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Summary Report
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I. Introduction

Transportation networks and facilities play a critical role in the economic development of communities. They serve as important links to new or emerging markets, and sources of materials and services needed for processing for existing and new businesses in a community. Transportation costs affect the location and growth of local businesses and serve historically as a primary industrial location factor.

With limited access to many transportation modes and networks, like rail or Interstate Highway systems, public-use and general aviation airports and air transportation in rural and non-metropolitan communities, would appear to function as exceptionally important local economic development factors, especially in agricultural states and states with dispersed populations.

Past studies on industrial location and economic development looked at railroads, highways, and interstate interchanges among others as important transportation factors to the location and growth of business and industry. This study examines small community airports and access to air transportation as critical industrial location factors in the economic development of rural and small dispersed communities. The research question is: What role does airports and air transportation play in economic development in small and medium sized rural communities?

To accomplish this research objective, the study examines approximately 90 small airports in Nebraska. Located near the geographic center of the continent, Nebraska, with its strong agricultural economic base and its 535 widely dispersed communities, can serve as a good model and case study for examining the importance of airports and air transportation as an industrial location factor for rural economic development. Small airports and air transportation potentially could be very important in the economic development of isolated rural counties which lack access to the interstate highway system and are long distances away from major airports and hubs.

This study develops a quantitative model to address the relationship of airports and air transportation to economic development. The importance of other transportation modes has been studied often. For example, the connection between interstate highways and interchanges and economic development has been the subject of numerous studies. We review these studies to help us develop a model for airports the air transportation system.

We then use county-level data from Nebraska to analyze economic performance among counties to determine whether growth was influenced by the presence or absence of an airport and by the characteristics of the airport. Some of counties will all have access to other transportation modes (interstate interchanges) while others are limited to two-lane highways. We will analyze only

those non-metropolitan counties where the largest town has a population of at least 2,500 persons.

Economic development can be defined in a number of ways, but they usually measure growth in some local economic indicator. The indicators of economic development that we will use may include changes in: employment, income, population, number of business establishments.

The primary data source for the economic and population data will be the US Bureau of Economic Analysis, Regional Economic Information System. This database has annual information from 1969 at the county level. We will collect airport-related data from existing state and local sources.

Study findings will give policy makers information on developing programs that link small community airports to rural development and provide states with a research framework to determine the economic impact of small airports.

Research on Airports and Economic Development

The following discusses relevant research to help us address our research question. The literature relating economic development in rural areas to airports and air transportation is extremely limited. There are numerous studies which look at the economic impact of airports on communities. Most of these studies use input-output analysis, which estimates the direct and indirect effects resulting from operations of the airport itself. However, they do not attempt to measure how the economy of a community with an airport may differ from one without an airport.

In 1999, Dennis Brown and Oliver Flake with the Economic Research Service and the United States Department of Agriculture produced an annotated bibliography of rural transportation. Their section on airports and rural development contained only six articles, and we deemed just three of those to be even marginally relevant.

Following are some resources identified:
Cooper, Ronald. 1990. "Airports and Economic Development: An Overview," *Transportation Research Record* 1274, pp. 125-133.

Norris, Baha B., and Richard Golaszewski. 1990. "Economic Development Impact of Airports: A Cross-Sectional Analysis of Consumer Surplus," Transportation Research Record 1274, pp.82-88.

Reeder, Richard J., and Cory Wanek. 1995. "The Importance of Local Airports to Rural Business," in Rural Development Strategies, David W. Sears, and J. Norman Reid, eds. Chicago: Nelson-Hall Publishers, pp. 162-186.

Since that publication, we found:

Gale, Fred, and Dennis Brown, 2000. "How Important is Airport Access for Rural Business," *Rural America,* Vol. 15, No. 3, pp. 16-25.

We found a more promising area of inquiry is the literature relating to roads, more specifically interstate highways and their interchanges. Some of the articles which describe models that may be applicable are:

Carlino, Gerald A., and Edwin S. Mills. 1987. "The Determinants of County Growth," *Journal of Regional Science,* Vol.27, No.1, pp. 39-54.

Henry, M., and T.G. Johnson. 1993. *The Contribution of Transportation to Rural Economic Development*. Southern Rural Development Center, Mississippi State University, No. 171, pp. 35-46.

Kusmin, Lorin D. John M. Redman, and David W. Sears. 1996. Factors Associated with Rural Economic Growth: Lessons from the 1980's. TB-1850, U.S. Dept. Agr., Econ. Res. Serv., September.

II. Methodology

Previous economic impact models in the literature typically utilized multiple regression models to examine the effects of various variables upon certain economic outcomes. While the specific models varied to some extent, similar methodologies were evident within the research. This research maintains the general approach found in previous research. Multiple regression models were formulized and refined to identify the relationships between certain factors (such as the existence and size of a local county airport) and economic development outcomes.

Specifically, the models in this research examine aviation's influence on four broad areas of economic outcomes: income, employment, population, and establishments. Within employment we analyzed both total jobs and nonfarm jobs. Many smaller rural counties primarily have farm employment, influencing the need to examine total jobs, whereas nonfarm jobs provided a measure of growth excluding farm proprietors, an important factor in more-populated areas. Similarly, we examined changes in both total establishments and those with 5 or more employees, the latter providing a measure of business growth of firms providing employment opportunities while the former included the influence of single-employee businesses (proprietors).

Time Period of Analysis

We strove to model and explain changes between 1980 and 2000 in the six economic outcomes mentioned above for Nebraska counties. 1980 was chosen as the starting time given that data was available for each variable, including information from the 1980 decennial census. The year 2000 was selected as the closing time given the availability of 2000 census data, adjustments to farm incomes having been made (versus not yet completed on more current data), and

employment data being consistent in the Standard Industrial Classification (SIC) system over the entire time period. (The classification was changed to NAICS in 2001.)

Unit of Analysis

This study used the county level as the unit of analysis. Nebraska has a total of 93 counties, including two metropolitan core counties: Douglas containing Omaha and Lancaster containing the city of Lincoln. The research design focused on economic growth in non-metropolitan and rural areas. Thus, Douglas and Lancaster Counties as metropolitan core counties were excluded from the analysis. In addition to the metropolitan core counties, Nebraska's third largest county, Sarpy, was also excluded given its location adjacent to Douglas County and lack of a county airport. We held that Sarpy County would rely on the major airport located in Omaha for its services. Together, these three largest counties contain more than half of Nebraska's total population.[1] In short, this study analyzes 90 of Nebraska's 93 counties, with the counties having the largest populations being excluded in order to focus on economic development in primarily non-metropolitan areas.

We formed separate regression models for the various economic outcomes, with the percent change in the specific outcome between 1980 and 2000 for Nebraska counties as the dependent variable in each model. A detailed description of the six dependent and various independent variables analyzed in this study follows below. See Appendix A for a concise list of the variables and their data source.

Dependent Variables

Percent Change in Population: Increases in population are viewed as desirable county growth outcomes. Like many portions of the rural United States, many counties in Nebraska have been experiencing population decline, especially in rural or non-metropolitan areas. Decreases in population stem from natural population loss (deaths greater than births), net outmigration (more people moving out than moving in) or both. Nebraska's population has been shifting toward the metropolitan portions of the state for several decades. County population figures came from the 100 percent count files of the 1980 and 2000 decennial censuses.

Percent Change in Per Capita Income: Increasing per capita income is the desired economic outcome. We selected to analyze per capita incomes since these figures show how the income levels are changing relative to how the area's population concurrently is changing. Incomes in rural areas vary dramatically from year to year since they are based on an agricultural economy dependent on the prices of inputs and goods sold and variable weather patterns affecting crop yields. To smooth the fluctuation in incomes, three-year averages centered around the starting and ending years of the time period of the analysis were used. The 1979 to 1981 and 1999 to 2001 averages reduced the influence of fluctuations between good and poor yields and market prices for single points in time. The per capita incomes based on the three-year averages were more representative of the typical income earned in a given year for the respective counties. Data on per capita income were taken from the Bureau of Economic Analysis local area annual estimates series. These data are released based on dollar values in the respective year. Thus, once

[1] Annual population estimates program, U.S. Census Bureau. Data as of July 1, 2004.

calculated, the three-year averages were deflated using the Consumer Price Index (CPI) for All Urban Consumers, U.S. city average. This made the dollar amounts comparable over time in real dollar terms.

Percent Change in Total Jobs: Employment growth is a fundamental measure of economic development. Increases in the number of jobs typically are indicative of an expanding local economy. The argument exists that not only the quantity but also the quality of employment drive a local economy. However, precise figures on the overall level of employment are more readily available and more objective, as what qualifies as a "quality" job is subject to debate and interpretation. Analyzing total jobs incorporated job changes in the agricultural economy, the main industry in most rural Nebraska counties. Data on total jobs came from the Bureau of Economic Analysis local area annual estimates series. The figures in both 1980 and 2000 were classified consistently according to the SIC system as previously mentioned.

Percent Change in Nonfarm Jobs: Nonfarm employment growth also was analyzed as a measure of economic development. Growth in nonfarm employment is more relevant in more populated areas, where agriculture is not the main industry. Growth in nonfarm employment typically stems from new companies moving into and starting operations, or existing firms expanding operations. This represents a separate type of economic development than changes in farm employment where increases typically involve proprietors and hired employees for such operations. Rural counties have a certain level of nonfarm jobs, albeit sometimes quite low, that can be compared over time to analyze whether existing businesses are expanding or new business are being created in these areas. Thus, the change in nonfarm jobs is an important measure even for less-populated areas.

The relationship between nonfarm jobs and total jobs is straightforward and simply that farm jobs plus nonfarm jobs equal total jobs. Nonfarm jobs represented about 80 percent of all jobs in 1980[2]; thus changes in nonfarm jobs strongly and directly cause changes in the level of total employment. The data source for nonfarm jobs was the Bureau of Economic Analysis local area annual estimates series. The figures in both 1980 and 2000 were classified consistently according to the SIC system.

Percent Change in Establishments: An "establishment" is defined as "a single physical location where business is conducted or where services or industrial operations are performed"[3]. Increases in the number of establishments are viewed as desirable county growth outcomes. An expanding business base implies a robust economic environment where an organization can make profits by manufacturing or selling goods, or offering services. The figures for all establishments include sole proprietors, an important group of businesses given the risks associated with such businesses and that increases in sole proprietors typically represent business creation. Data on business establishments are published by the U.S. Census Bureau through the annual County Business Patterns series.

[2] The 1980 level of nonfarm jobs in Nebraska less the three most populated counties (Douglas, Lancaster, Sarpy) not analyzed in this study was 379,393 versus 466,085 total jobs.

[3] County Business Patterns 1980 Nebraska. CBP-80-29 pg. v, U.S. Department of Commerce, Bureau of the Census.

Percent Change in Establishments with 5 or more Employees: The County Business Patterns series provides a breakdown of the number of establishments by their number of employees. The smallest business size category is from 1 to 4 employees, which would include sole proprietors and the smallest businesses. This dependent variable analyzes bigger businesses, those that can provide substantial employment if they start operations in a county. Changes over time in this category would also reflect expansion of businesses previously in the smallest size category of 1 to 4 employees. However, some businesses could downsize and move from having 5 or more employees to less than five, which would be viewed as a loss of businesses with 5 or more employees. Thus, as existing businesses change their number of employees, movement between the categories can occur and the net movement would be represented in the total change in the 5 or more employees category, along with the creation of new businesses of this size.

Independent Variables

Airport Size: The key factor being analyzed in this research was the economic impact of having an airport located in the county. More precisely, the size of such county airports was thought to be an important economic development factor. The hypothesis suggested that larger airports would have a larger impact, as they transport a more sizeable amount of goods and personnel. Many of the smallest Nebraska airports are often not much more than a landing strip, used primarily by agricultural spray planes and occasionally for medical transport. Thus, the size of the largest county airport was viewed as influencing economic growth.

The Nebraska Aviation System Plan (NASP) classified Nebraska's 90 airports into four airport size categories. Factors determining the NASP classification included runway length and width, navigational aids, on-site facilities, and services offered among others. The NASP classified 18 airports in the largest size category called "National Airports". This figure included the major airports in the metropolitan centers of Omaha and Lincoln, which are by far Nebraska's largest airports. The research design focused on economic growth in non-metropolitan and rural areas. Thus, Douglas and Lancaster Counties containing these largest airports were excluded from the analysis.

We utilized four dummy variables to identify the economic impacts of airports of various sizes. The values for these dummy variables were based on the size of the largest county airport. The NASP defined the categories from largest to smallest as **National**, **Regional**, **Local**, and **Limited**. If a county contained a National airport, that county was given a value of 1 for the National airport variable and values of 0 for the other three airport size variable, regardless of whether a smaller airport also existed in the county. Counties often had more than one county airport and in such cases, the classification resorted to the size of the largest county airport. For example, several counties contained both a local and limited airport. Since limited airports were believed to have limited economic impacts, it was the other larger airport (of "local" size in this case) that would be driving economic development. Thus, the Local airport variable was given a value of 1 while the other three airport size variables received a value of 0. Counties without an airport received a value of 0 in all four airport size dummy variables.

Map 1 provides an illustration of Nebraska counties based on their largest county airport and the associated Map 1 Table lists the counties and relevant airport cities in each size category. Of the

counties analyzed, a nearly equal number were in each size category with 16 counties having a National airport, 20 counties being in the Regional and Local categories, 16 counties with their largest airport being in the Limited category, and 18 counties not having any airport.

County Type: In order to interpret the nature and types of rural places within Nebraska, we modified a classification system for defining rural counties. The system merged measurement concepts used by the Census Bureau, in particular its newly employed micropolitan counties, and the Urban Influence Codes used by the USDA Economic Research Service. The classification scheme is based on county characteristics, first determining whether the county had metropolitan or micropolitan status and then analyzed the size of the largest town in non-metropolitan and non-micropolitan counties. The Modified Urban Influence Code used in this Nebraska study includes six classification categories, with code 1 representing the most urban counties and code 6 corresponding to more rural counties:

Code 1: Metropolitan core county (contains city with more than 50,000 residents);
Code 2: Metropolitan outlying county;
Code 3: Micropolitan core county (contains city with more than 10,000 residents);
Code 4: Micropolitan outlying county;

Code 5: County with the largest town having between 2,500 and 9,999 residents; and
Code 6: County with the largest town having fewer than 2,500 residents.

See Map 2 for the geographical distribution of the six codes with Nebraska and the associated Map 2 Table for an alphabetized list of counties in each category. Nebraska has two metropolitan core counties, Douglas and Lancaster, but they were not included in this analysis due to containing much larger airports than in the rest of the state as mentioned previously. Surrounding these core metropolitan counties are seven metropolitan outlying counties, of which one was Sarpy County, also excluded from the analysis. Hence, of the 90 Nebraska counties analyzed, 84 met the definition of a non-metropolitan county according to the most current classification available (2002); of these, 20 exist within a micropolitan area, 10 core and 10 outlying; 21 counties are classified by their largest town having 2,500 to 9,999 people; and 43 counties are in the category of not having a town with at least 2,500 residents.

The variable matrix included dummy variables for each county type category with the exception of metropolitan core counties (code 1) since they were not included in the analysis. Each county was included in only one category, given a value of 1 for that respective dummy variable and zeros for the other county type dummy variables. When utilizing regression analysis, all variables in this type of matrix cannot be included as a control is needed. We used the micropolitan outlying counties as this control (code 4) given that these 10 counties tended to be sparsely populated and the effects of such counties were better represented in the 43 counties that did not have a town with 2,500 people. Thus, the dummy variables analyzed included **metropolitan outlying** counties, **micropolitan core** counties, counties where the **largest town was between 2,500 and 9,999 residents**, and counties with a **largest town of less than 2,500 residents**.

County Age Structure: The relative ages of county residents might also have an impact on economic development. Counties with a college campus might have a relatively large portion of part-time workers. Counties with a large portion of residents ages 65 and over might have relatively few workers. Counties with a relatively large percentage of children might require both parents to work to support the family or conversely need one parent to stay home with the children. These types of age factors affecting the local workforce could influence a company's decision of whether to start operations in a certain area.

For this study, we defined a ratio measure to analyze county age structure. The ratio analyzes the number of people not likely to be in the workforce to those of working age. Specifically, the ratio is defined as the number of people under age 18 plus those 65 and older divided by the remaining population ages 18 to 64. The calculated figure is multiplied by 100 for clarity. The rationale for this specific ratio stems from the increased attention given to families that might have the parents caring both for their children and their aging parents. With those under 18 and 65 and older likely not working, the ratio can be thought of as the number of non-workers to the number of people of working age. Given the rationale for such a variable, we refer to it as the **Dependents to Workers** ratio, as children dependent on their parents and retirees possibly depending on these same parents (their children) for support are compared to the number of county residents of typical working age. Counties with lower ratios (fewer dependents, more workers) were expected to have more positive economic outcomes.

The Dependents to Workers ratio was calculated from the 1980 decennial census. We needed to calculate this variable at the start of the analysis period as it was hypothesized that it would affect economic development during subsequent years. The Census provides the most accurate data on county population and age structure and was thus relied upon in this analysis. The simple percentage of the population ages 18 to 64 would similarly measure county age structure; we deemed the results from using the ratio to be slightly easier to interpret.

County Job Structure: The relative level of people employed by firms versus working as proprietors could also impact economic outcomes. Wage and salary employment is often viewed as more stable than self-owned businesses, as companies rarely relocate or stop production once established in an area. Firms may downsize or need to layoff workers, but in general provide a relatively large number of stable jobs. Proprietors and other small businesses face substantial risks and often are not successful or have a large turnover.

For this study, we utilized the percentage of all jobs that were wage and salary jobs. The **Wage and Salary Jobs percentage** compares the level of employment offered by companies versus proprietor employment in an area. For Nebraska, less populated rural counties have a relatively low percentage of wage and salary jobs as most people work as agricultural proprietors and few larger firms exist in these counties. Micropolitan counties with a city of at least 10,000 people have relatively more firms offering wage and salary employment and relatively few farm proprietors. The number of nonfarm proprietors varies according to the area providing some variability to this variable. The figures are calculated for 1980 at the start of the analysis period as the level might affect future economic development during the analysis timeframe. We utilized data on total employment and wage and salary employment from the Bureau of

Economic Analysis local area annual estimates series. Areas with higher percentages of wage and salary jobs were expected to have better economic outcomes.

Education: Education levels often play a critical role in economic development. Areas with a more educated workforce attract potential employers to locate there. Educated workers demand higher compensation, and hold jobs that tend to have a stable nature. This higher employee income then typically is spent within the local area, helping the sales and profits of local businesses. Thus, an educated workforce can lead to a positive spiraling effect for the local economy. Some observers debate whether areas with education help create jobs or areas with jobs bring in educated workers (like discussing the chicken and the egg). Regardless, areas with higher education levels are hypothesized to have better economic outcomes.

This study used the percentage having a Bachelor's Degree or more education as a measure of education. The figures are calculated by the Census Bureau from the decennial census for the population ages 25 and older. The 1980 figures were used, as the education level at the start of the analysis period might affect future economic development during the analysis timeframe. We considered using the percentage of those 25 and older with a high school diploma or more education, but such figures for 1980 did not vary much between the Nebraska counties analyzed, so the Bachelor's Degree percentage with more variation between counties was viewed as the better measure.

Distance to Nearest Major Airport: Given the study's focus on the impact of relatively small airports, the distance to a major airport seemed reasonable as a possible explanatory variable. Areas with smaller airports near a more major hub might rely upon the larger airport for services, especially the transport of goods and personnel. Having a larger airport within a reasonable distance could affect a firm's decision to locate in a certain area. Thus, the number of miles to the closest major airport was viewed to be indirectly related to the economic outcome variables.

We defined a major airport as having 200,000 or more enplanements during calendar year 2003. Data on enplanements is published by the Federal Aviation Administration. Cities with the closest proximity to Nebraska counties with this level of passengers included Denver, CO; Omaha, NE; Sioux Falls, SD; Rapid City, SD; and Lincoln, NE[4]. The distance between the county's county seat and each of these cities was determined using an internet mileage calculation tool, and the lowest number of miles and corresponding major airport city were recorded. Map 3 illustrates the distance to the nearest major airport in miles for Nebraska counties.

Distance to Nearest Interstate: Similar to the distance to a major airport, the distance to the nearest interstate was viewed as a possible economic development factor. Shorter distances to the interstate system would help companies move their products or receive supplies more efficiently. Having an interstate within a reasonable distance could influence a firm's decision to locate in a certain area. Thus, the number of miles to the closest interstate was hypothesized to be indirectly related to the economic outcome variables.

[4] Other cities near Nebraska with this level of enplanements such as Kansas City, MO, Colorado Springs, CO, and Wichita, KS were analyzed but did not have the shortest distance to any Nebraska county.

The distance from a county's county seat to the nearest interstate was verified by two internet sources. In cases where internet data was missing, road maps and other aids were used to determine the number of miles to the closest interstate and the corresponding interstate name. Interstates located close to Nebraska include I-80 (NE), I-29 (IA/MO), I-90 (SD), I-70 (KS), and I-25 (WY).

III. Results

To view the central tendency patterns of the data, descriptive statistics and scatter plots were used. Given that each dependent variable was defined as a percent change from the level in 1980 to 2000, a wide range in values was expected. With many rural counties having small populations included in the analysis, percent changes were often sizeable even when the overall level did not change greatly over time. Relatively low figures for certain variables led to percent changes that were extreme when compared to values in more-populated counties. For example, McPherson County, containing slightly more than 500 people, only had two establishments in 1980. The figure grew by five establishments to total seven in 2000, making the percent change 250 percent over this time period. The next largest percent change in establishments was 63.2 percent, so McPherson County was clearly an outlying value.

The analysis of central tendency patterns led to the removal of certain cases due to the extreme nature of their values. Per the above example, McPherson County was removed when analyzing the percent change in establishments. However, no other McPherson County percent change values for other variables were considered extreme and thus it was included in all other models; outlying values for a particular variable did not lead to excluding a county entirely (all models) but did warrant its exclusion from the model in which it was an outlier. Other outlying values included Washington County regarding nonfarm jobs (large expansion stemming from its proximity adjacent to Douglas County and Omaha) and sparsely-populated Arthur County with respect to establishments with 5 or more employees. No extreme values existed for county percent changes regarding population, per capita incomes, and total jobs.

Table 1 provides a summary of relevant descriptive statistics. When the 90 separate county percent changes in population were averaged, nearly a 10 percent loss between 1980 and 2000 was evident.[5] Individual county percent change figures regarding population ranged from a loss of 33 percent to gaining 22 percent. Only 17 of the 90 counties experienced a population gain over this period. However, both total and nonfarm jobs did not always decline even in counties experiencing population loss. Nearly half of the counties analyzed (43 of 90) increased their level of total employment over this period and a decrease in nonfarm jobs occurred in only 15 of 89 counties. Overall, total jobs averaged nearly 5 percent growth while nonfarm jobs grew by more than 15 percent; the difference in these growth rates reflects a decreasing number of farms and farm employment within Nebraska.

County per capita income rose between 1980 and 2000 on a nominal basis, but once adjusted for inflation, per capita incomes fell in 14 out of 90 counties. Values ranged from a loss of 51 percent to gaining 77 percent, averaging a 26 percent increase. Counties experiencing declines in real per capita incomes were primarily rural and agriculturally-dependent "sandhills" counties, located in the west-central and western part of the state.

Both total establishments and those with 5 or more employees grew by an average of around 10 percent between 1980 and 2000. Each category had roughly 75 percent of Nebraska counties experiencing growth. In contrast to counties experiencing losses in real per capita incomes, those

[5] In aggregate terms, the total population in the 90 counties was 893,888 in 1980 versus 874,794 in 2000, which represents a loss of 19,094 people or a 2.1 percent change decline in population.

counties having declines in the establishment categories were not concentrated in a certain area, but scattered throughout the state, including counties on the northern, southern, and eastern state boundaries as well as "sandhills" and extreme western counties.

Correlations

Analyzing the correlations or relationships between variables often provides insight into the formulation of multiple regression models. Correlations show both the direction and strength of the relationship between two variables. Correlation coefficients, or r-values, range from -1 to 1, with negative figures indicating an indirect relationship and positive figures a direct relationship. Values closer to zero show a relatively weak relationship while values that approach -1 or 1 indicate increasingly strong relationships. In evaluating the correlations between independent variables and dependent variables, patterns in the relationships can be identified even if the independent variable does not prove to be a good predictor of the dependent variable in a multiple regression analysis—other independent variables might replace such a weak predictor, so analyzing the correlations helps in drawing conclusions on variable relationships. In addition, independent variables should not be highly correlated in a multiple regression analysis; eliminating such multicollinearity is an important step in formulating a valid regression model.

Table 2 shows a correlation matrix for the dependent and independent variables analyzed. Several items are worth noting. First, positive or direct relationships exist between percent population change and other dependent variables. Hence, areas with increasing populations tended to have increases in the other dependent variables; conversely, areas experiencing population decline also tended to witness declines in other items such as establishments. The relationship between population and both total jobs and nonfarm jobs is quite strong with a correlation coefficient greater than 0.71 in both cases. The relationship between population and both total establishments and establishments with 5 or more employees is moderately strong with both correlation coefficients around 0.35. Finally, the relationship between population and incomes is quite weak, indicating that areas having population increases did not necessarily experience a concurrent increase in incomes.

Another item apparent on the correlation matrix is that an inverse relationship exists between counties with their largest airport being of Limited size and each dependent variable. Thus, counties in the Limited size category tended to have relatively poor economic outcomes. Conversely, the largest airports in the National category tended to have strong and direct relationships with the economic outcome variables. These figures support the claims that the existence of a National airport is important to economic outcomes while Limited airports do not necessarily lead to economic development.

Similarly, relatively small and rural counties, those non-metropolitan and non-micropolitan counties without a town of 2,500 residents, tended to have negative correlation coefficients indicating an inverse relationship with the economic outcome variables, while relatively highly-populated micropolitan core and metropolitan outlying counties tended to have strong and direct relationships with the dependent variables. Micropolitan core counties tended to have National airports ($r = 0.668$). Counties in the county type category of Largest Town less than 2,500 residents tended to have Limited airports ($r = .428$) and not have National airports ($r = -0.445$).

While these independent variables showed relatively strong correlations, they did not represent a multicollinearity problem[6].

The final major important item from the correlation matrix is the consistent and expected correlations among non-airport size and non-county type variables and the economic outcome variables. The correlations between economic outcomes and the miles to the nearest major airport or nearest interstate were negative as hypothesized and significant in several cases. The same can be said of the percentage of wage and salary jobs except that the relationships were positive. The correlations between the economic outcomes and the ratio of dependents to workers and the percentage with Bachelor's Degrees were often significant and held the expected sign with the exception of the per capita income variable. As previously noted, increases in per capita incomes did not tend to occur in areas having growth in population or establishments. Apparent patterns did not always hold regarding percent changes in per capita incomes.

Regression Analysis

While the correlation analysis showed the direction and strength of relationships between variables, multiple regression analysis was needed to model the influence of airports on economic outcomes. The correlations suggested that counties with Limited airports would not perform as well economically as counties with National airports. The multiple regression models quantified these relationships and allowed the prediction of economic outcomes over the time period analyzed given known county characteristics.

To show the individual effects of various airport sizes, an add-on approach to the regression models was utilized. First, multiple regressions only including the airport size dummy variables showed the impact of airports of each size alone, that is without the influence of other variables. Then, given similar tendencies in the correlations between counties with Limited airports and counties in the Largest Town less than 2,500 residents category as well as National airports with Micropolitan Core counties, models with both the airport size dummies and county type dummies were ran to compare the relative impacts on the economic outcomes. Finally, models including all independent variables indicated the most influential variables. Hence, the add-on approach started with the simplest models to analyze specific variables alone and then the models became increasingly complex as various variables were added.

Tier 1 Models: Airport Size Dummy Variables

Table 3 summarizes the regression coefficients for the various independent variables and adjusted R squared values for the various regressions. The first "tier" of regression models including only the airport size dummy variables shows similar signs as in the correlation analysis. The impact of having a National airport was strongly positive on the economic outcomes while counties with their largest airport being of the Limited size were a drag on economic outcomes. This doesn't necessarily mean that counties with Limited airports had decreases in the percent change of the various economic outcomes.

[6] No multicollinearity problems were apparent among all independent variables analyzed as all such correlations were less than the absolute value of 0.70.

The constant for these models can be viewed as counties not having any airport. This base point or constant value is added to the regression coefficient multiplied by 0 or 1 for the corresponding airport size dummy variables specific to a county to find the predicted total change in the economic outcome for that county. Thus, for population, if a county had a National airport, the National coefficient of 14.604 would be added to the constant of -13.064 to predict the percent change in population in such a county with a National airport to be 1.54 percent. A county with a largest airport of the Limited size would have a lower percent change in population than the base (no county airport) since it's regression coefficient is negative (-3.949); when added to the constant of -13.064 the total predicted percent change in population for a county in the Limited airport size class would be -17.013 percent.

As mentioned above a negative regression coefficient does not necessarily mean that the outcome variable decreased over the period. It does indicate counties in the category having the negative coefficient did not perform as well as counties in a category having a positive coefficient. For example, the coefficient for the Limited airport size for per capita income is negative (-1.481), which when added to the constant of 21.83, predicts a per capita income percent change of 20.349. This is lower than the constant or no airport case, but still is a substantial increase. The rise is relatively low, however, when compared to a 32.446 percent increase in counties where the largest airport was of Regional size. (coefficient of 10.616 plus the constant of 21.83)

Overall, the National airport variable had a coefficient statistically significant at the 90% level in 5 of the 6 six models, the exception being per capita income. Coefficients were positive in all cases. The value tended to be around 15, meaning that the existence of a National airport lead to an increase of around 15 percent above the base (no county airport). The coefficients for Regional airports also tended to be positive and were significant in two cases. Coefficients for Local airports were mixed, with some being positive and other negative, and relatively small or fairly close to zero. Coefficients on the Limited variable were negative for each economic outcome model, and significant with respect to the percent change in establishments with 5 or more employees.

The influence of the existence of an airport of certain sizes was greater for certain economic outcome variables. The airport size dummies explained 27.7 percent of the variation in the percent change of total county jobs and 24.1 percent regarding percent population changes. The National and Regional airport size variables were significant and positive in these models. The "large" establishments model also had two significant variables, but its predictive power was somewhat less with an adjusted r-squared value of 0.161. Only the National airport variable was significant regarding nonfarm jobs and total establishments, leading to a relatively small adjusted r-squared value. No airport size variables were significant predictors of the percent change in per capita incomes and this model held no explanatory power.

Table 3 also shows the overall predicted percent changes in the various models. Most predicted values are positive, the exceptions being in population and for Limited airports. Perhaps more important is an apparent "stair step" pattern with increasing airport size. The predicted values (percent changes) for population, total jobs, and nonfarm jobs are smallest for Limited airports,

then increasingly larger for larger airports, those of Local, Regional, and National size. The pattern of the predicted percent changes increasing with increasing airport size holds in general for the other three dependent variables as well. This finding supports the claim that larger airports lead to more positive economic development outcomes.

Tier 2 Models: Airport Size and County Classification Scheme Dummy Variables

The county classification explained a great deal about the economic outcomes. These county type variables were better predictors of the economic outcomes than the airport size variables. The county type variables had significant coefficients more often than those regarding airport size. All coefficients but one for metropolitan outlying counties were significant, along with two each for micropolitan core and counties with their largest town having less than 2,500 people. There was one significant coefficient for counties with their largest town being between 2,500 and 9,999 people. Only one National and one Limited airport size coefficients were significant in these models. In short, the county type was a more important determiner of economic outcomes than the existence of airports of various sizes.

Similar patterns held in the sign or direction of the relationship between the county type and the economic outcomes as was viewed in the previous airport size models. The coefficients on the metropolitan outlying variables were all largely positive, just as those for National airports were in the airport size models. Coefficients for micropolitan core counties were mostly positive and those for the largest town of 2,500 to 9,999 residents mixed, similar to the Regional and Local airports respectively in tier one. Finally, counties with their largest town being less than 2,500 people had negative regression coefficients, just as the Limited airports did in the airport size models. The airport size and county type dummy variables were correlated as discussed earlier.

In general, the signs on the airport size coefficients remained the same in these second tier models, the notable exception being the coefficient on Limited airports becoming positive in some cases versus being negative in all cases in the tier one models. The size of the airport size coefficients tended to be smaller (closer to zero) in the second tier models, especially those for National and Regional airports.

Compared to the tier one models, those in tier two that included the county classification scheme had substantially higher adjusted r-squared values. The tier two models now explained 62.3 percent of the variation in percent population change and nearly 50 percent regarding the percent change in jobs. Recall that the adjusted r-square values for these dependent variables were near 0.25 in tier one. The model for nonfarm jobs also had its adjusted r-square double, from 0.13 in tier one to 0.26 in tier two. The r-square value for total establishments was nearly 4 times higher in tier two than in the tier one model. As in tier one, the model including the county type variables explained little about the percent change in per capita incomes.

Tier 3 Models: All Independent Variables

Including other independent variables besides the airport size and county class dummies made some improvements to the models. The most important new independent variable in the tier 3 models was the number of miles to the nearest major airport. The coefficient on this variable was

negative as expected and significant in 4 of the 6 models. The airport size dummies had only one significant coefficient in these models, a negative relationship between Limited airports and "large" establishments. Thus, it appears that when all independent variables are considered, the proximity to a major airport was more important than the existence of an airport of non-major size within the county.

The number of miles to the nearest interstate also had the expected negative sign and was significant regarding population change, but was not as important of a predictor as the miles to the nearest major airport. Interstates are more accessible to Nebraska counties than major airports. Table 1 shows that the average distance for the 90 counties analyzed to the nearest interstate was 45 miles, while over 110 miles to the nearest major airport. Thus, having a major airport relatively close to the county is somewhat rare, and appears to be beneficial to economic outcomes in Nebraska counties.

The percentage of county jobs that were wage and salary and the percentage of those 25 and older with Bachelor's Degrees tended to have the expected sign and both had significant coefficients in two models. The Bachelor's Degree percentage was an important predictor of job changes, both nonfarm and total.

The Dependents to Workers ratio had the expected negative sign in all models except per capita income, in which it was significantly positive. The airport size and county class dummy variables explained little about per capita income changes, making the inclusion of other independent variables relatively more important. Most counties witnessed increases in deflated per capita incomes between 1980 and 2000, while only more populated areas had increases in population. Thus, rural areas had relatively positive changes in income. The number of dependents is relatively more important in rural areas as a farm operator's children and aging parents often help provide farm labor, increasing the profitability of the business. Thus, the positive effect of dependents on per capita incomes, especially in rural counties, stands to reason.

The inclusion of other independent variables besides the airport size and county type dummies made some improvements to the predictive power of the models. Adjusted r-squared values increased for all models except establishments, which did not have any significant variables besides county type. The most notable increase occurred in per capita incomes, which improved from an r-squared near zero in tier two to 0.321 in tier three. The models now explained 71 and 56 percent of the variation in population and total jobs change respectively. These independent variables explained about 30 percent of the variation in the other economic outcome variables.

IV. Conclusions and Discussion

Aviation is generally viewed as a positive economic development factor in a local area. This study sought to quantify the economic impacts of airports in primarily rural Nebraska counties. This study analyzed various economic outcomes based on the presence of airports of various sizes within the county. Also analyzed were a variety of county factors such as the distance to a major airport or interstate and the county's education and workforce as well as the type of county, as defined by its metropolitan or micropolitan status or largest city size.

The following conclusions can be drawn from the analyses in this study:

- When only dummy variables denoting the presence of an airport of certain sizes were included in the model, those counties containing National and Regional airports often performed significantly better economically than those not having any airport or smaller airports. For these six economic models analyzed, counties where the largest airport was of Limited size actually tended to not perform as well economically as counties that did not have any airport. Thus, while the presence of a Limited airport may not have lead to this sub par economic performance, these smallest airports did not allow their counties to perform better economically than counties that did not contain an airport.

- Models that included both the county type and airport size dummy variables showed that the type of county was a larger determiner of economic performance than the presence of airports of various sizes. Counties located adjacent to a metropolitan area or those containing a micropolitan city of 10,000 or more residents tended to perform better economically while those without a town of 2,500 residents tended to have sub par economic performance. Thus, the county's location or size of the largest city influenced economic outcomes such as population and job growth to a larger extent than the presence of an airport within the county.

- The variable regarding the number of miles from a county's county seat to a major airport having 200,000 or more enplanements was significant and held a negative coefficient in most models. This meant that counties located closer to major airports had better economic outcomes while those located far from such hubs had sub par economic performance. For comparison, only one airport size variable was significant in the models including all variables. Thus, it appears that being located relatively closer to a major airport is more important to county economic development outcomes than having an airport, even of larger National or Regional size, located within the county.

This last point seems most relevant to policy discussions. Major airports provide numerous and more frequent services such as scheduled passenger service, charter services, and cargo transportation. Thus, consumers and businesses likely find it easier to schedule flights or send/receive materials from these major airports rather than utilizing their local airport even if the major airport is located somewhat further away. It is likely cheaper or easier for customers to drive to the major airport for passenger service or have materials transported from the major airport to their business than to wait for available services in their local area. These market factors beg the question of why a city or county would try to develop expanded airport services in the local area when there is a major airport offering such services within a reasonable distance.

Would it be more cost effective for stretched county budgets to reduce local airport services and rely on those provided by nearby major airports?

All airports, even those of Limited size, provide at least some benefits to the local area. While sometimes not being much more than a landing strip, Limited airports provide access for agricultural spray planes, medical transport, recreation, and emergency services. Airports of larger size with increased infrastructure would obviously provide expanded services to the local area. County officials do need to analyze the use and purpose of local airports. Is the airport actually serving an economic purpose, or is it primarily used for recreation purposes?

Phase I of this research focused on a survey of airport officials' perceptions of their local airport and it was sometimes noted that the airport wasn't much more than "a county club for pilots". Such an area would need to make tough decisions regarding the benefits and costs of the local facilities, especially if located in a close proximity to a "major" airport or one of even National or Regional size that could handle perhaps more efficiently various services that airports typically provide. An airport, as a public good functioning largely on public dollars, needs to function efficiently given strained local budgets. If not serving a large economic purpose, the consolidation of especially smaller airports may be an option worthy of consideration. Analyzing program plans such as those under the Small Aircraft Transportation Systems (SATS) program may help to improve airport services in rural and widely-dispersed states such as Nebraska.

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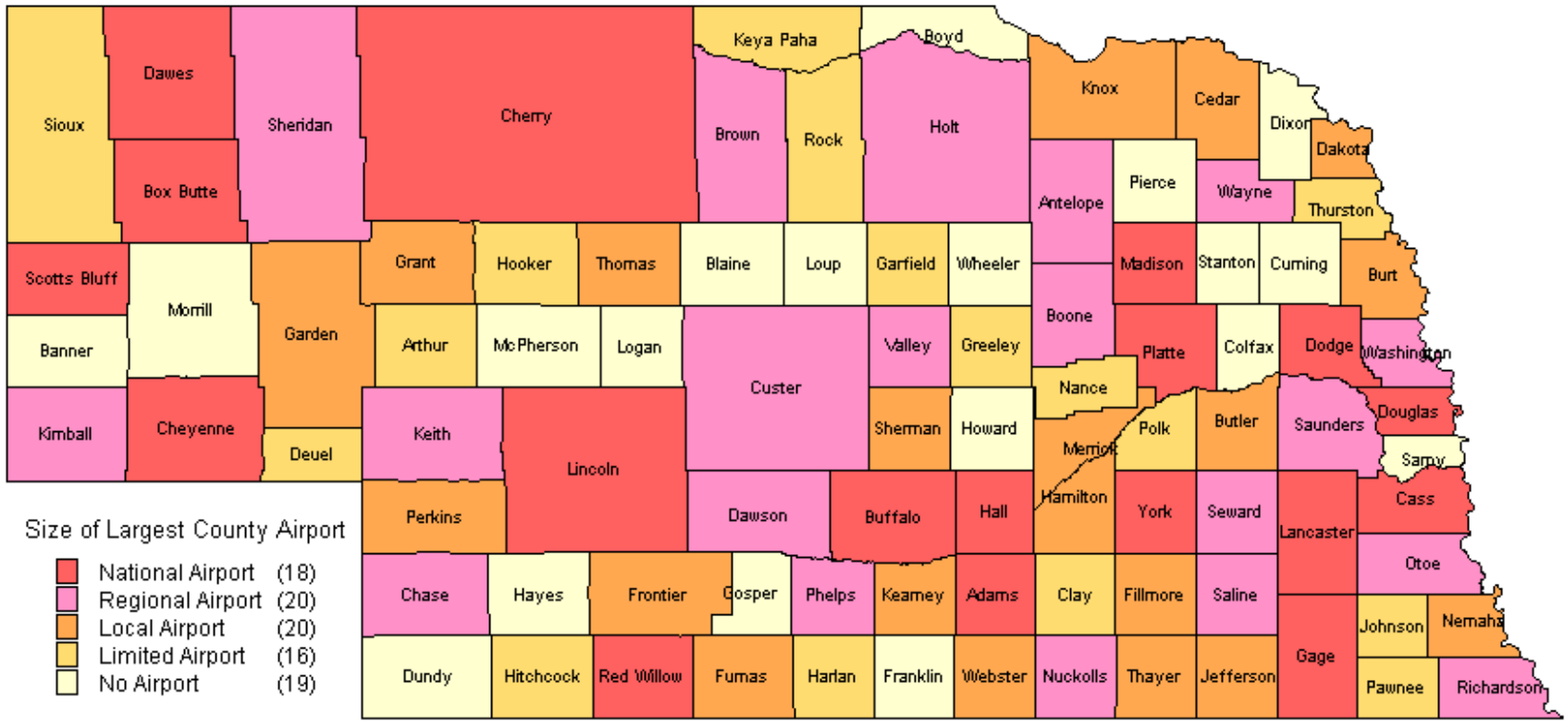
Map 1: Nebraska County Map Showing the Size of the Largest County Airport



Source: Nebraska Aviation System Plan

Map 1 Table: Listing of 90 Nebraska Counties by Largest County Airport and Associated Airport City or County Seat

National Airports

County	Relevant City	County	Relevant City	County	Relevant City
Adams	Hastings	Dawes	Chadron	Madison	Norfolk
Box Butte	Alliance	Dodge	Fremont	Platte	Columbus
Buffalo	Kearney	Gage	Beatrice	Red Willow	McCook
Cass	Plattsmouth	Hall	Grand Island	Scotts Bluff	Scottsbluff
Cherry	Valentine	Lincoln	North Platte	York	York
Cheyenne	Sidney				

Regional Airports

County	Relevant City	County	Relevant City	County	Relevant City
Antelope	Neligh	Keith	Ogallala	Saunders	Wahoo
Boone	Albion	Kimball	Kimball	Seward	Seward
Brown	Ainsworth	Nuckolls	Superior	Sheridan	Gordon
Chase	Imperial	Otoe	Nebraska City	Valley	Ord
Custer	Broken Bow	Phelps	Holdrege	Washington	Blair
Dawson	Lexington	Richardson	Falls City	Wayne	Wayne
Holt	O'Neill	Saline	Crete		

Local Airports

County	Relevant City	County	Relevant City	County	Relevant City
Burt	Tekamah	Garden	Oshkosh	Nemaha	Auburn
Butler	David City	Grant	Hyannis	Perkins	Grant
Cedar	Hartington	Hamilton	Aurora	Sherman	Loup City
Dakota	So. Sioux City	Jefferson	Fairbury	Thayer	Hebron
Fillmore	Fairmont	Kearney	Minden	Thomas	Thedford
Frontier	Curtis	Knox	Creighton	Webster	Red Cloud
Furnas	Cambridge	Merrick	Central City		

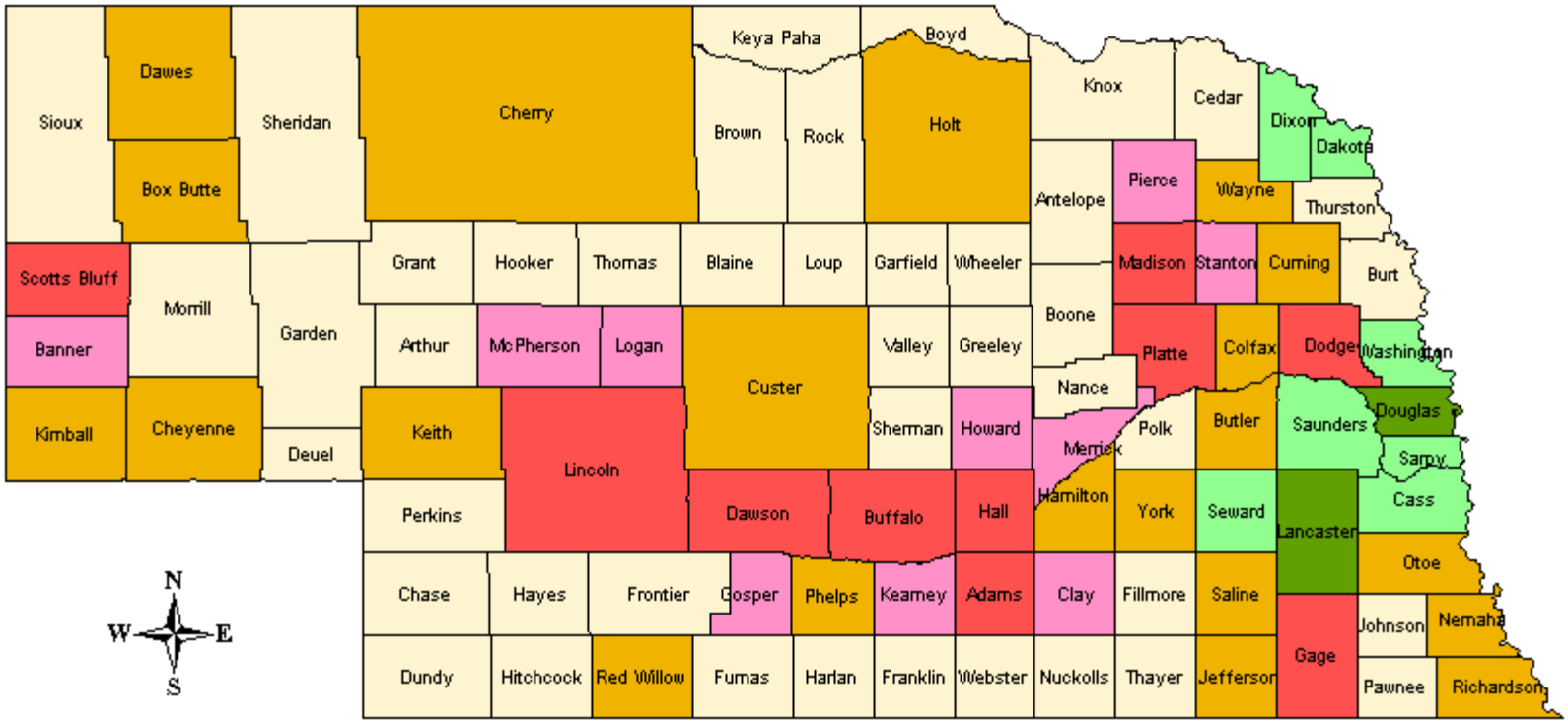
Limited Airports

County	Relevant City	County	Relevant City	County	Relevant City
Arthur	Arthur	Hitchcock	Trenton	Pawnee	Pawnee City
Clay	Harvard	Hooker	Mullen	Polk	Stromsburg
Deuel	Chappell	Johnson	Tecumseh	Rock	Bassett
Garfield	Burwell	Keya Paha	Springview	Sioux	Harrison
Greeley	Greeley	Nance	Genoa	Thurston	Pender
Harlan	Alma				

No Airports

County	Relevant City	County	Relevant City	County	Relevant City
Banner	Harrisburg	Dundy	Benkelman	Loup	Taylor
Blaine	Brewster	Franklin	Franklin	McPherson	Tryon
Boyd	Butte	Gosper	Elwood	Morrill	Bridgeport
Colfax	Schuyler	Hayes	Hayes Center	Pierce	Pierce
Cuming	West Point	Howard	St. Paul	Stanton	Stanton
Dixon	Ponca	Logan	Stapleton	Wheeler	Bartlett

Map 2: Nebraska Counties Classified by Modified Urban Influence Code



Modified Urban Influence Classification

Code 1:	Metropolitan core county (small metro--fewer than 1 million residents)	(2)
Code 2:	Metropolitan outlying county	(7)
Code 3:	Micropolitan core county (contains a city of at least 10,000 residents)	(10)
Code 4:	Micropolitan outlying county	(10)
Code 5:	County with largest town of 2,500-9,999 residents	(21)
Code 6:	County with largest town having less than 2,500 residents	(43)

Map 2 Table: Nebraska Counties Classified by Modified Urban Influence Code

Metropolitan Counties

Metropolitan core county (small metro--fewer than 1 million residents)	
Douglas	Lancaster

Metropolitan outlying county (small metro)			
Cass	Dixon	Saunders	Washington
Dakota	Sarpy	Seward	

Non-metropolitan Counties

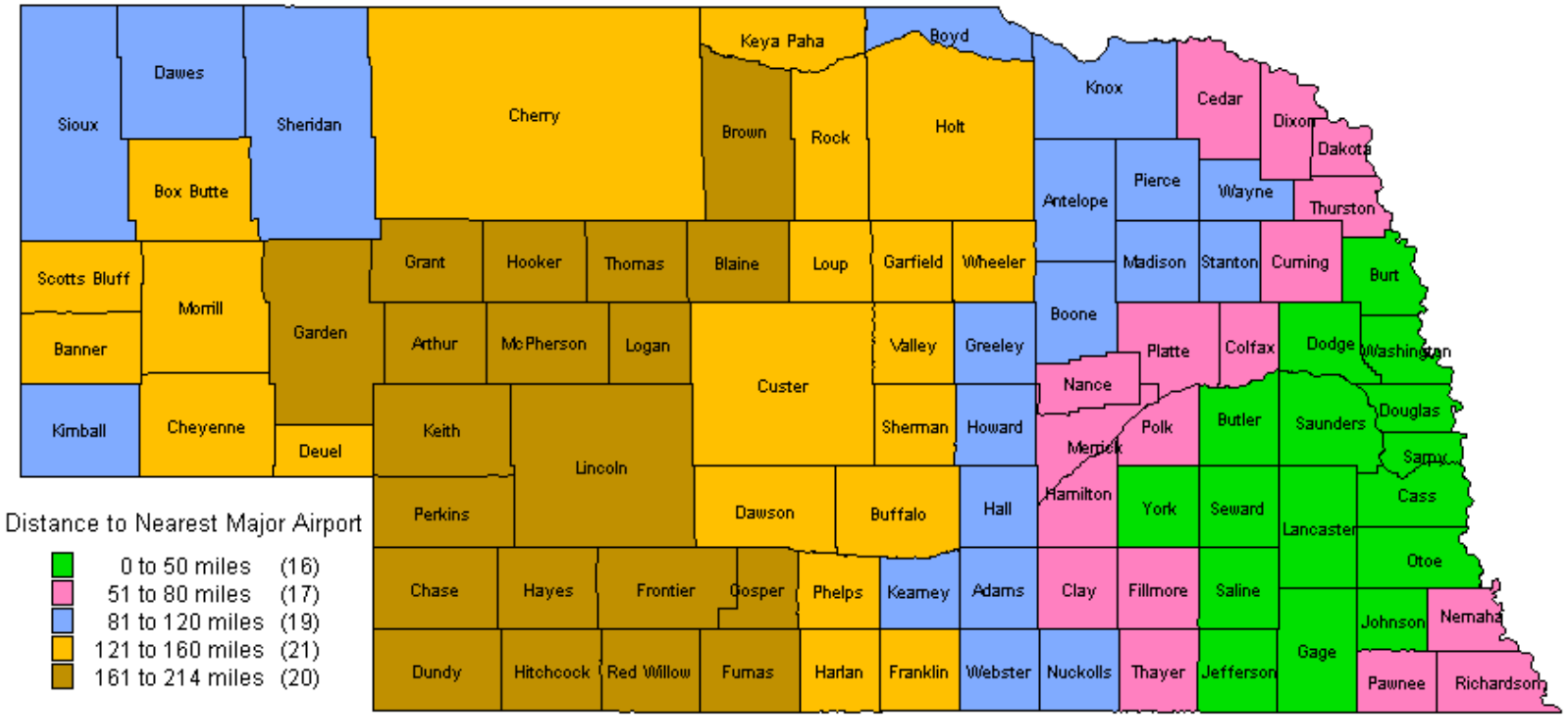
Micropolitan core county (contains a city of at least 10,000 residents)			
Adams	Dodge	Lincoln	Platte
Buffalo	Gage	Madison	Scotts Bluff
Dawson	Hall		

Micropolitan outlying county			
Banner	Howard	McPherson	Pierce
Clay	Kearney	Merrick	Stanton
Gosper	Logan		

County with largest town of 2,500-9,999 residents			
Box Butte	Custer	Keith	Red Willow
Butler	Dawes	Kimball	Richardson
Cherry	Hamilton	Nemaha	Saline
Cheyenne	Holt	Otoe	Wayne
Colfax	Jefferson	Phelps	York
Cuming			

County with largest town having less than 2,500 residents			
Antelope	Fillmore	Hooker	Rock
Arthur	Franklin	Johnson	Sheridan
Blaine	Frontier	Keya Paha	Sherman
Boone	Furnas	Knox	Sioux
Boyd	Garden	Loup	Thayer
Brown	Garfield	Morrill	Thomas
Burt	Grant	Nance	Thurston
Cedar	Greeley	Nuckolls	Valley
Chase	Harlan	Pawnee	Webster
Deuel	Hayes	Perkins	Wheeler
Dundy	Hitchcock	Polk	

Map 3: Nebraska County Map Showing the Distance to the Nearest Major Airport from the County's County Seat



Data Derived from: Mileage Calculator, http://www.symsys.com/~ingram/mileage/index.php

Table 1: Variables Included in the Models

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Dependent Variables:					
Percent Population change 1980-2000	90	-32.76	22.20	-9.629	11.640
Percent Per Capita Income change 1980-2000	90	-50.95	77.09	25.645	26.197
Percent Total Jobs change 1980-2000	90	-27.62	65.98	4.599	18.836
Percent Nonfarm Jobs change 1980-2000	90	-17.91	93.29	17.012	20.770
excluding outlier(s)	89	-17.91	69.25	16.155	19.221
Percent Establishments change 1980-2000	90	-25.00	250.00	12.336	30.213
excluding outlier(s)	89	-25.00	63.21	9.665	16.556
Percent Change in Establishments with 5 or more Employees 1980-2000	88	-66.67	200.00	14.388	32.775
excluding outlier(s)	87	-66.67	100.00	12.255	26.106
Independent Variables:					
County contains National Airport	90	0	1	0.178	0.384
Largest County Airport is in Regional Class	90	0	1	0.222	0.418
Largest County Airport is in Local Class	90	0	1	0.222	0.418
Largest County Airport is in Limited Class	90	0	1	0.178	0.384
County is Metropolitan Outlying	90	0	1	0.067	0.251
County is Micropolitan Core	90	0	1	0.111	0.316
County's Largest Town has 2,500 - 9,999 people	90	0	1	0.233	0.425
County's Largest Town has less than 2,500 people	90	0	1	0.478	0.502
Dependents per 100 Workers in 1980	90	59.72	102.22	83.286	8.953
Percentage of Wage and Salary Jobs in 1980	90	34.76	83.47	62.805	10.217
Percent of those aged 25+ who completed 4 or more years college in 1980	90	6.44	19.13	10.669	2.418
Miles to Nearest Major Airport	90	18	214	113.344	55.492
Miles to Nearest Interstate	90	1	135	44.844	31.641

Table 2. Correlation Matrix for Regression Variables

90 counties analyzed unless noted; significant correlations at the 0.01 level in **bold**

Variable	Dependent Variables						Airport Size				County Type				Various Independent Variables				
	Popu-lation	Per Capita In-come	Jobs	Non-farm jobs	Estab-lish-ments	Large Estab-lish-ments	Lim-ited	Local	Reg-ional	Nat-ional	Largest Town < 2,500 people	Largest Town 2,500-9,999	Micro-pol-itan Core	Metro-politan Out-lying	Depen-dents to Work-ers	Wage-Salary %	Bach-elor's Degree %	Miles to Major Airport	Miles to Inter-state
Percent Population Change	1	.178	**.803**	**.715**	**.344**	**.376**	**-.297**	-.111	.114	**.449**	**-.681**	.151	**.455**	**.463**	**-.492**	**.614**	**.386**	**-.426**	**-.559**
Percent Per Capita Income Change		1	**.289**	.178	-.076	-.170	-.095	.065	.140	-.051	-.118	.042	-.010	.203	**.365**	.030	-.181	**-.473**	-.134
Percent Jobs Change			1	**.909**	.189	.245	**-.287**	-.118	.159	**.463**	**-.547**	.224	**.412**	**.412**	**-.432**	**.538**	**.437**	**-.439**	**-.354**
Percent Nonfarm Jobs Change[1]				1	.237	**.345**	-.241	-.100	.029	**.368**	**-.465**	.205	**.288**	**.316**	**-.449**	**.279**	**.355**	**-.319**	**-.301**
Percent Establish-ments Change[2]					1	**.546**	-.117	-.142	.005	**.330**	**-.429**	.012	.222	**.437**	**-.315**	**.388**	.237	-.162	-.258
Percent "Large" Establishments Change[3]						1	**-.378**	.097	-.040	**.297**	**-.294**	.061	.176	**.313**	**-.333**	**.362**	.248	-.065	-.271
Limited Airport							1	-.249	-.249	-.216	**.428**	-.257	-.164	-.124	.269	-.201	-.208	.056	.130
Local Airport								1	**-.286**	-.249	.184	-.042	-.189	-.036	.179	-.078	-.082	-.080	-.123
Regional Airport									1	-.249	-.137	**.274**	-.104	.179	-.044	.146	.067	-.094	-.009
National Airport										1	**-.445**	.156	**.668**	-.008	**-.516**	**.592**	**.483**	-.071	-.111
Largest Town less than 2,500 people											1	**-.528**	**-.338**	-.256	**.511**	**-.513**	**-.345**	**.289**	**.463**
Largest Town of 2,500 to 9,999 people												1	-.195	-.147	-.216	**.280**	.205	-.152	-.122
Micropolitan Core													1	-.094	**-.384**	**.565**	**.344**	-.060	-.208
Metropolitan Outlying														1	-.148	.101	.002	**-.354**	**-.290**
Dependents to Workers															1	**-.423**	**-.647**	-.073	.233
Wage/Salary Percentage																1	**.480**	-.203	**-.326**
Bachelor's Degree Percentage																	1	.112	-.193
Miles to Major Airport																		1	.261
Miles to Interstate																			1

Notes: 1: 89 counties--Washington an outlier; 2: 89 counties--McPherson an outlier; 3: 87 counties--Arthur an outlier and unable to calculate McPherson, Banner

Table 3. Coefficients and Adjusted R Squared for Airport Influence on Economic Outcomes Regressions

All dependent variables are defined in terms of the percent change between 1980 and 2000. PCI refers to Per Capita Income.

Tier 1: Airport Size Dummies

Dependent Var.	Constant	Limited	Local	Regional	National	Adj R Sq
Population	**-13.064**	-3.949	1.035	**5.902**	**14.604**	0.241
PCI	**21.830**	-1.481	6.970	10.616	0.959	-0.013
Jobs	-3.294	-3.656	3.759	**13.454**	**26.536**	0.277
Nonfarm Jobs	**14.368**	-8.071	-1.756	2.868	**16.801**	0.129
Establishments	**7.555**	-2.013	-2.239	2.277	**13.701**	0.077
"Large" Estabs	**12.727**	**-22.240**	4.188	-2.420	**16.010**	0.161

Predicted Percent Change if Largest County Airport was …

Limited	Local	Regional	National
-17.013	-12.029	-7.162	1.540
20.349	28.800	32.446	22.789
-6.950	0.465	10.160	23.242
6.297	12.612	17.236	31.169
5.542	5.316	9.832	21.256
-9.513	16.915	10.307	28.737

Tier 2: Airport Size and County Class Dummies

Dependent Var.	Constant	Limited	Local	Regional	National	Largest Town < 2,500	Largest Town 2500-9999	Micro Core	Metro Outlying	Adj R Sq
Population	**-8.748**	2.602	3.573	2.972	3.651	**-11.592**	-0.714	**10.444**	**16.465**	0.623
PCI	**22.424**	1.865	7.760	7.431	-5.156	-4.204	2.023	6.367	18.884	-0.019
Jobs	-5.299	1.134	3.441	4.432	8.185	-2.971	**12.610**	**23.933**	**34.642**	0.495
Nonfarm Jobs	**13.700**	-3.057	-1.570	-3.479	3.081	-4.637	10.404	15.497	**28.302**	0.256
Establishments	**13.794**	4.529	1.058	1.846	**12.135**	**-13.632**	-8.248	-4.975	**19.494**	0.297
"Large" Estabs	10.400	**-20.295**	4.014	-6.658	13.201	0.410	3.040	3.490	**32.530**	0.212

Tier 3: All Independent Variables

Dependent Var.	Constant	Limited	Local	Regional	National	Town < 2,500	Town 2500-9999	Micro Core	Metro Outlying	Depen-dents to Workers	Wage, Salary Percent	Bachelor's Degree Percent	Miles to Major Airport	Miles to Nearest Interstate	Adj R Sq
Population	-6.161	-2.041	-1.912	-0.843	-0.954	**-6.382**	-3.303	3.193	**9.449**	-0.155	**0.286**	0.340	**-0.044**	**-0.071**	0.708
PCI	**-97.461**	-3.367	2.878	9.627	10.592	-9.985	-1.632	5.599	10.012	**1.764**	-0.286	1.252	**-0.157**	-0.036	0.321
Jobs	-15.506	-3.720	-2.706	-0.715	0.269	1.198	9.746	**19.189**	**27.052**	-0.028	0.108	**2.027**	**-0.096**	-0.013	0.560
Nonfarm Jobs	**68.895**	-4.264	-3.990	-4.192	-1.204	0.633	9.876	16.009	**22.753**	-0.447	-0.387	**1.732**	**-0.094**	-0.041	0.338
Establishments	-11.490	2.347	-1.481	-1.704	6.574	**-12.196**	-9.302	-9.000	**19.740**	-0.012	0.395	0.193	0.015	0.007	0.282
"Large" Estabs	-4.685	**-26.207**	-4.307	-14.858	1.180	8.802	-0.312	-10.385	**27.417**	-0.393	**0.911**	-0.213	0.030	-0.107	0.248

Values significant at the 90% level in **bold**

Appendix A: Data Sources

Variable	Source	Notes
Percent Population Change 1980-2000	Calculated from Decennial Censuses, U.S. Census Bureau	
Percent Per Capita Income Change 1980-2000	Calculated from Bureau of Economic Analysis (deflated)	3-year averages around selected years used to smooth fluctuations in farm income
Percent Total Jobs Change 1980-2000	Calculated from Bureau of Economic Analysis	Entirely SIC system; NAICS started in 2001
Percent Nonfarm Jobs Change 1980-2000	Calculated from Bureau of Economic Analysis	Entirely SIC system; NAICS started in 2001
Percent Establishments Change 1980-2000	Calculated from County Business Patterns, U.S. Census Bureau	
Percent Change in Establishments with 5 or more employees 1980-2000	Calculated from County Business Patterns, U.S. Census Bureau	
National Airport	Nebraska Aviation System Plan (NASP)	County contains a "national" airport
Regional Airport	Determined via NASP	Largest county airport is of "regional" size
Local Airport	Determined via NASP	Largest county airport is of "local" size
Limited Airport	Determined via NASP	Largest county airport is of "limited" size
Metropolitan Outlying County	USDA Economic Research Service and U.S. Census Bureau	County is part of a MSA but is not a core MSA county
Micropolitan Core County	USDA Economic Research Service and U.S. Census Bureau	County meets micropolitan definition (city with 10,000 people) and contains core city
County with Largest Town having 2,500 to 9,999 residents	Determined via USDA Economic Research Service and U.S. Census Bureau	County not meeting metropolitan or micropolitan designation and has a city with 2,500 to 9,999 residents
County with Largest Town having less than 2,500 residents	Determined via USDA Economic Research Service and U.S. Census Bureau	County not meeting metropolitan or micropolitan designation and does not have a city with more than 2,500 residents
Dependents per 100 Workers in 1980	Calculated via U.S. Census Bureau	Defined as persons under 18 plus persons 65 and over per 100 residents age 18-64
Percentage of Wage and Salary Jobs in 1980	Calculated via Bureau of Economic Analysis	Compares wage and salary jobs versus proprietors (including farm proprietors)
Percent with Bachelor's Degree in 1980	U.S. Census Bureau	For the population ages 25 and older
Miles to Nearest Major Airport	Mileage Calculator for 2 cities: http://www.symsys.com/~ingram/mileage/index.php	Shortest distance from county seat to airport with 200,000 enplanements (Denver, Omaha, Sioux Falls, Rapid City, Lincoln)
Miles to Nearest Interstate	http://bizfind.unk.edu; http://sites.nppd.com/aedc/CitySearch.asp; road maps	Shortest distance from county seat to an interstate