Table 1). Prior to the implementation of the checked baggage fees, all major airlines charged fees only to passengers checking more than two bags or for overweight luggage. Among the various ancillary fees, checked baggage fees are significant for at least three reasons: First, they generate significant revenue for US carriers, calculated by the US Department of Transportation at $3.35 billion in 2013 (US Department of Transportation, 2014); second, they are among the most "annoying" to passengers (Coy and Chiang, 2012); and, third, two significant US low-cost carriers (LCCs), Southwest Airlines and Jet Blue Airways, have elected not to charge checked baggage fees (Southwest for a passenger's first two bags and Jet Blue for a passenger's first bag), thus allowing these carriers to compete with the major airlines (and other baggage fee-charging LCCs) on the basis of "free" checked baggage. This competitive situation allows us to determine the impact of the baggage fees on passenger demand on routes where passengers have the choice between fee-charging and "free checked bag" carriers.

There are a number of reasons for airlines to assess baggage fees. Most importantly, as indicated above, they generate considerable revenue for carriers. According to the Bureau of Transportation Statistics (BTS), baggage fees have generated more than $12 billion in revenue for airlines over the period 2007–2012. Secondly, in the US, baggage fees are not subject to the 7.5% federal tax on airline tickets, since checked baggage is not related to the "transportation of a person" which is the basis for the assessment

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Table 1
Initial values and year-end 2010 values for baggage fees.
Source: Barone et al. (2012).

Airline	Initial 1st bag fee-2008	1st bag fee (online)-2010
American	$15	$25
United	$15	$23
US Airways	$15	$23
Northwest	$15	N/A
Continental	$15	$23
Delta	$15	$23
AirTran	$15	$20
Alaska Air	$15	$20

Note: The operating certificates of Northwest Airlines and Delta Airlines were combined on December 31, 2009.

Table 2
Descriptive statistics of variables (13,979 observations).

Variable	Obs	Mean	Std. dev	Min	Max
PASS	13,979	444.29	931.00	1	11,917
FARE	13,979	197.80	53.46	60.95	1352.99
BAG_FEE	13,979	7.37	9.63	0.00	25.00
MAS_{OD}	13,979	0.14	0.35	0	1
POP_{OD} *(mln)*	13,979	13,094,310	18,976,370	478,185	242,427,900
INC_{OD} *(mln)*	13,979	1,773.82	401.92	893	3,418.64
DIST	13,979	1,535.43	689.50	185	4,252
HHI	13,979	0.38	0.17	0.15	0.90
TOURIST	13,979	0.32	0.47	0	1
Year 2007	13,979	0.23	0.42	0	1
Year 2008	13,979	0.24	0.43	0	1
Year 2009	13,979	0.24	0.43	0	1
Year 2010	13,979	0.28	0.45	0	1
AA	13,979	0.13	0.34	0	1
AS	13,979	0.01	0.12	0	1
CO	13,979	0.09	0.28	0	1
DL	13,979	0.16	0.37	0	1
FL	13,979	0.03	0.18	0	1
NW	13,979	0.05	0.21	0	1
UA	13,979	0.13	0.34	0	1
US	13,979	0.13	0.34	0	1
WN	13,979	0.26	0.44	0	1

of this tax (US Government Accountability Office, 2010). By unbundling the cost of processing checked baggage from a passenger's ticket price, airlines can avoid paying the federal tax on the baggage-cost portion of the fare. Third, by unbundling the baggage fees, airlines can advertise a lower base price to potential customers (United States Government Accountability Office, 2010). Since many customers comparison shop on Internet search engines, providing a lower base fare may be able to generate significant demand for carriers.

Although there are several positive aspects to the baggage fees, airlines that charge these fees do risk losing passengers to competing carriers that do not charge for a first or second bag. Thus, the key research issue addressed in this paper is the impact of the baggage fees on passenger demand. In order to address this issue, we examine routes where baggage-fee charging carriers compete with a carrier that offers free checked baggage, specifically using a sample of routes where Southwest Airlines competes with at least one legacy carrier.

We estimate a system of equations with both carrier passenger demand and carrier air fares as dependent variables in order to account for endogeneity between these two variables. Our results indicate that the imposition of baggage fees has a significant, negative effect on passenger demand for a carrier, but that the impact is far lower than that of an equivalent increase in airfares. In other words, airlines can gain passengers by reducing fares and substituting increased baggage revenues for the lower fares. Secondly, in line with Henrickson and Scott (2011), we find a small but significant negative impact of baggage fees on airline fares with the revenue generated by the baggage fees exceeding the revenue loss from the lower fares. Thus, results from both the passenger demand equation and the fare equation indicated that airlines gain net revenues by imposing baggage fees in lieu of equivalent higher airline fares.

The rest of this paper is organized as follows. Section 2 provides a brief literature review on the impact of baggage fees. Section 3 describes our methodology and dataset. Section 4 presents our results. Section 5 provides an alternate model, while Section 6 summarizes and concludes the work.

2. Literature review

The literature on the impact of baggage fees (and other ancillary fees) on airline operations is very limited, although it broadly relies on research related to optimally costing services (e.g., Anderson and Claus, 1976) and to revenue management (e.g., Chiang et al., 2007). Garrow et al. (2012) find that the imposition of checked baggage fees in 2008 by the legacy carriers has been effective at increasing revenues. Whereas baggage fee revenues during the period 2007–2009 remained relatively constant for carriers that did not implement the checked baggage charges (e.g., from 0.21% to 0.26% of Southwest Airlines' operating income), they increased significantly for US passenger airlines as a whole (from 0.55% to 2.4%).[2]

Jenkins et al. (2011) find that the unbundling trend in the US airline industry has allowed carriers to reduce base airfares. Instead of increasing base airfares, airlines have been able to generate additional revenues by charging for ancillary services. According to the authors, in 2010, average US domestic fares at $158 per passenger segment were lower (on an inflation-adjusted basis) than in 2001 when they were priced at $164 per passenger segment.

[2] Southwest Airlines does charge fees for overweight bags and for passengers that check three or more bags, so it does generate some baggage fee revenues.