THE MARKET STRUCTURE DYNAMICS CREATED BY DE-BUNDLING OF AIRLINE BAG FEES

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ABSTRACT

Charging fees for checked bags is a recent phenomenon in the airline industry. Until late 2008, checking bags was a free service, the cost of which was bundled in base airfare. Our analysis of airline markets before and after the implementation of bag fees validates Chen's (1997) model of mixed bundling strategies leading to market differentiation and weakening of Bertrand equilibrium.

Keywords: Pricing, Market Structure Dynamics, Oligopoly Pricing, Baggage Fee, Revenue Management, Industrial Organization.

JEL Code: L11, L13

INTRODUCTION

Charging Baggage fees for checked bags is a recent phenomenon in the airline industry. Until late 2008, checking bags was a free service, the cost of which was bundled in the base airfare. This article builds on the findings by Henrickson and Scott (2012) and Schumann and Singh (2013) that showed airlines continuing the 'bags fly free' tradition were more successful in increasing base airfares than competitors charging checked bag fees. Henrickson and Scott (2012) and Schumann and Singh (2013) both base their findings on U.S. Department of Transportation (USDOT) 10 percent sample collected from all domestic airline tickets sold in United States, the former having looked at a sample of top grossing markets while the latter focused on sample of markets in which both "Fee" (airline carriers that charged fee for any and all checked baggage) and "No-Fee" (airline carriers that allowed at least one checked baggage at no additional charge with the purchase of base fare) carriers were jointly present. This article extends the research to specifically evaluate markets in which all carriers opted to de-bundle the air fare by charging separately for checked baggage. Looking at the two types of markets we noticed significant differences in the airline competitive dynamics.

The decision for some airlines to start charging for baggage is especially intriguing given that airlines have historically been very good at developing fences to separate leisure and business travelers, the former of which are assumed to be significantly more price elastic than business travelers as "many price-inelastic consumers travel for business related reasons and tend to value their time highly" (Gerardi and Shapiro 2009). Baggage fees would appear to have greater impact

and raise effective prices for leisure travelers, the opposite of what airlines would be expected to do.

The results of this study could extend well beyond the airline industry, as there are pricing structure parallels to many other industries where oligopolistic or duopolistic firms have an ability to bundle their products into a combined price, or to price and sell their products or product features "a la cart".

Different firms in all types of industries follow multiple pricing and bundling strategies. One extreme is the "a la cart" structure in which each individual attribute of the product is priced individually (de-bundled), while the other is where a product is offered 'all inclusive' with one price. "All inclusive" pricing structure sometimes have an adverse consumer reaction because some attributes of the product may have very little or no value to the consumer. Alternatively, other consumers may become upset by being asked to pay separate prices for each product attribute and complain about being "nickel and dimed".

Most economic analysis of bundling has been done in a monopolistic setting. Understanding optimal bundling strategies in an oligopolistic setting is more difficult as competitors could under-cut any bundled offering, yielding only the Bertrand equilibrium on the "bundle". Additionally, the existence of competitors can keep a potential product bundler from using mixed bundling strategy that relies on artificially inflated single product prices. We analyze the air fare bundling/de-bundling strategy in the US domestic airline industry which is oligopolistic in its structural attributes.

REVIEW OF LITERATURE

Henrickson and Scott (2012) and Schumann and Singh (2013) presented analysis of USDOT airline ticket data to analyze the de-bundling of ancillary services in the US domestic airline industry, in particular the baggage fee. Before that the popular and financial press has been the only sources investigating this phenomenon.

Burstein (1960) and Adams and Yellen (1976), were among the first to study product bundling in a monopoly setting. Carbajo, Meza, & Seidmann (1990) and Chen (1997) identified that bundling is often seen in duopoly or oligopolistic context. Specifically, Carbajo et. al. (1990) cites the photo film and processing industry as an example in which both the film and processing are sometimes bundled and at other times sold separately as individual offerings. Chen's (1997) examples include computer hardware and software, credit and travel companies with loyalty programs. Schumann (1986) explained that airline frequent flier programs are essentially a way in which oligopolistic airline carriers bundle their products together for greater differentiation.

Phillips and Schutte (1988) wrote about the bundling strategies adopted in gasoline station markets. One can draw parallels between the gasoline station markets and the airline industry. Full service gasoline stations bundled "full service" with the price of gasoline. This is similar to airlines providing baggage service as part of the base air fare purchase. Some gasoline stations choose a mixed pricing strategy wherein they offer some self-service pumps and some pumps with "full service" at a higher price. This is similar to the airlines offering an airfare that does not include checked baggage service and the baggage service is offered with a separate price. In the gasoline station markets there is another strategy adopted more commonly by most gasoline

stations these days, is completely self-service pumping of gasoline. With the exception of Eastern Airlines "moonlight special" flight service in the 1980s, that the airline did not guarantee checked baggage availability, the airline equivalent of a completely self-service gasoline station as of yet does not exist[1].

Phillips and Schutte's (1988) focus in researching the gasoline station markets was on determining the cross-price elasticities of full and self-serviced customers. Our focus in this article is to determine how a similar price partitioning affected the competitive structure and overall price levels within the airline oligopoly.

Chen (1997) was one of the first to develop a theoretical model that finds one duopolistic firm choosing a bundled product pricing strategy where the other offers an 'a la cart pricing'. The current market example of airline industry with their differing baggage fees mirrors this structure.

Product bundling and de-bundling is not only of interest to economists, but is also studied in the marketing field. Price Partitioning (Schindler 2011) is the term used in the marketing literature to describe when a firm de-bundles the product attributes to offer them via "a la cart" pricing. Customers not demanding a product attribute are not required to pay for that, when the price is "partitioned" among multiple features of the product. Price partitioning can also be used to communicate to the consumer the added cost of providing multiple product attributes. For example, an Ultra-Low Cost Carrier (ULCC) in United States separates the total fare in multiple cost factors the passenger is being asked to pay for including, the cost of fuel and "government's cut"[2].

Providing the air passenger with the service of checked baggage has costs of its own. These costs include, but are not limited to, handling, cargo space, security screening, etc. Similarly, there are costs to allow carry-on bags to board with the passenger. The most apparent being the time delay caused during boarding and disembarking of planes which decreases the scheduled asset productivity of the aircraft. Currently, the ULCCs operating in the United States domestic airline routes, have implemented in their pricing structure a higher carry-on baggage fee than their checked-baggage fee[3]. This clearly indicates that they wish to encourage passengers to check bags rather than bringing those as carry-on implying that, in their opinion, the cost of carry-on may be higher than checking a bag.

AIRLINES INDUSTRY AND THE ECONOMIC CONDITIONS DURING THE STUDY PERIOD

During the period of study there were major changes in the economy which affected the market for air travel. The great recession of 2007-09 had a negative impact on overall economic income levels and for services such as air travel. Indeed, precisely because of this reduction that some carriers chose to consider charging for bags, at least this was the public claim by some airline executives (AMR Corp., 2009, Delta Air., 2009 and UAL Corp., 2009). Because of these changes in the macro-economic environment, it is very difficult to analyze any changes in demand caused specifically by price changes. However, since all carriers operated in the same economic environment, we can compare airline to airline in terms of their pricing strategy and the number of passengers carried.

As we see in Figures I and II, 2008 brought significant economic changes that impacted the airline industry. The Producer Price Index (PPI) for Jet Fuel which constitutes a major variable cost for keeping the airplanes in the air was on the rise during all the "Prior" period (Defined as study period ranging from the beginning of first quarter of 2006 until the end of second quarter of 2008). During the same time, the overall PPI for Scheduled Passenger Air Transportation rose as well. These cost increases, along with the contracting economy, were significant in influencing most airlines to implement a new stream of ancillary revenue, in this case initiation of checked baggage fee. With the combination of the weakening economy together with the explosive growth in fuel expenses, airlines were looking for ways to protect their income. Indeed, it was these factors which were publically cited by the airlines in their announcements of initiating baggage fees.

PRODUCT DIFFERENTIATION IN AIRLINE INDUSTRY

The Airline industry is a very interesting industry to study pricing effects for a variety of reasons. Foremost, the basic transportation services provided by the carriers are identical with relatively little differentiation with each airline providing the same service of moving a customer from location A to location B. However, it is not a pure commodity as some minor differences do exist such as, flight schedule, seat comfort, quality of food snacks provided (if any), and any participation in frequent flyer loyalty programs.

The airline industry serves a heterogeneous population made up of vacation and leisure travelers. Since de-regulation, airlines have become very adept at developing pricing tools to segment price sensitive leisure travelers from price insensitive business travelers. These include fences such as, Saturday night stays, non-refundable fares, in-advance purchase requirements, etc., which have historically allowed airlines to offer leisure travelers a low fare while simultaneously charging the price inelastic business travelers a much higher price for the same base transportation service. As mentioned above, it is within this context that the current bag fees decisions are of such interest. As one would imagine, such a policy (fare increase) would be disproportionately aimed at a leisure traveler rather than a briefcase-carrying business traveler. The issue whether this policy disproportionately affects one segment greater than the other is left as an issue for further research.

Because the US airline industry used to be federally regulated, the old Civil Aeronautics Board collected extensive data off of a 10 percent sample of every airline ticket sold in United States. Even after de-regulation, the Department of Transportation has continued this data collection tradition. Very few industries are so data rich when it comes to market and price information.

THE DATA

The data for this analysis comes from the US Department of Transportation. The DOT requires airlines to submit a 10% sample of all domestic airline tickets sold with all data related to itinerary and fare charged. This data is compiled quarterly and made available via the internet to researchers and the public. For each origin-destination city pair and major carrier, the published

DOT data fields include: Average Fare, Number of Passengers, and carrier Market Share. For the airline's data to be included, they must have a market share of over 10% during that quarter. An origin-destination city pair includes all one-way segments in either direction regardless of their routing. For instance, data from a ticket for a flight from Chicago to Cleveland connecting to a flight from Cleveland to Boston would be included in the Boston-Chicago city pair and would not appear in either Chicago-Cleveland or Cleveland-Boston city pairs.

From this data, we analyze distinct city pairs for which there was consistent competition during the entire 2006 to 2010 study period. Markets for which the same set of competitors remained during the entire study period were retained, while those with only one dominant carrier or those with significant changes in competitors serving the market were dropped with the exception of certain instances of airline name changes due to airline mergers. Our final data set consisted of 112 distinct Origin/Destination city pairs.

Two major airline mergers happened during the study period, Delta/Northwest and US Airways/America West. Where possible we re-coded and combined data from both airlines for the period prior to their merging of operations. In some instances this may cause the market share gains of these two carriers to be over-reported. This would happen if one of the two pre-merger airlines had unreported data in a market due to falling under the 10% market share threshold.

Our analysis focuses on changes between two of the three time periods in our study, the "Prior" and "After" periods. Respectively these are defined as 1Q06 – 2Q08, and 1Q09 – 4Q10. Data for the "Transition" period, 3Q08 – 4Q08, is ignored as this was the time when most carriers were implementing baggage fee starting first checked baggage.

The carriers were broken into two categories.

"Fee" carriers refer to the US airlines that began charging separately for checking a first bag in 2008.

"No Fee" carriers are those carriers that continue to allow at least one "Free" checked bag during the entire study period.

Table I identifies the carriers, their classification, the bag fee charged and the date of this policy change. It also depicts the estimated bag fee revenue collected per passenger.

As described above, each of the city pair markets has had at least two competitors competing for passengers during the study period. We have broken these markets into two categories.

"Fee/Fee" markets are those where the major competitors all fit into the "Fee" carrier category. There are 46 markets that fall into this classification.

"Fee/Free" markets are those where there are competitors from both the "Fee" and "No Fee" carrier categories. There are 66 markets that fall into this classification.

Theoretically, there also could exist a third category, "Free/Free". Unfortunately, we could include none of the markets in which two or more "No Fee" carriers competed because they did not meet the criteria that competition must have existed during the "Prior" periods as well. Additionally, we did not look at markets that were dominated by one carrier.

RESULTS

When we look at the subset of markets where both "Fee and "No Fee" carriers operated we saw that both types of carriers were able to increase their base airfares despite the headwind from the economic environment. This price increase averaged $13.39 and was $16.69 and $11.31 for the "No Fee" and "Fee Carriers", respectively (see Table II). Although the "Fee" carriers had a lower price increase, they had access to the bag-fee revenue stream that the "No Fee" carriers did not.

When we analyze the markets where only "Fee" carriers operated, the results are remarkably different. Instead of fares increasing, the average base fare decreased by $12.28 during the exact same time periods. As the analysis is using the same data during the time period with the same macro-economic factors pertaining to the U.S. domestic airline industry, the changes in base fare is a valid comparative metric between the two types of markets. The overall difference in fare change for "Fee" carriers between these two types of markets is a little over $23.59. Table II details these findings for all major airline carriers.

As there is a positive change in the markets where "Fee" and "No Fee" carriers competed, and all factors are identical, our only conclusion is that there must be a difference between the competitive dynamics in the two market types.

This situation may be exactly what Chen (1997) predicted. His theoretical model predicted that if one oligopolistic firm may choose to bundle while the other did not, this would result in a differentiated market where price levels increase as the Bertrand competition was significantly weakened. In this case, baggage fees appear to be used as this creator of product/service differentiation leading to pricing power for all participating firms in the market.

Airlines do not disclose the baggage per route and the DOT only collects base airfare data. We therefore do not know how much more ancillary baggage revenue, if any, is collected when a "Fee" carrier does not have a "No Fee" alternative. Table I shows that even the largest system-wide revenue per passenger is dwarfed by the markets' base-fare difference. Therefore, even if there were differences in customers' propensities to check bags in these two markets, the resulting extra revenue increase could not close the base fare difference we have seen.

The result is clear, airlines that have charged bag fees benefit when their competitors choose not to. From Schumann and Singh (2013), airlines that choose not to charge bag fees when their competitors do, appear to post economic gains equal to or better than their "Fee" counterparts.

CONCLUSIONS

A priori, we had thought that the existence of carriers not charging for bag fees might be detrimental to the carriers who do. The results however indicate that "Fee" carriers do much better competing with a "No Fee" carrier vs. competing with another "Fee" carrier. This however does not appear to be at the expense of the "No Fee" carrier as both showed an ability to increase fares.

While we originally began this analysis to identify which airline executive group made the "right" bag-fee decision, it appears that collectively they both did. Should the "No Fee" carriers

join their counterparts, (or vice versa) this analysis predicts that both carrier types would stand to lose pricing power.

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APPENDIX A

Figure I

Figure I provides a visual comparison between "Prior" and "After" study periods in terms of macroeconomic variables in United States.

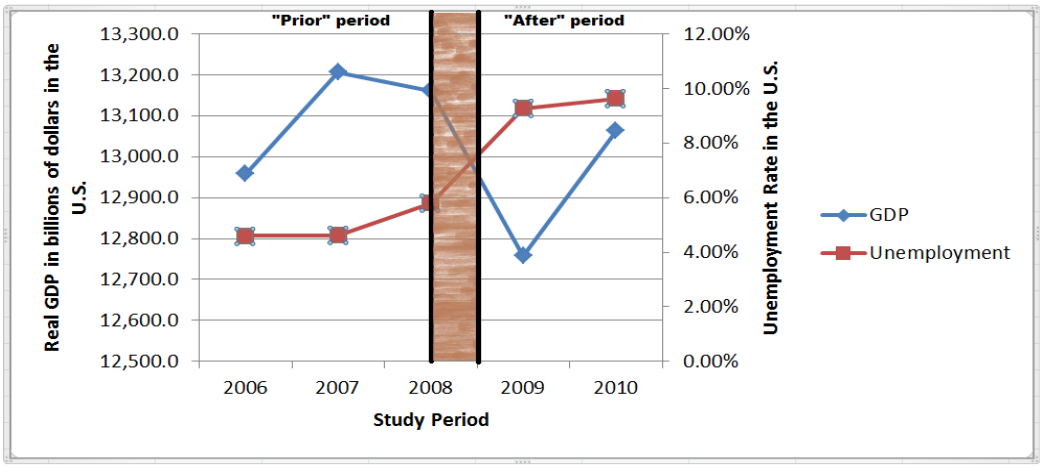

Figure II

Figure II provides a visual comparison between "Prior" and "After" study periods in terms of airline industry Producer Price Indexes.

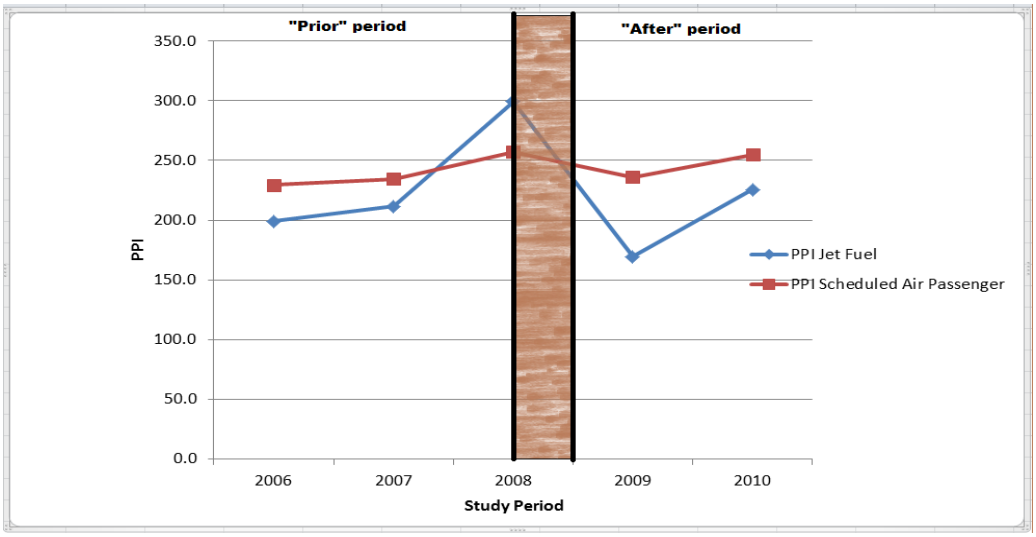

Table I

Table I shows the time line when each of the major "Fee" carriers initiated extra fees for first and second checked baggage. Prior to these dates, all of these carriers allowed for at least 1 free checked bag.

Airlines	Checked Bag Fee: 1st and 2nd	Bag fee Initiated	*Estimated Bag fee revenue/passenger[4]
Delta (DL)/ Northwest (NW)	$23, $32	2008 Q4	$8.58
American (AA)	$25, $35	2008 Q2	$6.74
United (UA)	$23, $32	2008 Q3	$5.79
US Airways (US)/ America West (HP)	$23, $32	2008 Q3	$9.91
Continental (CO)	$23, $32	2008 Q4	$7.86
AirTran (FL)	$15, $25	2008 Q4	$6.20
Midwest (YX)	$20, $30	2008 Q4	Not Reported
Frontier (F9)	$20, $30	2008 Q4	Not Reported
Average			$7.51

*It must be noted that these baggage fees are for the carrier as a whole and are not available on a route-by-route bases. As economic theory would dictate, the percentage of passengers checking bags on "Fee" carriers may be lower in the "Fee/Free" markets where customers expecting to check bags could book away from the carrier.

Table II

Table II provides detailed analysis of base fare comparison between the "Prior" and "After" study periods. Fare change between the two types of markets: "Fee/Fee" and "Fee/Free" is presented in the table as well.

	**Average of Airline Fare "Prior"	**Average of Airline Fare "After"	Average of Change in Fare "After – Prior"	Average of Percentage Change in fare	Count of Markets	**Average of Quarterly Airline Average Fare
Fee Markets	**174.81**	**162.53**	**-12.28**	***-7.73%**	**46**	**171.58**
Fee Carriers	174.81	162.53	-12.28	*-7.73%	46	171.58
AA	198.16	196.93	-1.23	-1.41%	13	200.62
CO	205.67	209.07	3.40	1.86%	2	210.08
DL***	185.10	163.02	-22.08	-11.98%	28	176.83
FL	134.16	121.79	-12.368	-9.30%	1	130.38
UA	227.51	239.18	11.67	5.24%	2	238.00
US***	209.83	197.83	-11.99	-6.57%	0	207.43
YX	134.82	122.80	-12.02	-8.92%	0	133.92
Fee/Free Markets	**155.03**	**168.42**	**13.39**	***9.75%**	**66**	**161.88**
Fee Carriers	164.60	175.91	11.31	*7.67%	60	170.37
AA	158.55	170.05	11.50	7.96%	33	164.32
CO	185.86	199.14	13.28	8.73%	6	192.70
DL***	168.42	171.62	3.20	1.19%	3	170.29
F9	120.76	114.94	-5.81	-4.57%	2	116.44
FL	118.36	119.93	1.57	1.36%	4	118.92
UA	176.59	187.71	11.12	7.37%	8	182.89
US***	163.09	186.19	23.10	16.35%	4	173.47

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	**Average of Airline Fare "Prior"	**Average of Airline Fare "After"	Average of Change in Fare "After – Prior"	Average of Percentage Change in fare	Count of Markets	**Average of Quarterly Airline Average Fare
No Fee Carriers	139.82	156.51	16.69	*13.04%	6	148.38
B6	143.64	143.50	-0.14	-0.79%	6	144.84
U5	142.92	138.35	-4.57	-3.20%	0	141.43
WN	139.29	158.46	19.17	15.05%	0	148.95
All Markets All Carriers	**162.60**	**166.17**	**3.57**	***3.06%**	**112**	**165.59**

* Statistically significant difference at α=0.05 level
** In Dollars.
***DL includes NW and US includes HP.

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