Journal of Air Transport Management 12 (2006) 277–287

Journal of
AIR TRANSPORT
MANAGEMENT

www.elsevier.com/locate/jairtraman

The appropriate scale of US airport retail activities

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Abstract

Terminal-based retail has been sufficiently successful that many airport operators are considering enlarging their facilities in order to increase revenues. On the basis of data on the retail sales and rental revenues for 75 of the US's most important passenger airports, we demonstrate the significant impact of passenger demography on the volume and nature of airport retail sales. A method is outlined for combining information on the demography of passenger flows with construction costs in order to evaluate appropriate capital investments for terminal retail expansions.

Keywords: Airport retail; Passenger demography; Capital investment

1. Introduction

Retail activities have become a central feature in the design of airport terminals (Edwards, 2005). Terminals are increasingly seen as gateways that should appropriately represent their regions to visitors, in part by symbolizing the distinctive character of the region through food and specialty retail offerings (Bruegmann, 1996; Sudjic, 1992). With 12–15% of sales accruing as rent payments, retail has also become an important component of airport revenue. Among a sample of 75 of the busiest US passenger airports, non-aeronautical income now comprises almost half of all operating revenue. Retail is responsible for 20% of that (based on US Federal Aviation Administration Form 127 data). At Atlanta's Hartsfield-Jackson Airport, the busiest in the world, retail contributes over one-sixth of all operating revenues. Consequently, airlines, airport operators, and airport owners each have interests in these financial flows (McHardy and Trotter, 2006; Zhang and Zhang, 1997).

Airline passengers, with an average annual income of $80,130, are a desired retail clientele. Typically, 54–68% of travelers purchase food or a beverage during a trip through an airport; 11–37% of airline passengers make a non-food retail purchase. Consequently, terminal-based stores can generate annual sales of $800–1200 per square foot (Airports Council International—North America, 2005). The average regional mall, by comparison, produces around $300 per square foot (Creative Host Services, 2004).

Encouraged by the promising results at key international gateway airports, such as Heathrow, Schiphol, Frankfurt, Dubai, and Hong Kong among others, US airport authorities have substantially expanded and upgraded their retail offerings in recent years, and plan to do so further. Airport retail space expanded by 16% between 2001 and 2003 alone despite airline industry woes (Favotto, 2003). Cincinnati/Northern Kentucky Airport, for example, released over 20,000 square feet of additional concession space over that period bringing their total to well over 100,000 square feet. Upscale restaurants and high-end boutiques catering to wealthier demographics are increasingly complementing food courts and magazine shops at major airports across the US.

The trade press continues to suggest that airports are under-retailed and that further expansion is warranted (Ward, 2006). The implication of much of the discussion about airport retail is that with proper incentives, airport operators can transform their terminals into attractive airport malls that not only serve as appropriate regional front doors (Storm, 2005) but also contribute to the financial sustainability of the airport.

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0969-6997/$ - see front matter © 2006 Published by Elsevier Ltd.
doi:10.1016/j.jairtraman.2006.04.003

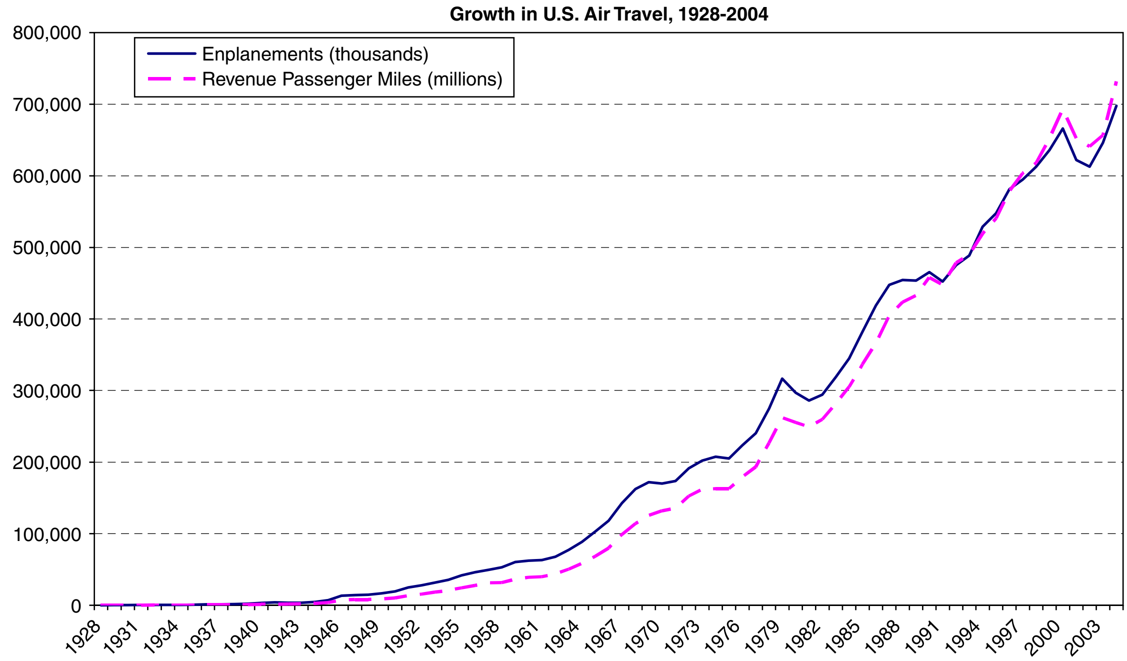

Fig. 1. Growth in US Air Travel, 1928–2004.

The attractions of air passengers notwithstanding, more than a few airport retail developments have struggled. Although not commonly publicized, some restaurant and retail areas suffer from a lack of adequate traffic. At a number of airports the recent retail additions, rather than tapping unmet demand, have begun to cannibalize the sales of the older establishments. In some airport terminals, retailers may even need inducements to provide services. Following Delta and American Airlines service cutbacks, Dallas-Fort Worth airport offered rebates to retailers to compensate for declining demand (Wethe, 2005), while Miami airport has had difficulties even getting retailers to bid on its space offerings (Ward, 2005). Some US airports may have too much retail space and even some of the most well-known international gateways, such as Singapore's Changi, are being forced to move 'down market' (Tio, 2005).

2. The demography of air travel

Nearby retail alternatives, concern about security clearance, and parking charges imply that contemporary US airport retail is almost entirely for passengers. Even before heightened security measures went into effect, only 5% of Pittsburgh's airmall sales were to non-ticketed customers. Among passengers, 80% report purchases only after clearing security (Weinstein, 2002) and some prefer shopping within sight of the departure gate (Doganis, 1992). Not benefiting from restrictions on operating hours at off-site locations (as is common in Europe), pre-security retail has suffered even at busy US airports with good public transportation connections, such as Reagan National.[1]

A substantial and dramatically growing number of passengers pass through US airports. As shown in Fig. 1, revenue passenger miles in the US have approximately tripled over the past 25 years (Air Transport Association, 2004). The number of passengers has followed a similar trend, now exceeding 700 million. By 1995, one out of every three US adults flew in an average year (80% had flown at least once in their lifetime) and air travel already accounted for almost one-sixth of person-trips of over 100 miles and 43% of person-miles on such long-distance trips. By 2015, more than one billion passengers are forecasted to travel through US airports annually (Federal Aviation Administration, 2005).

At the same time, as Fig. 2 shows, air travel is concentrated among US airports, suggesting that only a dozen or so of these airports may be able to sustain significant specialty retail activity. Moreover, as far as retail is concerned, the passenger flows in many US airports may be substantially lower than it first appears. Hong Kong and Schiphol, for example, channel all passengers through a single terminal while Atlanta, Chicago, Los Angeles, and Dallas-Fort Worth, by far the

[1]The US situation may differ significantly from that in Europe, the Middle East and Asia for three important reasons. First, most US destinations are mature retail environments that offer a full range of shopping options so airport retail is not greatly advantaged. Second, the US is a mature flying environment. By the late 1980s, a trip to an airport itself no longer prompted a purchase (Doganis, 1992). Third, with over 80% of the travel being domestic, high-yield duty-free shopping is not a major factor in the US.

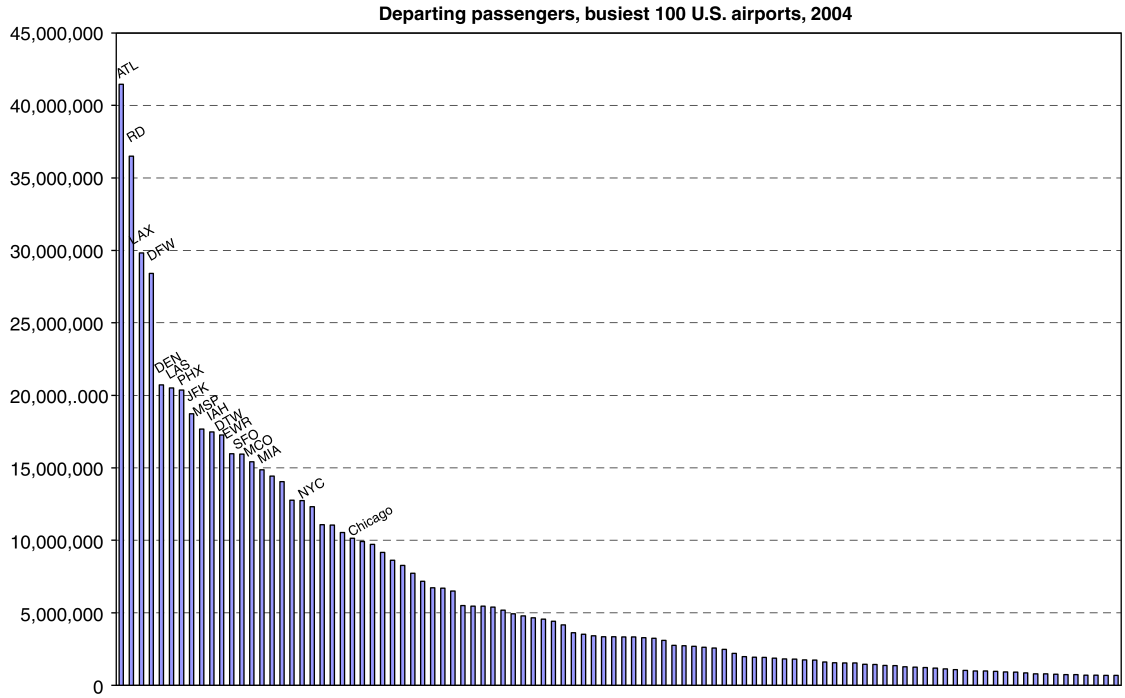

Fig. 2. Departing passengers, busiest 100 US airports, 2004.

largest domestic US airports, have multi-terminal designs that disperse passengers across separate locations. Even after consolidation, JFK has six separate terminals.

Centralized terminal design may help airports achieve market thresholds for specialty shops, such as jewelry outlets. With only 18% of Atlanta's domestic passenger traffic, Pittsburgh was able to boost retail sales in the 1990s by combining 'street price' (those at least approximately equivalent to those available in stores outside the airport) guarantees with its concentrated passenger flows.

Whereas the aggregate distribution of passengers among airports has been relatively stable considering the turbulence in the airline industry, local effects of airline instability on passenger flow can be substantial. Transfer passenger flows at the Denver, Pittsburgh, St. Louis, Cincinnati, and even Dallas-Fort Worth airports have been significantly reduced by hub consolidation, creating demand uncertainty at many large hub airports. Shifts among multiple airports within metropolitan areas, such as San Francisco and Oakland, and relative urban growth and decline, such as Las Vegas and St. Louis, respectively, also have also affected passenger flow at individual airports.

3. Specifying the demography of airport retail demand

The trends in passenger numbers and their concentration on particular airports and terminals suggest that air passenger demography may be an important determinant of airport retail demand. Terminal-level data were collected on key aspects of passenger demography for a sample of 75 of the busiest US passenger airports in order to estimate a series of models predicting sales and revenue. Collectively, these airports represent 80% of US enplanements. Data on the number of passengers originating in each terminal annually were obtained from the *Airport Revenue News Factbook* and double-checked against US Bureau of Transportation Statistics for each of the examined years. Airport dwell time (the amount of time spent in the terminal), passenger mix, trip mix, and other demographic indicators may modify the impact of the number of passengers on retail demand (Doganis, 1992; Freathy and O'Connell, 1998).

Dwell-time, the second major component of passenger demography, can be subdivided into ticket processing time, the time needed to check in and clear security, and the free time available to make purchases. One survey estimates dwell time to average 103 min in the US. Of this, approximately 86% is free time and almost all of that is in the gate area. The unpredictability of the time needed to clear security forces travelers to arrive early, resulting in increased waiting time. Average passenger dwell time, which varies substantially by airport, was estimated from reports contained in the *Airport Revenue News Factbook* and supplemented with security point waiting time data supplied by the Transportation Security Agency.

Transfer passengers with enforced free time are held to be more likely than others to make purchases at terminal shops and restaurants. Statistics from the *Airport Revenue News Factbook* were combined with data the Office of Airline Information of the Bureau of Transportation Statistics to estimate the proportion of passengers originating at each airport.

Table 1
Passenger demography, retail space, and (logged) airport retail sales (sales in thousands)

	Food and beverage sales	Non-food sales	Total domestic sales	Total (including duty-free) sales
Dependent variable unlogged				
Mean	$12,178.70	$8,547.21	$20,604.41	$23,844.69
Standard deviation	13233.43	9328.768	21836.43	29574.26
Coefficient of variation	0.920	0.916	0.944	0.806
Lowest	$16.63	$17.48	$159.85	$159.85
Highest	$82,996.76	$66,912.97	$149,909.70	$314,133.40
n	662	655	663	663
Dependent variable logged				
Departing passengers (logged)	0.875***	0.625***	0.721***	0.649***
Airport dwell time	0.000	0.000	0.000	0.000
Proportion passengers originating	−0.050	0.218	−0.004	−0.094
Gateway airport	0.061	0.071	0.053	0.065
Major tourist destination	−0.079[a]	0.056	−0.064	0.007
Mean logged flight distance	0.244***	0.352**	0.380***	0.535***
Food and beverage retail space (logged)	0.247***			
Total domestic non-food retail space (logged)	0.422***			
Total domestic retail space (logged)			0.378***	
Total retail space (logged)				0.456***
Constant	−1.872**	−2.614**	−2.500***	−3.605***
Airports	75	74	75	75
N	656	643	657	657
R^2	0.894	0.833	0.915	0.910
P	0.000	0.000	0.000	0.000

Standard errors corrected for clustering on airport.
[a]$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.

Passenger and trip mix may also affect retail sales. Because passengers beginning a long flight may be more likely to purchase food and beverages and possibly other goods at the airport, airport trip mix was estimated by calculating the average length of flight from each airport from flight segment data obtained from the Bureau of Transportation Statistics. Because much of the attention paid to airport retail is based at key gateway airports, an indicator, computed on the basis of international passenger flow, was included in the analysis. The gateway airports were Atlanta (ATL), Chicago (ORD), Dallas-Fort Worth (DFW), Detroit (DTW), Los Angeles (LAX), Miami, (MIA), New York (JFK), Newark (EWR), and San Francisco (SFO). Similarly, leisure passengers are said to be willing customers for specialty retail at major tourist destination airports.[2] We created a dummy variable for the top 10 tourist destinations as reported by the American Society of Travel Agents in 2003. (Several lists compiled by the travel industry showed a high level of agreement). Orlando (MCO), Las Vegas (LAS), New York, (JFK, EWR, LGA), San Francisco, (SFO, OAK), Honolulu (HNL), Los Angeles (LAX), San Diego, (SAN), Seattle (SEA), Miami (MIA), and Phoenix (PHX) were coded as major tourist destinations.

All data on retail sales, square footage, and rental payments to airports were obtained from reports contained in the *Airport Revenue News Factbook*. The data contain up to four observations per terminal. Pooling data across years (2000, 2002, 2003, and 2004) gives us more confidence in our estimates. In order to improve the quality of our estimates, several of the variables with skewed distributions have been logged.

4. Explaining retail payments to airports

The variation in retail sales among terminals in 75 of the busiest airports in the US was large but very predictable. Table 1 shows models predicting several different categories of retail sales. The standard errors have been corrected for the sampling method. The analysis is based on a measure of passenger traffic and dwell time. Multiplied together, they approximate the total number of minutes available for purchasing. The amount of purchasing in that time block may be influenced by the mix of passengers and trips. The model also includes the space available for retail to capture supply factors. The amount of space is also, in part, an indirect measure of anticipated demand. The number of departing passengers had a large, consistent impact on sales: a simple model including only the number of passengers accounted for 87% of the variation in aggregate airport food and beverage sales. The

[2]Although Dresner (2006) finds leisure passengers to be less different from business passengers than is sometimes assumed, the latter may be more likely to use car rental agencies and nearby hotels. On the basis of European experience, Doganis (1992) estimated that a million passengers per year will support a 100-bed hotel with the relationship being proportional thereafter.

other variables raised the variance explained only slightly. The impact of airport dwell time on sales was not as strong as anticipated on the basis of newspaper reports and theory. The quality of the dwell time data may account for this but proxy indicators, such as security clearance times, performed no better. Although conceptually clear, the impact of dwell time on airport retail purchases has proved difficult to capture (Torres et al., 2005). International gateway status and status as a major tourist destination did not have substantial independent effects on total food and beverage sales. Both types of airports have a mix of passengers who fly long distances, however, and the average distance flown did have a positive effect on food and beverage sales. Although our theory hypothesizes a multiplicative relationship between passenger numbers, dwell time, and sales, models assuming additive relationships or different non-linear functional forms among the variables did not give substantively different results. The results of analyses using logged and unlogged versions of the variables and using airport-level and terminal-level data are comparable.

We repeated our analysis, examining, in turn, non-food sales (news, gifts, and specialty items), total domestic sales, and total retail sales (including duty-free sales). The space devoted to retail and the average distance traveled had a substantial effect in determining sales in each category but, in each case, passenger flow accounted for the majority of variation in sales among terminals. The facts that even the simplest model accounts for almost 90% of variation in food and beverage sales among the sampled airports and that sales are very responsive to basic passenger numbers suggests that passenger flow dominates as a determinant of demand for terminal-based retail, leaving little room for the effects of presentation, floor layout, and retail mix strategies.

Sales per passenger, a commonly used performance indicator, were more variable, as measured by the coefficient of variation, than total sales but more difficult to predict. Table 2 shows that neither international gateways nor tourist destination airports had higher sales per passenger than most other airports but average distance traveled and the amount of retail space provided had positive effects on sales per passenger. Passenger traffic had a negative effect suggesting that as passenger traffic increases, given available space, congestion discourages sales. Improving sales per passenger may therefore entail a tradeoff with the capital costs of expanded space.

Closer examination [not shown] reveals that a fairly diverse set of airports have been able to achieve a high level of domestic sales per passenger. Duties in Asia may help explain the positive performance of Alaskan and Hawaiian international gateways. Those with a low level of sales per passenger are also a diverse set but appear to be mainly small regional airports, such as those in Boise and Fresno, and secondary airports in major metropolitan areas, such as Houston's Hobby Airport and New York's La Guardia.

Table 2
Passenger demography, retail space, and sales per passenger

	Food and beverage sales	Non-food sales	Total domestic sales	Total (including duty-free) sales
Mean	\$3.29	\$2.51	\$5.76	\$6.68
Standard deviation	1.33	1.61	2.47	4.36
Coefficient of variation	2.47	1.56	2.33	1.53
Lowest	\$0.12	\$0.01	\$0.37	\$0.37
Highest	\$14.81	\$18.27	\$23.29	\$38.75
n	659	652	660	660
Departing passengers (logged)	−0.540*	−1.282***	−1.768***	−3.031***
Airport dwell time	−0.001	0.001	0.002	−0.001
Proportion passengers originating	−0.337	−0.274	−0.998	−1.892
Gateway airport	0.113	−0.148	−0.093	−0.263
Major tourist destination	−0.087	0.241	0.026	0.844
Mean logged flight distance	0.824**	1.221***	2.247***	4.551***
Food and beverage retail space (logged)	0.705***			
Total domestic non-food retail space (logged)		1.232***		
Total domestic retail space (logged)			1.822***	
Total retail space (logged)				3.191***
Constant	−4.495*	−6.624***	−13.207***	−31.120***
Airports	75	74	75	75
N	656	643	657	657
R^2	0.176	0.412	0.334	0.453
p	0.000	0.000	0.000	0.000

Standard errors corrected for clustering on airport.
[a]$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.

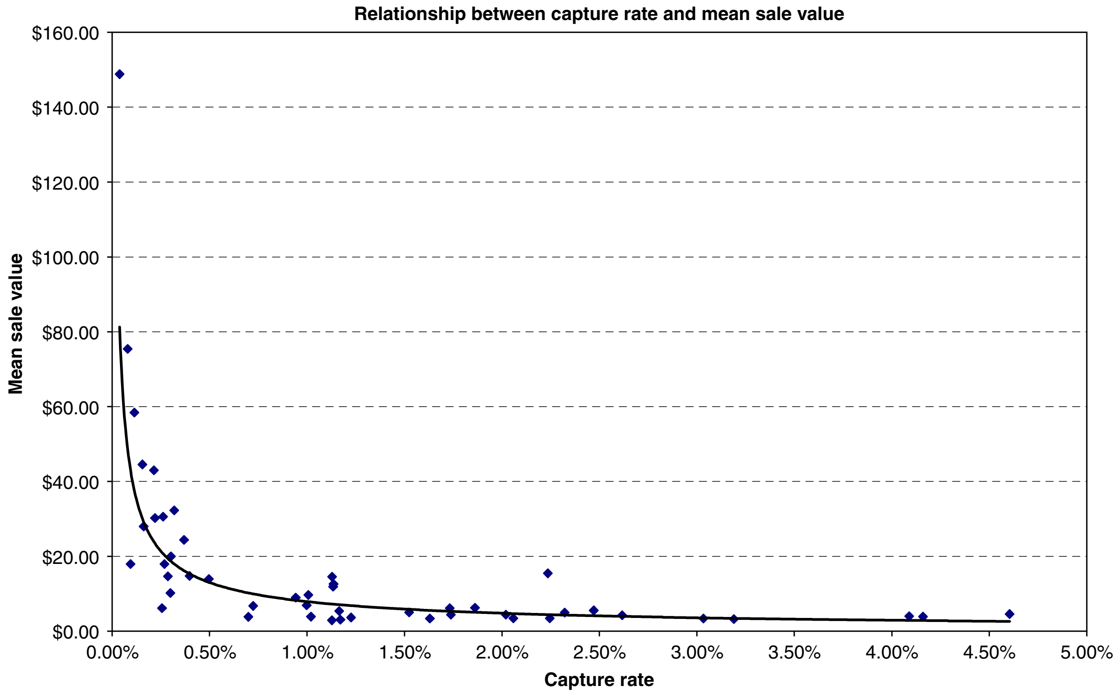

Fig. 3. Relationship between capture rate and mean sale value.

Many airport operators aspire to offer a range of luxury retail goods but supporting a diverse set of specialty shops may require a large passenger base. Fig. 3 shows the relationship between the average value of a sale and the number of sales per passenger (capture rate) among retailers in a busy terminal of a medium-sized hub. At the extremes, retailers can generate sales volume either by making large sales to a small proportion of passengers or by making smaller sales to a larger proportion of passengers. Almost all of the retailers shown on the left side of the figure are specialty retailers. One of them set the airport record for sales per square foot in a very modestly sized shop while making only a dozen or two sales on an average day. The retailers on the right of the figure (all food and beverage providers) served in excess of 1000 passengers per day (close to 5% of those using the terminal). Expanding specialty offerings at this airport would require either significantly greater passenger flow or substantially reduced rental charges to allow the survival of additional low-volume shops. Airport operators seeking to improve their terminal's image through up-scale retail may need to forego some financial benefit.

Ultimately, airport operators have an interest in maximizing their own revenues and the level of passenger service, not sales. Table 3 shows the results of an analysis of airport revenues from terminal retail rents. The several airports having contracts with retailers basing payments directly on sales were not included in this analysis. The level of retail sales alone (themselves largely determined by passenger flow) explained 83–95% of the variation in airport revenues generated, depending upon the category of sales. International gateway status and being a tourist destination airport did not affect airport retail rental revenues but, again, average trip length did.

Our analyses find a simple measure of passenger flow to account for the large majority of the variance in sales and in the rent revenues derived from airport retail. Unmeasured passenger attributes may account for some of the little additional variance in sales. Even at the most cosmopolitan airports less than half of the passengers have the attributes of A-list customers (Reinhardt-Lehmann, 2005).[3] On the other hand, the considerable variation in the nature and placing of the retail space has not been measured (Hsu and Chao, 2005) or the difficult-to-measure pricing strategies. Nor have we measured the impact of airport operator leasing practices. Each may account for a small increment of airport revenue.

Since airport malls depend upon a physical layout that concentrates passenger traffic to meet the thresholds needed to support specialty shops and since retail space adds to retail sales, some airports are building new terminals or extensively renovating older ones with the aim of enhancing a revenue stream (Gray, 1997). The cost-effectiveness of capital investment to expand retail revenues therefore needs to be established.

[3]In the few cases in our sample where low-cost and legacy airlines served the same airport in separate terminals, the retail sales per passenger were very similar. When such airlines served the same city from different airports, the sales per passenger differed—but not in a consistent direction.

Table 3
Passenger demography, retail space, sales, and (logged) airport rental revenues

	Rent revenue from food and beverage sales		Rent revenue from non-food sales		Rent revenue from total domestic sale		Rent revenue from total sales (including duty-free)	
Unlogged								
Mean	1508041		2866433		3813194		1368976	
Standard deviation	1799368		3354094		8569903		1755867	
Coefficient of variation	0.838		0.855		0.445		0.780	
Lowest	3496		30182		30182		6699	
Highest	1.03E+07		1.85E+07		1.25E+08		1.28E+07	
n	388		388		389		385	
Food and beverage retail sales (logged)	1.034***							
Non-food sales (logged)			1.014***					
Total domestic retail sales (logged)					1.055***			
Total (including duty-free) sales (logged)							1.081***	
Departing passengers (logged)		0.991***		0.618***		0.794***		0.680***
Airport dwell time		0.001		−0.003[a]		−0.001		−0.002
Proportion passengers originating		0.199		0.266		−0.016		−0.208
Gateway airport		0.086		0.113		0.031		0.041
Major tourist destination		−0.013		0.177		−0.024		0.083
Mean logged flight distance		0.334**		0.653**		0.627***		0.812***
Food and beverage retail space (logged)		0.146 a						
Total domestic non-food retail space (logged)			0.479***					
Total domestic retail space (logged)						0.284***		
Total retail space (logged)								0.414***
Constant	4.534***	2.090*	4.973***	0.146	4.445***	1.215	4.220***	−0.115
Airports	61	60	61	59	61	60	61	60
N	388	385	384	377	388	385	389	386
R^2	0.948	0.881	0.834	0.849	0.951	0.892	0.933	0.869
p	0	0	0	0	0	0	0	0

Standard errors corrected for clustering on airport.
[a]$p<.10$; $*p<.05$; $**p<.01$; $***p<.001$.

5. The finance of airport retail supply

Although payments derived from terminal retail make a significant contribution to airport revenues, they also require substantial capital investment in enlarged terminal space. The Federal Aviation Administration (1989) and the International Air Transport Association (1995) provided general design guidelines for retail space provision on the basis of passenger flows, sometimes recommending passenger thresholds for particular services. These guidelines are based on customer service targets, not the financial feasibility of providing that space.[4]

Table 4 shows the results of an analysis of the amount of retail space in each terminal. Passenger traffic alone explained approximately 55% of the variation in retail space. Interestingly, some of the terminals in several of the busiest airports, such as Atlanta, O'Hare, and Dulles, had comparatively little retail space per passenger while other large gateway airports, such as Miami and Orlando, had an abundance of retail space per passenger. The variation among terminals within airports sometimes rivaled the variation between airports with a few airports having terminals at both ends of the spectrum. As would be expected with any increase in supply, further analysis (not shown) suggests that the greater the available space per passenger, the lower the rental yield per square foot.

Fig. 4 shows the stylized relationships between key measures of space, sales, and cost holding airport

[4]There appears to be little discussion of the factors determining the amount of retail space in general (Betancourt, 2004). Store size and shopping center size is sometimes treated as being exogenous to the decision-making process.

Table 4
Passenger demography, sales, and (logged) airport retail space

	Space for food and beverage sales (unlogged)		Space for non-food sales (unlogged)		Space for total domestic sales (unlogged)		Space for total sales (including duty-free)	
Mean	16816.3		9159.88		25784.45		27320.43	
Standard deviation	15244.26		9177.983		23016.18		24350.5	
Coefficient of variation	1.103		0.998		1.120		1.122	
Lowest	286		90		286		286	
Highest	88304		66224		120190		129827	
n	660		649		661		661	
	Space for: (logged) F & B sales		Non-food sales		Total domestic sales		Total sales (including duty-free)	
Food and beverage retail sales (logged)	0.558**							
Total domestic non-food retail sales (logged)	0.543**							
Total domestic retail sales (logged)	0.818***							
Total retail sales (logged)	0.831***							
Departing passengers (logged)	0.661***	0.133	0.727***	0.224	0.692***	−0.081	0.686***	−0.099
Airport dwell time	0.002	0.001	0.001	0.001				
Proportion passengers originating	0.253	−0.067	0.177	0.163				
Gateway airport	−0.130	−0.100	−0.093	−0.096				
Major tourist destination	0.128	0.017	0.059	0.003				
Mean logged flight distance	−0.376[a]	−0.237	−0.423**	−0.485**				
Constant	4.245***	5.635***	3.065***	3.980***	4.437***	5.409***	4.543***	5.818***
Airports	75	75	74	74	75	75	75	75
N	657	656	646	643	658	657	658	657
R^2	0.530	0.617	0.595	0.691	0.586	0.723	0.569	0.735
P	0	0	0	0	0	0	0	0

Standard errors corrected for clustering on airport.
[a]$p<.10$; *$p<.05$; **$p<.01$; ***$p<.001$.

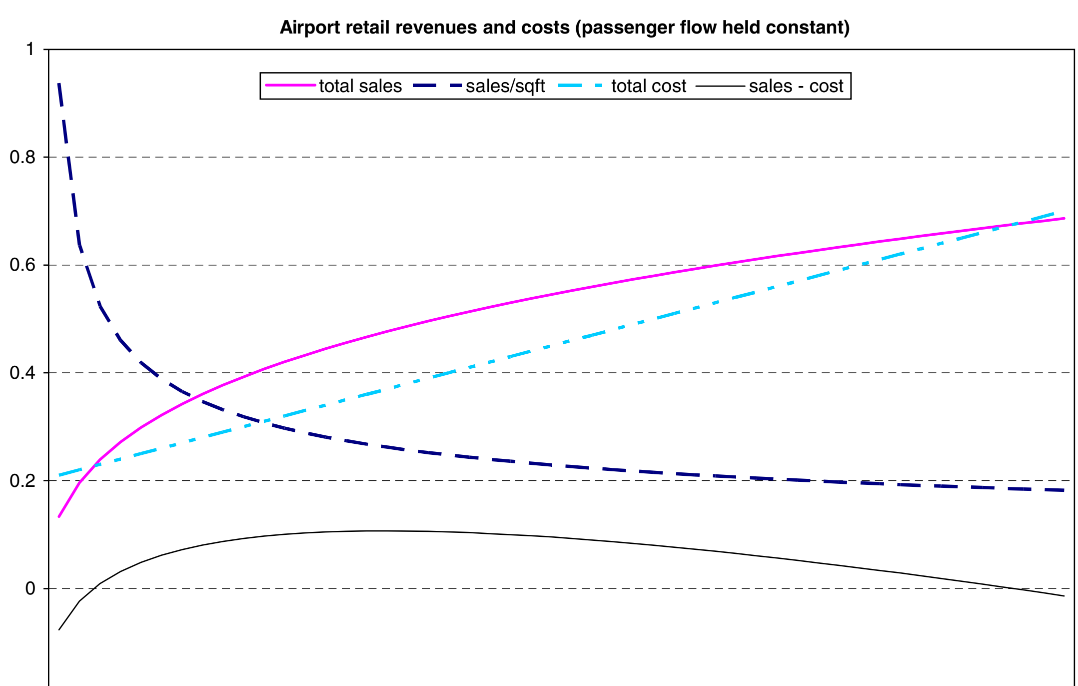

Fig. 4. Airport retail revenues and costs (passenger flow held constant).

passenger flow constant. The first curve illustrates the total sales (and since passenger flow is held constant, sales per passenger) achieved at different spatial allotments. As the space allocated to retail increases, the reduced congestion, more diverse assortment of products, and more attractive displays results in increased sales. Sales per square foot declines precipitously after certain basic needs are met, however. Unfortunately, neither of those measures accounts for the costs of providing and maintaining the retail space. The third curve represents such hypothetical costs for different amounts of retail area. The fourth curve in the figure illustrates the difference between sales and costs. The maximum point on that curve represents the optimal size of the retail area.

Because of the lack the detailed data needed to calculate optimum retail space, the following expository analysis shows how estimates of airport retail demand can be used in conjunction with estimates of cost can be used to evaluate the financial feasibility of specific plans. In order to provide an empirical referent, we build loosely on the case of a mid-level hub, Indianapolis. The airport is constructing a new $275 million midfield terminal that will include 90,000 square feet of retail space—approximately double the present capacity. The airport authority is projecting $29 million in annual retail sales of which approximately $3.7 million (1.3% of the construction costs) will go to the airport (Kim, 2004). The calculations are illustrative and are not meant to substitute for detailed analysis.

Table 5 presents a very basic calculation the value of the expansion in retail space. Other projections were estimated (not shown). The left panel illustrates the expected effects of terminal expansion on annual rent payments to the airport based on simple regressions. (Different specifications not shown produce similar results.) Eq. (1) shows the parameters of the regression equation used in projecting rental income. Eq. (2) uses the present passenger and space values for Indianapolis and compares the predicted values with the actual values. The actual rental payment was less than that predicted by the estimation method. Eq. (3) substitutes the planned expanded retail space for the present value to estimate annual post-expansion sales and retail rents. The bottommost equation estimates the increase in rent holding all other factors equal. The expansion of retail space to 90,000 square feet would be expected to increase airport rental revenues by almost $2.4 million per year. (The estimate of the rental income generated by the renovations is somewhat lower than the Indianapolis airport authority's estimate but estimates based on slightly different data straddle the airport authority's estimates.)

Having an estimate of expected overall rental income from the left panel of the table, the right panel of the table estimates the breakeven capital investment points for the increased revenue stream generated by the expansion in retail space at selected interest rates for a 10- and 20-year economic life, respectively (Clauretie and Sirmans,

Table 5
The value of retail space expansion (with example of significant expansion of mid-sized hub)

Panel A	
Total domestic rental payments ($)	Eq. (1)
Departing passengers	555.65
Total domestic retail space	45.62
Constant	−191,894.00
Indianapolis (present situation)	
	Eq. (2)
Actual	
Total rental payments ($)	3,762,029
Predicted	
Total rental payments ($)	4,000,469
Departing passengers	4021.748
Total domestic retail space	42,913
Space/ (1000) passengers	10.67
Indianapolis (after expansion)	
	Eq. (3)
Pojected	
Total rental payments ($)	6,148,577
Departing passengers	4021.748
Total domestic retail space	90,000
Space/ (1000) passengers	22.38
Indianapolis (projected increase above present)	
	Eq. (4)
Increase in rent payments ($) (predicted [after] vs. actual [2004])	$2,386,548
Panel B	
Increase in gross annual income from retail-based rent	
Estimate (predicted vs. actual)	
Overall annual increase in rental income	$2,386,548
Estimatesd expense ratio	0.25
Net annual rental income	$1,789,911
Project life	
Ten-year project life	
Interest rate	
0.050	$13,821,219
0.075	$12,286,094
0.100	$10,998,229
0.125	$9,909,719
0.150	$8,983,149
0.175	$8,189,075
0.200	$7,504,152
0.225	$6,909,747
0.250	$6,390,883
Twenty-year project life	
Interest rate	
0.050	$22,306,248
0.075	$18,247,233
0.100	$15,238,522
0.125	$12,961,378
0.150	$11,203,647
0.175	$9,821,586
0.200	$8,716,115
0.225	$7,817,779
0.250	$7,077,099

2003). The estimate of increased revenue is adjusted for a 25% operating expense (providing HVAC, security, maintenance, etc.). The relatively short economic lifetimes estimated are justified by the frequent need to renovate airport facilities. At 5% interest (the rate at which bonds were offered) and with a 20-year life, the value of the retail expansion is estimated to be worth 8% of the total terminal project costs (just over $22.3 million), account for 7.5% of the space, and presumably require a lower portion of the construction costs.

A complete evaluation would use more realistic cost information. Relaxing several critical assumptions could reduce or increase the value of retail expansion. The amount of retail space per passenger in the Indianapolis terminal would go from somewhat below average to substantially over average. Although increases in passenger flows have historically absorbed excess space, as noted above, predicting traffic at individual airports has been difficult and may become more risky in the future (Dempsey, 2000). Over-expansion may result in substantial retail space vacancies and weaken airport bargaining position vis-à-vis concessionaires, ultimately reducing airport revenues. Although investors continue to favor revenue bonds financing airport expansion, the more speculative investments may need to absorb a good deal of risk.

6. Conclusions

The analysis indicates that the financial potential of airport retail is sharply delimited by passenger demography with the number of passengers having the largest single effect. Our analyses further indicate that food service is the most immediate demand. In the US context, the need for specialty retail is sufficiently small that only the major air intersections can support the upscale boutiques thought to lend allure to terminals without cross-subsidy. The recent experience in Pittsburgh should serve as sufficient warning to any airport counting on transfer passengers as a customer base.

The number of passengers, and thus demand, is beyond the control of most airport operators but the supply of retail space is not. Increasing sales per passenger requires expanding retail space, which decreases sales and rents per square foot. The negative effect on the return on investment in terminal space suggests a need to carefully balance demographically induced demand with the capital and operating costs of additional terminal space. Turbulence and uncertainty in the aviation industry also call for greater flexibility and reconfigurability in terminal retail space design.

Acknowledgements

We thank the editor and two anonymous reviewers for helpful comments on an earlier version of this article and Jonathan Green and David Sullivan for research assistance. Steven A. Anderson of the Bureau of Transportation Statistics provided important data inputs.

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