

# Optimal Food & Beverage Mix at Full Service Airline and Low Cost Carrier Terminals<sup>1</sup>

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**Abstract** This paper investigates the space allocation and mix of commercial activities for a sample of North American airport terminals from 2002 to 2008 following the entry of low cost carriers. With the growing importance of low cost carriers (LCC) in addition to the traditional full service airlines (FSA), a different allocation of commercial activities with respect to both space and categories can be observed. An econometric panel data analysis is used to identify the reasons behind this divergence in space allocation between LCC and FSA terminals.

Our major findings indicate that while food and beverages (F&B) services are important for both types of terminals, the particular division of F&B service types, such as sit down restaurants, bars, and lounges or other categories is less crucial for revenue levels at FSA terminals. Sit down restaurants, bars, and lounges at FSA terminals occupy 31 percent of total F&B space, less than the 40 percent at LCC terminals. However, the larger supply of sit down restaurants, bars and lounges at LCC terminals, as suggested in our analysis, results in less F&B gross revenue ( and rental) per square foot. This suggests that a more profitable strategy would involve a change in the F&B mix at LCC terminals, which may take time..

Key Words: Airports, Commercial revenues, Non-aviation, Panel data analysis.

JEL classification: C23, D12

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## **Introduction**

In recent decades non-aviation (i.e. commercial) revenues have become more and more crucial to an airport's economic success. Beside F&B, retailing, and parking services, airports now even invest in real estate. F&B is therefore an important component of commercial revenue. With the emergence of LCC, spending by passengers on F&B has increased since carriers are now charging for F&B on the plane<sup>3</sup>. This greatly alters the behavior of passengers who avoided F&B purchase at terminals since they could receive this for free inside the cabin. Therefore, at terminals where the dominant airlines are LCC, the purchase of F&B on the ground can be seen as substitutes for F&B during the flight. Consequently, airports have to adjust F&B facilities at terminals to accommodate the change in passengers' demand.

Behind this issue, there are two questions which are important when terminal space is to be allocated. The first one is that how much space should be designated for commercial activities; the second one is how to allocate the amount of space to each category of the activities. To optimally solve these two questions, one must first decide on the criteria which are to be followed. Specifically, terminals are not only designed for commercial use but also for aviation operations. The optimal allocation of space in this sense would require sufficient area for smooth aviation operations, and at the same time meet the demand of commercial activities. Further, in order to utilize commercial space properly, the particular combination of F&B facilities and correct amount of space for each would play a key role to satisfy passengers' preferences and maximize profits from commercial activities.

We must also remember that customer segmentation is an important element of the strategy of airlines. The type of airlines which passengers choose therefore provides important information about their characteristics to the airports. The impact of LCC is not only represented by the increasing number of passengers it brings to airports, but also distinguishes its passengers from those of FSA in aspects like price sensitivity, flexibility, and travel distance. By understanding and identifying these characteristics with the type of airlines passengers choose, airports can plan the commercial facilities more effectively and extract more of their spending power. However, a deeper understanding of this topic is beyond the scope of this paper.

### **A slow move towards a greater interest in non-aviation at US airports**

Airports today are more than the places where aircrafts take off and land in the sense that they have been increasing the variety of services offered to passengers. Beside F&B, retailing and parking services, airports now even invest in real estate such as offices, hotels and etc. in the surrounding area

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<sup>3</sup> Increasingly, GSA also start charging for F&B during the flight

(Humphrey I. et al., 2006). LCC have become a popular alternative to FSA and have obtained a larger market share and have also been attracting additional passengers to airports. Instead of relying on charges on aircraft movements<sup>4</sup>, airports have been trying to squeeze more revenue from the non-aeronautical side to subsidize both aeronautical and non-aeronautical infrastructure (Brendan Sobie (2006)). Consequently, non-aviation revenues have been gaining importance as a source of revenues.<sup>5</sup>.

Since we focus on airports in the U.S. which are mostly publicly owned, an understanding of their governance structure is crucial. An important element of this is the concept of a residual fee.. The residual fee system is designed to limit the monopoly rents in a way that they are extracted from non-aviation revenue so that the landing fees paid by airlines can be held down (Levine,). Given this type of pricing regulation, airports in the U.S. were not oriented to make good use of concession opportunities, especially with respect to the development in concessions areas. Therefore, they often failed to plan optimal space and location for concession use, especially under the space constraint. Moreover, the focus of non-aviation activities was mainly on travel needs and conveniences rather than the willingness or the impulse for shopping which could be found in other countries. Specifically, in North American airports, revenues from F&B account for a greater part of non-aeronautical revenues than duty free and specialty retail sales. As a result, airports in the U.S. earned lower non-aviation revenue than elsewhere due to both the lack of an efficient plan for non-aviation construction and an effective approach for exploiting the potential value of concessions.

Nevertheless, with the growing concern of airlines on airports' charges that has been mentioned by Graham (2008), even in the U.S. airport policy is slowly changing...The airport-as-shopping-mall concept was pioneered by BAA at the Pittsburgh airport more than 10 years ago, when it was asked to develop a master concessionary (DeLise , 2000). The new policy was soon imitated by other airports, as the reevaluation of existing concession allocation in line with market trends would allow them to generate more from non-aviation activities. The consensus in the industry gradually changed so that the more non-aviation oriented business model can be found in most airports in the U.S. They not only improved shopping facilities, but they also tried to provide F&B

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<sup>4</sup> A. A. Walters (1978) has argued that most airports levy charges on aircraft movements following the principle that the charges reflect the ability of each movement to pay rather than the cost of operation which airports bear.

<sup>5</sup> According to Brendan (2006),” non-aeronautical revenues account for about 50% of total revenues at Sydney, Copenhagen, Johannesburg, Paris and Vancouver airports. Several airports even have over 50% non-aeronautical revenues, such as Frankfurt with up to two-thirds non-aeronautical revenues, and Jacksonville airport in Florida with 70% non-aeronautical revenues and being confident to achieve 75%”. One has to be careful however about interpreting these percentages. If the airport has very high aviation charges, then it would be difficult to achieve such percentages. Low aviation charges would result in the other way around. A better way to assess the importance of non-aviation revenues would be to look only at total spending per passenger on the one hand and aviation charges per passenger on the other.

with greater variability in order to meet tastes of all types of passengers<sup>6</sup>.. ,

The business model of airlines also changed, with the increased market share of Low Cost Carriers (LCC). Consequently, the strategy difference between LCC and Full Service Airlines (FSA) received a lot of attention in the literature. Even changes in the strategy of LCC themselves are worth noting; for example, the profile of the passengers has altered overtime and that in turn leads to changes in demand. The original target customers of many LCC were mostly leisure travelers; however, recent evidence suggests that LCC have been capturing a significant and larger share of business travelers (Huse and Evangelho, 2007).

The combined effect of the growth of LCC and an increasingly important role of non-aeronautical revenues has changed the airport-airline relationship as well. Based on semi-formal interviews with airport and airline managers in the UK, Italy, Germany, France, Slovakia, Poland, Czech Republic and Denmark, Humphreys et al. (2006) point out that airports see LCC not only as a way to increase the number of passengers passing through their terminals, but also to increase revenues through passenger spending, most notably in terms of retail sales and car parking fees. As airports need to reduce charges to attract more LCC carriers there is now a greater need to improve profits of non-aeronautical activities. Therefore, revenue streams need to be carefully examined since the amount of money spent and the nature of purchases made by LCC passengers may be different from those experienced by FSA passengers.

Given the developments discussed above, airports have to better understand how the presence of LCC affects their non-aeronautical revenues. The question of how to model and estimate the growing influence of LCC passengers empirically has however not yet received much attention. In this paper we will therefore focus on the difference in F&B performance in terminals where LCC carriers dominantly operate, and in terminals where FSA carriers dominantly operate.

## **Data**

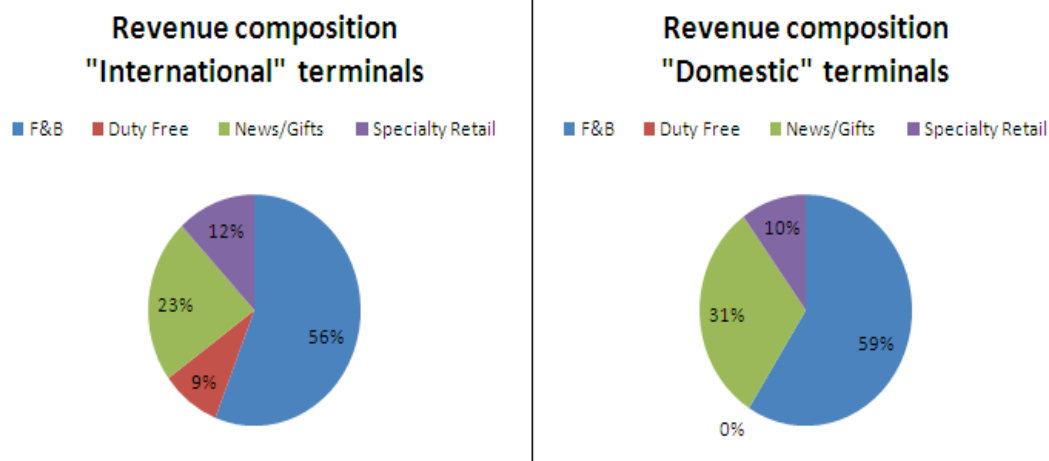
The data used in this paper is from the ARN Fact Book published by the Armbrust Aviation Group (AAG). The ARN data set contains revenue details of 100 North American airports on a terminal-by-terminal basis and covers more than 250 terminals during the years 1999 to 2008. We focus on F&B revenues and concessions since at North American airports these represent the largest share of total non-aviation revenues.

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<sup>6</sup> Food concessions, for example, may include a sushi bar, an Italian eatery, steakhouse, and Spanish tapas bar etc. along with traditional American restaurant types. "Broadening the selection can significantly impact increased revenues" as stated by Scott Kilgo, at Portland International Airport, see Infanger John F. Concessions update, Airport business, *april* 2005.

Figure 1 below shows the non-aeronautical revenue composition at international and domestic terminals at these 100 U.S. airports in the year 2008 which also includes Duty Free, News/Gifts, and Specialty Retail.

**Figure 1 Non-aviation revenue composition at the US Airports in the year 2008 (From ARN Fact Book)**



In order to extract the detailed data on F&B categories and their locations, the original ARN data set was reduced to a smaller number of altogether 97 terminals at 58 airports for the period 2002 to 2008<sup>7</sup>. For later analytic use, the categories are further divided into two groups: Sit down restaurants/Bars/Lounges, and all other categories. As a result, we are able to obtain the total space and number of locations for each category by summing up the data. However, for some terminals, we are not able to calculate the total F&B space at terminal-by-terminal level, especially when it comes to Sit down restaurants/Bars/Lounges. This explains why we had to significantly reduce in the final sample size.

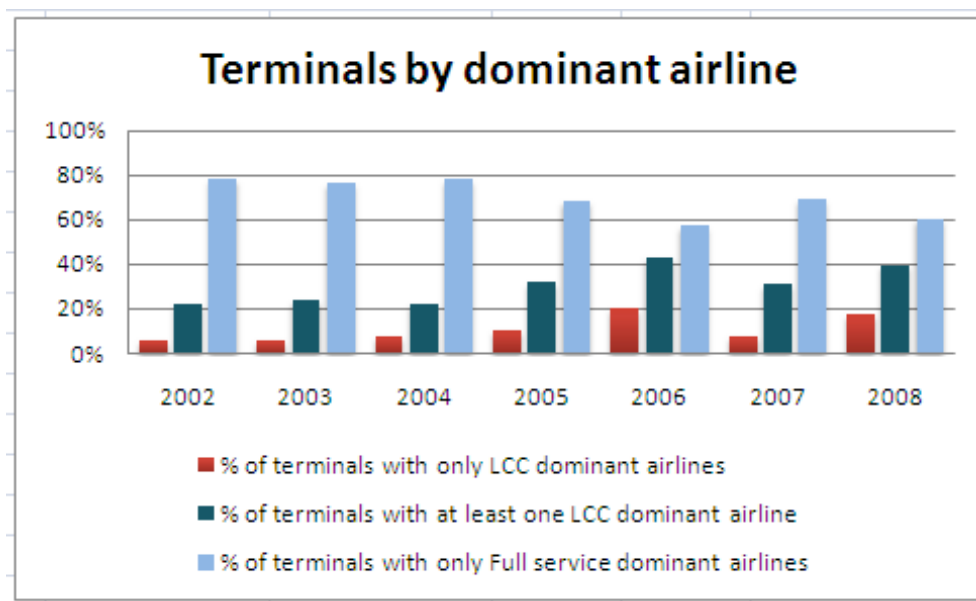
The final sample consists of 18 large hub airports, 25 medium hubs, and 15 small hubs according to Federal Aviation Administration (FAA) categorization<sup>8</sup>. In terms of terminals, 76 percent of terminals had more than 1 mill. emplaning passengers on average and 30 percent of terminals had more than 3 mill. emplaning passengers during 2002 to 2008.

<sup>7</sup> Due to the a lack of location indications in the sample that prevented us from calculating total F&B space. This is because although the indicators of space and the category such as Sit Down Restaurant, Cafeteria, Fast Food, Walk Away etc. of each F&B unit is available, it was impossible to detect the exact location of most F&B units for calculating total F&B space

<sup>8</sup> The FAA defines large hubs as airports with more than 1 percent of worldwide annual passenger boarding, medium hubs with at least 0.25 percent, but less than 1 percent annual passenger boarding, small hubs with at least 0.05 percent, but less than 0.25 percent and non-hubs have less than 0.05 percent annual passenger boarding.

There are several major objectives which can now be realized with this data sample. First of all, the revenue performance of F&B outlets at different types of airports can be extracted. Furthermore, we can differentiate the performance of F&B at terminals used mainly by FSA from that at terminals used mainly by LCC. Finally, the effects of a change in the F&B mix across terminals can be assessed. For our specific purpose, we therefore divided all terminals into three groups according to the type of their dominant airlines<sup>9</sup>. The rest of the terminals in the sample are then those where at least one LCC airline is present among FSA airlines. The composition of terminals in the sample is shown in Figure 2. We can now see that the share of LCC terminals increased whereas that of FSA decreased over the period. Descriptive statistics of the two target terminal groups, FSA and LCC terminals are in Table 1.

**Figure 2 The percentage of terminals with different types of dominant airlines**



If we assume that there is no economic difference between these two types of terminals, the number and area of F&B units should increase/decrease more or less proportionally with terminal size as measured by number of passengers (pax). However, economic differences like service offered and passengers' characteristics do exist between LCC and FSA terminals. FSA terminals in the sample are on average smaller than LCC ones in terms of 26.43 percent less emplaning passengers. Correspondingly, they have a smaller number of all types of F&B locations. However, the average size of F&B units at FSA terminals is not smaller but rather on average 63.45 percent larger than that at LCC terminals. . To summarize, we observed (on average and for specific categories) a larger numbers of F&B units at LCC terminals. On the other hand, the space per F&B unit is smaller at LCC terminals, except for the category of Sit down restaurant/ Bars/ Lounges.

<sup>9</sup> LCC terminals refer to terminals where all the dominant airlines are low cost oriented and FSA terminals refer to terminals where all the dominant airlines provide full services.

**Table 1 Summary Statistics**

	Only LCC		only FSA		Difference
	obs	mean	obs	mean	
Emplaning pax	35	3 130 695	244	2 303 404	-26.43%
Food/Beverage Gross Revenue per square foot	35	11 062.97	244	10 149.29	-8.26%
Food/Beverage Rent Revenue to the Airport (per square foot)	35	91.99	244	44.46	-51.67%
Food/Beverage average space per unit	35	1 179.38	244	1 927.67	63.45%
Sit down restaurants/Bars/Lounges average space per unit	30	2 535.44	156	1 952.96	-22.97%
Other Food/Beverage average space per unit	35	843.49	233	1 752.86	107.81%
Food/Beverage (number of locations)	35	10.57	244	7.65	-27.66%
Sit down restaurants/Bars/Lounges (number of locations)	35	1.91	244	1.60	-16.50%
Other Food/Beverage (number of locations)	35	8.66	244	6.05	-30.12%

Does the difference in amount of space and locations reflect the economic difference between FSA and LCC terminals? Specifically, does the greater amount of F&B offerings in the form of Sit down restaurant/ Bars/ Lounges and all other types of F&B units at LCC terminals represent a response to greater passengers` demand for Sit down restaurant/ Bars/ Lounges? Furthermore, does it bring in additional revenue to LCC terminals?

In the sample both F&B revenue per square foot and F&B rent payments per square foot are higher at LCC terminals. Again from Table 1, FSA terminals generate not only 8.26 percent less F&B revenue per square foot but also almost 52 percent less rent payment. This could mean that because of probably smaller turnover and thus less profit for F&B units at FSA terminals, the airports offer better terms of lease contracts to the F&B operators. Following the same logic, we could expect that the turnover is relatively higher at LCC terminals, and the lease contracts bring in higher rents, since the profitability is also higher. We will try to explore the reasons for the difference in the empirical part below.

## Empirical results

In the econometric estimations Food & Beverage gross revenue per square foot was used as a dependent variable and the number of locations of sit down restaurants, bars, lounges and number of other Food & Beverage places were chosen as independent variables. Only a limited number of highly recognized F&B brands (like Starbucks Coffee or Burger King) have several locations in the same terminal, all other F&B units have usually only one location. Therefore the number of locations of sit down restaurants, bars, lounges and other Food & Beverage places can be used as an indicator of specialization. The idea here is that with increasing specialization, i.e. with more food and beverage places available, a greater variety of food is being offered with more chances to satisfy the varying passenger demand. We therefore expect a positive relation between the number of F&B locations and F&B revenue per square foot. Total Food & Beverage square footage was included in the model as a proxy for size.

The number of locations per terminal is explained by two components: first it is an indicator for specialization and second it is related to terminal size (more F&B places when the terminal is larger and larger terminals have a bit different structure of passenger flows, etc.). So after adding in the model the variable Food & Beverage square footage, we assume that variable “number of F&B locations” accounts only for specialization. Finally, the following model was estimated:

$$\text{F\&B sales per square foot} = \alpha * \text{locations} + \beta * \text{space} + \text{const}$$

,where locations – number of locations of F&B units

space – total F&B square footage

const – constant term

$\alpha, \beta$  - regression coefficients

Two models for LCC and FSA terminals were estimated (Table 2).

We can see that in both types of terminals the increase in variety of F&B units contributes to Food & Beverage gross revenue per square foot. From the descriptive analysis we saw that the mix



and space occupied by these categories is different in LCC and FSA terminals. The next step is then to explain the revenue differences between sit down restaurants, bars, lounges and other kinds of F&B like fast food, coffee, kiosk, walk away, etc. This is an attempt to understand the effectiveness and optimality in locating these types of F&B units in LCC and FSA terminals.

<b>Table 2. Fixed and Random effects regressions for LCC and FSA terminals</b>				
Food/Beverage Gross Revenue per square foot	<b>Model 1 (35 observations) LCC terminals Random effects regression</b>		<b>Model 2 (244 observations) FSA terminals Fixed effects regression</b>	
	<b>Coef.</b>	<b>Std. Err.</b>	<b>Coef.</b>	<b>Std. Err.</b>
Food/Beverage (number of locations)	161.68	(22.57)***	25.40	(11.97)**
Food/Beverage Square Footage	-0.18	(0.02)***	-0.02	(0.01)**
Const	1552.57	(290.07)***	850.77	(67.47)***

“\*\*\*” Significant at the 0.1% level. “\*\*” Significant at the 1% level. “\*” Significant at the 5% level. “^” Significant at the 10% level.

The first model (Model 3 ) was estimated for LCC terminals.(Table 3)

$$\text{F\&B sales per square foot} = \alpha * \text{RBLshare} + \beta * \text{enp\_pax} + \text{const}$$

,where RBLshare – share of Sit down restaurants, Bars and Lounges locations in total number of F&B locations

enp\_pax – number of emplaning passengers

const – constant term

$\alpha, \beta$  - regression coefficients

<b>Table 3. Random effects regression LCC terminals</b>		
Food/Beverage Gross Revenue per square foot	<b>Model 3 (35 observations) LCC terminals</b>	
	<b>Coef.</b>	<b>Std. Err.</b>
Share of Sit down restaurants/Bars/Lounges locations	-2 509.97	(749.28)***
Number of enpaning passengers	0.0006	(0.00006)***
Const	-215.78	(288.66)

“\*\*\*” Significant at the 0.1% level. “\*\*” Significant at the 1% level. “\*” Significant at the 5% level. “^” Significant at the 10% level.

The proxy for size in the model estimated for LCC terminals was number of emplaning passengers.

Similar relations were tested for FSA terminals (Table 4)

<b>Table 4. Random effects regression FSA terminals</b>		
Food/Beverage Gross Revenue per square foot	<b>Model 4 (244 observations) FSA terminals</b>	
	<b>Coef.</b>	<b>Std. Err.</b>
Share of Sit down restaurants/Bars/Lounges locations	-25.70	(133.91)
Number of enpaning passengers	0.0001	(0.00001)***
Const	482.33	(83.64)***

“\*\*\*” Significant at the 0.1% level. “\*\*” Significant at the 1% level. “\*” Significant at the 5% level. “^” Significant at the 10% level.

The coefficient for the variable “Share of Sit down restaurants/Bars/Lounges locations” is statistically significant and negative. So we see that an increase in sit down restaurants, bars, lounges decreases Food & Beverage gross revenue per square foot. On the other hand, an increase in other

types of Food & Beverage increases Food & Beverage gross revenue per square foot. This means that it would be more profitable for the LCC terminals to change their F&B mix, i.e. to decrease the number of sit down restaurant, bars, lounges and to increase the number of other types of Food & Beverage places.

The coefficient for the variable “Share of Sit down restaurants/Bars/Lounges locations” is statistically insignificant in the model for FSA terminals.

Taking into account that in model 2 (table 2) the variables “total number of Food & Beverage locations” and “total Food & Beverage space” were significant, we can conclude that in general specialization and variety of F&B is important for the level of revenues at FSA terminals, but the particular division in sit down restaurants, bars, lounges and others is not so important. This could be explained by the differences in structure of passenger flows. Passengers at FSA terminals are much less homogeneous than passengers of LCC airlines, because full service airlines have more international and intercontinental flights and therefore passengers with a wider variety of habits and tastes. Also the dispersion of ticket price is higher for FSA than for LCC, because LCC compete mainly on price, while FSA compete over a wider range of dimensions and can afford larger differences in the ticket price. This is why in FSA terminals the space division into sit down restaurants, bars, lounges and other Food & Beverage is not so important. Both types face a similar demand in these terminals.

To check the robustness of our conclusions, we estimated both models using Generalized Least Squares method. For both models we checked for the panel-level heteroskedasticity, but the hypothesis of the presence of the panel-level heteroskedasticity was rejected. As a proxy for sized we used number of emplaning passengers in one of the estimations and both number of emplaning passengers and F&B space in the second round. Results with both these variables as a proxy for size are presented in the table 5 below. The results show the robustness of the previous estimations. The

increase in the share of Sit down restaurants/Bars/Lounges locations decrease Food/Beverage Gross Revenue per square foot in LCC terminals, whereas it is statistically insignificant in FSA terminals.

<b>Table 5. Cross-sectional time-series FGLS regression LCC and FSA terminals</b>				
Food/Beverage Gross Revenue per square foot	<b>Model 5 (35 observations) LCC terminals</b>		<b>Model 6 (244 observations) FSA terminals</b>	
	<b>Coef.</b>	<b>Std. Err.</b>	<b>Coef.</b>	<b>Std. Err.</b>
Share of Sit down restaurants/Bars/Lounges locations	-2 672.66	(544.95)***	-123.40	(143.45)
Number of enpaning passengers	0.0006	(0.00005)***	0.0002	(0.00002)***
F&B Square Footage	- 0.05	(0.01)***	-0.03	(0.005)***
Const	602.09	(238.19) **	732.37	(57.34)***
“***” Significant at the 0.1% level. “**” Significant at the 1% level. “*” Significant at the 5% level. “^” Significant at the 10% level.				

## **Conclusion**

Revenue from Food & Beverage accounts for a major part of non-aeronautical revenue at US airports. It is significantly greater than revenues from Duty Free or Speciality retail, the other two big non-aviation items (if parking is excluded). This is why airport management must pay attention to the space allocation for F&B and the associated product variety when the composition of passengers changes.

The focus of this study was on differences in F&B performance in terminals where the dominant airlines are only LCC types (LCC terminals) and terminals which serve only Full service airlines (FSA terminals). For LCC terminals we find a larger difference between average size of sit down restaurants, bars, lounges and the average size of other types of Food & Beverage places. In LCC terminals this difference is 1, 692 square feet and in FSA terminals only 200 square feet. Sit down restaurants, bars and lounges occupy 40% of total F&B space at LCC terminals and only 31% at

FSA terminals.

Our econometric analysis showed that an increase in sit down restaurants, bars and lounges decreases Food & Beverage gross revenue per square foot. An increase in alternative types of Food & Beverage increases Food & Beverage gross revenue per square foot. Taking into account the results of descriptive analysis it is possible to conclude that LCC terminals have perhaps not yet adjusted to the changed structure of passenger flows, as we find an excess supply of sit down restaurants, bars and lounges. It could be more efficient for the LCC terminals to change the F&B mix, i.e. to decrease the number of sit down restaurants, bars and lounges and increase the number of other types of Food & Beverage places or at least to decrease total area occupied by bars, lounges and sit down restaurants. This follows from the changed structure of passenger flows, as passengers of LCC terminals prefer to eat in places other than sit down restaurants, bars and lounges, because they are perhaps more price sensitive than passengers of FSA and the price level could be more important for them than comfort or the quality of food.

Our statistical estimation for a sample of FSA terminals showed that specialization and variety of F&B in general is important for explaining revenue at FSA terminals, but the particular division in sit down restaurants, bars, lounges and others is not so crucial. The optimal mix of F&B in FSA terminals could depend on more complicated factors because of a different structure of demand and lower price elasticity of passengers.

### **References**

1. Brendan Sobie, Restricted retail Airline Business, 02687615, Vol.22, Issue 12 – Dec 2006.
2. DeLise Jacqueline T, Elaborate retail environments taking off at U.S. airports;*Brandweek*; Apr 10, 2000; 41, 15; ABI/INFORM Global.
3. Graham 2008????????????????????
4. Humphreys I., Ison S., Francis G., A Review of the Airport-Low Cost Airline Relationship, Review of Network Economics Vol.5, Issue 4 – December 2006.

5. Huse C., Evangelho F. Investigating business traveler heterogeneity: Low-cost vs full-service airline users? *Transportation Research Part E* 43 (2007) pp. 259–268.
6. Infanger John F. Concessions update, *Airport business*, *april* 2005
7. Levine ME,,*Airport Congestion: When Theory Meets Reality*, *Nyu Law and Economics Working Papers* , Ny, 2008  
*lsr.nellco.org/cgi/viewcontent.cgi?article=1163&context=nyu\_lewp*
8. Serwer Jesse, First-class shopping, food for flyers, *Shopping centers today*, December 2008.
9. The Airport Food Review, *GOOD MEDICINE* Winter 2007.
10. Transportation Research Board, *Airport Governance and Ownership*, Washington 2009

## Appendix A

### Sample's descriptive statistics

Terminal id	Number of years in th sample	IATA Code	Airport Name	Average Number of Emplaning Passengers
520	5	ACY	Atlantic City International Airport	482 667
178	7	ANC	Ted Stevens Anchorage International Airport	213 446
179	6	ANC	Ted Stevens Anchorage International Airport	2 203 787
612	1	ATW	Outagamie County Regional Airport	258 510
464	1	BDL	Bradley International Airport	2 230 528
143	1	BNA	Nashville International Airport	500 690
144	1	BNA	Nashville International Airport	1 002 476
145	1	BNA	Nashville International Airport	3 189 400
167	4	BOI	Boise Airport	1 618 100
152	4	BOS	Boston Logan International Airport	1 846 027
154	5	BOS	Boston Logan International Airport	4 097 146
153	4	BOS	Boston Logan International Airport	5 319 653
357	3	COS	Colorado Springs Airport	1 038 182
277	1	CVG	Cincinnati/No. Kentucky International Airport	180 633
278	6	CVG	Cincinnati/No. Kentucky International Airport	325 589
280	2	CVG	Cincinnati/No. Kentucky International Airport	917 868
462	2	CVG	Cincinnati/No. Kentucky International Airport	3 585 417
282	2	CVG	Cincinnati/No. Kentucky International Airport	5 493 183
279	4	CVG	Cincinnati/No. Kentucky International Airport	8 894 055
194	7	DAL	Dallas Love Field Airport	3 277 321
588	1	DTW	Detroit Metropolitan Wayne County Airport	829 665
382	5	DTW	Detroit Metropolitan Wayne County Airport	14 258 727
142	5	EWR	Newark-Liberty International Airport	10 470 041
151	2	FAI	Fairbanks International Airport	406 360
465	7	FAT	Fresno Yosemite Air Terminal	584 927
475	4	FWA	Ft. Wayne International Airport	315 535
470	3	GRR	Gerald R. Ford International Airport	408 012

469	3	GRR	Gerald R. Ford International Airport	595 815
271	5	GSO	Piedmont Triad International Airport	1 231 944
375	2	IAH	Houston George Bush Intercontinental Airport	1 951 174
374	2	IAH	Houston George Bush Intercontinental Airport	8 124 033
575	1	ICT	Wichita Mid-Continent	805 286
355	5	IND	Indianapolis International Airport	644 641
354	5	IND	Indianapolis International Airport	857 236
356	2	IND	Indianapolis International Airport	891 768
353	2	IND	Indianapolis International Airport	1 366 485
350	1	JAN	Jackson International Airport	614 878
598	1	JFK	John F. Kennedy International Airport	942 924
128	7	JFK	John F. Kennedy International Airport	1 704 661
132	6	JFK	John F. Kennedy International Airport	2 034 296
130	7	JFK	John F. Kennedy International Airport	3 201 779
129	6	JFK	John F. Kennedy International Airport	3 715 579
133	4	JFK	John F. Kennedy International Airport	4 296 926
131	6	JFK	John F. Kennedy International Airport	4 786 410
423	6	LFT	Lafayette Regional Airport	181 456
137	5	LGA	LaGuardia Airport	680 178
139	4	LGA	LaGuardia Airport	2 243 244
136	5	LGA	LaGuardia Airport	2 934 919
135	3	LGA	LaGuardia Airport	6 165 150
317	1	MCO	Orlando International Airport	2 884 534
315	1	MCO	Orlando International Airport	3 334 695
316	1	MCO	Orlando International Airport	3 666 857
551	1	MSN	Dane County Regional Airport	739 729
254	1	MSP	Minneapolis-St. Paul International Airport	1 045 463
200	5	OAK	Oakland International Airport	2 850 395
199	6	OAK	Oakland International Airport	3 925 895
291	4	OMA	Eppley Airfield	1 922 201
121	7	ORD	Chicago-O'Hare International Airport	1 926 443
283	7	ORF	Norfolk International Airport	1 800 976
172	5	PBI	Palm Beach International Airport	1 629 713
171	7	PBI	Palm Beach International Airport	1 674 370
514	5	PHL	Philadelphia International Airport	1 403 137
227	5	PHL	Philadelphia International Airport	1 798 279
232	5	PHL	Philadelphia International Airport	2 056 965
231	7	PHL	Philadelphia International Airport	2 183 220



473	7	PHL	Philadelphia International Airport	2 263 369
230	3	PHL	Philadelphia International Airport	3 063 753
228	6	PHL	Philadelphia International Airport	4 667 005
314	4	PIE	St. Petersburg-Clearwater International Airport	445 529
583	1	RDU	Raleigh-Durham International Airport	339 413
426	1	RNO	Reno-Tahoe International Airport	2 264 185
186	6	ROA	Roanoke Regional Airport	306 630
158	3	RSW	Southwest Florida International Airport	1 164 482
157	4	RSW	Southwest Florida International Airport	1 417 092
548	1	RSW	Southwest Florida International Airport	1 526 081
332	6	SAN	San Diego International Airport	435 181
333	6	SAN	San Diego International Airport	3 425 685
331	6	SAN	San Diego International Airport	4 512 607
459	5	SAT	San Antonio International Airport	1 378 366
458	5	SAT	San Antonio International Airport	2 496 059
422	1	SAV	Savannah /Hilton Head International Airport	988 929
539	3	SDF	Louisville International-Standiford Field Airport	1 870 627
446	6	SFO	San Francisco International Airport	3 935 464
362	6	SJC	Norman Y Mineta International Airport	1 924 821
361	5	SJC	Norman Y Mineta International Airport	3 420 031
308	4	SMF	Sacramento International Airport	930 079
307	5	SMF	Sacramento International Airport	3 134 042
306	6	SNA	John Wayne Airport/Orange County	4 480 609
538	1	SWF	Stewart International Airport	456 782
451	2	TPA	Tampa International Airport	992 988
452	6	TPA	Tampa International Airport	1 993 266
510	6	TPA	Tampa International Airport	2 177 447
449	6	TPA	Tampa International Airport	2 643 084
512	3	TPA	Tampa International Airport	2 702 338
499	2	TUL	Tulsa International Airport	1 577 706
535	1	TUS	Tucson International Airport	2 067 819
542	1	TYS	McGhee Tyson Airport	863 294