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Analysis of Small Airports within a One Hundred and Twenty Mile Radius of Medium and/or Large Airports

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ANALYSIS OF SMALL AIRPORTS WITHIN A ONE HUNDRED AND TWENTY MILE RADIUS OF MEDIUM AND/OR LARGE AIRPORTS

by

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This thesis was prepared under the direction of the candidate's thesis committee chairman, Dr. Abe Harraf, Department of Aviation Business Administration, and has been approved by the members of her thesis committee. It was submitted to the Department of Aviation Business Administration and was accepted in partial fulfillment of the requirements for the degree of Master of Business Administration in Aviation.

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ABSTRACT

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The purpose of this research is to investigate how income, population age, scheduled air carrier services, and distance between competing airports impact annual scheduled passenger enplanements for airports in smaller communities. Small airports located within a 120 miles radius of larger sized (medium or large) airports are considered to be within the "shadow" of larger airports with which they must compete for passenger enplanements.

Two methods were employed to evaluate shadow airports within a 120 mile radius of larger airports. First, an historical view, analyzing each of the airports with regard to schedule passenger enplanements, median disposable incomes, median ages, and distances between competing air passenger cities was completed. Comparisons were done over a 13 year period from 1980 to 1993 and an average annual growth rate was computed for all the airports' dependent and independent variables. The next step was to pinpoint those small airports experiencing declining enplanements. Following this process, eight airports were singled out with declining trends. Six of the eight airports were found to be within an hour's driving time of a

larger airport. The remaining two were nearer to a two hour drive. Notably, the southeastern region of the United States accounted for half of the shadow airports experiencing declines.

Also of significance, when comparing all other shadow airports to these declining airports revealed that the overall group grew 2 1/2 times faster than the eight cited. Additionally, their competing large airport counterparts when compared to their larger airport overall peer group grew twice as fast, suggesting that market share is being transferred from the shadow airports to their nearby competing airports.

Second, a double log multiple regression model was developed. The final results suggest that this model's independent variables account for 12.45% of the enplanements at the small/shadow airports. The outcome indicated that these independent variables--median disposable income, median age, and distance between air passenger cities were statistically significant at 95% and support the null hypothesis which states that there is a relationship between small air passenger city's median disposable income, median population age, competing airports scheduled passenger enplanements, and distance from small air passenger city to the larger air passenger city. The independent variable, enplanements at the larger airport, was not as strong statistically and fell within a confidence level of 88%. Enplanements at the large hub were included in an attempt to measure the impact of increasing growth at the large airports on its smaller competitors.

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CHAPTER 1

INTRODUCTION

According to some forecasters and other aviation experts, the potential for growth at U.S. small airports, whether within a two-hour drive of a larger competing airport or not is very strong. Airlines are redirecting some air traffic away from the larger airports because of airport capacity constraints. Also, airlines are moving away from hub build up to increase growth and transition to line flights, modeling themselves after the Southwest Airline configuration. Demographic shifts in the decade ahead could mean dramatic changes for both small and medium-sized airports.[1]

Many large airports such as LaGuardia, Kennedy, and Boston Logan have limited expansion capability. This, combined with continued demographic and business shifts away from central cities and into suburban and ex-urban areas, suggest strong traffic demand at the country's smaller airports. However, a shift in how airlines do business occurred in the early 1990 which counters these projections, and it is unclear whether some small airports within a short distance of a larger airport will regain their previous status or fulfill forecasted growth projections.[2]

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1 *America's Airport Capacity Needs: A Futurist Approach to Traffic Forecasting for the 21st Century,* Aviation Research Corporation (Golden, Colorado, August 1990), 100.

2 (Aviation Research Corporation 1990, 100)

The early 1990s saw increased competition from start-up airlines and the Gulf War which resulted in increased fuel costs and air travel interruptions. In addition, most major airlines were suffering from several years of unprofittability and were forced to reevaluate their corporate strategies and their market viability. Later, the Gulf War left the U. S. in a slump and recession causing further economic losses for the major airlines.

Research Objective

The purpose of this research will be to investigate how smaller airport which are within a short drive of a larger airport have faired over a 13 year period and to assess their potential for future growth. This research will investigate how income, population age, scheduled air carrier services, and distance between competing airports impact annual scheduled passenger enplanements for airports in smaller communities. Small airports located within a 120 miles radius of larger sized (medium or large) airports are considered to be within the "shadow" of larger airports with which they must compete for passenger enplanements. The size classification of air passenger cities which offer scheduled passenger air services is determined through the Federal Aviation Administration's (FAA) definition of an "air traffic hub." This definition of "hub" is limited to airports and differs from the better known definition of hub meaning an airline's location for commercial air service connections and route structure. This is commonly known as the "hub and spoke" system.

The FAA defines air traffic hubs as those geographical areas composed of cities and Metropolitan Statistical Areas (MSAs) requiring aviation services; each city/MSA must enplane at least .05% of all U. S. domestic passengers in a given year to be classified as a hub.

An air traffic hub may include more than one airport and falls into one of four classifications. Hub classification is determined by the total annual enplaned passengers of air carriers in the 50 United States, the District of Columbia, and other areas designated by the FAA.[3] The following table provides a breakdown of air traffic hub classifications by total scheduled passenger enplanements. For purposes of clarity, an air traffic hub will be referred to as an air passenger city throughout this paper.

Table 1 **FAA's Classification of Air Traffic Hubs**

Hub Size (air passenger city)	Annual Enplanements (based on 10% ticket sample)
Large Air Traffic Hub (air passenger city)	1% passenger enplanements
Medium Air Traffic Hub (air passenger city)	.25 to .999% enplanements
Small Air Traffic Hub (air passenger city)	.05 to .249% enplanements
Nonhub Air Traffic Hub (air passenger city)	< .05% enplanements

Source: U.S. Department of Transportation, Federal Aviation Administration, *Airport Statistics of Certified Route Air Carriers,* 1992.

Hypothesis

Small airports within 120 miles of one or more large/medium airports compete for scheduled passenger enplanements. Scheduled passenger enplanements of those small air passenger cities served by small airports are influenced by their communities' fluctuation in

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[3] U. S. Department of Transportation, Federal Aviation Administration, *Airport Statistics of Certified Route Air Carriers, (1992): v.*

disposable income, the age distribution of the population, air carrier services of the competing airport, and the distance in highway mileage between the small air passenger city and the medium or large air passenger city. Air carrier services of the competing airport are an important consideration because these larger airports provide residents of the "shadow" city alternatives to their local airport services. The larger airport affords greater economies of scale, more competitive air fares, and generally more choices (direct flights, jet service, and more arrival/departures times) for air passengers. Small air passenger cities closest in highway miles (43-79 miles) to larger air passenger cities suffer the greatest adverse impact.

Research Hypothesis

Based on these concerns, the following hypothesis was formulated.

H_O = There are economic relationships between the small air passenger city's median disposable income, median population age, competing airports' scheduled passenger enplanements, and its distance from the larger air passenger city.

H_A = There are no economic relationships between the small air passenger city's median disposable income, median population age, competing airports' scheduled passenger enplanements, and its distance from the larger air passenger city.

Scope of the Research

The scope of this research is to assess the trend of U. S. scheduled passenger enplanements at small airports, which must compete in multiple airport regions against one or more medium and/or large airports located within a 120 highway mile radius of the small airport. The 120 mile radius is based on previous research conducted by Andrew Goetz and will be discussed in detail in Chapter 3 of this paper.[4] To accomplish this, the following demographic data, economic data, and airport statistical data were gathered for each MSA or air passenger city within the defined study group for the time period of 1980 to 1993. The study group of airports in this research can be found in Chapter 3, Table 3. These four variables are examined:

A. Median disposable income for the small and medium/large air passenger cities

B. Median age of population for the small and medium/large air passenger cities

C. Highway mileage between each of the small air passenger cities and medium/large air passenger cities

D. Scheduled passenger enplanements for small airports and medium/large air passenger cities

Structure of Research

This research is developed based on a double log multiple regression equation which will attempt to explain the historical trends of scheduled passenger enplanements for small airports within driving distance of medium and/or large airports. Other factors which also will be compared within these competing markets are the age of the population in each air passenger city and the income level of the resident populations for both the small air passenger cities and the larger air passenger cities. In addition, the scheduled passenger enplanement statistics of the small or shadow airport with be analyzed as well as those of its competitor(s)

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4 Andrew R. Goetz, "Geographic Patterns of Air Service Frequencies and Pricing at U. S. Cities," *Journal of the Transportation Research Forum*, 33 (1993): 70.

Chapter 2, Review of Literature, examines pertinent research in relation to social and economic characteristics of business and nonbusiness air passengers and those factors which influence air passengers' airport selections.

Chapter 3 formulates a set of competing airports for the study group and identifies the necessary data resources for the dependent and independent variables. The development of the double log multiple regression model concludes this section.

Chapter 4 analyzes the study group of competing airports, and Chapter 5 discusses the results and findings of the multiple regression model.

Finally, Chapter 6 summarizes the findings of both Chapters 4 and 5. In addition, recommendations are provided for conducting further research.

CHAPTER 2

LITERATURE REVIEW

There are two primary categories of air travel passengers--those traveling for business and those traveling for nonbusiness activity. The largest portion of the nonbusiness category includes leisure travelers. Other air travel classified as nonbusiness travel include: emergency trips, traveling for a job interview, military leaves, and travel to and from school.[3]

When evaluating how air passengers choose an airport in a region which supports more than one airport, it is important to understand the variety and hierarchical level of decisions which affect the traveler's choice of departure airport. Those influencing factors-- flight frequency, price, quality of air service, and ground access to airports--that are important to the business traveler may differ or play a lesser role for the leisure traveler. Also, the rationale used by each of these market segments in selecting which airport to depart/arrive from may be very similar but the priority and the weighting of each variable may differ between the business and nonbusiness air passenger.

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[3] Rigas Doganis, *Flying Off Course: The Economics of International Airlines* (New York: Harper Collins Academics, 1991), 208.

Socioeconomic Characteristics of Air Travel Passengers

Business. Of the two groups, business travelers are generally less price sensitive than leisure or nonbusiness. However, with the rise of small businesses, entrepreneurs can be more price sensitive than established large firms since entrepreneurs typically are closer to their organization's accounts payables, and they often act more like a price sensitive leisure traveler than the traditional business traveler from a medium or large sized firm. However, for typical business travelers, availability of seating on demand, high frequency of service, the ability to change travel plans quickly, and number of stop overs enroute are considered very important.[4]

Leisure. The general characteristics of the leisure traveler are more diverse than those of the business traveler. Because of this diversity, their travel preferences reflect different priorities. Price, however, is by far the leading factor in choosing which airline to fly or which airport to depart/arrive from, even though both age and income elasticity of the leisure segment vary greatly. Current estimates suggest that leisure air travel may have an income elasticity as high as 2.0, meaning that in a developed economy, like the United States, if real income rises by 5%, a 10% growth in expenditures on leisure air travel is expected.[5] Another study conducted by Kenneth Kaemmerle echoes a similar result but with a lower ratio. Kaemmerle's model measured the dependence of enplanements to income (defined as total community personal income). The model yielded an elastic parameter of 1.197 supporting the

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4 (Doganis 1991, 210)

5 Stephen Shaw, *Airline Marketing and Management* (Malabar, FL: Krieger Publishing Company, 1993), 50.

concept that as community income increases, passenger enplanements will increase at a greater rate.[6]

An example of a specific population segment among leisure travelers is adults in their early twenties to mid thirties. Prior to taking on responsibilities, such as families and/or home mortgages, this segment as a whole, tends to fly more because they have higher disposable incomes. In addition, the evolutionary changes of the family structure are also impacting leisure travel. People are waiting longer to marry and to have children. They are also choosing to have fewer children. These factors have a positive impact on leisure travel since waiting means a longer initial period of higher disposable income and smaller families increase the likelihood of air travel. Additionally, people are living longer, healthier lives allowing seniors to travel more in their twilight years.[7]

In an economic environment in which retired persons rely heavily on fixed incomes, a community's growth in disposable income increases at a slower rate than a among a working population; consequently, the opportunity cost of traveling to a distance airport to reap ticket savings is often seen as a viable alternative. The cost of travel time for retired persons is lower than that of the working population which is estimated by one researcher to be at least the same dollar rate as their earned income rate. The seniors market, the fastest growing population segment, can prove to be disappointing for small air passenger cities as they are forced by virtue of their fixed incomes (which often do not keep pace with inflation) to be cost conscious shoppers. This group also has the time to

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6 Kenneth C. Kaemmerle, "Estimating the Demand for Small Community Air Service," *Transportation Research,* Part A, 25A (15 May 1990): 107.

7 (Shaw 1993, 48)

price shop and the opportunity cost for this group is lower than for persons currently in the work force.[8]

In general, however, consumers have become much smarter shoppers and will only indulge in goods and services perceived as good values. In addition, leisure travelers are accustomed to the cycle of air fare wars and air fare sales and plan in advance to take advantage of discounted tickets. Passengers are willing to wait for low prices and recognize that deciding early when and where to travel can result in substantial savings. Moreover, there has been a slowing trend of the one- to three-week vacation/holiday, partially as the result of uncertainties in the job market and also in response to the rise in entrepreneurs. Instead, leisure travelers are opting for three to four day mini-vacations, and as a result, are traveling shorter distances.[9]

Research has for some time shown that flight frequency, airport access, and service (pricing) greatly influence airport choice. There has also been a shift from business-dominated travel to more leisure driven travel. Business travelers no longer account for the majority of air travel. In 1979 business travel accounted for approximately 55% of air travel but has since declined to approximately 46% in 1991. It is expected to decline to approximately 39% by 2005. [10] With this shift, the economic factors which influence airport choice will play a greater role. These factors--ticket price, travel time or distance to the airport, and flight frequency--are seen as the crucial variables in predicting

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8 *The Avmark Aviation Economist,* (May, 1993): 14, "Are the US Titans Running out of Jet Fuel?"

9 (*Avmark,* May 1993, 14)

10 John M. Rodgers, "FAA Forecasts," *in Restructuring for Growth and Profitability: 20th Annual FAA Commercial Aviation Forecast Conference Held in Washington, D.C., March 3, 1995* (Washington, D.C.: U. S. Department of Transportation), 42-48.

how both business and nonbusiness passengers choose airports when alternatives are presented.

Analysis of How Passengers Choose a Departure Airport

Multiple airport regions compete against each other in terms of: 1) the types of ground access and access time to airport, 2) the level of service available at the airport, and 3) the airport terminal characteristics. Airport market shares are the result of air travelers choosing among alternative airports to maximize their travel options based on these three criteria.[11] There are several influencing characteristics that air travelers consider before choosing a departure airport and/or trip destination. They are categorized as follows:

- Individual characteristics: travel purpose, occupation, income, and family structure
- Access transportation service characteristics: surface access travel time and cost to alternative airports
- Air transportation service characteristics: ticket price and flight frequency for all combinations of departure airport and destination
- Destination attractions

Whether or not to travel by air results from a set of choices made by the traveling party and are influenced by the above four categories. The traveler's choices include: whether or not to make an air trip; destination of the air trip; time-of-day to travel; which airline to fly; destination airport; location of departure for airport; airfare category; ground mode of

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[11] Masahiko Furuichi and Frank S. Koppelman, "An Analysis of Air Travelers' Departure Airport and Destination Choice Behavior," *Transportation Research Record,* 28A (May 1994): 187.

Structure of Air Travel Choices

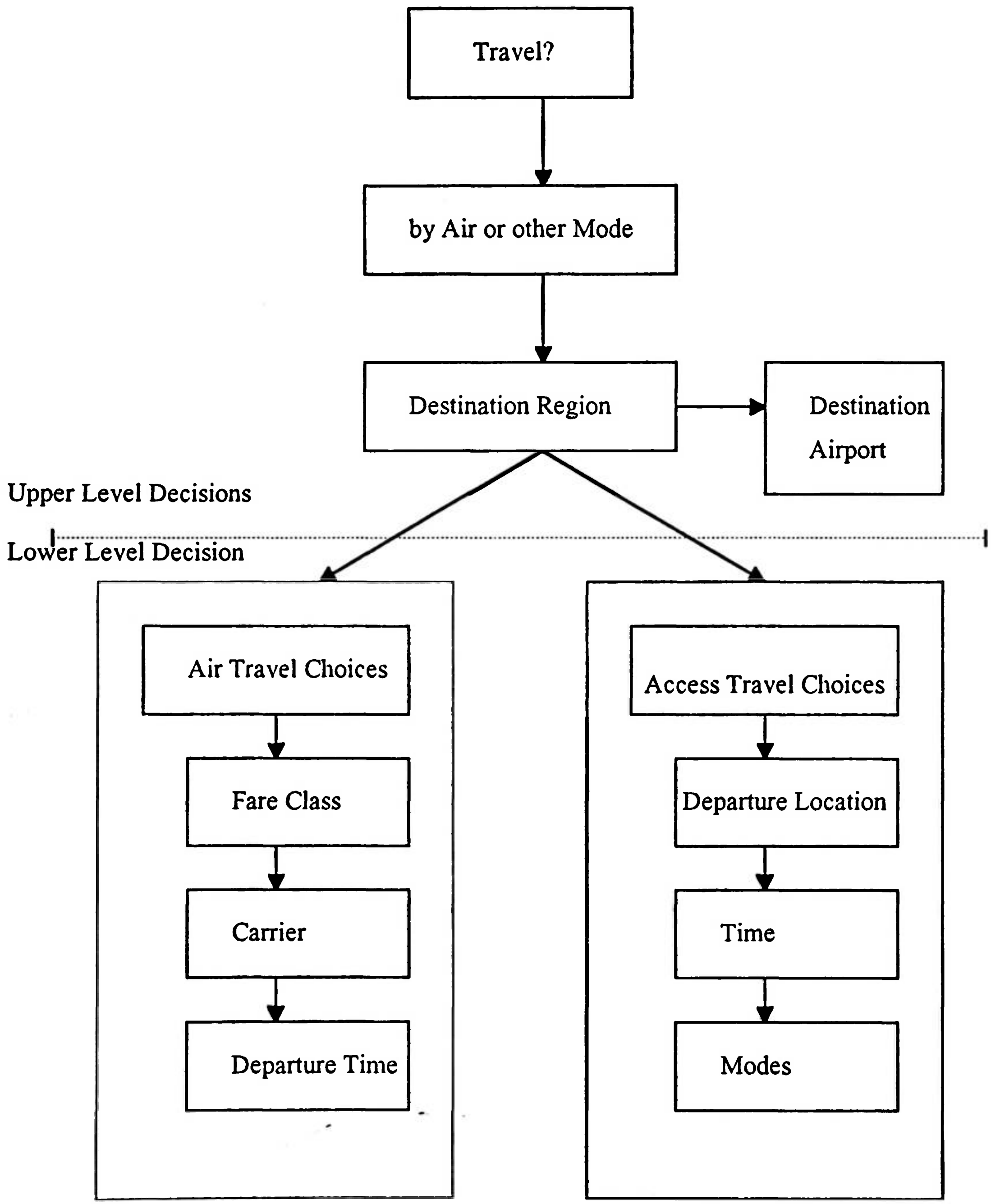

Figure 1

Source: Furuichi and Koppelman 1994, 188.

access to airport; and parking option. (See Figure 1)[12]

The choice of a departure airport often rests on the decision to travel to a specific destination on a particular date and time; those are considered to be high-level decisions. Most likely the decision about which departure airport to select has already been made based upon destination and travel dates and times. Essentially, the choice of which departure airport to fly from is a lower-level decision and is dependent upon on the traveling party and the level of service offered at the airport.[13]

Prior to research conducted by Norman Ashford's and Messaoud Benechemam's (1987), there was a general belief that passengers typically chose to depart/arrive from the closest airport from their departure/arrival locations. However, Ashford and Benechemam theorized that air travelers make choices between airports in multiple airport regions and that airports were not guaranteed patrons based on their location and existence. Given a choice of airports, the air passenger will most likely select a departure airport based on the perception of the airport's overall level of service. Their research employed a multinomial logit model (MNL) with separate models calibrated for specific passenger groups:

- domestic
- international business
- international leisure
- and international inclusive tours.

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12 (Furuichi and Koppelman 1994, 187-188)

13 Greig Harvey, "Airport Choice in a Multiple Airport Region," *Transportation Research Record,* 21A (March 1987): 440.

The model included travel time to the airport, number of flights per day, and air fare rates. The data were retrieved from origin-destination surveys distributed by the Civil Aviation Authority in the United Kingdom.[14]

The study revealed that for business and inclusive tour travel, the most important variables were access time to the airport and number of daily flights to the chosen destination. For domestic and leisure trips there were primary three factors: air fare, access time, and frequency of available flights, in that order of importance.[15] Table 2 is a ranking of airport service by travel purpose.

Table 2

Ranking of Airport Services by Travel Purpose

	Business-Inclusive Tour	**Domestic-Leisure**
1st Dominant	Travel time to airport	Air Fare
2nd Dominant	Number of flights per day	Travel time to airport
3rd Dominant		Number of flights per day

Source: Norman Ashford and Messaoud Benchemam, "Passenger's Choice of Airport: An Application of the Multinomial Logit Model. *Transportation Research Record*, n. s. 1147 (1987): 1.

Airport Access and Time and Costs Factors

As discussed, the choice of a departure airport and, more specifically, how to access the airport, is considered a "lower-level" decision for the traveling party.

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14 Norman Ashford and Messaoud Benchemam, "Passengers' Choice of Airport: An Application of the Multinomial Logit Model, *Transportation Research Record*, n.s. 1147 (1987): 1.

15 (Ashford and Benchemam 1987, 4)

However, similar to the air travel decision, time, cost, and convenience of surface travel to the departure airport are considerations which influence the passenger's airport selection within a multiple airport region.

Access time to the departure airport can be a critical factor for both business and nonbusiness travelers. Researchers have evaluated the value of the passengers' time and the cost of ground transportation for these different market segments. Research indicates that both business and nonbusiness travelers are highly sensitive to travel time to the airport. Generally speaking, as flight time increases so does the passenger's sensitivity toward access time to and from airports. Subsequently, value of time placed on airport access appears higher than estimated by many field experts who study transportation problems and some researchers suggest that improving the infrastructure that supports airport access might be justified. As a result, because travelers perceive ground access to airports as an integral part of the total trip, the quality of ground access can greatly influence an airport's market share.[16]

Only a few researchers have studied the value of time and cost sensitivities of ground access and have formally published their results. Some unpublished studies have been discussed by the researchers cited in this document and support much of what Greig Harvey; Masahiko Furuichi and Frank Koppelman; and Norman Ashford and Messaoud Bencheman have discovered. These studies all used passenger survey data and have developed multinomial logit choice models to evaluate the collected data.

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16 Greig Harvey, "Study of Airport Access Mode Choice," *Journal of Transportation Engineering,* 112 (September 1986): 525.

An unpublished study conducted by the Massachusetts Port Authority (Massport) employed a multinomial logit model of airport access behavior for residents and nonresidents traveling for business or nonbusiness purposes. Both time and cost variables were used as well as:

- auto ownership,
- income,
- number of pieces of luggage,
- size of traveling party,
- and number of children of the traveling party.

The model yielded extremely high values on an individual's time ($30--$100/hr). As expected, elasticity of time for traveling to the airport was substantially higher than travel time dedicated to work or shopping. Because of the prevalence of high-income travelers using air travel, the value of time for airport access is expected to be higher than that of the general population.[17] Another unpublished study analyzed airport access in the Baltimore-Washington region using survey data collected from air travelers in 1966 for the three major airports and represented 78 regional zones. Again, the results indicated that both business and nonbusiness travelers were equally sensitive to cost and time related to airport access. The study also indicated that both time and cost sensitivities were substantially higher for trips to the airport in comparison to return trips. This could be equated to a higher anxiety level at departure and the passenger's concern for making certain he/she arrives on time to make the scheduled flight.[18]

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17 (Harvey 1987, 528)
18 (Harvey 1987, 528)

In 1980, a survey of outbound air passengers in departure lounges of three major competing airports--San Francisco International (SFO); Oakland International (OAK); and San Jose Municipal (SJC)--was conducted of residents (business and nonbusiness) to survey ground transportation choices. Three categories were included in the survey: automobile, taxi service, and public transit. Results revealed that business travelers drove to the airport more frequently than nonbusiness travelers (51% vs 27%) and took a taxi more often (8% vs 4%). Nonbusiness travelers were more likely to be dropped off at the airport (56% vs 31%) or to take public transit (5.4% vs 3%) than the business traveler. (See Figure 2)[19]

Auto access, as indicated, was the primary choice, among business travelers, reflecting this segment's affluence. Income levels of this study's business sample were found to be high. Nearly 85% of the business travelers reported household incomes above the area's median income. Busy schedules, multiple car households, and above average household income explain the higher expenditures on airport access.[20] Also, for those traveling on business, corporate travel reimbursement transfers the higher travel cost related to accessing the airport to the employer.

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19 (Harvey 1987, 528)

20 (Harvey 1987, 528-529)

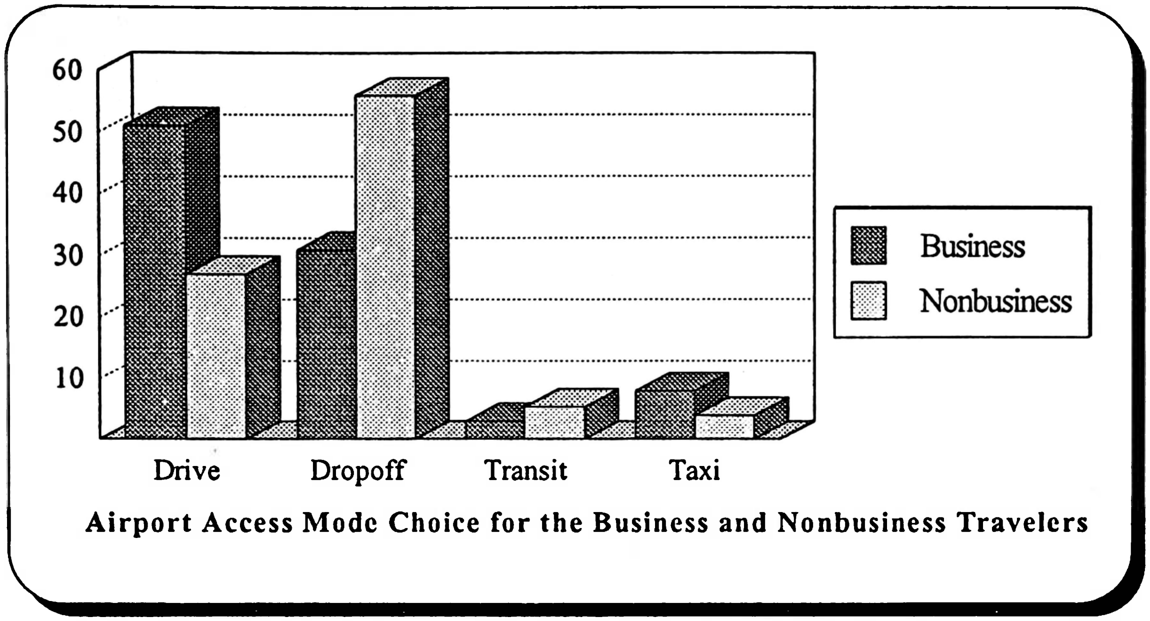

Figure 2

Source: Greig Harvey, "Study of Airport Access Mode Choice," *Journal of Transportation Engineering,* 112 (September 1986): 529.

Nonbusiness travelers, as expected, were less affluent than business travelers with 60% of this segment reporting income above the median, a distribution resembling the resident population and also explaining the reduction in nonbusiness travelers using personal vehicles or taxis. A greater percentage of nonbusiness travelers chose less expensive access modes such as drop off by friends, family or public transportation.[21]

Trip duration, the number of days away from home, is another contributing factor to airport access choice for both business and nonbusiness travelers. Long-term parking for the air traveler's personal vehicle is the largest single cost associated with driving to the airport. Importantly, the cost conscious or price sensitive nonbusiness travelers, on average, take longer trips which supports why they elect to be dropped off at an airport.

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[21] (Harvey 1987, 529)

Dropping off a family member not only helps in trimming travel costs, but also has a social value. Wishing the traveler a safe trip and greeting the traveler upon return is an established tradition. On the other hand, business travelers generally make shorter trips and are very often reimbursed for expenses such as long-term parking.[22]

As a result of the information gathered at the three San Francisco area airports, Harvey hypothesized that cost sensitivity for nonbusiness travelers should decrease as income rises. As the nonbusiness traveler's higher disposable income rises, some will be expended on travel. His results also showed that the low and medium income ranges were not well distinguished as the current sample size. Harvey's model did reveal that differences in access time sensitivity for all travelers existed and cost sensitivity for low income travelers were surprisingly strong. However, the difference in cost sensitivity for medium and high incomes did not appear to exist. As anticipated, the cost sensitivity of the nonbusiness traveler decreased with increasing income. One exception was the category of long-haul, low income travelers. Lack of sensitivity to cost may be impacted by travel subsidies by relatives or by a high ratio of assets to income which is characteristic of retirees. For example, those with low income may have travel expenses paid by family members. Also, some retirees may have a below average incomes but have fewer large payments such as on cars and houses, and therefore, their sensitivities to costs and their actual disposable incomes may be misrepresented. Generally, business travelers are less ticket price sensitive than nonbusiness travelers, and income does not appears to be an important factor to their cost sensitivity since the corporation absorbs the expense. In

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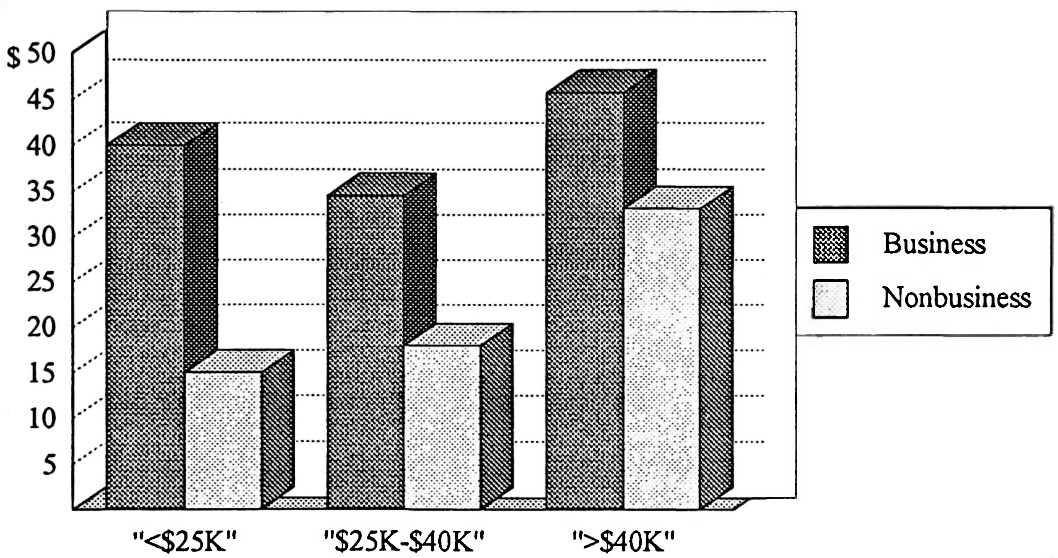
22 (Harvey 1987, 529-533)

summary, Harvey's research indicated that for most air travelers, the value of time is at least as high as the average wage, or salary; in many cases, it appears to be much higher. Business travelers are considerably more sensitive to airport access time than to other types of travel time. Nonbusiness travelers also exhibit high time sensitivity, but not as high as business travelers.[23]



Cost Coefficient of Ground Access to Airport by Income Level and Study Group

Figure 3

Source: Greig Harvey, "Study of Airport Access Mode Choice," *Journal of Transportation Engineering,* 112 (September 1986): 536--539.

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[23] (Harvey 1986, 541)

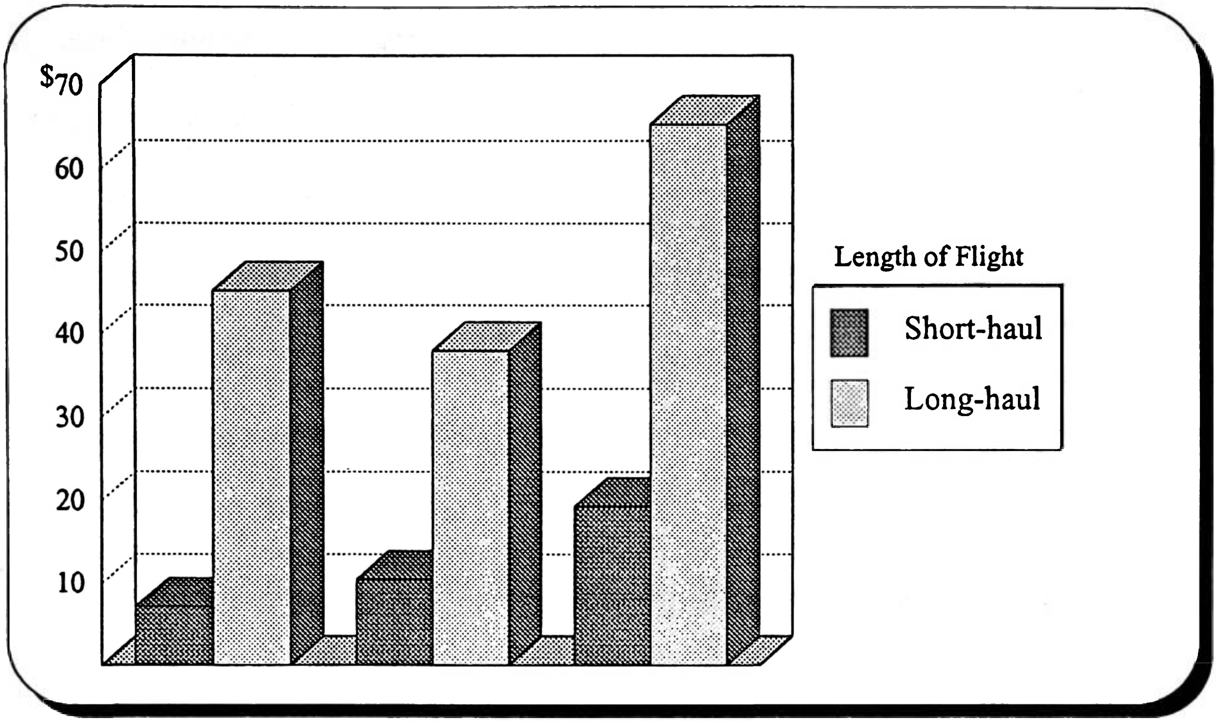

Figure 4

Source: Greig Harvey, "Study of Airport Access Mode Choice," *Journal of Transportation Engineering,* 112 (September 1986): 540.

Other researchers as well have studied the value of time in air travel and found it to be high. Mohring argued that the value of time for the business traveler is equal to the traveler's wage rate.[24] Another researcher, Winston (1985) estimated the value of time for inter-city travel to be 50% higher than one's hourly wage. He suggests that because salaried employees are measured by their employer more by the tasks accomplished, rather than time on the job, he argues that professionals often have a secondary earning potential (such as bonuses and stock options) that are much higher than their hourly rate. Also, professionals tend to be familiar with air travel and understand the physical and psychological stresses associated with air travel which contribute to fatigue and anxiety (jet lag, seating discomfort, terminal waits, ozone exposure, safety concerns). These factors

[24] H. Mohring, *Transportation Economics, Ballinger, Cambridge, Mass.,* (1976): *58.*

are seen as reducing one's performance, and, therefore, carry a higher cost than the average hourly wage.[25]

When both business and nonbusiness travelers were asked to list their primary reasons for choosing an airport, the responses by both business and nonbusiness travelers were "near home," "near work," and "airport access" as the major influencing factors. The second category, flight frequency, also played an important role in deciding which airport to choose. These supported Harvey's theory that given an adequate number of flights (9 or more) to a traveler's destination, the traveler will chose the airport closest to either home or work. However, small airports with limited or no direct air service will be bypassed in favor of better service offered at a competing airport even though additional ground travel time is required. [26] Another decision which affected the traveling party's airport choice was whether direct service was available. Passengers will choose to travel over two hours to a competing airport in order to fly direct rather than endure connecting flights. Harvey concluded that access distance to an airport affects both airport attractiveness and demand for air travel especially in short-haul markets. However, the type and level of services offered at a distant competing airport (flight frequency, direct flights, and jet service) are often attractive enough to outweigh the cost and time factors associated with a lengthy ground commute.[27]

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[25] C. Winston, "Conceptual Developments in Economics of Transportation," *Journal of Economic Literature* 23 (1985): 57-94.

David J. Innes and Donla H. Doucet, "Effects of Access Distance and Level of Service on Airport Choice," *Journal of Transportation Engineering, n.s. 116 (July/August 1990): 509-516.*

[26] (Harvey 1987, 442)

[27] (Harvey 1987, 442)

Using a disaggregate model, researchers David Innes and Donald Doucet also attained similar results during their examination of the effects of airport proximity, level-of-airport service, and types of airport service on airport choice. Those factor affecting the choice of alternate airports for their area of study (northern New Brunswick, Canada) were:

- number of flights offered at each airport
- availability of direct air services
- availability of jet service

Results revealed that air travelers strongly preferred jet service and would travel a significant distance to depart from an airport offering jet service rather than depart from a much closer airport offering commuter service. Jet service was determine to be the most important variable in deciding airport choice. Other variables included flying time difference and availability of direct flights. Shortly after the completion of Innes' and Doucet's research, commuter service was discontinued within the New Brunswick region. In this case commuter services versus jet services and direct flights were discovered to have high value to air travelers.[28]

[28] David J. Innes and Donla H. Doucet, "Effects of Access Distance and Level of Service on Airport Choice," *Journal of Transportation Engineering, n.s.* 116 (July/August 1990): 509-516.

CHAPTER 3

DATA COLLECTION AND MODEL DEVELOPMENT

As hypothesized, the disposable income and age of the population, as well as the enplanements of the competing airports, impact scheduled passenger enplanements at shadow airports which must compete against larger airports within driving distance of the small airport. Additionally, the closer the large airport is to the shadow city the greater the impact on the shadow airport's scheduled passenger enplanements. Based on this hypothesis, the following criteria were established for data collection and measurement:

1. Small, medium, and/or large airports are considered to be competitors if within 120 radius miles. A group of such airports were identified by Andrew Goetz (1993). The small air passenger cities are referred to as "shadow cities."

2. Scheduled passenger enplanements were collected for both shadow airports and the larger airports within the study group for the time period 1980 to 1993.

3. The socioeconomic indicators collected for this study were median disposable income and median population age. These data were collected for each air passenger city/MSA.

The following sections detail each data source and the collection process.

Selection of Air Passenger Cities for the Study Group

A listing of small, medium, and large air traffic hubs was taken from *FAA Statistical Handbook of Aviation, 1992,* and was combined with *Cities within a Traffic Shadow* identified by Andrew Goetz. Goetz considers a small or medium-sized city to be a "traffic shadow city" when located within 120 highway miles of a larger air passenger city. Goetz cites research completed by Taaffe (1956) as having identified a 120-mile radius as the most appropriate for the range of a traffic shadow.[29] However, this research is limited to small airports as shadow cities and does not include medium sized air passenger cities as does Goetz's study. The *FAA Statistical Handbook of Aviation* for the year ending 1992 was consulted to compile a selected list of "U.S. Traffic Shadow Cities" appropriate for this thesis. In Goetz's study the same source was used to compile his table of competing airports. However, the FAA classification of small, medium, and large air traffic hubs changes yearly and is dependent upon each individual airport's reported annual scheduled passenger enplanements. Those small air passenger cities not included in Goetz's research, dated 1990, but met the FAA's criterion (definition of small traffic hub city) for 1992, were added to this study group. (Refer to Table 3)

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29 (Goetz 1993, 70)

TABLE 3

U. S. CITIES WITHIN A TRAFFIC SHADOW [30]

Small Airport Shadow Air Passenger City	Medium/Large Airport Nearby Larger Air Passenger City
Allentown, PA	Philadelphia, PA; New York, NY; Newark, NJ
Baton Rouge, LA	New Orleans, LA
Colorado Spring, CO	Denver, CO
Columbia, SC	Charlotte, NC
Dayton, OH	Cincinnati, OH
Daytona Beach, FL	Orlando, FL; Jacksonville, FL
Eugene, OR	Portland, OR
Greenbay, WI	Milwaukee, WI
Greensboro, NC	Charlotte, NC; Raleigh-Durham, NC
Greenville, SC	Charlotte, NC
Harrisburg, PA	Baltimore, MD; Philadelphia, PA
Huntsville, AL	Nashville, TN
Lansing, MI	Detroit, MI
Lexington, KY	Cincinnati, OH
Louisville, KY	Cincinnati, OH
Madison, WI	Milwaukee, WI
Melbourne, FL	Orlando, FL
Palm Springs, CA	Ontario/Riverside
Portland, ME	Boston, MA
Providence, RI	Boston, MA; Hartford, CT
Richmond, VA	Washington, DC
Rochester, NY	Buffalo, NY
Saginaw/Bay City, MI	Detroit, MI
Sarasota/Bradenton, FL	Tampa, FL, Ft. Myers, FL
South Bend, IN	Chicago, IL
Toledo, OH	Detroit, MI; Cleveland, OH

30 (Goetz 1993, 72)

Data Collected for Multiple Regression Analysis Model

Highway Mileage between the Competing Air Passenger Cities. The highway mileage of the major metropolitan cities for each set of competing airports was gathered from the *Rand McNally Standard Highway Mileage Guide.*[31] (See Table 4). An assumption made in the development of the multiple regression model was that if a shadow city had more than one competing airport within the 120 mile radius offering scheduled air service, the competing city/MSA with the shortest distance from the shadow city/MSA was used in the model and was considered to be the primary competitor.

Scheduled Passenger Enplanements (1980-1993). After identifying the sets of competing airports, scheduled passengers enplanements were gathered for each airport within the study group. Data collected for this portion of the methodology were obtained from the FAA's *Airport Activity Statistics of Certified Route Air Carriers* (Tables 3, 4, 5, and 6) for the years 1980 through 1993. Data were collected on absolute enplaned passenger counts at small, medium, and large air traffic hubs in competition with one another. (See Appendix A) An enplaned passenger may be defined as any person receiving air transportation from a scheduled air carrier for which renumeration is received by the air carrier. Enplaned passenger traffic statistics are collected annually and are based on 10 percent samples of the number of revenue passengers boarding aircraft, including originating, stop-over, and transfer passengers.[32]

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31 *Standard Highway Mileage Guide, Skokie, IL: Rand McNally, 1987.*

32 *Airport Activity Statistics of Certified Route Air Carriers,* U. S. Department of Transportation, Federal Aviation Administration, Washington: Superintendent of Documents: (1980-1993).

Demographical Information. The median age of a population and the median disposable income, known as Effective Buying Income (EBI) for each city/MSA, were gathered from *Sales and Marketing Management, Survey of Buying Power (1981-1994).* Both the EBI and the median population were based on U.S. Census data and from annual survey samplings of each Metropolitan Statistical Area taken by the journal's staff of *"Buying Power."* Each issue summarizes the previous year's statistics.[33] Data collected for the cities/MSAs selected for this study are outlined in Table 3, "U. S. Cities within a Traffic Shadow." Appendix B provides the data collected regarding median population ages for shadow cities/MSAs, and Appendix C provides the data collected for median Effective Buying Incomes for shadow cities/MSAs.

Effective Buying Income (EBI) is a bulk measurement of a specific city/MSA's market potential and reflects the population's general disposable income and its purchasing power. In order to estimate EBI, *Market Statistics* excludes the tax from the census income data, while taking into account the variation of tax rates by income level and by local taxes.[34]

Multiple Regression Model Development

The next step of this research was to test the hypothesis to measure what impact the independent variables (disposable income, population age, competing airport's scheduled passenger enplanements, and distance to competing air passenger cities) had on the dependent

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33 *Sales and Marketing Management, 1981-1994 Survey of Buying Power,* A Bill Publication, (July/August 1981-1994).

34 *(Sales and Marketing Management* July 1981, A-14).

variable (shadow airports' scheduled passenger enplanements). A double log multiple regression model was formulated.

Double-Log Multiple Regression Model

<u>Model</u>

ln enp-sm = c + ln enp-lg + ln ag + ln ebi + dum1 (distance)

ln enp-sm	represents the natural log of the dependent variable of scheduled passenger enplanement at small airport
c	constant
ln enp-lg	represents the natural log of the independent variable of scheduled passenger enplanements at the larger airport
ln age	represents the natural log of the median population age at the small air passenger city
ln ebi	represents the natural log of effective buying income at the small air passenger city
dum 0/1 (distance)	represents the highway mileage between the cities/MSAs competing for scheduled passenger enplanements

First, the researcher hypothesized that the small airport's scheduled passenger enplanements will rise as disposable income rises. Traveling to the distant airport would be less attractive since the passenger's opportunity cost of traveling to the distant airport would rise. Also, more disposable income is available for travel and cost concerns are lessened.

Secondly, it is hypothesized that as the age of the population increases, enplanements at the small airport will also rise. Seniors would find it tiresome to travel by car and then fly; the return trip would also end in a drive following what might have been a long day.

Conversely, younger travelers would opt to drive to a distant airport to decrease total travel costs. Those in the prime of their careers are less willing to travel to distant airports because of the time factor. In addition, this middle aged segment has reached its financial peak and can expend more for convenience. At the same time, this business segment's value on time has also reached a peak discouraging lengthy travel time to more distant airports.

Thirdly, as the distance between competing airports increases, the passenger enplanements will increase at the small airport making connections with the larger airport less attractive and a more expensive, time consuming option.

Finally, the economies of scale of a larger airport can negatively impact enplanements at a small airport. Larger airports which services a major metropolitan statistical area have more airlines creating a more competitive environment favorable to the traveling public. Also, larger airports can offer more services such as increased flight frequency, nonstop flights, and jet service. Because of the population size of the small air passenger city, these services can be nonexistent or limited. This, in return, fosters an environment which makes it attractive to travel to the larger, more distant airport.

CHAPTER 4

ANALYSIS OF COMPETING AIRPORTS

The study group consisting of small airports within a 120 mile radius of one or more larger airports was divided into four regional areas. Regions 1 (northeast) and 2 (southeast) contain the greatest proportion of large airport reflecting the population density within the United States. Region 3 generally covers the north and south central sections of the U.S. and is comprised of 18 airports, mostly small and medium sized airports. Region 4, the smallest grouping of airports consists of 6 airports and covers the western region of the United States. Figure 5 includes a U. S. map depicting the regional divisions. Tables showing how each airport ranks in comparison to its regional peers is included in the Regional sections of this chapter. These tables compare average annual growth rates and annual growth rates with respect to scheduled passenger enplanements, median disposable income, and median age.

Graphs were also prepared for each set of competing airports comparing annual scheduled enplanements, median population ages, and median disposable incomes from 1980 to 1993. Enplanements between the small airports and larger airports were logarithmetically equated in order to draw a clearer and more meaningful comparison. The left-hand Y-axis provides the scale for small or shadow airport and the right-hand Y-axis provides the scale for the larger airport. Those shadow airports which exhibit a downward trend in scheduled

Air Traffic Hubs
December 31, 1992

Figure 5

Source: FAA Statistical Handbook of Aviation, 1993 passenger enplanements are further analyzed and included within the Regional sections. Appendix D provides a complete listing of graphs.

Lastly, four ordinal tables were compiled of all airports within the study group ranking each airport and its air passenger city on growth. A table ranking all shadow cities and their respective airports in relation to distances to their competitors introduces this chapter and the remaining summary tables rank all airports with regard to growth in enplanements, median age, and median disposable income.

Distance Between Competing Airports

Twenty-seven shadow airports and their larger competitors are ranked from shortest to farthest distance in Table 4. The average distance between competing airports is 78.3 highway miles. Providence, Rhode Island, and Boston, Massachusetts, record the shortest distance of 43 miles. The competing airports of Greenbay and Milwaukee, Wisconsin, are ranked 24th, a distance of 112 highway miles. Throughout each section of this chapter, this table will be referred to for comparisons between competing airports and trends in scheduled passenger enplanements from 1980 through 1993.

Table 4 Distance Between Competing Hubs

Region	Small/Shadow Airport	Larger Airport	Distance (Highway Mileage)	Ranking
Region 1	Providence, Rhode Island	Boston, Massachusetts	43.00	1.00
Region 2	Sarasota, Florida	Tampa Florida	52.00	2.00
Region 3	Dayton, Ohio	Cincinnati, Ohio	54.00	3.00
Region 2	Daytona Beach, Florida	Orlando, Florida	54.00	3.00
Region 1	Allentown, Pennsylvania	Philadelphia, Pennsylvania	55.00	4.00
Region 1	Manchester, New Hampshire	Boston, Massachusetts	55.00	4.00
Region 3	Toledo, Ohio	Detroit, Michigan	56.00	5.00
Region 4	Colorado Springs, Colorado	Denver, Colorado	67.00	6.00
Region 2	Melbourne, Florida	Orlando, Florida	68.00	7.00
Region 2	Greensboro, North Carolina	Charlotte, North Carolina	71.00	8.00
Region 1	Rochester, New York	Buffalo, New York	74.00	9.00
Region 4	Indio/Palm Springs, California	Riverside, California	75.00	10.00
Region 1	Harrisburg/York, Pennsylvania	Baltimore, Maryland	77.00	11.00
Region 3	Madison, Wisconsin	Milwaukee, Wisconsin	77.00	11.00
Region 3	Lexington, Kentucky	Cincinnati, Ohio	78.00	12.00
Region 3	Baton Rouge, Louisiana	New Orleans, Louisiana	80.00	13.00
Region 3	Lansing, Michigan	Detroit Michigan	84.00	14.00
Region 3	South Bend, Indiana	Chicago, Illinois	85.00	15.00
Region 2	Columbia, South Carolina	Charlotte, North Carolina	88.00	16.00
Region 2	Greenville, South Carolina	Charlotte, North Carolina	89.00	17.00
Region 3	Saginaw/Bay City, Michigan	Detroit, Michigan	93.00	18.00
Region 3	Louisville, Kentucky	Cincinnati, Ohio	101.00	19.00
Region 1	Richmond, Virginia	Washington, D.C.	103.00	20.00
Region 1	Portland, Maine	Boston, Massachusett	106.00	21.00
Region 3	Huntsville, Alabama	Nashville, Tennessee	108.00	22.00
Region 4	Eugene, Oregon	Portland, Oregon	109.00	23.00
Region 3	Greenbay, Wisconsin	Milwaukee, Wisconsin	112.00	24.00
		Average	**78.30**	

Comparison of Independent and Dependent Variables by Region

Region 1 (Northeast). Of the 13 competing airports within this region, 6 are small or shadow airports and 7 are large and medium sized airports. Only a single small airport experienced steady declines in enplanements. The Portland, Maine, airport experienced a sharp decline in enplanements in 1989 from a previous high of 612,800 which is also a high for the study period (1980-1993). (See Figure 6) During 1989, the Portland airport suffered a 29.39% loss in scheduled passenger enplanements while its rival airport, Boston, experienced only a 4.73% decline in enplanements from 1988 to 1989. In comparison to the other 13 airports within Region 1, Portland, ranked 5th in average annual growth in enplanements. (See Table 5) It is very possible, however, that another small airport located in Manchester, New Hampshire, with strong growth during this study period and located within 88 miles of the Portland, attracted passengers from the Portland area. The Manchester airport ranks first in growth in annual scheduled enplanements and experienced an annual growth rate of 181.89%. Manchester's growth began excelerating in 1987 and peaked in 1991 with only slight declines in 1992 and 1993. (Refer to Appendix A for scheduled passenger enplanement figures.) The distance between Portland and Boston is 106 highway miles, ranking 21st among 27 air passenger cities.

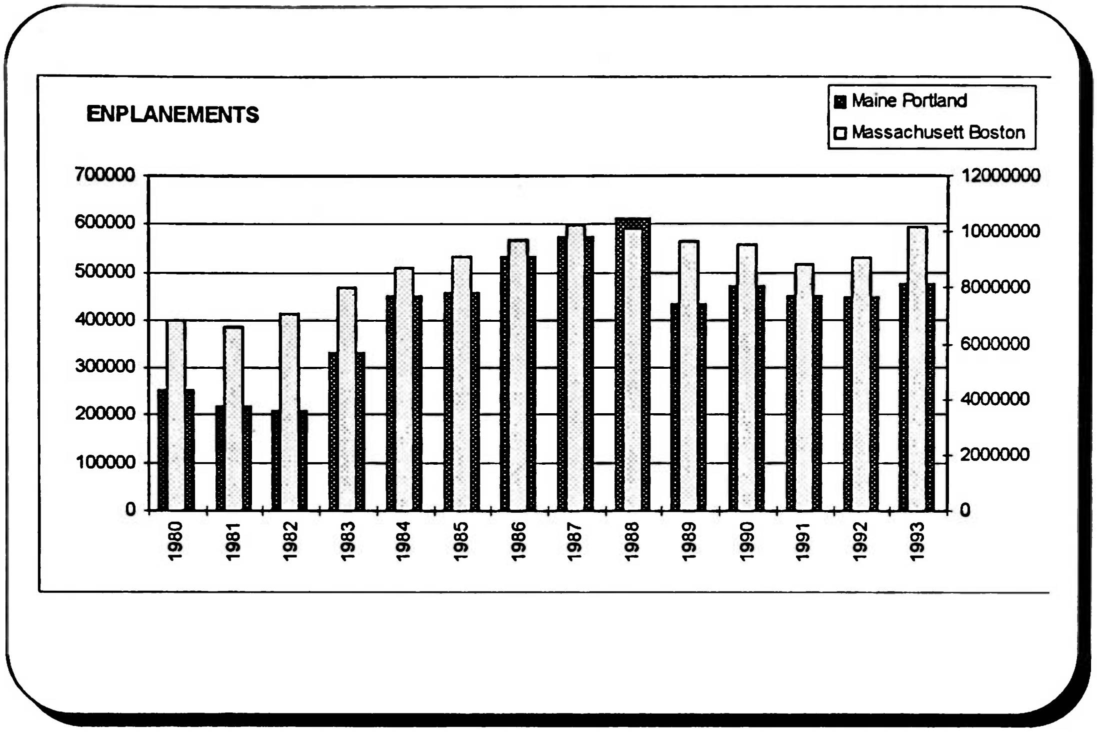

Figure 6: Scheduled Passenger Enplanements from 1980-1993 for Portland, Maine, and Boston, Massachusetts

It should be noted that the Manchester airport was removed from the data tallied for the double log regression model because of its irregular growth, but remains in this chapter as a possible explanation for declines in enplanements at the Portland airport. In addition, two averages for enplanements were calculated for Region 1--one average with Manchester and a second removing Manchester. Removing Manchester is more reflective of the region's overall growth performance. Portland has posted some gains in passenger enplanements from its low in 1989 and seems to have stabilized. Portland ended 1993 with an increase of 5.76% over the previous year for a year-end total of 472,996 enplanements. Its average annual growth rate is 6.77%, which is above average when Manchester is removed from the regional grouping. The average annual growth rate was 5.09% for the 13 years.

With respect to growth in median income, again, the Portland area ranked high among its regional peers. Ranking 4th, Portland experienced an annual growth rate of 8.11%, just behind its competitor, Boston. Boston experienced an annual average growth rate of 8.20%. Table 6 provides a comparison of all air passenger cities within Region 1 and their placement regarding growth in median disposable income.

Regarding median age, Portland ranked 4th highest (.92%) in growth in average annual median age from 1980 to 1993. Boston ranked 9th posting a .76% average annual growth rate. (See Table 7)

Table 5 Scheduled Passenger Enplanements--Region 1

Type of Airport	Air Passenger City	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Regional Ranking
Shadow	Manchester, New Hampshire	2,364.59	181.89	1.00
Large	Newark, New Jersey	160.71	12.36	2.00
Medium	Baltimore, Maryland	139.06	10.70	3.00
Shadow	Providence, Rhode Island	111.22	8.56	4.00
Shadow	Portland, Maine	88.03	6.77	5.00
Shadow	Harrisburg/York,Pennsylvania	82.17	6.32	6.00
Large	Philadelphia, Pennsylvania	79.70	6.13	7.00
Medium	Hartford, Connecticut	54.66	4.20	8.00
Large	Boston, Massachusetts	49.05	3.77	9.00
Shadow	Allentown, Pennsylvania	18.78	1.44	10.00
Shadow	Rochester, New York	15.79	1.21	11.00
Large	New York, New York	0.43	0.03	12.00
Medium	Buffalo, New York	-5.01	-0.38	13.00
	Averages	***243.01***	***18.69***	
	Averages without Manchester	***66.22***	***5.09***	

Table 6	Median Disposable Income--Region 1			
Type of Airport	Air Passenger City	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Regional Ranking
Shadow	Manchester, New Hampshire	131.55	10.12	1.00
Large	Newark, New Jersey	107.42	8.26	2.00
Medium	Boston, Massachusetts	106.61	8.20	3.00
Shadow	Portland, Maine	105.42	8.11	4.00
Shadow	Baltimore, Maryland	104.31	8.02	5.00
Shadow	New York, New York	99.20	7.63	6.00
Medium	Hartford, Connecticut	98.73	7.59	7.00
Large	Philadelphia, Pennsylvania	93.40	7.18	8.00
Shadow	Harrisburg/York, Pennsylvania	83.73	6.44	9.00
Shadow	Allentown, Pennsylvania	79.57	6.12	10.00
Shadow	Providence, Rhode Island	75.94	5.84	11.00
Medium	Buffalo, New York	71.26	5.48	12.00
Shadow	Rochester, New York	65.30	5.02	13.00
	Averages	***94.03***	***7.23***	

Table 7 Median Age--Region 1

Type of Airport	Air Passenger City	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Regional Ranking
Shadow	Allentown, Pennsylvania	22.00	1.69	1.00
Shadow	Harrisburg/York, Pennsylvania	12.97	1.00	2.00
Medium	Buffalo, New York	12.26	0.94	3.00
Shadow	Portland, Maine	11.97	0.92	4.00
Shadow	Rochester, New York	11.88	0.91	5.00
Medium	Hartford, Connecticut	11.75	0.90	6.00
Large	Philadelphia, Pennsylvania	10.19	0.78	7.00
Shadow	Manchester, New Hampshire	10.00	0.77	8.00
Large	Boston, Massachusetts	9.94	0.76	9.00
Medium	Baltimore, Maryland	9.62	0.74	10.00
Large	Newark, New Jersey	8.26	0.64	11.00
Shadow	Providence, Rhode Island	7.69	0.59	12.00
Large	New York, New York	4.50	0.35	13.00
	Averages	***94.03***	***0.85***	

Region 2 (Southeast). Region 2, which encompasses the southeastern section of the U. S., has experienced the most shadow airports with declining passenger enplanements. Of these four shadow airports within this region, three are located in the state of Florida and include Daytona Beach, Melbourne, and Sarasota. The other small airport which has experienced a downturn in enplanements outside of Florida is located in Columbia, South Carolina.

Daytona Beach maintained a positive growth in enplanements through 1990 with a peak of 490,336 enplanements. However, in 1991 the airport experienced a 20.19% decline losing nearly 100,000 enplanements from the previous year. It was followed by a slight increased in 1992 (414,790) and then fell once again in 1993 (384,516). Its competitor, the

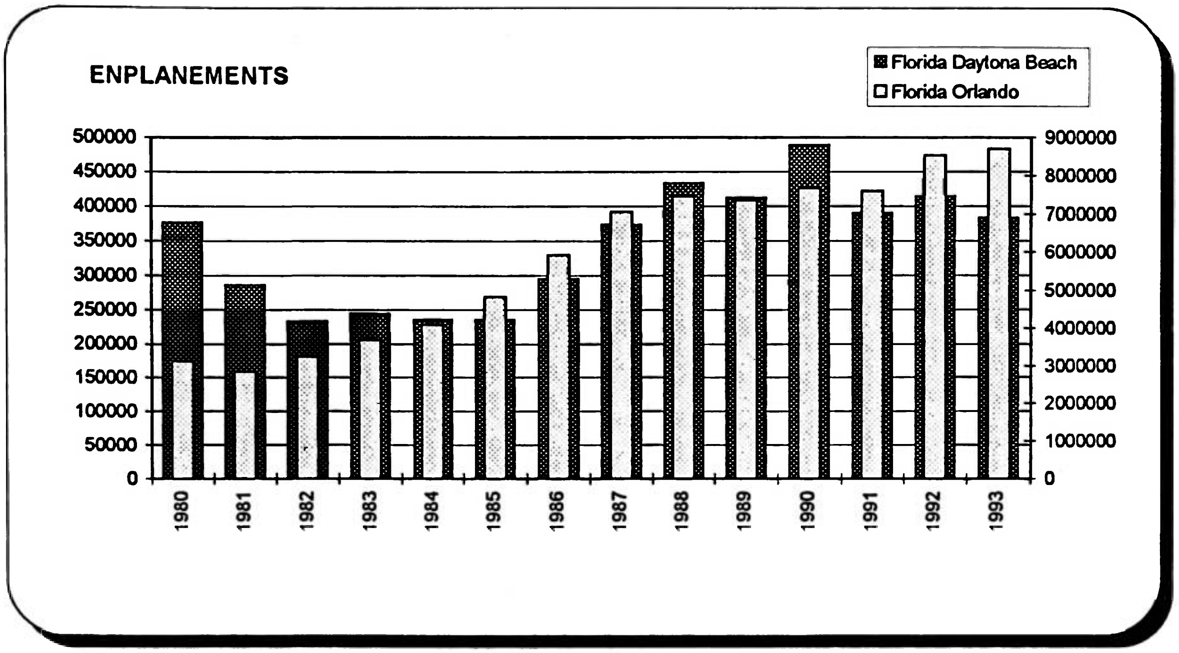

Figure 7: Scheduled Passenger Enplanements from 1980-1993 for Daytona Beach and Orlando, Florida

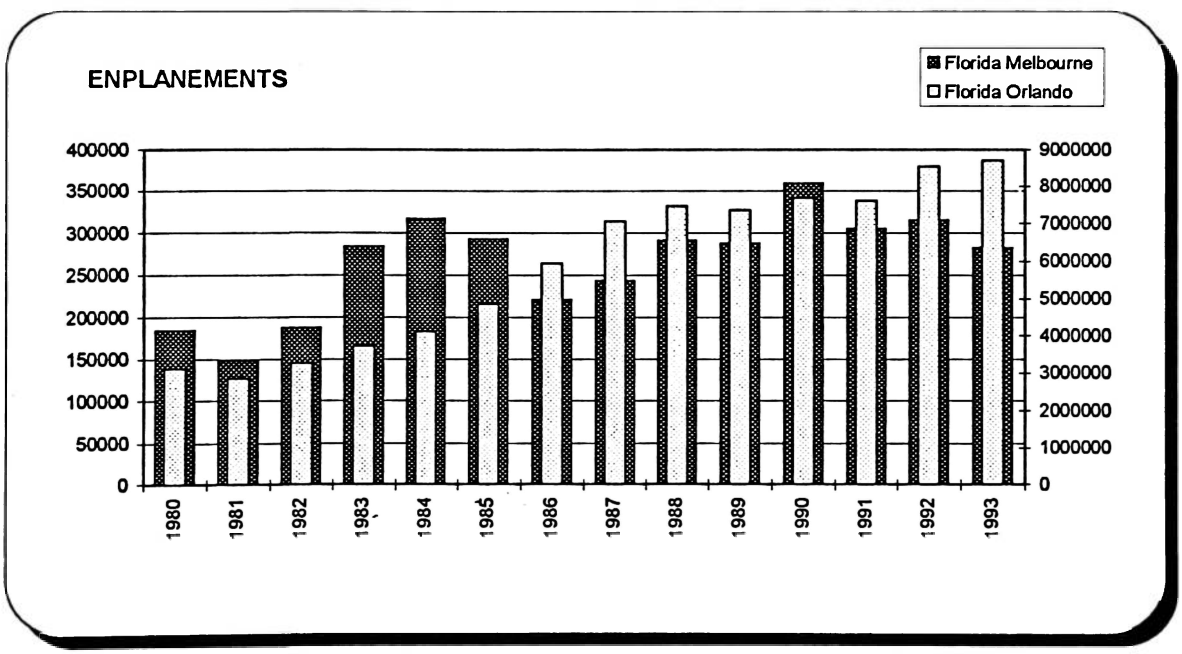

Figure 8: Scheduled Passenger Enplanements from 1980-1993 for Melbourne and Orlando, Florida

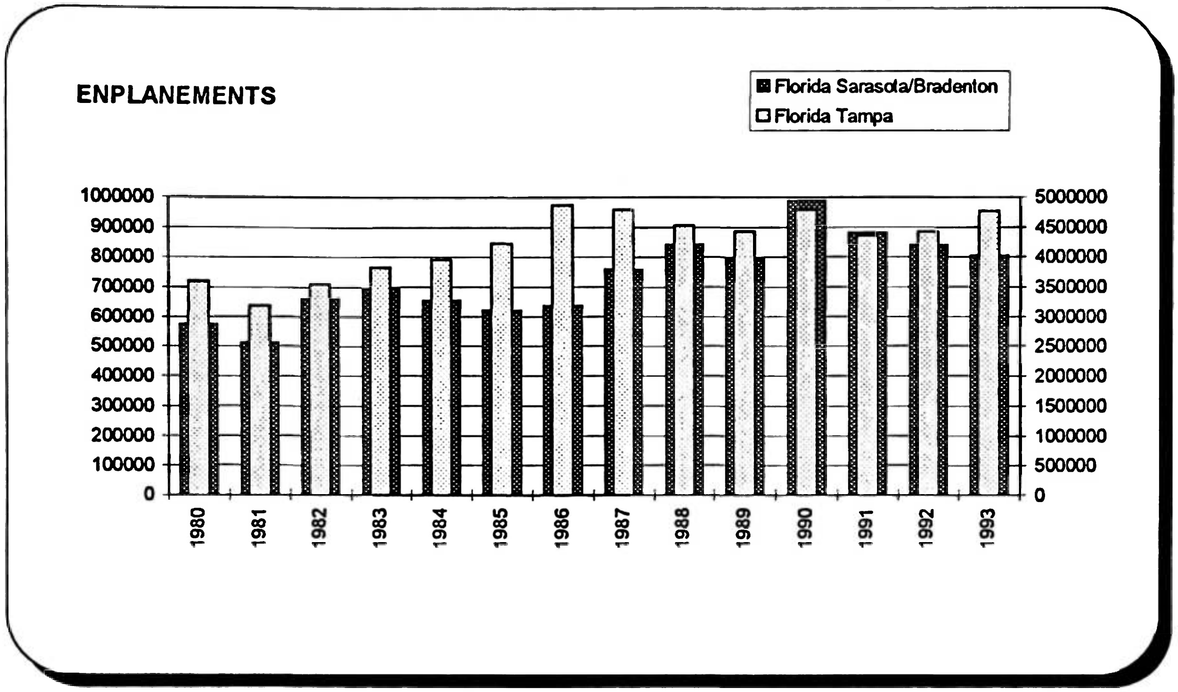

Figure 9: Scheduled Passenger Enplanements from 1980-1993 for Sarasota and Tampa, Florida

Orlando airport, however, has made steady gains in scheduled passenger enplanements. (See Figure 7) Regionally, Orlando ranks 4th in average annual growth (13.76%) while Daytona Beach ranked second from the bottom (13th) with an average annual growth over 13 years of .13% (See Table 9).

Another small airport within driving distance to Orlando is Melbourne. Although Melbourne ranked 5th, just behind Orlando in scheduled passenger enplanements, its average annual growth is well below Orlando's. Melbourne posted a growth rate of 4.14%. (See Table 9) Like Daytona Beach, Melbourne also had capstone growth in 1990 with enplanements reaching 360,126. The Melbourne airport, however, ended the study period with further declines in 1993 with enplanements dropping to 283,008. A comparison of Figures 7 and 8 show both Daytona Beach and Melbourne airports with similar growth patterns in comparison to their primary competitor, Orlando.

The last of the Florida small or shadow airports to experience declining passenger traffic is Sarasota. Again, similar to Daytona Beach and Melbourne airports, Sarasota began its declines following a strong growth trend ending in 1990. At year end, Sarasota had gained 24.61% from the previous year's enplanements. Sarasota peaked in 1990 with 989,935 scheduled passenger enplanements followed by three successive years of declines. (See Figure 9) Enplanements in 1993 had declined to 805,613. Although its competitor, Tampa airport, grew along side Sarasota in 1990, it only claimed a 7.94% growth from 1989 to 1990, compared with Sarasota's 24.61% average annual growth rate. Regionally, Sarasota ranked ahead of Tampa in average annual growth in enplanements with a rate of 3.08%. Tampa airport ranked 12th out of 14. However, in 1992 and 1993 Sarasota reported declines of -4.85% and -4.11%, respectively while its rival realized a slight growth of 1.61% and a stronger growth of 7.86% in 1993. Refer to Table 9.

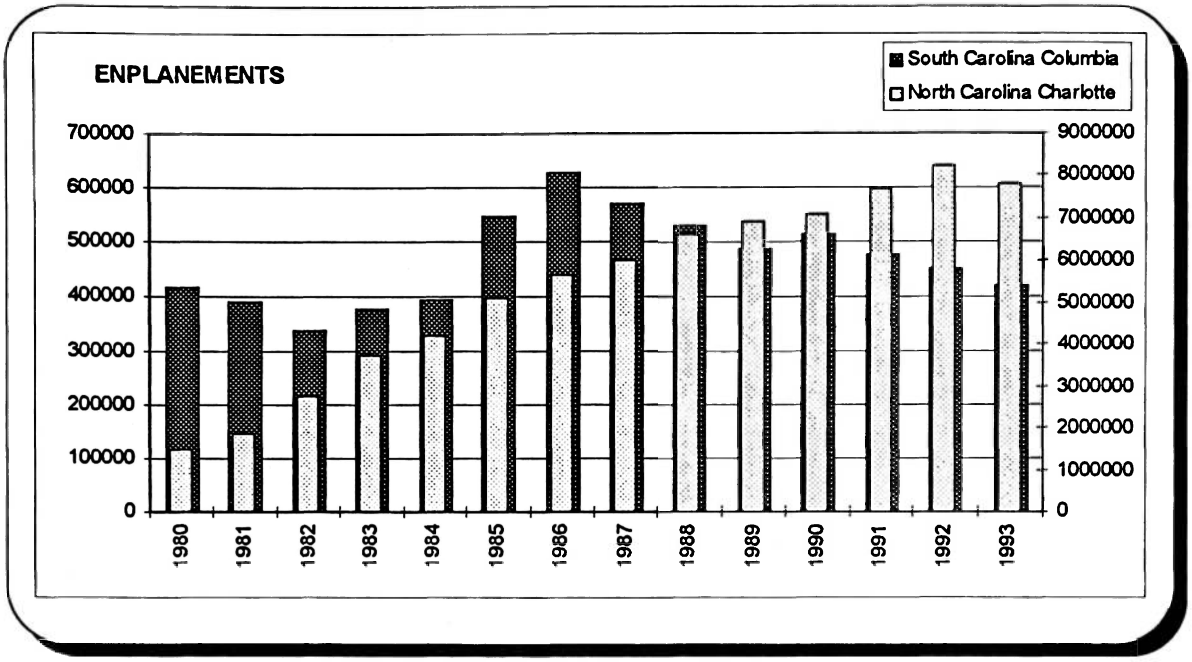

Figure 10: Scheduled Passenger Enplanements from 1980-1993 for Columbia, South Carolina and Charlotte, North Carolina

The small airport of Columbia, South Carolina, which competes against the Charlotte airport, began experiencing declines in scheduled passenger enplanements in 1987. Except for a 5.27% increase in enplanements in 1990 from the previous year, the Columbia airport has suffered from steady declines. In 1986 Columbia reported a peak of 627,480 enplanements and at the end of the study period had reported a fall in enplanements to 420,075. (See Figure 10). Conversely, its large competitor, Charlotte, has had consistent increases in passenger traffic. As shown in Table 9, while the Charlotte airport ranked 1st regionally with an average annual growth rate of 32.85%, the small airport of Columbia ranked last at 14th with an minuscule average growth rate of .06% for the 13 year period.

Notably, the shadow airports of Daytona Beach, Melbourne, and Sarasota ranked in the top 8 of 27 in shortest distance to its competing air passenger city. (Refer to Table 3 to review mileage rankings.) Sarasota ranked 2nd in shortest distance to its competing air passenger city and is located 52 highway miles from Tampa. Daytona Beach ranked 3rd with a distance of 54 miles from its competing air passenger city, Orlando. Lastly, Melbourne ranked 7th with a distance of 68 highway miles from Orlando. Columbia is a longer drive and is 88 highway miles from Charlotte and ranked 16th.

A contradictory point within this section is the theory that as disposable income rises, so will passenger enplanements at the small airport; however, the Florida small air passenger cities of Daytona Beach and Sarasota showed superior average annual growth rates in median income from 1980 to 1993 but ranked below average with respect to growth in passenger enplanements. Sarasota and Daytona Beach ranked first (10.98%) and second (10.49%) regionally with respect to growth in median disposable income. Melbourne had a slightly higher than average growth in median disposable income of 7.46%. (See Tables 9 and 10)

Median income within the Carolinas lagged behind most others. Nearer to the bottom (ranking 10th), Columbia reported a 7.03% growth rate; Charlotte reported a 6.19% growth rate. Charlotte ranked 12th out of 14th. See Table 10.

Although Florida is known as home for many retirees, its average growth rate for the 13 year study period in median age is slowing in comparison to other U.S. air passenger cities. The Carolinas, however, are experiencing a strong growth trend in aging population. Within Region 2 Columbia, Greenville, Raleigh-Durham, and Greensboro were ranked 2 through 4. Charlotte ranked 7th with a average annual growth rate of .92% compared with Columbia's 1.42% growth rate. With the exception of Melbourne, which ranked first regionally in average annual growth, Sarasota and Daytona Beach ranked near the bottom at 12th and

14th, respectively. Other Florida air passenger cities also ranked below average. (See Table 11) Nationally, however, Florida dominates in Metropolitan Statistical Areas with the highest concentration of retirees. Daytona Beach, Melbourne, and Sarasota ranked in the top 10 in median age for 1994. Table 8 ranks the top 10 Metropolitan Statistical Areas with the highest median age for 1994.[35]

Table 8
Top Ranked MSAs for
Median Age--1994

Metropolitan Statistical Area	State		National Ranking
Punta Gorda	Florida	53.10	1.00
Sarasota/Bradenton	Florida	47.00	2.00
Ft. Myers/Cape Coral	Florida	43.10	3.00
Naples	Florida	42.00	4.00
Ft. Pierce-Port St. Lucie	Florida	41.60	5.00
Daytona Beach	Florida	41.30	6.00
Ocala	Florida	41.20	7.00
West Palm Beach/Boca Raton	Florida	41.20	7.00
Barnstable/Yarmouth	Massachusetts	40.60	8.00
Tampa-St. Pete-Clearwater	Florida	40.00	9.00
Ft. Lauderdale	Florida	39.10	10.00
	U.S. Median Age	***34.10***	

Source: *Sales and Marketing Management, 1995 Survey of Buying Power,* a Bill Publication, (August 1995)

35 Chart on Median Age, *Sales and Marketing Management 1995 Survey of Buying Power,* August 1995, B-17.

Table 9 Scheduled Passenger Enplanements--Region 2

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Large	Charlotte, North Carolina	427.01	32.85	1.00
Medium	Raleigh/Durham, North Carolina	383.38	29.64	2.00
Medium	Fort Myers, Florida	211.28	16.25	3.00
Large	Orlando, Florida	178.90	13.76	4.00
Shadow	Melbourne, Florida	53.76	4.14	5.00
Shadow	Richmond, Virginia	49.86	3.84	6.00
Small	Greenville/Spartanburg, South Carolina	44.70	3.44	7.00
Large	Washington, DC	44.61	3.43	8.00
Medium	Jacksonville, Florida	41.39	3.18	9.00
Shadow	Sarasota/Bradenton, Florida	40.06	3.08	10.00
Shadow	Greensboro/High Point, North Carolina	35.84	2.76	11.00
Large	Tampa, Florida	32.51	2.50	12.00
Shadow	Daytona Beach, Florida	1.74	0.13	13.00
Shadow	Columbia, South Carolina	0.81	0.06	14.00
	Averages	*110.42*	*8.50*	

Table 10 Median Disposable Income-Region 2

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Sarasota/Bradenton, Florida	142.73	10.98	1.00
Shadow	Daytona Beach, Florida	135.50	10.42	2.00
Medium	Fort Myers, Florida	121.07	9.31	3.00
Large	Tampa, Florida	114.42	8.80	4.00
Medium	Jacksonville, Florida	110.21	8.48	5.00
Medium	Raleigh Durham, North Carolina	102.31	7.87	6.00
Large	Orlando, Florida	99.82	7.68	7.00
Shadow	Melbourne, Florida	96.96	7.46	8.00
Large	Washington, DC	94.19	7.25	9.00
Shadow	Columbia, South Carolina	91.45	7.03	10.00
Shadow	Richmond, Virginia	83.27	6.41	11.00
Large	Charlotte, North Carolina	80.50	6.19	12.00
Shadow	Greenville/Spartanburg, South Carolina	79.94	6.15	13.00
Shadow	Greensboro/High Point, North Carolina	76.68	5.90	14.00
	Averages	***102.08***	***7.85***	

Table 11 Median Age-Region 2

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Melbourne, Florida	23.03	1.77	1.00
Shadow	Columbia, South Carolina	18.52	1.42	2.00
Shadow	Greenville, South Carolina	15.00	1.15	3.00
Medium	Raleigh-Durham, North Carolina	14.79	1.14	4.00
Shadow	Greensboro, North Carolina	13.55	1.04	5.00
Large	Washington, DC	12.84	0.99	6.00
Large	Charlotte, North Carolina	12.00	0.92	7.00
Medium	Jacksonville, Florida	11.53	0.89	8.00
Shadow	Richmond, Virginia	10.36	0.80	9.00
Large	Orlando, Florida	9.32	0.72	10.00
Medium	Ft. Myers, Florida	4.39	0.34	11.00
Shadow	Daytona Beach, Florida	-3.76	-0.29	12.00
Large	Tampa, Florida	-4.58	-0.35	13.00
Shadow	Sarasota, Florida	-10.17	-0.78	14.00
	Averages	*9.06*	*0.70*	

Region 3 (North & South Central). Within Region 3 there are 2 shadow airports experiencing declining enplanements. Of the 18 airports (11 are categorized as small airports), Toledo and Dayton were ranked at the bottom. Conversely, their larger competitors, Cincinnati and Detroit ranked at the top. Cincinnati which competes with Dayton for passenger traffic ranked 1st in passenger growth while Dayton ranked last at 14th. Detroit ranked 3rd regionally and the shadow airport of Toledo ranked 13th. Both Dayton and Toledo suffered negative growth over the 13 year study period. Dayton's average annual growth rate is a -4.37% and Toledo's is -1.91%. (See Table 12)

Dayton's growth in enplanements peaked and stabilized from 1986 until 1989. In 1986 Dayton's scheduled passenger enplanements were 2,140,242 and in 1989 had begun to decline slightly to 2,082,123. The following 4 years (1990-1993) resulted in dramatic declines. Dayton's airport enplanements over the 13 years period had shrunk by a -56.75% while its rival airport, Cincinnati, had grown steadily through the 13 years study period resulting in an average annual growth rate of 20.65%.

Although Toledo's declines in enplanements are not as dramatic as Dayton's, it too posted a downward average annual growth rate of -1.91%. Its enplanements had dropped by a total of -24.78% for the study period. Toledo recorded a peak of 283,654 enplanements in 1984 and had enjoyed relatively consistent air traffic from 1983 to 1986. In 1987 Toledo underwent its first major decline of 10.48%. With the exception of 1992, Toledo has experienced successive years of declines with 1993's enplanements total at 206,221. Detroit, however, experienced a healthy growth rate with enplanement expanding by an average of 9.48% annually and for a total of 123.28% over the study period.

Similar to the three small airports in Florida identified has having declining passenger enplanements, both Toledo and Dayton are located relatively close to their larger competing airports. Toledo is located 54 highway miles from Detroit and Dayton is 56 from the Cincinnati airport ranking 3rd and 5th in shortest distance. (Refer to Table 3).

Table 13 Ranks Region 3's air passenger cities with respect to average annual growth in median income. Dayton ranked 11th, regionally--near average at 5.4%. Toledo ranked near the bottom at 16th and averaged 3.75% annually. Cincinnati faired the best ranking 7th regionally with an average annual growth in median income of 6.08%. Detroit followed Dayton in 13th placed with an average of 4.69% annually.

Dayton had the highest average annual growth in median age at 1.35% and ranked 5th regionally. Finally, Toledo ranked at the bottom with median age growth rate of .77% tied for the slowest growth with Chicago. Cincinnati was 16th with .79% growth and Detroit was near average at 1.06% annual growth. The average for the region was 1.09%. (See Table 14)

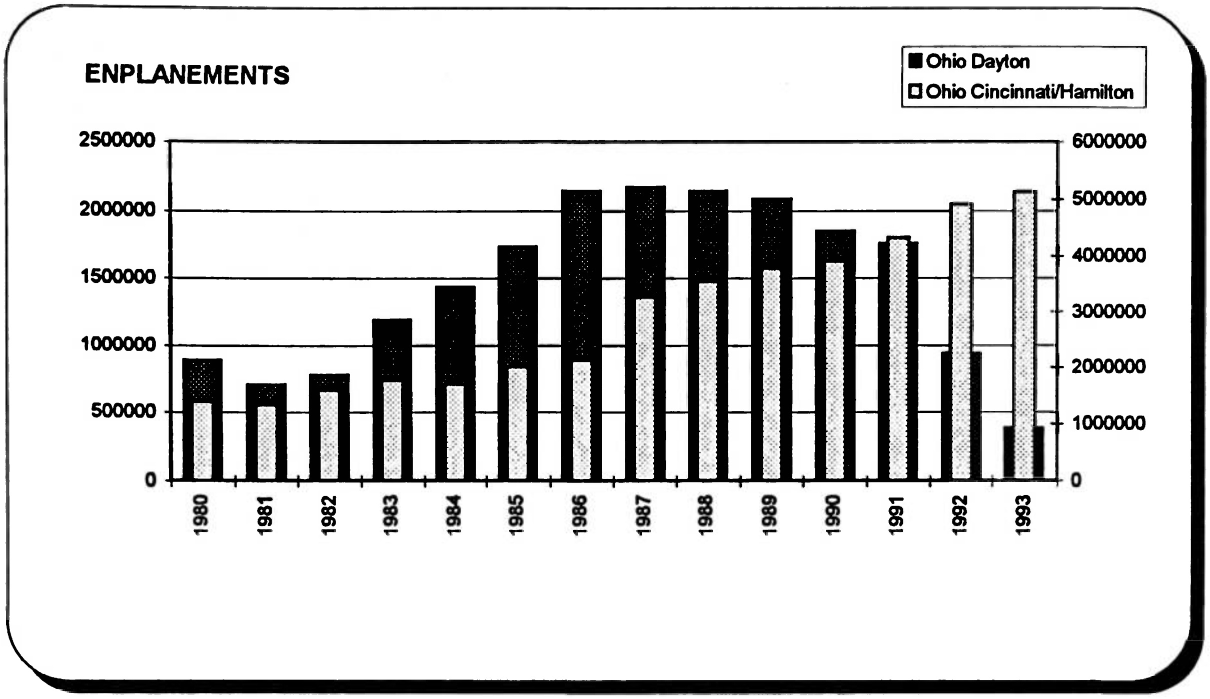

Figure 11: Scheduled Passenger Enplanements from 1980-1993 for Dayton and Cincinnati, Ohio

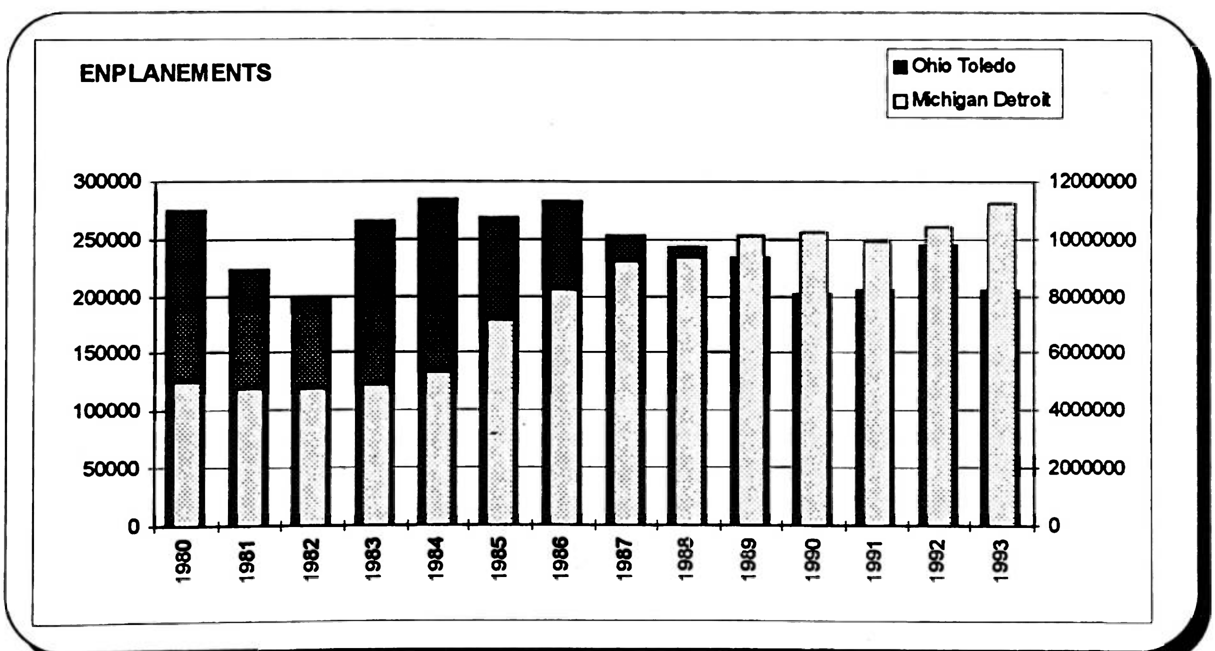

Figure 12: Scheduled Passenger Enplanements from 1980-1993 for Toledo, Ohio and Detroit, Michigan

Table 12 Scheduled Passenger Enplanements--Region 3

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Medium	Cincinnati/Hamilton, Ohio	268.44	20.65	1.00
Medium	Nashville, Tennessee	239.89	18.45	2.00
Large	Detroit, Michigan	123.28	9.48	3.00
Shadow	South Bend, Indiana	117.11	9.01	4.00
Large	Chicago, Illinois	65.41	5.03	5.00
Shadow	Huntsville, Alabama	64.31	4.95	6.00
Shadow	Madison, Wisconsin	50.05	3.85	7.00
Medium	Cleveland, Ohio	30.27	2.33	8.00
Shadow	Baton Rouge, Louisiana	29.68	2.28	9.00
Medium	Milwaukee, Wisconsin	28.45	2.19	10.00
Shadow	Saginaw/Bay City, Michigan	17.38	1.34	11.00
Shadow	Louisville, Kentucky	12.45	0.96	12.00
Shadow	Lexington, Kentucky	6.75	0.52	13.00
Shadow	Lansing, Michigan	6.34	0.49	14.00
Medium	New Orleans, Louisiana	5.63	0.43	15.00
Shadow	Greenbay, Wisconsin	-13.76	-1.06	16.00
Shadow	Toledo, Ohio	-24.78	-1.91	17.00
Shadow	Dayton, Ohio	-56.75	-4.37	18.00
	Averages	*53.90*	*4.15*	

Table 13 Median Disposable Income-Region 3

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Huntsville, Alabama	111.07	8.54	1.00
Medium	Nashville, Tennessee	95.11	7.32	2.00
Shadow	Madison, Wisconsin	89.77	6.91	3.00
Large	Chicago, Illinois	84.53	6.50	4.00
Shadow	Lexington, Kentucky	84.44	6.50	5.00
Medium	Milwaukee, Wisconsin	80.24	6.17	6.00
Medium	Cincinnati/Hamilton, Ohio	79.09	6.08	7.00
Shadow	Lansing, Michigan	74.12	5.70	8.00
Shadow	South Bend, Indiana	72.36	5.57	9.00
Shadow	Louisville, Kentucky	71.52	5.50	10.00
Shadow	Dayton, Ohio	70.15	5.40	11.00
Shadow	Baton Rouge, Louisiana	65.10	5.01	12.00
Large	Detroit, Michigan	61.00	4.69	13.00
Medium	New Orleans, Louisiana	59.97	4.61	14.00
Medium	Cleveland, Ohio	56.50	4.35	15.00
Shadow	Toledo, Ohio	48.80	3.75	16.00
Shadow	Saginaw/Bay City, Michigan	42.87	3.30	17.00
Shadow	Greenbay, Wisconsin	35.65	2.74	18.00
	Averages	*71.24*	*5.48*	

Table 14 Median Age-Region 3

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Saginaw/Bay City, Michigan	19.72	1.52	1.00
Shadow	Madison, Wisconsin	19.70	1.52	2.00
Shadow	Louisville, Kentucky	18.37	1.41	3.00
Shadow	Greenbay, Wisconsin	17.52	1.35	4.00
Shadow	Dayton, Ohio	16.95	1.30	5.00
Medium	Baton Rouge, Louisiana	15.97	1.23	6.00
Shadow	Lansing, Michigan	15.47	1.19	7.00
Shadow	Lexington, Kentucky	15.41	1.19	8.00
Shadow	Huntsville, Alabama	13.84	1.06	9.00
Large	Detroit, Michigan	13.76	1.06	10.00
Medium	New Orleans, Louisiana	13.68	1.05	11.00
Medium	Cleveland, Ohio	12.34	0.95	12.00
Medium	Milwaukee, Wisconsin	11.63	0.89	13.00
Medium	Nashville, Tennessee	11.00	0.85	14.00
Shadow	South Bend, Indiana	10.49	0.81	15.00
Medium	Cincinnati, Ohio	10.30	0.79	16.00
Shadow	Toledo, Ohio	10.07	0.77	17.00
Large	Chicago, Illinois	9.97	0.77	18.00
	Averages	***14.23***	***1.10***	

Region 4 (Western). Region 4 is the smallest of the regions and includes 6 airports. Only one shadow airport was identified as experiencing declining enplanements. The small airport of Indio/Palm Springs, California, ranked last in average annual growth in passenger enplanements (2.08%), while its competing airport located in Riverside, California, ranked 1st in growth with an average annual growth rate of 16.02% and throughout this study period had prospered from steady growth. As shown in Figure 13, Palm Springs reached its peak in

air passengers in 1990 with enplanements topping at 353,294. The successive 3 years (1991-1993) recorded declines. Enplanements for 1993 were 274,724.

In addition, Indio/Palm Spring also ranked last in average annual growth in median income with a growth of 4.20% annually. It's competitor, Riverside, ranked second highest with a annual growth rate of 7.46%. The distance between these two air passenger cities is 75 highway miles.

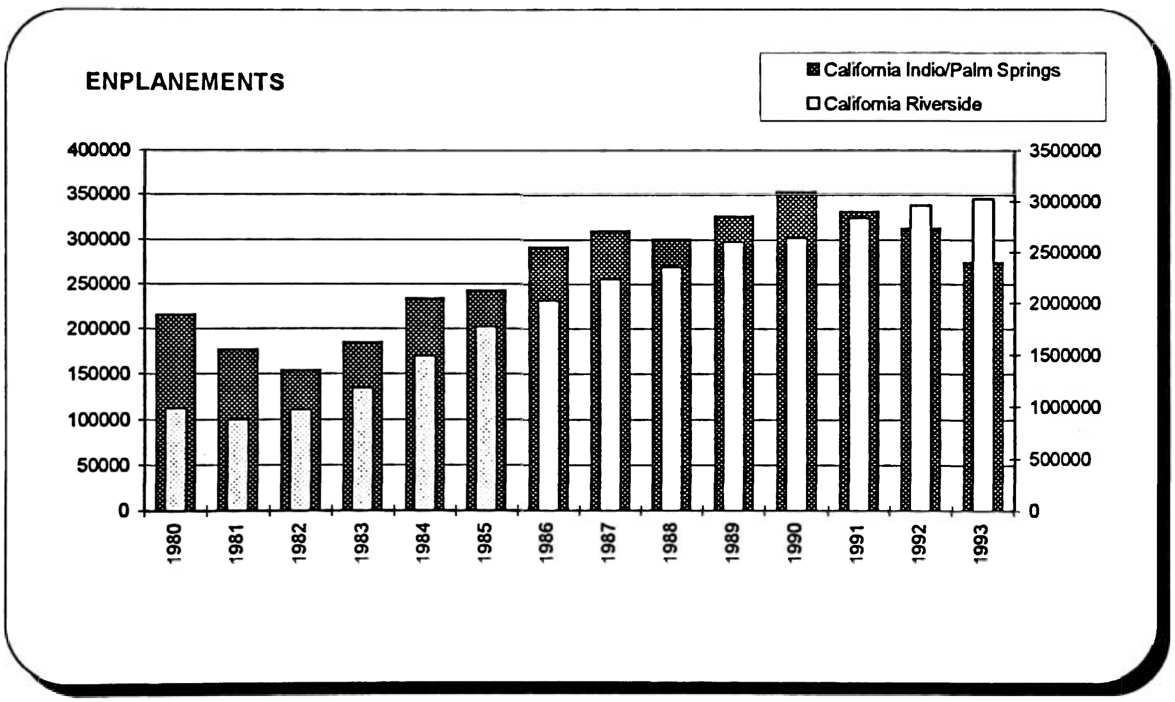

Figure 13: Scheduled Passenger Enplanements from 1980-1993 for Indio/Palm Springs and Riverside, California

Table 15 Scheduled Passenger Enplanements--Region 4

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Medium	Riverside, California	208.24	16.02	1.00
Shadow	Colorado Springs, Colorado	165.26	12.71	2.00
Medium	Portland, Oregon	132.10	10.16	3.00
Shadow	Eugene, Oregon	52.55	4.04	4.00
Large	Denver, Colorado	49.01	3.77	5.00
Shadow	Indio/Palm Spring, California	27.06	2.08	6.00
	Averages	***105.70***	***8.13***	

Table 16 Median Disposable Income-Region 4

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Colorado Spring, Colorado	102.08	7.85	1.00
Medium	Riverside, California	97.02	7.46	2.00
Medium	Portland, Oregon	77.33	5.95	3.00
Large	Denver, Colorado	76.74	5.90	4.00
Shadow	Eugene, Oregon	64.09	4.93	5.00
Shadow	Indio/Palm Springs, California	46.22	4.20	6.00
	Averages	***77.25***	***6.05***	

Table 17 Median Age-Region 4

Type of Hub	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Eugene, Oregon	22.38	1.72	1.00
Shadow	Colorado Springs, Colorado	20.23	1.56	2.00
Large	Denver, Colorado	15.12	1.16	3.00
Medium	Portland, Oregon	13.40	1.03	4.00
Medium	Riverside, California	0.98	0.08	5.00
Shadow	Indio/Palm Springs, California	-6.00	-0.55	6.00
	Averages	*11.02*	*0.83*	

Summary

The average distance among the study group is 78.3 miles between the shadow MSAs/cities and the larger air passenger cities. Among the 8 small or shadow airports identified with slow or declining growth, 6 were above average in shortest distance between cities. Notably, Portland, Maine, shows possible signs of recovery in growth in scheduled passenger enplanements and is ranked near the bottom with respect to distance between its competing air passenger city, Boston (106 highway miles). Enplanements had increased by 5.76% over the previous year and are slightly above its 1990 year-end total. Refer to Figure 6.

Columbia, South Carolina, the other shadow airport with declining enplanements, however, is farther from its competitor than those listed below. It is located 88 highway miles from Charlotte and at the conclusion of this study did not show any signs of recovery. In fact, enplanements at the beginning of this study in 1980 and at the conclusion of this study in 1993 were comparable. From 1990, Columbia reported losses in air traffic for 4 consecutive years.

Other small airports which rank high in shortest distances between competing hub sites include:

Sarasota, Florida	52 highway miles
Daytona Beach, Florida	54 highway miles
Dayton, Ohio	54 highway miles
Toledo, Ohio	56 highway miles
Melbourne, Florida	68 highway miles
Indio/Palm Springs	75 highway miles

Each of the 8 shadow airports (including Columbia and Portland) has suffered from slow or declining growth in scheduled passenger enplanements while their competitors have steadily gained air passengers. In reviewing Table 18, Charlotte, Cincinnati, Riverside, Orlando, and Detroit made significant enplanement gains in comparison to their small competitors. Also, in comparison to all larger airports within this study, this specific group of 8 medium/large competing airports grew at twice the pace. These larger airports averaged 14.10%; the average of all large/medium airports for this study produced a growth rate of 7.50%. Comparing all shadow airports to the 8 declining shadow airports in this study revealed that the overall group grew 2 1/2 times faster. Scheduled passenger enplanements of 8 shadow airports grew at an average annual rate of 1.24 in comparison to the overall shadow airports average annual growth rate of 3.11%. (Manchester, New Hampshire, was not included in this average.)

Table 18
Comparison of Enplanements

Shadow Airports with declining enplanements	Ranking	Average Annual growth in Enplanements	Larger Competing Airports	Ranking	Average Annual growth in Enplanements
Portland, ME	16.00	6.77	Boston, MA	26.00	3.77
Melbourne, FL	22.00	4.14	Orlando, FL	8.00	13.76
Sarasota, FL	31.00	3.08	Tampa, FL	33.00	2.50
Indio/Palm Springs, CA	37.00	2.08	Riverside, CA	7.00	16.02
Columbia, SC	46.00	0.81	Charlotte, NC	2.00	32.85
Daytona Beach, FL	45.00	0.13	Orlando, FL	8.00	13.76
Toledo, OH	50.00	-1.91	Detroit, MI	13.00	9.48
Dayton, OH	51.00	-4.37	Cincinnati, OH	4.00	20.65
Averages for Selected Airports		***1.43%***			***14.10%***

Group Average for Growth in Passenger Enplanements	
All Other Small Airports (Excluding, Manchester, NH)	***3.70%***
All Other Larger Airports	***7.5%***

With respect to median disposable income, Sarasota ranked 1st and Daytona Beach ranked 2nd among all airports in average annual growth in median disposable income. This growth, however, did not translate into growth in passenger enplanements for their community airports. In fact, 5 of the 8 shadow air passenger cities experienced above average annual growth in median disposable income. The average for all airports is 6.52%. Only Dayton, Toledo, and Indio/Palm Springs fell into the bottom 20% of all airports. (Refer to Table 19)

With the exception of Melbourne, Florida, which ranked number 1 in growth in median age, most of the Florida sites ranked below average in average annual growth. (See Table 20) Within the time period of this study, those air passenger cities with the lowest ranking growth rates are the traditional retirement communities. They include Indio/Palm Springs, California; Daytona Beach, Florida; Tampa, Florida, and Sarasota Florida. All had suffered either negative or flat growth in enplanement. In reviewing Table 20, the small/shadow air passenger cities generally dominated the top of the chart reflecting the choice of retirees to live in smaller, less crowded communities.

Table 19		Top Ranked MSAs for Enplanements			
Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Region 1	Manchester, New Hampshire	2,364.59	181.89	1.00
Large	Region 2	Charlotte, North Carolina	427.01	32.85	2.00
Medium	Region 2	Raleigh-Durham, North Carolina	383.38	29.64	3.00
Medium	Region 3	Cincinnati, Ohio	268.44	20.65	4.00
Medium	Region 3	Nashville, Tennessee	239.89	18.45	5.00
Medium	Region 2	Ft. Myers, Florida	211.28	16.25	6.00
Medium	Region 4	Riverside, California	208.24	16.02	7.00
Large	Region 2	Orlando, Florida	178.90	13.76	8.00
Shadow	Region 4	Colorado Springs, Colorado	165.26	12.71	9.00
Large	Region 1	Newark, New Jersey	160.71	12.36	10.00
Medium	Region 1	Baltimore, Maryland	139.06	10.70	11.00
Medium	Region 4	Portland, Oregon	132.10	10.16	12.00
Large	Region 3	Detroit, Michigan	123.28	9.48	13.00
Shadow	Region 3	South Bend, Indiana	117.11	9.01	14.00
Shadow	Region 1	Providence, Rhode Island	111.22	8.56	15.00
Shadow	Region 1	Portland, Maine	88.03	6.77	16.00
Shadow	Region 1	Harrisburg/York, Pennsylvania	82.17	6.32	17.00
Large	Region 1	Philadelphia, Pennsylvania	79.70	6.13	18.00
Large	Region 3	Chicago, Illinois	65.41	5.03	19.00
Shadow	Region 3	Huntsville, Alabama	64.31	4.95	20.00
Medium	Region 1	Hartford, Connecticut	54.66	4.20	21.00
Shadow	Region 2	Melbourne, Florida	53.76	4.14	22.00
Shadow	Region 4	Eugene, Oregon	52.55	4.04	23.00
Shadow	Region 3	Madison, Wisconsin	50.05	3.85	24.00
Shadow	Region 1	Richmond, Virginia	49.86	3.84	25.00
Large	Region 1	Boston, Massachusetts	49.05	3.77	26.00
Large	Region 4	Denver, Colorado	49.01	3.77	27.00
Shadow	Region 2	Greenville, South Carolina	44.70	3.44	28.00

Table 19 (Cont.)		Top Ranked MSAs for Enplanements			
Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Region 2	Sarasota, Florida	40.06	3.08	31.00
Shadow	Region 2	Greensboro, North Carolina	35.84	2.76	32.00
Large	Region 2	Tampa, Florida	32.51	2.50	33.00
Medium	Region 3	Cleveland, Ohio	30.27	2.33	34.00
Shadow	Region 3	Baton Rouge, Louisiana	29.68	2.28	35.00
Medium	Region 3	Milwaukee, Wisconsin	28.45	2.19	36.00
Shadow	Region 4	Indio/Palm Springs, California	27.06	2.08	37.00
Shadow	Region 1	Allentown, Pennsylvania	18.78	1.44	38.00
Shadow	Region 3	Saginaw/Bay City, Michigan	17.38	1.34	39.00
Shadow	Region 1	Rochester, New York	15.79	1.21	40.00
Shadow	Region 3	Louisville, Kentucky	12.45	0.96	41.00
Shadow	Region 3	Lexington, Kentucky	6.75	0.52	42.00
Shadow	Region 3	Lansing, Michigan	6.34	0.49	43.00
Medium	Region 3	New Orleans, Louisiana	5.63	0.43	44.00
Shadow	Region 2	Daytona Beach, Florida	1.74	0.13	45.00
Shadow	Region 2	Columbia, South Carolina	0.81	0.06	46.00
Large	Region 1	New York, New York	0.43	0.03	47.00
Medium	Region 1	Buffalo, New York	-5.01	-0.38	48.00
Medium	Region 3	Greenbay, Wisconsin	-13.76	-1.06	49.00
Shadow	Region 3	Toledo, Ohio	-24.78	-1.91	50.00
Shadow	Region 3	Dayton, Ohio	-56.75	-4.37	51.00
		Averages	***75.86***	***9.34***	
		Averages without Manchester	***68.98***	***5.31***	

Table 20		Top Ranked MSAs--Median Disposable Income			
Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Region 2	Sarasota, Florida	142.73	10.98	1.00
Shadow	Region 2	Daytona Beach, Florida	135.50	10.42	2.00
Shadow	Region 1	Manchester, New Hampshire	131.55	10.12	3.00
Medium	Region 2	Ft. Myers, Florida	121.07	9.31	4.00
Large	Region 2	Tampa, Florida	114.42	8.80	5.00
Shadow	Region 3	Huntsville, Alabama	111.07	8.45	6.00
Medium	Region 2	Jacksonville, Florida	121.07	9.31	7.00
Large	Region 1	Newark, New Jersey	107.42	8.26	8.00
Medium	Region 1	Boston, Massachusetts	106.61	8.20	9.00
Shadow	Region 1	Portland, Maine	105.42	8.11	10.00
Shadow	Region 1	Baltimore, Maryland	104.31	8.02	11.00
Medium	Region 2	Raleigh-Durham, North Carolina	102.31	7.87	12.00
Shadow	Region 4	Colorado Springs, Colorado	102.80	7.85	13.00
Large	Region 2	Orlando, Florida	99.82	7.68	14.00
Large	Region 1	New York, New York	99.20	7.63	15.00
Medium	Region 1	Hartford, Connecticut	98.73	7.59	16.00
Medium	Region 4	Riverside, California	97.02	7.46	17.00
Shadow	Region 2	Melbourne, Florida	96.96	7.46	18.00
Medium	Region 3	Nashville, Tennessee	95.11	7.32	19.00
Large	Region 1	Washington, D.C.	94.19	7.25	20.00
Large	Region 1	Philadelphia, Pennsylvania	93.40	7.18	21.00
Shadow	Region 2	Columbia, South Carolina	91.45	7.03	22.00
Shadow	Region 3	Madison, Wisconsin	89.77	6.91	23.00
Large	Region 3	Chicago, Illinois	84.53	6.50	24.00
Shadow	Region 3	Lexington, Kentucky	84.44	6.50	25.00
Shadow	Region 1	Harrisburg, Pennsylvania	83.73	6.44	26.00
Shadow	Region 1	Richmond, Virginia	83.27	6.41	27.00
Large	Region 2	Charlotte, North Carolina	80.50	6.19	28.00

Table 20 (Cont)		Top Ranked MSAs--Median Disposable Income			
Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Region 1	Allentown, Pennsylvania	79.57	6.12	31.00
Medium	Region 3	Cincinnati, Ohio	79.09	6.08	32.00
Medium	Region 4	Portland, Oregon	77.33	5.95	33.00
Large	Region 4	Denver, Colorado	76.74	5.90	34.00
Shadow	Region 2	Greensboro, North Carolina	76.68	5.90	35.00
Shadow	Region 1	Providence, Rhode Island	75.94	5.84	36.00
Shadow	Region 3	Lansing, Michigan	74.12	5.70	37.00
Shadow	Region 3	South Bend, Indiana	72.36	5.57	38.00
Shadow	Region 3	Louisville, Kentucky	71.52	5.50	39.00
Medium	Region 1	Buffalo, New York	65.30	5.02	40.00
Shadow	Region 3	Dayton, Ohio	70.15	5.40	41.00
Shadow	Region 1	Rochester, New York	65.30	5.02	42.00
Shadow	Region 3	Baton Rouge, Louisiana	65.10	5.01	43.00
Shadow	Region 4	Eugene, Oregon	64.09	4.93	44.00
Medium	Region 3	New Orleans, Louisiana	59.97	4.61	45.00
Large	Region 3	Detroit, Michigan	61.00	4.69	46.00
Medium	Region 3	Cleveland, Ohio	56.50	4.35	47.00
Shadow	Region 3	Toledo, Ohio	48.80	3.75	48.00
Shadow	Region 4	Indio/Palm Springs, California	46.22	4.20	49.00
Shadow	Region 3	Saginaw/Bay City, Michigan	42.87	3.30	50.00
Shadow	Region 3	Greenbay, Wisconsin	35.65	2.74	51.00
		Averages	***84.67***	***6.52***	

Table 21 Top Ranked MSAs-- Median Age

Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Shadow	Region 2	Melbourne, Florida	23.03	1.77	1.00
Shadow	Region 4	Eugene, Oregon	22.38	1.72	2.00
Shadow	Region 1	Allentown, Pennsylvania	22.00	1.00	3.00
Shadow	Region 4	Colorado Springs, Colorado	20.23	1.56	4.00
Shadow	Region 3	Saginaw/Bay City, Michigan	19.72	1.52	5.00
Shadow	Region 3	Madison, Wisconsin	19.70	1.52	6.00
Shadow	Region 2	Columbia, South Carolina	18.52	1.42	7.00
Shadow	Region 3	Louisville, Kentucky	18.37	1.41	8.00
Shadow	Region 3	Greenbay, Wisconsin	17.52	1.35	9.00
Shadow	Region 3	Dayton, Ohio	16.95	1.30	10.00
Shadow	Region 3	Baton Rouge, Louisiana	15.97	1.23	11.00
Shadow	Region 3	Lansing, Michigan	15.47	1.19	12.00
Shadow	Region 3	Lexington, Kentucky	15.41	1.19	13.00
Large	Region 4	Denver, Colorado	15.12	1.16	14.00
Shadow	Region 2	Greenville, South Carolina	15.00	1.15	15.00
Medium	Region 2	Raleigh-Durham, North Carolina	14.79	1.14	16.00
Shadow	Region 3	Huntsville, Alabama	13.84	1.06	17.00
Large	Region 3	Detroit, Michigan	13.76	1.06	18.00
Medium	Region 3	New Orleans, Louisiana	13.68	1.05	19.00
Shadow	Region 2	Greensboro, North Carolina	13.55	1.04	20.00
Medium	Region 4	Portland, Oregon	13.40	1.03	21.00
Shadow	Region 1	Harrisburg/York, Pennsylvania	12.97	1.00	22.00
Large	Region 1	Washington, D. C.	12.84	0.99	23.00
Medium	Region 3	Cleveland, Ohio	12.34	0.95	24.00
Medium	Region 1	Buffalo, New York	12.26	0.94	25.00
Large	Region 3	Charlotte, North Carolina	12.00	0.92	26.00
Shadow	Region 1	Portland, Maine	11.97	0.92	27.00
Shadow	Region 1	Rochester, New York	11.88	0.91	28.00

Table 21 (Cont)		Top Ranked MSAs-- Median Age			
Type of Hub	Region	MSA	13-Yr. Growth Rate (%)	Avg. Annual Growth Rate (%)	Ranking
Medium	Region 2	Jacksonville, Florida	11.53	0.89	31.00
Medium	Region 3	Nashville, Tennessee	11.00	0.85	32.00
Shadow	Region 3	South Bend, Indiana	10.49	0.81	33.00
Shadow	Region 1	Richmond, Virginia	10.36	0.80	34.00
Medium	Region 3	Cincinnati, Ohio	10.30	0.79	35.00
Large	Region 1	Philadelphia, Pennsylvania	10.19	0.78	36.00
Shadow	Region 3	Toledo, Ohio	10.07	0.77	37.00
Shadow	Region 1	Manchester, New Hampshire	10.00	0.77	38.00
Large	Region 3	Chicago, Illinois	9.97	0.77	39.00
Large	Region 1	Boston, Massachusetts	9.94	0.76	40.00
Medium	Region 1	Baltimore, Maryland	9.62	0.74	41.00
Large	Region 2	Orlando, Florida	9.32	0.72	42.00
Large	Region 1	Newark, New Jersey	8.26	0.64	43.00
Shadow	Region 1	Providence, Rhode Island	7.69	0.59	44.00
Large	Region 1	New York, New York	4.50	0.35	45.00
Medium	Region 2	Ft. Myers, Florida	4.39	0.34	46.00
Medium	Region 4	Riverside, California	0.98	0.08	47.00
Shadow	Region 4	Indio/Palm Springs, California	-6.00	-0.55	48.00
Shadow	Region 2	Daytona Beach, Florida	-3.76	-0.29	49.00
Large	Region 2	Tampa, Florida	-4.58	-0.35	50.00
Shadow	Region 2	Sarasota, Florida	-10.17	-0.78	51.00
		Averages	*11.39*	*0.86*	

CHAPTER 5

ANALYSIS OF MULTIPLE REGRESSION MODEL

A double-log multiple regression formula was developed for this research because of its ability to measure the elasticity of output--in this case, scheduled passenger enplanements of the shadow airports. The logarithm method was applied to the formula to provide information about returns to scale which is the response of output to proportionate changes in inputs. For instance, if the sum is equal to one, then there is a constant return to scale. However, if the sum is less than one, there is a decreasing return to scale. Likewise, if the sum is greater than one, then there are increasing returns to scale. Doubling the inputs will more than double the output.[36]

Double-Log Multiple Regression Model

Model

ln enp-sm = c + ln enp-lg + ln ag + ln ebi + dum1 (distance)

ln enp-sm represents the natural log of the dependent variable of scheduled passenger enplanement at small airports

c constant

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36 Domodar Gujarati, *Basic Econometrics* (New York: McGraw-Hill Inc., 1978), 107-108.

ln enp-lg represents the natural log of the independent variable of scheduled passenger enplanements at the larger airports

ln age represents the natural log of the median population age at the small air passenger cities

ln ebi represents the natural log of effective buying income at the small air passenger cities

dum 1 (distance) represents the highway mileage between the cities/MSAs competing for scheduled passenger enplanements.

<u>**Coefficients**</u>

ln enp-sm = (3.995867) + (-0.065981) ln enp-lg + (0.508938) ln age +

(.784904) ln income + (.248567) dum1(distance)

The signs of the coefficients are positive for three of the four independent variables supporting positive growth in enplanements at the shadow airport as a result of increases in median disposable income, median population age, and distance between competing airports. Distance between competing air passenger cities was represented as a dummy variable. Those shadow cities within 78 highway miles or less were represented by "1" and those shadow cities greater than 78 highway miles was represented in the formula as "0"

Results indicate that for a one percentage increase of the population's median disposable income at the small passenger city, enplanements will be increased by .78 percent. Likewise, a one percentage increase in the population's median age will increase enplanements at the shadow city by .51 percent. Lastly, for every one percentage increase in the distance between the larger air passenger city and the shadow city, enplanements will increase at the shadow city by .25 percent.

The coefficient for enplanements at the large airport was negative which can be interpreted as follows: a one percentage growth in enplanements at the larger airport will result in a .07 percentage decline in enplanements at the shadow airport.

R-Squared

The R^2 (coefficient of determination) is used to evaluate the overall significance of the regression model. The purpose of this measurement is to determine the success of the regression in predicting the values of the dependent variable of scheduled passenger enplanements at the shadow/small airport. The results of the R^2 indicate that 12.45 percent of all enplanements at the shadow airport can be attributed to these independent variables (median age and median disposable income of the shadow air passenger city, enplanements at the larger airport, and distance between the two primary cities). This indicates that other factors such as ticket price, an airport's level of service, and flight frequency play a much greater role in determining how enplanements at the shadow airport are affected.

F-Statistic

The F-Statistic is another test of the hypothesis for overall significance or "goodness of fit." Its purpose is to test the hypothesis and to determine if all of the coefficients in a regression are zero or to determine if there is no relationship between the dependent and independent variables. For the number of observations (13), the degrees of freedom (8), (4,8) and a confidence level of 95 percent, the F-Statistic must be above 3.84. The F-Statistic for this model was 12.44 indicating that it is significant.

Table 22 T-Statistics for Regression Equation

Variables	Enplanements at Larger Airports	Median Disposable Income	Median Age	Distance between Air Passenger Cities
T Statistic T-value +/- 1.86	-1.55	4.58	2.08	3.54

For the T statistic values of these four independent variables to be statistically significant at a confidence level of 95 percent their t-value must be +/- 1.86. Again, median disposable income, median age, and distance between air passenger cities are statistically significant. However, enplanements at the larger airport were not as significant and falls within a range of 88 percent confidence level. For a confidence level of 80 percent, the t-statistic for enplanements at the larger airports must fall between +/- 1.397, which it does.

Table 23 Probability

Variables	Enplanements at Larger Airports	Median Disposable Income	Median Age	Distance between Air Passenger Cities
Probability	.12	0.0	0.38	0.0004

Three of the four (median income, median age, and distance between hubs) show a probability lower than .05 which supports acceptance of the null hypothesis (H_0). However, the probability for the independent variable, enplanements at the competing larger airport is .12 and is not as supportive of the null hypothesis but does carry merit.

Correlation Matrix

A correlation matrix was developed to evaluate the correlation between the dependent and independent variables. Table 25 lists all the variables applied in the double-log regression model.

When comparing the dependent variable (enplanements at small airports) to each of the independent variables, it was found, that based on the hypothesis, all the signs were correct. In addition, all of the independent variables showed some correlation with the dependent variable. A dummy variable (dum 1 = 43-78 miles between air passenger cities) used to measure the impact of those airports, yielded a correlation of .24 in relation to the dependent variable. Also, the matrix generated a correlation of .40 between the independent variables of distance between cities and median age of small air passenger cities. Median disposable income of small air passenger cities correlated with the dependent variable by .19. Median age at the same small cities yielded a .11. Lastly, enplanements at the larger airport yielded a -.11 correlation. In general, the relationship between the dependent variable and the independent variables support the null hypothesis. Median disposable income and median age of small air passenger cities, as well as distances of 43 and 78 miles between competing airports, all evidenced a positive correlation. As suggested, enplanements at larger airports would have an negative impact on enplanements at the small airports. The correlation matrix shows a -.10 between these two variables.

Table 24 Correlation Matrix

Variables	Enplanements at Small Airports (Dependent Variable)	Enplanements at Large Airports	Median Disposable Income	Median Age	Distance
Enplanements at Small Airports (Dependent Variable)	1.00	-0.10	0.19	0.11	0.24
Enplanements at Larger Airports	-0.10	1.00	0.18	-0.05	-0.18
Median Disposable Income	0.19	0.18	1.00	-0.04	0.01
Median Age	0.11	-0.05	-0.04	1.00	0.40
Distance between Air Passenger Cities	0.24	-0.18	0.01	0.40	1.00

The matrix is also a tool to inspect for multicollinearity among the independent variables. There is no strong relationship among any of the independent variables which would indicate a modeling error within the multiple regression model. Multicollinearity does not appear to be a concern for this regression model.

Durbin-Watson Statistic

The Durbin-Watson statistic measures the association between adjacent residuals and is a test for serial correlation. If there is no problem of association between adjacent residuals, the statistic will be near 2. The results for this research found the Durbin-Watson statistic to be 2.08 indicating that there is no problem associated between adjacent residuals.

CHAPTER 6

SUMMARY AND CONCLUSIONS

Review of Findings

Two methods were employed to evaluate shadow airports within a 120 mile radius of larger airports. Chapter 4 took an historical view, reviewing each of the airports with regard to enplanements, median disposable incomes, median ages, and distances between competing air passenger cities. Comparisons were done over a 13 year period and an average annual growth rate was computed for all the airports' dependent and independent variables. The next step was to pinpoint those small airports experiencing declining enplanements. Following this process, 8 airports were singled out with declining trends and further evaluations were done with respect other regional airports of similar backgrounds. Six of the 8 airports were found to be within an hour's driving time of a larger airport. The remaining 2 were nearer to a two hour drive. Notably, Region 2 (southeastern United States) accounted for half of the shadow airports experiencing declines.

Chapter 5 discussed the results and findings of the double log multiple regression model. The final results suggest that this model's independent variables account for 12.45% of the enplanements at the small/shadow airports. The outcome indicated that median disposable income, median age, and distance between air passenger cities were statistically significant at 95% and support the null hypothesis which states that there is a relationship between small air passenger city's median disposable income, median population age, competing airports scheduled passenger enplanements, and distance from small air passenger city to the larger air passenger city. The independent variable, enplanements at the larger airport, was not as strong statistically and fell within a confidence level of 88 percent. Enplanements at the large airports were included in an attempt to measure the impact of increasing growth and the economies of scale of the large airports on their smaller competitors.

Summary

Chapter 4 allowed a closer examination of each individual airports and its respective air passenger city, while Chapter 5 focused on the overall performance of small airports. What Chapter 4 revealed supported much of the regression model employed for this study; however, it also revealed isolated instances which contradicted the regression model. Examples of this included Daytona Beach and Sarasota relative to their exceptional growth in median disposable income and a contradictory decline in enplanements at their respective airports.

Beyond the model, comparisons of scheduled passenger enplanements were possible for the major airport classifications. The average annual growth of enplanements was calculated for the selected 8 small airports suffering from declining enplanements; enplanement growth for their competing large airports were also calculated. These pairings were compared against the average annual growth of enplanements for all small airports and all large airports within this study. The results confirmed the fact that small airports were growing at a much slower rate than other like airports within this study, but more importantly, their competing large airports within the subgroups, when compared to all other large airports in Chapter 4, were growing twice as fast. This suggests that market share is being transferred from the shadow airports to their nearby competing airports.

The average distance among the study group is 78.3 miles between the shadow MSAs/cities and the larger air passenger cities. Among the 8 small or shadow airports identified with slow or declining growth, 6 were above average in shortest distance between cities. Notably, Portland, Maine, shows possible signs of recovery in growth in scheduled passenger enplanements and is ranked near the bottom with respect to distance between its competing air passenger city, Boston (106 highway miles). Enplanements had increased by 5.76% over the previous year and are slightly above its 1990 year-end total. Refer to Figure 6.

Columbia, South Carolina, the other shadow airport with declining enplanements, however, is farther from its competitor than those listed below. It is located 88 highway miles from Charlotte and at the conclusion of this study did not show any signs of recovery. In fact, enplanements at the beginning of this study in 1980 and at the conclusion of this study in 1993 were comparable. From 1990, Columbia reported losses in air traffic for 4 consecutive years.

Other small airports which rank high in shortest distances between competing hub sites include:

Sarasota, Florida	52 highway miles
Daytona Beach, Florida	54 highway miles
Dayton, Ohio	54 highway miles
Toledo, Ohio	56 highway miles
Melbourne, Florida	68 highway miles
Indio/Palm Springs	75 highway miles

Each of the 8 shadow airports (including Columbia and Portland) has suffered from slow or declining growth in scheduled passenger enplanements while their competitors have steadily gained air passengers. In reviewing Table 18, Charlotte, Cincinnati, Riverside, Orlando, and Detroit made significant enplanement gains in comparison to their small competitors. Also, in comparison to all larger airports within this study, this specific group of 8 medium/large competing airports grew at a faster pace. These larger airports averaged 14.10%; the average of all large/medium airports for this study produced a growth rate of 7.05%. Comparing all shadow airports to the 8 declining shadow airports in this study revealed that the overall group grew 2 1/2 times faster. Scheduled passenger enplanements of 8 shadow airports grew at an average annual rate of 1.24% in comparison to the overall shadow airports average annual growth rate of 3.11%. (Manchester, New Hampshire, was not included in this average.)

With respect to median disposable income, Sarasota ranked 1st and Daytona Beach ranked 2nd among all airports in average annual growth in median disposable income. This growth, however, did not translate into growth in passenger enplanements for their community airports. In fact, 5 of the 8 shadow air passenger cities experienced above average annual growth in median disposable income. The average for all airports is 6.52%. Only Dayton, Toledo, and Indio/Palm Springs, California, fell into the bottom 20% of all airports. (Refer to Table 19)

With the exception of Melbourne, Florida, which ranked number 1 in growth in median age, most of the Florida sites ranked below average in average annual growth. (See Table 20) Within the time period of this study, those air passenger cities with the lowest ranking growth rates are the traditional retirement communities. They include Indio/Palm Springs, California; Daytona Beach, Florida; Tampa, Florida, and Sarasota Florida. All had suffered either negative or flat growth in enplanements. In reviewing Table 20, the small/shadow air passenger cities generally dominated the top of the chart reflecting the choice of retirees to live in smaller, less crowded communities.

Improvements to the Model

The number of observations were limited to 13 for this study with enplanements collected annually. The inclusion of 4 independent variables reduced the degrees of freedom to 8. A suggestion for possible improvements to this model would be to gather either monthly or quarterly enplanements while increasing the degree of freedom and allowing for additional independent variables in an attempt to increase the R^2 above this study's outcome of 12.45%. With the increased number of observations additional variables could be added to the model such as breakdown of age brackets and/or additional variables (nonstop flights, flight frequency, jet service, ticket price, and substitution for flight, etc.) which more accurately measure airport services. This model attempted to capture the overall impact of airport services through the inclusion of enplanements at the larger competing airport. It was thought that growth outpacing the small airports was generally due to increased or better services being offered at the larger airports. With an increase in the number of observations, specific services could be evaluated and, again, perhaps increase the R^2.

Also, eliminating those large airports with small airports nearby which artificially divert air passengers to less crowded airports as a result of government regulation regarding "excess capacity," would confine the study to natural market forces. An example of this artificial interference exists between Chicago and South Bend.

Another anomalous factor which may appear with the quarterly or monthly enplanements, may be the impact of weather conditions (especially in the Northeast) on seasonal enplanements. Good weather in the southeastern region of the U.S. may encourage travel to more distant airports while unpredictable winter travel may result in increased passenger traffic at the smaller airports during the season of harsh weather. Again, the inclusion of quarterly or monthly enplanement statistics may capture this factor.

Recommendations

After singling out eight shadow airports seemingly troubled by the competition of their nearby larger airports, this study recommends that scheduled passenger enplanements statistics should be added to determine whether declining shadow airports are continuing to lose market share to their nearby larger airport competitors, especially under a strengthening economy (post Gulf War).

Also, those shadow airports with successful growth trends which are within an hour's drive of a larger airport should be scrutinized to see what competitive advantages could be transferred to the shadow airports with declining enplanements.

Finally, shadow airports within an hour drive should diversify services and use target marketing to increase passenger traffic. Airports could consider specializing in charter services, if feasible for the particular community. In addition, targeting advertising resources to the community's demographic profile may encourage more residents to choose the closer airport and increase passenger traffic, thereby recapturing lost market share.

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APPENDIX A

SCHEDULED PASSENGER ENPLANEMENTS

1980 TO 1993

ENPLANEMENTS	CITY/MSA	1980	1981	1982	1983	1984	1985	1986
Alabama	Huntsville	240,363	213,390	225,797	231,175	266,277	281,048	299,327
California	Indio/Palm Springs	216,224	176,933	154,151	185,047	234,051	242,299	291,320
California	Riverside	982,390	871,424	968,730	1,175,644	1,488,495	1,771,099	2,030,310
Colorado	Colorado Springs	276,119	223,845	195,928	246,439	409,981	576,197	711,341
Colorado	Denver	9,615,785	10,437,142	11,404,157	11,401,005	12,812,656	13,862,992	15,087,330
Connecticut	Hartford	1,401,135	1,162,993	1,144,221	1,420,664	1,535,368	1,705,896	1,998,477
District of Columbia	Washington	7,756,053	7,282,727	7,132,925	7,885,801	8,191,080	9,015,583	10,890,580
Florida	Daytona Beach	377,924	286,696	233,219	244,240	235,700	235,678	295,080
Florida	Fort Myers	546,422	532,612	543,908	582,014	579,416	776,762	967,371
Florida	Jacksonville	872,979	858,902	982,157	1,044,359	1,056,365	1,160,053	1,373,191
Florida	Melbourne	184,059	148,997	187,505	284,284	317,686	293,144	220,672
Florida	Orlando	3,124,568	2,866,389	3,268,933	3,721,059	4,108,413	4,848,771	5,946,686
Florida	Sarasota/Bradenton	575,194	514,169	662,976	696,177	653,968	621,993	637,386
Florida	Tampa	3,600,730	3,184,121	3,560,548	3,830,148	3,962,211	4,240,557	4,875,116
Illinois	Chicago	19,417,854	16,906,634	16,699,134	18,953,681	20,030,016	22,752,033	26,512,200
Indiana	South Bend	159,349	159,349	90,361	134,472	165,115	191,334	278,523
Kentucky	Lexington	320,061	284,523	262,392	281,773	290,556	300,128	342,907
Kentucky	Louisville	993,355	848,184	874,842	855,970	845,914	912,181	946,140
Louisiana	New Orleans	3,107,183	2,928,436	2,852,632	2,868,966	3,193,181	2,912,675	3,040,026
Louisiana	Baton Rouge	273,479	267,790	272,948	291,828	318,398	351,061	376,852
Maine	Portland	251,552	219,166	209,560	331,078	451,124	458,369	531,807
Maryland	Baltimore	1,652,494	1,521,330	1,903,229	2,296,538	2,876,946	3,408,608	3,847,977
Massachusetts	Boston	6,844,951	6,622,905	7,111,936	8,044,651	8,702,896	9,112,901	9,695,876
Michigan	Detroit	5,050,735	4,749,836	4,790,521	4,888,149	5,357,166	7,163,840	8,206,266
Michigan	Lansing	181,343	112,548	114,041	158,000	143,501	105,205	103,072
Michigan	Saginaw/Bay City	191,130	141,595	133,202	141,497	136,910	166,137	190,609
New Hampshire	Manchester	10,986	387	72	0	8,536	23,844	21,158
New Jersey	Newark	4,206,011	4,523,898	5,659,064	8,300,298	11,743,964	14,272,558	19,553,707
New York	Buffalo	1,540,313	1,333,165	1,620,637	1,707,482	1,803,770	1,681,254	1,731,363

ENPLANEMENTS	CITY/MSA	1980	1981	1982	1983	1984	1985	1986
New York	New York	17,520,433	16,686,921	17,418,606	18,580,651	20,008,318	19,665,920	14,405,042
New York	Rochester	870,480	736,282	843,811	861,319	895,372	1,229,991	1,241,968
North Carolina	Charlotte	1,480,787	1,894,928	2,768,882	3,763,812	4,226,187	5,102,703	5,687,255
North Carolina	Greensboro/High Point	696,327	756,800	683,403	740,899	785,241	1,102,525	1,039,838
North Carolina	Raleigh/Durham	866,007	828,176	911,866	1,122,732	1,289,108	1,345,077	1,441,832
Ohio	Cincinnati	1,391,638	1,331,791	1,598,641	1,769,830	1,703,819	2,014,386	2,136,184
Ohio	Cleveland	2,989,234	2,656,006	2,521,662	2,626,602	2,751,460	3,023,714	3,092,753
Ohio	Dayton	889,035	707,426	774,638	1,191,509	1,430,970	1,732,155	2,140,242
Ohio	Toledo	274,162	222,837	199,887	265,347	283,654	268,297	282,421
Oregon	Eugene	232,376	180,321	156,627	172,928	176,063	194,620	265,929
Oregon	Portland	1,804,395	1,731,302	1,850,515	2,074,741	2,150,617	2,526,852	2,414,960
Pennsylvania	Allentown	273,839	152,033	136,490	144,398	164,576	168,074	221,559
Pennsylvania	Harrisburg/York	284,299	200,711	176,164	208,927	214,086	284,659	375,182
Pennsylvania	Philadelphia	4,058,167	3,581,634	3,844,822	3,980,574	4,365,216	4,760,972	5,423,885
Pennsylvania	Harrisburg/York	284,299	200,711	176,164	208,927	214,086	284,659	375,182
Rhode Island	Providence	459,316	319,354	305,433	314,620	398,756	553,540	715,688
South Carolina	Columbia	416,684	389,814	338,016	377,295	395,480	548,738	627,480
South Carolina	Greenville/Spartanburg	329,354	282,762	243,589	299,759	351,049	399,164	422,998
Tennessee	Nashville	1,122,084	1,033,206	1,079,076	1,108,572	1,216,188	1,395,487	2,165,808
Virginia	Richmond	619,775	565,832	461,362	476,137	564,687	703,497	807,801
Wisconsin	Greenbay	299,342	243,000	251,645	218,942	171,375	198,939	221,754
Wisconsin	Madison	352,745	275,483	274,961	298,751	329,074	376,807	414,895
Wisconsin	Milwaukee	1,623,318	1,550,847	1,562,381	1,352,044	1,115,865	1,350,401	1,514,107

ENPLANEMENTS	*CITY/MSA*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
Alabama	Huntsville	359,374	355,930	357,658	381,668	378,501	407,079	394,940
California	Indio/Palm Springs	309,968	300,029	326,599	353,294	331,221	312,769	274,724
California	Riverside	2,232,486	2,353,959	2,608,588	2,641,132	2,837,028	2,965,837	3,028,121
Colorado	Colorado Springs	682,285	641,126	599,669	551,507	608,831	698,777	732,422
Colorado	Denver	15,593,583	14,441,817	12,320,246	11,961,839	12,313,733	13,426,038	14,328,589
Connecticut	Hartford	2,267,686	2,321,986	2,269,982	2,312,455	2,107,004	2,131,225	2,167,003
District of Columbia	Washington	12,030,011	11,586,627	11,439,093	11,483,285	11,340,673	11,290,271	11,215,785
Florida	Daytona Beach	374,058	433,958	412,317	490,336	391,319	414,790	384,516
Florida	Fort Myers	1,241,995	1,460,146	1,525,884	1,712,679	1,585,515	1,584,414	1,700,882
Florida	Jacksonville	1,407,222	1,287,939	1,249,258	1,266,677	1,146,229	1,179,087	1,234,294
Florida	Melbourne	243,711	291,352	288,087	360,126	305,371	315,398	283,008
Florida	Orlando	7,074,737	7,473,086	7,373,449	7,677,769	7,605,356	8,535,628	8,714,400
Florida	Sarasota/Bradenton	761,025	842,674	794,430	989,935	883,000	840,157	805,613
Florida	Tampa	4,798,969	4,538,643	4,429,612	4,781,138	4,353,420	4,423,496	4,771,252
Illinois	Chicago	28,671,279	29,770,857	29,073,992	29,183,423	28,816,463	30,645,315	32,119,096
Indiana	South Bend	229,833	244,615	244,077	224,050	242,206	356,377	345,969
Kentucky	Lexington	336,610	331,667	334,073	291,634	277,864	310,419	341,677
Kentucky	Louisville	1,034,162	1,013,770	910,288	937,645	893,817	963,178	1,117,049
Louisiana	New Orleans	3,311,172	3,200,056	3,170,967	3,361,062	3,151,718	3,231,972	3,282,080
Louisiana	Baton Rouge	400,314	388,419	427,295	423,808	406,214	423,313	354,648
Maine	Portland	574,313	612,800	432,704	472,393	450,252	447,248	472,996
Maryland	Baltimore	4,009,780	4,369,596	4,446,139	4,420,425	4,249,906	3,614,491	3,950,419
Massachusetts	Boston	10,255,305	10,141,298	9,661,258	9,549,585	8,862,052	9,087,607	10,202,076
Michigan	Detroit	9,254,473	9,343,770	10,084,132	10,265,768	9,938,906	10,408,519	11,277,359
Michigan	Lansing	117,548	174,737	207,063	187,455	190,010	234,357	192,833
Michigan	Saginaw/Bay City	205,392	222,619	246,982	219,310	218,113	231,478	224,347
New Hampshire	Manchester	111,501	168,880	228,874	267,963	292,793	282,131	270,760
New Jersey	Newark	11,288,941	10,837,963	20,921,323	9,853,925	9,737,488	10,442,112	10,965,362
New York	Buffalo	1,728,690	1,780,070	1,628,990	1,637,293	1,542,816	1,484,181	1,463,368

ENPLANEMENTS	*CITY/MSA*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
New York	New York	21,466,318	21,982,221	9,822,491	20,412,533	17,439,839	17,554,230	17,595,951
New York	Rochester	1,254,005	1,241,528	1,149,438	1,154,747	1,067,343	1,018,125	1,007,944
North Carolina	Charlotte	6,021,104	6,619,780	6,903,482	7,076,954	7,668,793	8,220,185	7,803,870
North Carolina	Greensboro/High Point	1,026,113	993,682	894,404	894,532	810,404	848,948	945,896
North Carolina	Raleigh/Durham	2,316,211	3,517,525	4,116,520	4,361,369	4,309,550	4,376,097	4,203,412
Ohio	Cincinnati	3,264,622	3,542,865	3,770,623	3,907,625	4,314,474	4,903,127	5,127,375
Ohio	Cleveland	3,102,547	3,547,258	3,722,208	3,836,050	3,545,000	3,740,901	3,893,989
Ohio	Dayton	2,166,547	2,140,470	2,083,123	1,845,160	1,757,893	933,753	384,516
Ohio	Toledo	252,832	243,785	234,377	202,354	204,983	244,646	206,221
Oregon	Eugene	272,112	227,646	240,151	224,658	256,950	277,504	354,495
Oregon	Portland	2,834,327	2,823,311	3,054,925	3,025,345	3,164,431	3,500,423	4,187,972
Pennsylvania	Allentown	263,930	295,168	296,246	349,358	340,076	349,951	325,261
Pennsylvania	Harrisburg/York	396,226	420,741	443,954	437,341	452,218	515,660	517,900
Pennsylvania	Philadelphia	6,602,687	6,633,677	6,247,489	6,970,820	6,381,130	6,827,030	7,292,669
Pennsylvania	Harrisburg/York	396,226	420,741	443,954	437,341	452,218	515,660	517,900
Rhode Island	Providence	864,078	944,843	952,289	1,060,719	954,208	976,879	970,186
South Carolina	Columbia	570,566	531,224	487,069	512,759	476,079	452,350	420,075
South Carolina	Greenville/Spartanburg	498,312	506,508	493,426	503,271	435,383	423,578	476,561
Tennessee	Nashville	2,987,233	3,244,014	3,746,367	3,404,243	3,901,875	4,461,221	3,813,856
Virginia	Richmond	873,569	850,593	826,955	864,381	819,539	882,368	928,769
Wisconsin	Greenbay	201,876	191,534	189,963	187,513	202,288	254,281	258,138
Wisconsin	Madison	378,019	373,288	384,201	425,563	390,951	524,474	529,283
Wisconsin	Milwaukee	1,619,426	1,779,140	1,871,914	1,915,390	1,756,680	1,938,384	2,085,185

APPENDIX B

MEDIAN AGE FOR MSAs

1980-1993

MEDIAN AGE	*CITY/MSA*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*
Alabama	Huntsville	28.9	30.0	29.6	30.1	30.3	30.6	31.0	31.4	31.7
California	Indio/Palm Springs	46.6	46.6	46.7	46.7	46.7	46.8	46.9	46.9	47.0
Colorado	Colorado Springs	25.7	27.7	27.9	28.0	28.3	28.6	28.9	29.2	29.5
Florida	Daytona Beach	42.5	40.5	40.8	41.0	41.2	41.5	41.6	41.8	42.0
Florida	Melbourne	30.4	34.8	35.2	35.5	35.9	36.1	36.5	36.8	37.1
Florida	Sarasota	52.1	50.8	50.9	50.9	51.0	51.0	51.1	51.1	51.1
Indiana	South Bend	30.5	30.9	31.2	31.4	31.7	32.0	32.3	32.5	32.8
Kentucky	Lexington	27.9	29.1	29.3	29.6	30.0	30.2	30.5	30.8	31.0
Kentucky	Louisville	29.4	30.5	30.8	31.1	31.4	31.6	31.9	32.2	32.5
Louisiana	Baton Rouge	26.3	26.8	27.1	27.4	27.7	28.0	28.3	28.5	28.8
Maine	Portland	30.9	31.4	31.9	32.2	32.5	32.7	33.0	33.3	33.6
Michigan	Lansing	26.5	26.9	27.2	27.5	27.8	28.1	28.4	28.7	28.9
Michigan	Saginaw/Bay City	28.4	28.5	29.2	29.5	29.8	30.1	30.5	30.7	31.0
New York	Rochester	30.3	30.8	31.1	31.4	31.7	31.9	33.3	32.5	32.8
North Carolina	Greensboro	31.0	31.1	31.7	31.9	32.2	32.5	32.8	33.1	33.3
Ohio	Dayton	29.5	30.8	31.1	31.4	31.7	32.0	32.3	32.6	32.9
Ohio	Toledo	29.8	29.6	29.9	30.2	30.5	30.8	31.1	31.3	31.6
Oregon	Eugene	28.6	29.5	29.8	30.0	30.3	30.5	30.8	31.0	31.2
Pennsylvania	Allentown	30.0	33.6	33.9	34.1	34.4	34.6	35.0	35.3	35.6
Pennsylvania	Harrisburg/York	31.6	32.1	32.5	32.6	32.9	33.1	33.4	33.7	34.0
Rhode Island	Providence	32.5	32.6	32.9	33.2	33.5	33.7	34.1	34.3	34.6
South Carolina	Columbia	27.0	28.0	28.3	28.5	38.9	29.2	29.6	39.8	30.1
South Carolina	Greenville	30.0	30.4	30.7	31.0	31.3	31.6	31.9	32.2	32.4
Virginia	Richmond	30.9	30.9	31.0	31.3	31.5	31.8	32.1	32.3	32.5
Wisconsin	Greenbay	27.4	28.1	28.5	28.8	29.1	29.4	29.7	30.0	30.3
Wisconsin	Madison	26.4	28.3	28.6	28.9	29.1	29.4	29.6	29.9	30.1

MEDIAN AGE	*CITY/MSA*	*1989*	*1990*	*1991*	*1992*	*1993*
Alabama	Huntsville	32.0	32.0	32.3	32.6	32.9
California	Indio/Palm Springs	47.0	43.9	44.0	44.1	43.9
Colorado	Colorado Springs	29.7	30.3	30.5	30.7	30.9
Florida	Daytona Beach	42.2	39.8	40.0	40.6	40.9
Florida	Melbourne	37.4	36.5	36.8	37.0	37.4
Florida	Sarasota	51.1	48.9	49.0	46.5	46.8
Indiana	South Bend	33.0	32.9	33.3	33.4	33.7
Kentucky	Lexington	31.2	31.9	32.2	32.0	32.2
Kentucky	Louisville	32.7	33.9	34.3	34.5	34.8
Louisiana	Baton Rouge	29.0	29.9	30.1	30.3	30.5
Maine	Portland	33.9	33.7	34.1	34.3	34.6
Michigan	Lansing	29.2	29.9	30.2	30.3	30.6
Michigan	Saginaw/Bay City	31.3	33.0	33.4	33.6	34.0
New York	Rochester	33.1	33.0	33.3	33.5	33.9
North Carolina	Greensboro	33.6	34.1	34.5	34.8	35.2
Ohio	Dayton	33.1	33.5	33.9	34.1	34.5
Ohio	Toledo	31.9	32.0	32.3	32.5	32.8
Oregon	Eugene	31.4	34.0	34.4	34.6	35.0
Pennsylvania	Allentown	35.9	35.5	35.9	36.2	36.6
Pennsylvania	Harrisburg/York	34.2	34.9	35.1	35.3	35.7
Rhode Island	Providence	34.9	34.1	34.4	34.6	35.0
South Carolina	Columbia	30.2	31.3	31.6	31.8	32.0
South Carolina	Greenville	32.7	33.3	33.7	34.2	34.5
Virginia	Richmond	32.8	33.3	33.6	33.8	34.1
Wisconsin	Greenbay	30.5	31.5	31.8	31.9	32.2
Wisconsin	Madison	30.3	30.9	31.2	31.4	31.6

APPENDIX C

MEDIAN DISPOSABLE INCOME FOR MSAs

1980 to 1993

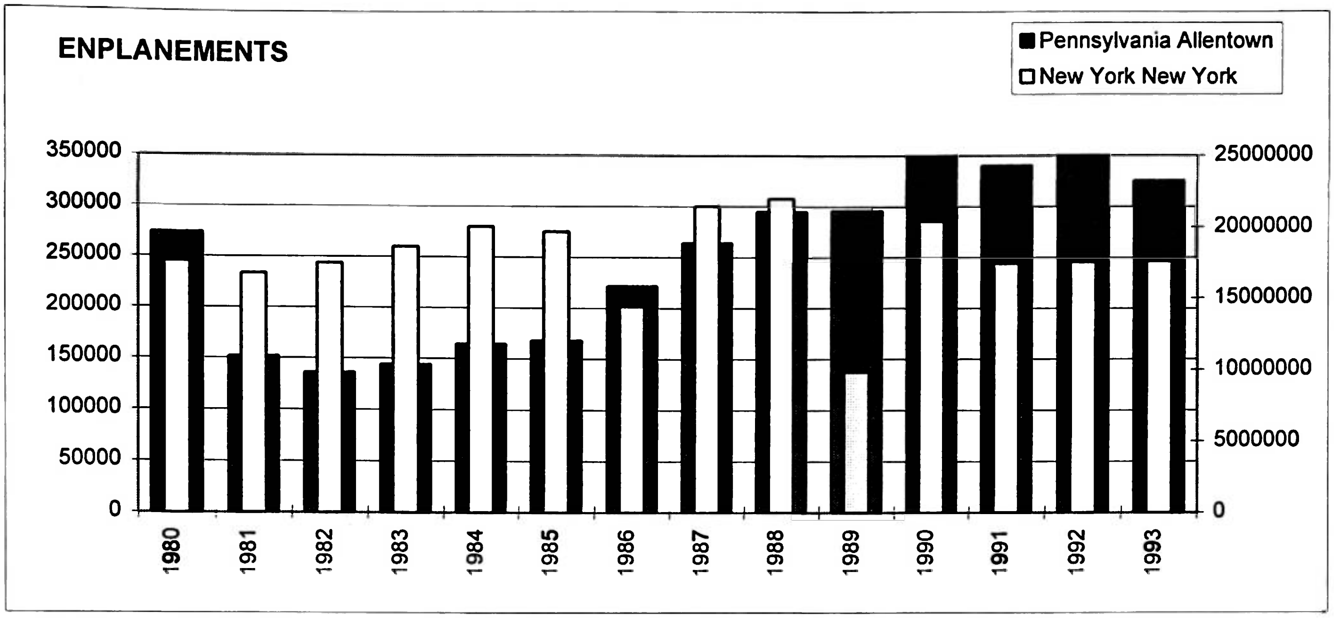
MEDIAN INCOME	*CITY/MSA*	*1980*	*1981*	*1982*	*1983*	*1984*	*1985*	*1986*	*1987*	*1988*
Alabama	Huntsville	18,404	20,316	22,156	24,384	26,508	24,485	25,798	26,950	26,135
California	Indio/Palm Springs	19,202	20,044	20,923	21,685	23,930	22,277	22,703	25,208	24,884
Colorado	Colorado Springs	16,384	17,334	20,229	22,259	23,694	23,147	24,101	24,765	22,453
Florida	Daytona Beach	11,835	13,246	16,437	18,066	20,617	19,389	20,237	21,011	20,682
Florida	Melbourne	17,736	19,980	20,812	21,036	22,791	22,239	22,983	23,987	23,209
Florida	Sarasota /Bradenton	12,863	14,306	18,774	20,504	22,181	21,267	22,299	23,549	22,408
Indiana	South Bend	19,566	21,545	21,684	23,698	25,051	23,735	24,330	25,562	23,641
Kentucky	Lexington	18,165	19,374	20,204	21,862	24,518	21,849	22,423	23,839	21,716
Kentucky	Louisville	19,643	21,262	20,915	23,177	25,648	23,280	23,620	25,144	23,179
Louisiana	Baton Rouge	21,345	23,087	24,524	25,320	26,861	24,546	24,555	24,962	22,322
Maine	Portland	18,290	20,426	21,067	22,734	25,131	23,098	24,719	26,830	26,589
Michigan	Lansing	21,953	24,831	25,032	27,333	29,024	27,094	27,408	28,297	25,543
Michigan	Saginaw/Bay City	23,175	25,701	24,557	26,179	27,280	25,156	26,147	26,992	24,674
New York	Rochester	23,284	25,421	27,035	29,014	30,404	27,764	30,176	30,698	28,235
North Carolina	Greensboro/High Point	18,606	19,889	20,130	22,339	24,256	22,640	23,412	24,052	23,665
Ohio	Dayton	21,015	23,076	23,374	23,724	26,293	24,752	25,919	26,402	24,575
Ohio	Toledo	21,971	24,061	23,016	23,980	25,763	24,538	25,402	27,186	24,177
Oregon	Eugene	17,862	18,749	18,753	19,871	21,625	20,220	21,035	21,070	21,018
Pennsylvania	Allentown	20,980	22,496	24,576	25,473	27,537	25,338	26,029	27,974	26,691
Pennsylvania	Harrisburg/York	21,047	22,655	23,903	25,153	27,002	24,645	25,878	28,054	26,427
Rhode Island	Providence	19,228	21,032	21,894	23,313	26,412	24,614	25,640	26,968	26,087
South Carolina	Columbia	18,010	19,588	21,033	22,873	25,161	23,483	24,549	25,611	24,497
South Carolina	Greenville/Spartanburg	17,510	19,135	19,369	20,079	21,540	20,019	20,906	21,505	21,056
Virginia	Richmond	20,553	22,639	23,200	24,978	27,808	27,160	28,145	29,697	29,463
Wisconsin	Greenbay	20,496	21,997	23,074	26,064	27,253	25,113	25,982	27,056	25,051
Wisconsin	Madison	21,420	22,825	23,301	27,001	27,330	25,071	26,183	27,703	25,812

MEDIAN INCOME	*CITY/MSA*	*1989*	*1990*	*1991*	*1992*	*1993*
Alabama	Huntsville	27,940	30,483	35,828	36,543	38,846
California	Indio/Palm Springs	25,310	27,985	29,126	29,480	30,593
Colorado	Colorado Springs	24,067	25,678	30,835	31,395	33,108
Florida	Daytona Beach	21,927	23,439	25,187	25,680	27,871
Florida	Melbourne	25,181	26,592	31,471	32,146	34,933
Florida	Sarasota /Bradenton	24,246	25,788	29,715	28,433	31,223
Indiana	South Bend	24,727	26,366	30,211	31,465	33,724
Kentucky	Lexington	23,146	24,831	31,230	31,780	33,503
Kentucky	Louisville	24,505	25,896	30,367	31,670	33,691
Louisiana	Baton Rouge	24,549	28,110	31,743	33,006	35,241
Maine	Portland	28,561	29,780	34,729	36,552	37,572
Michigan	Lansing	28,166	29,475	34,223	35,986	38,225
Michigan	Saginaw/Bay City	26,687	27,682	30,244	31,495	33,111
New York	Rochester	29,974	32,561	35,735	36,619	38,489
North Carolina	Greensboro/High Point	25,483	26,410	29,843	31,062	32,873
Ohio	Dayton	26,197	27,773	32,689	33,662	35,758
Ohio	Toledo	25,805	27,210	30,443	31,209	32,693
Oregon	Eugene	21,649	22,972	27,136	28,076	29,309
Pennsylvania	Allentown	28,286	30,117	35,122	35,969	37,674
Pennsylvania	Harrisburg/York	28,053	30,491	35,074	36,925	38,670
Rhode Island	Providence	27,798	28,441	31,744	33,353	33,829
South Carolina	Columbia	25,610	28,565	31,696	32,729	34,480
South Carolina	Greenville/Spartanburg	22,112	24,687	29,662	29,881	31,508
Virginia	Richmond	31,876	32,135	34,244	35,164	37,668
Wisconsin	Greenbay	25,919	28,491	24,218	25,599	27,803
Wisconsin	Madison	28,138	30,218	36,172	37,799	40,648

APPENDIX D

CHARTS COMPARING ENPLANEMENTS, MEDIAN AGE, AND MEDIAN DISPOSABLE INCOME FOR COMPETING MSAs

1980 to 1993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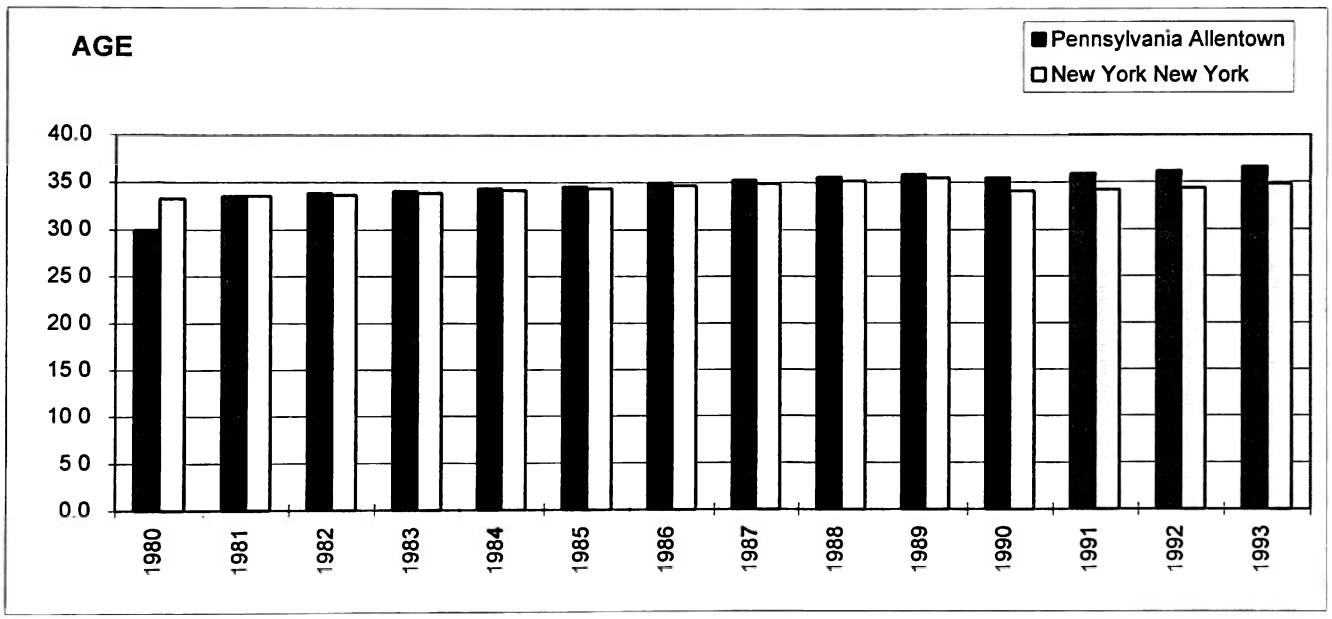
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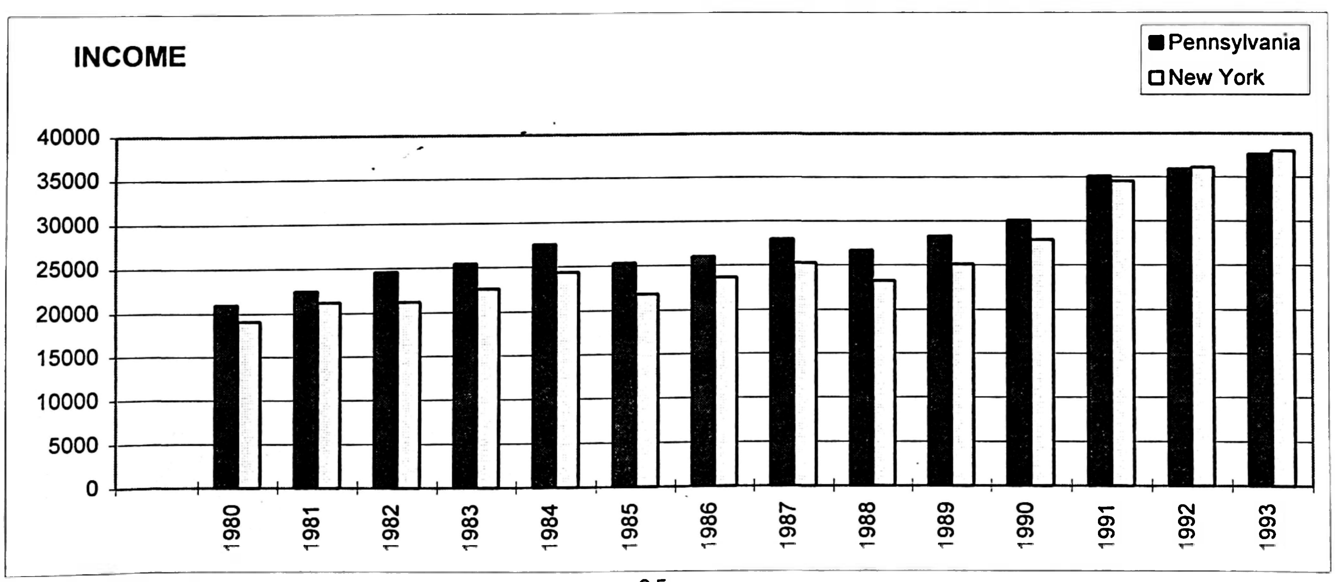
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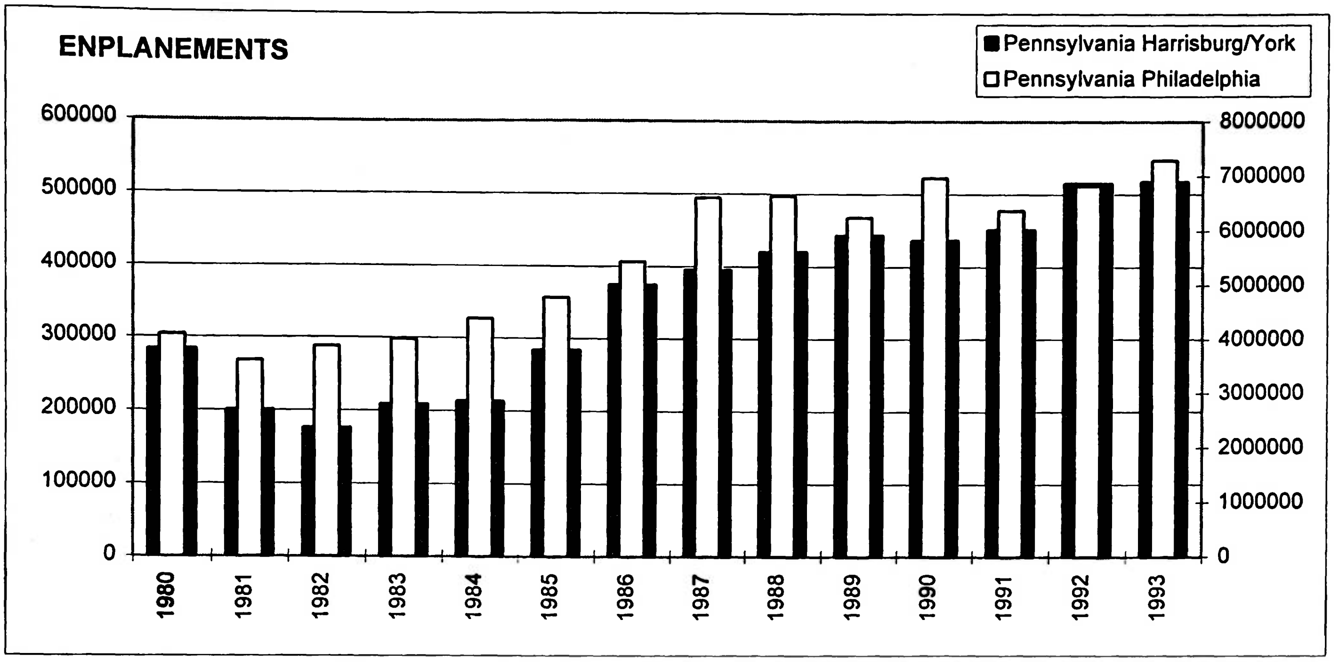
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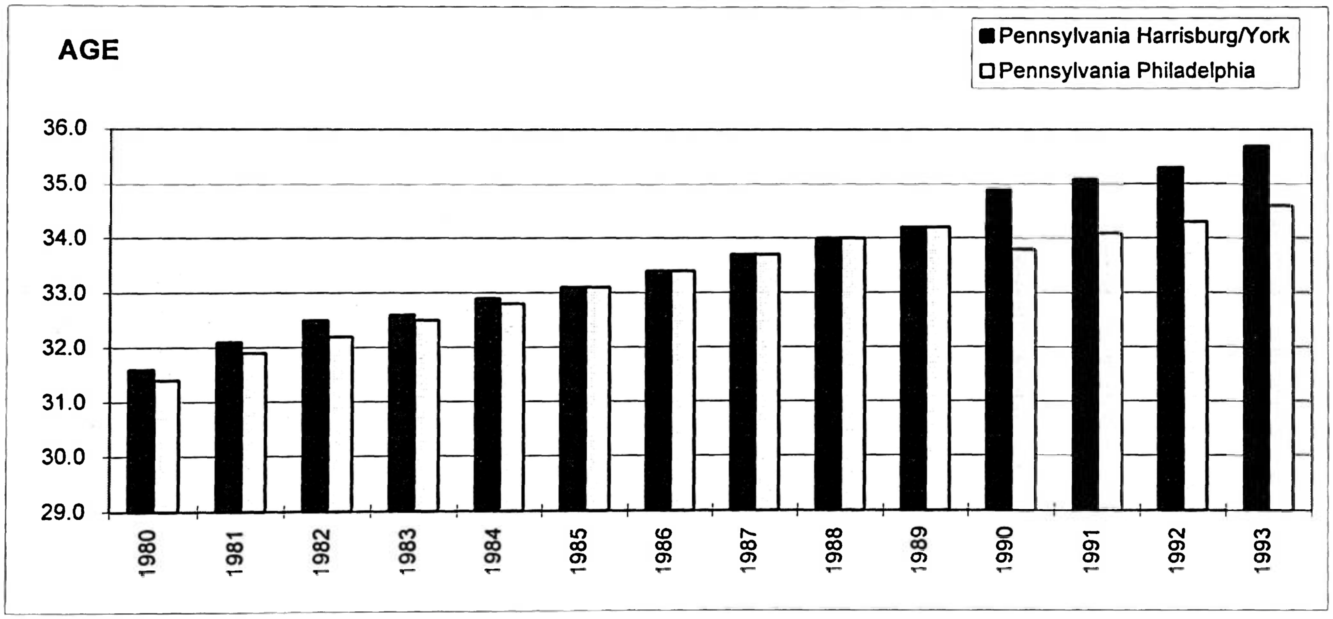
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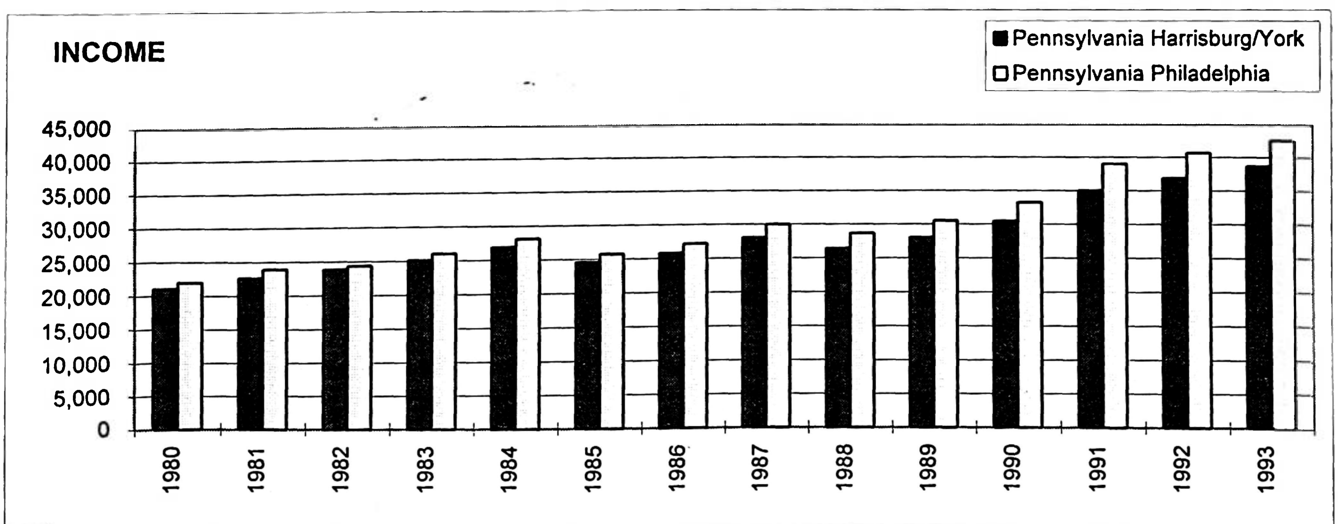
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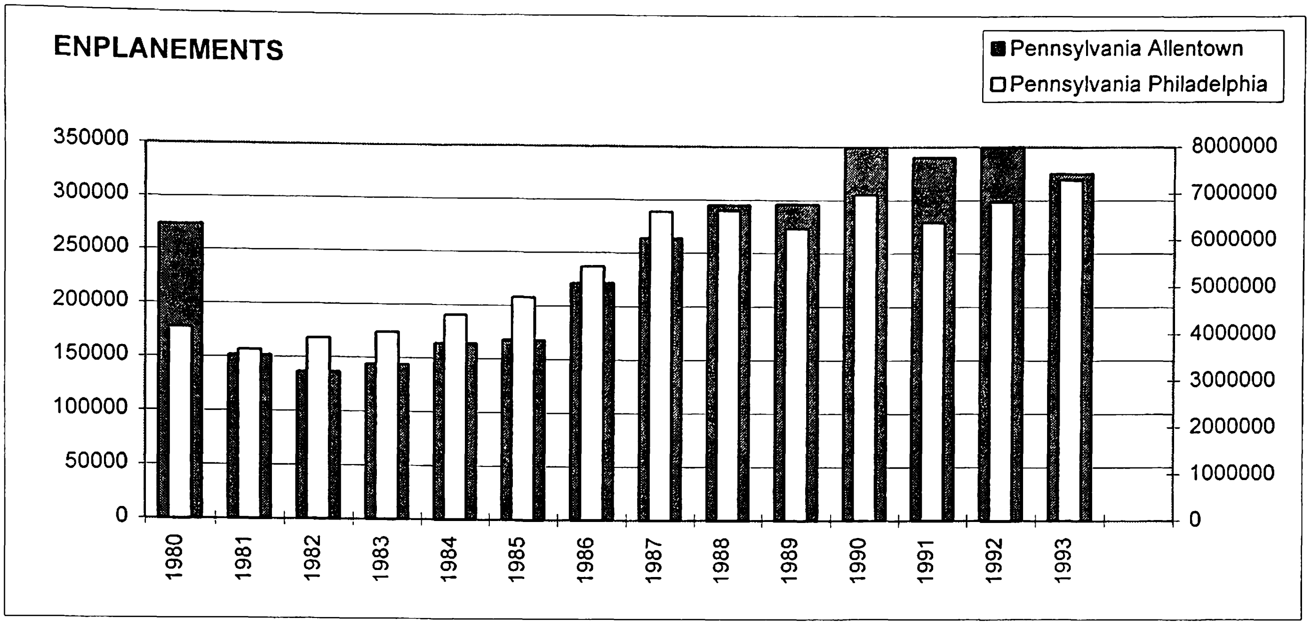
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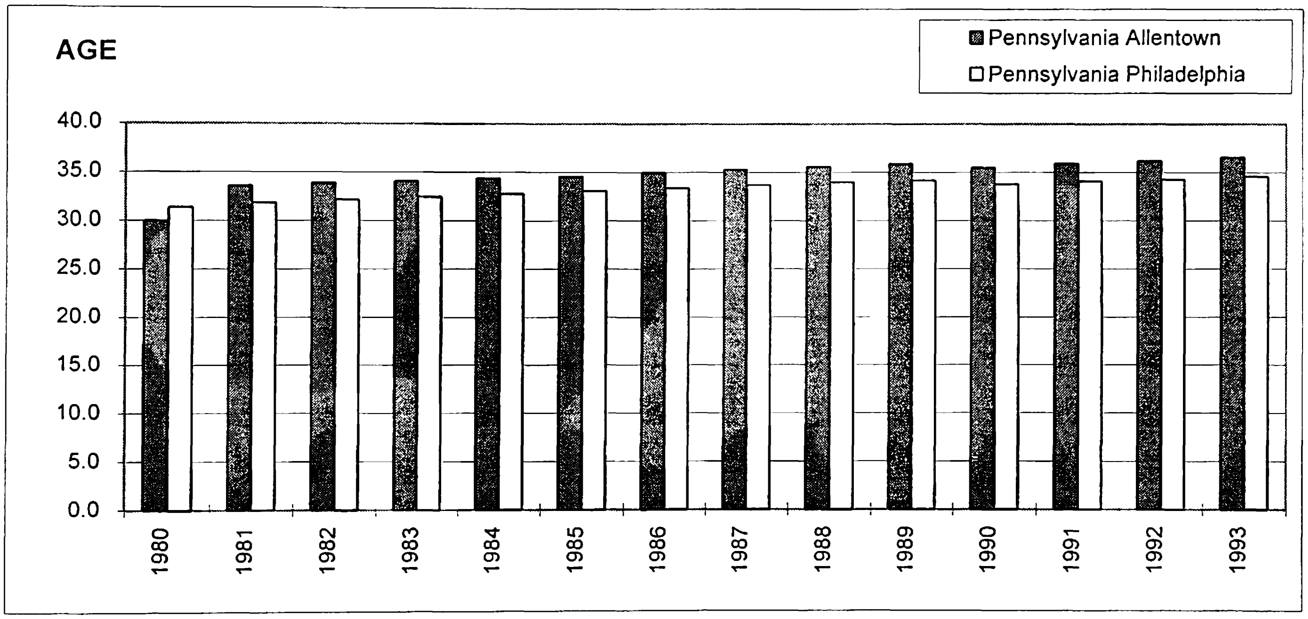
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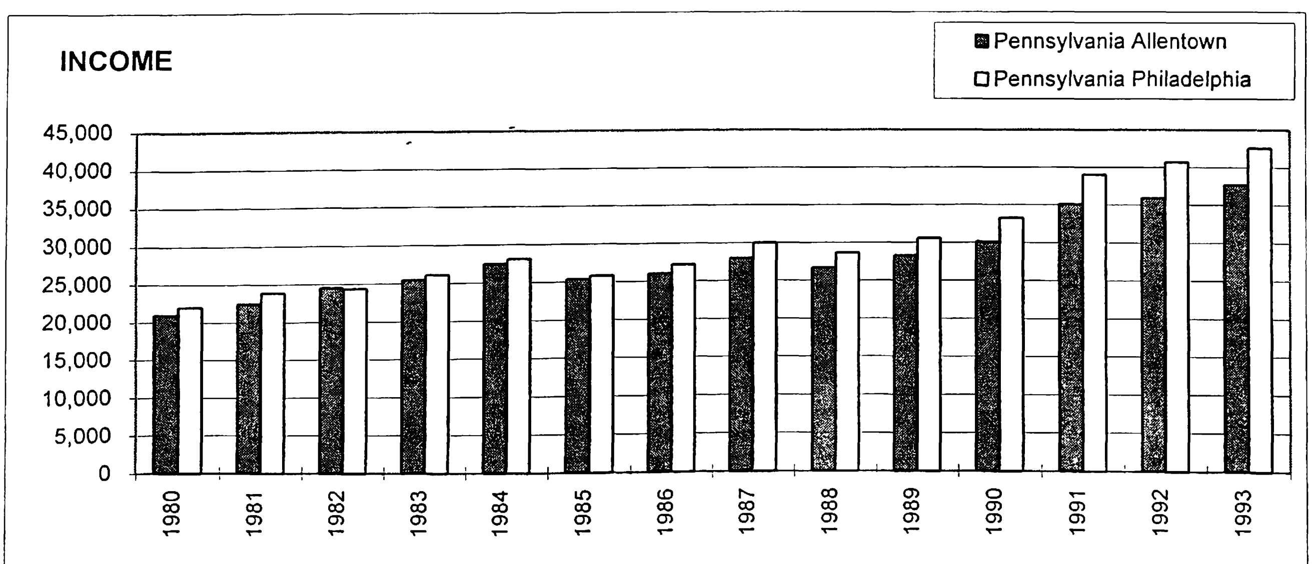
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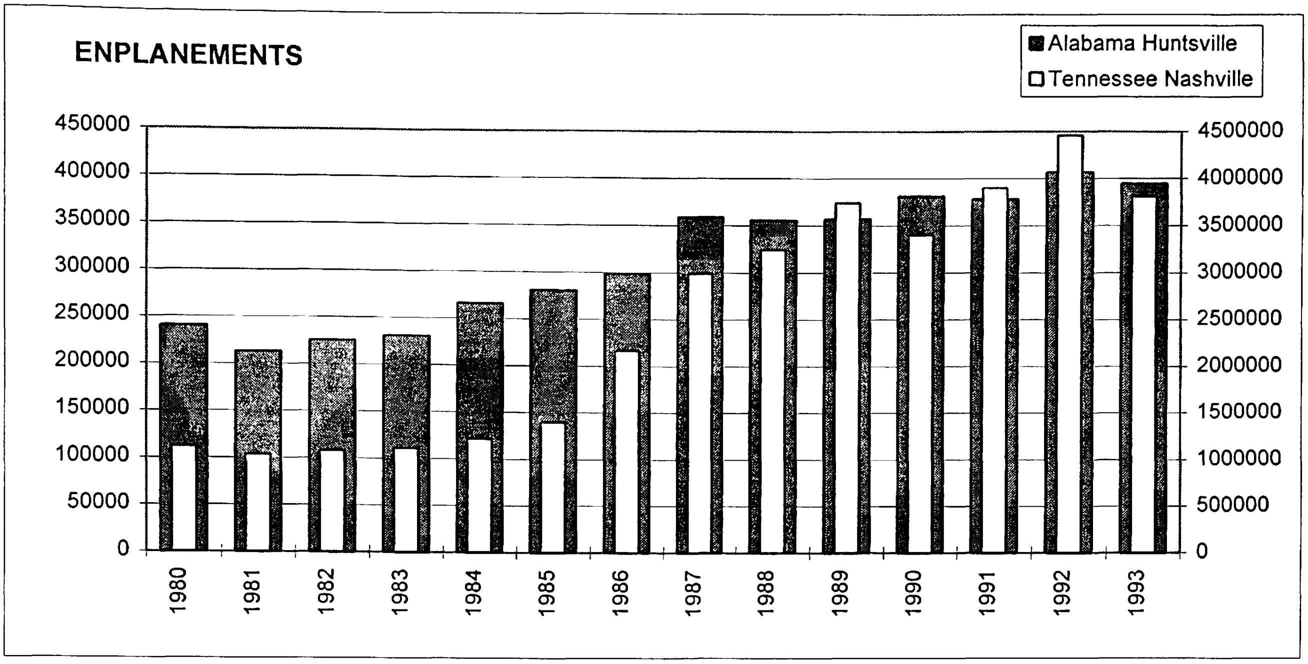
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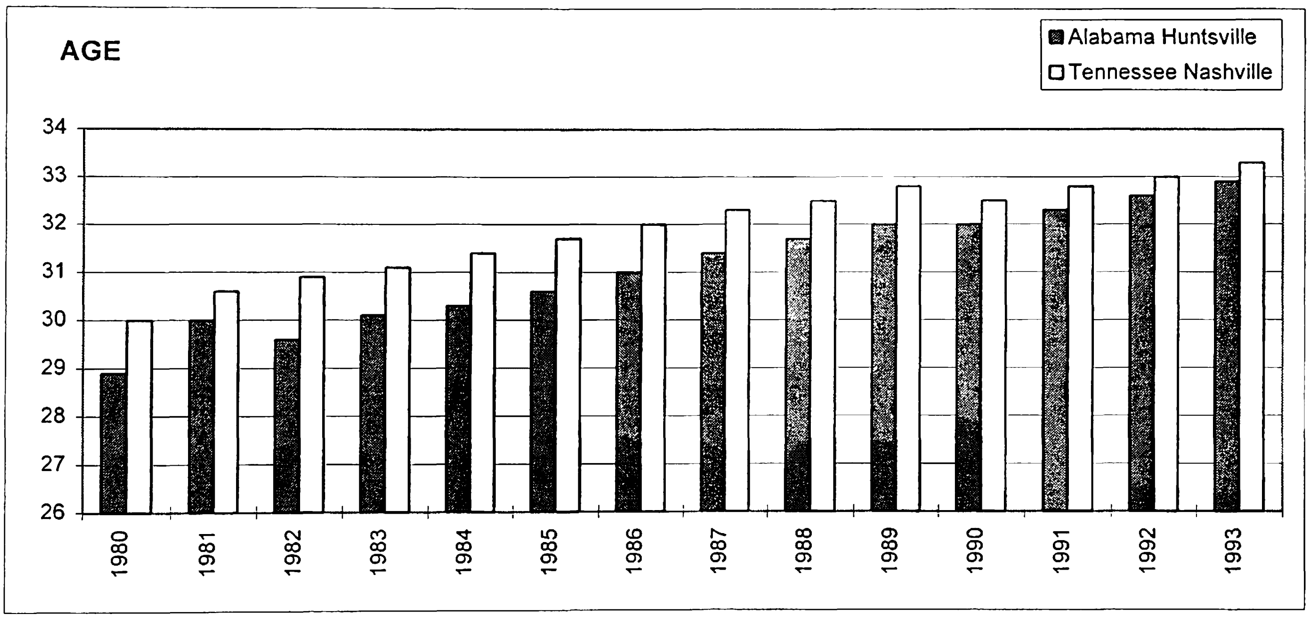
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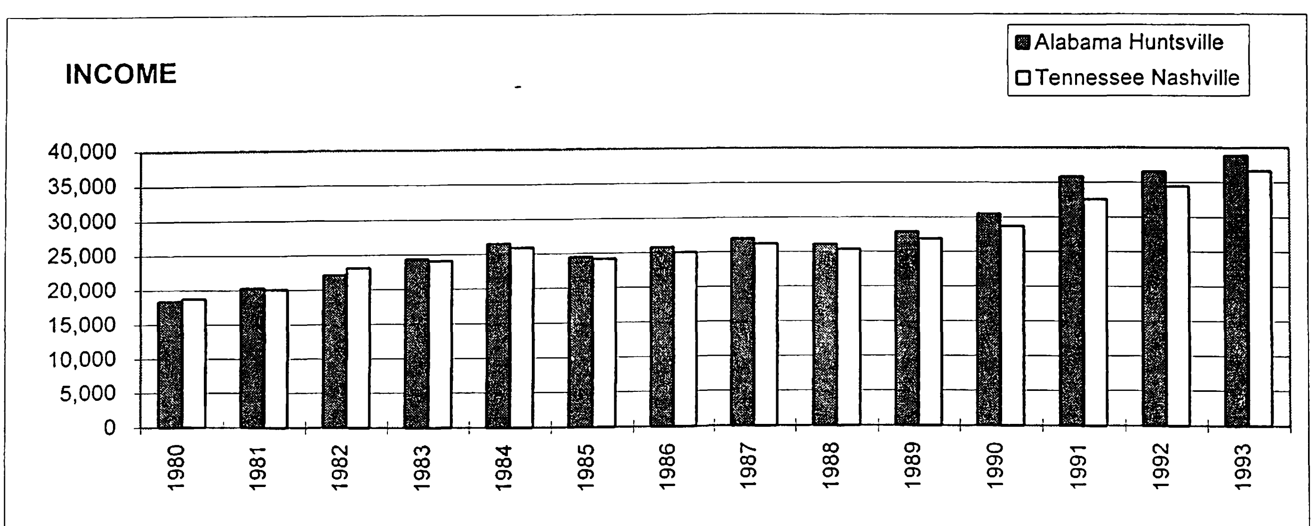
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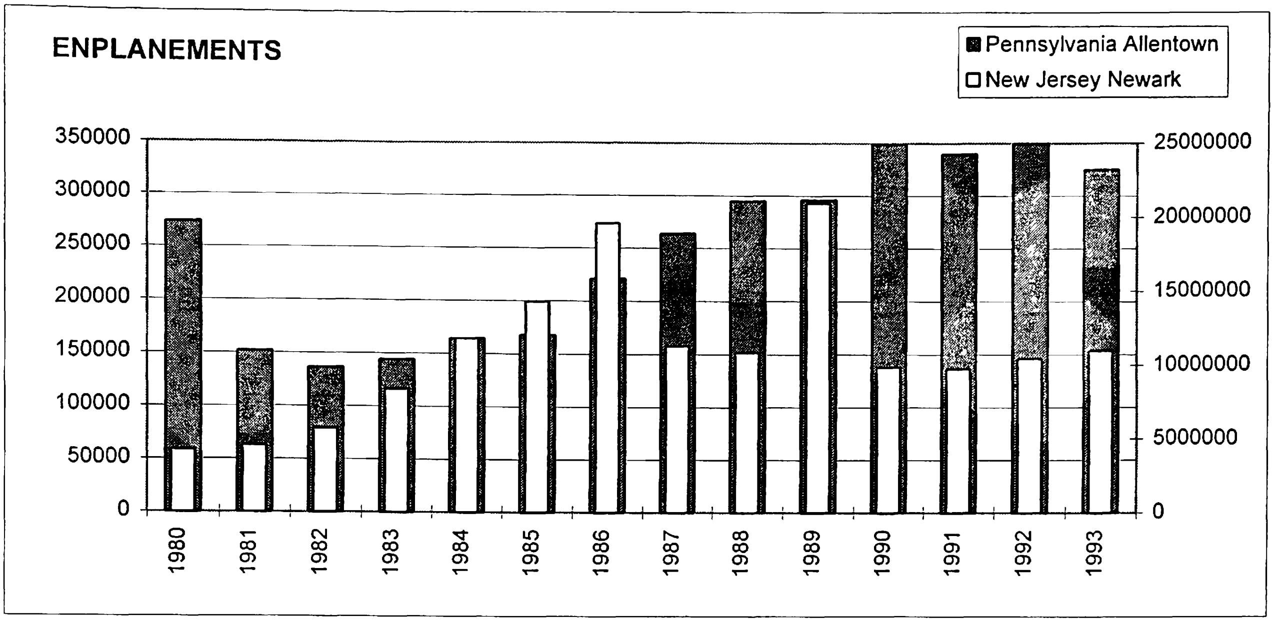
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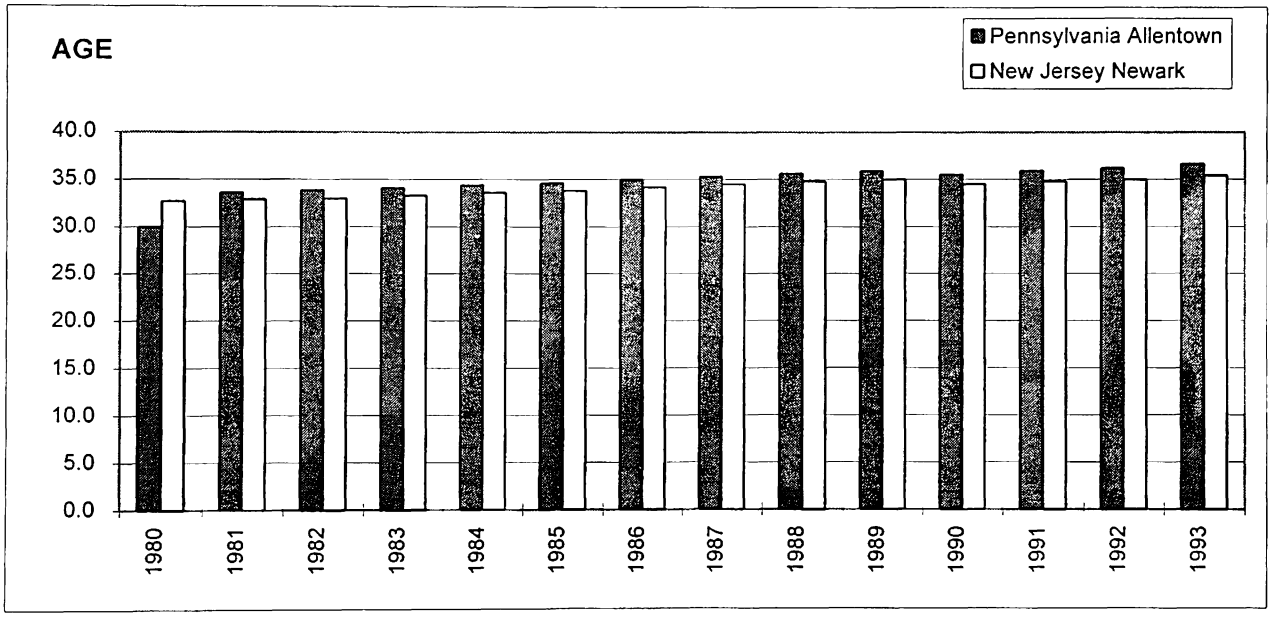
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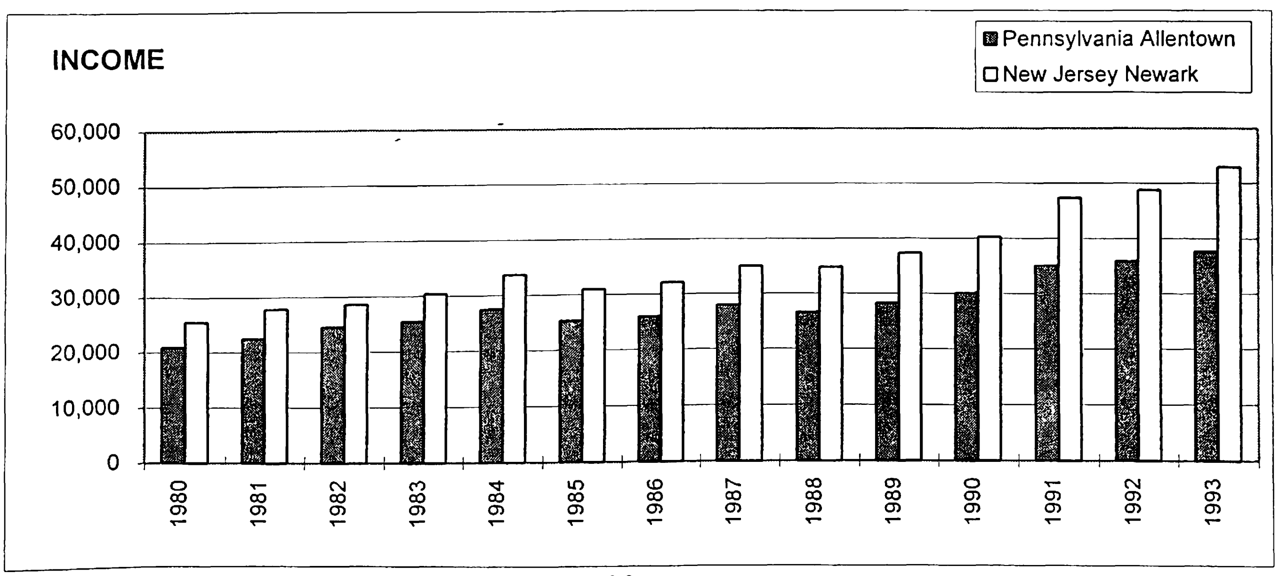
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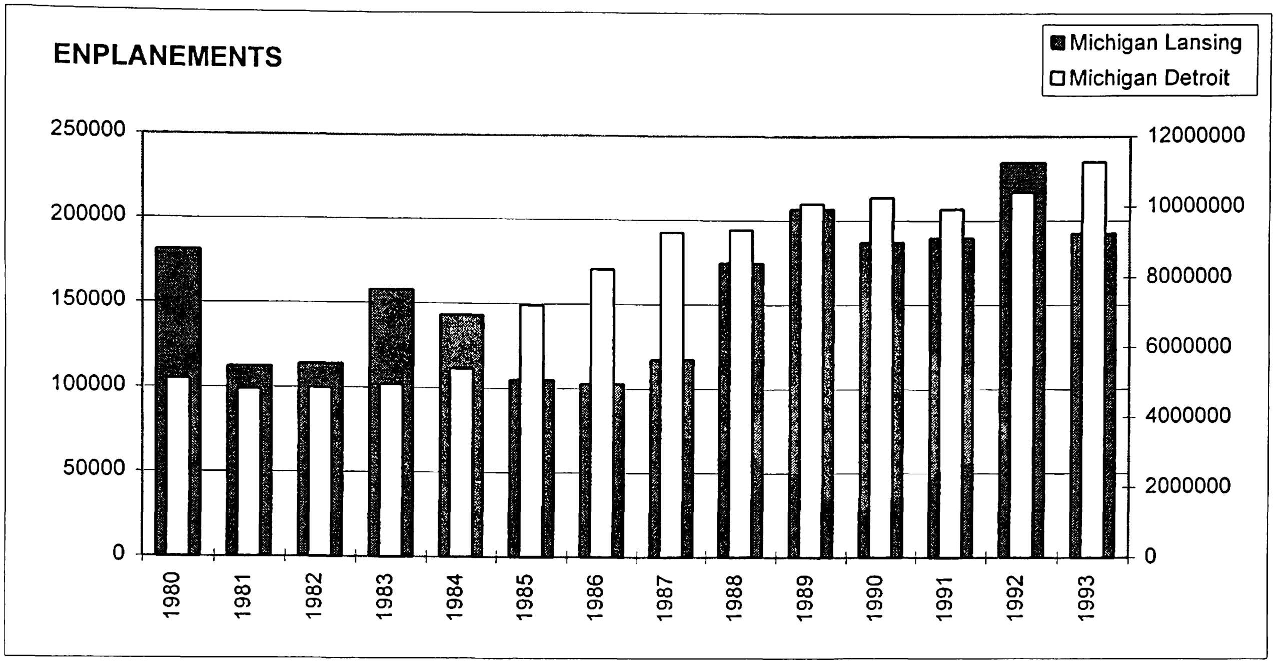
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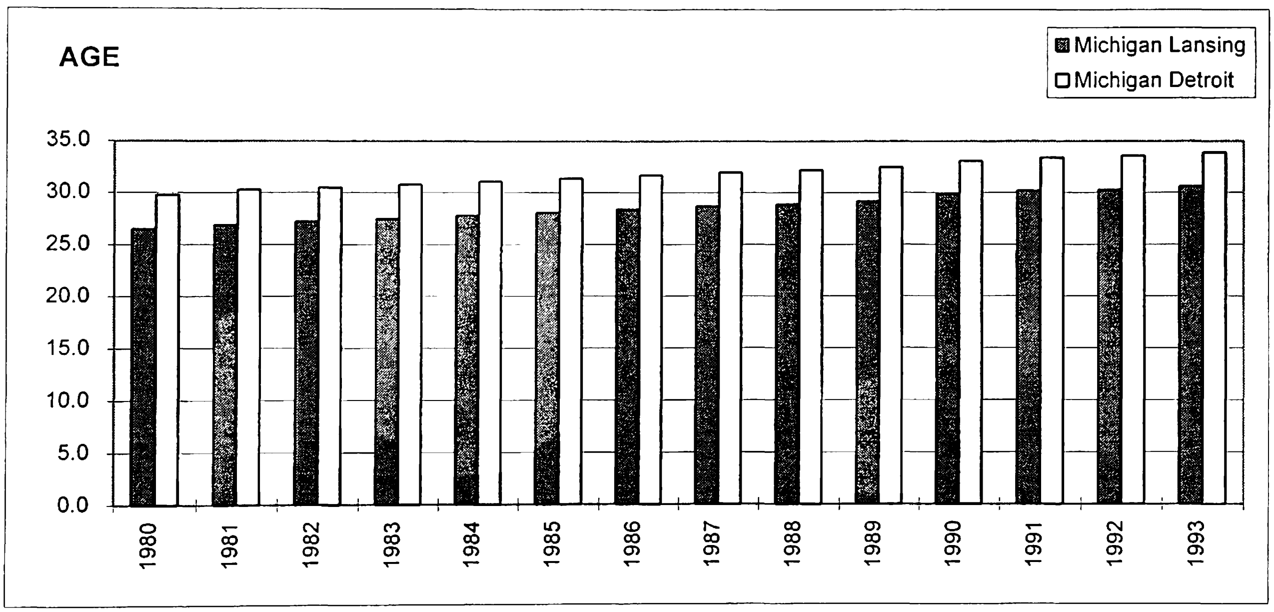
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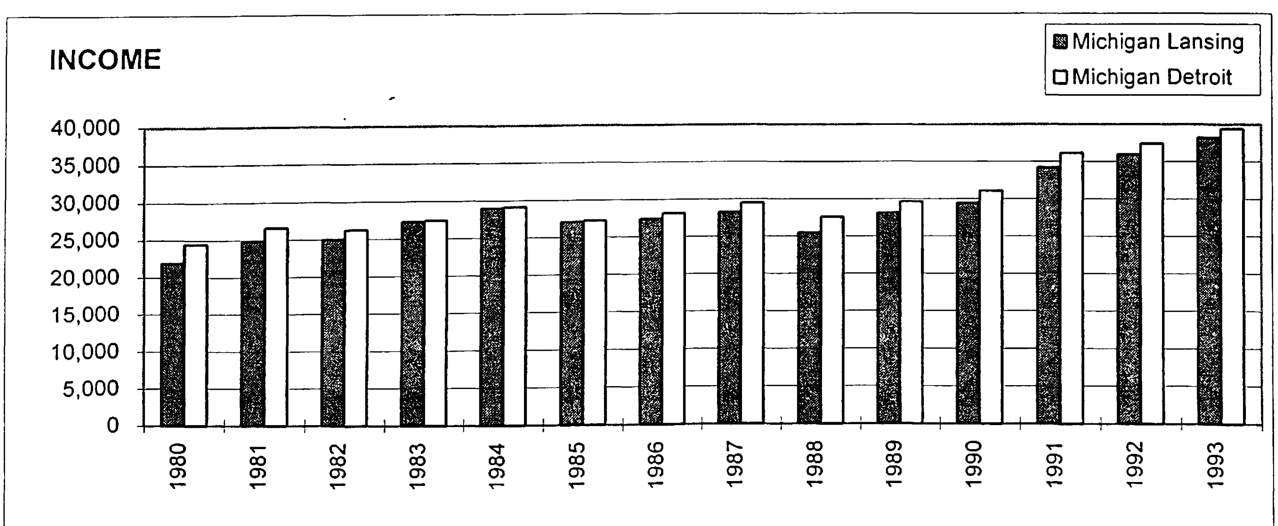
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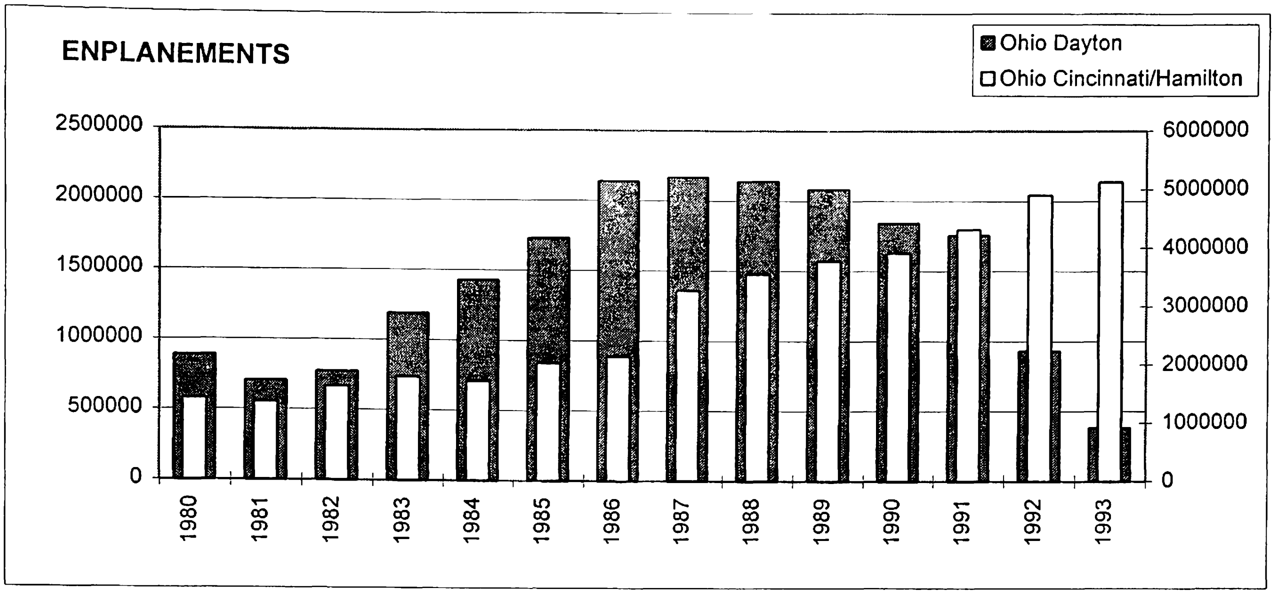
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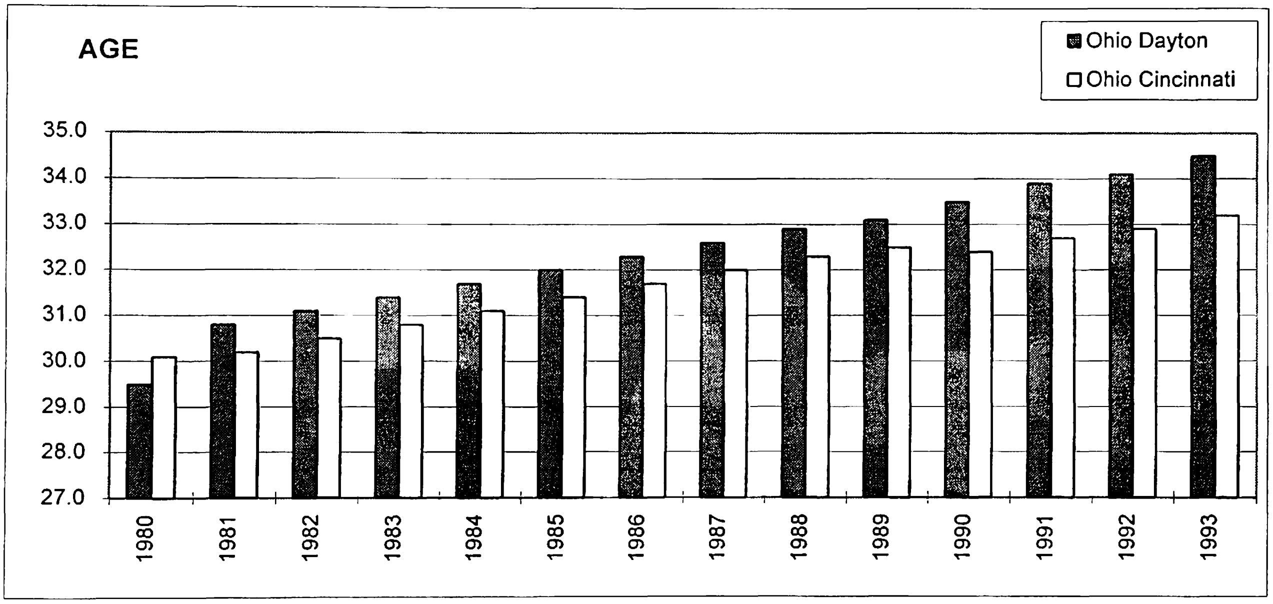
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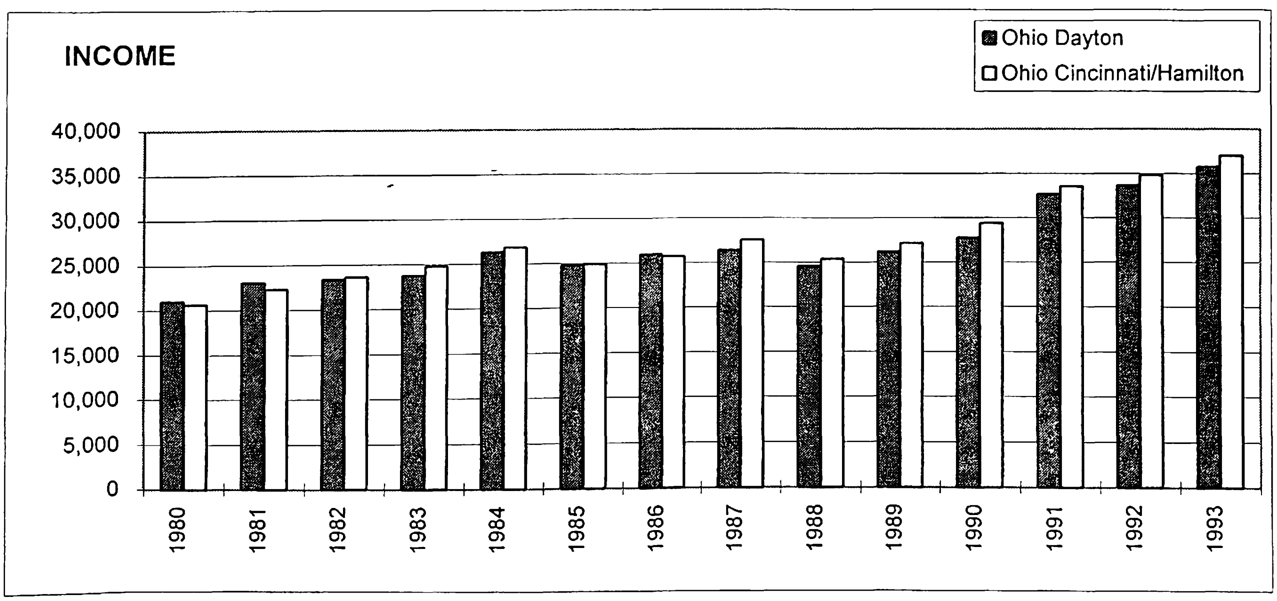
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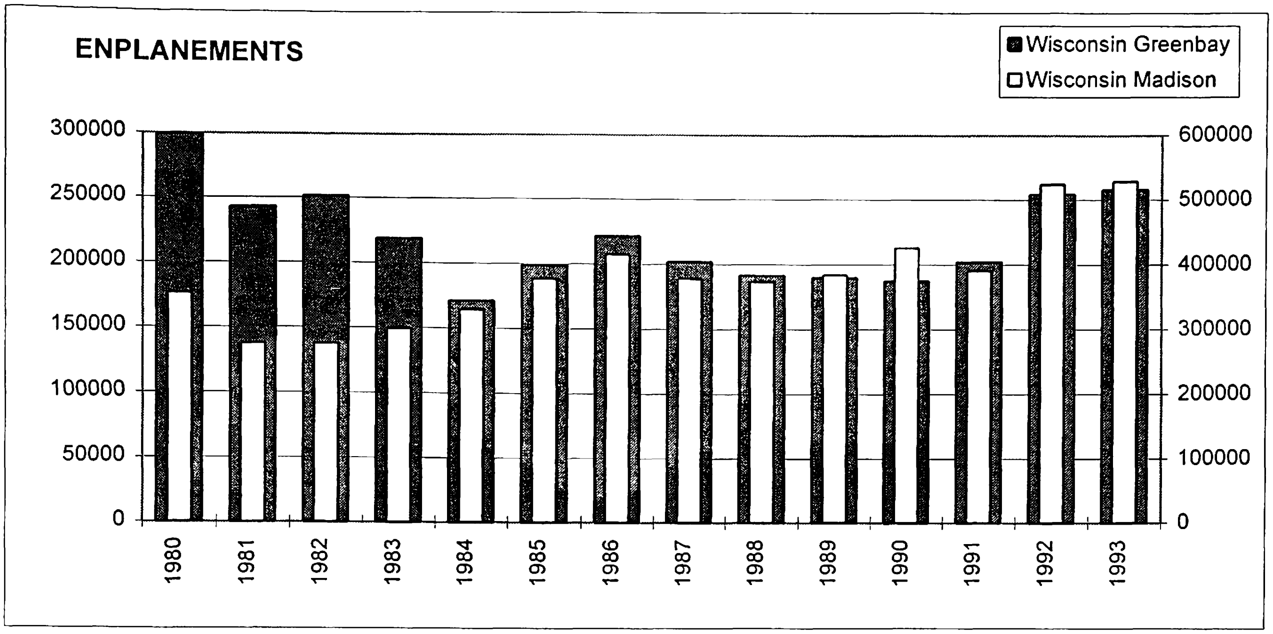
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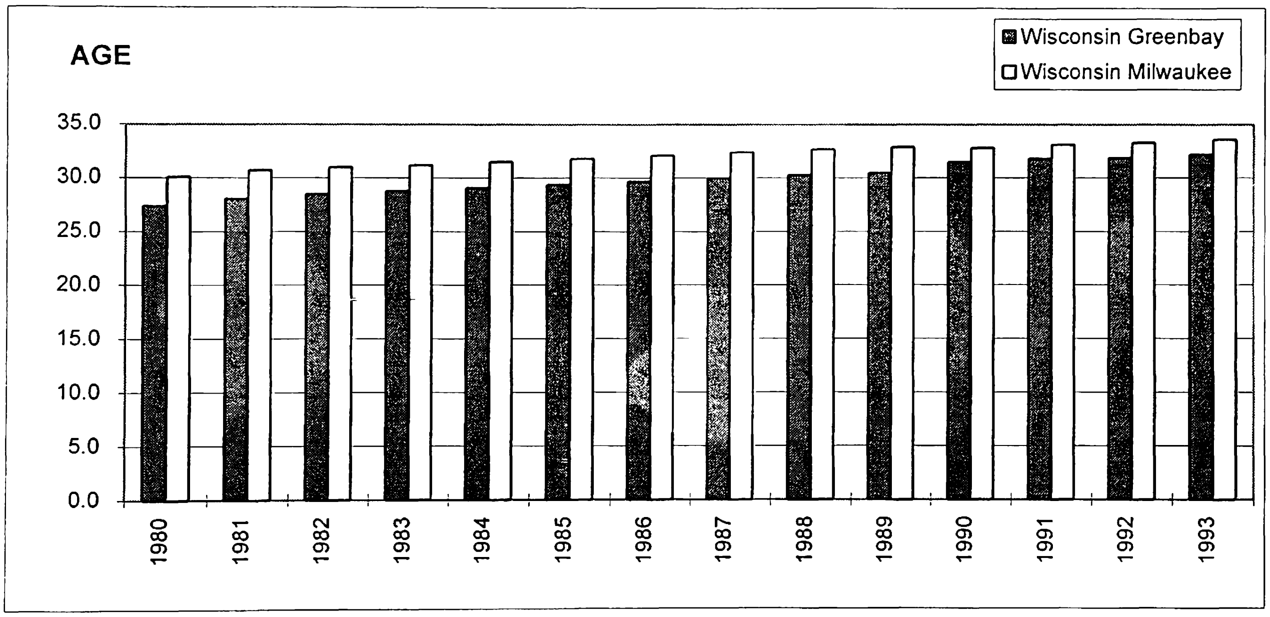
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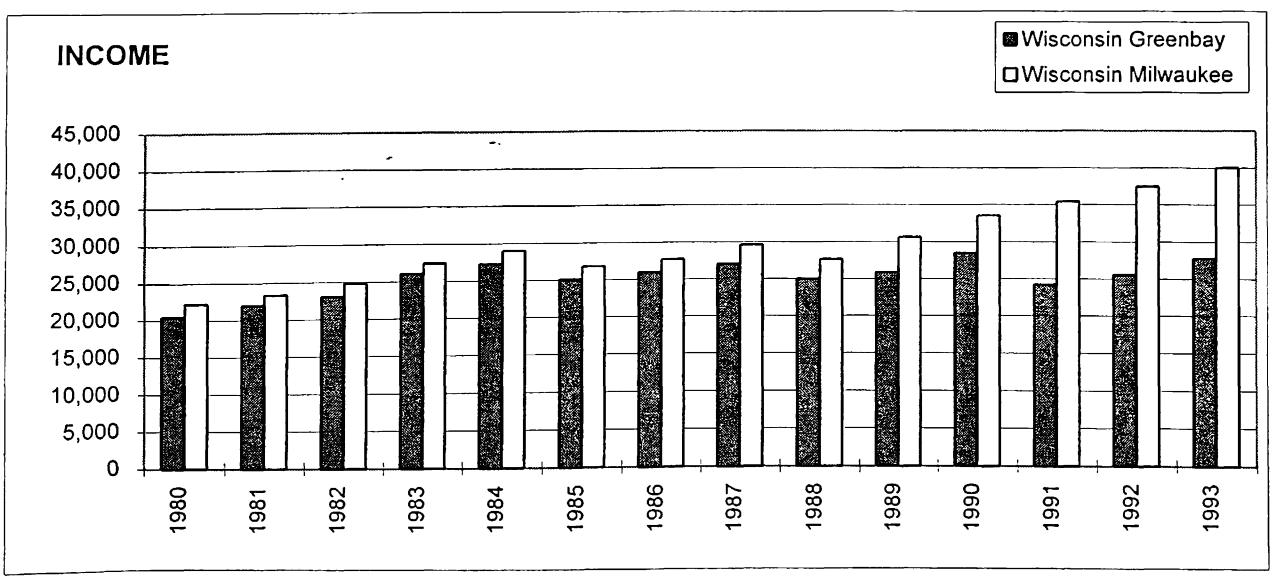
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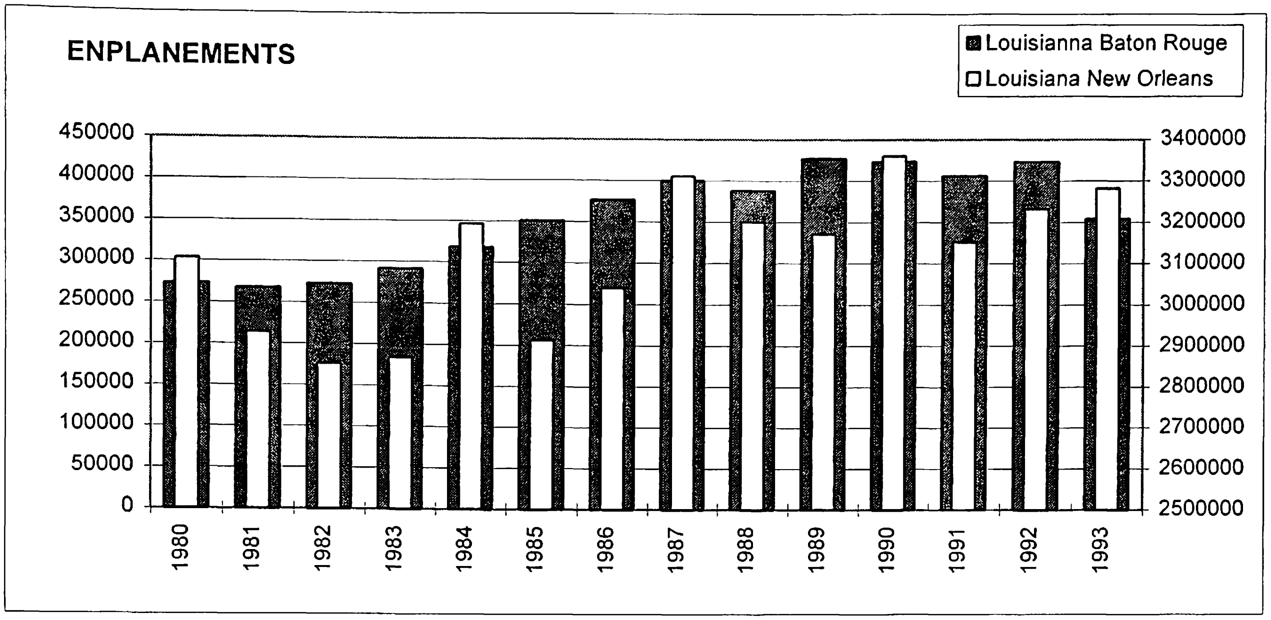
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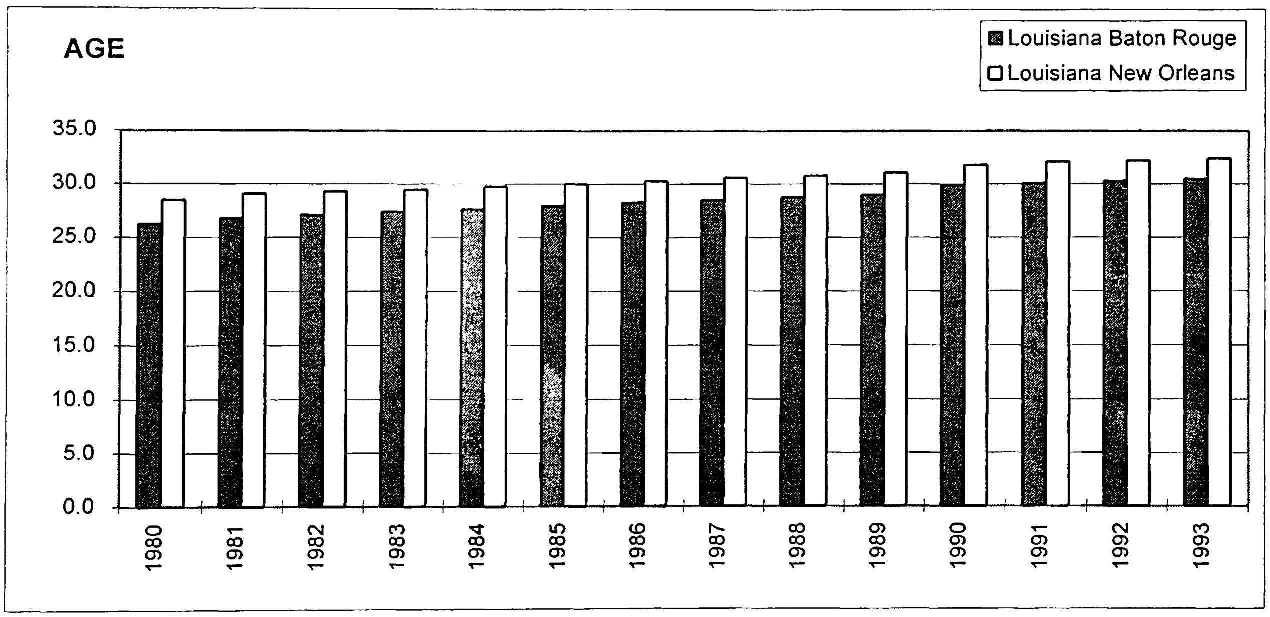
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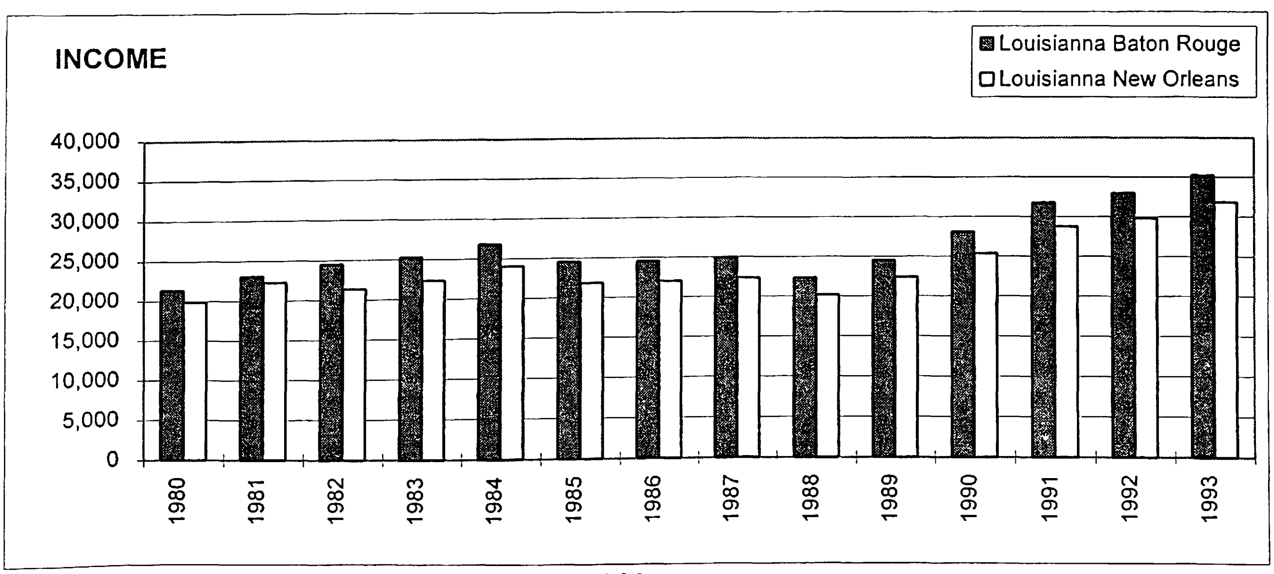
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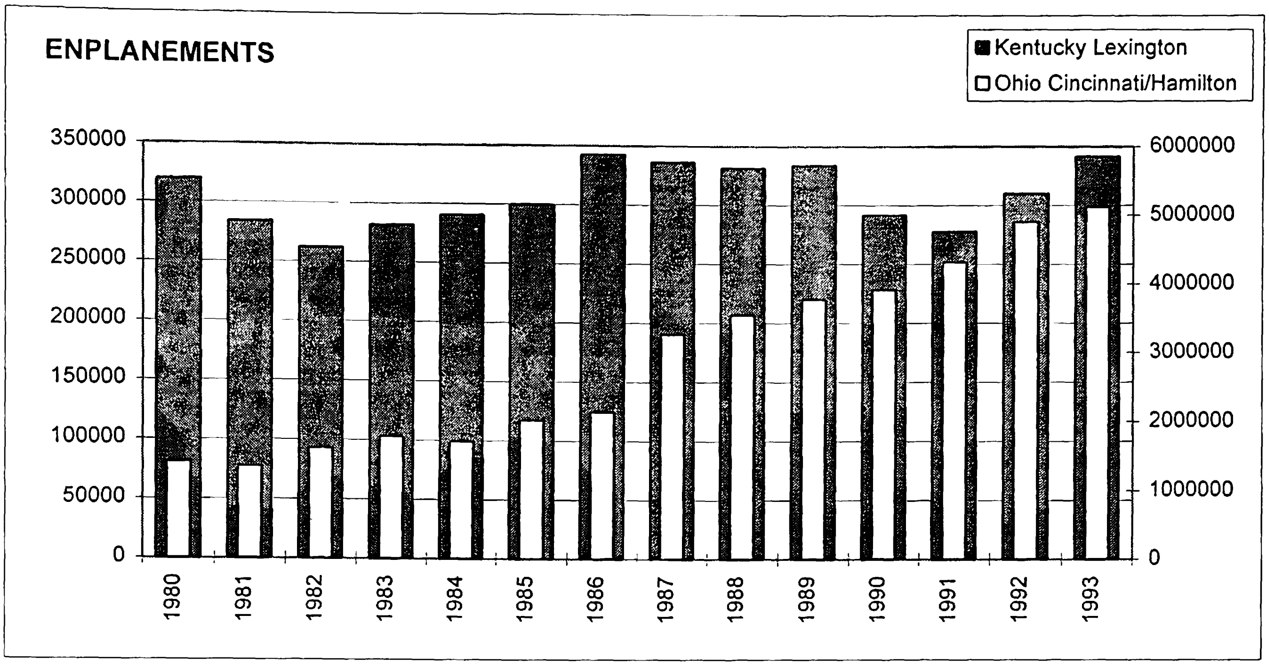
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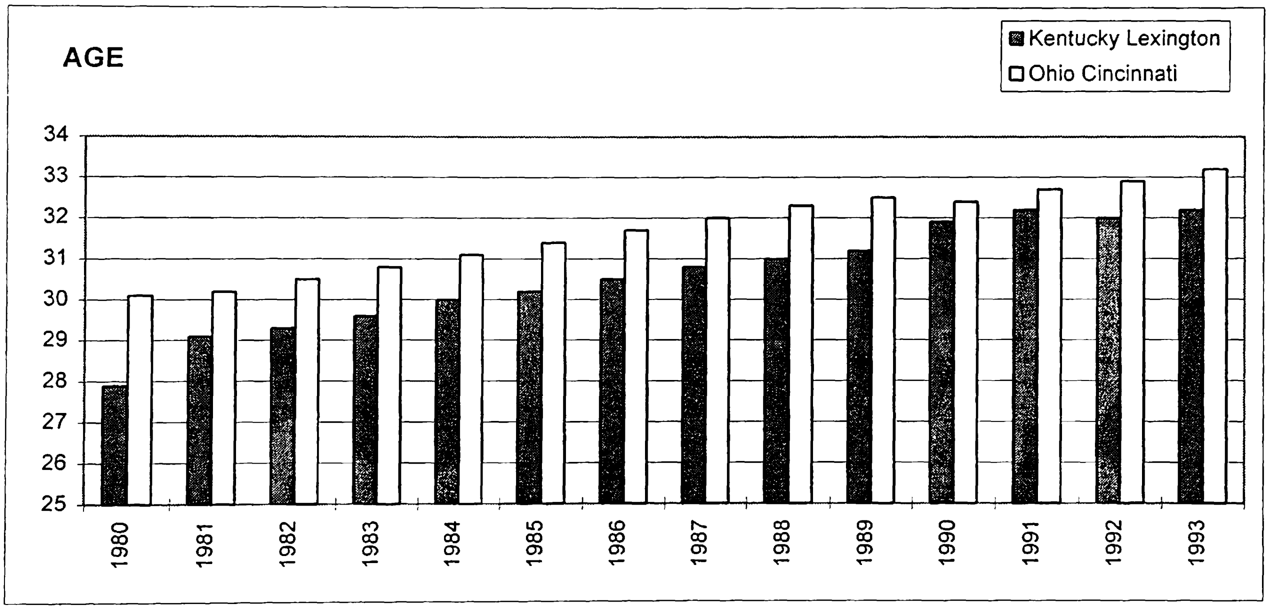
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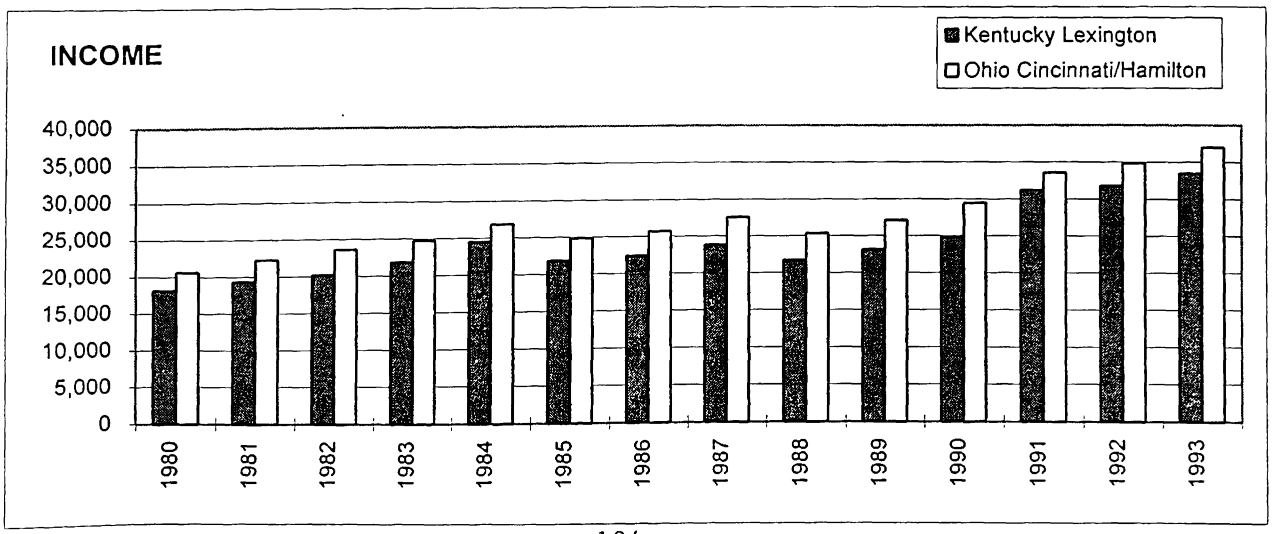
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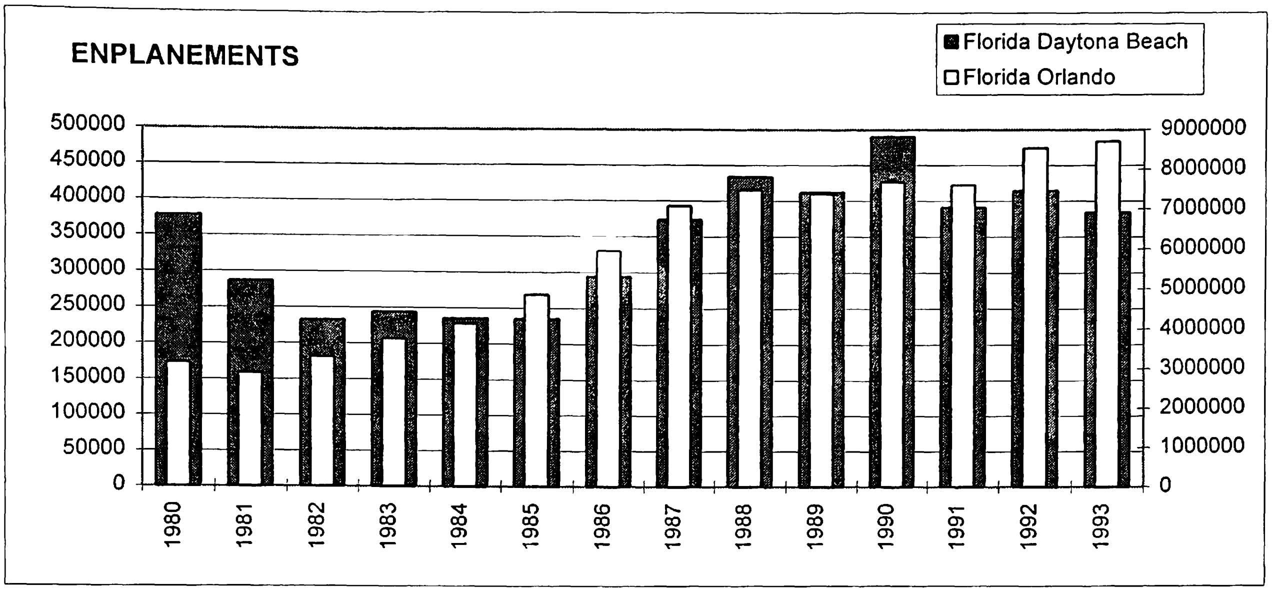
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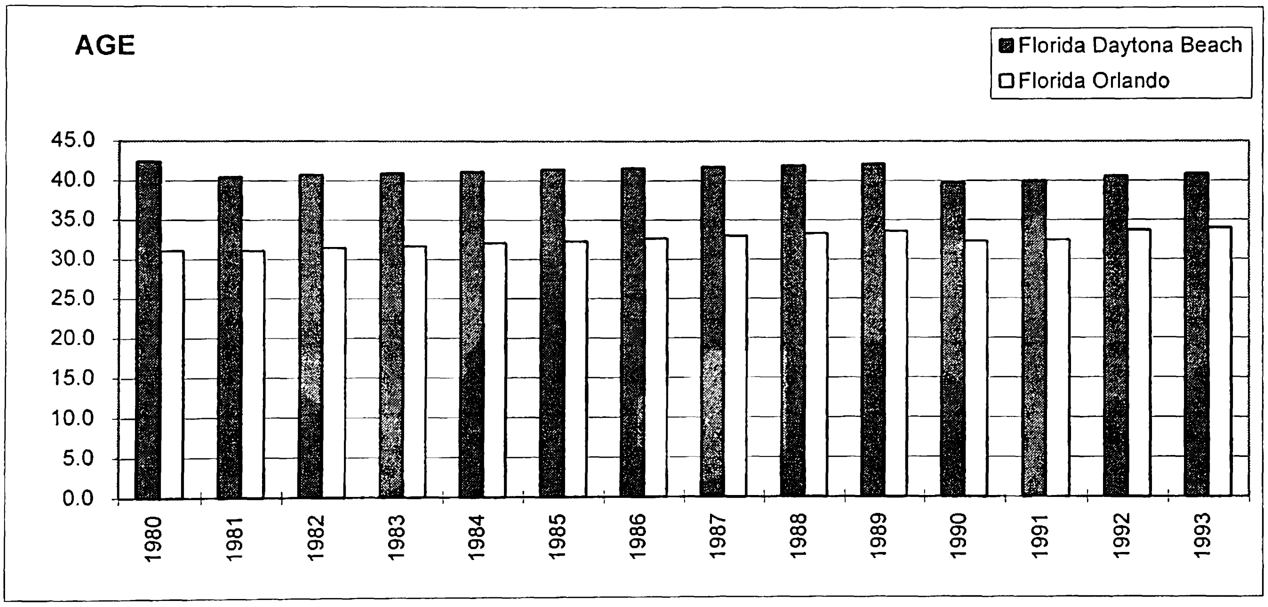
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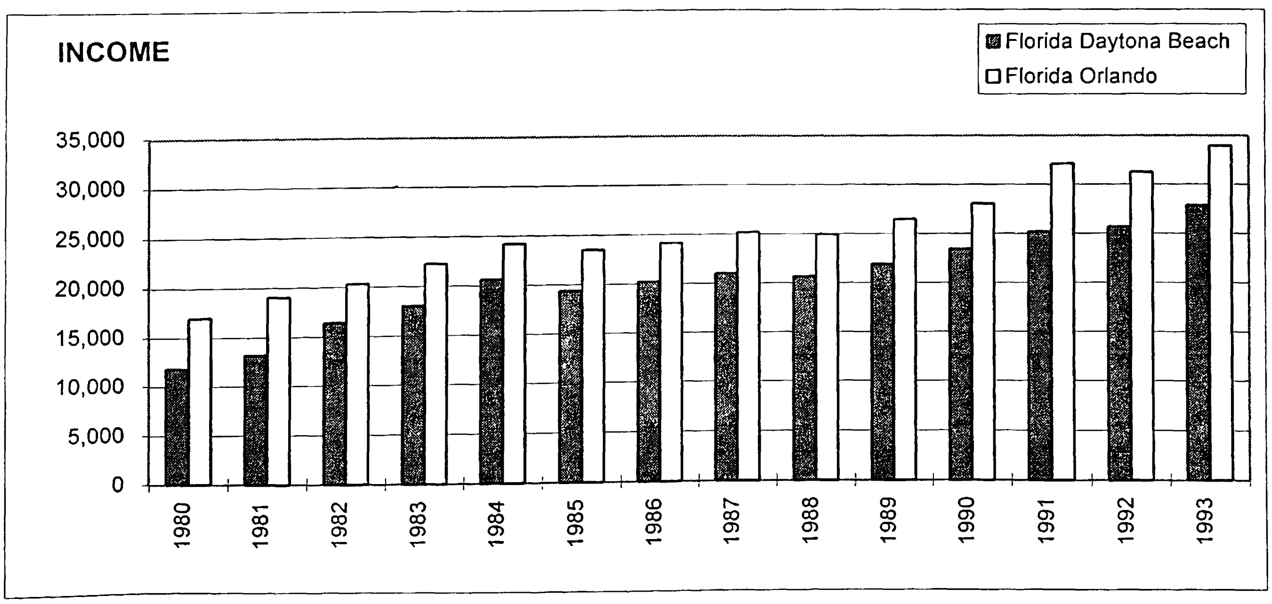
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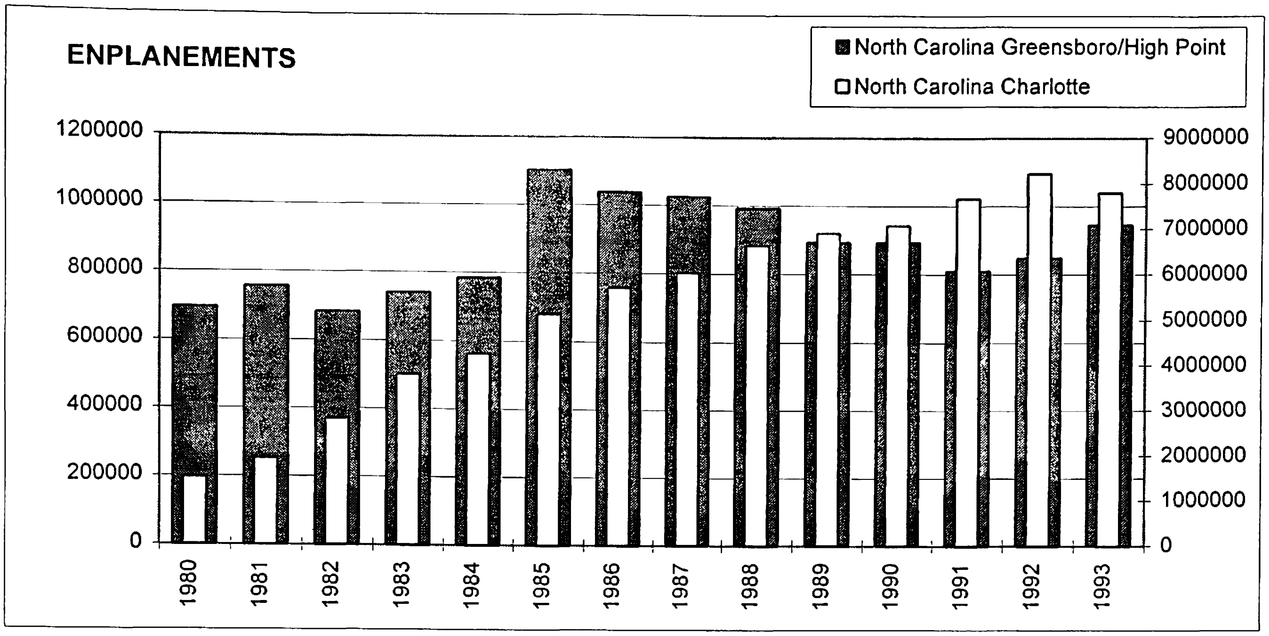
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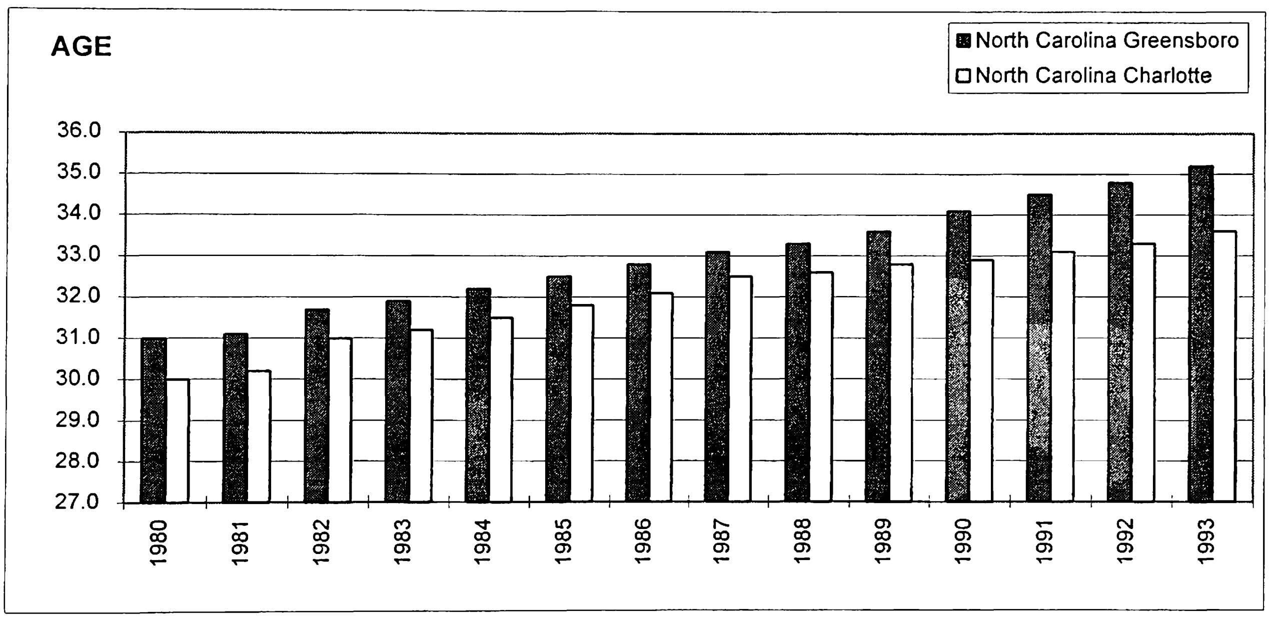
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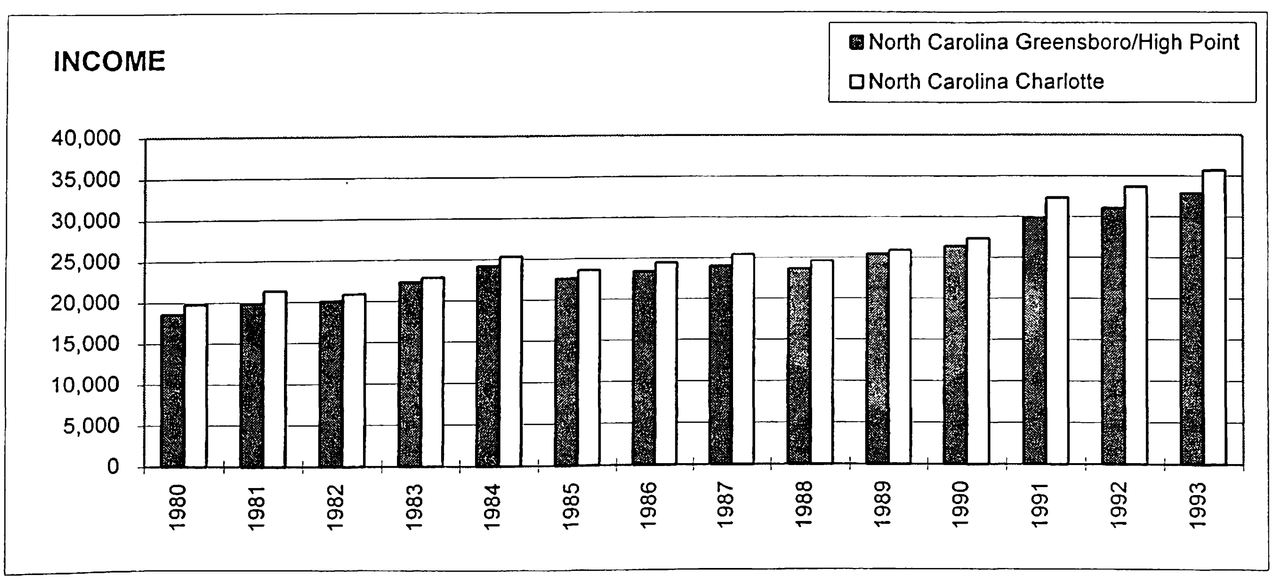
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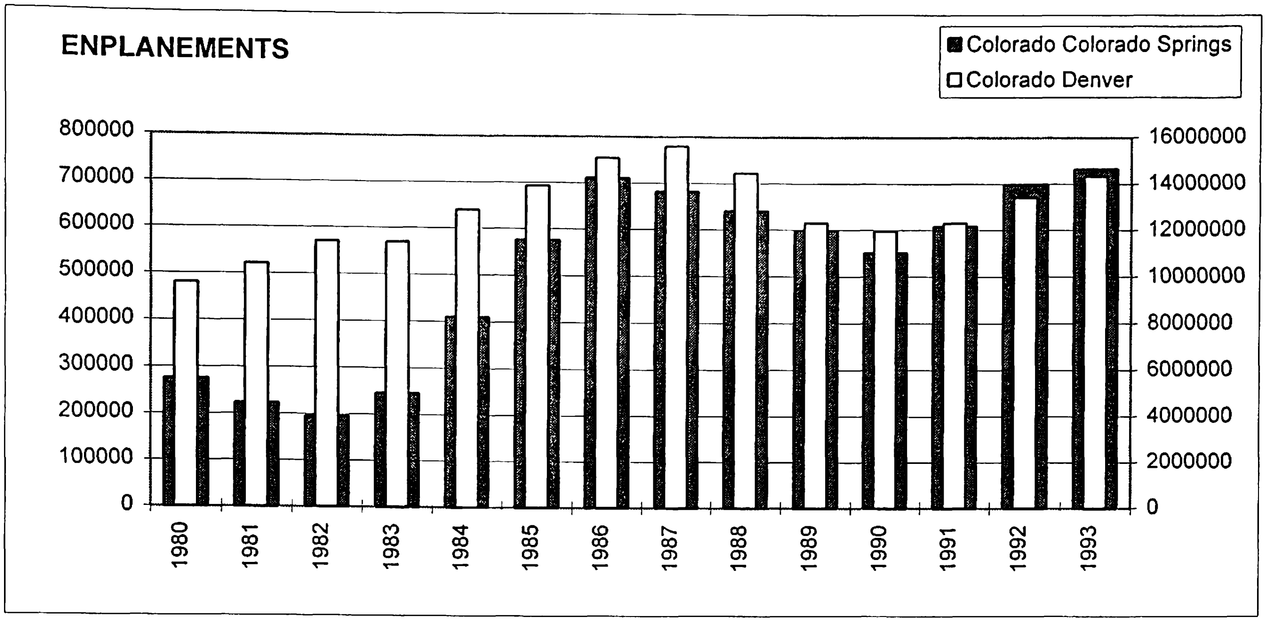
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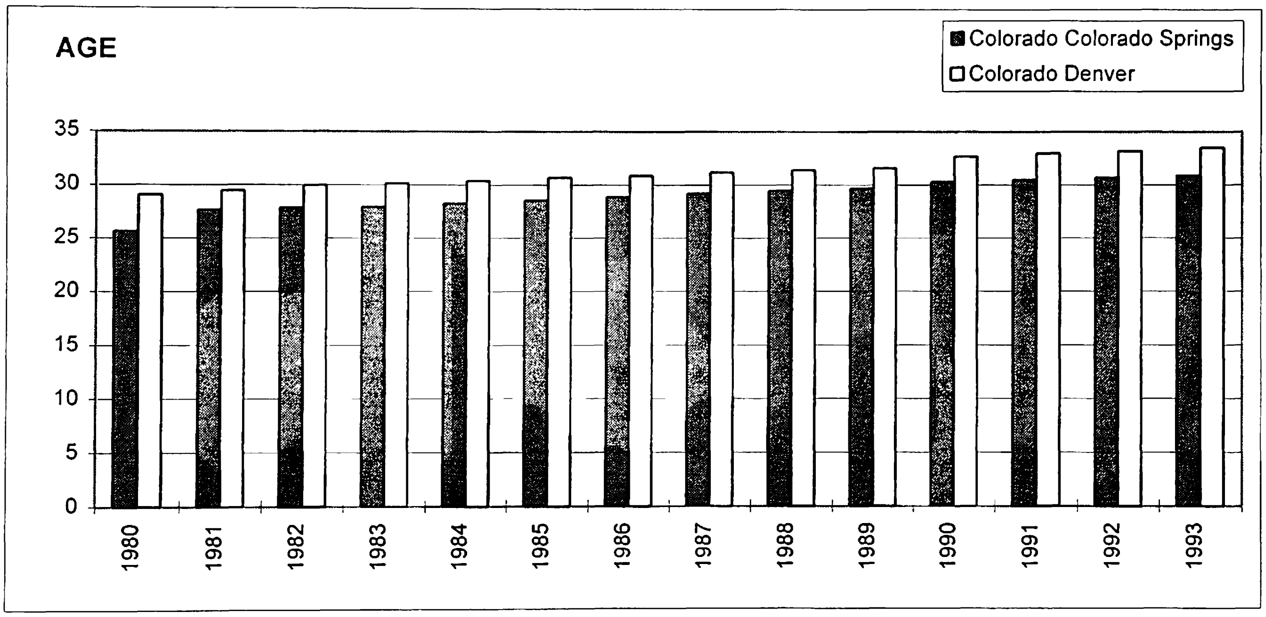
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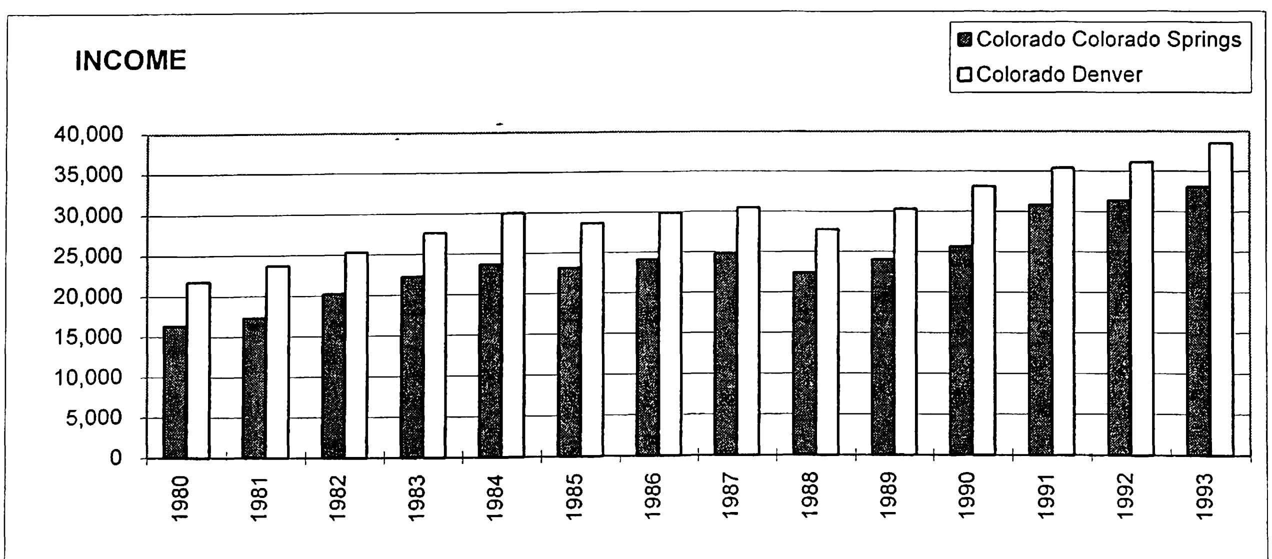
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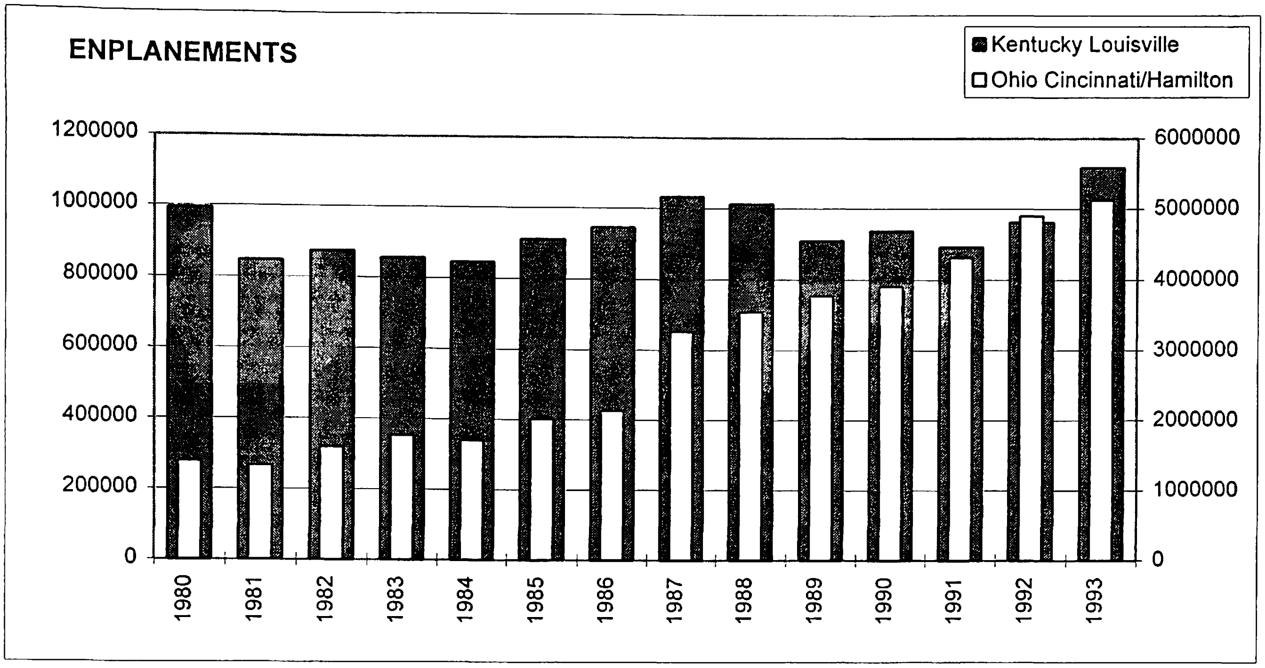
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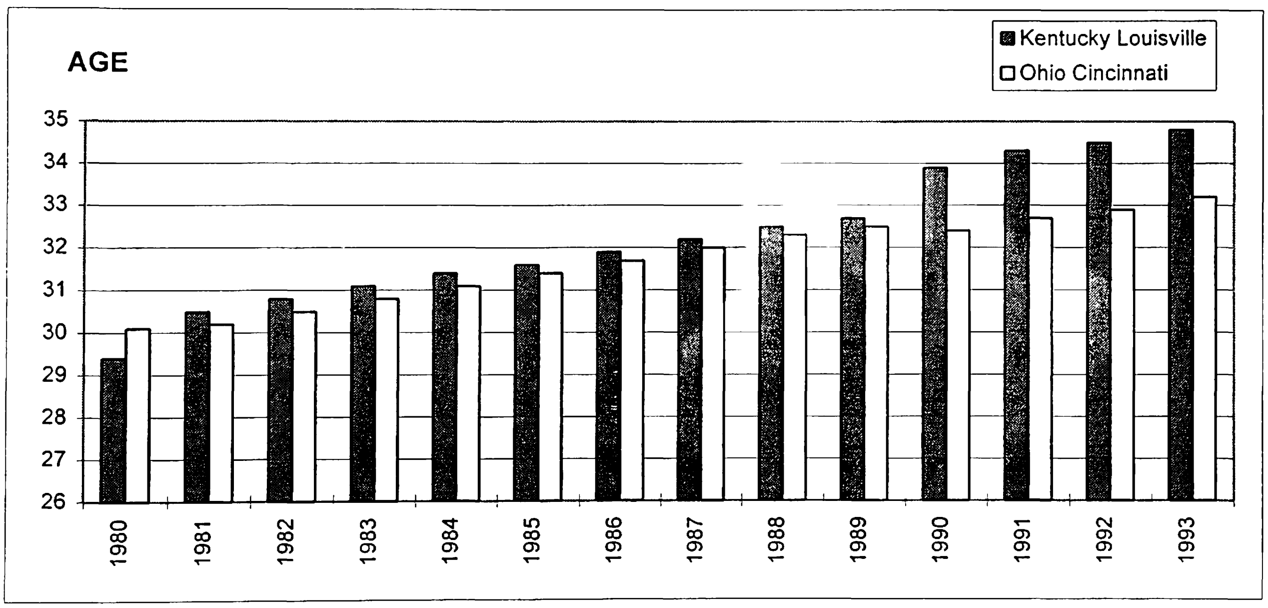
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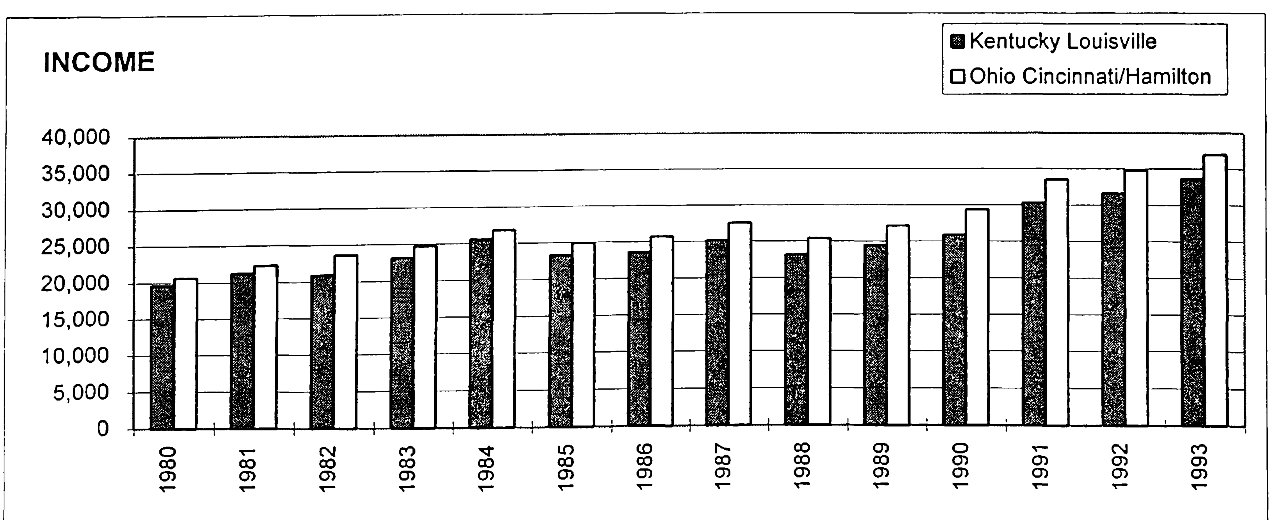
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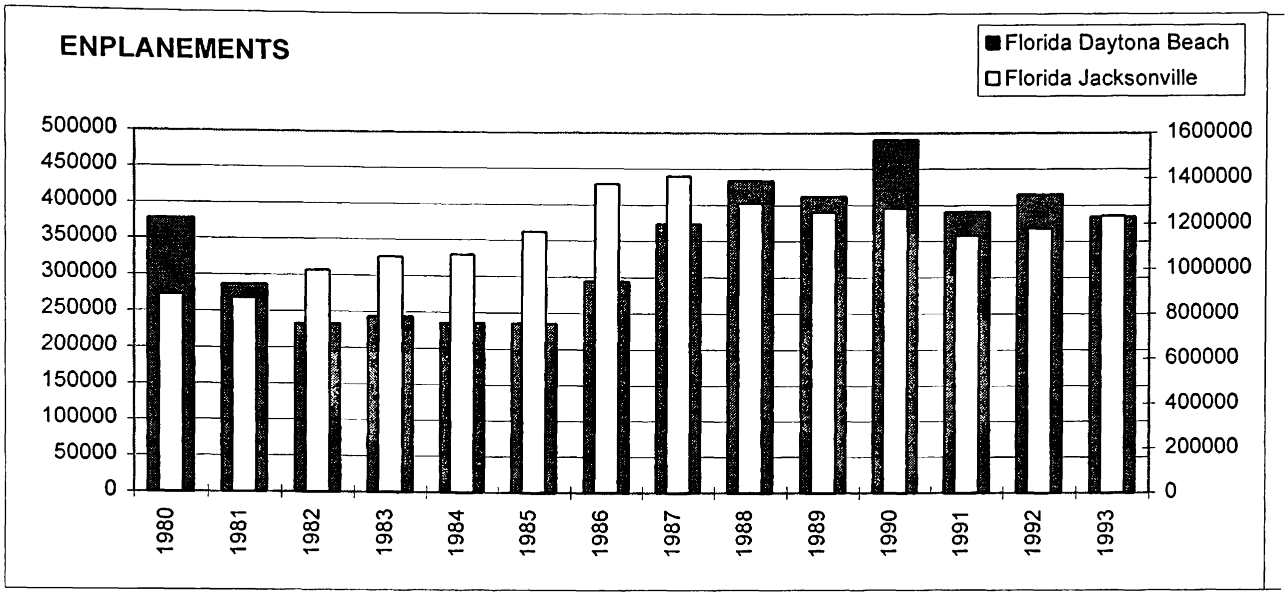
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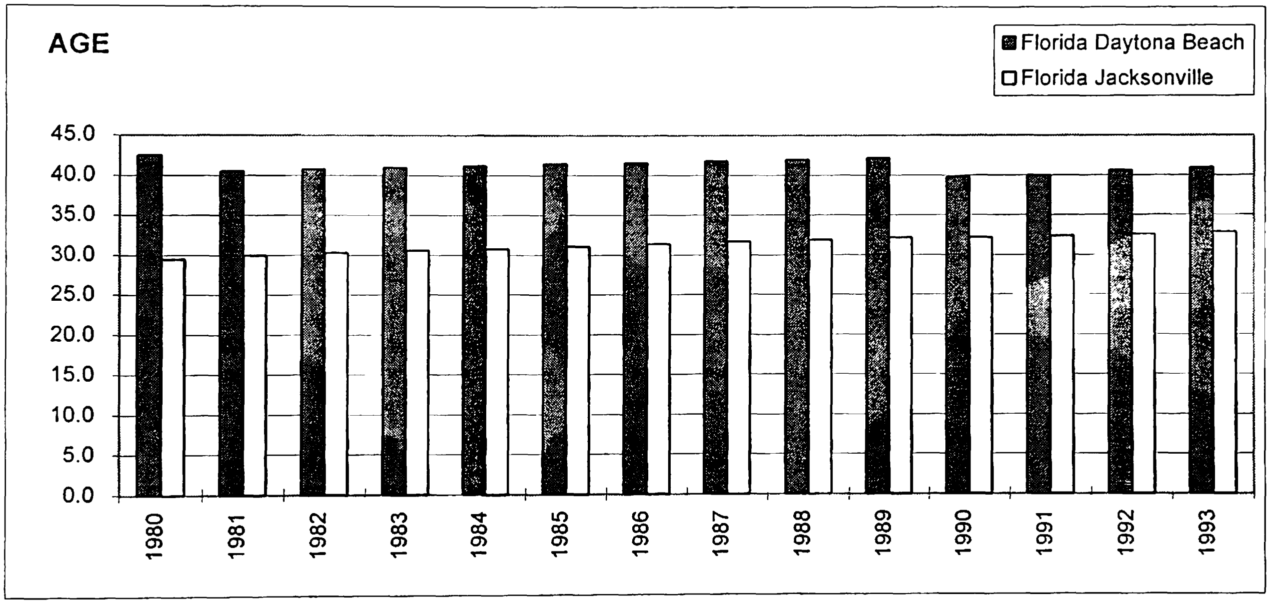
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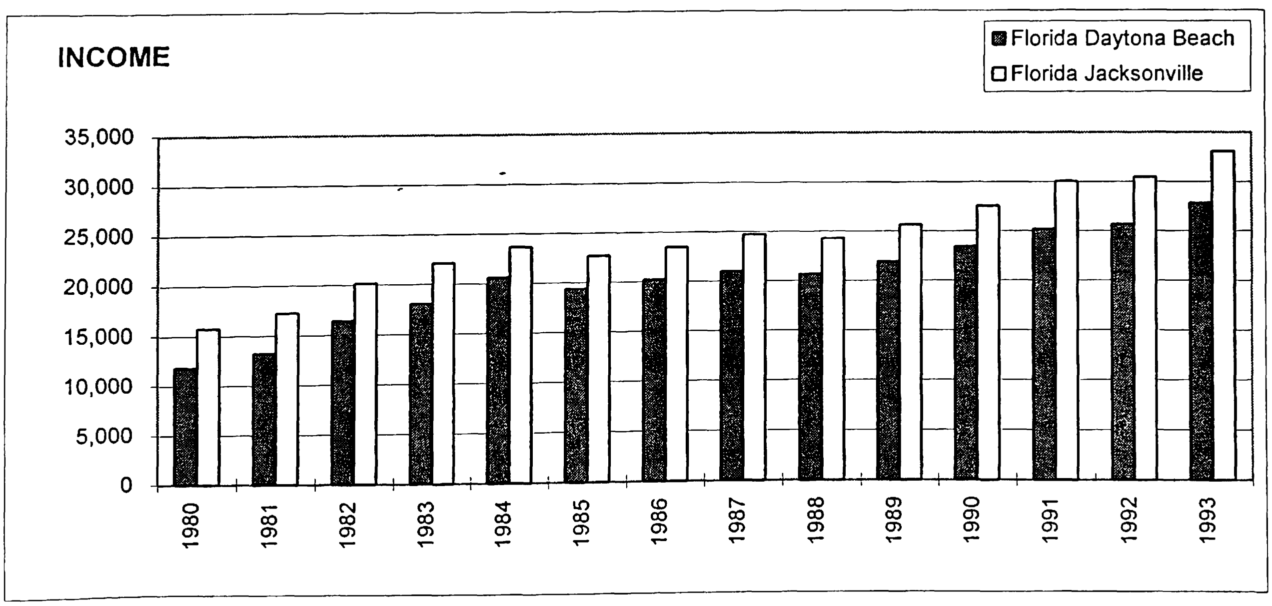
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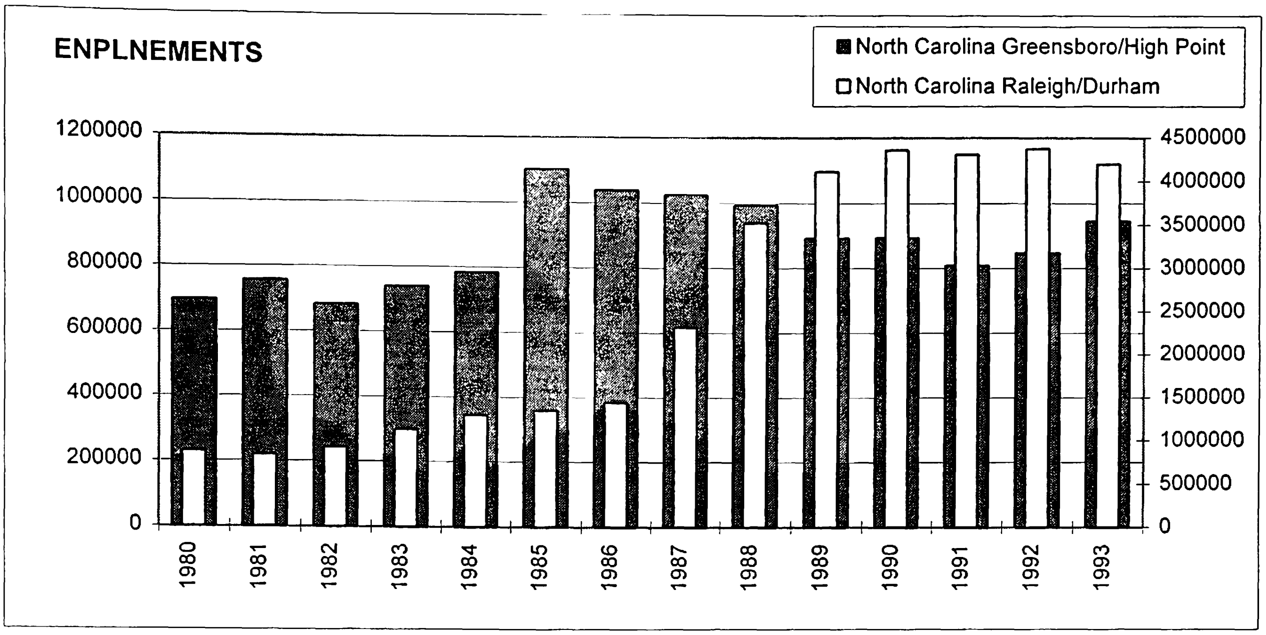
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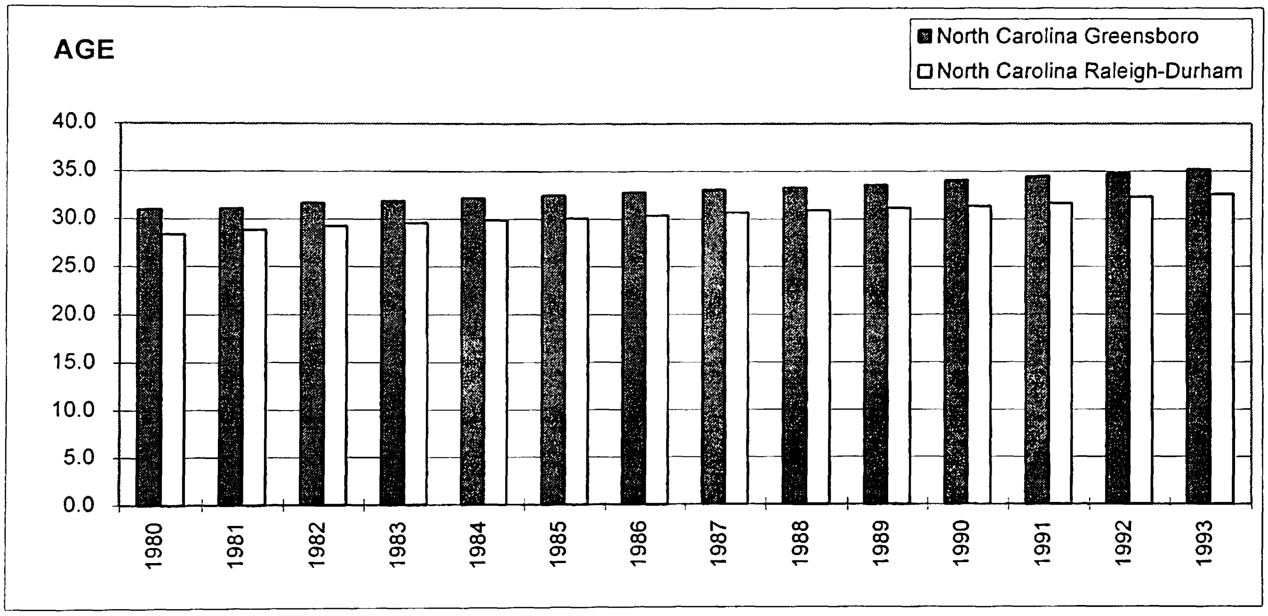
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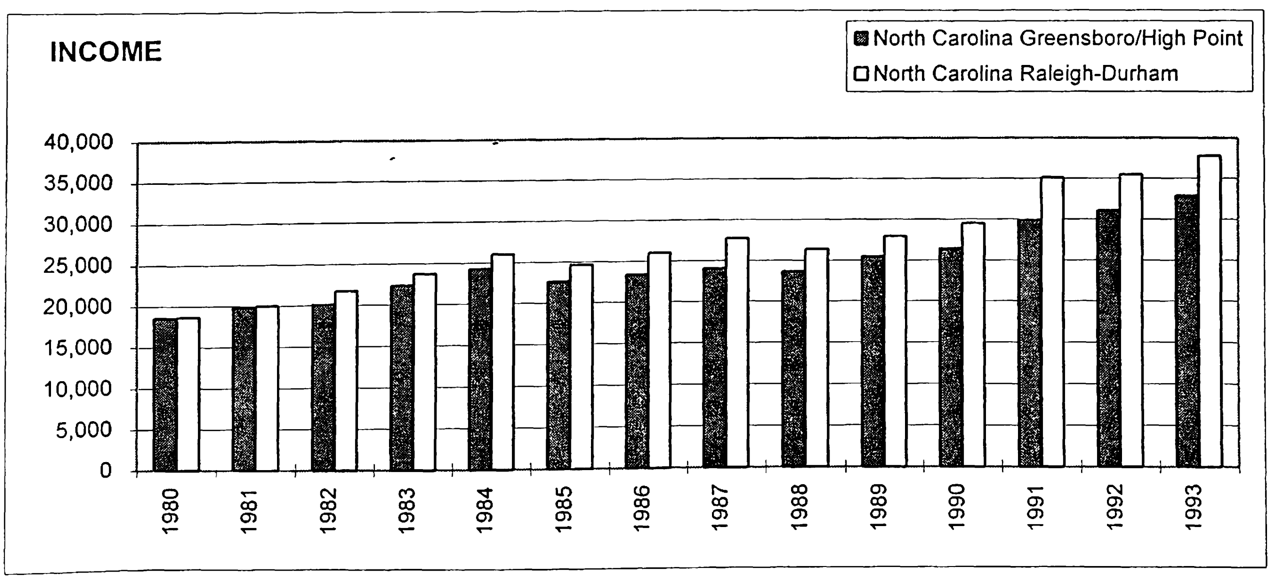
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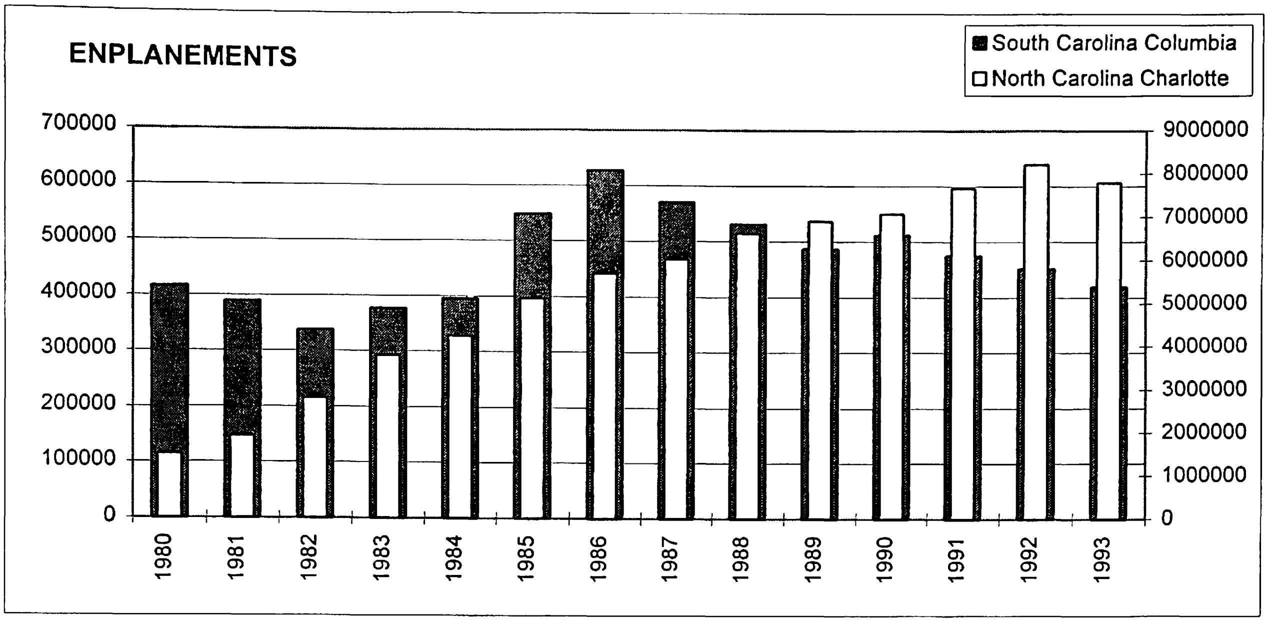
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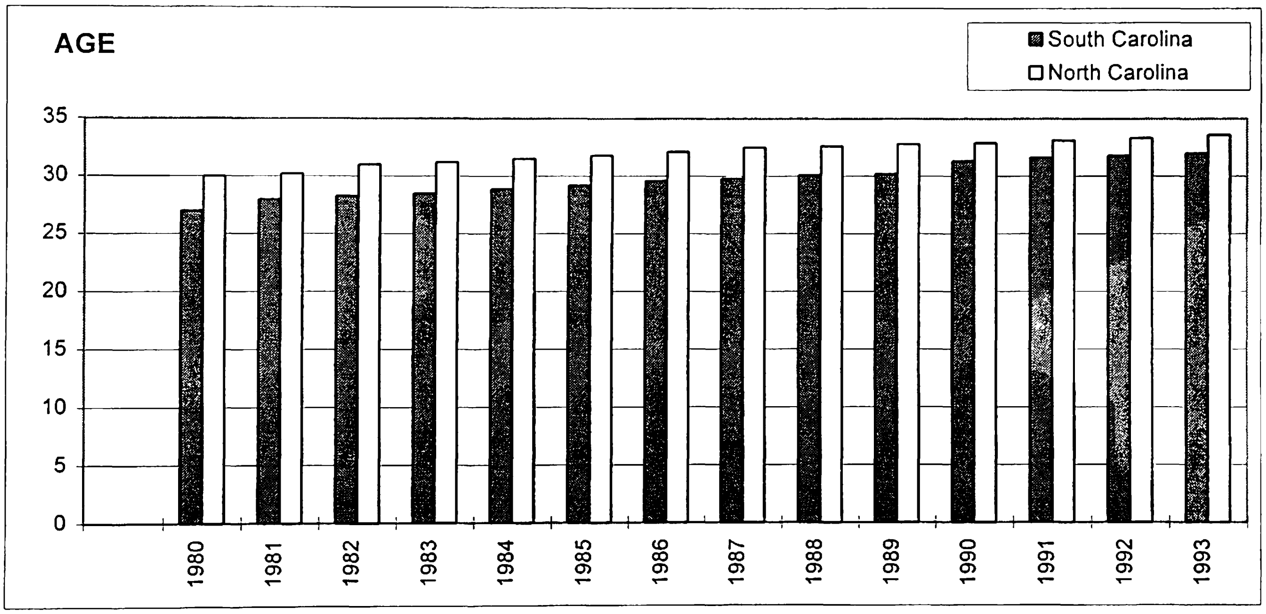
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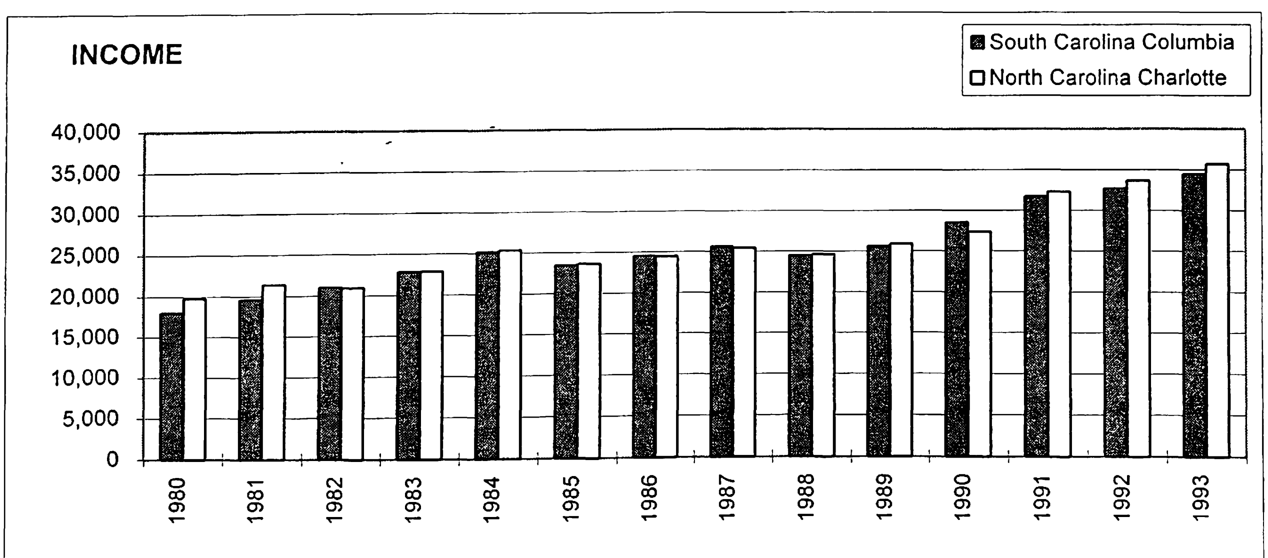
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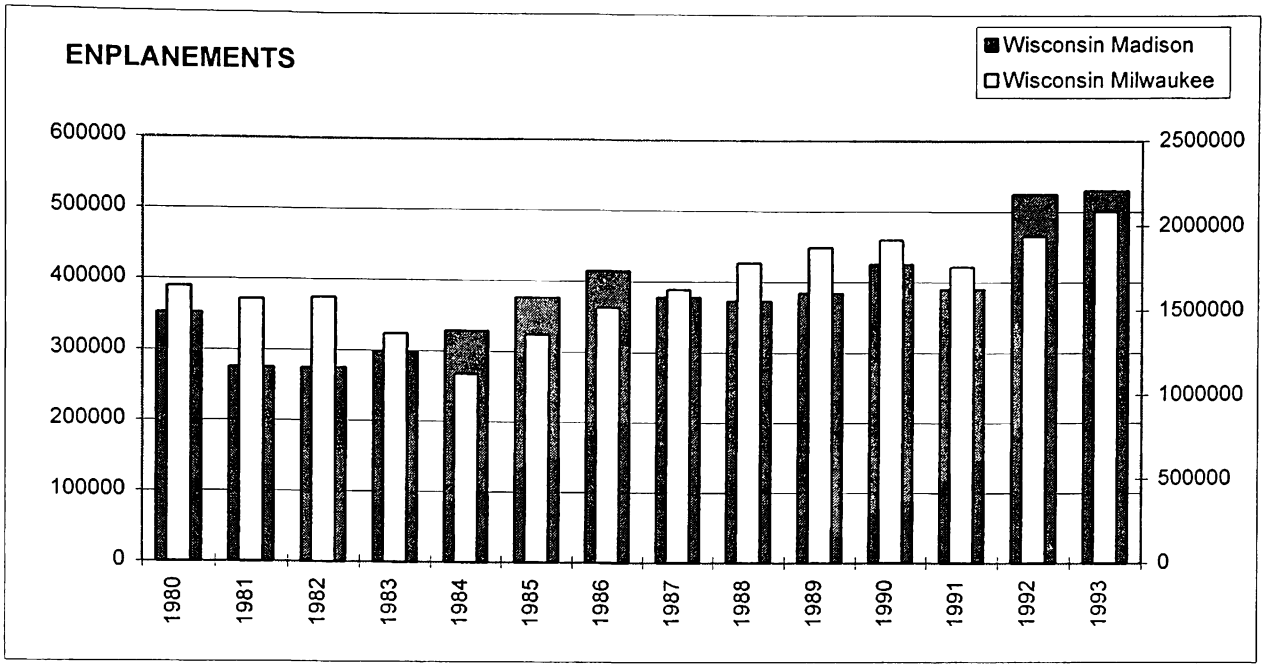
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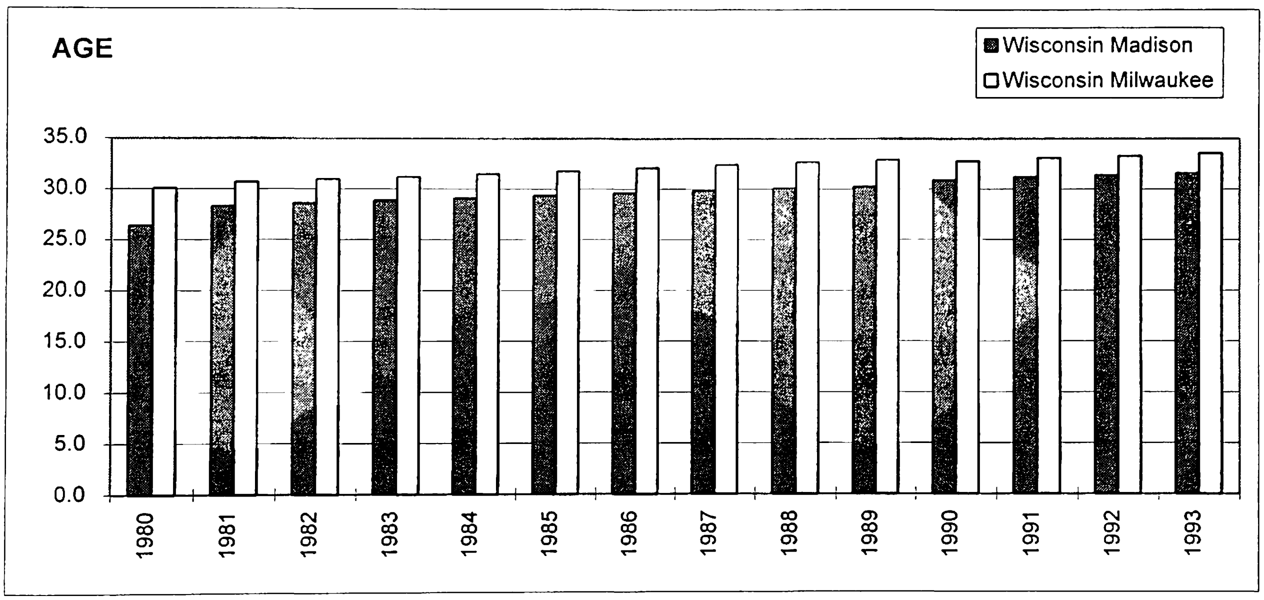
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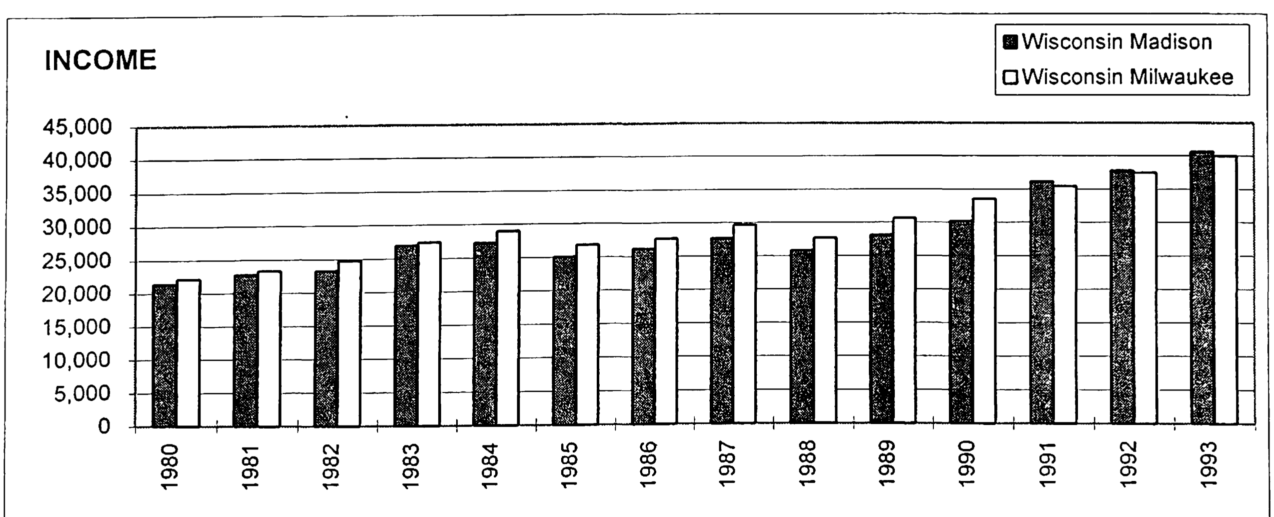
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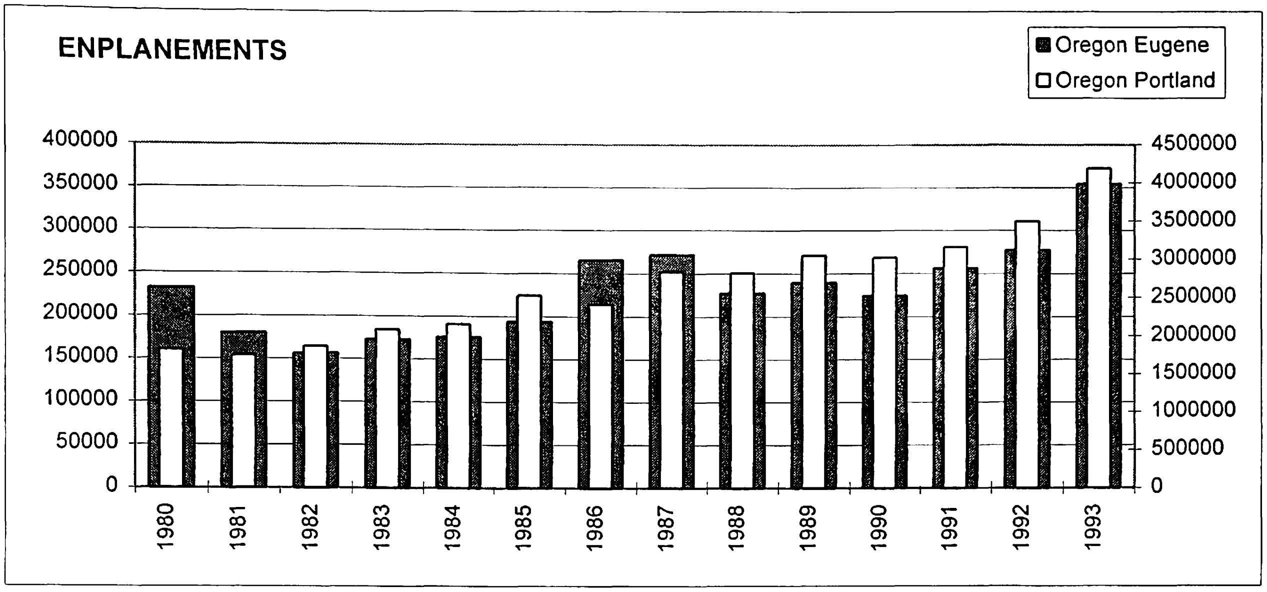
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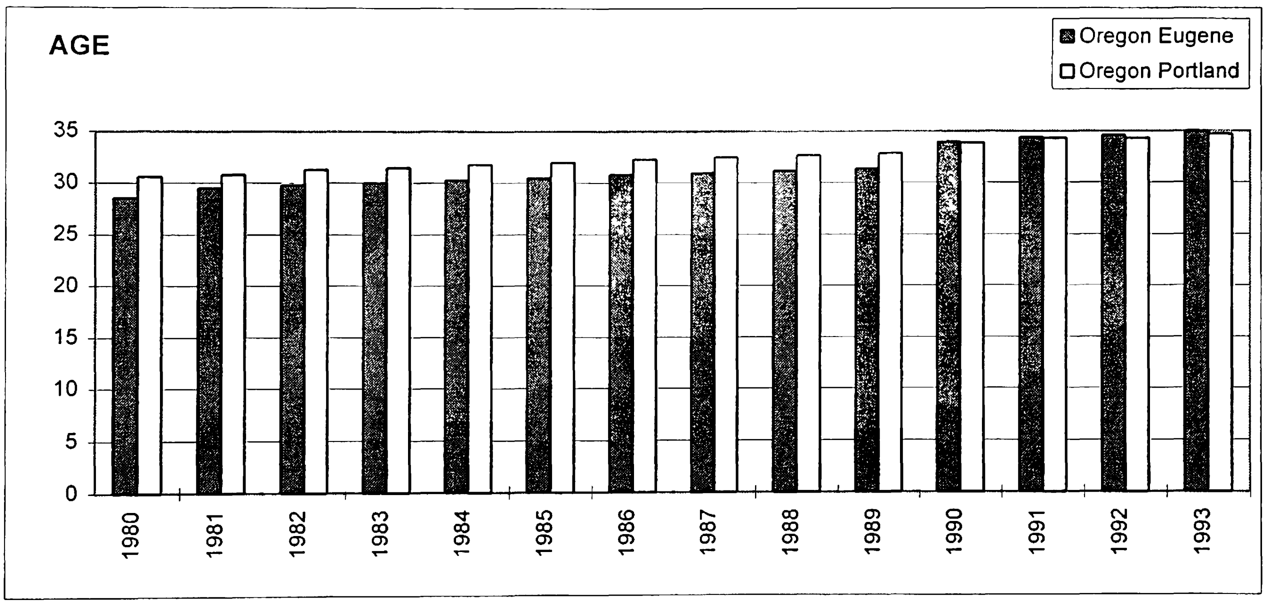
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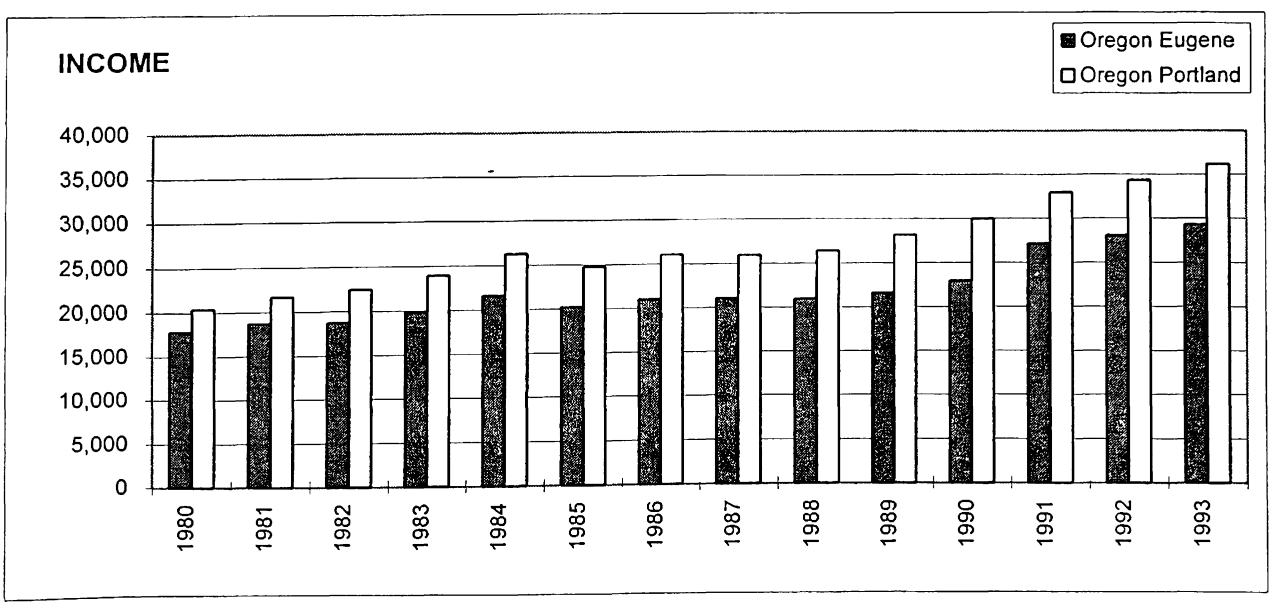
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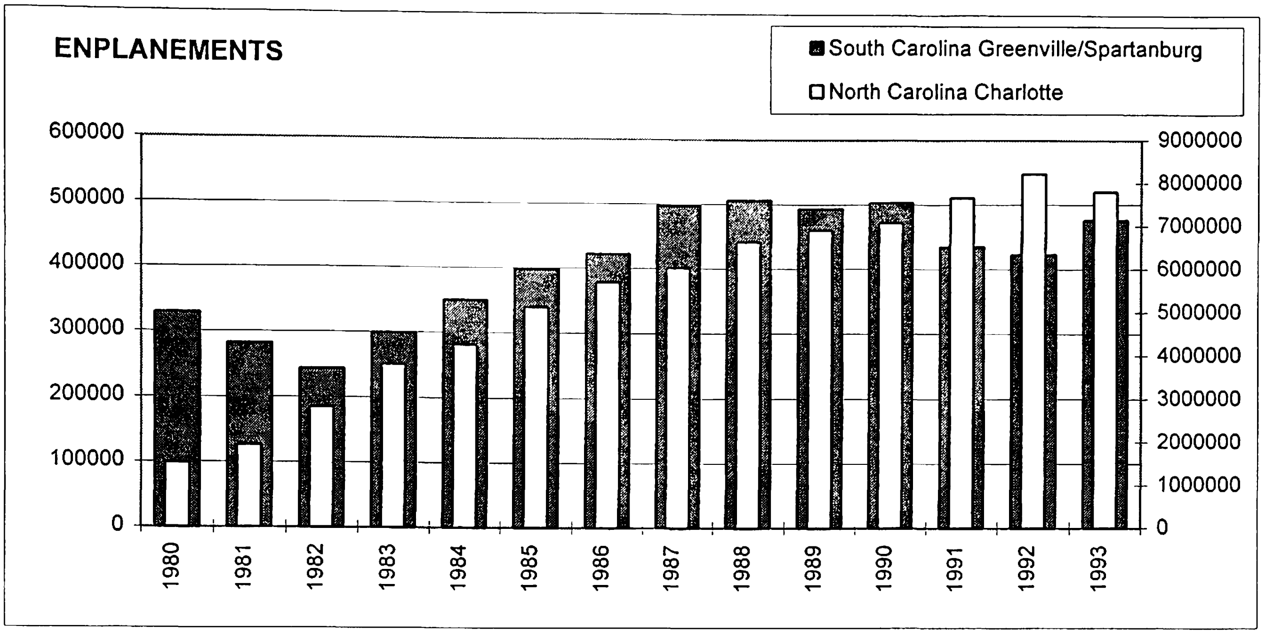
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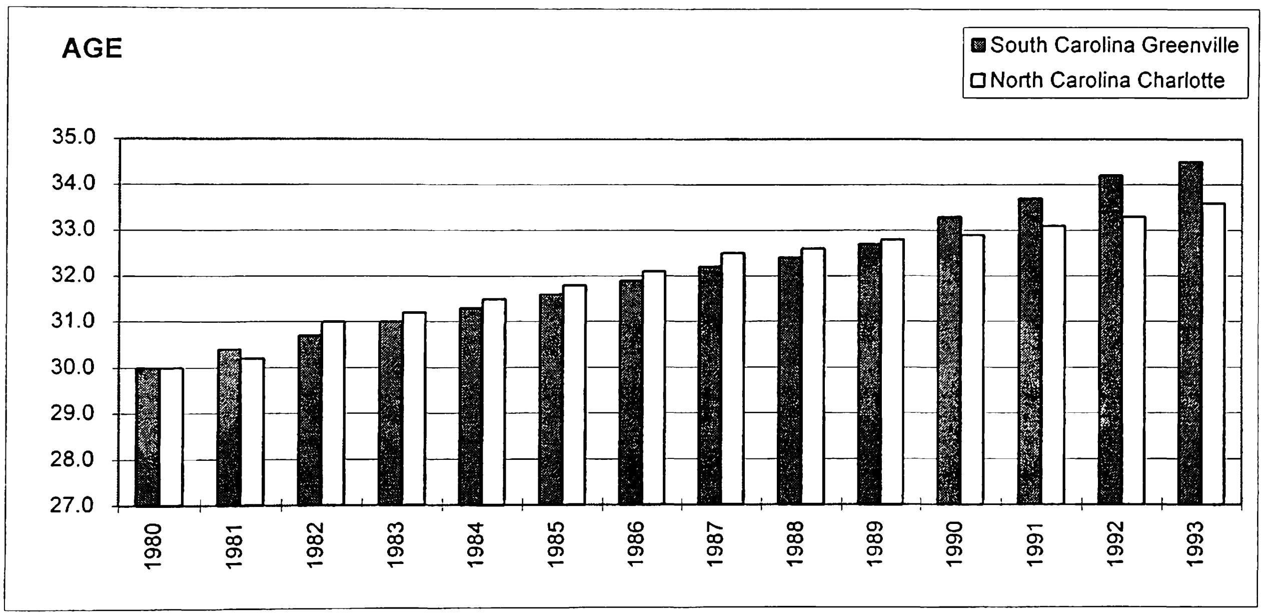
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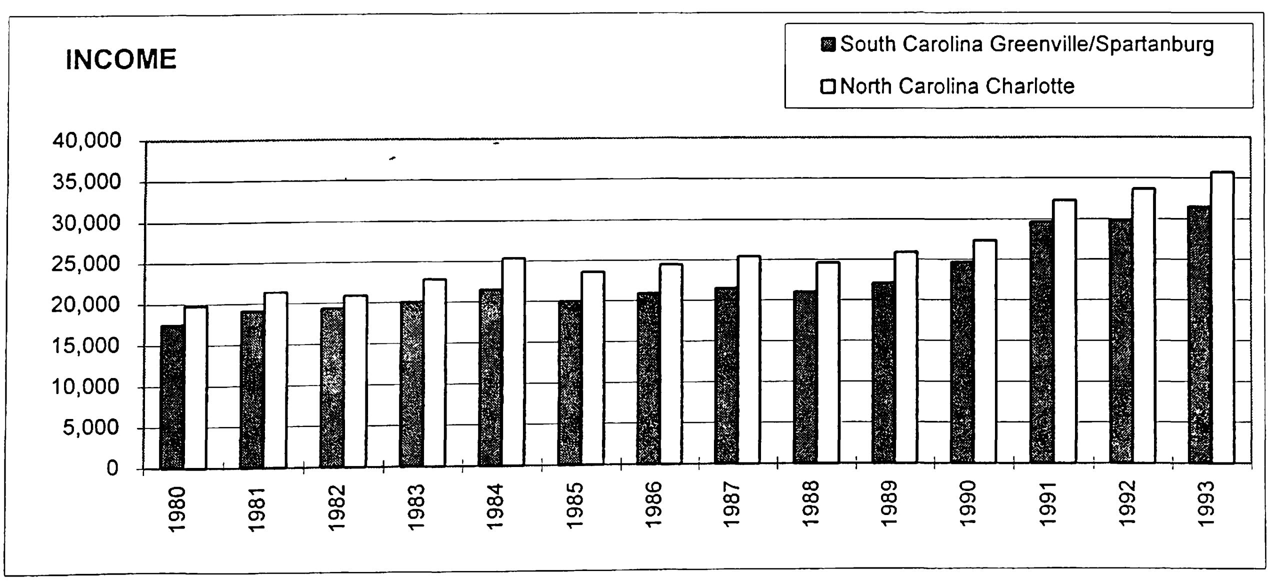
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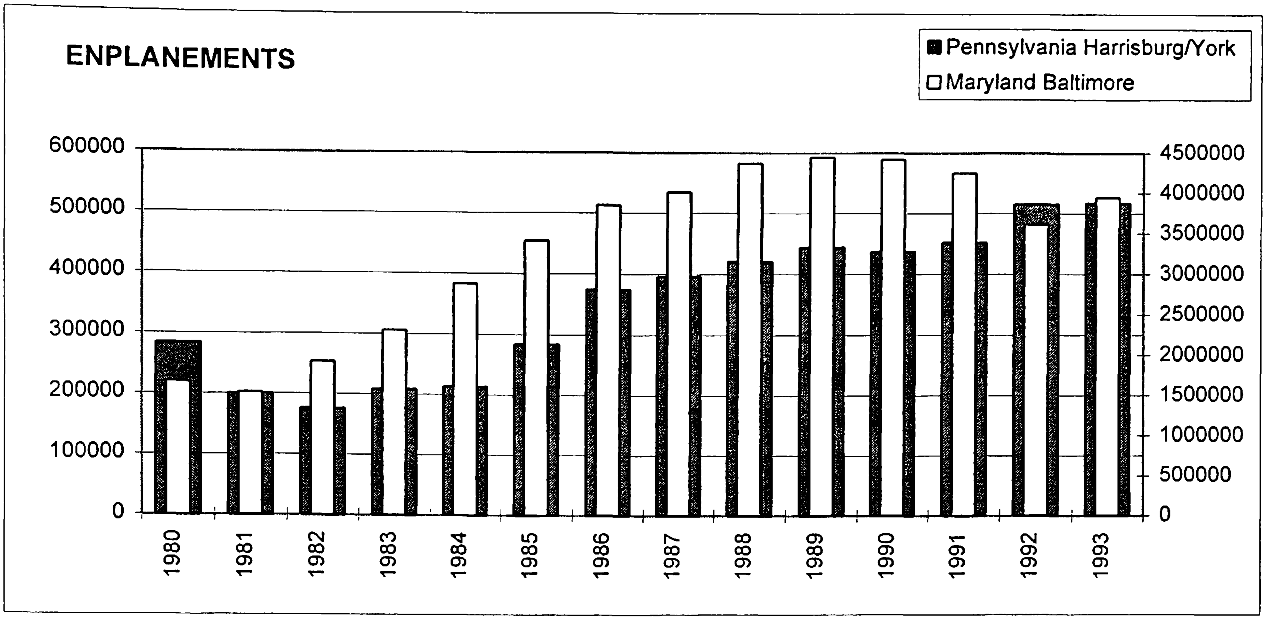
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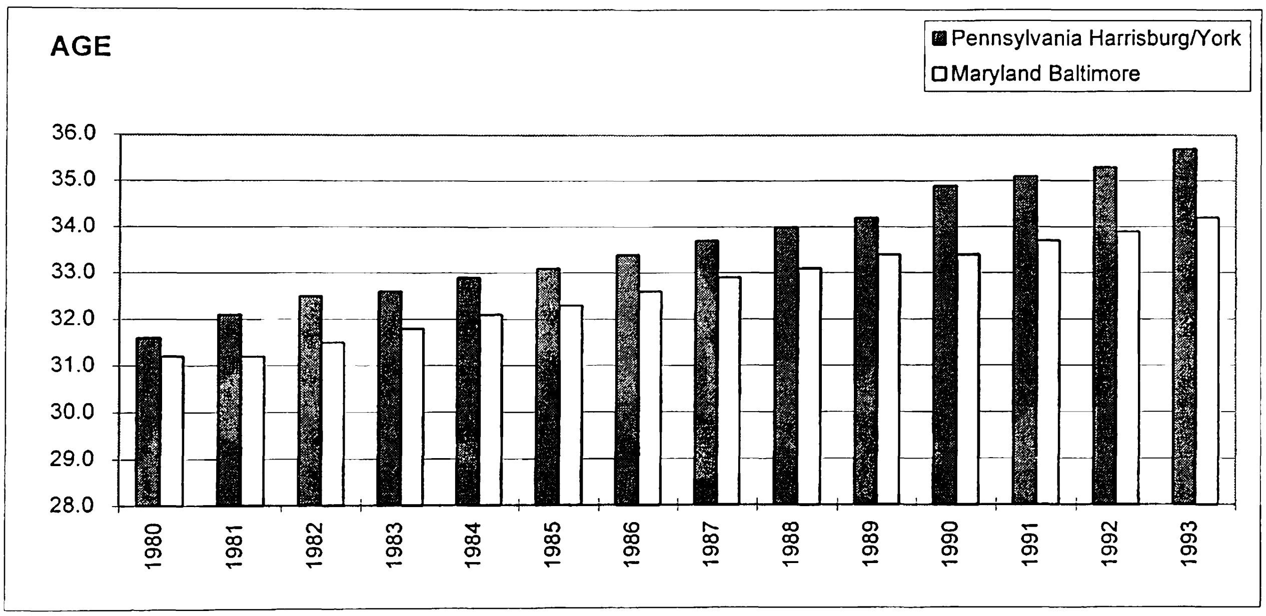
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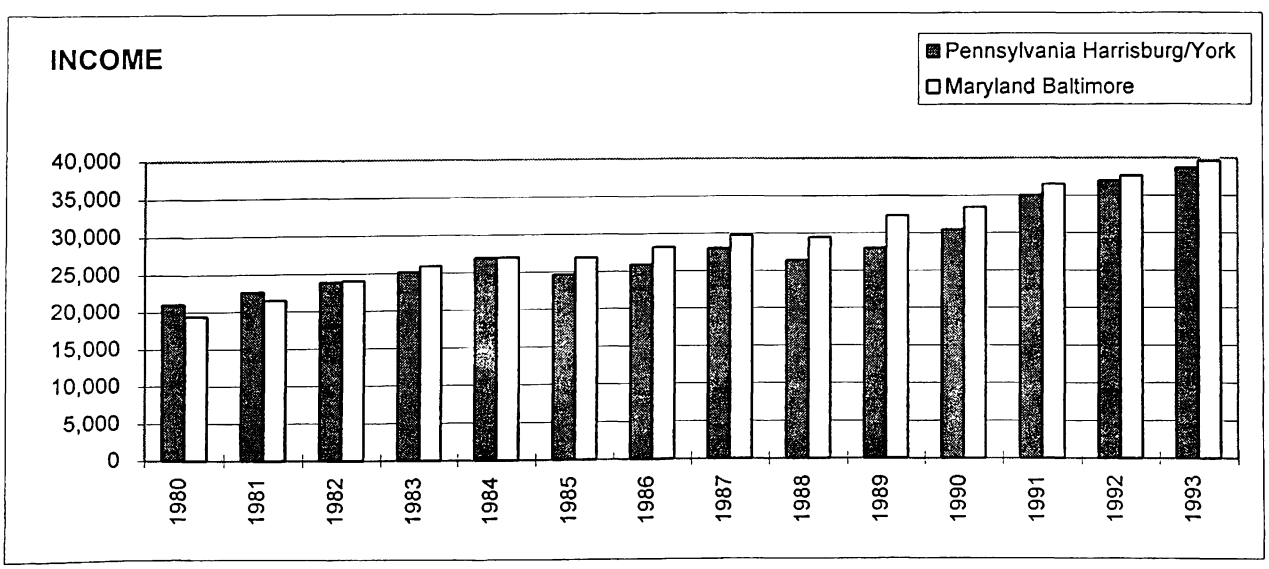
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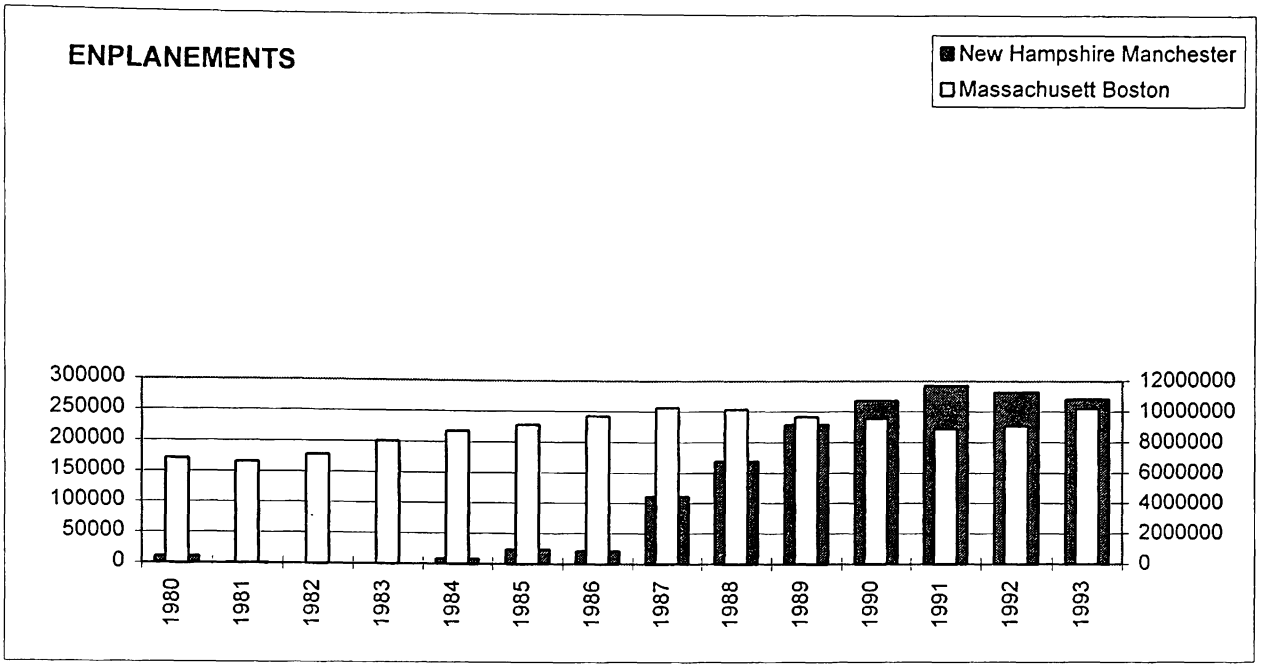
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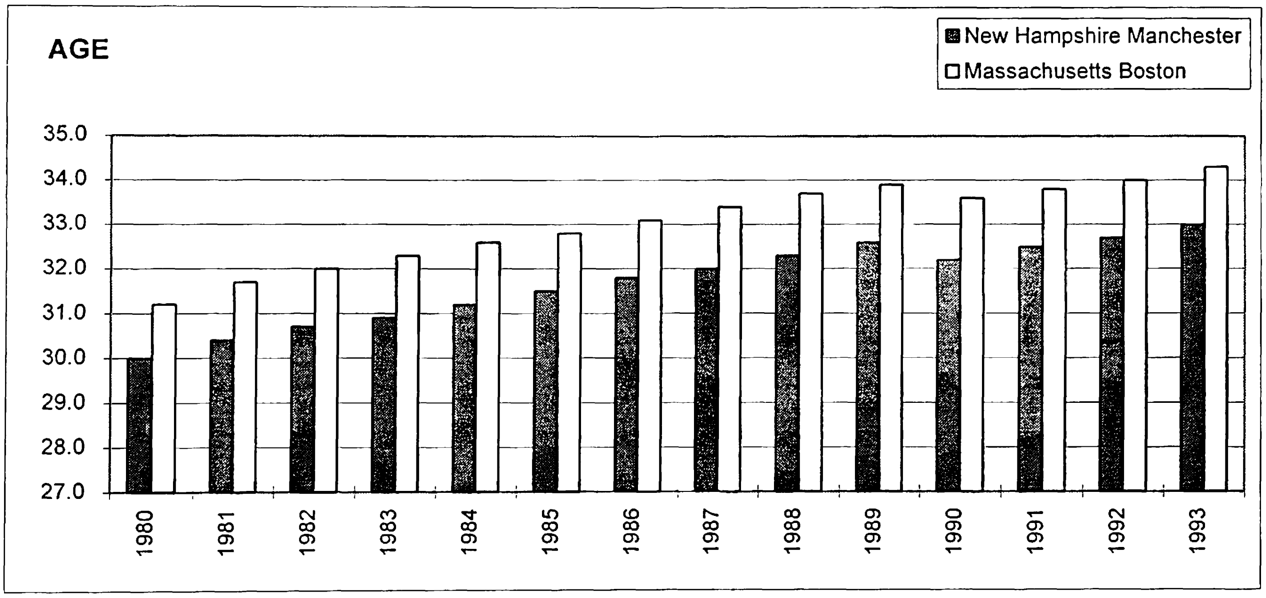
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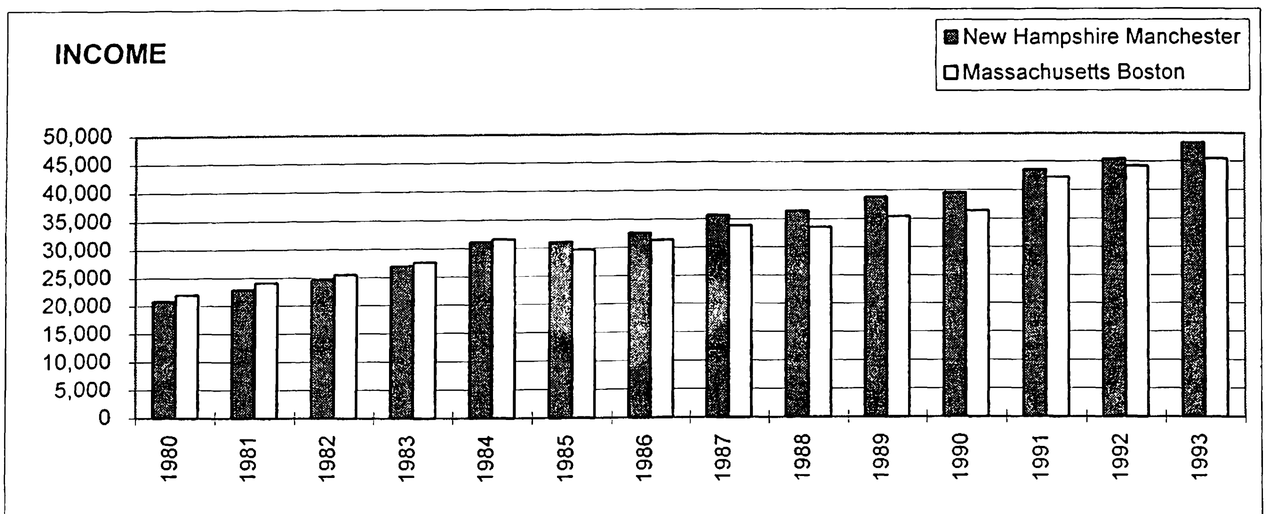
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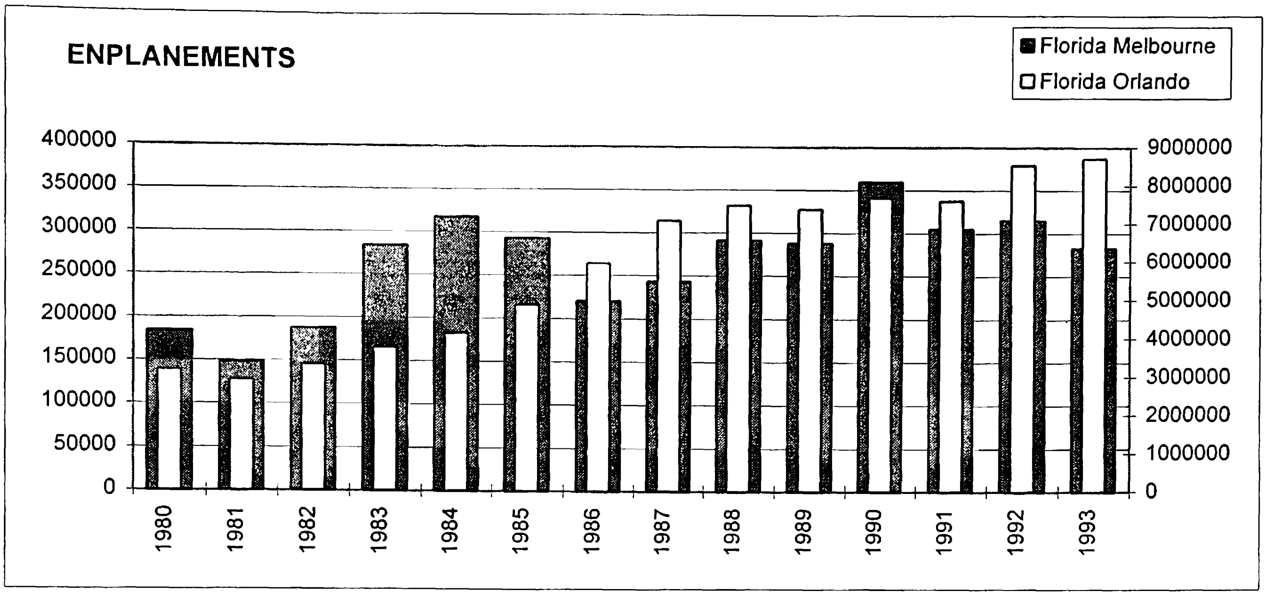
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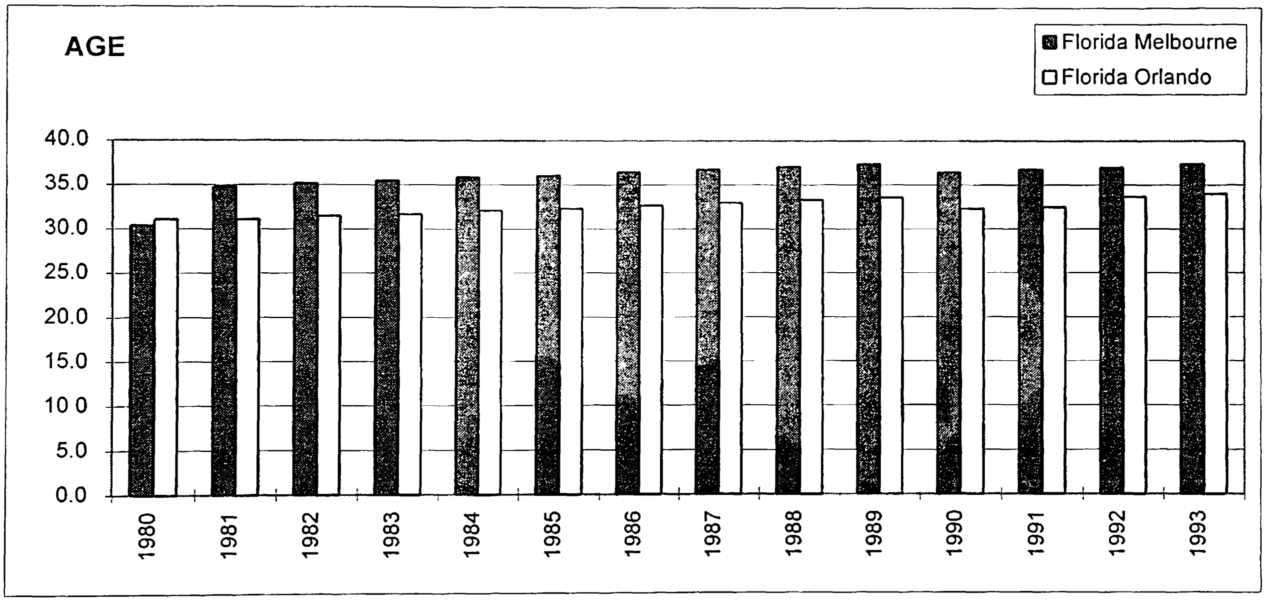
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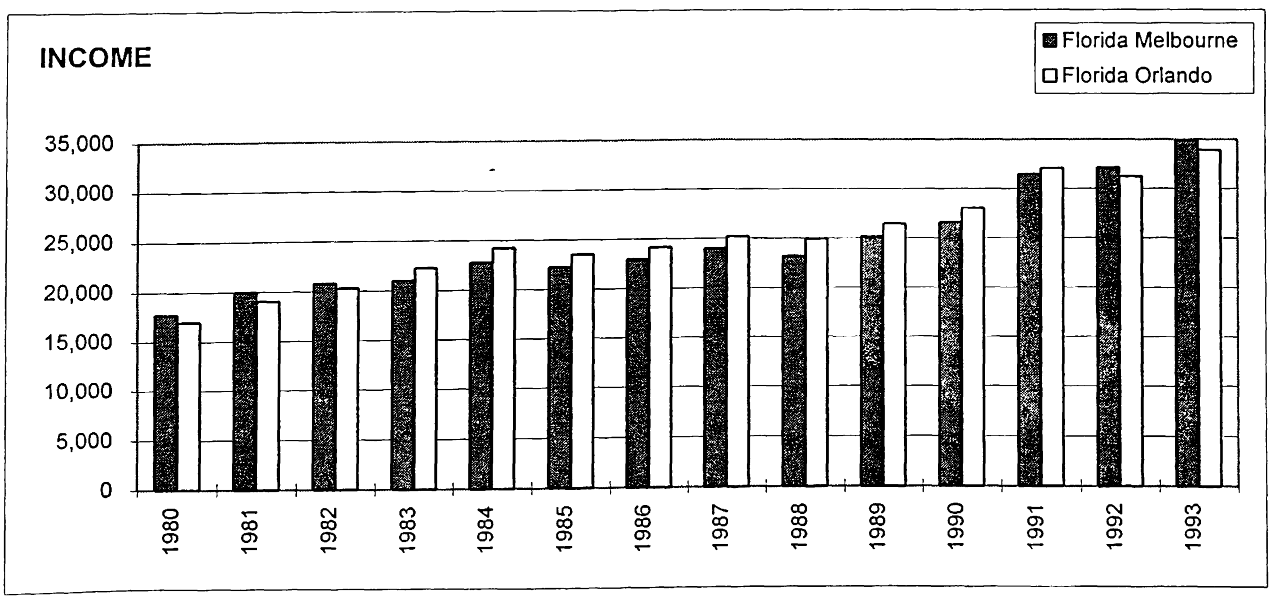
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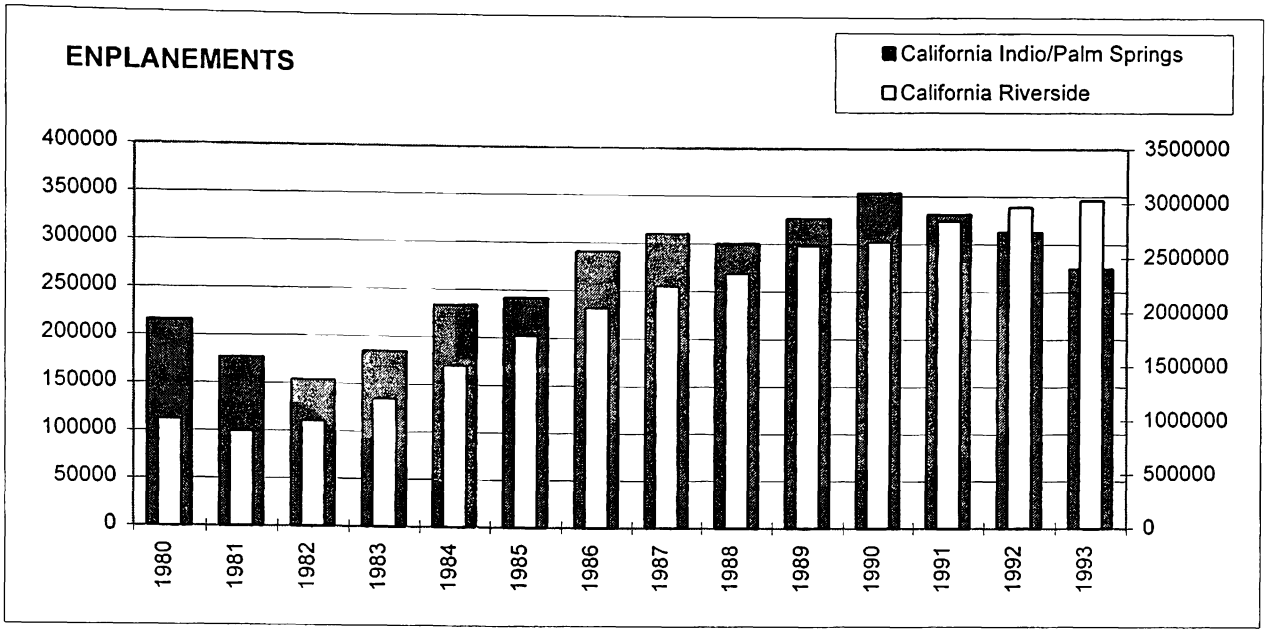
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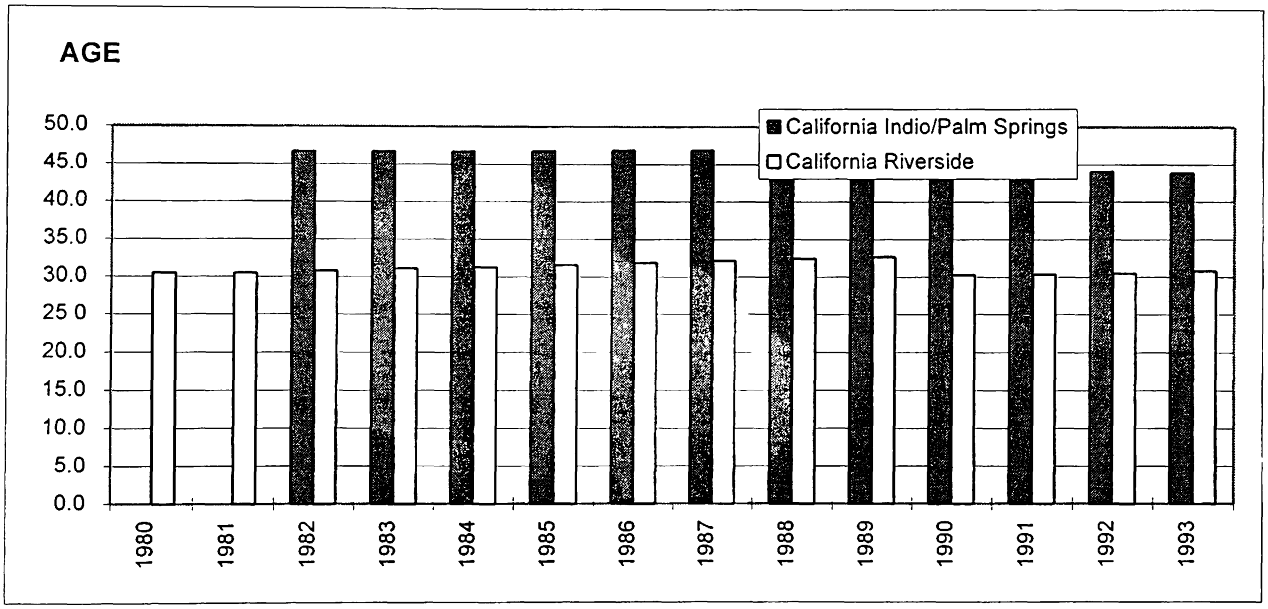
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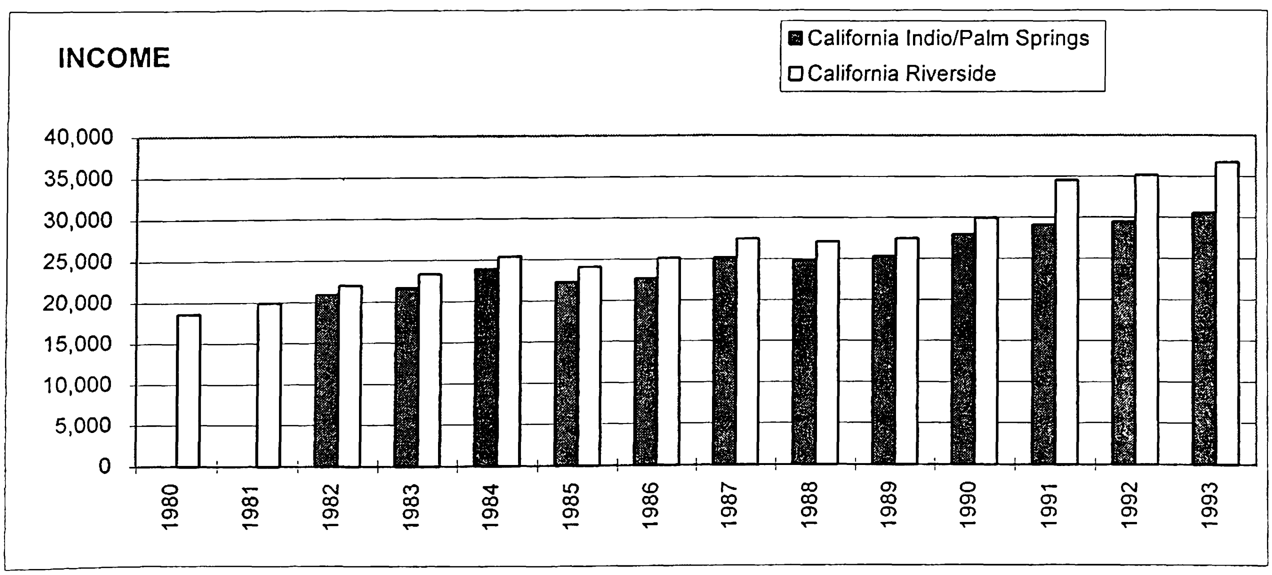
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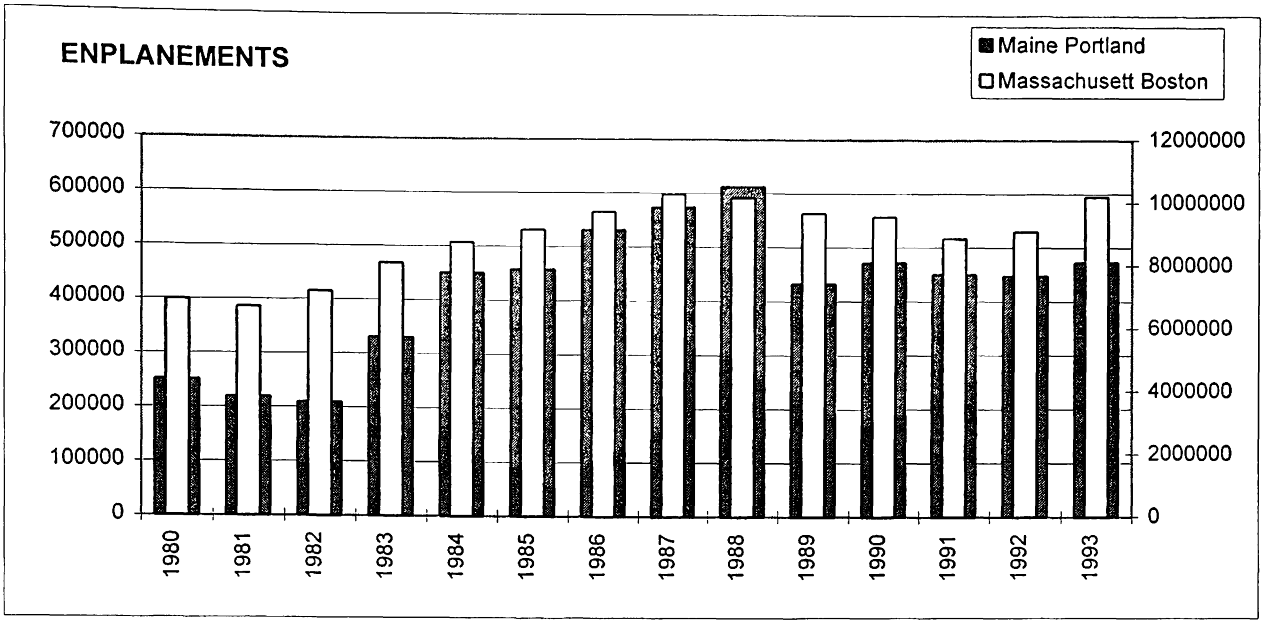
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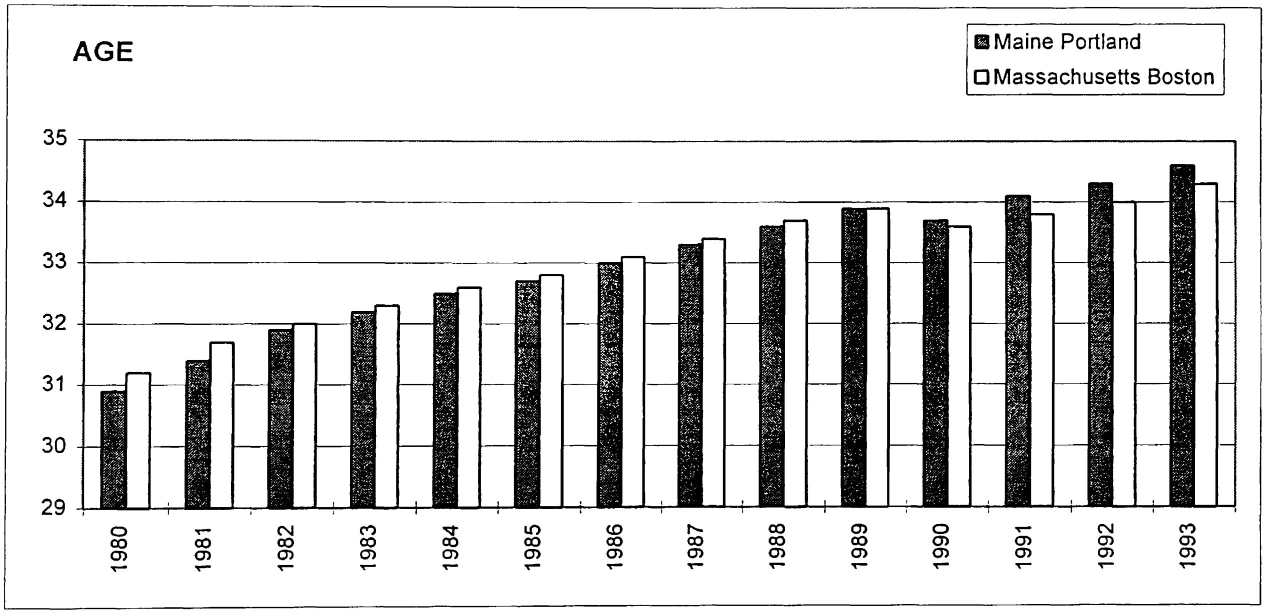
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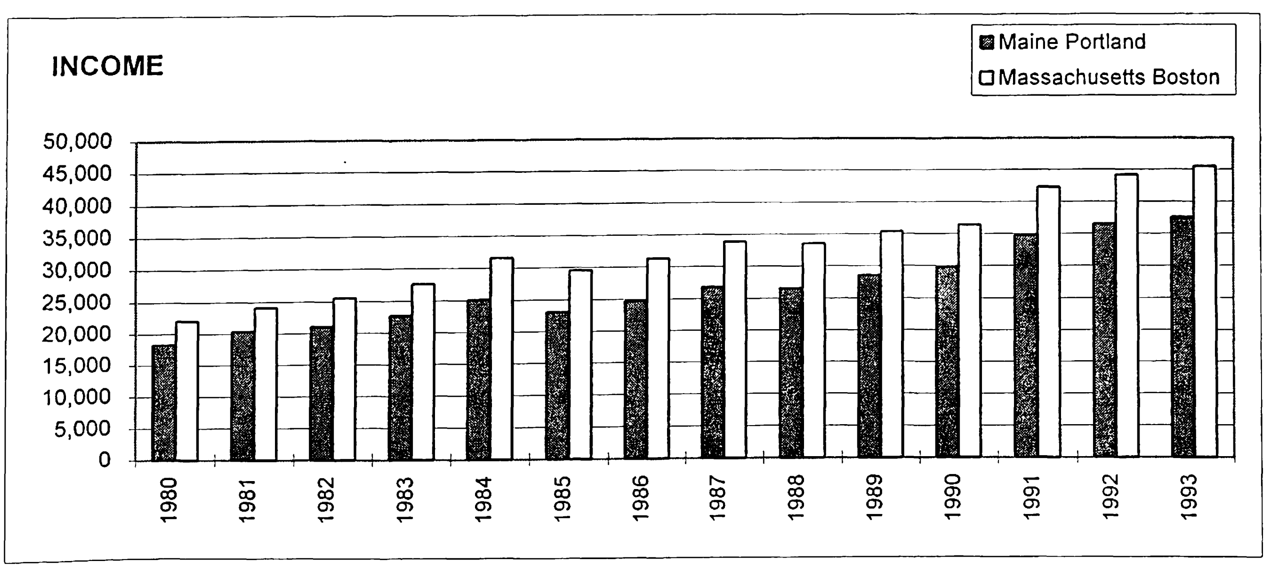
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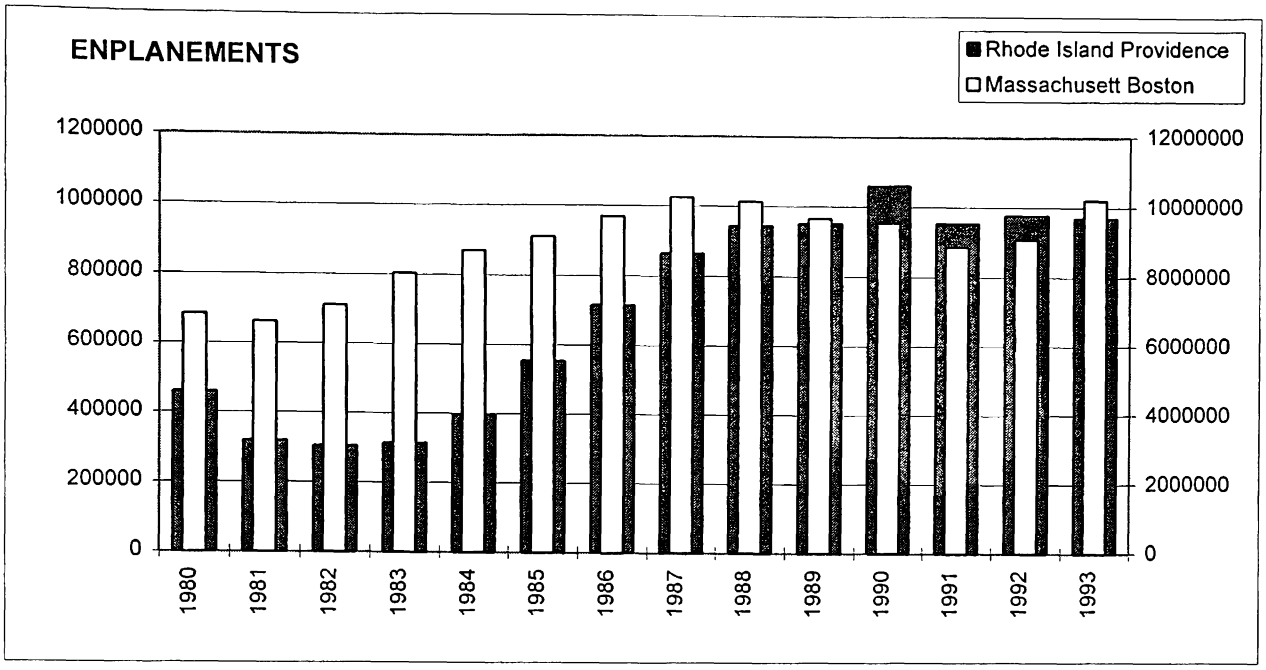
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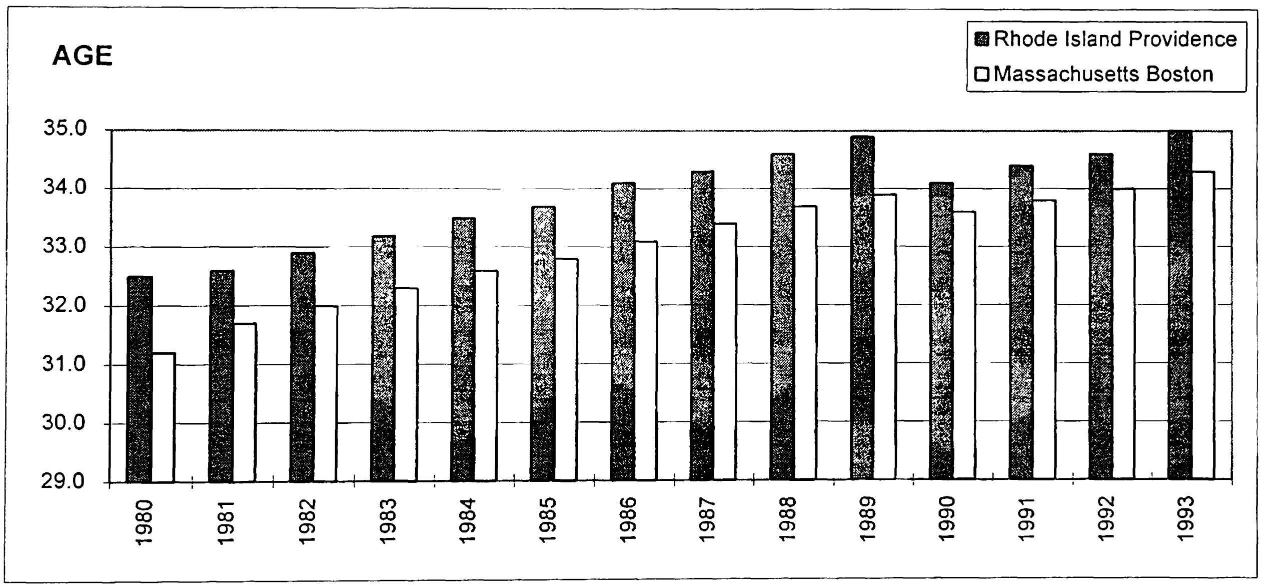
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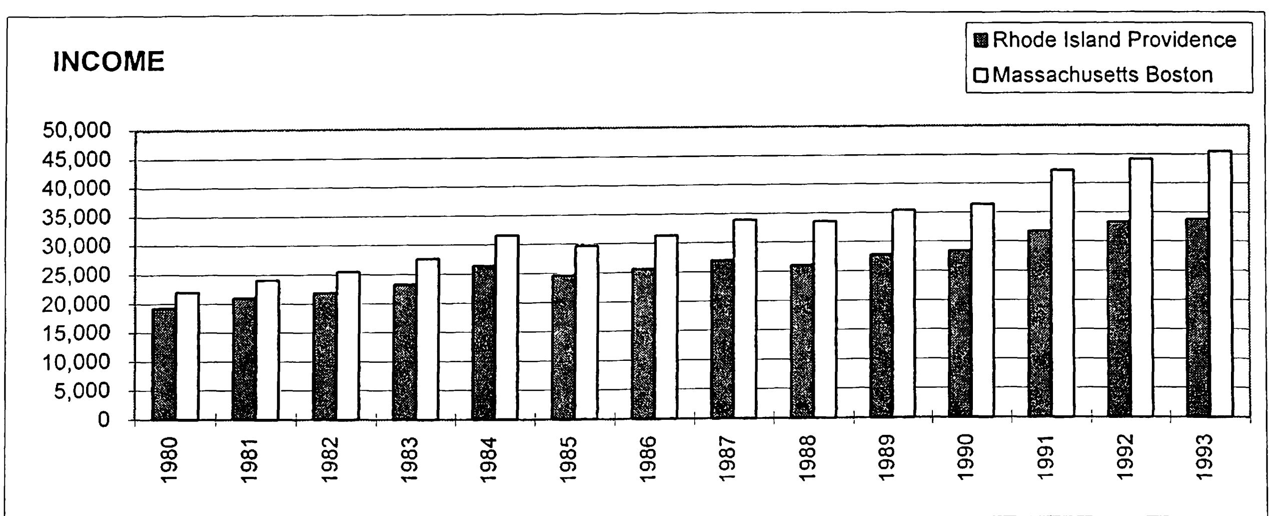
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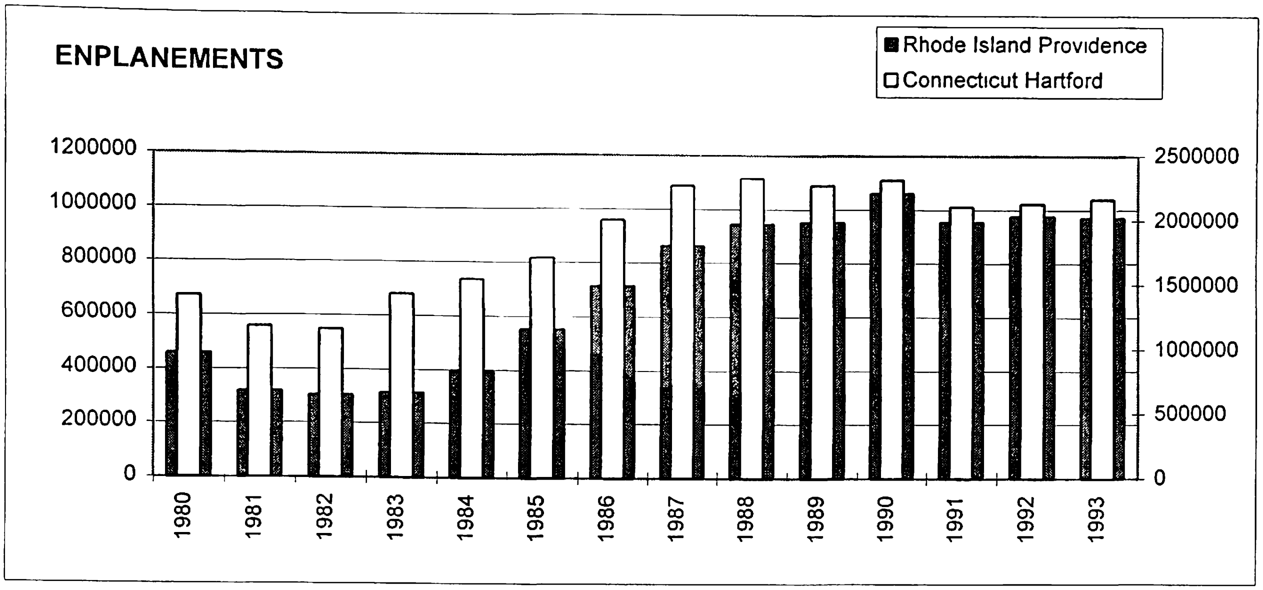
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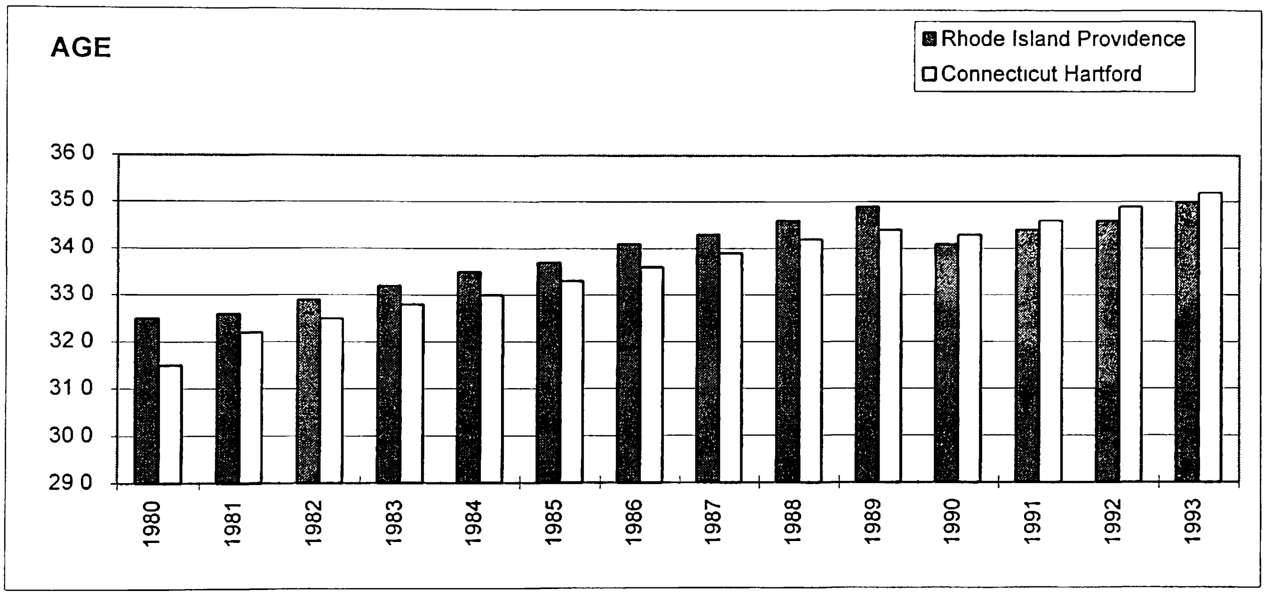
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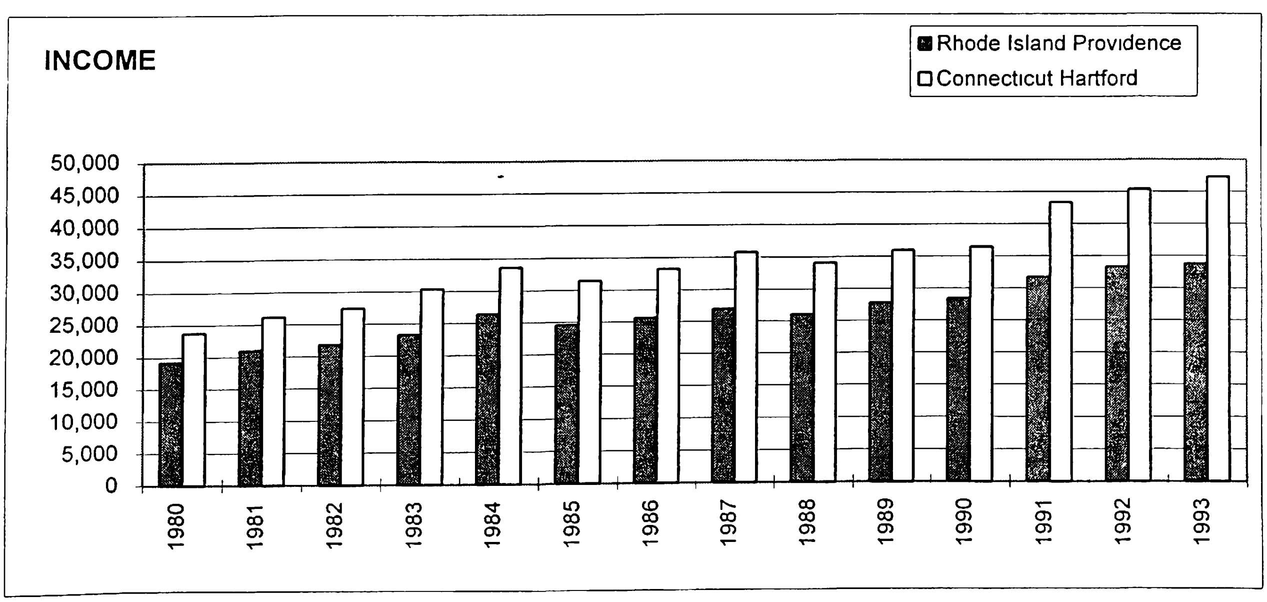
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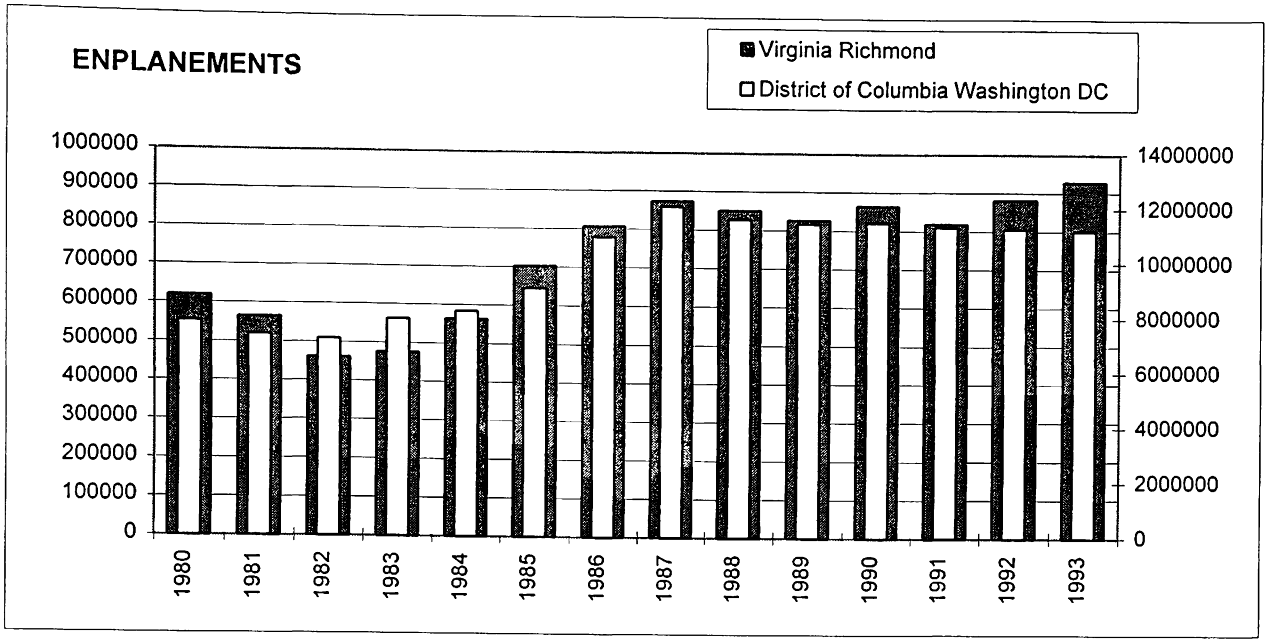
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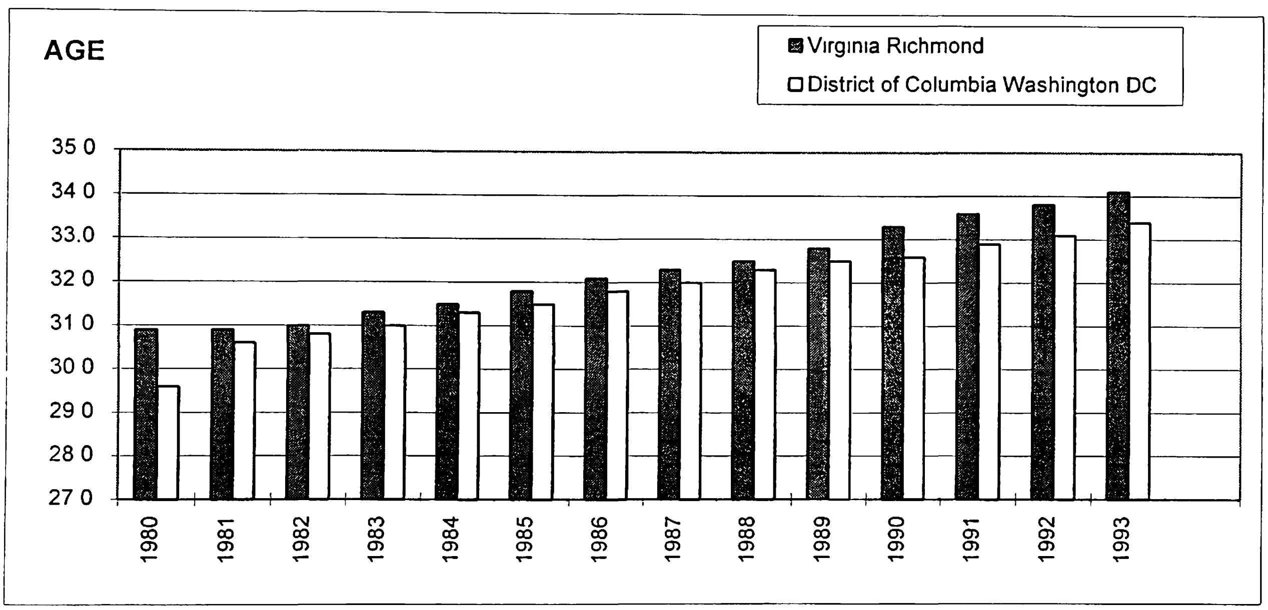
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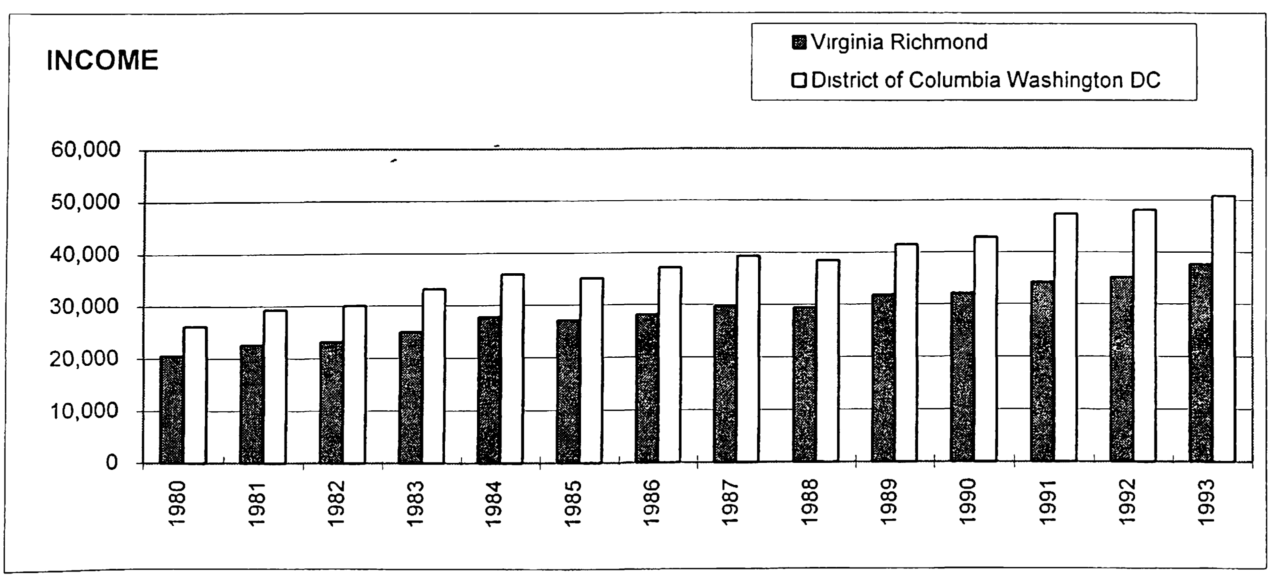
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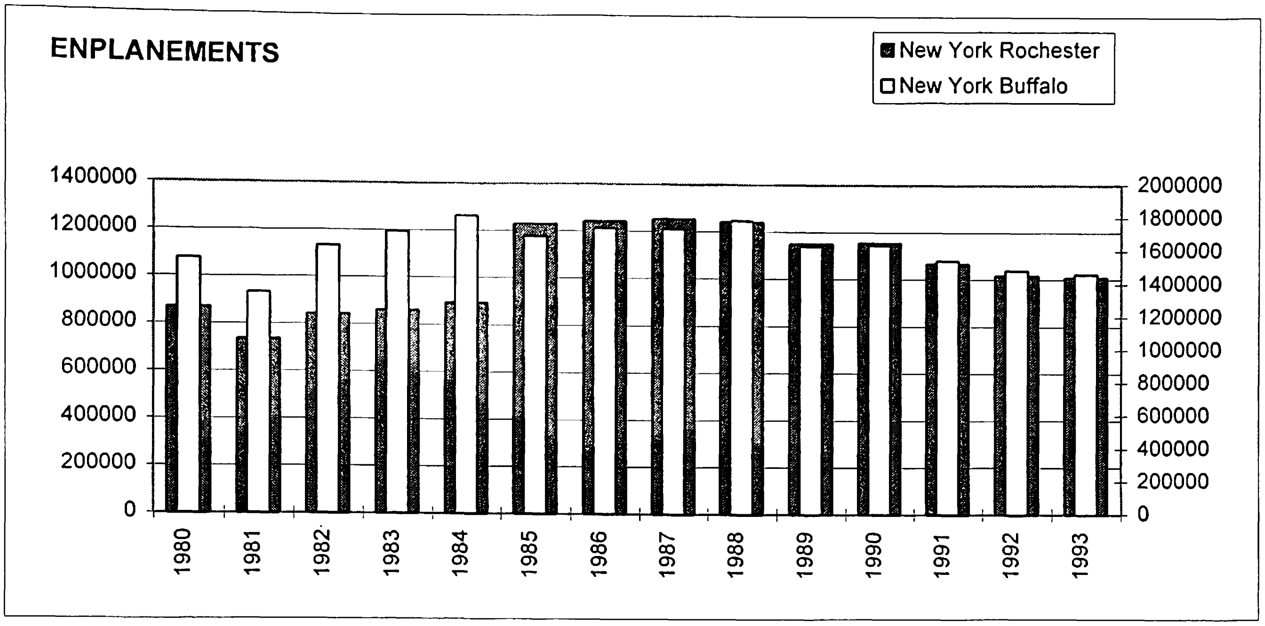
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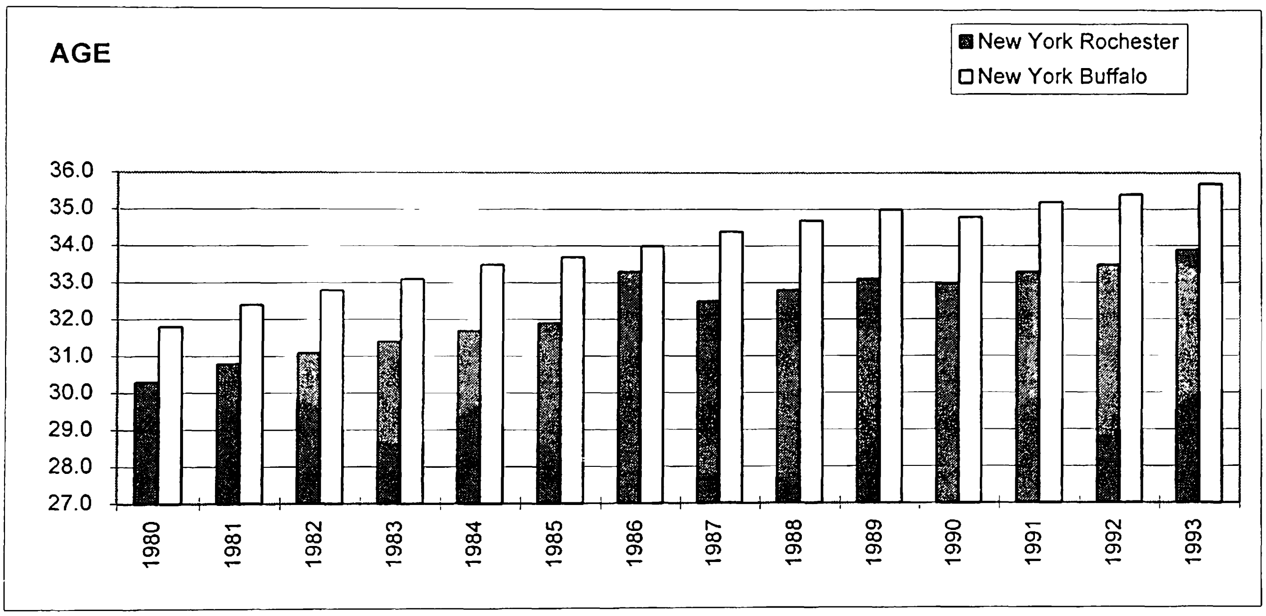
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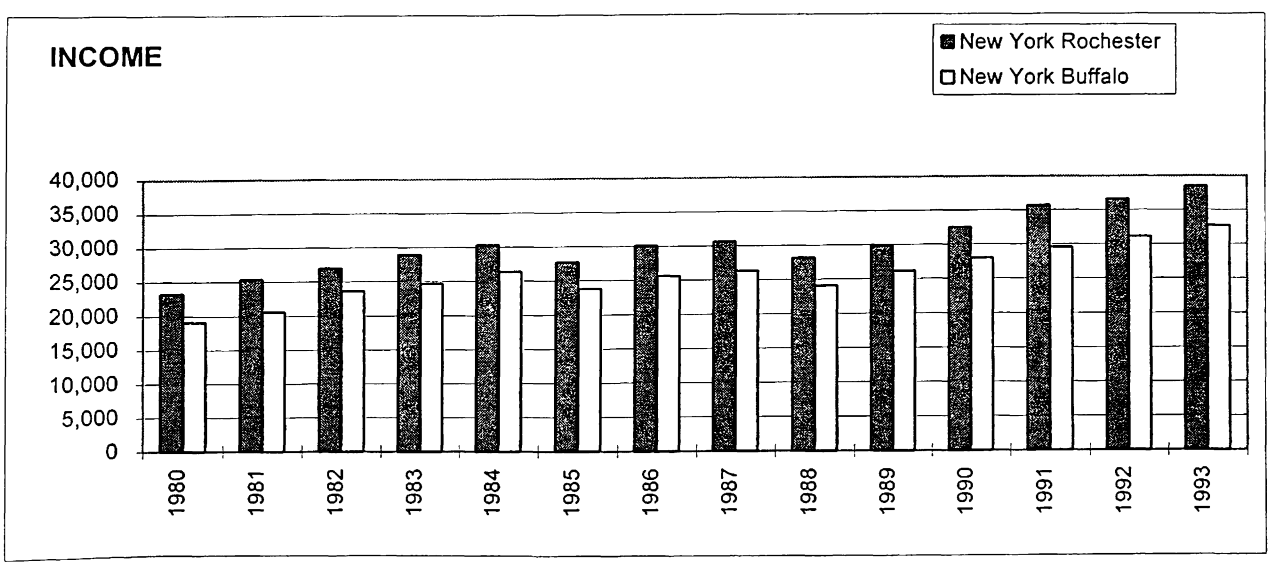
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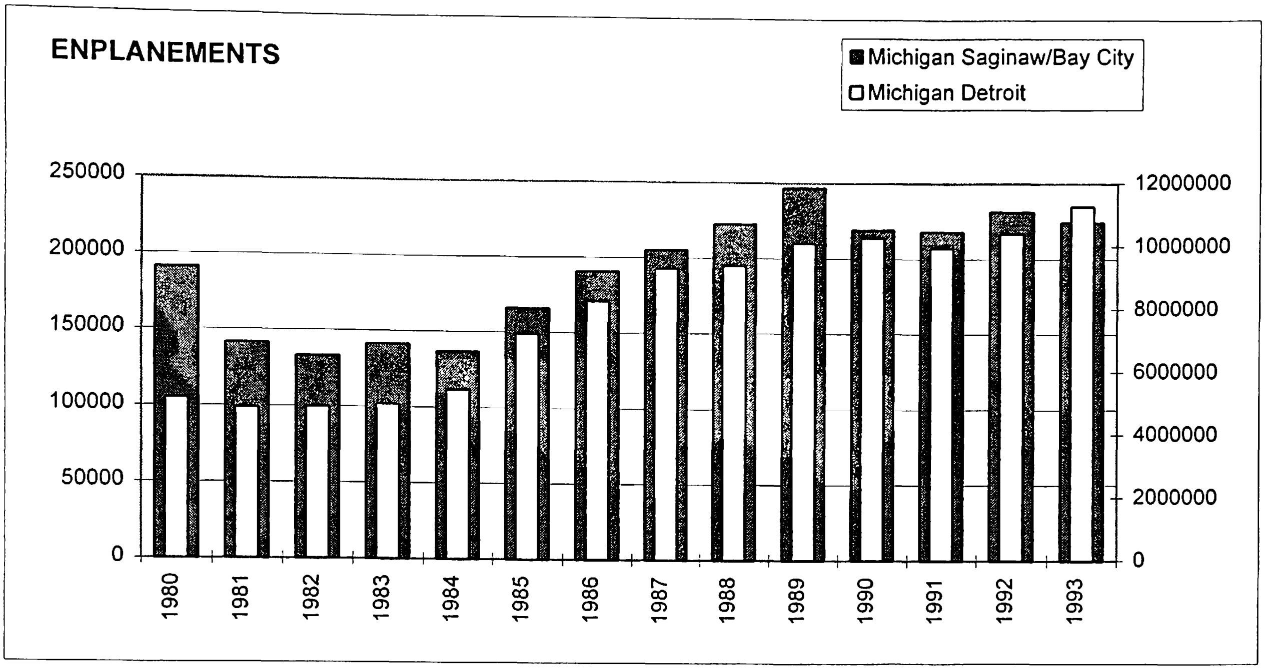
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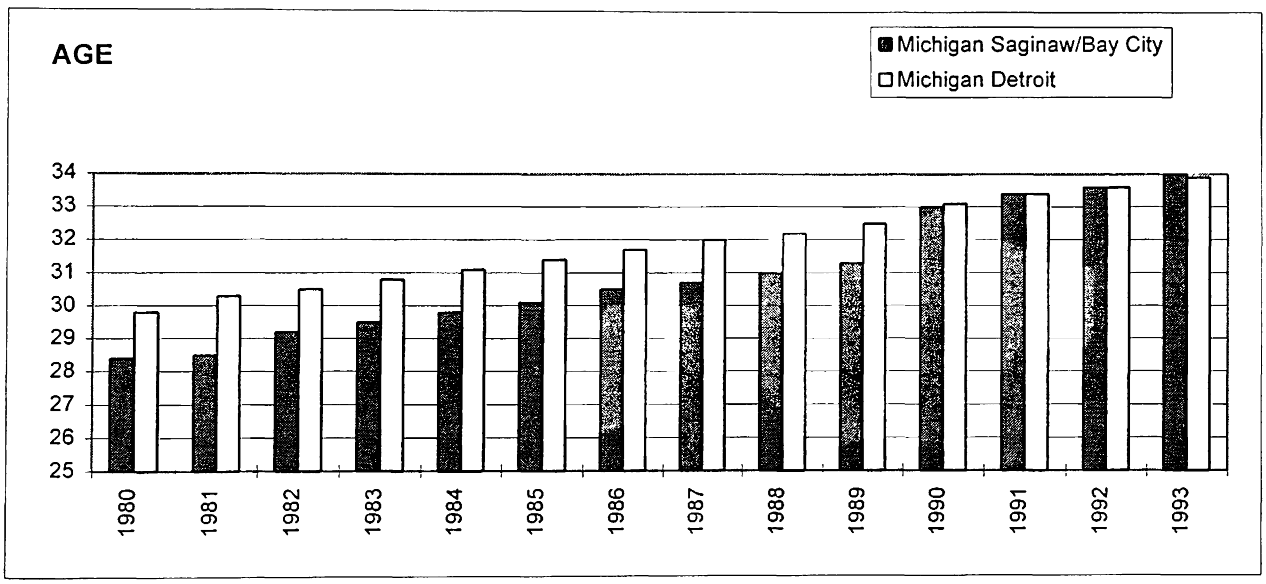
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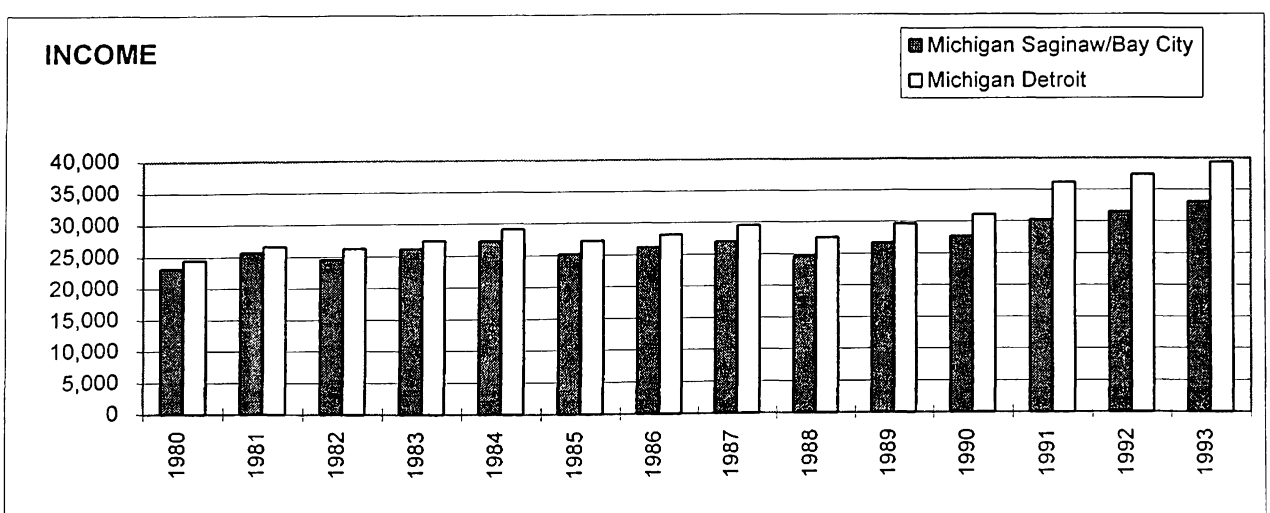
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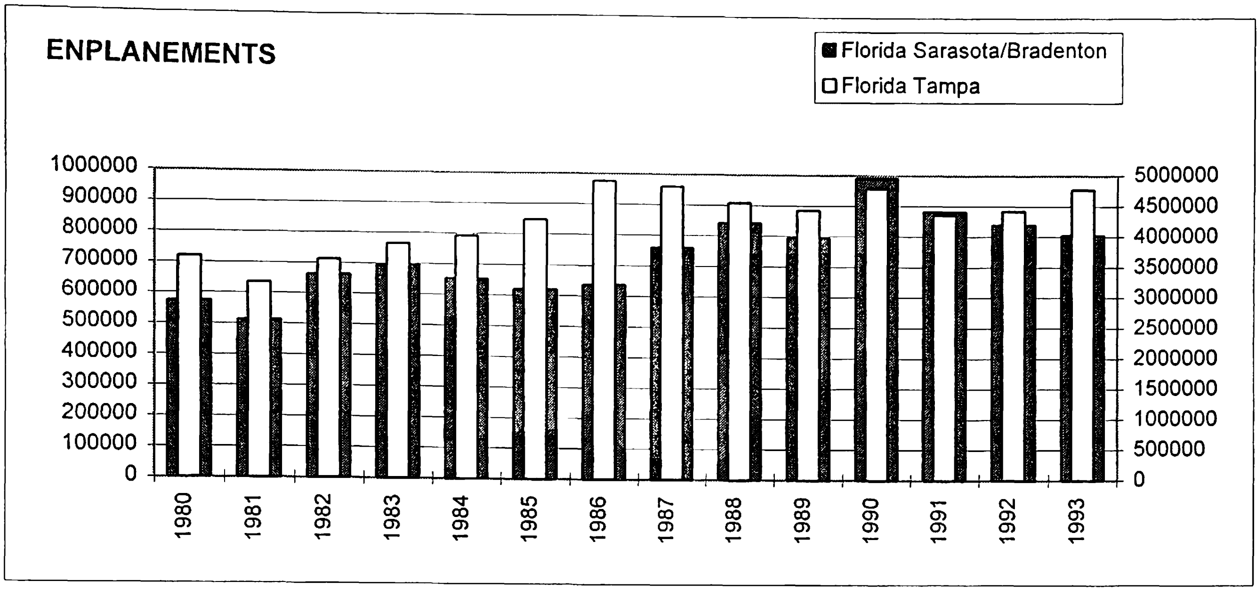
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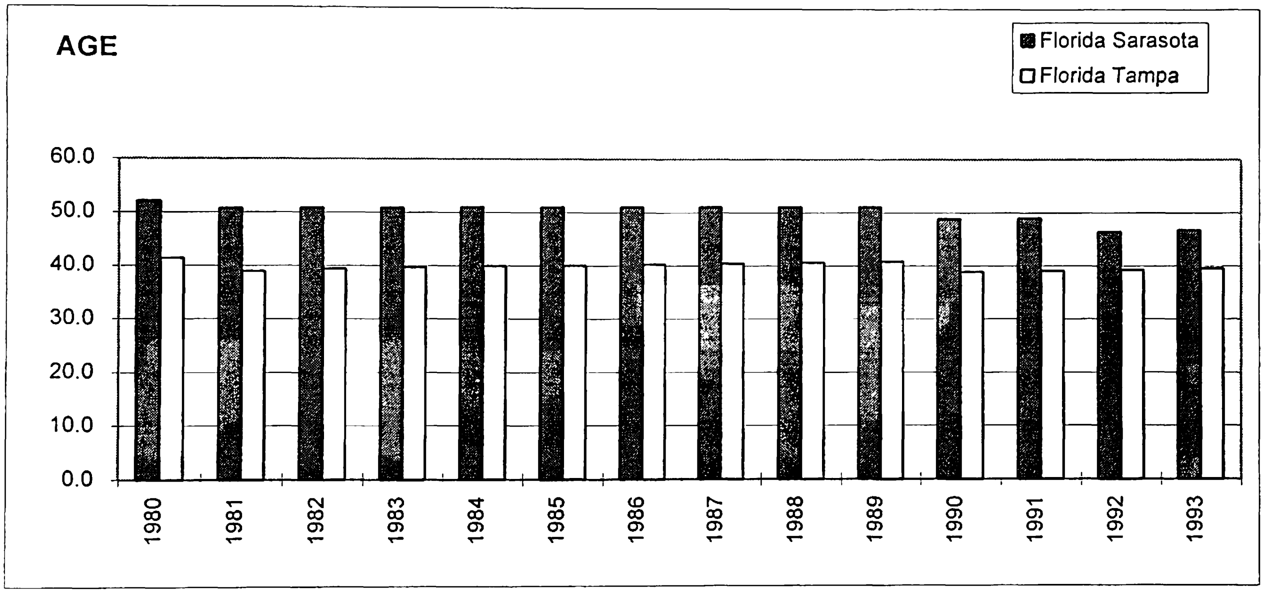
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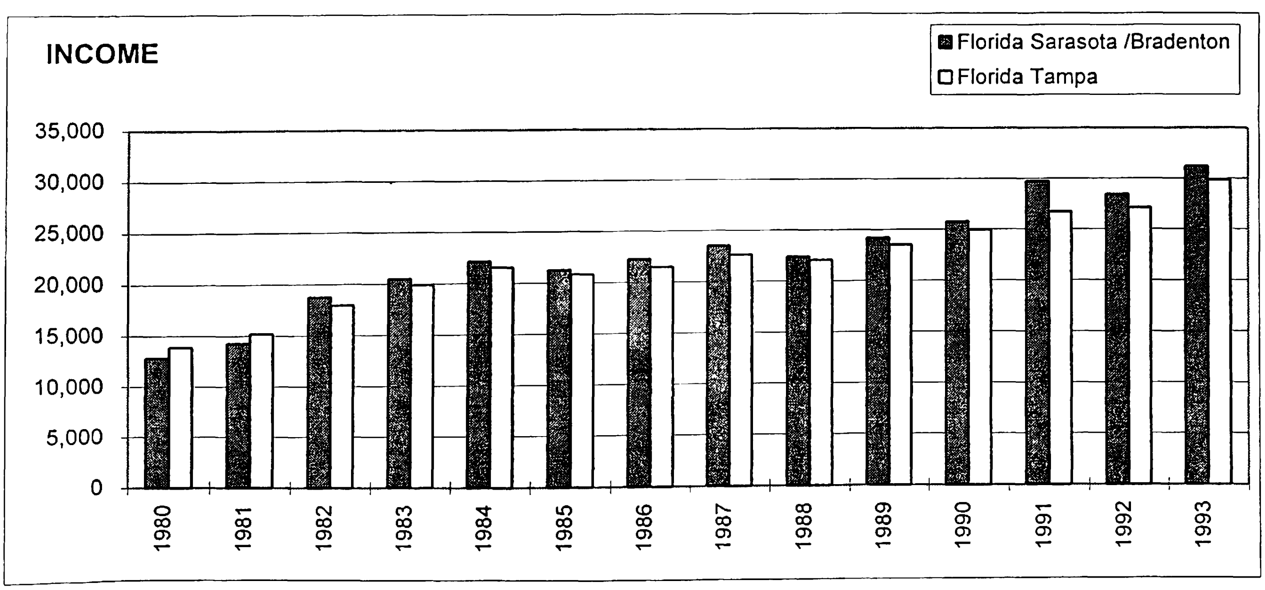
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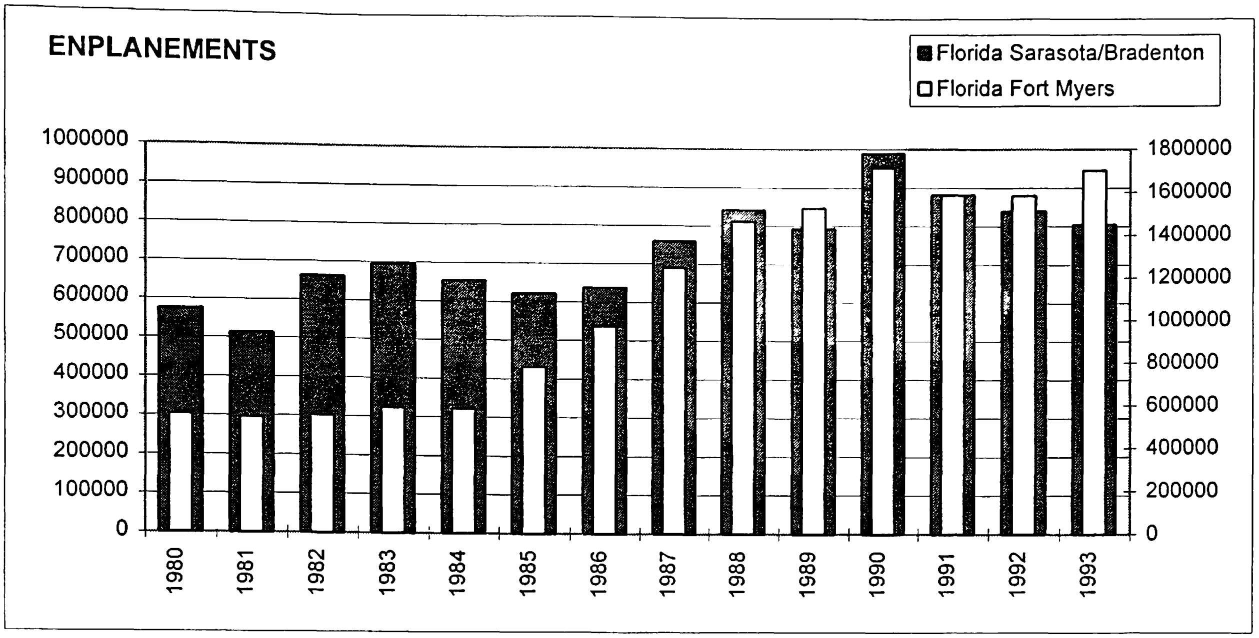
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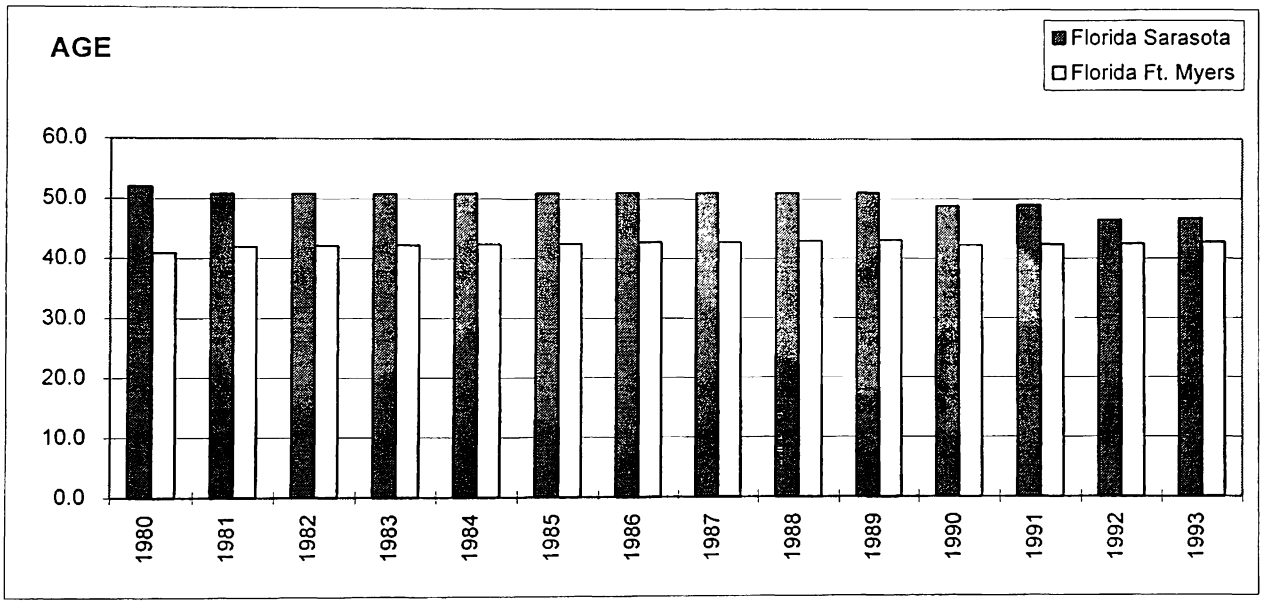
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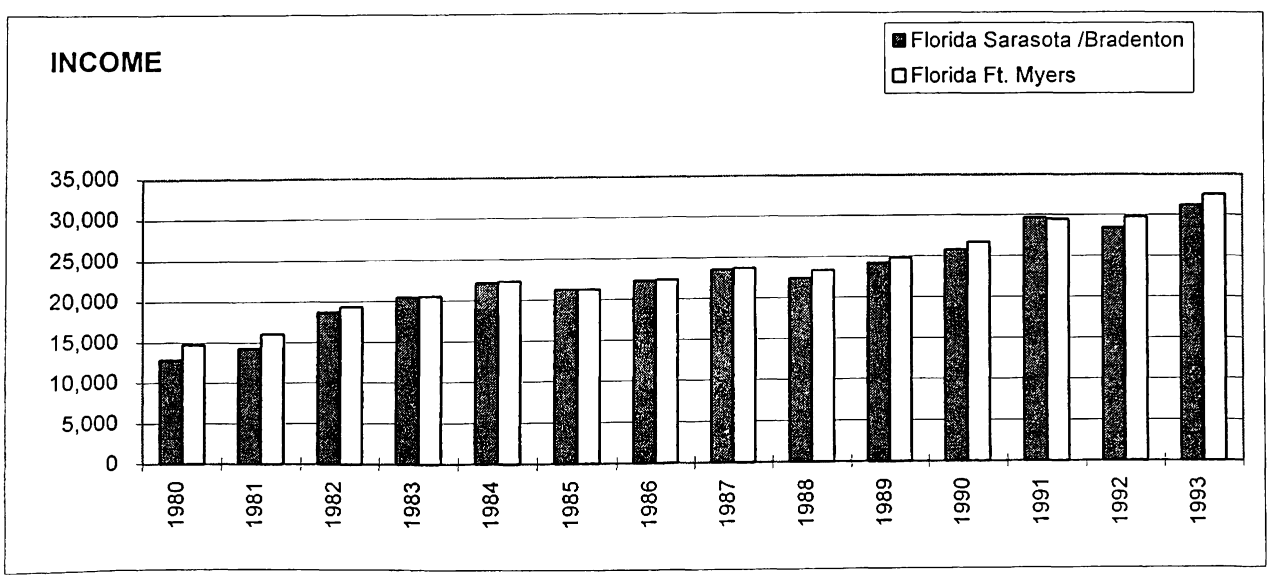
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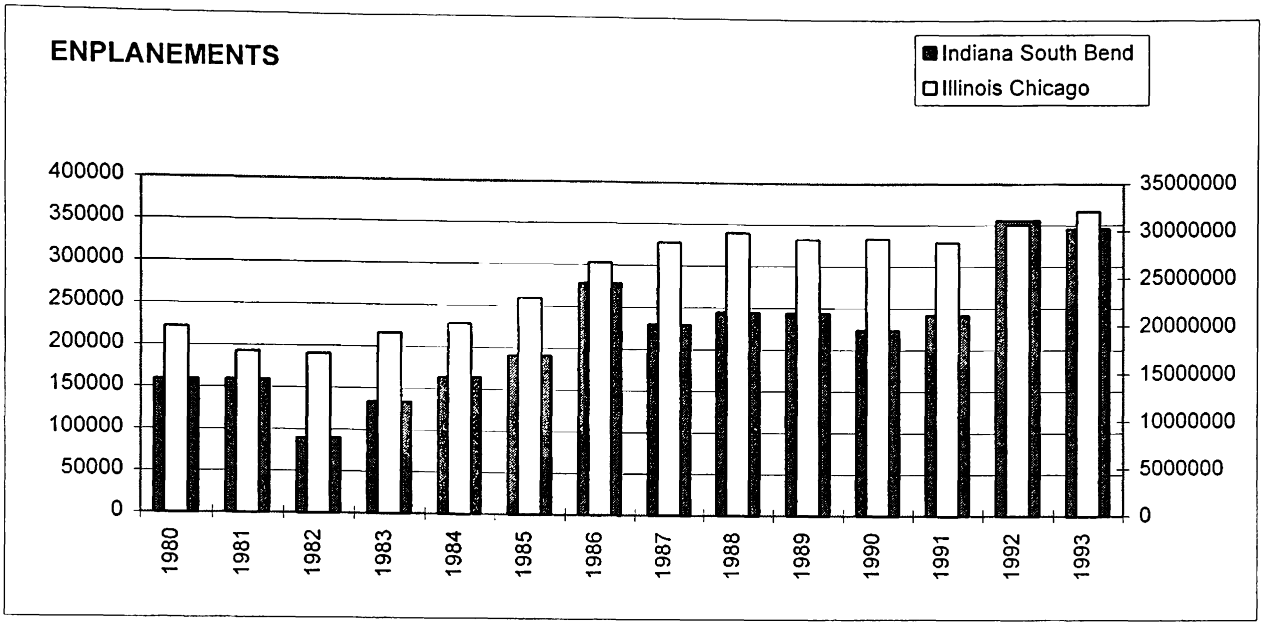
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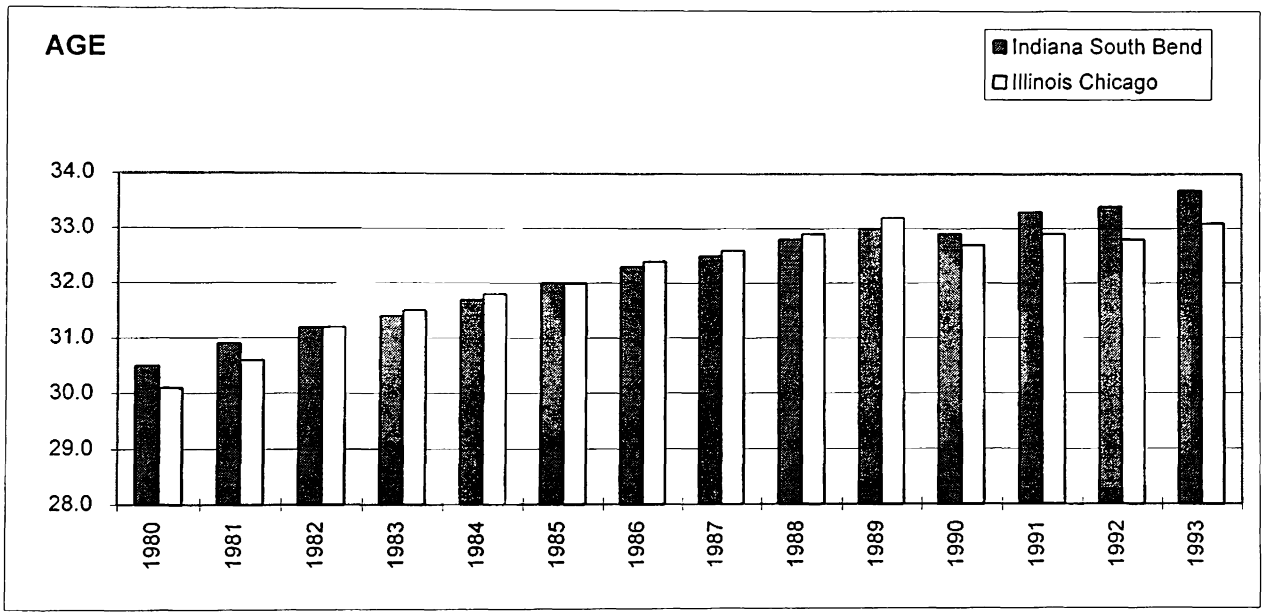
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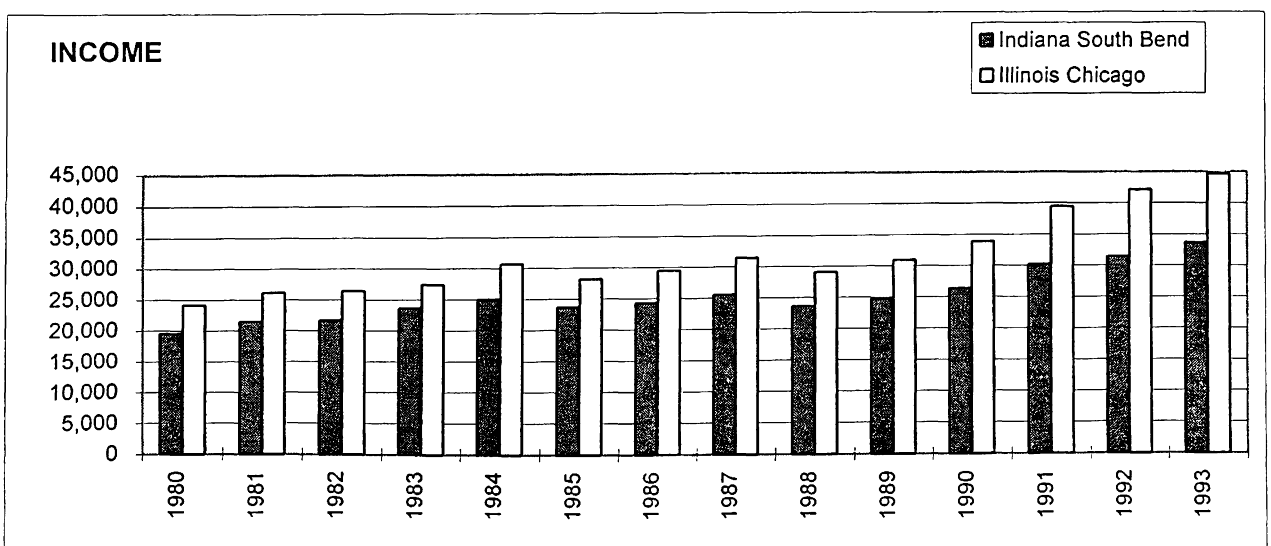
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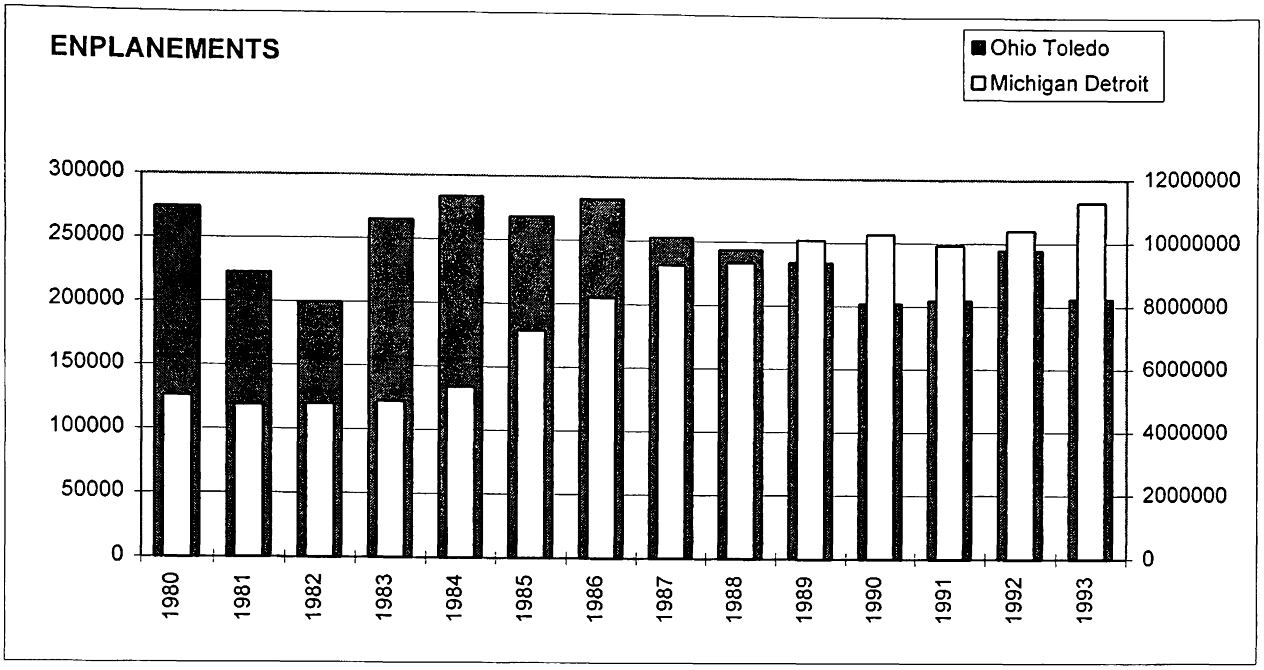
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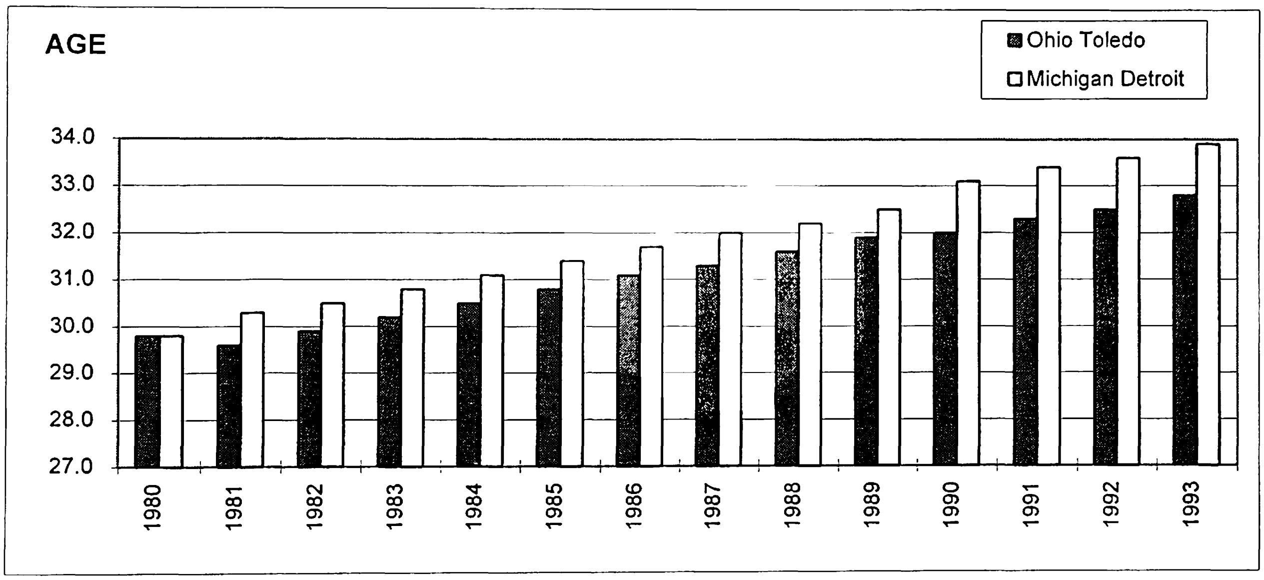
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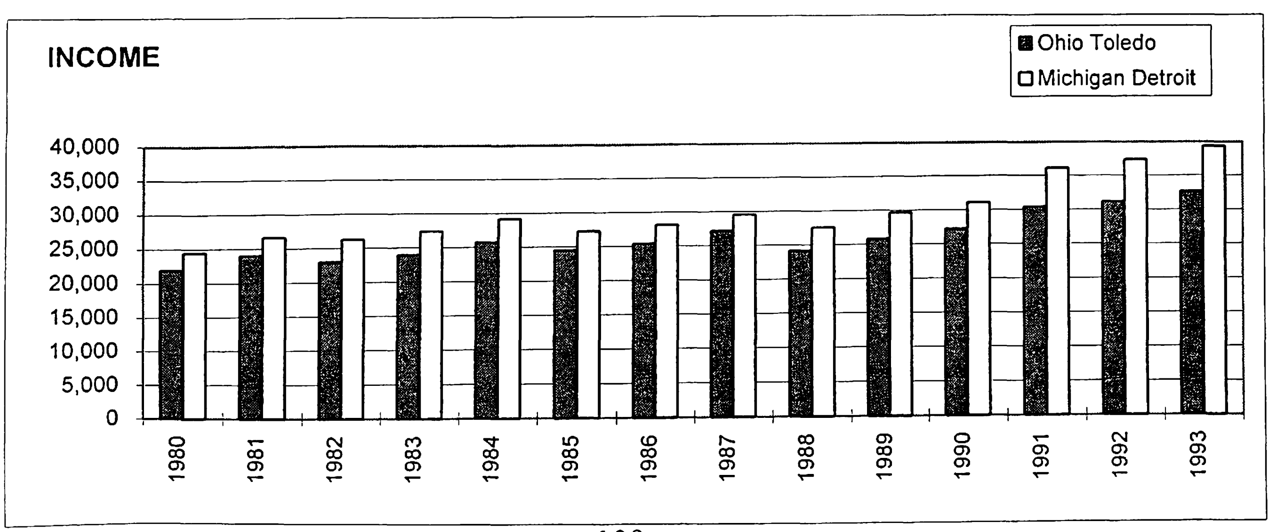
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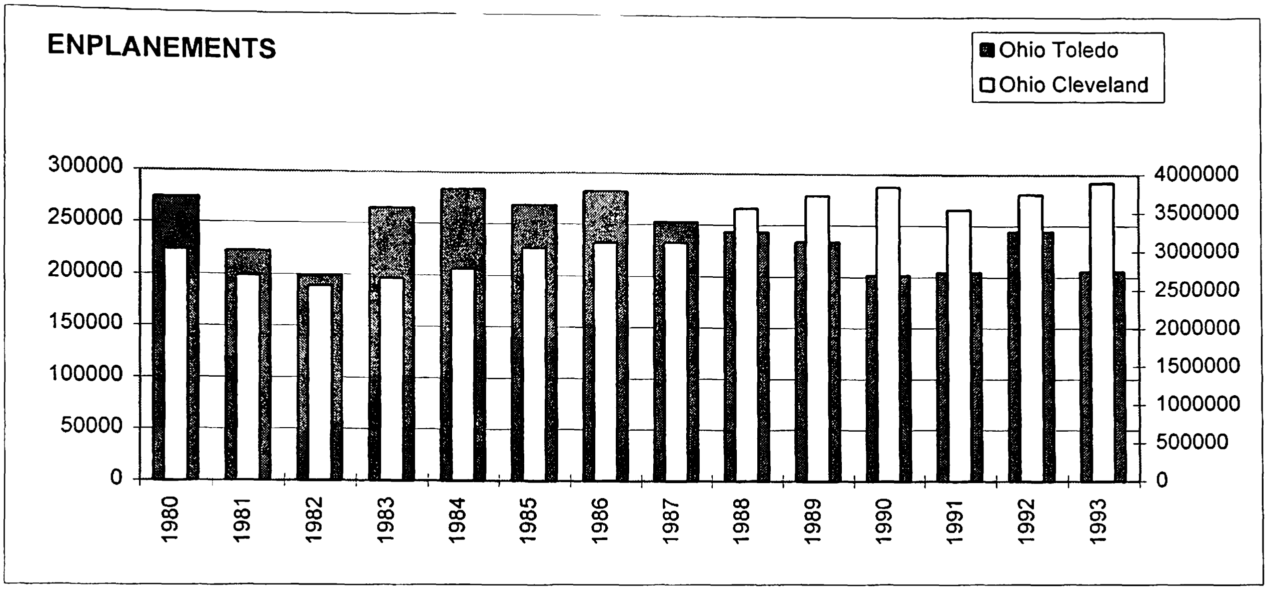
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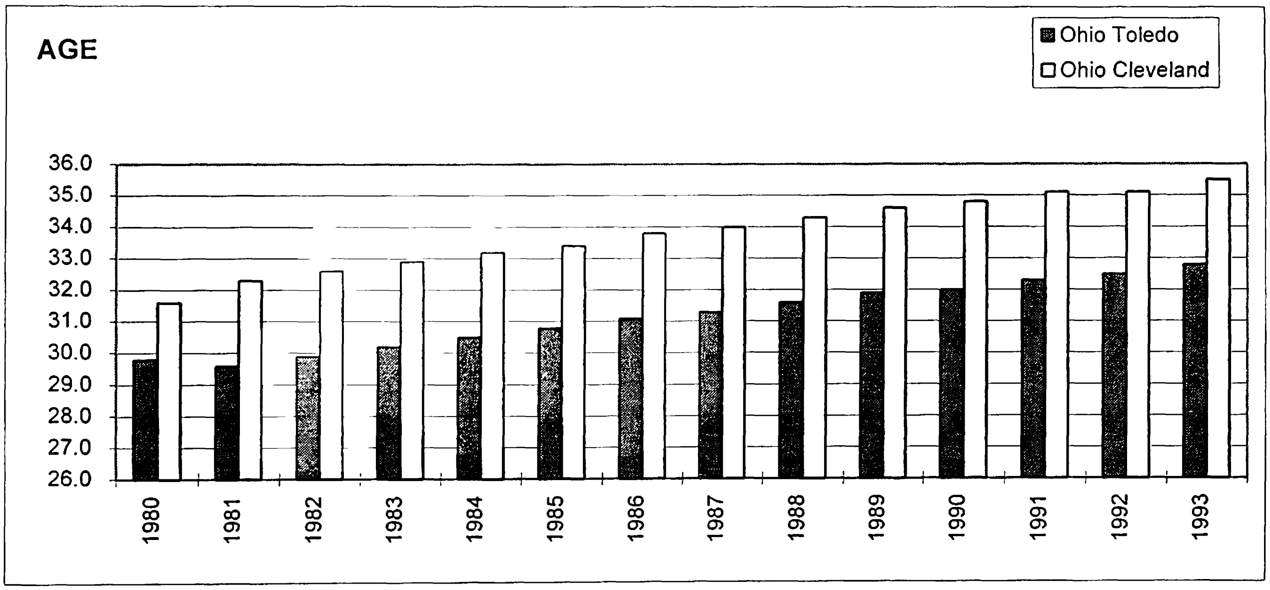
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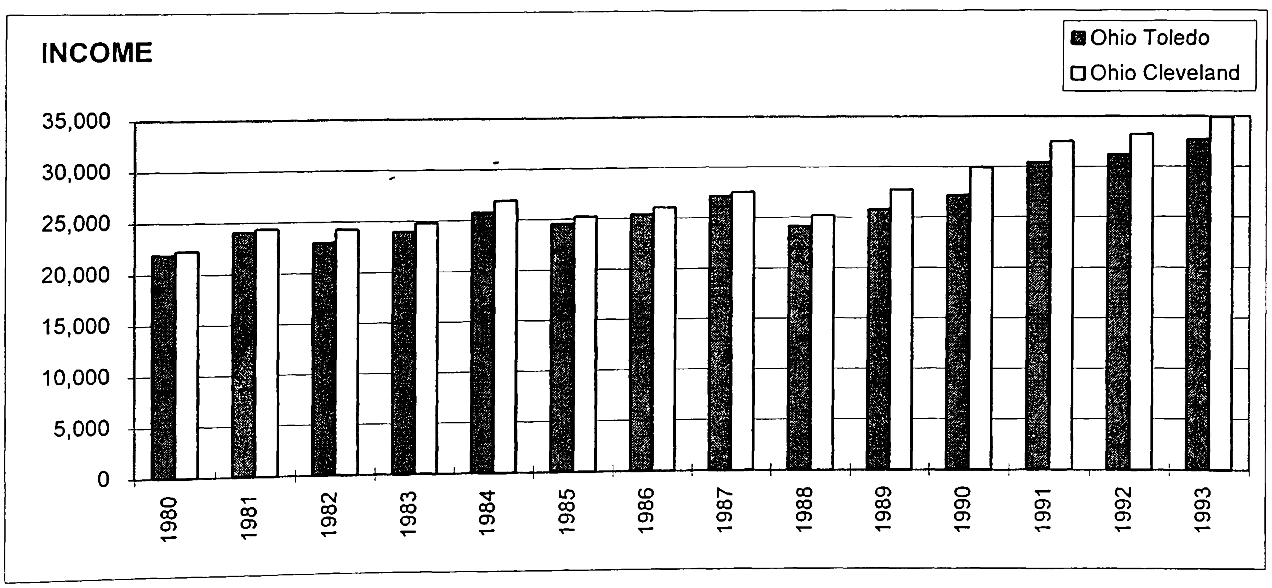
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