

AIR TRAVEL DEMAND IN THE UPPER MIDWEST: POTENTIAL FOR LOW-COST CARRIERS

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ABSTRACT

Overall, around 0.53 billion long-distance trips are taken by the upper Midwest residents every year; air travel accounts for 10% of all long-distance trips. Since economically successful regions tend to possess discount airlines or low cost carriers (LCCs) to move information and people securely, quickly and efficiently, we explore the upper-Midwest aviation market for room for LCC entry. A demand system that involves simultaneous estimation of passenger numbers, drivers of air fare, and determinants of competition, suggests that LCC entry in routes such as “Evansville, In - Cincinnati, OH” would increase passenger traffic by 50%. LCCs looking for opportunity gaps could benefit from results presented in the paper.

Keywords: Midwest, Low cost carrier, aviation industry, demand analysis, 3SLS

INTRODUCTION

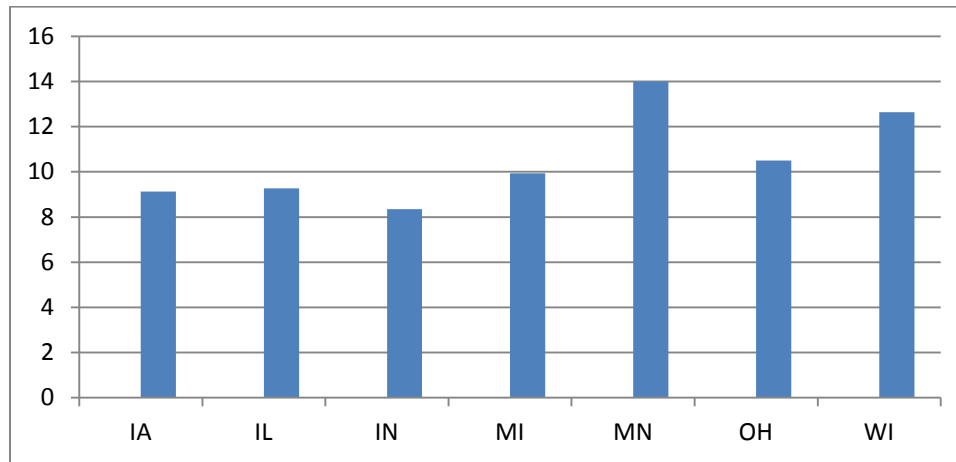
This paper explores demand for air-travel among the upper Midwest states which include Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin. Collectively, they house 88 airports that possess part-139 certification; a requirement for passenger-carrying operations (see http://www.faa.gov/airports/airport_safety/part139_cert/)¹. Most of these airports tend to be “focus cities” which are ideal for service by low-cost carriers (LCCs) (Piper, 2009). While the extant literature lacks a precise definition of an LCC, the notion of cost reduction: a business model that offers low fares, characterizes LCCs. More precisely, attributes of LCCs include: direct flights emphasizing point-to-point transit, a single passenger class, unreserved seating, and charges for priority boarding, and snacks and drinks (Lawton, 2003). Research suggests that lower prices of LCCs influence customers to take weekend breaks in destinations that are farther afield, and take advantage of job opportunities hundreds of miles away (Daraban, and Fournier, 2006). Is there room for LCC entry in the upper-Midwest?

LONG-DISTANCE TRAVEL IN THE UPPER MIDWEST

Overall, around 0.53 billion long-distance trips are taken by the upper Midwest residents every year; nationally 3.2 billion trips (NHTS, 2009). These are trips of 50 miles or more away from home for people of all ages, by all modes of travel, and for any purpose. People in Indiana take the least number of trips (8 trips per year). The opposite is true for Minnesota residents (14 trips per year; see Figure 1).

¹ A list of these airports can be obtained from the author.

Figure 1: Average Number of Long-Distance Trips in a Year: Upper-Midwest States

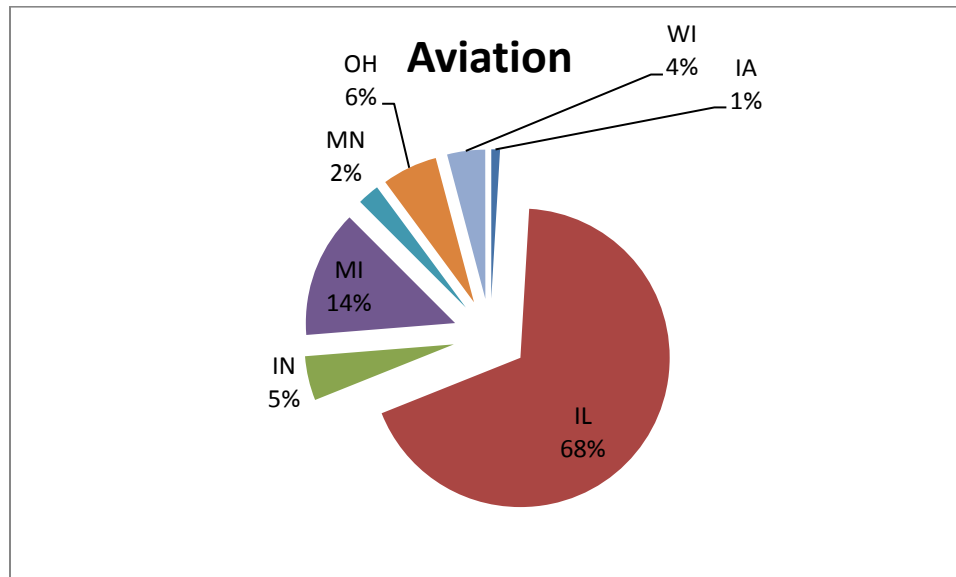


Although Illinois residents take only nine long-distance trips in a year, they travel the farthest; 773 miles, compared to 361 miles for the entire upper Midwest (Table 1). These lengthier trips often require airplane travel. Figure 2 shows the share of aviation, state-wise, on total long-distance trips originating in the region.

Table 1: Long-Distance Trips: Distance and Model of Travel

State	Avg. Trip Distance (Miles)	Travel Mode	
		Automobile	Airplane
IA	191	91%	2%
IL	702	64%	33%
IN	263	91%	5%
MI	285	87%	8%
MN	189	98%	2%
OH	361	94%	3%
WI	209	97%	3%
Upper Midwest	361	87%	10%

Figure 2: Share of Aviation in the Region: A State-wise Analysis



As for the motivation of long-distance travel, approximately one-in-three trips (35%) are for social and recreation activities; 15% for work purposes; 10% for shopping, and 7% for eating-out purposes. Long-distance travel for personal / family obligation accounts for less than 3% of all long-distance trips. Given such a travel pattern, is there room for LCC entry? In the next section we address the rationale for focusing on LCCs. Empirical analysis of the upper-Midwest aviation market follows.

RATIONALE FOR THE STUDY

The salience of LCCs to the economic development of a region can be highlighted using the ‘economies of flows’ framework (Williams and Balaz, 2009; Hudson, 2004). The framework suggests that regions are constituted of local and more spatially stretched social and economic relationships. These relationships are facilitated by LCCs. Specifically, (i) labor migration is shaped by changes in the costs of air travel, and (ii) LCCs shape business connectivity by facilitating face-to-face contacts among business personnel, and hence knowledge transfers, which in turn influence inward investment or capital flows. Put simply, economically successful regions tend to possess LCCs to move information and people securely, quickly and efficiently (Docherty 2004; Neal 2010).

This kind of reasoning is part of the general theories of regional competitiveness and regional externalities (see for example, Camagni 2003). These theories conceptualize a region as having absolute competitive advantages in one or more technological, social, infrastructural or institutional assets. These assets, although external to firms, benefit individual firms in a manner that no set of alternative factor prices would induce a geographical redistribution of economic activity. Put differently, these assets tend to give the region’s firms higher productivity than would otherwise be the case.

THE DEMAND MODEL

Data from National Household Travel Survey (NHTS, 2009) suggest that IA, and OH residents travel by plane mostly for work purposes. The opposite is true for Wisconsin residents; 80% travel by plane for social and recreational purposes.

Irrespective of motivation, literature on factors influencing air travel suggests that air fares, presence of LCC, and attractions of the origin-destination cities as major determinants (Ito and Lee 2003). A demand function based on these drivers is given below (equation 1).

$$PASS_{AB} = f\{FARE_{AB}, LCC_{AB}, POP_{AB}, INC_{AB}\} \quad (1)$$

where, $PASS_{AB}$ = annual passengers between cities A and B;
 $FARE_{AB}$ = vector of average airfares between routes A and B;
 LCC_{AB} = Presence of LCCs in the route;
 POP_{AB} = Population of the origin / destination cities or endpoints, and
 INC_{AB} = Per capita income of the population at endpoints.

A careful scrutiny of equation 1 reveals that $FARE_{AB}$ is endogenous, or determined within the system. The determinant of $FARE_{AB}$ is number of airlines servicing the route (COMP) (equation 2):

$$FARE_{AB} = f\{COMP_{AB}\} \quad (2)$$

where, $COMP_{AB}$ denotes the number of passenger airlines servicing the route.

Again, since $COMP_{AB}$ is endogenous, equation 3 highlights the hypotheses about its predictors.

$$COMP_{AB} = f\{LF_{AB}, FARE_{AB}\} \quad (3)$$

Where, LF_{AB} is the average load factor or flight productivity in the route AB .

Note that the structural equation system of three interdependent equations is a set of simultaneous equations. Hence we utilize three stage least squares (3SLS) to obtain parameter estimates. The estimation procedures commence with equation 4:

$$\overset{\Delta}{Z}_i = X(X'X)^{-1}X'Z_i \quad (4)$$

where X is a 143×6 matrix of exogenous variables that contains vectors of city-pair population, income, fare, presence of LCCs, and load factor;
 Z_1 is a 143×5 matrix which includes a unit vector and the four explanatory variables given in equation 1, Z_2 is a 143×2 matrix with one explanatory variable (equation 2), and Z_3 is a 143×3 matrix with two explanatory variables (equation 3).

Next, we stack the $\overset{\Delta}{Z}_i$ matrices as in equation 5

$$\hat{\beta} = [Z'(\Sigma^{-1} \otimes I_3)Z]^{-1}Z'(\Sigma^{-1} \otimes I_3)y \quad (5)$$

where, Σ is the variance – covariance matrix of the *three* equations

note that $e_i = y_i - \left(\begin{matrix} \hat{\beta}' & \hat{\beta}' \end{matrix} \right)^{-1} \begin{matrix} \hat{\beta}' \\ Z_i' \end{matrix} y_i X' y_i$; and

$\hat{\beta}$ denote the 10 parameters of the *three* equations.

Table 2 lists the operational definitions of variables used in model construction. Appendix 1 contains the data used in the analysis. A double-log functional form was utilized to model the data.

Table 2: Variables, Definitions, and Data Source

Variable	Description	Source
PASS _{AB}	Annual total passengers for the route (2010 data).	< http://www.transtats.bts.gov/Data_Elements.aspx? >
FARE _{AB}	Vector of average airfares between routes A and B; calculated using 2010 data.	< http://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=247&DB_Short_Name=Origin%20and%20Destination%20Survey >
POP _{AB}	Product of population at the end points.	< http://www.census.gov >
INC _{AB}	Median weekly per capita income at the end points.	< http://www.census.gov >
COMP _{AB}	Number of competitors in the route; calculated by adding operating carriers between the origin and destination airports.	< http://www.transtats.bts.gov/DL_SelectFields.asp?Table_ID=258&DB_Short_Name=Air%20Carriers >
LF _{AB}	The percentage of available seats, or maximum carrying weight paid for and used by passengers; average for A and B.	< http://www.transtats.bts.gov/Data_Elements.aspx?Data=5 >
LCC	Indicates the presence of low cost carrier(s) in the route.	LCCs = 1; Otherwise = 0

RESULTS

The 143 city-pair observations used in the analysis had a combined total of 18.44 million airline seats (Appendix 1). The busiest route in the region is the Chicago, IL - Minneapolis-St. Paul International (MSP) connection. During 2010, five airlines serviced the route and charged an average of \$113 for a roundtrip. The load factor for the city-pair connection was 81%.

Table 3 highlights the descriptive statistics for all of the variables. The zero-order correlations among the variables reveal that LCCs are associated with increased competition, and reduced roundtrip fares. Forty one percent of the routes had one or more LCCs (Appendix 1). In general, population in the city-pair route co-varies with number of passengers in the route.

Table 3: Descriptive Statistics

Variable	Mean (SD)	PASS	FARE	POP	INC	COMP	LF	LCC
PASS	128923 (15603)	1						
FARE	278 (105)	-.308**	1					
POP	982662 (54776)	.393**	-.037	1				
INC	458 (69)	.156	.052	.202*	1			
COMP	4 (.87)	.214*	-.12	.07	-.21*	1		
LF	78 (3.5)	.377**	-.21*	-.02	-.17*	.465**	1	
LCC	.41 (.49)	.03	-.31**	-.145	-.07	.183*	.357**	1

Note: **Correlation is significant at the 0.01 level; *Correlation is significant at the 0.05 level

The results of the simultaneous estimation of equations 1 to 3 are presented in Table 4. As expected, number of passengers in the route depends on fare, population, income, and the presence of one or more LCCs in the route. Collectively, the explanatory variables, including the constant, account for 83% of the single-equation variation in passenger numbers between the 143 pairs. As a double-log function, the parameter estimates can be interpreted as elasticities.

Table 4: Passenger Demand Model

Explanatory Variable	Parameter (SD)	t	p
Ln (product of populations at city-pair)	0.402 (0.539)	7.44	2.54408×10^{-11}
Ln (product of weekly per capita income at the end points)	0.502 (0.194)	2.58	0.0151066
Dummy variable that indicates the presence of LCCs in the route	0.898 (0.35)	2.52	0.0182334
Ln (average fare)	-0.187 (.07)	-2.43	0.0215703
Constant	-6.652 (2.68)	-2.48	0.0193091
R^2			0.83
Adjusted R^2			0.82
Number of observations			143

As shown in Table 4, the presence of LCCs is expected to stimulate passenger traffic. Also, air fare decreases with competition (see the air fare model shown in Table 5). Note that 41% of the variability in air fares is captured by the model in Table 5.

Table 5: The Air Fare Model

Explanatory Variable	Parameter (SD)	t	p
Ln (number of competitors in the route)	-0.931289 (0.280739)	-3.31727	1.50873×10^{-36}
Constant	6.84417 (0.392703)	17.4284	0.00191837
R^2			0.41
Adjusted R^2			0.39
Number of observations			143

Finally, Table 6 summarizes the results of the competition model. All right-hand-side variables except the constant are statistically significant at the $p \leq 0.001$ level. Load factor is positively related to number of competitors. In line with expectations, airfare decreases with increased competition.

Table 6: Airline Competition

Explanatory Variable	Parameter (SD)	t	p
Ln (load factor)	0.762423 (0.224741)	3.39245	0.00151813
Ln (average fare)	-0.438334 (0.11065)	-3.96447	0.000220022
Constant	-2.80867 (2.25306)	-1.2466	0.182872
R ²			0.21
Adjusted R ²			0.17
Number of observations			143

INTRODUCTION OF LCCs: SCENARIO ANALYSIS

In this section we address the question, “what would happen to passenger traffic if LCCs enter the market”. The model system discussed in the previous section is employed to implement the scenario analysis. Symbolically, the prediction equation is:

$$PASS_{AB} = f[\{FARE_{AB} = f\{COMP_{AB}\}, [COMP_{AB} = f\{LF_{AB}, FARE_{AB}\}], LCC_{AB}, POP_{AB}, INC_{AB}\}]$$

For each of the 143 city-pair connections, the relationship between actual and predicted passenger movements is shown in Table 7. On average, the predictions are slightly higher than the actual numbers (0.88 points higher).

Table 7: Calibrated Passenger Movements

Airport A	Airport B	Ln		Difference
		Actual	Predicted	
Evansville, IN (EVV)	Cincinnati, OH (CVG)	10.32	10.98	-0.66
Wausau/Marshfield, WI (CWA)	Detroit, MI (DTW)	10.33	11.22	-0.89
Chicago, IL (ORD)	Dubuque, IA (DBQ)	10.33	11.46	-1.13
Cincinnati, OH (CVG)	Fort Wayne, IN (FWA)	10.34	11.77	-1.43
Chicago, IL (ORD)	Saginaw/Bay City/Midland, MI (MBS)	10.37	11.90	-1.53
Cleveland, OH (CLE)	Columbus, OH (CMH)	10.40	12.19	-1.79
Milwaukee, WI (MKE)	Grand Rapids, MI (GRR)	10.42	11.70	-1.28
Columbus, OH (CMH)	Cleveland, OH (CLE)	10.46	12.19	-1.73
Columbus, OH (LCK)	Milwaukee, WI (MKE)	10.46	12.47	-2.01
Dayton, OH (DAY)	Cleveland, OH (CLE)	10.47	11.46	-0.99
Chicago, IL (ORD)	Lansing, MI (LAN)	10.48	12.06	-1.58
Chicago, IL (ORD)	CAPITAL REGION INTL, MI (LAN)	10.48	11.64	-1.17
Cleveland, OH (CLE)	Dayton, OH (DAY)	10.48	11.38	-0.90
Lansing/CAPITAL REGION INTL, MI (LAN)	Chicago, IL (ORD)	10.49	12.23	-1.74
Bloomington, IL (BMI)	Chicago, IL (ORD)	10.51	12.23	-1.72

Milwaukee, WI (MKE)	Columbus, OH (CMH)	10.52	12.47	-1.96
Cincinnati, OH (CVG)	Cleveland, OH (CLE)	10.53	11.95	-1.42
Chicago, IL (ORD)	Kalamazoo, MI (AZO)	10.54	11.92	-1.38
Chicago, IL (ORD)	Springfield, IL (SPI)	10.54	12.05	-1.51
Minneapolis-St Paul International (MSP)	Moline, IL (MLI)	10.55	11.65	-1.11
Moline, IL (MLI)	Minneapolis-St Paul International (MSP)	10.55	11.65	-1.11
Milwaukee, WI (MKE)	Madison, WI (MSN)	10.57	11.75	-1.17
Akron, OH (CAK)	Chicago, IL (ORD)	10.58	12.74	-2.16
KALAMAZOO/BATTLE CREEK INTL, MI (AZO)	Chicago, IL (ORD)	10.58	12.55	-1.97
Chicago, IL (ORD)	Evansville, IN (EVV)	10.59	12.25	-1.67
Detroit, MI (DTW)	Cedar Rapids/Iowa City, IA (CID)	10.59	11.93	-1.34
Evansville, IN (EVV)	Chicago, IL (ORD)	10.62	12.24	-1.62
FLINT - BISHOP INTL, MI (FNT)	Chicago, IL (ORD)	10.65	12.34	-1.69
Cleveland, OH (CLE)	Cincinnati, OH (CVG)	10.66	12.03	-1.38
Des Moines, IA (DSM)	Minneapolis/St. Paul (MSP)	10.66	12.26	-1.61
Detroit, MI (DTW)	Akron, OH (CAK)	10.67	11.88	-1.21
Chicago, IL (ORD)	Flint, MI (FNT)	10.70	12.28	-1.59
La Crosse, WI (LSE)	Chicago, IL (ORD)	10.71	11.82	-1.11
Chicago, IL (ORD)	La Crosse, WI (LSE)	10.71	11.92	-1.21
Akron, OH (CAK)	Detroit, MI (DTW)	10.72	11.88	-1.15
Cincinnati, OH (CVG)	Dayton, OH (DAY)	10.72	11.29	-0.57
Cedar Rapids/Iowa City, IA (CID)	Minneapolis/St. Paul (MSP)	10.73	12.06	-1.33
Detroit, MI (DTW)	Moline, IL (MLI)	10.73	11.53	-0.80
Cleveland, OH (CLE)	Indianapolis, IN (IND)	10.74	12.34	-1.61
Minneapolis-St Paul International (MSP)	La Crosse, WI (LSE)	10.74	11.20	-0.46
Moline, IL (MLI)	Detroit, MI (DTW)	10.74	11.74	-0.99
La Crosse, WI (LSE)	Minneapolis-St Paul International (MSP)	10.75	11.31	-0.55
Minneapolis-St Paul International (MSP)	Rochester Municipal (RST)	10.76	11.81	-1.05
Indianapolis, IN (IND)	Cleveland, OH (CLE)	10.76	12.34	-1.59
Wausau/Marshfield, WI (CWA)	Minneapolis-St Paul International (MSP)	10.78	11.34	-0.55
Rochester Municipal (RST)	Minneapolis-St Paul International (MSP)	10.79	11.80	-1.01
Minneapolis-St Paul International (MSP)	Cedar Rapids/Iowa City, IA (CID)	10.79	12.06	-1.27
Cincinnati, OH (CVG)	Milwaukee, WI (MKE)	10.80	12.26	-1.46
Detroit, MI (DTW)	Appleton, WI (ATW)	10.84	11.56	-0.72
Detroit, MI (DTW)	Dayton, OH (DAY)	10.85	11.61	-0.76
Detroit, MI (DTW)	Des Moines, IA (DSM)	10.86	12.08	-1.21
Des Moines, IA (DSM)	Detroit, MI (DTW)	10.87	11.97	-1.10
Rochester Municipal (RST)	Chicago, IL (ORD)	10.87	12.34	-1.47
Minneapolis-St Paul International (MSP)	Wausau/Marshfield, WI (CWA)	10.87	11.34	-0.47
Detroit, MI (DTW)	Fort Wayne, IN (FWA)	10.89	11.93	-1.04

Dayton, OH (DAY)	Detroit,MI (DTW)	10.91	11.60	-0.70
Madison, WI (MSN)	Milwaukee, WI (MKE)	10.91	11.85	-0.95
Appleton, WI (ATW)	Minneapolis-St Paul International (MSP)	10.91	11.63	-0.72
Chicago,IL (ORD)	Wausau/Marshfield, WI (CWA)	10.97	11.89	-0.92
Champaign/Urbana, IL (CMI)	Chicago,IL (ORD)	10.98	11.60	-0.61
Wausau/Marshfield, WI (CWA)	Chicago,IL (ORD)	10.98	11.78	-0.80
Chicago,IL (ORD)	Champaign/Urbana, IL (CMI)	10.99	11.60	-0.61
Chicago,IL (ORD)	Fort Wayne, IN (FWA)	11.01	12.72	-1.71
Detroit,MI (DTW)	Cleveland,OH (CLE)	11.02	12.02	-1.00
Milwaukee, WI (MKE)	Cleveland,OH (CLE)	11.02	12.11	-1.09
Duluth International (DLH)	Minneapolis-St Paul International (MSP)	11.04	11.77	-0.73
Cleveland,OH (CLE)	Detroit,MI (DTW)	11.07	12.02	-0.96
Cleveland,OH (CLE)	Milwaukee, WI (MKE)	11.08	12.11	-1.03
KALAMAZOO/BATTLE CREEK INTL, MI (AZO)	Detroit,MI (DTW)	11.11	12.08	-0.97
Chicago,IL (ORD)	South Bend, IN (SBN)	11.16	12.24	-1.08
Traverse City/CHERRY CAPITAL, MI (TVC)	Chicago,IL (ORD)	11.19	11.49	-0.30
Appleton, WI (ATW)	Chicago,IL (ORD)	11.19	12.40	-1.21
Chicago,IL (ORD)	Appleton, WI (ATW)	11.19	12.40	-1.21
Chicago,IL (ORD)	Traverse City, MI (TVC)	11.20	11.51	-0.31
Traverse City/CHERRY CAPITAL, MI (TVC)	Detroit,MI (DTW)	11.23	10.73	0.50
Chicago, IL (ORD)	Peoria, IL (PIA)	11.24	12.47	-1.23
Peoria, IL (PIA)	Chicago,IL (ORD)	11.25	12.48	-1.23
Minneapolis-St Paul International (MSP)	Duluth International (DLH)	11.29	11.84	-0.55
Chicago,IL (ORD)	Duluth International (DLH)	11.29	12.47	-1.18
Lansing/CAPITAL REGION INTL, MI (LAN)	Detroit,MI (DTW)	11.33	11.61	-0.28
Cincinnati, OH (CVG)	Columbus,OH (CMH)	11.36	12.19	-0.83
Detroit,MI (DTW)	Cincinnati, OH (CVG)	11.36	12.28	-0.92
Minneapolis-St Paul International (MSP)	Des Moines, IA (DSM)	11.37	12.18	-0.81
Chicago,IL (ORD)	Dayton, OH (DAY)	11.39	12.53	-1.15
Dayton, OH (DAY)	Chicago, IL (ORD)	11.41	12.52	-1.11
FLINT - BISHOP INTL, MI (FNT)	Detroit,MI (DTW)	11.42	11.54	-0.12
Minneapolis-St Paul International (MSP)	Columbus,OH (CMH)	11.45	13.00	-1.54
Cincinnati, OH (CVG)	Detroit,MI (DTW)	11.45	12.18	-0.73
Minneapolis-St Paul International (MSP)	Green Bay/Clintonville, WI (GRB)	11.47	11.74	-0.27
Green Bay/Clintonville, WI (GRB)	Minneapolis-St Paul International (MSP)	11.49	11.85	-0.35
Detroit,MI (DTW)	Columbus,OH (CMH)	11.52	12.48	-0.95
Cincinnati, OH (CVG)	Minneapolis-St Paul International (MSP)	11.52	12.70	-1.18
Chicago, IL (ORD)	Moline, IL (MLI)	11.54	12.12	-0.58
Green Bay/Clintonville, WI (GRB)	Detroit,MI (DTW)	11.55	11.51	0.04
Chicago IL (MDW)	Indianapolis, IN (IND)	11.56	13.31	-1.76
Minneapolis-St Paul International (MSP)	Cleveland,OH (CLE)	11.60	12.63	-1.03

Moline, IL (MLI)	Chicago, IL (ORD)	11.60	12.03	-0.43
Minneapolis-St Paul International (MSP)	Grand Rapids, MI (GRR)	11.61	12.08	-0.47
Chicago,IL (ORD)	Green Bay/Clintonville, WI (GRB)	11.62	12.37	-0.75
Cleveland,OH (CLE)	Minneapolis-St Paul International (MSP)	11.63	12.55	-0.93
Green Bay/Clintonville, WI (GRB)	Chicago,IL (ORD)	11.63	12.18	-0.55
Indianapolis, IN (IND)	Chicago,IL (MDW)	11.74	13.23	-1.49
Madison, WI (MSN)	Minneapolis-St Paul International (MSP)	11.75	12.38	-0.63
Minneapolis-St Paul International (MSP)	Madison, WI (MSN)	11.86	12.28	-0.42
Cedar Rapids/Iowa City, IA (CID)	Chicago, IL (ORD)	11.89	12.55	-0.65
Chicago,IL (ORD)	Cedar Rapids/Iowa City, IA (CID)	11.90	12.55	-0.65
Chicago, IL (ORD)	Milwaukee, WI (MKE)	11.90	12.89	-0.99
Madison, WI (MSN)	Detroit,MI (DTW)	11.95	12.18	-0.24
Minneapolis-St Paul International (MSP)	Indianapolis, IN (IND)	11.95	12.95	-1.00
Detroit,MI (DTW)	Madison, WI (MSN)	11.97	12.18	-0.21
Milwaukee, WI (MKE)	Chicago,IL (ORD)	11.99	12.89	-0.90
Indianapolis, IN (IND)	Minneapolis-St Paul International (MSP)	12.00	13.03	-1.03
Detroit,MI (DTW)	Indianapolis, IN (IND)	12.04	12.55	-0.51
Indianapolis, IN (IND)	Detroit,MI (DTW)	12.05	12.63	-0.58
Des Moines, IA (DSM)	Chicago, IL (ORD)	12.06	12.74	-0.67
Chicago,IL (ORD)	Grand Rapids, MI (GRR)	12.12	12.60	-0.49
Madison, WI (MSN)	Chicago,IL (ORD)	12.12	12.84	-0.72
Chicago, IL (ORD)	Des Moines, IA (DSM)	12.14	12.82	-0.68
Detroit,MI (DTW)	Green Bay/Clintonville, WI (GRB)	12.20	11.61	0.59
Chicago, IL (MDW)	Columbus,OH (CMH)	12.26	13.34	-1.08
Chicago, IL (MDW)	Cleveland,OH (CLE)	12.28	12.91	-0.63
Columbus,OH (LCK)	Chicago, IL (MDW)	12.31	13.34	-1.03
Cleveland,OH (CLE)	Chicago, IL (MDW)	12.32	12.99	-0.67
Chicago, IL (ORD)	Cincinnati, OH (CVG)	12.35	12.87	-0.52
Cincinnati, OH (CVG)	Chicago, IL (ORD)	12.38	13.06	-0.68
Chicago, IL (MDW)	Detroit,MI (DTW)	12.50	13.16	-0.67
Detroit,MI (DTW)	Chicago, IL (MDW)	12.59	13.08	-0.49
Columbus,OH (CMH)	Chicago, IL (ORD)	12.59	13.36	-0.77
Chicago,IL (ORD)	Columbus,OH (CMH)	12.60	13.37	-0.77
Indianapolis, IN (IND)	Chicago,IL (ORD)	12.60	13.35	-0.75
Chicago,IL (ORD)	Indianapolis, IN (IND)	12.61	13.35	-0.74
Cleveland,OH (CLE)	Chicago, IL (ORD)	12.72	13.02	-0.29
Chicago, IL (ORD)	Cleveland,OH (CLE)	12.73	13.02	-0.29
Milwaukee, WI (MKE)	Minneapolis-St Paul International (MSP)	12.89	12.58	0.31
Minneapolis-St Paul International (MSP)	Chicago, IL (MDW)	12.90	13.41	-0.51
Minneapolis-St Paul International (MSP)	Milwaukee, WI (MKE)	12.90	12.58	0.33
Chicago, IL (MDW)	Minneapolis-St Paul International (MSP)	12.91	13.17	-0.25

Minneapolis-St Paul International (MSP)	Detroit,MI (DTW)	13.10	12.83	0.26
Detroit,MI (DTW)	Minneapolis/St. Paul	13.14	12.83	0.31
Detroit,MI (DTW)	Chicago,IL (ORD)	13.18	13.17	0.01
Chicago,IL (ORD)	Detroit,MI (DTW)	13.19	13.19	0.00
Chicago,IL (ORD)	Minneapolis-St Paul International (MSP)	13.63	13.43	0.20
Minneapolis-St Paul International (MSP)	Chicago, IL (ORD)	14.02	13.51	0.51

Note: Natural logs are reported. Color-coded routes have LCC operations.

If LCC is introduced in each of the 85 routes that are functioning without a low-cost airline, total passenger movements would increase from the current 18.44 mil to around 32mil. However, since it might be difficult, if not impossible, for LCCs to service from Chicago O'Hare (airport charges and aviation gridlock would be the major constraints (Chicago Tribune, 2010)), we focus mainly on the non-O'Hare routes shown in Table 8.

As shown in the Table, we expect the "Cincinnati, OH (CVG) - Fort Wayne, IN (FWA)" route to benefit the most from LCC introduction; passenger numbers are forecast to more than double from approximately 31,000 to 70,000. The "Evansville, In – Cincinnati, OH" link, and the "Detroit, MI – Fort Wayne, IN" route are forecast to see at least 50% surge in passenger numbers with the introduction of LCC services. These predictions correlate with industry forecasts highlighted by Polek (2010).

Table 8: Impact of Introducing a LCC on Passenger Movements

Airport A	Airport B	No. of Passengers	
		Current (2010)	Prediction with LCC
Cincinnati, OH (CVG)	Columbus,OH (CMH)	85418	104534
Cincinnati, OH (CVG)	Detroit,MI (DTW)	94306	99084
Cincinnati, OH (CVG)	Fort Wayne, IN (FWA)	30978	69912
Cleveland,OH (CLE)	Detroit,MI (DTW)	63995	78503
Dayton, OH (DAY)	Cleveland,OH (CLE)	35215	47408
Detroit,MI (DTW)	Appleton, WI (ATW)	51241	58837
Detroit,MI (DTW)	Fort Wayne, IN (FWA)	53753	80861
Duluth International (DLH)	Minneapolis-St Paul International (MSP)	62215	68910
Evansville, IN (EVV)	Cincinnati, OH (CVG)	30313	49875
La Crosse, WI (LSE)	Minneapolis-St Paul International (MSP)	46760	51254
Wausau/Marshfield, WI (CWA)	Detroit,MI (DTW)	30585	45394
Wausau/Marshfield, WI (CWA)	Minneapolis-St Paul International (MSP)	48279	51887
Total		633058	806459

CONCLUSION

Ryan Air, the low cost Irish Airline, plans to sell standing room tickets on flights of less than two hour duration (Robinson, 2009). Other discount airlines including the Chinese carrier Spring have expressed interest in adapting the Ryan Air model. While in this country the FAA stipulates that every passenger over the age of two must have a seat, new discount airlines are

expected to emerge in the coming years and takeaway market share from major, legacy airlines (Ito and Lee, 2003; Johnsson, 2010). We hope that the modeling system developed in this paper would be of use to LCCs wanting to enter the Upper Midwest marketplace.

Preliminary and tentative. Please do not cite or quote

REFERENCES

- Camagni, R. (2003) Regional clusters, regional competencies and regional competition. Cluster Management and Stuctural Policy- International Experiences and Consequences for Northrhine-Westfalia. Duisburg.
- Chicago Tribune (2010). Bad air days: FAA: State of plane travel not improving anytime soon, *Chicago Tribune Red Eye Edition* (IL), March 10, 2010
- Daraban, B., & Fournier, G. M. (2006). The impact of low cost carriers on airfares: Insights from spatial econometrics, Working paper: Florida State University.
- Docherty, J. (2004). Transport and regional economic competitiveness in the global economy, *Journal of Transport Geography*, 12, 341–342
- Hudson, P., 2004, “Industrial Organization and Structure,” in Floud, R. and Johnson, P., editors, *The Cambridge Economic History of Modern Britain*, London, UK: Cambridge University Press.
- Ito, H., and Lee, D. (2003). *Low Cost Carrier Growth in the US Airline Industry: Past, Present , and Future*, Providence, Rhode Island: Brown University.
- Johnsson, J. (2010). United merger may be bumpy: Regulators will study effect on ticket prices, competition, *Chicago Tribune Red Eye Edition* (IL), My 18, 2010
- Lawton, T. C. (2003). Low Fare Airlines in Asia: An Exploratory Study of Cost Competition, Market Dynamics and Sustainable Advantage, Air Transportation Research Society World Conference, July 10-12, 2003, Toulouse, France.
- Neal, Z (2011). From Central Places to Network Bases: A Transition in the US Urban Hierarchy, 1900 – 2000, *City and Community* 10, 49 – 74.
- NHTS (2009). U.S. Department of Transportation, Federal Highway Administration, 2009 National Household Travel Survey. URL: <http://nhts.ornl.gov>.
- Piper, A. (2009). Delta move no surprise, *Telegraph Herald* (Dubuque, IA), July 1, 2009.
- Polek, G. (2010). Airbus raises expectations in latest forecast, *Aerospace Industry, Air Transport & Cargo*
- Robinson, A. (2009). How much would you pay for a flying barstool? Ryanair hopes to find out, *St. Paul Examiner* (MN), July 7, 2009.
- Williams, A., and Balaz, V. (2009). Low Cost Carriers, Economies of Flows and Regional Externalities, *Regional Studies*, 43(5), 677-691.

APPENDIX 1 – RAW DATA

Airport A	Airport B	Avg. Pop	Avg.Inc	Pax	Avg. LF	MF	LCCexist	Comp
Evansville, IN (EVV)	Cincinnati, OH (CVG)	223042.5	431.71	30313	68.495	260	0	2
Wausau/Marshfield, WI (CWA)	Detroit,MI (DTW)	437343.5	380.33	30585	72.08	302	0	4
Chicago,IL (ORD)	Dubuque, IA (DBQ)	1428657	485.98	30700	71.26	301	0	1
Cincinnati, OH (CVG)	Fort Wayne, IN (FWA)	291144	458.73	30978	78.205	424	0	4
Chicago,IL (ORD)	Saginaw/Bay City/Midland, MI (MBS)	1427095	444.73	31930	70.425	446	0	4
Cleveland,OH (CLE)	Columbus,OH (CMH)	592898.5	386.02	32896	78.44	139	0	5
Milwaukee, WI (MKE)	Grand Rapids, MI (GRR)	388858.5	353.575	33672	78.64	265	1	5
Columbus,OH (CMH)	Cleveland,OH (CLE)	592898.5	386.02	34914	78.425	211	0	5
Columbus,OH (LCK)	Milwaukee, WI (MKE)	665881	408.795	35057	77.35	137	1	4
Dayton, OH (DAY)	Cleveland,OH (CLE)	296751.5	326.465	35215	77.47	382	0	5
Chicago,IL (ORD)	Lansing, MI (LAN)	1457683	430.17	35506	72.165	326	0	3
Chicago,IL (ORD)	CAPITAL REGION INTL, MI (LAN)	1417667	450.9308	35506	72.165	376	0	3
Cleveland,OH (CLE)	Dayton, OH (DAY)	296751.5	326.465	35679	77.7	202	1	4
Lansing/CAPITAL REGION INTL, MI (LAN)	Chicago,IL (ORD)	1456901	450.9308	36041	72.55	275	0	4
Bloomington, IL (BMI)	Chicago,IL (ORD)	1435241	550.055	36535	75.805	353	1	4
Milwaukee, WI (MKE)	Columbus,OH (CMH)	665881	408.795	36876	77.41	135	1	4
Cincinnati, OH (CVG)	Cleveland,OH (CLE)	385250	390.55	37555	80.255	387	0	4
Chicago,IL (ORD)	Kalamazoo, MI (AZO)	1435721	420.295	37644	70.46	362	0	5
Chicago, IL (ORD)	Springfield, IL (SPI)	1455479	534.885	37761	68.675	290	0	2
Minneapolis-St Paul International (MSP)	Moline, IL (MLI)	355297.5	551.825	38062	77.4	261	1	4
Moline, IL (MLI)	Minneapolis-St Paul International (MSP)	355297.5	551.825	38088	77.4	318	0	4
Milwaukee, WI (MKE)	Madison, WI (MSN)	401925	473.295	39085	78.74	218	1	3
Akron, OH (CAK)	Chicago, IL (ORD)	1503967	451.01	39323	80.3	315	0	4
KALAMAZOO/BATTLE CREEK INTL, MI (AZO)	Chicago,IL (ORD)	1524204	501.825	39334	70.7	424	0	4
Chicago,IL (ORD)	Evansville, IN (EVV)	1456814	459.785	39543	69.72	449	0	4
Detroit,MI (DTW)	Cedar Rapids/Iowa City, IA (CID)	482053.5	405.735	39797	78.695	432	0	4
Evansville, IN (EVV)	Chicago,IL (ORD)	1456814	459.785	41124	68.795	404	0	4
FLINT - BISHOP INTL, MI (FNT)	Chicago,IL (ORD)	1455738	409.1135	42354	78.975	154	1	5

Cleveland,OH (CLE)	Cincinnati, OH (CVG)	385250	390.55	42449	80.325	342	0	5
Des Moines, IA (DSM)	Minneapolis/St. Paul (MSP)	431901	531.365	42458	77.195	209	1	5
Detroit,MI (DTW)	Akron, OH (CAK)	522822.5	336.61	43032	81.035	228	1	5
Chicago,IL (ORD)	Flint, MI (FNT)	1454152	409.49	44231	80.715	254	0	4
La Crosse, WI (LSE)	Chicago,IL (ORD)	1425484	463.635	44742	70.44	100	0	3
Chicago,IL (ORD)	La Crosse, WI (LSE)	1425484	463.635	44964	70.44	286	0	4
Akron, OH (CAK)	Detroit,MI (DTW)	522822.5	336.61	45410	80.95	368	1	5
Cincinnati, OH (CVG)	Dayton, OH (DAY)	243959.5	395.415	45431	78.165	407	0	5
Cedar Rapids/Iowa City, IA (CID)	Minneapolis/St. Paul (MSP)	396600	557.31	45782	78.035	362	0	4
Detroit,MI (DTW)	Moline, IL (MLI)	440751	400.25	45786	78.06	234	1	5
Cleveland,OH (CLE)	Indianapolis, IN (IND)	614428.5	404.645	46077	79.41	120	1	4
Minneapolis-St Paul International (MSP)	La Crosse, WI (LSE)	358886	500.81	46195	70.43	319	0	3
Moline, IL (MLI)	Detroit,MI (DTW)	440751	514.65	46222	77.4	228	1	4
La Crosse, WI (LSE)	Minneapolis-St Paul International (MSP)	358886	500.81	46760	70.43	209	0	4
Minneapolis-St Paul International (MSP)	Rochester Municipal (RST)	385145	610.7212	46966	74.455	274	0	4
Indianapolis, IN (IND)	Cleveland,OH (CLE)	614428.5	404.645	47047	79.41	139	1	4
Wausau/Marshfield, WI (CWA)	Minneapolis-St Paul International (MSP)	351890	531.905	48279	71.42	268	0	4
Rochester Municipal (RST)	Minneapolis-St Paul International (MSP)	385145	610.7212	48592	74.43	154	0	4
Minneapolis-St Paul International (MSP)	Cedar Rapids/Iowa City, IA (CID)	396600	557.31	48771	78.035	338	0	4
Cincinnati, OH (CVG)	Milwaukee, WI (MKE)	458232.5	413.325	49006	79.165	265	1	5
Detroit,MI (DTW)	Appleton, WI (ATW)	453864	400.235	51241	82.135	435	0	3
Detroit,MI (DTW)	Dayton, OH (DAY)	496586	309.09	51293	79.115	229	1	4
Detroit,MI (DTW)	Des Moines, IA (DSM)	517354.5	379.79	52290	77.855	244	1	4
Des Moines, IA (DSM)	Detroit,MI (DTW)	517354.5	379.79	52594	77.935	200	1	3
Rochester Municipal (RST)	Chicago, IL (ORD)	1451743	515.65	52622	74.44	95	0	3
Minneapolis-St Paul International (MSP)	Wausau/Marshfield, WI (CWA)	351890	531.905	52681	71.42	268	0	4
Detroit,MI (DTW)	Fort Wayne, IN (FWA)	543770.5	372.405	53753	78.855	213	0	4
Dayton, OH (DAY)	Detroit,MI (DTW)	496586	309.09	54476	78.885	316	1	4
Madison, WI (MSN)	Milwaukee, WI (MKE)	401925	473.295	54566	78.92	231	1	4
Appleton, WI (ATW)	Minneapolis-St Paul International (MSP)	368410.5	551.81	54593	81.475	358	1	2
Chicago,IL (ORD)	Wausau/Marshfield, WI (CWA)	1418488	494.73	58042	71.43	378	0	4

Champaign/Urbana, IL (CMI)	Chicago,IL (ORD)	1437936	491.125	58717	72.445	324	0	1
Wausau/Marshfield, WI (CWA)	Chicago,IL (ORD)	1418488	494.73	58780	71.43	293	0	3
Chicago,IL (ORD)	Champaign/Urbana, IL (CMI)	1437936	491.125	59017	72.5	319	0	1
Chicago,IL (ORD)	Fort Wayne, IN (FWA)	1524915	486.805	60368	78.505	393	0	4
Detroit,MI (DTW)	Cleveland,OH (CLE)	637876.5	304.225	61135	81.19	164	0	5
Milwaukee, WI (MKE)	Cleveland,OH (CLE)	511024.5	344.375	61327	78.7	105	1	4
Duluth International (DLH)	Minneapolis-St Paul International (MSP)	375611.5	526.5962	62215	78.665	222	0	4
Cleveland,OH (CLE)	Detroit,MI (DTW)	637876.5	304.225	63995	81.205	169	0	5
Cleveland,OH (CLE)	Milwaukee, WI (MKE)	511024.5	344.375	65179	78.7	191	1	4
KALAMAZOO/BATTLE CREEK INTL, MI (AZO)	Detroit,MI (DTW)	543059	501.825	66796	72.52	240	0	4
Chicago,IL (ORD)	South Bend, IN (SBN)	1449258	443.51	70162	81.695	518	0	5
Traverse City/CHERRY CAPITAL, MI (TVC)	Chicago,IL (ORD)	1407266	471.74	72339	72.35	464	0	4
Appleton, WI (ATW)	Chicago,IL (ORD)	1435009	514.635	72382	81.485	410	1	5
Chicago,IL (ORD)	Appleton, WI (ATW)	1435009	514.635	72641	81.485	480	1	5
Chicago,IL (ORD)	Traverse City, MI (TVC)	1407266	471.74	73076	73.335	457	0	4
Traverse City/CHERRY CAPITAL, MI (TVC)	Detroit,MI (DTW)	426121.5	357.34	75312	74.17	260	0	4
Chicago, IL (ORD)	Peoria, IL (PIA)	1455676	523.51	75919	80.62	286	0	4
Peoria, IL (PIA)	Chicago,IL (ORD)	1455676	523.51	77018	81.29	412	0	4
Minneapolis-St Paul International (MSP)	Duluth International (DLH)	375611.5	526.5962	80074	78.385	242	0	5
Chicago,IL (ORD)	Duluth International (DLH)	1442210	489.4212	80074	78.395	428	0	4
Lansing/CAPITAL REGION INTL, MI (LAN)	Detroit,MI (DTW)	475756.5	450.9308	83624	74.37	349	0	4
Cincinnati, OH (CVG)	Columbus,OH (CMH)	540106.5	454.97	85418	78.905	352	0	4
Detroit,MI (DTW)	Cincinnati, OH (CVG)	585084.5	373.175	86108	81.74	333	0	5
Minneapolis-St Paul International (MSP)	Des Moines, IA (DSM)	431901	531.365	86893	77.195	186	1	4
Chicago,IL (ORD)	Dayton, OH (DAY)	1477731	423.49	88286	78.235	361	0	5
Dayton, OH (DAY)	Chicago, IL (ORD)	1477731	423.49	90608	78.18	345	0	5
FLINT - BISHOP INTL, MI (FNT)	Detroit,MI (DTW)	474593	409.1135	90738	80.135	243	1	4
Minneapolis-St Paul International (MSP)	Columbus,OH (CMH)	707279.5	520.22	94275	79.195	173	0	5
Cincinnati, OH (CVG)	Detroit,MI (DTW)	585084.5	373.175	94306	81.67	428	0	4
Minneapolis-St Paul International (MSP)	Green Bay/Clintonville, WI (GRB)	382640	509.865	96140	75.93	414	0	3
Green Bay/Clintonville, WI (GRB)	Minneapolis-St Paul International (MSP)	382640	509.865	98022	75.93	394	1	4

Detroit,MI (DTW)	Columbus,OH (CMH)	792733	368.645	100951	79.915	285	1	5
Cincinnati, OH (CVG)	Minneapolis-St Paul International (MSP)	499631	524.75	101119	81.01	327	1	5
Chicago, IL (ORD)	Moline, IL (MLI)	1421896	514.65	103026	77.64	370	0	5
Green Bay/Clintonville, WI (GRB)	Detroit,MI (DTW)	468093.5	358.29	103891	76.59	479	0	3
Chicago IL (MDW)	Indianapolis, IN (IND)	1795408	501.67	104343	79.005	176	1	5
Minneapolis-St Paul International (MSP)	Cleveland,OH (CLE)	552423	455.8	109139	80.545	156	1	5
Moline, IL (MLI)	Chicago, IL (ORD)	1421896	514.65	109642	77.355	287	0	4
Minneapolis-St Paul International (MSP)	Grand Rapids, MI (GRR)	430257	465	110524	80.485	396	1	5
Chicago,IL (ORD)	Green Bay/Clintonville, WI (GRB)	1449238	472.69	111539	75.94	475	1	5
Cleveland,OH (CLE)	Minneapolis-St Paul International (MSP)	552423	455.8	112098	80.545	156	1	4
Green Bay/Clintonville, WI (GRB)	Chicago,IL (ORD)	1449238	472.69	112507	75.94	476	0	3
Indianapolis, IN (IND)	Chicago,IL (MDW)	1795408	501.67	125687	79.005	189	1	4
Madison, WI (MSN)	Minneapolis-St Paul International (MSP)	443323.5	584.72	127316	80.585	236	1	4
Minneapolis-St Paul International (MSP)	Madison, WI (MSN)	443323.5	584.72	141666	80.585	280	1	3
Cedar Rapids/Iowa City, IA (CID)	Chicago, IL (ORD)	1463198	520.135	146525	78.045	380	0	4
Chicago,IL (ORD)	Cedar Rapids/Iowa City, IA (CID)	1463198	520.135	146601	78.045	406	0	4
Chicago, IL (ORD)	Milwaukee, WI (MKE)	1692004	441.4	147605	79.465	144	1	5
Madison, WI (MSN)	Detroit,MI (DTW)	528777	433.145	154657	81.245	389	0	4
Minneapolis-St Paul International (MSP)	Indianapolis, IN (IND)	728809.5	538.845	155354	80.165	277	0	4
Detroit,MI (DTW)	Madison, WI (MSN)	528777	433.145	157958	81.245	363	1	4
Milwaukee, WI (MKE)	Chicago,IL (ORD)	1692004	441.4	160530	79.465	149	1	5
Indianapolis, IN (IND)	Minneapolis-St Paul International (MSP)	728809.5	538.845	163223	80.165	156	1	5
Detroit,MI (DTW)	Indianapolis, IN (IND)	814263	387.27	169315	80.825	173	0	4
Indianapolis, IN (IND)	Detroit,MI (DTW)	814263	387.27	171187	80.825	173	1	5
Des Moines, IA (DSM)	Chicago, IL (ORD)	1498499	494.19	173431	77.205	268	1	4
Chicago,IL (ORD)	Grand Rapids, MI (GRR)	1496836	443.335	183000	80.495	341	0	5
Madison, WI (MSN)	Chicago,IL (ORD)	1509922	547.545	183456	80.595	366	1	5
Chicago, IL (ORD)	Des Moines, IA (DSM)	1498499	494.19	187149	77.205	233	1	5
Detroit,MI (DTW)	Green Bay/Clintonville, WI (GRB)	468093.5	358.29	199314	76.59	490	0	4
Chicago, IL (MDW)	Columbus,OH (CMH)	1773878	483.045	210222	78.035	213	1	5
Chicago, IL (MDW)	Cleveland,OH (CLE)	1619021	418.625	214314	79.385	173	0	4

Columbus,OH (LCK)	Chicago, IL (MDW)	1773878	483.045	221732	78.035	230	1	5
Cleveland,OH (CLE)	Chicago, IL (MDW)	1619021	418.625	224028	79.385	242	1	5
Chicago, IL (ORD)	Cincinnati, OH (CVG)	1566229	487.575	230704	81.02	176	0	3
Cincinnati, OH (CVG)	Chicago, IL (ORD)	1566229	487.575	238325	80.965	362	0	5
Chicago, IL (MDW)	Detroit,MI (DTW)	1818856	401.25	267605	80.8	169	1	5
Detroit,MI (DTW)	Chicago, IL (MDW)	1818856	401.25	293262	80.8	169	1	4
Columbus,OH (CMH)	Chicago, IL (ORD)	1773878	483.045	295025	79.15	147	0	5
Chicago,IL (ORD)	Columbus,OH (CMH)	1773878	483.045	296141	79.205	208	0	5
Indianapolis, IN (IND)	Chicago,IL (ORD)	1795408	501.67	297544	80.175	201	0	5
Chicago,IL (ORD)	Indianapolis, IN (IND)	1795408	501.67	298217	80.175	193	0	5
Cleveland,OH (CLE)	Chicago, IL (ORD)	1619021	418.625	335531	80.5	80	0	5
Chicago, IL (ORD)	Cleveland,OH (CLE)	1619021	418.625	336705	80.555	112	0	5
Milwaukee, WI (MKE)	Minneapolis-St Paul International (MSP)	625405.5	478.575	395407	79.455	90	1	4
Minneapolis-St Paul International (MSP)	Chicago, IL (MDW)	1733402	552.825	401284	79.79	171	1	4
Minneapolis-St Paul International (MSP)	Milwaukee, WI (MKE)	625405.5	478.575	402046	79.455	188	1	4
Chicago, IL (MDW)	Minneapolis-St Paul International (MSP)	1733402	552.825	406304	80.14	179	1	2
Minneapolis-St Paul International (MSP)	Detroit,MI (DTW)	752257.5	438.425	486707	81.96	251	1	5
Detroit,MI (DTW)	Minneapolis/St. Paul	752257.5	438.425	509424	81.96	279	1	5
Detroit,MI (DTW)	Chicago,IL (ORD)	1818856	401.25	530805	80.8	178	0	5
Chicago,IL (ORD)	Detroit,MI (DTW)	1818856	401.25	535326	82.05	259	0	5
Chicago,IL (ORD)	Minneapolis-St Paul International (MSP)	1733402	552.825	828583	81.31	179	0	4
Minneapolis-St Paul International (MSP)	Chicago, IL (ORD)	1733402	552.825	1228685	81.255	113	0	5