AIRPORT – LCC AIRLINE RELATIONSHIP AND ITS IMPLICATIONS ON DISTRIBUTION OF AIRPORT'S AERONAUTICAL AND NON-AERONAUTICAL REVENUE

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ABSTRACT: LCC market share in the airline industry increase globally and affect airport business model. LCC push airports to reduce charges but promise to bring additional traffic to the airport, which is the main prerequisite for successful non-aviation business. While the airport can forecast how changes in charges will affect its aeronautical revenue, the changes of non-aeronautical revenue are uncertain because spending patterns and preferences of LCC passengers could be different from passengers of full service airlines. This paper on the US case shows how increase of LCC share in airline industry changed airport performance, measures the effect of the introduction of LLC on the distribution of airports' revenue between aeronautical and non-aeronautical sources and the changes in relative importance of different non-aviation revenue streams (Car rental, Parking, Retail, Catering). Finally explanations for the differences in LCC impact on airports' non-aeronautical business among countries were suggested.

Key words: LCC, Airports, Aeronautical revenue, Non-aeronautical revenue, Panel data analysis

Introduction

Airports are major economic drivers of the local and global economy. Air Transport contributes around US$ 2 trillion to world GDP, accounting for 3% of the world GDP[1]. Passenger traffic reflects level of economic development, business activity and tourism of a location and cargo traffic facilitates world trade. Passenger and cargo traffic during last decade have grown at a higher rate than the overall economy and as air traffic expected to growth further, many airports will face capacity constraints that stimulate huge capital expenditures in the airport industry. Additionally, airports are a major employer in the economy with around 4.5 million people working on airport sites.[2]

Airports' indirect business activities, such as development of nearby land for offices, hotels and shopping malls generate additional revenues. With increasing globalization, airports' role is expected to become even more important. Nowadays, despite airport's primary activity to provide transportation services, an airport's non-primary operations and non-aeronautical business are even more important than its aeronautical activities for revenue generation. According to the Airport Council International (ACI) annual world airport economic survey in 2008, non-aeronautical revenue accounted for 53% of the total revenue at North America airports, for 50% at Asia/Pacific airports, for 47% for European airport and for 28% of the total revenue for airports located in Latin America/Caribbean region.

Over the last years interest in the non-aviation business of airports has been increasing. One of the major reasons for the increased attention is a booming number of Low Costs Carriers (LLC), which was caused by the airline market liberalization expanding globally from the US. The effect of the LCC entrance and the increase in LCC market share is complex: to boost their sales and remain competitive LCC push airports to reduce charges, sometimes even below their marginal costs (Francis et al., 2004) but promise to bring additional traffic to the airport, which is the main prerequisite for successful non-aviation business. The only way to stay financially sustainable for airports is to compensate their losses from aeronautical activities with non-aeronautical ones. And while the airport can forecast how changes in charges will affect its aeronautical revenue, the changes of non-aeronautical revenue are uncertain because spending patterns and preferences of LCC passengers could be different from passengers of full service airlines.

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[1] Senguttuvan, P., S. Global Trends in Air Transport: Traffic, Market Access & Challenges, Presentation slides from ICAO and World Bank Development Forum, 2008.

[2] Cherry, J. The Economic Importance of Airports, Presentation slides from ICAO and World Bank Development Forum, 2006.

Most paper dealing with LCC impact on airport have mainly descriptive or case study based analysis this paper will focus on econometrical analysis of the sample of the US airports.

The purpose of this research is to understand how the increase of LCC share in airline industry changed airport performance and in particular the non-aeronautical business, to measure the effect of the introduction of LLC on the distribution of airports' revenue between aeronautical and non-aeronautical sources and the changes in relative importance of different non-aviation revenue streams (Car rental, Parking, Retail, Catering).

This research focuses on US airports because the US airline market was the first to be deregulated and remains the largest in the world. Many trends observed in the US airline market have already spread to Europe and Asia. (Belobaba P. et al., 2009). LCC have the longest history in the US and understanding how changes in airports' business environment affected US airports helps to understand potential outcomes of an increase in LCC traffic in the other parts of the world where LCC began operations much later.

The paper is organized as follows. The review of the literature covers influence of latest tendencies in the airline industry on the airport business. Next the changes in revenue distribution between aeronautical and non-aeronautical sources are described by means of descriptive and econometrical analysis.

Review of the literature

Graham (2009) distinguished two key factors driving the development of airports' non-aeronautical revenue during last years: the evolution of the airport sector from a public utility to a commercialized business and the increasing pressure from the airline industry. The focus of this research is the consequences of the second factor on non-aeronautical revenue. Graham (2009) pointed out that the airlines industry became more competitive, which resulted in a decrease in yields and forced airlines, especially LCC, to control their costs. Controlling costs including airport charges, which leaded to increased pressure on the airport. The next section describes the LCC business model and LCC's relation to airport operations, particularly non-aviaition business.

LCC history and business model

Low Cost Carry (LCC) history was started from US airline Southwest, which introduced its services in 1971. Initial Southwest business model included the following base principles which were different from Full Service Airlines:

- Low fares

- Short-haul point to point flights
- High frequency flights
- Absence of seat reservation
- No free drinks and food on board
- Flights to/from secondary airports[3].

This classical model sometimes with some variations was copied by other airlines not only in the US but all other the world. European LCC history was started in 1986 when Ryanair started to operate Dublin-London route.

LCC nowadays implement different strategies that differentiate their product and target different customer segments. Here are just some examples of product differentiation between several LCC.

Ryanair (European LCC) has one of the most closed business model to the initial Southwest model with point-to-point flights between secondary airports, absence of seat reservation, absence of drinks and meals (included in the price of the ticket), absence of frequent flyer program and very short turnaround time (approximately 25 minutes in comparison with 40-60 minutes turnaround time of full service airlines). Easyjet (European LCC) in comparison with Ryanair for part of its flights uses more central but not secondary airports.

Southwest (US LCC) nowadays modified its business model and currently has frequent flyer program, connecting flights and offer soft drinks on board[4]. Spirit (US LCC) tries differentiating itself by providing long distance flights. JetBlue (US LCC) puts attention on improvement of service level and quality, they also have frequent flyer program, and moreover they focus for additional services for corporations with their product CompanyBlue to attract more business passengers on their flights.

The motivation of LCC for differentiation of their products is that differentiated product will be able to retain more customers with particular airline and as economic theory tells differentiation and branding give an opportunity to the firm to charge a price premium.

From the airport prospective the trend of LCC to differentiate themselves and to add additional services means that typical LCC passengers profile will be affected and this will result in different spending patterns of LCC passengers and as a consequence will influence airport non-aeronautical revenue.

In 2008 in the US LCC accounted up to 30% of the market in comparison with only 10% in 1999[5]. LCC benefited from the shift in US consumer behavior, as households start to allocate

[3] Fojt, M. Strategic Direction: The Airline Industry, Emerald Group Publishing Ltd, 2006.
[4] Fojt, M. Strategic Direction: The Airline Industry, Emerald Group Publishing Ltd, 2006.

[5] Reed, D. Reshuffled deck leaves low-cost carriers king, *USA Today*, 2009, Nov 10, 07347456.

for travelling lower share of their budget. During 1990 – 2000 and in previous decades annual spending on domestic air travel accounted to around 0,74% of the US GDP, this ratio remain stable independently on the dynamic of cost of air travel. During current decade cumulative spending on domestic air travel dropped to 0,57%, that for example in 2008 accounted to $27 billion of unearned revenue (industry losses) for US airlines.

Airport – LCC airline relationship

Entrance of LCC from one hand increases the total passengers volumes carried by air as they catch that segment of passengers who were travelled by car, train or just travelled less before but from the other hand LCC grab part of the passengers from nearby airports that results in increase competition between nearby airports. Quite often LCC choose secondary airports for their operations which located relatively closed to larger airports that were dominated in the region before. Increase in competition leads to greater airports' incentives for efficiency improvement.

Barrett (2004) stated that for airports with free capacity LCC entrance will be attractive for the following reasons: "

- the low-cost airlines have a strong track record in delivering business even to virtually empty airports
- the low-cost airlines offer non-aeronautical revenue sources such as catering and shopping for services normally provided as inflight services by full fare airlines
- low-cost airlines generate a greater than average use of car hire where they serve smaller airports "

Thus the decrease in aeronautical charges required by LCC should be compensated by the increase of non-aeronautical revenue. Humphreys et al. (2006) argues that all benefits from attracting LCC could be uncertain and short lived because of volatility of low cost sector, LCC can easily withdraw all or part of their operations from the airport moreover improvement of non-aeronautical revenue is not guaranteed as the amount of money spend and purchasing preferences of LCC passengers could be different from numbers airport experienced before.

Francis et al. (2004) provided the similar point of view and stated that some low cost airlines are pushing for a prices below the airports' marginal costs, which will not allow the airport to cover costs. In this way airport can withdraw from negotiations with LCC or relies on the potential of non-aeronautical revenue and calculates whether giving airlines cheap landing

fees will provide appropriate revenue streams through the retail facilities or considers that there are potential economies of scale to be achieved.

Graham and Dennis (2007) showed that at a number of UK and Irish airports since 1998 LCCs have been largely responsible for strong passenger growth. A the same time these airports tend to have lower unit revenues especially for the aeronautical part of the revenue but at the same time these airports has lower unit costs and there is no overall obvious link between presence and share of low cost operations and airport profitability. Graham and Dennis (2007) questioned that increase in traffic is an ultimate airport objective. Airport needs to decide first if its objective will be increase in traffic, high profit margin, increased turnover or other factors like improvement of accessibility to or from a region or may be just use of its under-utilized infrastructure.

Humphreys et al. (2006) also emphasized some not airport related benefits of LCC presence in the region which could be taken into account. Humphreys et al. (2006) stated that some publicly owned airports have chosen to attract LCC in order to attempt to bring benefits to the local economy like attracting additional tourists. Whilst such benefits may accrue, it can be difficult to quantitatively estimate their effect in advance.

LCC impact on the airport non-aviation business

Castillo-Manzano (2010) based on survey of over 20 000 passengers at seven Spanish regional airports concluded that likelihood of making a purchase or consuming Food and Beverages has no statistically significant difference between LCC passengers and passengers from traditional full-service airlines. But once passengers have decided to spend money, LCC passengers spend seven percent less than those who fly with a traditional airline.

Lei and Papatheodorou (2010) conducted an empirical research on British regional airports and found out that each additional LCC passengers on average increase airport commercial revenue by GBP 2.87, while each additional other carrier passenger increase commercial revenue by GDP 5.59. As commercial revenue Lei and Papatheodorou (2010) used a total airports' revenue from retail, car parking, baggage handling, stationing and on-site property rental to airlines, car rental agencies and other concessionaries revenue. Based on Lei and Papatheodorou (2010) results it is possible to conclude that if airport has free capacity it is still better to have LCC and additional traffic even if LCC passengers contribute less to commercial revenue and if charges at the same time are also lower than average industry charges. From the other hand if airport was already serving full services airlines conflict of interest could arise. Humphreys et al. (2006) pointed put that pressure from existing airlines to receive the same

discounts in charges as LCC can lead to unforeseen decrease in aeronautical revenue which could be not compensated by non-aeronautical revenue from LCC passengers.

Airport system and LCC market in the US. Sample selection

One of the main occurrences affecting airports today is an increase in market share of LCC. This paper will illustrate how airport performance changes in response to the presence of LCC in the airport. The focus of descriptive and econometrical analysis later in this paper will be on US airports and LCC airlines because the US was the first liberalized airline market and has the longest history of LCC in the world. Moreover, US aviation activity accounts for 50 percent of all general aviation activity in the world[6]. And the first step will be selection of airports and LCC for further research.

Problems in definition of LCC

For a long period of time, "No frills" was a synonym for LCC, but as mentioned in the literature review, a lot of companies often considered as LCC still add some frills to their offers, such as frequent flyer programs, special products for corporations and business travelers, flights from primary airports.

Lei and Papatheodorou's (2010) study of LCC impact on British regional airports' commercial revenue counted a wide range of airlines that operated in the region as LCC , such as Ryanair, easyJet, easyJet Switzerland, Bmibaby, Go, MyTravelLite, Jet2, FlyGlobespan, Flybe, Astraeus (Iceland Express), Air Berlin, Deutsche BA, Norwegian Air Shuttle, Sky Europe, Basiq Air and Hapag-Lloyd Express. LCC strategies and range of services offered became quite different nowadays and this fact influences the customer profile and purchasing behavior of different LCC passengers.

Graham and Dennis (2007) also raise the problem of LCC definition. As the low cost industry evolves, other traditional and charter carriers react to the development of this sector. Some LCC use primary airports and established regional airports whereas others seek out small secondary airports. This means that these airlines have varying price sensitivities, as well as different traffic characteristics, and hence will have different impacts on an airport's performance.

It seems logical to cluster LCC based on their key characteristics and what "product" whey offer in order to form the profile of their customers. If a LCC offers connecting flights or

[6] Airport Improvement Program Fiscal Year 2008, Report to Congress, 25th Annual Report of Accomplishments, Federal Aviation Administration, 2010.

serve corporations, this mean that the LCC will have transfer passengers and business passengers who's purchasing behavior could be different from O&D or leisure passengers.

The share of business travelers carried by LCC is increasing, but a number of full service airlines in the US like Delta, American, United, Continental and US Airways collectively offer more seats at discount prices than LCC do and thus the reason of increasing share of business passengers in LLC market is not only price.. Moreover, business travelers are not as price-sensitive since their companies pay their transportation costs. One of the reasons business passengers switch to a LCC is flight availability and LCC sometimes have a more convenient schedule, wide variety of destinations and fly secondary airports and primary airports[7].

The question of LCC market power is very important as well because if LCC have a strong market power they can reduce charges more significantly in negotiations with airport.

In this Chapter will be answered a question if the influence of a LCC on airport performance will be different based on LCC market power and LCC customers profile.

The large number of passengers carried by the LCC will be used as a proxy for LCC market share or bargaining with an airport.

Selection of LCC

The following table demonstrates the overview of LCC market in the United States.

Table 1. US LCC traffic in 2008

LCC name	Domestic enplaned passengers*	International enplaned passengers**	Total enplaned passengers	International traffic as a % of total		Market share in domestic traffic out of domestic traffic controlled by US carriers	Market share in international traffic out of International traffic controlled by US carriers	Market share in total traffic controlled by US carriers
AirTran	24 586 032	2 638	24 588 670	0.01%		3.76%	0.00%	3.31%
Allegiant Air	4 263 157	29 275	4 292 432	0.68%		0.65%	0.03%	0.58%
Frontier	10 096 403	544 138	10 640 541	5.11%		1.54%	0.61%	1.43%
Horizon Air	6 480 805	909 094	7 389 899	12.30%		0.99%	1.01%	0.99%
JetBlue	20 517 934	1 345 466	21 863 400	6.15%		3.14%	1.50%	2.94%
Midwest	3 004 083	1 323	3 005 406	0.04%		0.46%	0.00%	0.40%
Southwest	101 965 552	0	101 965 552	0.00%		15.60%	0.00%	13.71%

[7] Reed, D. Reshuffled deck leaves low-cost carriers king, *USA Today*, 2009, Nov 10, 07347456.

Spirit	5 500 761	1 319 114	6 819 875	19.34%		0.84%	1.47%	0.92%
Sun Country	1 270 630	202 182	1 472 812	13.73%		0.19%	0.22%	0.20%
USA 3000	809 307	698 562	1 507 869	46.33%		0.12%	0.78%	0.20%
Virgin America	2 564 629	0	2 564 629	0.00%		0.39%	0.00%	0.34%
All groups (including those not displayed) in the selected category	653 816 163	89 901 130	743 717 293	12.09%				

* – Contains domestic enplanements reported by U.S. air carriers when both origin and destination airports are located within the boundaries of the United States and its territories.

** – Contains international enplanements reported by U.S. air carriers when at least one point of service is in the United States or one of its territories. Flights with both origin and destination in a foreign country are not included.

The data presented for the year 2008. In the Table 1 all US LCC in the broad understanding of this term are listed. The sample for the empirical analysis will include data during the period from 2000 to 2008. During 2000-2008 in the US two more LCC were operated which will not be taken into account because they had no significant influence on the industry and were bankrupted later on. These companies are: Ted Airlines and Independence Air.

Ted airlines belonged to United Airlines and started operations on the 12th of February 2004. Ted was focused on leisure destinations, had frequent flyer program, seat reservation (including seat pre-assignment) and more over all the seats in the plane ware divided into Economy and more comfortable Economy Plus[8]. Ted airlines ceased its operations on January 6, 2009.

Independence Air was founded 1989 as Atlantic Coast Airlines and changed the name to the current one in 2003. Independence Air ceased its operations on January 5, 2006.

From the Table 1 we can see that Southwest, AirTran and JetBlue are leading LCC from the criteria of number of passengers carried. In 2008 their market share in international and domestic traffic controlled by US air carriers was 13.71%, 3.31% and 2.94% correspondingly. As all other US LCC do not have enough volumes to influence the industry trends significantly the analysis will be limited to Southwest, AirTran and JetBlue and term LCC further in this research in relation to the US market will mean only Southwest, AirTran or JetBlue airline.

Southwest, AirTran and JetBlue's profiles[9]

[8] United Airlines press release, November 12, 2003, http://www.united.com/press/detail/0,1442,51441,00.html

[9] Based on information from airlines' websites: www.southwest.com, www.airtran.com, www.jetblue.com

The airlines profiles analysis performed with the purpose to understand who are the passengers of these airlines, because passenger characteristics influence airports' non-aviation business. All passengers are characterized by three categories International/Domestic, O&D/Transfer, Business/Leisure and each of these categories can influence the spending patterns of the passangers.

In the case of International/Domestic passengers: only JetBlue focuses on international flights which account to 6,15% of total JetBlue's traffic. Share of AirTran's international traffic almost equals to 0 and Southwest doesn't operate international traffic at all.

In the case of O&D/Transfer passengers: all three airlines offer connecting flights to their passengers that means that all three airlines have transfer passengers.

In the case of Business/Leisure passengers: all three airlines put a lot off efforts to create corporate programs and attract business traffic. Some details of Southwest, AirTran and JetBlue's passengers are presented below.

Southwest created a special corporate tool SWABIZ for corporate booking which simplifies the integration of all booking information in corporate accounting systems. In addition Southwest corporate program allows to make changes and cancellations without additional fees, no extra charges for onboard snacks, pillows, or blankets. Southwest also allocates different seats (Comfortable All-Leather Seating with ample legroom) for business passengers. Moreover Southwest corporate program has no restrictions on level of company's revenue or amount of money spent on Southwest services. SWABIZ was introduces on May 1, 2000.

AirTran provides different seats for business class travelers, first and second checked bag fees waived, and complimentary cocktails are offered on board. AirTran doesn't offer seat reservations but has priority boarding for ordinary business travelers however only if the company has ten or more frequent travelers or spends more than $50,000 per year on AirTran's services, AirTran corporate program also includes such options as seat reservation, fully refundable fares and no change fees for select coach fare passengers, as long as the reservation is changed one hour prior to departure.

JetBlue's corporate program is more far away from corporate services of Full service carriers. JetBlue offers only different types of seats for business passengers and application which makes it possible toreport easily for accounting purposes. JetBlue launches its corporate booking tool, CompanyBlue on June, 28 2004.

Second important point for Business passengers is on-time arrival. Average on-time performance between all US carriers was 76,04% on-time arrivals in 2008. Southwest had 80,48%, AirTran had 76,73% and JetBlue had only 72,87% on-time arrivals.

Summarizing online performance data and flexibility of corporate programs it is possible to conclude that JetBlue probably has the lowest share of business passengers and Southwest the highest.

Airport system in the US and selection of airports

Aviation activity in the United States accounts for approximately 40 percent of all commercial aviation and 50 percent of all general aviation activity in the world[10]. The US law defines airports by categories of airport activities, including commercial service, primary, cargo service, reliever, and general aviation airports. The interest of this research is commercial service airports. FAA defines commercial service airports as publicly owned airports receiving scheduled passenger service and having 2,500 or more enplaned passengers per year. In 2008 it was 503 commercial service airports in the US. Further commercial service airports are divided on Primary and Nonprimary with 10 000 passengers as a cutting benchmark. 121 airports from 503 commercial airports in the US in 2008 were classified as non-primary and had less than 10 000 of departure passengers per year. This paper analyzes Primary Commercial service airports (which have more than 10 000 boardings per year). It was 382 Primary Commercial service airports in the US in 2008. This number varies slightly from year to year, for example in 2007 388 airports was categorized as Primary airports and in 2006 this number was 382. Further classification of Primary Commercial service airports presented in Table 2.

Table 2. Primary Commercial service airports categorization and sample coverage

Common Name	Hub Type: Percentage of Annual Passenger Boardings	Total number in US in 2008	Total number in the sample in 2008
Large Hub	**Large:** 1% or more or more of all enplaned (boarded) passengers in the United States	**29**	**29**
Medium Hub	**Medium:** At least 0.25%, but less than 1% of all enplaned (boarded) passengers in the United States	**37**	**35**
Small Hub	**Small:** At least 0.05%, but less than 0.25% of all enplaned (boarded) passengers in the United States	**72**	**25**

[10] Airport Improvement Program Fiscal Year 2008, Report to Congress, 25th Annual Report of Accomplishments, Federal Aviation Administration, 2010.

Nonhub Primary	**Nonhub:** More than 10,000, but less than 0.05% of all enplaned (boarded) passengers in the United States	**244**	**6**

Initially in the sample used for the research 95 airports were included from the years 2004-2008. The aim of this research is to understand how importance of airport's non-aeronautical business changed with increase of LCC share in the airline industry. In Nonhub group of airports LCC was almost not operating and this group was represented the least in the sample this is why it was excluded from the analysis. Results received from the research could be used as a forecast for probable changes in Nonhub airport performance in case if LCC increase their presence in Nonhub group.

As shown in the Table 2 sample used for the analysis covers all Large Hubs, almost all Medium Hubs and 35% of all Small Hubs in the US.

US Air Hubs system is presented on the Figure 1.

Figure1. US Air Hubs

Descriptive analysis

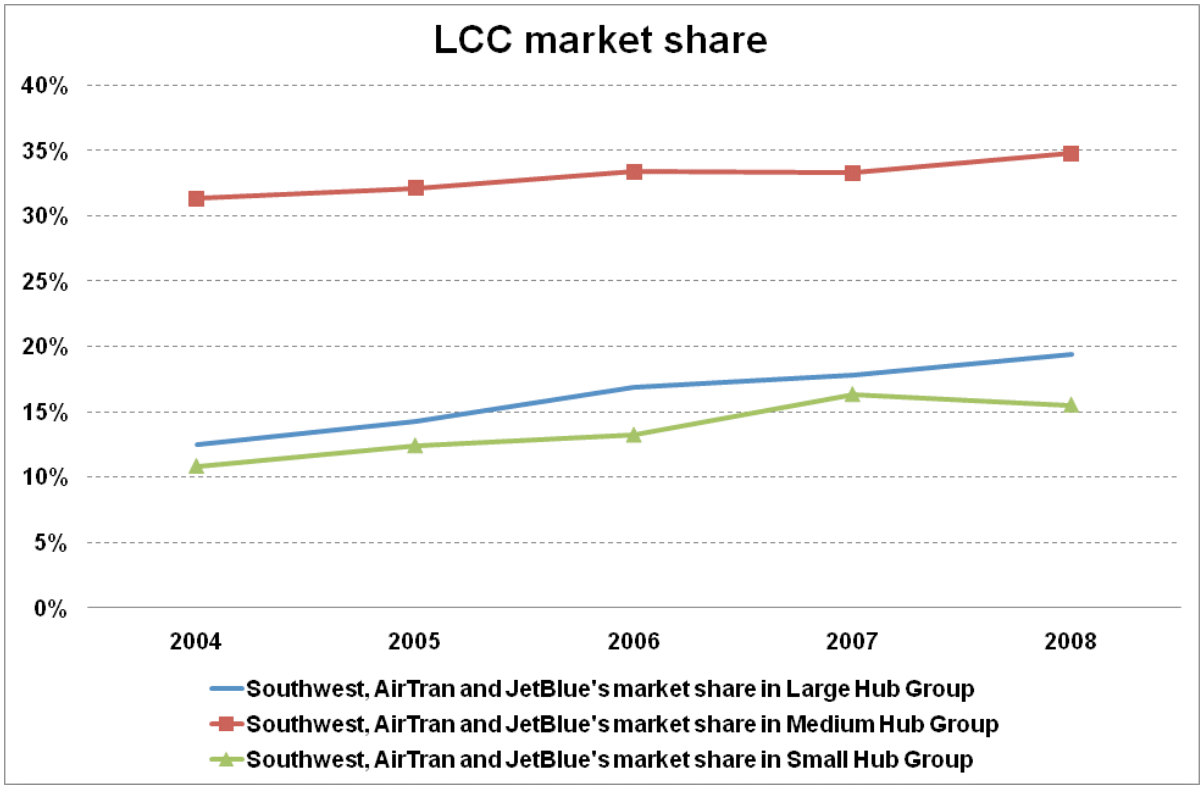
The aim of descriptive and econometrical analysis is to understand how the increase of LCC share in airline industry changed airport performance and in particular the non-aeronautical

business. As airport performance differs with the change of the size (passenger volumes), the descriptive and econometrical analysis will be performed with the focus on changing of different parameters depending on the change in the size of the airport and the change in the LCC share in the airport.

The data panel is unbalanced, for some airports data was available not for the whole period 2004-2008.

Different LCC nowadays have different business models some of them focus mainly on regional airports like Southwest and airlines like JetBlue use large airports as their hubs. As was mentioned above this research will be focused on main 3 US LCC: Southwest, AirTran and JetBlue. After strong LCC starts operations in the airport the additional traffic brought by LCC could move the airport between Hub categories. Dynamic of LCC share in the sample is presented in Figure 2.

Figure 2. US LCC (Southwest, AirTran, JetBlue) market share dynamic at different Hubs groups



As it is shown in the Figure 2 the trend (except 2008 for Small Hub group) is the increase in the market share of Top 3 US LCC. Southwest, AirTran and JetBlue dominate in Medium Hub group and in all Hubs groups their share is below 15%, which could give them enough negotiation power in bargaining special conditions (e.g. lower fares) with the airport.

Following descriptive analysis will be divided in 2 parts: analysis of aeronautical and analysis of non-aeronautical part of the airports' revenue.

Aeronautical revenue is an airport's revenue from aviation related services and non-aeronautical revenue relates to all other services provided by the airport which are not airport related. Analysis of aeronautical and non-aeronautical revenue will give the first illustration how LCC presence in the airport influences its incomes.

Impact of LCC on airports' aeronautical revenue

Aeronautical revenue constitutes on average 48% of total airports revenue in the sample for the whole period. The share of Aeronautical revenue in total operating revenue (vs. non-aeronautical revenue) was decreasing from 2004 to 2008.

In 2008 Aeronautical revenue accounted for 51,3%, 46,6%, 41,3% of total operating revenue in Large, Medium and Small Hubs respectively. This seems to be different at least from some evidence from Europe where larger airports tend to have smaller share of aeronautical revenue in comparison with small airports (Graham, 2006).

Two main components of aeronautical revenue are Landing Fees and Terminal/International arrival area rental charge which accounted in 2008 for 35% and 43% of aeronautical revenue.

To adjust for size effect and in order to analyze better LCC influence on aeronautical revenue Landing Fees and Terminal/International arrival area rental charges will be analyzed in per passenger terms (Table 3).

Table 3. Airport charges per passenger by different levels of LCC share in airport's traffic (in 2008)

	Landing Fees per enplaning passenger	Terminal/International arrival area rental charges per enplaning passenger
Average	3.72	4.61
Total share of LCC in the airport is equal ot higher than 15%	3.17	4.07
Total share of LCC in the airport is equal ot higher than 25%	3.26	3.98

The general trend which is shown in the Table 3 is that Airport charges per passengers is lower at the airports which have higher presence of LCC. In the literature review a problem of trade-off between reductions of charges per passenger after LCC entrance and additional traffic which LCC bring to the airport was risen. The interesting question here is whether reduction in

per passenger charges is compensated by the increase in passenger volumes. If the decrease in per passenger charges is compensated by additional traffic, then the total airport's aeronautical revenue should remain the same and airport will only win from the presence of LCC. This question will be answered in empirical part.

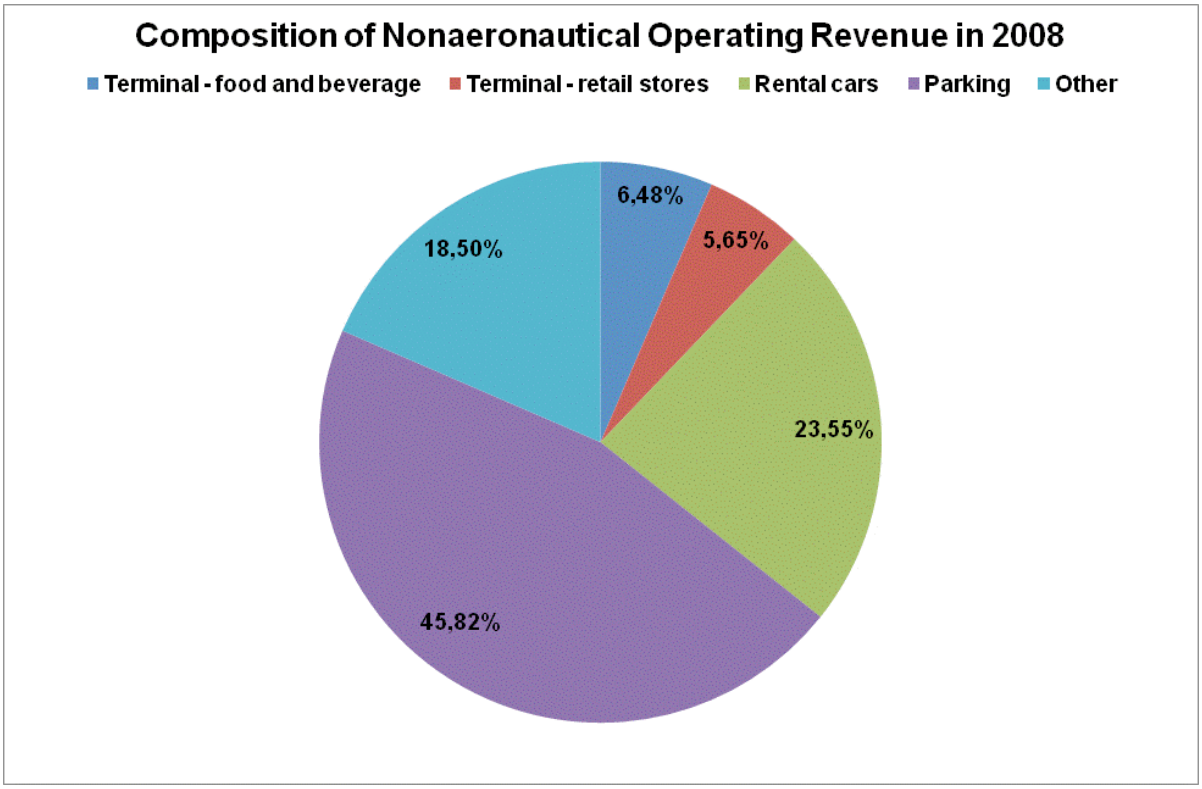
Impact of LCC on airports' non- aeronautical revenue

Non-aeronautical revenue is the second part of airports operation revenue. It constitutes 52% of total airports revenue in the sample for the whole period. The share of non-aeronautical revenue in total operating revenue (vs. non-aeronautical revenue) was increasing from 2004 to 2008.

In this part of research non-aeronautical revenue means actual money which airport got from non-aeronautical activities, in the case that Retail or F&B operated in the airport by specialized companies (concessionaire) Retail and F&B airport's revenue is final rent payments which these operators paid to the airport based on their contract agreements. Typically the concessionaire pays a fixed rental, plus additional income to the airport once a predetermined profit or turnover level has been reached by the concessionaire. The contract also could be entirely based on the profit/turnover of the concession if airport want to attract more concessionaires Francis et al. (2004).

The composition of non-aeronautical revenue for sample of airports for the year 2008 presented in Figure 3.

Figure 3. Composition of Non-aeronautical Operating Revenue at US airports in 2008



As shown in Figure 3 the main part of non-aeronautical operating revenue in the airport is Parking which accounts for 45,82% of total non-aeronautical revenue following by Rental cars, Food and Beverage and Retail Stores.

Further all components of non-aeronautical revenue will be analyzed in per passenger terms (Table 4).

Table 4. Non-aeronautical revenue per passenger by source and by different levels of LCC share in airport's traffic (in 2008)

	Terminal - Food and Beverage revenue per passenger (in $)	Terminal - Retail stores revenue per passenger (in $)	Car Rental revenue per passenger (in $)	Parking revenue per passenger (in $)
Average	0.64	0.56	2.62	5.13
Large Hubs with share of LCC less or equal to 15%	0.88	0.92	1.52	3.59
Large Hubs with share of LCC more than 15%	0.82	0.68	2.26	4.02
Medium Hubs with share of LCC less or equal to 15%	0.51	0.42	2.06	4.45
Medium Hubs with share of LCC more than 15%	0.57	0.56	2.97	5.70
Small Hubs with share of LCC less or equal to 15%	0.43	0.30	3.50	6.49

Small Hubs with share of LCC more than 15%	0.59	0.31	3.04	6.07

Table 4 shows that holding level of LCC share constant Retail and F&B revenue per pax decrease with decrease in airport size (based on passenger volumes) and Car rental and Parking revenue increases with decrease in airport size (based on passenger volumes). This evidence is quite intuitive as Large Hubs have more intercontinental and transfer passengers who spend money on Retail and F&B but don't need Car rental and Parking services. Moreover small airports have worse connection with the city which forces passengers to use car and as a consequence spend money on Car rental and Parking.

Interesting fact is that only for Large Hubs and only for F&B and Retail, airports with higher share of LCC have lower revenue per passenger. For all other revenue categories and Hubs group airports with higher LCC share have higher revenue per passenger. This seems to be in line with literature where it is stated that LCC entrance should increase airport non-aeronautical revenue, but the question of whether this increase is sufficient enough to compensate losses in aeronautical revenue is still open and will be answered in empirical part of the research.

Empirical evidence

In line with descriptive analysis, the empirical estimations will be also divided into analysis of LCC effect on aeronautical and non-aeronautical airports' revenue.

Empirical evidence – aeronautical revenue

In order to analyze the LCC impact on aeronautical revenue, several econometric models were estimated. The final model for LCC impact on Landing Fees and Terminal/International arrival area rental charges (Terminal charges) per passenger, after most of statistically insignificant variables were excluded, is the following:

LCC impact on Landing Fees per enplaning passenger and Terminal charges per enplaning passenger

$$(\text{Ln(Charges per passengers)})_{it} = \alpha_0 + \alpha_1 * (\text{Ln(Enplaning\_pax)})_{it} + \alpha_2 * (\text{MajorLCC\_share\_LargeHub})_{it} + \alpha_3 * (\text{MajorLCC\_share\_MediumHub})_{it} + \alpha_4 * (\text{LargeHub})_{it} + \alpha_5 * (\text{MediumHub})_{it} + \alpha_6 * (\text{SeparateLCC\_share\_15})_{it} + \varepsilon_{it}$$

,where

Ln (Charges per passenger) – Natural logarithm of the Landing Fees per enplaning passenger in Model 2 and Terminal charges per enplaning passenger in Model 3

Ln (Enplaning_pax) – natural logarithm of Number of Departure passengers in the terminal

MajorLCC_share_LargeHub – is a cross dummy variable that equals one multiplied by LCC share (Southwest, AirTran and JetBlue) in the airport's traffic if the airport belongs to Large Hub group and zero otherwise

MajorLCC_share_MediumHub – is a cross dummy variable that equals one multiplied by LCC share (Southwest, AirTran and JetBlue) in the airport's traffic if the airport belongs to Medium Hub group and zero otherwise

LargeHub – is a dummy variable that equals one if the airport belongs to Large Hub group and zero otherwise

MediumHub – is a dummy variable that equals one if the airport belongs to Medium Hub group and zero otherwise

SeparateLCC_share_15 – is a dummy variable that equals one if share of at least one LCC carry (Southwest, AirTran or JetBlue) separately in the airport's traffic is exceed 15% level and zero otherwise

α_0 – is a constant term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ – coefficients

ε_{it} – error term

$t \in [2004;2008]$ – time effect

i – individual terminal effect

In this estimation was important to control not just for total share of all three LCC in the airports but for the share of each separate LCC. For instance, for aeronautical revenue in case when the airport has a share of LCC traffic of 30% equally divided between 3 LCC these LCC will have less bargaining power than in case that this 30% share in LCC traffic generated by only one LCC. In the second case LCC has more bargaining power and can push airport to reduce charges.

The results of the empirical estimations of LCC impact on Landing Fees per enplaning passenger presented in Model 1 and on Terminal charges per enplaning passenger resented in Model 2 (Table 5).

Table 5. LCC impact on Landing Fees per enplaning passenger and Terminal charges per enplaning passenger

	Model 1 **Dependent Variable:** ***Ln(Landing Fees per enplaning passenger)***	**Model 2** **Dependent Variable:** ***Ln(Terminal charges per enplaning passenger)***
Independent Variable	*Coefficient*	*Coefficient*
Ln (Enplaning_pax)	-0.45 (0.11)***	-0.35 (0.14)***
MajorLCC_share_LargeHub	0.94 (0.36)***	1.78 (0.44)***
MajorLCC_share_MediumHub	1.87 (0.29)***	1.42 (0.36)***
LargeHub	-1.36 (0.16)***	-0.68 (0.20)***
MediumHub	-1.04 (0.16)***	-0.33 (0.20)*
SeparateLCC_share_15	-0.18 (0.07)***	-0.06 (0.09)
Constant term	8.61 (1.73)***	6.68 (2.12)***
Number of observations	388	387

Notes: Fixed-effects GLS regressions. The numbers in parentheses are standard errors

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

Empirical estimations showed similar results for both Landing fees and Terminal charges that show similar nature of these services as both of them provided by Airport, and Airlines cannot operate in the airport without paying for both of them.

Until LCC share is not taken into account Large and Medium Hubs have lower both Landing Fees and Terminal Charges in comparison with Small Hubs. If LCC presence is considered, in Large and Medium Hubs Landing Fees and Terminal Charges will be higher with the increase of LCC share. If share of each LCC reaches the level of 15%, Landing Fees per passenger will be lower and this is not the case for Terminal charges.

So the share in airports traffic of 15% allows each LCC to negotiate and decrease Landing Fees per passenger. This outcome was proposed in the literature on Airport Low-Cost Airline relationship ((Humphreys et al.,2006), (Francis et al.,2003)) at the same time with decrease in Landing Fees per passenger LCC brings additional traffic to the airport but the question of whether these traffic compensate decrease in per passenger charges is uncertain. According to empirical model (Model1), in the airports, where the share of any LCC is 15% or higher, in Landing Fees per Passenger are 18% less (all else equal).

If landing fees were decreased for all airlines, the airport needs to understand if the additional traffic compensates the decrease in the landing fees. To understand it the following equation should be solved:

$$\begin{cases} x * y = (x + n)(1 - 0.18)y \\ \text{if share of LCC in new traffic is } 15\% \text{ it'll be } \dfrac{0.15x}{x - 0.15x} \text{ share of old traffic} \end{cases}$$

, where

x – is old traffic

n – is additional traffic brought by LCC

y – is Landing Fee per passenger

In order the total sum of Landing Fees to remain the same (if Landing Fee per passenger was decreased on 18%), the traffic should increase on 21,95%[11] from the previous levels. But actually it was increased only on 17,65%

$$\begin{cases} \text{requred increase in traffic is } 21{,}95\% \\ \text{actual increase in traffic is } 17{,}65\% \end{cases}$$

This calculation shows that if Airline promises that its share will be 15% of the airports traffic but require 18% decrease in landing fees per passenger airport must understand whether it will be able to earn additional money on non-aeronautical services from these additional traffic and if not, the decrease in landing fees will not be compensated.

Next subsection of this research will show how LCC impact non-aeronautical business of airport.

Empirical evidence – non-aeronautical revenue

To analyze the LCC impact on non-aeronautical revenue first airports F&B and Retail activities will be analyzed and afterwards Car rental and Parking will be analyzed (As most of non aeronautical activities often outsourced to F&B, Retail operators and Car rental companies revenue here means final rent payments airport got from these companies).

For F&B and Retail was estimated the following base model:

LCC impact on F&B and Retail revenue per enplaning passenger

[11] Case for uncongested airport when marginal cost of increased traffic for the airport is 0, otherwise this number will be even higher.

$$(\text{Ln(NA revenue per passengers)})_{it} = \alpha_0 + \alpha_1 * (\text{LCC\_pax})_{it} + \alpha_2 * (\text{Other\_pax})_{it} +$$
$$\alpha_3 * (\text{LCC\_pax\_LargeHub})_{it} + \alpha_4 * (\text{LCC\_pax\_MediumHub})_{it} +$$
$$\alpha_5 * (\text{LCC\_pax\_SmallHub})_{it} + \alpha_6 * (\text{Other\_pax\_LargeHub})_{it} +$$
$$\alpha_7 * (\text{Other\_pax\_MediumHub})_{it} + \alpha_8 * (\text{Other\_pax\_SmallHub})_{it} + \alpha_9 * (\text{MajorLCC\_share\_20})_{it} +$$
$$\alpha_{10} * (\text{MajorLCC\_share\_25})_{it} + \varepsilon_{it}$$

,where

Ln (NA revenue per passenger) – Natural logarithm of airport's revenue per passenger from F&B in Model 4 and airport's revenue per passenger from Retail stores in Model 5

LCC_pax – Number of LCC passengers in the terminal (sum of Southwest, AirTran and JetBlue's enplaning passengers)

Other_pax – Number of Non LCC passengers in the terminal (sum of other than Southwest, AirTran and JetBlue's enplaning passengers)

LCC_pax_LargeHub – is a cross dummy variable that equals one multiplied by Number of LCC passengers in the airport if the airport belongs to Large Hub group and zero otherwise

LCC_pax_MediumHub – is a cross dummy variable that equals one multiplied by Number of LCC passengers in the airport if the airport belongs to Medium Hub group and zero otherwise

LCC_pax_SmallHub – is a cross dummy variable that equals one multiplied by Number of LCC passengers in the airport if the airport belongs to Small Hub group and zero otherwise

Other_pax_LargeHub – is a cross dummy variable that equals one multiplied by Number of Non LCC passengers in the airport if the airport belongs to Large Hub group and zero otherwise

Other_pax_MediumHub – is a cross dummy variable that equals one multiplied by Number of Non LCC passengers in the airport if the airport belongs to Medium Hub group and zero otherwise

Other_pax_SmallHub – is a cross dummy variable that equals one multiplied by Number of Non LCC passengers in the airport if the airport belongs to Small Hub group and zero otherwise

MajorLCC_share_20 – is a dummy variable that equals one if total share of Southwest, AirTran or JetBlue in the airport's traffic is exceed 20% level and zero otherwise

MajorLCC_share_25 – is a dummy variable that equals one if total share of Southwest, AirTran or JetBlue in the airport's traffic is exceed 25% level and zero otherwise

α_0 – is a constant term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6, \alpha_7, \alpha_8, \alpha_8, \alpha_{10}$ – coefficients

ε_{it} – error term

$t \in [2004;2008]$ – time effect

i – individual terminal effect

During estimations of the base model all statistically insignificant variables were excluded from the model. The final results of the empirical estimations of LCC impact airport's revenue per passenger from F&B presented in Model 3 and airport's revenue per passenger from Retail stores in Model 4 (Table 6).

Table 6. LCC impact on F&B revenue per enplaning passenger and Retail stores revenue per enplaning passenger

	Model 3 **Dependent Variable:** ***Ln(F&B revenue per enplaning passenger)*** Random effect GLS regression	**Model 4** **Dependent Variable:** ***(Retail stores revenue per enplaning passenger)*** Fixed-effects GLS regression
Independent Variable	*Coefficient*	*Coefficient*
LCC_pax	7.11e-08 (2.35e-08)***	Was excluded because of insignificance
Other_pax	Was excluded because of insignificance	Was excluded because of insignificance
LCC_pax_LargeHub	Was excluded because of insignificance	-3.85e-08 (1.40e-08)***
LCC_pax_MediumHub	Was excluded because of insignificance	-4.36e-08 (2.58e-08)*
LCC_pax_SmallHub	6.27e-07 (3.80e-07)*	Was excluded because of insignificance
Other_pax_LargeHub	Was excluded because of insignificance	7.99e-08 (3.27e-08)**
Other_pax_MediumHub	Was excluded because of insignificance	2.13e-07 (9.96e-08)**
Other_pax_SmallHub	-3.22e-07 (1.41e-07)**	Was excluded because of insignificance
MajorLCC_share_20	-0.15 (0.07)**	Was excluded because of insignificance
MajorLCC_share_25	0.12 (0.06)**	Was excluded because of insignificance
Constant term	-0.74 (0.08)***	0.61 (0.12)***
Number of observations	387	388

Notes: Fixed-effects and Random effect GLS regressions. The numbers in parentheses are standard errors

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

For F&B LCC passengers are more important category of passengers and airports with higher number of LCC passengers have higher revenue per square foot from F&B. This is quite intuitive as LCC offer drinks and in some cases food on board only for business passengers and all other passengers have to buy something in the airport if they are hungry.

Part of airports' lease contracts is a percentage of revenue of F&B and Retail operators, the more passengers spend in the terminal, the more revenue got F&B and Retail operators which is converted in airport's revenue. This is why looking on the dynamic of airports revenue from F&B and Retail it is possible to talk about the dynamic of passenger spending.

LCC passengers' spending on F&B is even higher in Small Hubs. This probably could be explained by the fact that Small Hubs are located more far away from the city and have worse connections, and it took passengers longer to get to the airport and they get more hungry and spend more money on F&B. On the contrary non LCC passengers spend even less money on F&B in Small Hubs than in Large and Medium Hubs.

Two dummy variables were included in the model which was controlling for share of LCC passengers in the airport. Airports with level of LCC pax more than 25% have on average higher F&B revenue per passenger. And airports with level of LCC pax more than 20% have on average lower F&B revenue per passenger, because in the sample airports with the share of LCC between 20 and 25% have lower than average F&B revenue per passenger.

In Case of Retail revenue per passenger Small Hubs category was not significant group in the model probably because Retail is not developed enough in Small Hubs. With the increase in Non LCC passenger, the Retail revenue per passenger also increases in Large and Medium Hubs. And with the increase in LCC passengers in Large and Medium Hubs, the Retail revenue per passenger decreases due to the fact that LCC serve more budget-conscious customers who tend to spend less in the airport.

Next step is to look at Car rental and Parking airport's revenue which accounts on average for more than 65% of Non aeronautical revenue in the airport.

For Car rental and Parking was estimated the following base model:

LCC impact on Car rental and Parking revenue per enplaning passenger

$$(\text{Ln}(\text{NA revenue per passengers}))_{it} = \alpha_0 + \alpha_1 * (\text{Ln}(\text{LCC\_pax}))_{it} + \alpha_2 * (\text{Ln}(\text{Other\_pax}))_{it} + \alpha_3 * (\text{Ln}(\text{LCC\_pax})\_\text{MediumHub})_{it} + \alpha_4 * (\text{Ln}(\text{Other\_pax})\_\text{MediumHub})_{it} + \alpha_5 * (\text{MajorLCC\_share\_15})_{it} + \alpha_6 * (\text{MajorLCC\_share\_25})_{it} + \varepsilon_{it}$$

,where

Ln (NA revenue per passenger) – Natural logarithm of airports revenue per passenger from F&B in Model 4, airports revenue per passenger from Retail stores in Model 5, airports revenue per passenger from Car rental in Model 6, airports revenue per passenger from Parking in Model 7

Ln (LCC_pax) – natural logarithm of Number of LCC passengers in the terminal (sum of Southwest, AirTran and JetBlue's enplaning passengers)

Ln (Other_pax) – natural logarithm of Number of Non LCC passengers in the terminal (osum of other than Southwest, AirTran and JetBlue's enplaning passengers)

Ln (LCC_pax)_MediumHub – is a cross dummy variable that equals one multiplied by natural logarithm of Number of LCC passengers in the airport if the airport belongs to Medium Hub group and zero otherwise

Ln (Other_pax)_MediumHub – is a cross dummy variable that equals one multiplied by natural logarithm of Number of Non LCC passengers in the airport if the airport belongs to Medium Hub group and zero otherwise

MajorLCC_share_15 – is a dummy variable that equals one if total share of Southwest, AirTran or JetBlue in the airport's traffic is exceed 15% level and zero otherwise

MajorLCC_share_25 – is a dummy variable that equals one if total share of Southwest, AirTran or JetBlue in the airport's traffic is exceed 25% level and zero otherwise

α_0 – is a constant term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ – coefficients

ε_{it} – error term

$t \in [2004;2008]$ – time effect

i – individual terminal effect

The results of the empirical estimations of LCC impact airport's revenue per passenger from Car rental presented in Model 5 and from Parking in Model 6

Table 7. LCC impact on Car rental and Parking revenue per enplaning passenger

	Model 5 **Dependent Variable:** ***Ln(Car rental revenue per enplaning passenger)***	**Model 6** **Dependent Variable:** ***Ln(Parking revenue per enplaning passenger)***
Independent Variable	*Coefficient*	*Coefficient*
Ln (LCC_pax)	0.09 (0.03)***	0.14 (0.02)***
Ln (Other_pax)	-0.16 (0.06)***	-0.14 (0.05)***

Ln (LCC_pax)_MediumHub	0.13 (0.05)***	0.12 (0.05)***
Ln (Other_pax)_MediumHub	-0.11 (0.05)**	-0.11 (0.04)**;;
MajorLCC_share_15	Was excluded because of insignificance	0.08 (0.05)*
MajorLCC_share_25	0.09 (0.04)**	Was excluded because of insignificance
Constant term	1.65 (0.91)*	1.44 (0.77)*
Number of observations	325	325

Notes: Fixed-effects GLS regressions. The numbers in parentheses are standard errors

*, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively

Airports where LCC share exceedes 15% have on average higher Parking revenue per passenger and airports with LCC share less then 25% have on average higher Car rental revenue per passenger, all else equal.

For Both Car rental and Parking with the increase in number of LCC passengers, revenue per passenger increases and with the increase in non LCC passengers revenue per passenger decreases that means that LCC passengers spend more money on Car rental and Parking. The difference between LCC and non LCC passengers is even bigger in Medium Hubs.

The importance of LCC passenger group for Car rental and Parking could be explained by the fact that the airports dominated by LCC in general located more far away from the city center, have worse ground access system: less frequency and variety of transportation possibilities (which also make them more expensive), moreover the flight time could be less convenient (too early or too much late departure or arrival) in comparison with legacy carriers. All mentioned above can stimulate passenger to use own car or to rent a car in order to get to or from the airport and as a consequence to spend more money on Car rental and Parking than non LCC passengers.

Ground access system is critical for the airport. The busiest airports' ground access systems usually include a combination of highway (private and rental cars, taxis and busses) and rail access. In the US private automobiles have held a dominant position among the various modes of ground access to the airport[12].

Most airports in the US placed limited reliance on rail access. The share of rail access to/from the airport is below 10% in the US, with the highest in Washington Reagan airport where

[12] Belobaba, P., Odoni, A., Barnhart. C. The Global Airline industry, Wiley, 2009.

it accounts for roughly 15%. By contrast, it is in the 20% to 40% range at many of the busiest airports in Europe (de Neufville R. and Odoni A., 2003)

Summarizing results of empirical estimations for US airports it was got that LCC passengers on average contribute more to the airports non aeronautical revenue and this helps airport to generate additional income and compensate losses in aeronautical revenue which was cause by LCC entrance. These findings show that the importance of airports non-aviation business in the US should even increase nowadays when share of LCC companies increases permanently.

Findings for US airports non-aviation revenue are different from findings of Lei and Papatheodorou (2010) for British regional airports. One of the reasons for this could be difference in non-aeronautical revenue composition for US and British airports. Graham (2009) stated that in opposed to most world regions in North America Car rental and Parking is more important than Retail. Average share of Retail revenue in airport non-aeronautical revenue at world airport in 2006 was 22% (Graham, 2009). For British airports this number could be even higher as they have more potential for duty free sales because of large volumes of international flights in comparison with US even for regional airports.

This empirical results showed decrease of Retail revenue per passenger with increase in share of LCC, in case that Retail revenue accounts for major part of non-aeronautical revenue in British airports this explains the difference in results of US and UK markets.

Conclusion

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The purpose of this research was to measure the effect of the introduction of LLC on the distribution of airports revenue between aeronautical and non-aeronautical sources and to observe the changes in relative importance of different non-aviation revenue streams (Car rental, Parking, Retail, Catering).

The main US LCC selected for the research were Southwest, AirTran and JetBlue, which comprise 22,5% of the total 2008 North American domestic traffic market share. Following US Federal Aviation Administration categorization all airports in the sample were divided into three categories of Small, Medium, and Large Hubs based on their number of enplaning passengers.

The share of non-aeronautical revenue in total operating revenue (vs. aeronautical revenue) increased from 2004 to 2008. In 2008, non-aeronautical revenue accounted for 48,7%, 53,4% and 58,7% of total operating revenue in Large, Medium and Small Hubs respectively.

The main contributions of this research are the following:

1. Airport's aeronautical and non-aeronautical revenue was analyzed in a complex manner.

2. Empirically the starting point (in terms of share of LCC traffic in airport's traffic) since which LCC have enough bargaining power to negotiate the decrease in Landing Fees was estimated (Landing Fees accounted for 35% of airports aeronautical revenue in 2008). This share is 15% of Low Cost Airline's traffic in total airports traffic.
3. Numerical calculations show that the decrease in Landing Fees by the airport is not fully compensated by additional traffic brought by LCC in the US.
4. LCC impact was analyzed on different components of airport's non-aeronautical revenue but not only on total non-aeronautical revenue behavior. The relative contributions of LCC and Full Service Airline passengers to all main components of non-aeronautical revenue were compared. On average, LCC passengers contribute more to all the main components of airports non-aeronautical revenue (F&B, Parking and Car rental) than non LCC passengers (Full Service Airline passengers), except for Retail activities.
5. The differences in non-aeronautical revenue in different size Hub groups in the US were analyzed. The contribution of LCC passengers to F&B revenue is higher in Small Hub airports and Car rental and Parking revenue contribution from LCC passengers is higher in Medium Hubs.
6. The findings of the research give a basis for concluding that US airports can remain competitive under the growing LCC presence between air carriers since their non-aeronautical activities help them to generate more money from LCC passengers than from passengers of traditional airlines, which compensates for the reduction in aeronautical revenue. Moreover, social welfare is also increasing because passengers are able to use cheaper LCC flights from the airport, increasing total traffic. More traffic leads for additional employments opportunities and probably an increase in tourism and other economic activities of the surrounding area.
7. Explanations for the differences in LCC impact on airports' non-aeronautical business among countries were suggested.

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