

POPULATION GROWTH AND HOUSING DENSITY AROUND THE JACKSONVILLE INTERNATIONAL AIRPORT

Afolabi Adegbite Adedibu

Airports have negative or positive effects on the community where they are located,¹ and the relationship of an airport to the development of a community can be measured in several ways. In the present study emphasis is placed on the impact of an airport on population growth and housing density in the immediate area of the airport. It is hypothesized that although an airport tends to support an increase in population growth and housing density within the total area of a given community, population growth, and housing density are retarded in its immediate vicinity. Data from Jacksonville, Florida, were used to test this hypothesis. The Jacksonville International Airport, which began operation in 1968, was the airport of concern.

Rationale for Research Hypothesis

Economic geographers, regional economists, and land-use planners have noted the relationship between airports and the employment multiplier concept.² These studies indicate that such multipliers will affect the population and housing density around the airport. The rationale is that the payroll of airport employees may filter down to all members of the community.

Indirect employment, as a component of the multiplier, consists of ancillary activities created to serve the airport. Airport service activities such as hotels, car rentals, and catering firms generate income which adds to the community's economy, and this in turn may attract more population to the community. Secondly, there are employment sectors such as laundries and grocery stores which depend on the needs of those directly employed by the airports. These basic jobs induce population increase. For example, many people displaced from the agricultural sector when an airport is built may be absorbed into basic jobs provided by the airport, or better still, some farmers so displaced may use their land rent to establish businesses to serve the airport community, which may bring more population to the community.³

Many people so displaced and many of those working in the airport may, however, reside far from the airport because of the noise around the airport. For example, the majority of the employees at Heathrow Airport near London live about five miles away--an evidence of how an airport favors daytime population increase.⁴

A work-place census reveals that airports have a tremendous impact on population increase in their immediate areas, but that residential population may be retarded. At Tampa International Airport, the two thousand people employed caused a population increase of 40 percent in the tract where the airport was located, while other tracts in the city increased by 12.3 percent.⁵ It must be noted, however, that this result was based on both business and residence populations and may not reflect the true population and residential increase. From 1966 to the time the new terminal was opened in 1974, 660 hotel units were added to the existing 700--this alone is an increase of nearly 90 percent and may account for the rapid increase in that census tract.

Another major factor that retards residential development near airports is land value. Many local studies show that land values around airports increase at a higher rate than the rest of the areas of the city. The increase in land values may automatically divert the population to other areas of the city, where land will be cheaper and less prone to accident and noise-pollution risks. In San Francisco, land value increased more than 500 percent in a few

years, making it impossible for new home owners to move near airports.⁶ The same trend is found in King County, Washington; Dallas/Ft. Worth Regional Airport; Miami; Tampa; and Jacksonville.⁷ Government regulations sometimes prevent people from living very close to airports. The most commonly given reason for reduced housing density, however, is the effect of noise on the residents.

Notwithstanding, residents are found around airports for many reasons. First, people respond to noise at different levels in different ways, and it may be that those living around the airport are less sensitive to airport noise. Secondly, such people may not have any choice of where to build their homes because of extensive urban development. The two airports in Louisville, Kentucky, are good examples of places where residents surround the airports.⁸ It must, however, be said that there are very few cases like this. Wherever such incidents occur, suits are usually filed against the airport authorities for noise and accidents.⁹ Another major reason for the low density of housing around airports is the inability of the Veterans Administration (VA) and Federal Home Administration (FHA) to insure home mortgages in high-noise areas.¹⁰ In 1954, 38 percent of homes near airports were insured by these associations; but by 1964, only 17 percent were insured and this proportion continues to decrease.

Local ordinances concerned with building codes and land use around airports can also contribute to the low housing density. In many airports, noise contours have been used to guide residential location.¹¹ However, in some areas, zoning regulations are not in force and there often occur many non-conforming land uses. Dulles International Airport near Washington, D.C., is a case in point. In spite of the vast amount of land acquired for the airport, and an attempt by the federal government to induce local jurisdiction to zone the surrounding land for compatible uses, subdivisions have developed near the airport.¹² As long as zoning can be changed by local zoning commissions, it is obvious that homes and other noise-sensitive land uses will continue to be built in noise-affected areas, simply because of the demand for residential sites in a convenient location.

Data and Analysis

Data for the study were collected through the census of population and some local planning documents, with Jacksonville's ninety-seven census tracts serving as the data base. The years between 1960 and 1970 were used as the study period because the airport was opened in 1968, and the planning for the airport had actually started some eight years before its opening.¹³ It is assumed that if those tracts chosen were homogenous in 1960, a change in a ten-year period would show the differences in development, and the effect of the airport would be demonstrated.

Fourteen demographic and socioeconomic variables were subjected to a grouping analysis in order to determine which census tracts had the same attributes in 1960 as Census Tract 103 in which Jacksonville International Airport is located. The result showed this tract to be very similar to six others in 1960. Percentage changes of the fourteen variables from 1960 to 1970 were then calculated to find the changes in development (Table 1). Analysis of variance showed that the seven census tracts which were homogenous in 1960 were significantly different in 1970 (Table 2).

For further explanation of the differences, a Duncan New Multiple Range Test was conducted, and the mean values of the changes in the tracts used for the study were mapped (Fig. 1). Tract 103 where the airport was located developed almost at the same rate as Tract 105 next to it. This was not expected. Better accessibility of Tract 103 via Interstate 95 should have caused it to develop more than Tract 105 with limited accessibility. The opposite, however, is true. Only a 42 percent increase in housing units of

TABLE 1
PERCENTAGE OF CHANGE IN SOME VARIABLES FROM 1960 TO 1970

	Census Tracts						
	<u>103</u>	<u>105</u>	<u>117</u>	<u>133</u>	<u>135</u>	<u>136</u>	<u>137</u>
% Professional Workers	52.8	34.4	16.2	32.4	742.3	-21.4	36.8
% Employed in Managerial Jobs	-5.6	49.0	-41.0	-66.6	-152.9	-100.0	340.6
% Clerical Workers	50.9	51.3	49.1	-14.8	425.1	-78.0	516.6
% in Manufacturing	221.3	161.9	44.2	-37.5	247.5	-77.9	223.6
% in Wholesale	8.5	136.7	-17.8	-90.2	375.5	-100.0	9.3
% in Education Services	205.5	131.5	12.5	186.9	936.4	100.0	278.6
Total Housing Units	42.0	50.0	5.4	-29.3	154.6	-77.9	125.4
% Sound Units	73.3	123.8	91.0	-22.2	385.2	-100.0	251.8
% Owner-Occupied	17.3	13.2	24.5	-12.0	16.9	-100.0	23.2
% Rental Occupied	-28.9	-21.4	-35.0	-0.6	58.0	117.4	-31.6
% Vacant All Year Round	-47.0	-35.0	-1.6	-74.0	-40.0	-58.0	-70.0
% Negro	7.5	65.5	-95.2	67.3	17.4	176.2	-90.9
Total Population	45.4	38.0	6.9	-36.3	200.7	17.6	105.7
Density	25.5	14.6	3.3	-65.4	165.1	-67.4	100.0

Tract 103 was recorded within this period, and a 50 percent increase for Tract 105. No other reason can be advanced for this than that the location of the airport retarded housing units that much in ten years.

Although the two tracts developed almost at equal rates, the population density for Tract 103 increased significantly, while there was very little increase in Tract 105. The reason for this may still be attributed to the airport, which occupied most of the better residential land, and to the presence of I-95, which encouraged commercial land use, making it difficult for residences to be where theory suggests they ought to be. Tract 105, on the other hand, did not have these impediments and could spread out to develop with low density.

Tracts 133 and 136 have negative development scores. Among the reasons for this are that the U.S. Navy has taken control of Tract 136 completely. In 1960, most of the houses in this tract were privately owned, but by 1970, the Navy had control of all the houses, and 100 percent were rental-occupied homes. The development of this tract, both in population density and housing density, depended on the Navy's choice. The Navy could have developed more residences, but a Navy airport on the tract served as a barrier for the construction of more dwellings. The Ortega River and the nearness of Jacksonville Naval Air Station are the major reasons for the negative score for Tract 133. Also, most of the tract was not served by adequate roads, and limited residential facilities were provided. This diverted population to other parts of the city.

TABLE 2

ANALYSIS OF VARIANCE

Source	DF	SS	MS	F	F ₀₁	F ₀₅
Total	98-1 = 97	870,340.4				
Treatment	14-1 = 13	833,328.7	64,102.21	145.48**	2.45	1.90
Error	84	37,011.7	440.62			

$$\text{Correction Term: } \frac{(\Sigma X..)^2}{n} = \frac{(6,550.9)^2}{98} = \frac{42,914,290}{98} = 437,900.91$$

$$\text{Total SS: } \Sigma X^2 - CM = 1,308,241.3 - 437,900.91 = 870,340.4$$

$$\text{Treatment SS: } \frac{(\Sigma X.)^2}{r} - Cm = 1,271,229.6 - 437,900.91 = 833,328.7$$

$$\text{Error SS} = \text{TSS} - \text{Treatment SS} = 870,340 - 833,328.7 = 37,011.7$$

$$\text{MST} = \frac{833,328.7}{13} = 64,102.21 \quad \text{MSE} = \frac{37,011.7}{84} = 440.62$$

Duncan New Multiple Range Test

Mean arranged in order, from the lowest to the highest:

Tract	136	133	117	103	105	137	135
Mean	-26.38	-10.75	3.99	46.53	58.03	144.22	252.27
SSR	3.730	3.890	4.000	4.080	41.400	4.230	
LSR	78.292	81.651	83.960	85.639	86.898	88.780	
RP	5.590	5.820	5.990	6.140	6.211	6.330	

$$W \text{ which is constant} = \sqrt{1/2 + 1/14 + 1/14} = .0714$$

$$\sqrt{\text{MSE}} = \sqrt{440.615} = 20.99$$

$$\text{RP} = \text{SSR} (20.99) (.0714)$$

Tract 117 had a very small increase, and does not fall into any of the development categories. The main cause of this may be the lack of city facilities in this tract. Tract 106, adjacent to 117, had no major road, and the land in the tract was mainly owned by corporations whose aim may have been to produce timber rather than residences, causing the retardation of the population.

So far, discussion has centered upon those tracts in which population growth and residential development lagged behind. In contrast, Tracts 135 and 137, with very little if any impediment to development, developed rather more rapidly than expected. Tract 135 is zoned residential and equipped with roads,

sewage treatment, and a fire station. This, coupled with lack of noise pollution and accident risk from plane crashes, might have accounted for the rapid development of the tract. Tract 137 might have developed as rapidly as 135, since the two have similar facilities, but it did not for two reasons. First, Tract 136, which belonged to the Navy is surrounded by 137. Second, Tract 137 is larger than any of the others, and full facilities could not be provided for the entire tract in a short time.

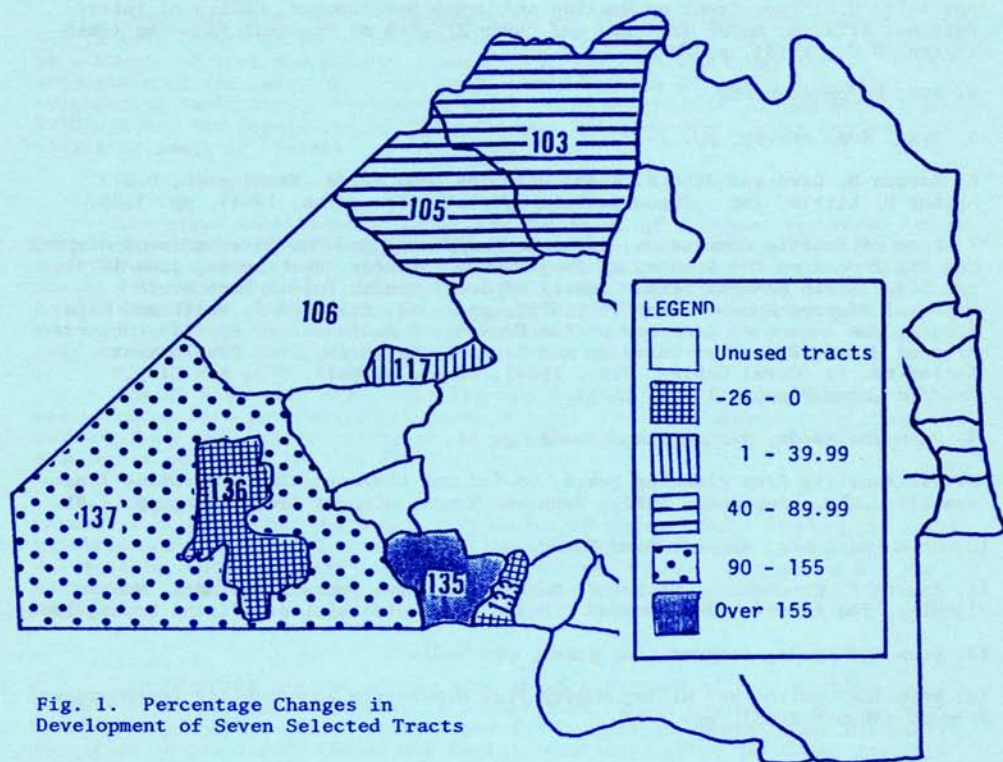


Fig. 1. Percentage Changes in Development of Seven Selected Tracts

Conclusion

Through the use of analysis of variance we are able to reject the null hypothesis of no significant differences in the development of the seven census tracts used. The analysis showed that the homogenous census tracts of 1960 in Jacksonville became heterogenous in 1970 for different reasons. The most conspicuous reason is that the airport location influenced housing density and population increase in three of the seven tracts studied.

1. George J. Bean, *Area Survey of Airport Environ Economic Reactions Present and Future* (Tampa: Hillsboro County Aviation Authority, 1973), pp. 1-21.
2. Numerous papers have been written by economists and land-use planners on how airports affect the economy of an area. A good example is the paper written by George J. Bean (*ibid*).
3. Federal Aviation Administration, *The Airport--The Influence on Community Economy*, System Planning Division, Airport Service (Washington, D.C., 1962), pp. 1-74; U.S. Department of Housing and Urban Development, Office of International Affairs, *Major Airports and Their Effects on Regional Planning* (Washington, D.C., 1973), pp. 2-22.
4. HUD, *Major Airports*.
5. Bean, *Area Survey*, pp. 1-22.
6. Warren H. Deen and John S. Reeds, *Airport Land Needs* (Washington, D.C.: Arthur D. Little, Inc., Communication Service Corporation, 1964), pp. 1-85.
7. Port of Seattle Commission, *Airborne Traffic of Sea-Tac International Airport and Its Impact on the Economy of King County* (Seattle, Washington, June 1974), pp. 1-43; North Central Texas Council of Governments, *Dallas/Fort Worth Regional Airport Economic Impact* (1975), pp. 1-14; Reinhold F. Wolff and Maja Slotta, *The Impact of Airports on the Economy of Southeastern Florida*, University of Miami, Bureau of Business and Economic Research, Area Development Series no. 11 (Coral Gables, Fla., 1964); Edward N. Hall, "The Air City," *Traffic Quarterly* 26 (1972): 15-31.
8. Deen and Reeds, *Airport Land Needs*, p. 11.
9. Jacksonville Area Planning Board, *Social and Environmental Conditions* (Jacksonville, Fla., September 1970); Deen and Reeds, *Airport Land Needs*, pp. 1-85.
10. Deen and Reeds, *Airport Land Needs*, pp. 1-85.
11. Angelo J. Cerchoione; Victor E. Rothe; and James Vercellino, eds., *Master Planning, The Aviation Environment* (Tucson: The University of Arizona Press, 1969).
12. Deen and Reeds, *Airport Land Needs*, pp. 1-85.
13. Reynolds; Smith; and Hills, *Master Plan Report for Jacksonville International Airport* (August 1965), pp. 1-14.