**The Value of Public Transportation in Durham, NC: A Comparative Analysis on the Impact of Access to Public Transportation on Property Value**

Outline:

1. Abstract
   1. To be written at the end of the entire paper; will address basic introduction, methodology, and results
2. Introduction
   1. Discussion of the importance of public transportation to Durham
   2. Introduction of two other cities to be analyzed (tentatively San Francisco and a new urbanist city (Greenville, SC))
   3. Intentions, goals, and hypothesis of this paper
3. Literature Review
   1. Monocentric City Model
      1. Discussion of William Alonso’s model
      2. Discussion of the model’s relevancy today (Arribas-Bel et al)
   2. Previous Literature
      1. Examination of inconsistencies found by different studies
      2. An explanation for possible reasoning behind inconsistency
      3. Examination of scope of previous literature (much analysis on railway systems and categorical data)
4. Data and Methodology
   1. Data Collection
      1. Overview of what data was used, what procedures were used to demonstrate the data in the way used by this model and this paper
      2. Outline of replicable steps
   2. Data Considerations
      1. Outliers, excluded data and wrongly categorized data will be discussed
5. Model
   1. Influences and Rationale
      1. Discussion of issues in previous literature corrected for in this model
      2. Discussion of the rationale behind the model
   2. Variables
      1. Discussion of variables used
      2. Discussion of data transformation, rationale for using specific techniques
   3. Review of other models
      1. Categorical use of data
         1. Instead of regression between distance and property value, divide properties into tiers based on distance to nearest bus stop
         2. Statistical determination of how different the various groups are
   4. Discussion of data
      1. Discussion of results from bootstrapping
         1. Explanation of tools and rationale behind use: corrections that are displayed in bootstrapping
      2. Determination of biases observed in the data from resampling
6. Results
   1. Explanation of the hedonic regression developed
   2. Explanation of the results of the regression
7. Discussion
   1. Analysis of the impact of access to public transportation
   2. Comparison of the results from Durham to the results of other cities
      1. Discussion and analysis for possible reasons behind the differences
   3. Discussion of possible flaws in the empirical study
8. Conclusion
   1. The meaning of this study in relation to Durham
   2. Possible extensions from this paper

Introduction

Public transportation continues to constitute a large factor in the commute of citizens in metropolitan areas. This sentiment is especially true of the city of Durham, a city in North Carolina whose public transportation system ranks as one of the fifty most prolifically used in the US, despite the city’s modest population size of 347,602 (APTA 9). In terms of per capita public transportation use, Durham outpaces significantly larger cities like Miami and Atlanta, ranking 21st in unlinked public transportation trips per capita, according to the poll aggregate site FiveThirtyEight (Fischer-Baum).

This paper intends to address the question of what effect public transportation has on Durham, specifically how access to public transportation impacts property value in Durham. The direction and magnitude of the effect of access to public transportation will be determined by the construction of a hedonic regression on the property value of residential locations in the city of Durham. Additionally, this paper aims to use the results from the hedonic regression to form a comparative analysis between Durham and two other cities in order to compare the magnitude of impact that access to public transportation has on residential property value. This comparative analysis would not only observe the impact of public transportation on property value in Durham, it would also derive differences that potentially drive the difference in magnitude of this effect between Durham and other cities.

Literature Review

The monocentric city model introduced by William Alonso in 1960 established an economic model and foundation on which to examine the value of access to public transportation. The model holds that the location of actors around a central business district (CBD) is determined through the bid rent curve of an individual actor (Alonso 152-154). As individual agents attempt to maximize their utility between proximity to the city center and the cost of commute, the equilibrium that is reached requires that the marginal cost of proximity to the central business district is equal to the marginal benefit of the move away due to lower cost. In Alonso’s introduction of the monocentric city model, the model is also attributed to residential land use, with the stipulation that the household maximizes satisfaction rather than profits (154). As such, the availability of public transportation to these agents can serve to reduce this cost of commute to the urban center; the subsequent clearing of this market should, in turn, cause an increase in the value of properties with easier access to public transportation, facilitated through proximity to these access points.

Various studies have been conducted to determine a causality between access to public transportation and property value, building upon the monocentric city model. While literature on the subject exists, the results frequently differed, oftentimes due to inconsistent modeling and methodology (Debrezion et al 161-164). In a review of empirical studies on the relationship between property value and transportation, Ryan found that inconsistency in the findings of the literature on the subject could be a result of the omission of travel time from the analysis of the relationship (423). This analysis of previous literature found that effects tended to be observed when this omission was accounted for.

Data and Methodology

The data that will be used in the analysis and construction of a hedonic regression come from the Durham GIS Services Department, the US Census Bureau, and the Durham County Tax Administration. Rather than use land value as was done previously, this analysis would control for structure cost. Additionally, the use of bootstrapping on the sampling distribution could allow for an analysis on the underlying distribution that is used. This would allow for the identification of any possible biases in the data.

Using ArcGIS, a dbf file of bound data between census bureau and tax information about residential properties will be spatially bound to the shapefile provided by the Durham GIS Services Department. This will allow for parcels of residential land to be associated with their nearest access to the Durham bus system. This data will be ported into a statistical package to run a regression between proximity to public transportation and various measures of property value, controlling for numerous variables not accounted for before, such as poverty rate. The methodology conducted on this effect will be significantly more robust than before.

Source Documentation

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