<u>The Downside of Being the Air Cap</u>

An Analysis of Factors Affecting Airline Passenger Traffic

by Harry R. Clements

As periodically reported in the Wichita Eagle newspaper this city's Mid-Continent Airport has realized some measurable increases in airline passenger traffic in recent years, which authorities attribute to the city's ongoing airline subsidy program. (Ref. 1) But according to statistics reported by the Federal Aviation Administration (FAA) Wichita still ranks at the bottom in this measure compared to other cities of similar size in this region (Des Moines, Oklahoma City, Omaha, Tulsa) on both an absolute and per capita basis. (And also compared to Kansas City, another close-by jurisdiction included in the analysis to be described.) Wichita's traffic for May and June of this year set records, but even if that performance was duplicated for every month of the year it would barely equal that for Des Moines, a city with substantially less population, for the year 2002 and Des Moines has a persistent record of traffic growth to add to it. This calls into question both the efficacy of the subsidy program and the reason for this relatively poor capability of Wichita to attract airline passengers. The latter failing, certainly related to the long term success of the subsidy, is the subject of this article.

Another recent study (Ref. 2) evaluated the likelihood of that long term success for Wichita's airline subsidy, or in fact any airline subsidy program, in broad but convincing economic and historical terms. The expectation of success was not found to be encouraging. That work did not take into account all the specific factors studied here, which only serve to further diminish the likelihood of success for Wichita's program. The results of the current analysis are intended to present some policy alternatives that might improve the program's chances, but the solutions do not appear easy to formulate and implement or in some cases even conceive.

Since the stimulation of airline traffic is the focus of this evaluation, the industry view of this phenomenon was sought from the airline industry's primary trade organization, the Air Transport Association (ATA), which has a membership of well over twenty of the country's major carriers. The Economics section of their website (they did not respond to a more detailed e-mail inquiry) lists the important elasticities (demand determinants) of air travel demand as price, income, and total trip time, and the significant substitute "services" as coming from automobiles, trains, and videoconferencing. This curiously omits alternative ways of flying, that is general and business aviation, for which there is a demonstrated relationship with airline traffic. In fact the deregulation of the airlines, which occurred over twenty years ago, and subsequent growth of the industry have had a direct and catastrophic effect on the low end, mostly piston engine, airplane industry in this country (Ref. 3). It seems plausible, given the alternative use of general and business aviation aircraft in place of airlines, that the reverse could occur under certain circumstances. (Also missing from the ATA list are airport considerations like security and amenities, but these are not likely to be substantially different for the airports involved here.)

A statistical analysis relating selected factors in the previous paragraph over a six year period (from 1997 to 2002, the most recent year with data available on all the included variables) was undertaken for the cities listed above, which are those in Wichita's region of influence that have regular airline service. There is of course a lack of statistical robustness in having observations for only six cities, but these are cities of obviously similar demographic and cultural characteristics. The inclusion of cities, even of comparable size, say in border, coastal or mountainous areas of this diverse country (and not to mention the effect of different industrial orientations and the proximity of other cities to them), would create the risk of introducing biases that were not understood (at least by the author).

Population (in this case of the Metropolitan Statistical Area, MSA) is obviously another important factor, and is included as a variable, but results are more fairly represented in normalized, that is per capita, terms since the cities/MSAs, though similar, still vary considerably in size. (In this regard it was expected that Kansas City might be an outlier, but that did not turn out to be the case.) Per capita values for traffic as the dependent variable were applied as well, but regressions were also run with absolute passenger traffic as the variable with overall less satisfactory results and hence not continued. It should be stated here that airline passenger traffic is uniformly reported by the FAA in terms of “boardings”, at a value of about half of that reported by Mid-Continent and, it is supposed, to it by its airlines.

With a main objective of this analysis being to assess policy alternatives concerning traffic generation here is how the various factors listed above (and a few others) were addressed:

Elasticity (Demand) Factors

1.Price – there is a substantial causality question with this variable. Lower prices attract traffic, but higher traffic volumes also allow airlines to offer reduced prices without sacrificing profit. In addition there is already a city policy in place using the existing subsidy with the expectation that by offering lower prices this hopefully convergent sequence will generate enough permanent traffic to sustain those lower prices. For these reasons price is not included in the evaluation.

2. Income – is addressed by the use of per capita income for the city’s MSA, with MSA being the basis for all variables used in this study. Per capita income was adjusted for inflation over the evaluation period.

3. Total Trip Time – information on this factor was not immediately available, so it is not included. Additionally it is difficult to conceive a straightforward city policy that would have an effect on it.

Substitute Services

1.Automobiles – this factor was initially addressed via automobile registrations (per capita) for the MSA. It was found to be negatively related to airline traffic and since Wichita is already rated last in this region for per capita registrations (an assist to airline traffic) does not afford a useful policy alternative. It was dropped from further evaluation.

2. Trains – are not important to personal travel in this region, and are not included in the assessment.

3. Videoconferencing – is another factor for which information is not readily available, and is a feature not likely to respond to any evident policy alternative. It is therefore excluded from this study.

4. Flying by general aviation and business aircraft owned by individuals and corporations – was added to the ATA list of alternative modes. The Federal Aviation Administration supports the author’s experience that registration data by location of aircraft is not reliable, so a proxy of number of pilots in the MSA, with any level of FAA license above student, was incorporated.

Other

1. Population – is included as a variable, for reasons described in the foregoing paragraph.

2. Per Cent of Population Holding a Bachelor or Higher Degree – is regarded as another indicator for airline traffic, but was found to be too highly correlated with income to add any statistical value.

Thus the basic regression to be reported here is per capita (airline) traffic as the dependent variable, and (inflation adjusted) per capita income, pilots per capita and population as the independent variables. All data were obtained from Federal government sources, the Department of Commerce’s Census Bureau for population (Ref. 4) and their Bureau of Economic Analysis for income (Ref. 5), and the Department of Transportation’s FAA for pilot population (Ref. 6) and airline traffic (Ref. 7). Results of the regression for the variables are presented in Figure 1 along with the usual tests of suitability. The three independent variables are shown to be significant and have measurable impact on the dependent variable, positive for population and income, and negative for pilot population. (See the further quantified discussion below.) A regression of these variables was also done on a log-log basis to explore non-linearities, which were found not to be significant.

This specification does omit, for reasons stated above, some known contributing variables and it is to be expected that there are other less recognized, or quantified, variables as well. It was hoped, and realized, that the included variables would explain a substantial variation of the dependent variable (the figure is 75%). Still, with limited observations plus limited included variables there is further question as to the robustness of the results and it was deemed sensible to try to quantify these effects by including dummy variables for each of the six cities. This result was not kind to any of the independent variables, even those two most observers would expect to have a direct effect on per capita traffic – population and per capita income. However Reference 8, while making observations on results in another field, points out that if the explanatory variables change slowly over time, fixed effect regressions (that is with dummies) may fail to detect direct relationships in the data even when they exist. It is certainly the case that population, per capita income, and pilots per capita changed only slowly over the six years for the six cities evaluated here. Thus it is reasonable to conclude that the strong relationship found here between pilots per capita and traffic per capita does exist, as it does for the other two explanatory variables (at these times in this region).

One additional check on the effect of pilots per capita was obtained with a basic regression (no dummies) excluding Wichita, which as noted below has a disproportionately heavy pilot population, to see if the relationship persisted. It did, with of course reduced impact. Another modification attempted to correct for the effects of 9/11 by including U.S. air traffic as a variable, but results were not significantly different.

Summarizing from the foregoing, these auxiliary regressions were attempted to better understand or improve on the basic one of three salient independent variables of income, pilot population (both per capita) and area population on the dependent variable, airline traffic per capita:

1. Substituting absolute airline traffic in place of per capita airline passenger traffic

2. Evaluating linearity through a log-log regression of the basic variables

3. Adding dummy variables for the six cities to the basic regression to assess the robustness of the basic regression results

4. Eliminating Wichita from the basic regression to see the impact of omitting its unusually high per capita pilot population

5. Accounting for the effect of the 9/11 catastrophe (which occurred after the midpoint of the period evaluated) on airline traffic by adding overall U.S. traffic as a variable

Other than the adding of city dummies, none of these had a significant impact on the conclusions drawn from the basic regression, and the slowly changing nature of the variables over the period evaluated supports accepting the results of the basic regression rather than that with the city dummies.

The results of the basic regression provide insight into Wichita's relatively poor performance in generating airline traffic. Comparing Wichita to its peer cities (based on the independent variables), it is hurt by having the next to lowest per capita income, and suffers again from having the next to lowest population. Finally, Wichita is compromised by having by far the greatest proportion of pilots in its population, by a factor of more than two over four of the "competing" cities, and by one and one half over the remaining one.

Based on the regression coefficients, if Wichita had a per capita income as great as the three regional cities at the top of this category, which would require about a 13% increase over its present figure, it would benefit by a 36% increase in passenger traffic. If it had as low a relative pilot population as the lowest four cities in this comparison it would realize over a 50% increase in passenger traffic – but that would require somehow reducing the per capita number of pilots by more than half. A similar analysis based on the elasticities from the log-log regression provides results that are still dramatic, but somewhat less so than the foregoing. Perhaps an organization like ATA should investigate if the pilot to traffic relationship found here holds nationwide. They might also determine if Wichita's concentration of pilots in the population is as unique in the nation as it is in the region.

Outside of the statistical information, it was learned that although a couple of the competing cities have tried a type of subsidy – creating their own airline – these have already failed or are failing, and one city presently has a very selective subsidy that is truly miniscule compared to Wichita's. Essentially all these cities appear to be outdistancing Wichita without the necessity of any form of airline, or passenger, inducement.

Finally, the proportion of the population of the Wichita MSA that are pilots is a microscopic .5% (one half of one percent) and for the most of the other MSA's an even tinier .2%. (Wichita's licenses additionally are somewhat skewed to higher pilot ratings – these are the commercially viable pilots.) Is it possible that the presence of these few people can really distort the number of air passengers going to airlines? The explanation may be that in flying an airplane, say on a business trip, they also are carrying passengers. The passenger capacity of various business aircraft (including the jets) range from 4 to as many as 24, with an average of about 8 – in that case not including the pilot(s). If just half of the primarily professional registered/licensed pilots in Wichita's MSA flew a business trip only every other week, with a passenger load of 4 (a half load for the "average" plane) it would equate to one-third of Wichita's present airline passenger volume. This seems like a practical representation and demonstrates the plausibility, and significance, of the pilot population contribution. Relatedly, the Wichita (MSA) phone directory lists four air charter services and of course the major companies here have their own fleets.

What are the policy implications of these results? Certainly programs to increase business, and population, would be beneficial to airline service if successful. But the type of business is crucial – call centers and specialty retail outlets will not be as fruitful as more aerospace work or (for example) bio-technology. And this, like the subsidy program itself, is a chicken-and-egg proposition – higher income businesses mean more passengers, but that amount of airline service is necessary to attract high income businesses in the first place. These constraints appear to recently have been recognized by city leaders and the local media (Refs. 1, 9 and 10) Further, a population with a higher education level travels more – on business and pleasure – but it takes high income "businesses" to attract or retain these more educated people. Some cities are actually instituting programs with the sole purpose of gaining graduates and post-graduates (Ref.11). In the long run a sustained program of focused resources to keep (aerospace) or attract other, preferably nascent, high income businesses seem essential.

But what about the possibility of devising a policy to address the apparently more serious disparity revealed in this study and obtain the benefits - to airline traffic - of a reduced number of pilots in the population? The airline subsidy is even more unlikely to be effective without such an outcome. But would the city otherwise be motivated to do such a thing? That enigmatic paradox is the downside of being The Air Capital of the World.

References

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Dependent Variable: PCTRAFFIC
Method: Least Squares
Date: 08/16/04 Time: 15:57
Sample: 3 38
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.456787	0.871363	-1.671849	0.1043
PCINCOME	0.000122	2.83E-05	4.308744	0.0001
PILOTSPC	-210.2755	65.46206	-3.212173	0.0030
POPULATION	8.57E-07	1.33E-07	6.438831	0.0000

R-squared	0.775719	Mean dependent var	2.052495
Adjusted R-squared	0.754693	S.D. dependent var	0.667612
S.E. of regression	0.330659	Akaike info criterion	0.728978
Sum squared resid	3.498722	Schwarz criterion	0.904925
Log likelihood	-9.121607	F-statistic	36.89270
Durbin-Watson stat	1.302254	Prob(F-statistic)	0.000000

Figure 1

Results of the Regression

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About the author:

Harry Clements is native to the Oklahoma-Missouri-Kansas area and has master's degrees in aerospace engineering from Wichita State University and economics from George Mason University. While most of his career was devoted to the aerospace-defense-high speed transportation industry, he also was involved in security/currency printing as director of the U.S. Bureau of Engraving and Printing in Washington, D.C., and in various aspects of vocational rehabilitation at the local and national levels. He has taught both aerospace engineering and economics as an adjunct professor at Wichita State and represented the university teaching a business course at the Maastricht Center for Transatlantic Studies in the Netherlands.