A Study of Metropolitan Economies from 1980 to 2000: Examining Changes in Metropolitan Sectoral Employment and Poverty

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DEDICATION

This dissertation is dedicated to Rebecca Fazzari for her patience and support throughout the research, writing and revision process. I also would like to dedicate this to my parents, James and Janice Fazzari.

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LIST OF ABBREVIATIONS AND SYMBOLS

Con.	Construction
Man.	Manufacturing
Tran.	Transportation
Whole.	Wholesale Trade
Ret.	Retail Trade
FIRE	Finance, Insurance and Real Estate
Bus. S., BusSer	Business Services
Per. S., PerSer	Personal Services
Prof. S., ProfSer	Professional Services
Govt., PubAdm	Public Administration
Other	Jobs Not Categorized in aSector
Dep Var	Dependent Variable
Type	Type of Model
Dum	Dummy Model or Dummy Variables
Interact	Interactive
PopDenCh	Population Density Change
EmpDenCh	Employment Density Change
PopCh	Population Change
EmpCh	Employment Change
HS Less	High School Education or Below
CollMore	College Education and Above

LIST OF ABBREVIATIONS AND SYMBOLS (continued)

IncPcCh	Income Per Capita
MedValCh	Median Housing Value Change
PovCh	Poverty Level Change
PopDen	Population Density
EmpDen	Employment Density
Pop	Population
Emp	Employment
IncPc	Income Per Capita
MedVal	Median Housing Value
Pov	Poverty Level
Const	Construction
OLS	Ordinary Least Squares
E	Spatial Error Model
L	Spatial Lag Model
FIPS	Federal Information Processing Standard that uniquely identifies county and county equivalents in the U.S.
A-C Recurrence	Autocorrelation Contiguity Recurrence
Cont.	Contiguity
C	Core Jursidiction
I	Inner Jurisdiction
M	Mature Jusrisdiction
E	Emerging Jurisdiction
X	Exurban Jurisdiction

ABSTRACT

A STUDY OF METROPOLITAN ECONOMIES FROM 1980 TO 2000: EXAMINING CHANGES IN METROPOLITAN SECTORAL EMPLOYMENT AND POVERTY

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Economic growth in metropolitan areas has not occurred evenly in all jurisdictions. Less dense suburban areas have experienced the majority of employment growth, raising questions about the changing roles of cities and counties in metropolitan economies. In this dissertation a dataset is constructed using cities and counties in the 20 largest metropolitan areas categorized into five levels of population density, from most dense to least dense. As is seen in the literature this creates a template for examining different parts of metropolitan areas. This dataset is used to conduct spatial analysis of the economic and socioeconomic conditions in metropolitan cities and counties. The methodology includes sectoral employment and poverty level spatial regression, employment and population trend analysis and location quotient analysis. The results show that less dense suburbs experienced significant population and employment growth from 1980 to 2000 compared to more dense jurisdictions. There is support for the

hypothesis that for counties in the sectoral employment spatial regression model, increases in employment density and employment levels tend to be associated with increases in sectoral employment change. The results partially support the hypothesis that in metropolitan cities, increases in population density and population levels tend to be associated with increases in sectoral employment change. The results show that for the 1990 period employment change is associated with increases in sectoral employment change. Business services, professional services, wholesale, FIRE and retail trade employment sectors increased more significantly in lower density jurisdictions during this time period. Higher levels of income per capita and education are found to be significantly associated with lower levels of poverty across all jurisdictions. Less dense areas were found to have lower levels of poverty than high density jurisdictions.

CHAPTER I

INTRODUCTION

Patterns of Metropolitan City and Suburban Growth

The pattern of growth in metropolitan areas has favored jurisdictions outside of the traditional urban core since the 1930s when suburban population growth first exceeded city growth. The major expansion of suburbia began in the 1940s and by the 1950s suburbs were growing 30 percent faster than cities. This large gap continued through the 1960s and 1970s with rates topping 25 percent. Since the 1980s, suburban growth rates have exceeded city growth rates by about 10 percent (Rappaport 2005). This trend has caused concern that central cities and inner suburban areas will experience increased economic and social inequalities making them less poised for future growth and further reinforcing suburban expansion.

This pattern is illustrated by looking at the New York metropolitan area from 1974 to 1996 as seen in Table 1. When looking at central city versus suburban employment growth in the business services sector, the central city has nearly 60 percent of the employment in business services. Through the 1980s the central city falls to 45 percent with suburban areas reaching almost 60 percent by 1992 and 63 percent of

employment by 1996. Over this 22 year period the majority of employment steadily moved from New York's central city to its suburbs.

Table 1 Central City and Suburban Percentages of New York Metropolitan Employment in the Business Services Sector, 1974-1996

Year	New York City	Suburban Ring
1974	57.3	42.7
1984	48.4	51.6
1988	45.4	54.6
1992	40.9	59.1
1996	36.7	63.3

Source: U.S. Department of Commerce, Bureau of the Census, County Business Patterns (annually). The MSA definition is based on New York 1993 by the Office of Management and Budget. Figures compiled by Muller 1997.

The continued concentration of growth in suburbs and economic restructuring of metropolitan areas over the last 70 years has caused changes in economic and socioeconomic conditions in the suburbs that must be addressed by policymakers faced with seemingly conflicting public requests for increased economic development and growth management. Therefore, this research examines these employment changes in different parts of metropolitan areas.

Growth of the suburban employment base has made the suburbs an increasingly important area within metropolitan areas because these areas have become the new employment centers. As a result of spatial changes in the location of employment in metropolitan areas, policymakers are faced with addressing the decline of central cities' employment base and the related economic/social problems. This is supported by the fact that in 1990 central cities made up 31 percent of the U.S. population but had 42 percent

of all people below the poverty line. Overall, central cities contained 19 percent of the poor population in metropolitan areas compared with 8.4 percent in suburban jurisdictions. Poverty concentrations have also increased as there were 10 million people living in census tracts with 40 percent of the residents living below the poverty line. The majority, about 7.5 million lived in central cities. This is a significant increase compared to 1980 when there were only 5 million people living in these census tracts (Downs 1997).

Scope of the Research

This introductory chapter provides an overview of the dissertation including the research objective; the theoretical framework; the research questions, hypotheses and methodology; the uniqueness of the research and the expected outcomes. This research uses the theoretical framework provided in Chapter II to generate the research questions and hypotheses listed Chapter III as the basis for examining the factors that influence sectoral employment change and poverty levels in the 20 largest U.S. metropolitan areas from 1980 through 2000. Chapter IV includes data descriptions and information on the dataset construction.[1] All other data are from Census 1980, 1990, and 2000. Chapter V examines population density, employment density and income per capita changes from

[1] The dataset was created using Employment Data from Census Place of Work provided by the Department of Housing and Urban Development, Office of Policy Development and Research, Office of Economic Affairs. In order to convert the 2000 NAICS codes to SIC codes for comparison with prior years, the SOCDS presents estimates of the discontinued Census SIC employment data series for 2000. The estimation technique is based on the approach used to convert employment from NAICS to SIC categories in the SOCDS County Business Patterns Special Extract Data System http://socds.huduser.org/CBPSE/note.htm.

1980-2000. Chapter VI uses location quotient analysis to examine employment concentrations during this period. Chapters VII and VIII use a spatial regression model to examine sectoral employment changes. Chapter IX utilizes a spatial regression model to analyze poverty levels across metropolitan jurisdictions. Research findings and implications are provided in Chapter X.

Research Objective

As cities and suburbs experience changes in economic and socioeconomic conditions, decision makers knowledge of these changes can play an important part in crafting informed local economic development policies to deal with emerging needs in local jurisdictions (Selting, Allanach and Loveridge 1994 and Downs 1997). Based on this policy need, this research asks, what indicators can decisionmakers use to become more knowledgeable about local economic and socioeconomic conditions? As the field of spatial econometrics shows, space plays a major role in regional economies and labor markets. Therefore, policymakers would want to look at economic and socioeconomic indicators within a spatial context. This dissertation provides one method of analyzing economic and socioeconomic conditions in metropolitan areas through the use of spatial analysis of metropolitan employment and population trends, sectoral employment and poverty levels.

Theoretical Framework

In order to address this expansive regional economic topic, many fields of study were surveyed and it was found that each of these areas provides insight into the theoretical framework of this research on Metropolitan Transformation. The major subject areas surveyed include: Metropolitan Restructuring/Transformation, City-Suburban Growth, Employment Decentralization, Suburban Sprawl, Density Changes, Land/Rent Prices, Poverty Economics, Income Distribution, Agglomeration Economies and Human Capital Development. Metropolitan Restructuring/Transformation takes a comprehensive view of all the factors that occur as metropolitan economies transform over time. City-Suburban Growth focuses on the relationship, competition and dependence between cities and suburbs. Employment Decentralization looks into the issues surrounding the spreading out of employment centers within a metropolitan area. Suburban Sprawl and Density Changes examine land use patterns, the results from lack of planning in low density areas and fragmentation of employment and population centers. Land/Rent Prices look at land values and how they impact population and employment patterns. Poverty Economics and Income Distribution examine how the trends in metropolitan restructuring can adversely affect the poor who have less access to transportation, thus limiting the employment opportunities for urban communities. Agglomeration Economies covers the concentration of workers and businesses in an area and the resulting efficiencies from this concentration. Human Capital Development examines the quality and education of the workforce and how this leads to higher productivity and economic expansion.

Research Questions, Hypotheses and Methodology

The cities and counties in the dataset are divided into five categories based on population density. These five categories are core areas, inner suburbs, mature suburbs, emerging suburbs and exurbs. In Chapter V, the first research question examines how population density, employment density and income per capita have changed in core areas, inner suburbs, mature suburbs, emerging suburbs and exurban jurisdictions during the period 1980-1990 and 1990-2000. It is hypothesized that population density and employment density will decrease or increase slightly in the core and inner suburbs, increase moderately in the mature suburbs and increase most significantly in the emerging suburbs and exurbs.[2] Income per capita is expected to have the largest increase in the core and exurban areas. Larger increases are expected in the 1980-1990 period with moderate increases in the 1990-2000 period.

In Chapter VI, the second research question uses location quotient analysis to examine the pattern of sectoral concentration change within and across jurisdictional categories. It is hypothesized that sectoral concentrations in construction, manufacturing, retail trade and wholesale trade will be higher in all city categories other than in the core. Core cities will have high concentrations in personal services, professional services and government employment. Inner counties will also have high concentrations in personal services and professional services. Personal services will also be highly concentrated in emerging suburban cities. Sectoral concentrations in construction, manufacturing and retail trade will be high in mature emerging and exurban counties.

[2] The urban studies literature that models the urbanization process uses population density as a proxy for urbanization. The use of population density as a proxy for urbanization is utilized in this research.

In Chapter VII and VIII, research questions three, four and five utilize a base spatial regression model, a dummy variable spatial regression model and an interactive spatial regression model to examine the relationship between economic/socioeconomic factors and sectoral employment for cities and counties for the time periods 1980-1990 and 1990-2000. The dependent variables are the 11 SIC sectoral employment categories. The independent variables include population, population change, population density, population density change, employment, employment change, employment density, employment density change, level of education, income per capita, income per capita change, median housing value, median housing value change, median rent, median rent change, poverty level and poverty level change. It is generally hypothesized that population density change, population change, employment density change and employment change will be the main significant variables in these models. More specific hypotheses are generated for each model in Chapter 7. The theory of firm location and thus employment centers states that firms locate in areas with lower production costs (Carlino 1998). Therefore the regression results may provide some information about whether changes in sectoral employment will be driven more by changes in overall levels of population and employment or by changes in employment and population densities.

In Chapter IX and X, the final three models use a spatial regression model to analyze the relationship between economic/socioeconomic factors and poverty levels. It is hypothesized that an increase in income per capita will be associated with lower poverty levels and that higher levels of poverty will be found in core and inner jurisdictions. More specific hypotheses are presented for each model in Chapter III.

Uniqueness of the Methodology and Dataset

This research is unique because it examines both the economic (employment) and socioeconomic (poverty) factors in metropolitan economies. The dataset is different because it includes cities and counties covering all jurisdictions in the metropolitan area. One of the underlying themes of the research is the spatial differences of cities and counties within the metropolitan area. Therefore, the methodology is distinguished by categorizing each metropolitan area into population density groups to allow the analysis of different parts of the transforming metropolitan area.

County and city level analysis is used because it provides a more detailed view of changes in metropolitan economies than suburb-city or county only comparisons. Creating a dataset that includes city and county data has advantages and disadvantages. The advantages are that including city level data fills in the holes that would exist in a county only metropolitan analysis. Since some metropolitan areas have a large number of cities, including city data provides a more complete picture of Metropolitan Transformation. The disadvantage of including city data are the limited availability of data sources. This limitation constrains the number of variables that can be created and time periods examined. The task of individually analyzing cities and counties in 20 metropolitan areas included in this research creates a data management problem and feasibility issue. In order to create a manageable level of data output it was necessary to categorize and group jurisdictions with similar population densities across all 20 metropolitan areas. The categorization of metropolitan jurisdictions and method of analysis will be further explained in Chapter IV.

This research on Metropolitan Transformation is distinguished by adding insight into how different parts of metropolitan economies change over time through the examination of the relationship between employment/poverty and economic/socioeconomic factors. This adds onto the literature that examines entire metropolitan economies or uses city-suburban comparisons (Lang and Simmons 2003, Mikelbank 2006, Voith 1992 and 1998). Examining suburbs at the aggregate level is appropriate when comparing them to a central city. However, since suburbs are heterogeneous areas, analysis at the jurisdictional level can provide added insight into the changes and differences in metropolitan employment and poverty. Another question is whether cities and counties with similar population density levels have other characteristics in common. There may be some similarities but there are most likely enough differences to warrant constructing separate models for cities and counties. The spatial regression analysis will look further into this question.

Metropolitan Transformation in the context of this research refers to the changing dynamics of metropolitan economies over time, with a specific focus on changing economic and socioeconomic conditions that include but are not limited to sectoral employment and poverty levels. Suburbs are interesting areas to examine because they contain many common characteristics across metropolitan areas based on their level of population density. The conclusions from the analysis are limited to the outputs resulting from the conditions present in these metropolitan areas during the 1980-2000 time period.

Expected Outcomes

In Chapter V, it is expected that population density and employment density growth will be lowest in core jurisdictions and will increase from the core to the suburbs and exurbs. When sectoral concentrations are examined in Chapter VI; it should be shown that construction, manufacturing, wholesale and retail employment will be more concentrated outside the core toward the mature suburbs and into the emerging suburbs and exurbs. Core and inner cities are expected to have higher concentrations in personal services, professional services and government employment. The spatial regression output in Chapters VII and VIII should show that population density change, population change, employment density change and employment change will be the main significant variables that are associated with sectoral employment change. A main question is whether density or overall level is more significant. Finally, in Chapters IX and X the spatial poverty model output should show that income per capita is associated with lower poverty levels and that higher levels of poverty are found in core and inner jurisdictions.

Local economies and their components, local jurisdictions are constantly changing and this supports theories of the creative destruction of local industries and population migration. Therefore, the conclusions from this analysis are influenced by economic and social conditions during the 1980 to 2000 time period. The following section provides an overview of the regional development literature with a focus on the theory of Metropolitan Transformation.

CHAPTER II

THEORETICAL FRAMEWORK OF TRANSFORMING METROPOLITAN ECONOMIES

The Role of Space in Economics

Space plays many roles in regional development from the most basic to complex. Populations live in places such as cities or counties that are defined at the sub-metropolitan level. Within these areas there are often differing views on how to utilize and optimize limited space. Determinants of optimal use are often closely tied to existing dominant industries and sectoral structure. However, newly urbanizing areas without an existing dominant industry present an opportunity for the jurisdiction to position itself to appeal to industries that most benefit the existing population and future growth of the area. While people do migrate toward opportunities afforded by specific industries, people also put a high value on private property and the type of community in a location. There is also a premium put on accessibility to other important locations, especially if people do not live in the same location as their place of employment. This puts a major emphasis on the availability of modern and efficient transportation systems. During metropolitan expansion, a period of transition may be needed when existing

transportation systems cannot handle existing volume and need to be upgraded. The resulting daily gridlock puts downward pressure on the ability of the region to attain its potential growth rate (Higgins and Savoie 1997).

Problems can also occur in regions during structural adjustments when a large percentage of the population is involved in a few declining sectors as seen in rustbelt economies over the past 40 years. These structural adjustments in industrial sectors are provided in Table 2. The largest declines are shown in Agriculture and Manufacturing with Services having the most significant increase over the 43-year period.

Table 2 Percentage Distribution of Employment by Major Industry, 1950, 1970 and 1993

Industry	1950	1970	1993
Agriculture	13.7	4.7	2.7
Mining	1.7	0.8	0.5
Construction	4.5	4.8	4.0
Manufacturing	29.1	26.1	15.7
Transportation and Public Utilities	7.7	6.1	5.0
Wholesale and Retail trade	17.9	20.2	22.8
Finance, Insurance and Real Estate	3.6	4.9	5.8
Services	10.2	15.5	26.7
Government	11.5	16.9	16.6
Total	100	100.	100

Source: Wolff 1997.

In growing sectors such as services, entrepreneurs seek to establish more advanced industries but may face problems such as an under qualified workforce, friction over available property, zoning restrictions and regulations crafted to address the needs of older and declining sectors. It is a difficult task to transition a workforce from declining

sectors into growth sectors at a point when the local community is comfortable and established at producing certain types of output. The push to integrate new and more productive industries within local jurisdictions must take into account the impacts of these changes on product-mix, socioeconomic conditions and population migration. The fluid movement of people and businesses make it imperative that localities adapt quickly to changes in economic structures in order to keep businesses and people from migrating to more attractive locations (Higgins and Savoie 1997).

Locational Economic Theories

This section examines the origin of location theory and how researchers have adapted it over time to examine more complex economic issues. Agglomeration is explored as this occurrence plays a critical role in how metropolitan economies change over time. This section also provides evidence for the links between modern location theory and agglomeration economies. Finally, metropolitan growth theories are examined.

Location Theory

Location theory is used to study location decisions made by firms and people due to transportation costs and spatial differences in the accessibility of inputs and markets. The theory was formally developed as a response to neoclassical economics and its neglect of spatial conditions in economic analysis. Location theory, based on the value of land in an agriculture society, was initially posed by von Thunen (1826). He argued that

land was not valued by what it produces, but that land is valued based on its distance from markets because of transportation and access costs. Hotelling (1929) added to the theory with his marketplace model of two ice cream sellers and how they eventually end up locating next to each other to gain the most competitive position in a duopoly market environment.

Weber (1929) initially discussed the connection between economic growth and an economy based on manufacturing. He formulated a theory that manufacturing industries locate where the transportation costs of raw materials and final products are minimized (Higgins and Savoie 1997, Malecki 1985, Blair and Premus 1993). The central idea is that firms will locate near markets if final goods are more expensive to transport and will locate near primary inputs if raw goods are more expensive to transport. The result is a concentration of related firms in central locations allowing transportation costs to be minimized (Malecki 1985). As mentioned, location theory's main influence in the literature is its integration of space with other economic development theories. Isard (1949) utilized this idea of space and economies as a basis for developing regional science, a broad field that examines the impact of space on economic decision-making.

Agglomeration Theory

Agglomeration is a concept that attempts to explain the geographic concentration of economic activity that results from increasing returns to scale from production. The agglomeration literature can be traced back to Marshall (1920) who discussed the importance of knowledge spillovers from advances in technology resulting from

specialized human capital. The two kinds of externalities discussed by Isard (1956) were the advantages of firms in the same industry locating near each other and advantages of firms in different industries locating in the same proximity. Henderson (1986) lists three factors that best describe agglomeration externalities. These include greater industry size allowing more specialization, reductions in costs related to finding qualified workers and increases in innovation (Baptista 2003).

Earlier theories of agglomeration examine spillovers such as human capital between firms located in close proximity. More recent agglomeration literature focuses on demand linkages between firms created by the interaction of fixed production costs and transportation costs. Density is a key term in the agglomeration literature and refers to labor intensity or human and physical capital in relation to physical space. The key to the theory is that density increases productivity because knowledge spillovers result from locational proximity and this leads to increases in productivity (Baptista 2003).

Subsequent additions to the theory have attempted to further explain why agglomeration occurs and findings include pure technical economies to scale, economies evolving from product variety, knowledge spillovers, growth from firms pooling resources, and economies forming from labor heterogeneity (Buttner 1999). Lucas (1988) provided a dynamic addition that workers learn from each other and as one worker's education increases it affects the knowledge level of other workers. A follow up model by Black and Henderson (1999) showed a dynamic model of city creation that combined agglomeration economies and localized human capital spillovers (Baptista 2003).

Four types of agglomeration that are highlighted in the literature are horizontally diversified agglomerations, agglomerations of vertically disintegrated activities, hierarchical spatially localized agglomeration and agglomeration as sheer outcomes of path-dependence (Bottazzi 2002). Horizontally diversified agglomerations occur in districts where constantly changing products are produced by small to medium sized companies in sectors such as clothing, textiles and jewelry. The agglomerations of vertically disintegrated activities overlap horizontally diversified agglomeration. The distinction is that vertically integrated firms branch out into a "Smithian" division of labor creating different firms that have more labor specialization, input-output links and user-producer knowledge exchanges. Hierarchical spatially localized relations involve an oligopolic core surrounded knowledge factors, driven by exogenous scientific research that flows into an industry. This is seen in areas like Silicon Valley. Agglomeration as sheer outcomes of path-dependence occurs from the churn of firm creation and firm death.

One of the main benefits of agglomeration is the ease of information flow between firms located in close proximity. This provides an explanation for why actors are willing to pay higher rents and incur higher costs for the location advantage of agglomeration. However, at some point costs begin to outweigh benefits and firms begin to locate in lower cost areas such as suburbs. In these lower cost suburban locations, the agglomeration process begins again and continues until costs at the new location exceed equilibrium (Fujita and Thisse 2002).

Agglomeration and Business Services

Agglomeration is especially desirable in the business service industry because the flow of information is partially dependent on the distance of participating parties. Therefore, urban areas can play a vital as they are high density and residents often live close to their place of employment. The result is agglomeration that occurs through the decisions made by individual actors. The decreased distance fosters interaction between economic interests and increases the desire for more entities to locate in these areas. This positions urban areas as a magnet that concentrates people in close proximity (Fujita and Thisse 2002). Diversity is another unique element that makes urban areas equipped for generating new ideas. People that inhabit these areas come from many different backgrounds and perspectives. When these people interact they bring different ways of approaching issues and tackling problems. Adopting the best ideas from these interactions allows firms to become more competitive and innovative (Fujita and Thisse 2002).

The exchange of information highlights a public-good aspect where the use of information by one firm does not reduce the usefulness to other firms. This generates externality benefits for all firms involved. The quality of information flows is purer when these firms are located in close proximity because information can lose accuracy and value when it travels over longer distances. Despite the emergence of the Internet and the resulting increase in the flow of information, face-to-face communication is still the most effective transmitter of information for use in developing products and processes to make firms more competitive. This type of communication is also more effective for

entrepreneurs generating ideas that ultimately lead to product development and innovation (Fujita and Thisse 2002).

A drawback of firms locating in close proximity is the increased commuting cost for some workers in terms of time and distance. The result is a demand for higher wages by those living close to the cluster of firms because of the higher cost living and those who have higher commuting costs. At some point the costs of agglomeration begin to outweigh the benefits and this leads to the dispersion of firms to lower cost areas. Theoretically, the end result is equilibrium between the density of firms and the costs associated with agglomeration (Fujita and Thisse 2002).

Modern Location Theory and Agglomeration

Modern location theory is set in the context of the shift from a manufacturing to a service based economy (Hansen 1994). In the service-based economy, different aspects of location theory have become more important than in the manufacturing economy. Labor quality and availability are the most important factors in the location decisions of service-based firms (Fujita and Thisse 2002). Service-based industries locate near the largest and most qualified labor population to maximize efficiency and maintain sufficient staffing levels (Malecki 1985).

When a large number of firms locate in the same proximity it allows agglomeration economies to develop. Agglomeration economies can range from specific to diffuse. Specific agglomeration is the result of business clusters forming and creating an enhanced labor force, providing opportunities to share costly machinery, increase

customer traffic and providing the ability to stay current on competitors' technological advances. Diffuse agglomeration usually occurs in urban areas and can decrease transportation and negotiating costs when firms buy and sell with each other. Agglomeration in an urban environment allows all firms to benefit from a rise in economic activity in the region. Locating near a large market also softens the effects of random, seasonal, and cyclical business factors (Blair and Premus 1987).

In newer suburban areas, consumers spend money in the local economy that is earned from sources outside the local jurisdiction. However, when the industrial effects of agglomeration create significant clusters in suburban jurisdictions they move from income importers to income exporters. This influx of money causes growth and as agglomeration and density increase, suburbs become more urbanized (Carlino 1998 and 2000). This causes the metropolitan area to spread towards the periphery because as the cost of living increases, people migrate toward lower cost localities (Voith 1991 and 1996).

Economic Growth Theories

Traditional economic growth theory such as central place and growth pole theory says that areas grow from the central core outward toward the periphery (Desousa and Stutz 1994). In the monocentric theory, the city is the economic base with the most concentrated areas of employment and population density decreasing toward the periphery (Boarnet 1993, Davis and Swanson 1972).

The polycentric structure has multiple sub-centers of employment and is found in many metropolitan areas. The central city is but one employment hub in this structure (McMillen and Smith 2003, McMillen and McDonald 1997). The emergence of significant growth outside the geographic center of metropolitan areas has created an economic reality vastly different from central location based development theories such as growth pole theory and central place theory (Hartshorn 2003, Lang and LeFurgy 2003). In the polycentric model the economic base of the metropolitan area is in the surrounding suburbs. Even though suburbs contain a majority of employment in metropolitan areas, they have much lower employment and population densities than traditional cores. They are spatially expansive areas with varying levels of density across jurisdictions.

Metropolitan Transformation

The theoretic framework of Metropolitan Transformation provides a basis for the empirical analysis in this dissertation of the relationship between economic/socioeconomic factors and changes in sectoral employment and poverty. A review of this literature will contribute to a fuller understanding of metropolitan structural change (Anas et. al. 1998, Hughes 1993, McMillen and Smith 2003, Martin 2004, Mieszkowski and Mills 1993, Hughes and Holland 1994 and Goldstein and Moses 1973).

Metropolitan Transformation Theory

Alonso (1975) examined regional Metropolitan Transformation and stated that areas have an equilibrium point for wages and rents that cause people and firms to relocate. When city rents become too high, people demand higher wages to compensate and this drives up costs for firms. This leads to a tipping point when people begin to look for less expensive housing in the suburbs. Firms follow a similar trend and begin to relocate to the suburbs seeking cheaper rent and labor. Employers are further enticed by the abundance of custom developed space, created to meet the needs of modern service-based businesses that are much different than the needs of a manufacturing-based economy. This movement induces rapid growth in the suburbs and causes out migration from cities. The result is decreasing employment and erosion of the city tax base (Lahr 2004). This creates a situation where suburbs benefit at the expense of cities (Voith 1992). Some argue this can also cause negative spillover effects from cities to suburbs where decreased city income leads to increased crime in the suburbs, pushing people to move even further toward the periphery of the metropolitan region (Lahr 2004).

This spatial restructuring of metropolitan areas has increased the need to understand suburban development patterns as they urbanize over time (Erickson 1986, Haynes and Machunda 1987). This restructuring has created debate in the literature about how suburban development should occur and whether it detracts or complements city economies (Kotkin 2005, Brookings 1998, Voith 1992 and 1998, Rappaport 2005, Pack 1998). Some research argues that as economic and population levels increase in

metropolitan areas, suburbs have surpassed cities as the main location of growth (Guest and Nelson 1978 and Lang, LeFurgy and Nelson 2006).

The Role of Suburban Migration

Metropolitan trends show that since the 1940s people and employment have been migrating from the center of metropolitan areas to the suburbs and exurbs (Martin 2004). Population levels in central cities and suburbs were almost even in the 1920s. By the late 1940s, suburban migration began to substantially increase. The decline of manufacturing employment since the late 1970s has further reinforced this out-migration from central cities. The most dramatic effect can be seen in Northeast and Midwest cities with economies based on manufacturing such as St. Louis, Pittsburgh and Detroit (Rappaport 2005).

Three main factors that contributed to suburban migration include increased mobility, structural changes in the U.S. industrial mix, and changes in quality of life amenities. Suburban migration was aided by the development of the U.S. highway system coupled with the affordability of automobiles. This increased the suburban migration trend and allowed people to live farther away from city jobs (Rappaport 2005). Structural changes then began to occur in suburbs due to the growth of service-based employment in these areas as employers began to move to suburban locations for lower costs and proximity to the workforce. The result was economic growth from these new businesses and residents. There are also regionally specific factors that contributed to growth such as quality of life and local amenities. For example, air conditioning

provided a suitable environment for firms to locate in the Southern and Southwestern United States (Rappaport 2005).

Metropolitan Economic Transformation

The economic transformation of the American economy has led to the growth of economic activity outside the confines of major cities. The new metropolitan form is polycentric with not one central business district but many concentrations of employment and population that are self-supporting economic centers (Muller 1997). The movement of labor and commerce to these locations has caused the economic contribution of central cities to decrease over time. This is partially due to new technology that allows firms to locate in low-cost locations without affecting their ability to meet customer needs and grow their businesses. This trend has been aided by the rise of the service-based economy and online technologies making location less important within regions. Economic structural changes have also increased the importance suburbs as the industrial mix of sub-economies has become increasingly complex. The ability for the suburbs to generate growth internally has led to a decentralization of important economic functions once dominated by central cities. Suburbs have developed their own economic base and created a critical mass of economic activity, defined as 50 percent or more of the economic activity in a metropolitan area.

As this trend continued through the mid-1980s many suburbs gained their own downtowns and became edge cities (Muller 1997). Many of these suburban jurisdictions and edge cities have developed the qualities of central cities, making them more attractive

to employers because of lower operating costs and labor cost advantages.[3] Employers in these suburban areas have also been able to hire qualified employees for lower wages due to a lower cost of living. The internet revolution in the 1990s only accelerated this trend as it has allowed many back office functions that do not require face to face customer interaction to move to these lower cost locations (Knox 1997).[4]

Policy Implications of Metropolitan Economic Transformation

This economic restructuring has important policy implications because cities must strive to retain niche location-based sectors to maintain their economic stature within a region. Central cities must also maintain their employment base because a certain level of tax revenue is needed for cities to conduct basic functions like police, fire and ambulance services. Secondary functions like social services can also be severely impacted by a decrease in tax revenue. A reduction in social services can have undesirable consequences like higher poverty rates, increased crime and lower education spending.

Suburbs are the economic beneficiaries in the service-based, footloose economy but this has created new policy implications as inner and mature suburbs become more like traditional urban areas and face challenges that were once relegated to central cities. These include higher poverty rates, increased social services needs and infrastructure

[3] The term "Edge City" was created by Joel Garreau (1991). Edge Cities are suburbs that have transformed from bedroom communities to densely populated areas with their own economic vitality and a more even residence/employment mix. Garreau defines Edge cities as having over 5 million square feet of office space, over 600,000 square feet of retail space, containing more jobs than residences, are perceived as a central location and did not exist in urban form 30 years ago.

[4] Back office function can be skilled or unskilled labor but the key is that the work can be performed without the need for direct personal contact with customers or other businesses (Knox 1997).

problems. Infrastructure can become a major issue for suburban jurisdictions if they begin to experience a pattern of sprawled development. The magnitude and importance of these issues varies for each metropolitan area as the scope, structure, and dynamics of growth differs in each region.

Policymakers in suburban municipalities are also faced with the need to craft policies to address the sometimes competing needs of old and new residents. They must balance quality of life of current residents with policies needed to address the increases employment and population. This friction of allowing market development and also providing for the needs of residents in urbanizing and newly suburbanizing parts of metropolitan areas will continue to be an issue for local policymakers (Lang 2005a).

Approaches for Examining the Changing Role of Cities and Suburbs

One of the first comprehensive economic studies on suburban areas that acknowledged the importance of studying areas outside the urban core is Stanback and Knight's 1976 book, *Suburbanization and the City*. Subsequently, there has been a large amount of economic analysis performed on suburban economies as these suburbs have become large economic contributors to metropolitan economies. This research has combined traditional urban analysis of cities and suburban economic analysis (Sole-Olle and Viladecans-Marsal 2004, Shuai 2005, Voith 1998, Glaeser 1998, Glaeser, Kolko, and Saiz 2001, Glaeser and Shapiro 2003 Lang 2002 and Gough and Lang 2003).[5]

[5] Some areas of research still focus on areas like suburban demographics and entire metropolitan economies (National League of Cities 2005, Carlino 1998, Mills and Lubuele 1995, Malpezzi, Seah and Shilling 2004).

Recent analysis of suburbs identifies and examines different types of suburban jurisdictions because they have become geographically too large and economically too complex to view as a single unit of analysis (Lang 2004, Lang 2005). This dissertation takes these spatial grouping ideas and analyzes economic and socioeconomic changes within metropolitan areas, using the counties and cities as the unit of analysis (White, Binkley, and Osterman 1993, Carlino and Mills 1987, Clark and Murphy 1996). Examining metropolitan areas by jurisdiction provides more detail about changing populations and economic structures over time. This research contributes to the literature by providing this type of approach to better understand the different parts of suburban economies as they continue to be the major employment and growth areas in metropolitan economies.

Methodologies for Categorizing Metropolitan Components

The methodology in this research characterizes cities and counties into five different spatial forms based on population density level. The five types are the core, inner suburbs, mature suburbs, emerging suburbs, and exurban areas (Leigh and Lee 2005 and Puentes 2006). The theory is that jurisdictions have distinct attributes at different stages of population density. Therefore, differences can be observed by categorizing jurisdictions by their level of population density.

Some of these differences and changing characteristics occurring during suburban transformation are that inner suburban economies begin to resemble their adjacent cities more than traditional suburbs. This means inner and increasingly mature suburbs must

deal with historically core city issues like crime, aging infrastructure, congestion, and other social needs. Suburbs that are categorized as mature have transitioned from primarily bedroom communities into areas with an increasing employment to residential mix. Areas grouped as emerging suburbs are primarily bedroom localities and experience areas of employment growth in new industries that are seeking new, low cost localities for their operations. The fastest growing parts of the suburbs are fringe areas or exurbs where growth tends to be sprawled because these localities often have limited economic development policies. These areas face significant infrastructure challenges to accommodate quickly growing population and employment levels. These areas are the newest bedroom communities, have the smallest employment base and lowest cost of living in the metropolitan area.

The methodology described above is similar to the one used in the paper, "Determining the Density of Urban, Suburban, Exurban and Rural Settlement."[6] This methodology involves creating population density levels for each block group in Ohio for the 1970, 1980, 1990 and 2000 time periods. Based on density level; each jurisdiction is categorized as urban, suburban, exurban or rural for each decade.

In this study, the urban category includes all block groups with high population densities of 5,000 or more persons per square mile and lower population densities of 1,000 to 5,000 persons per square mile. These population densities average about one-third an acre per housing unit and one-third to one fifth of an acre per housing unit, respectively. These thresholds were guided by the U.S. Census Bureau's definition of

[6] http://exurban.osu.edu/maps_ohio.htm.

urban land that "includes all block groups or blocks with a population density of at least 1,000 people per square mile, surrounded by census blocks with at least 500 people per square mile."[7]

A threshold of 1,000 people per square mile is set as the line between urban and suburban. Core urban areas are distinguished from higher density suburban areas by categorizing areas with 5,000 persons per square mile or more as urban high density. Areas with densities from 325 to 1,000 persons per square mile are categorized as suburban areas. This translates into about between 1.5 and 5 acres per housing unit. Exurban areas include all areas with population density levels of 40 to 325 or about 5 to 40 acres per household. The parameters for suburban and exurban are based on state law that focuses on the "unique nature of the 5-acre lot size in land use regulation."[8] Ohio law stipulates that lots greater than 5 acres are exempted from local subdivision regulations.

Rural areas include all block groups with population density levels less than 40 persons per square mile. This translates into 40 or more acres per housing unit. This 40-acre parameter per housing unit is utilized because it is estimated that this level is the minimum amount of land needed to successfully support agriculture. This is a conservative measure since average farms in Ohio have about 186 acres and smaller farms in urban counties average between 63 and 125 acres. Further support is provided by the national survey, "Farmland Information Library's State Farmland Protection

[7] et al.
[8] et al.

Database."[9] This survey defines large lot zoning for agriculture as "typically at least 20 acres in the eastern United States and at least 35 acres in other regions."

Additionally, a method to examine larger metropolitan components is to divide the area into three rings based on distance from the central business district. This method creates rings at three-miles, ten-miles, and beyond ten-miles from the central business district. Based on these rings, four geographic areas are created; dense metropolitan areas, centralized metropolitan areas, decentralized metropolitan areas and extremely decentralized metropolitan areas. Dense metropolitan areas have at least 25 percent metro employment within 3 miles of the Central Business District. Centralized metropolitan areas have 10 to 25 percent metropolitan employment within 3 miles of the central business district and more than 60 percent of employment within 10 miles of the CBD. Decentralized metropolitan areas have 10 to 25 percent metropolitan employment within 3 miles of the central business district but less than 60 percent of employment within 10 miles of the CBD. Extremely decentralized metropolitan areas have less than 10 percent of metropolitan employment in the CBD (Glaeser and Kahn 2001).

Other Terminologies for Metropolitan Components

Since the emergence of suburban bedroom communities, suburbs have expanded to such an extent that new terms have been developed to describe different parts of the suburbs. The terms defined in this section are included to provide a clearer understanding about the different terms used in the literature when discussing

[9] http://exurban.osu.edu/maps_ohio.htm.

metropolitan areas. Cities are defined as the administrative boundaries established by a city government. Primary downtowns refer to the original central business district in a city or the original economic center of a region. Secondary downtowns are economic centers in surrounding suburbs and other centers of business in the city or inner suburbs that are less dense than the primary downtown. Suburbs are a general term referring to areas surrounding the city boundaries. Boomburbs are defined as large suburban cities that have over 100,000 residents but are not the largest city in the metropolitan area and have maintained at least a 10 percent growth rate in the last two or more decades. They are also near the edge of the metropolitan area and are the newest developing parts of the region. Much of the growth in these areas is low-density, unplanned residential retail and business development (Lang 2004).

An edgeless city is a concept that refers to a city with economic activity spread out geographically from the urban core. In the edgeless city concept, a high level of overall employment takes place outside the city, in low-density suburban locations. Edge cities include suburbs that have transformed from bedroom communities to densely populated areas. These areas have their own economic vitality and a more even employment to resident mix. Edge cities are defined as having over 5 million square feet of office space, over 600,000 square feet of retail space, containing more jobs than residences, are perceived as a central location and did not exist in urban form 30 years ago (Garreau 1991). First suburbs are similar to edge cities and are the first ring of suburbs to develop around cities. They began as bedroom communities for city workers but over time have developed their own economic base. Mega counties are normally

found in growing regions in the Sunbelt or suburban counties around the largest U.S. cities. They are first ring suburban counties that have undergone substantial urbanization (Lang 2002). New metropolis counties are on or outside the regional fringe. They are mainly bedroom communities with little retail or business development. They are the current equivalent of early suburbs that grew around cities 70 years ago.

These terms illustrate the need to explain not just differences between suburbs and cities but the differences between different parts of the suburbs. The employment and geographic expansion of these areas has raised a debate in the literature about the economic roles and importance of suburbs and cities in regional economies. The next section summarizes these changing roles.

Summary of the Changing Role of Cities and Suburbs

Cities have historically been the focal point for production and transportation of goods within a region. The economic transformation of the U.S. economy since the 1940s has shown continued growth of economic activity outside the confines of major cities. This is due in part to new technology allowing many firms to locate in low-cost locations without drawbacks from an increased distance from the city center.

Metropolitan Transformation is an interesting and important area of research as the role of suburbs continues to increase in metropolitan economies. The structural changes occurring in the U.S. economy continue to influence employment trends and decrease the importance of centralized locations for firms within regions. Service-based sectors will most likely provide the majority of future growth in the U.S. economy. New

technologies have enabled these firms to link into networks regardless of distance, decreasing the importance of a central location within a region. Structural changes in the suburbs have given them the ability to self-generate growth through the addition of more complex industry structures. These factors have all contributed to the increasing economic importance of suburbs (Swanstrom et. al. 2004).

The growth of suburbs will continue to influence future city growth because firms not dependent on location will continue migrate to the suburbs as evidenced by the decentralization of employment in many metropolitan areas. In this environment, cities should strive to retain niche, location-based sectors to maintain their economic standing within a region. As suburbs have become the economic force in metropolitan economies, they will face new policy challenges as the characteristics of inner and mature suburbs begin to resemble central cities more than traditional suburbs (Swanstrom et. al. 2004).

Poverty in a Metropolitan Spatial Context

The literature examining poverty is vast covering subtopics such as the root causes of poverty including individual and societal influence; the effects of the state of poverty on individuals including health, education and prospects for increased standards of living; and the effects on the larger community and society such as crime, health and housing costs (Gundersen and Ziliak 2004). Research in the area of poverty and economic growth has generally found that there is a strong inverse relationship between economic growth and poverty rates (Aaron 1967, Anderson 1964, Blank 1993, Blank and Blinder 1986, Blank and Card 1993, Cain 1998, Cutler and Katz 1991, Freeman 2002,

Gottscalk and Dazinger 1985, Havean and Schabish 2000 and Iceland 2003). The strongest evidence of this was found in the 1960s and 1970s. The theory was weakened slightly in the 1980s when poverty rates did not drop as expected during the economic expansion. In fact, as can be seen in Table 2, by 1993 the poverty rate had not dropped below the 1970s average. Therefore, the trend of income inequality became a real public policy issue (Blank and Card 1993 and Iceland 2003).

Table 3 Average Poverty Rate by Decade, 1960s-1990s

Year	Unemployment Rate
1960s	19.1%
1970s	11.9%
1980s	13.8%
1990s[10]	14.4%

Source: Wolff 1997.

Poverty Trends in Central Cities and Suburbs

The metropolitan poverty literature shows that concentrations of low-income households have increased in central cities from 1970 to 1990 while simultaneously higher-income populations have increased in suburban areas (Madden 2003). Central city unemployment rates increased from 4.4 percent in 1970 to 7.3 percent in 1980 to 7.8 percent in 1990. Additionally, when comparing cities to suburbs, the central city to suburban ratio of unemployment increases from 1.33 in 1970 to 1.59 in 1990 (Deka

[10] The author only provides unemployment rates for 1990 through 1993.

1998). The same trend has been reflected in poverty rates and income as the central city to suburban ratio of poverty rates increased from 2.22 in 1980 to 2.35 in 1990 and the ratio of median household income between these two areas decreased from 0.79 to 0.74 (Deka 1998).

Inner-ring suburbs have been identified as experiencing similar spatial concentrations of poor populations as central cities (Katz and Bradley 1999 and Orfield 1997). Research has also shown that some of the inner-ring suburban areas have experienced increasing poverty rates and lower income levels (Bollens 1988; Bourne 1993; Logand and Golden 1986; Orfield 1997, 2002; Persky 1990; Scheider and Logan 1985; Madden 2002.) Madden (2002) found that central cities experience larger concentrations of poverty than suburbs. Employment base plays a role in the likelihood of increases in poverty concentration as areas that are traditionally industrial based experience larger increases in poverty compared to traditional bedroom communities (Bourne 1993).

Poverty Concentration in Metropolitan Areas

While the trend of poor populations concentrating within central urban areas has occurred simultaneously during the process of metropolitan growth, this has not been the sole or possibly even main factor in this occurrence. Some of the reason is due to low-income people not being able to afford to live in newly developed suburban locations because of price limitations (Downs 1997). The large amount of older, low-cost housing in central cities works as an incentive for low-income households to remain in urban

cores even at a time when employment is decentralizing (Deka 1998). However, a highly functioning metropolitan economy relies of people with various levels of employment skills and therefore low-income individuals are needed in order to have a functioning local economy.

The social complication that occurs is that lower-income people tend to require higher levels of social and economic government services but simultaneously contribute less to the tax base compared to higher income households. This has also caused policymakers to increase tax rates to make up for the loss in tax receipts. The drawback is the creation of an additional incentive for businesses and people with resources to move to less expensive outer locations of the metropolitan area. This in turn leads to a lack of access for poor residents to suburban jobs and a simultaneous decrease in the supply of quality jobs in central cities. These conditions eventually lead to even higher poverty rates in urban centers. The result is the growth of new suburban areas at the expense of older urban areas.

Housing policy has also reinforced this trend as most subsidized housing is located in older, urban areas and housing subsidies provide enough for only about 20 percent of poor households to live in newly developed suburban areas. Zoning laws in suburban areas also play a role by restricting land use and limiting the development of multifamily housing and in some cases even lower-cost single family housing. In addition to these conditions reinforcing poverty concentration; higher crime rates, lower quality public schools and the ineptitude of many central city governments to manage successful welfare, housing and police protection has reinforced the migration of higher-

income households with more income to move to lower tax areas thus reinforcing a concentration of poor residents in older urban areas (Downs 1997).

Employment Decentralization and the Implications for Poverty

Poverty is significantly affected by regional economic development because through this growth process, people and business are continually changing location for better opportunities (Gundersen and Ziliak 2004). Businesses move to be closer to employment opportunities and in some cases a qualified employment base. However, changing location has inherent monetary costs. Therefore, moving to areas with better employment opportunities requires resources that poor residents often lack. These include money to conduct an actual move, money for public or personal transportation and money for rent/ownership in a potentially more expensive area. The location of new employment centers as seen in the polycentric model shows that these new employment bases are often located in areas that are not easily accessible or entirely inaccessible by public transportation.

These conditions are reinforced by research that looks at how low-income, low-skilled workers have much shorter commuting times than higher-income workers but live farther away from high paying employment opportunities (Holzer, Ihlanfedt and Sjoquist 1994). The theory behind this states that this tendency for low-income, low-wage workers to commute short distances is due to high transportation costs and that workers net wages are severely impacted by the added commuting cost. This makes the decision to commute farther for a slightly higher wage not in the workers economic benefit (Clark

and Whiteman 1981). This pattern is even more pronounced for low-skilled, low-wage workers in the retail and services sectors (Inhlanfeldt and Sjoquist 1989 and Mills and Hamilton 1994). Therefore, job decentralization has a different impact across sectors (Deka 1998). According to Deka (1998) the job accessibility problem has been examined in many studies over the last four decades but none of these studies have looked at employment at the sectoral level (Kain 1968; Hill and Wolman 1997; Holzer et. al. 1994, Inhlanfelt and Sjoquist 1989, 1991; Ihlanfeldt 1992, O'Reagan and Quigley 1991, 1993, 1996; Kasarda and Ting 1996; Madden 1996; Zax and Kain 1991).

Metropolitan Transformation and Policy Implications

The theory of Metropolitan Transformation has evolved out of a need to explain and understand the importance of the changing roles of cities and suburbs in metropolitan areas. The importance of location can be seen in the changing location of people and firms within the metropolitan area. This ultimately leads a change in the economic structure of metropolitan areas. These changes are not uniform and thus differences can be observed based on certain characteristics of jurisdictions within the metropolitan area. Population density is one key indicator that can show commonality between jurisdictions in a metropolitan area. This calculation is used in this research to rank and categorize metropolitan jurisdictions and is used as a main independent variable in the economic and poverty spatial regression models.

Metropolitan Transformation theory includes suburban migration, economic agglomeration and economic restructuring. Metropolitan migration trends have shown

that people have been migrating from the center toward the periphery of metropolitan areas since the 1940s. This suburban migration has caused major shifts in population and employment. This suburban migration was made possible and sustainable through increased mobility (highway infrastructure and transportation), structural changes in U.S. employment sectors (establishment of an economic base in the suburbs and the expansion/decline of certain sectors) and the desire for better quality of life amenities. Along with suburban population migration, businesses have also relocated toward the periphery for access to cheaper land/rents and access to qualified workers. The changing structure of the economy has also decreased the need to locate in the urban center of a metropolitan area. Agglomeration economies have been created as higher skilled workers and newer businesses cluster in suburban areas. The service-based economy and online technologies played a major role in this metropolitan decentralization and agglomeration in suburban jurisdictions. The resulting economic transformation has continued as an increasing industrial mix of firms continues to migrate to suburban areas at the expense of central cities. The loss of existing and potentially new employment and the migration of higher skilled workers have caused a slow erosion of the tax base in many central cities. With less-skilled workers and less employment opportunities, central cities are left to deal with increasing social problems such as crime, poverty, unemployment and social service needs of the existing population.

Since one of the effects of transforming metropolitan economies is changes in poverty in central cities and surrounding jurisdictions, this research examines what economic/socioeconomic factors are associated with poverty rates. Understanding what

factors are associated with poverty in metropolitan areas is one public policy issue that can assist local governments in determining what steps should be taken to proactively deal with changing poverty levels as their jurisdictions transform over time. This knowledge can help local governments facilitate continued development while maintaining current residents' quality of life.

This chapter has provided an overview of the literature surrounding Metropolitan Transformation. As the literature shows, there are many factors that play into the changes occurring in metropolitan areas. Chapter III lays out the specific issues focused on in this dissertation through a detailed presentation of the research questions, hypotheses, data sources and methodologies.

CHAPTER III

RESEARCH DESIGN

Research Questions, Hypotheses, Data Sources and Methodology

This research examines how economic and socioeconomic factors relate in metropolitan cities and counties during the periods 1980-1990 and 1990-2000 through eight research questions and hypotheses. This research highlights the relationship of economic and socioeconomic factors as changes occur in jurisdictions with different levels of urbanization. Population density is used as a proxy for urbanization as defined by the U.S. Census.[11]

Research question one examines how population density, employment density and income per capita have changed in cores, inner suburbs, mature suburbs, emerging suburbs and exurban jurisdictions during the period 1980-1990 and 1990-2000. The second research question looks at sectoral concentrations and how these concentrations

[11] "For Census 2000, the Census Bureau classifies as "urban" all territory, population, and housing units located within an urbanized area (UA) or an urban cluster (UC). It delineates UA and UC boundaries to encompass densely settled territory that consists of: core census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500 people per square mile. In addition, under certain conditions, less densely settled territory may be part of each UA or UC. The Census Bureau's classification of "rural" consists of all territory, population, and housing units located outside of UAs and UCs. The rural component contains both place and non-place territory. Geographic entities, such as census tracts, counties, metropolitan areas, and the territory outside metropolitan areas, often are "split" between urban and rural territory, and the population and housing units they contain often are partly classified as urban and partly classified as rural <http://www.census.gov/geo/www/ua/ua_2k.html>."

have changed within and across jurisdictional categories. Research question three, four and five utilize a spatial regression model to examine the relationship between economic/socioeconomic factors and sectoral employment from 1980-1990 and 1990-2000. The final three research questions analyze the relationship between economic/socioeconomic factors and poverty levels.

Changes in Population, Employment, Densities and Income

Research Question: How have population density, employment density, and income levels changed in metropolitan jurisdictions from 1980 to 2000?

Hypotheses: Population density and employment density will decrease or increase slightly in the core and inner suburbs, increase moderately in the mature suburbs and increase significantly in the emerging suburbs and exurbs. Income per capita will increase the most in the core and exurban areas with increases much larger in the 1980-1990 period compared to the 1990 -2000 period.

Data Source: Place of employment data were created from a dataset called Census Place of Work. This dataset was acquired from the Department of Housing and Urban Development, Office of Policy Development and Research, Office of Economic Affairs, Economic and Public Finance Division. Population and Income data were acquired through Geolytics software for 1980 and 1990 and from the Census' American FactFinder Detailed Tables Function for 2000.

Methodology: Examination of changes in population, population density, employment, employment density, and income levels in the core, inner suburbs, mature suburbs, emerging suburbs and exurban suburbs from 1980-2000.

Location Quotient Analysis of Metropolitan Jurisdictions

Research Question: What is the pattern of sectoral concentration in metropolitan jurisdictions from 1980 to 2000?

Hypotheses: Sectoral concentrations in construction, manufacturing, retail trade and wholesale trade in city jurisdictions will be higher in all city categories than in the core. Core cities will have high concentrations in personal services, professional services and government employment. Personal services will also have high concentrations in emerging suburban cities. Sectoral concentrations in construction, manufacturing and retail trade will be high in mature emerging and exurban counties. Inner counties will also have high concentrations of employment in personal services and professional services.

Data Source: Place of employment data were created from a dataset called Census Place of Work. This dataset was acquired from the Department of Housing and Urban Development, Office of Policy Development and Research, Office of Economic Affairs, Economic and Public Finance Division.

Methodology: Location quotient analysis is used to analyze the pattern of sectoral employment and sectoral concentration change.

Sectoral Employment Models

Sectoral Employment Base Models

Research Question: What is the relationship between changes in selected economic/socioeconomic factors and employment and for all jurisdictions from 1980-1990 and 1990-2000 at the County and City level?[12][13]

Hypothesis: In Counties (1980-1990) population density change, population change, employment density change and employment change will be the main significant variables in these models.[14]

Hypothesis: In Counties (1990-2000) population density change, population change, employment density change and employment change will be the main significant variables in these models.

Hypothesis: In Cities (1980-1990) population density change, population change, employment density change and employment change will be the main significant variables in these models.

Hypothesis: In Cities (1990-2000) population density change, population change, employment density change and employment change will be the main significant variables in these models.

[12] Jurisdictional types include the core, inner suburbs, mature suburbs, maturing suburbs and exurbs.
[13] Independent variables include population density change, employment density change, population change, employment change, less than high school education, more than a high school education, income per capita change, median housing value change, poverty rate, poverty rate change, population density, employment density, income per capita, population, median value, employment, median rent, median rent change and employment density.
[14] The "main"significant variable(s) refers to the variable(s) that are significant the most number of time across all the sectoral models.

Data Source for All Sectoral Employment Models: Employment data are from Census Place of Work provided by the Department of Housing and Urban Development, Office of Policy Development and Research, Office of Economic Affairs.[15] All other data are from Census 1980, 1990, and 2000.

Methodology for All Sectoral Employment Models: Spatial regression is used to analyze the relationship between changes in socioeconomic/economic variables and sectoral employment.

Sectoral Employment Dummy Models

Research Question: What is the relationship between changes in selected economic/socioeconomic factors including jurisdictional dummy variables and employment from 1980-1990 and 1990-2000 at the County and City level?

Hypothesis: In Counties (1980-1990) a higher level of personal services employment change will be found in core, inner and mature cities. Also, mature, emerging and exurban counties will have a higher level of retail and public administration employment change.

Hypothesis: In Counties (1990-2000) a higher level of transportation, wholesale and FIRE employment change will be found in mature and emerging suburbs compared to other metro jurisdictions. A higher level of professional services employment change will be found in inner, mature, emerging and exurban areas than in the core counties.

[15] In order to convert the 2000 NAICS codes to SIC codes for comparison with prior years, the SOCDS presents estimates of the discontinued Census SIC employment data series for 2000. The estimation technique is based on the approach used to convert employment from NAICS to SIC categories in the SOCDS County Business Patterns Special Extract Data System http://socds.huduser.org/CBPSE/note.htm.

Hypothesis: In Cities (1980-1990) a higher level of wholesale employment change will be found in the core compared to other metro jurisdictions.

Hypothesis: In Cities (1990-2000) a lower level of wholesale, FIRE and retail employment change will be found in the core compared other jurisdictions. A higher level of business service employment change will be found in emerging suburbs compared to other jurisdictions.

Sectoral Employment Interactive Models

Research Question: What is the relationship between changes in selected interactive jurisdictional economic/socioeconomic factors and employment from 1980-1990 and 1990-2000 at the County and City level?

Hypothesis: In Counties (1980-1990) employment density change will be the main significant variable in the mature, emerging and exurban counties.

Hypothesis: In Counties (1990-2000) employment density change will be the main significant variable in mature, emerging and exurban counties.

Hypothesis: In Cities (1980-1990) population density change will be the main significant variable in core, inner and mature cities.

Hypothesis: In Cities (1990-2000) population density change will be the main significant variable in the core, inner and mature cities.

Poverty Models

Poverty Base Models

Research Question: What is the relationship between poverty rates and changes in selected economic/socioeconomic factors for all jurisdictions from 1980-1990 and 1990-2000 at the County and City level?

Hypothesis: In Counties (1980-1990) an increase in income per capita will be associated with lower poverty levels.

Hypothesis: In Counties (1990-2000) an increase in income per capita change will be associated with lower levels of poverty.

Hypothesis: In Cities (1980-1990) an increase in employment density change, the number of college educated, income per capita and median rents will be associated with lower poverty levels.

Hypothesis: In Cities (1990-2000) an increase in income per capita change will be associated with lower poverty levels.

Data Source for all Poverty Models: Employment data are from Census Place of Work provided by the Department of Housing and Urban Development, Office of Policy Development and Research, Office of Economic Affairs.[16] All other data are from Census 1980, 1990, and 2000.

[16] In order to convert the 2000 NAICS codes to SIC codes for comparison with prior years, the SOCDS presents estimates of the discontinued Census SIC employment data series for 2000. The estimation technique is based on the approach used to convert employment from NAICS to SIC categories in the SOCDS County Business Patterns Special Extract Data System <http://socds.huduser.org/CBPSE/note.htm>.

Methodology for All Poverty Models: Three spatial regression models are used to examine the relationship between the dependent variable, poverty and independent variables, change in economic/socioeconomic factors.

Poverty Dummy Models

Research Question: What is the relationship between poverty rates and selected economic/socioeconomic factors including jurisdictional dummy variables from 1980-1990 and 1990-2000 at the County and City level?

Hypothesis: In Counties (1980-1990) mature, emerging and exurban counties will have lower levels of poverty than inner and core counties.

Hypothesis: In Counties (1990-2000) mature, emerging and exurban counties will have lower levels of poverty than inner and core counties.

Hypothesis: In Cities (1980-1990) higher levels of poverty will be found in core and inner cities.

Hypothesis: In Cities (1990-2000) lower levels of poverty will be found in inner and mature cities.

Poverty Interactive Models

Research Question: What is the relationship between poverty rates and selected interactive jurisdictional economic/socioeconomic factors from 1980-1990 and 1990-2000 at the County and City level?

Hypothesis: In Counties (1980-1990) an increase in income per capita will be associated with lower levels of poverty in inner, mature, emerging and exurban counties.

Hypothesis: In Counties (1990-2000) an increase in income per capita and population density will be associated with lower poverty levels in inner, mature, emerging and exurban counties.

Hypothesis: In Cities (1980-1990) an increase in the number of college educated and income per capita will be associated with lower levels of poverty in core, inner, mature and emerging cities.

Hypothesis: In Cities (1990-2000) an increase in population density change will be associated with higher levels of poverty in core, inner and mature cities.

Creating the Framework for Analysis

This chapter has provided the eight research questions and hypotheses to be examined. The expected collective result of examining changes, concentrations and spatial regressions is to generate outcomes that examine the economies of metropolitan jurisdictions over time. The next chapter provides a thorough description of the data sources and dataset construction including the criteria used to select metropolitan areas included in the analysis and the number of cities and counties in each metropolitan area.

CHAPTER IV

DATA DESCRIPTION AND DATASET CONSTRUCTION

The research questions presented in Chapter III create the need to construct a comprehensive dataset for all the cities and counties in the 20 metropolitan areas in the analysis.[17] The data points for 1980, 1990 and 2000 include 135 principal cities and 190 counties totaling 325 metropolitan jurisdictions. The first two research questions use all three data points in the analysis. Additional data were created for the spatial analysis in research questions three through eight. For the analysis of these research questions, data points were calculated to show the changes from 1980 to 1990 and 1990 to 2000.

Considering the large number of jurisdictions included in the dataset, a method was needed to categorize these jurisdictions by a common characteristic. This research uses the population density method to categorize jurisdictions into core, inner, mature, emerging and exurban areas. The use of this categorization helps to illustrate patterns of employment, poverty, income and employment concentrations across metropolitan areas over time. These categorizations are based on a typology developed by Lang and Sanchez (2006). They utilized a similar methodology and categorized all metropolitan

[17] Metropolitan areas were chosen based on the 2000 U.S. census count of population.

jurisdictions according to level of population density. Similar types of jurisdictional classification have been developed by Ada Chen (2001) who categorized super-suburbs and Brennan et al. (2005) who grouped cities by economic and socioeconomic characteristics. The advantage of using the Lang and Sanchez (2006) methodology is that it provides a complete usable categorization of counties that can be adapted to categorize both the cities and counties in this research.

Data Sources

The dataset was constructed using U.S. Census data from 1980, 1990 and 2000. Due to data limitations, the starting point for the dataset is 1980. The 1970 Census data is not useful because employment data were collected at the place of residence and not place of employment. Place of employment data were crucial to this methodology because one of the underlying assumptions is that employment data reflects employment taking place within the jurisdiction. Place of residence employment data reflects employment held by residents of the jurisdiction. However, many people are employed outside their home jurisdiction and these data would not clearly show what type of employment occurs within a jurisdiction.

County and city place of employment data are found in the dataset "Census Place of Work," acquired from the Department of Housing and Urban Development's (HUD) Office of Policy Development and Research, Office of Economic Affairs, Economic and Public Finance Division. HUD's State of the Cities Data System (SOCDS) provides estimates of the discontinued Census SIC employment data series for 2000. Therefore

this system was used to convert the 2000 NAICS codes to SIC codes for comparison with 1980 and 1990. The estimation technique was based on the approach used to convert employment from NAICS to SIC categories in the State of the Cities Data System (SOCDS), County Business Patterns Special Extract Data System.[18] HUD provides public access to the city portion of these data through the State of the Cities Data System (SOCDS).[19] The county level data were part of an original Census data package and were archived by the Economic and Public Finance Division. All other data were gathered from the U.S. Census using Geolytics software for the years 1980 and 1990 and the Census' American FactFinder Detailed Tables Function for 2000.

Data Set Construction

Employment sectors were built from the 1980 Census categorizations. This required merging some 1990 and 2000 employment sectors to match the 1980 categories. Employment categories from 1980 and the subsequent combination of employment categories are provided in Appendix A. Merging the 1990 classifications to match 1980 only required a few modifications because most of the SIC categories were used in both years. The 2000 data required categorizing NAICS into SIC classifications. Continuity issues were minimized between the 1980 and 1990 SIC and 2000 NAICS through the aggregation of employment sectors into 11 major classifications. Separate datasets were created for cities and counties. Cities and counties are inherently different jurisdictional

[18] http://socds.huduser.org/CBPSE/note.htm
[19] http://socds.huduser.org/

types, both spatially and economically. They will most likely be associated with different independent variables in each model type.

Metropolitan Classifications

Lang and Sanchez (2006) classify metropolitan counties based on their degree of urbanization. The authors define urbanized counties as "slower growing, have higher population densities, feature greater 'urbanized' populations,[20] and maintain smaller proportions of non-Hispanic white residents (Lang and Sanchez 2006, 2)."[21] Under this classification system, population densities are highest in the core and decrease toward the exurbs. The population of the average core county is 100 percent urbanized and is at least 9,000 people per square mile. Inner suburbs have a high percentage of urbanized populations and average between 2,000 and 9,000 people per square mile. Mature suburbs also have a high percentage of urbanized populations with densities between 1,285 and 2,000. Density significantly decreases in emerging suburbs at levels of 300 to 1,285 people per square mile. These emerging suburbs have experienced the large population growth rates, averaging 30 percent a year in the 1990s. Exurbs have high rates of population growth but have much smaller absolute gains than in emerging suburbs.

The Metropolitan Institute codes 417 counties in the largest 50 metropolitan areas. Core counties are densely populated, traditional central cities. Inner suburbs are the first

[20] "Urbanized land" is defined by the Census Bureau as contiguously settled area with 1,000 or more people per square mile.
[21] Further detail about this classification system can be found in Lang and Dhavale's (2005), "The 2005 Governor's Race: A Geographic Analysis of the 'Four Virginias.'"

ring of the suburbs surrounding the principal city. Much of the housing in inner suburbs was built before WWII with the additional build out occurring in the following two decades. Mature suburbs are the current midpoint of metropolitan areas. They grew fast from the 1970s to 1990s but recently have experienced slower growth rates. They contain secondary cities with affluent neighborhoods and concentrations of business employment centers. Neighborhoods are mostly subdivisions with some newly constructed mixed use development, giving a more urban character to the area. Emerging suburbs are the fastest growing counties in a region. They were mostly constructed in the 1980s and 1990s, undergoing rapid growth in population and business activity. Exurbs have mostly rural population densities. In these areas land is inexpensive and suburbanization has not taken hold in any significant way. These jurisdictions are included in metropolitan areas because of the high level of residential commuting to other employment locations in the metropolitan area (Lang and Sanchez 2006).

The city and county classifications in this study use the methodology of Lang and Sanchez (2006) as the basis for jurisdictional categorization. Table 4 shows the degree of urbanization, along with the population density classification parameters set by Lang and Sanchez (2006). The parameters are the average of 417 counties in the 50 largest metropolitan areas in the United States. For example, to be categorized as a mature suburb the jurisdiction must have a population density greater than 1,285 but less than 2,000.[22]

[22] The population density parameters used to categorize metropolitan jurisdictions are based on 1980 density levels.

Table 4 The Process of Metropolitan Transformation

Type of Jurisdiction	Degree of Urbanization	Population Density Classification Parameters
Core	Urban	Core > 9,000
Inner Suburb	Urban	9,000 > Inner Suburb > 2,000
Mature Suburb	Recently Urban	2,000 > Mature Suburb > 1,285
Emerging Suburb	Suburban	1,285 > Emerging Suburb > 300
Exurban Suburb	Suburbanizing	300 > Exurb > 0

Source: Lang and Sanchez 2006.

Table 5 shows the twenty most populous metropolitan areas based on Census 2000 including all counties and principal cities in these metropolitan statistical areas. These population levels were used as the parameters for choosing the metropolitan areas to include in this research. The metropolitan areas included are New York, Los Angeles, Chicago, Philadelphia, Dallas, Miami, Washington, Houston, Detroit, Boston, Atlanta, San Francisco, Riverside-San Bernardino, Phoenix, Seattle, Minneapolis, St. Louis, San Diego, Baltimore, and Pittsburgh. In the dataset dummy variables were used to denote jurisdiction types. Table 6 provides a breakdown of the number of cities and counties in each metropolitan area.

Table 5 Population Levels in 2000

	Metropolitan Statistical Area	2000
1	New York Northern New Jersey Long Island NY NJ PA	18,323,002
2	Los Angeles Long Beach Santa Ana CA	12,365,627
3	Chicago Naperville Joliet IL IN WI	9,098,316
4	Philadelphia Camden Wilmington PA NJ DE MD	6,392,414
5	Dallas Fort Worth Arlington TX	5,161,544
6	Miami Fort Lauderdale Miami Beach FL	5,007,564
7	Washington Arlington Alexandria DC VA MD WV	5,000,306
8	Houston Baytown Sugar Land TX	4,715,407
9	Detroit Warren Livonia MI	4,452,557
10	Boston Cambridge Quincy MA NH	4,391,344
11	Atlanta Sandy Springs Marietta GA	4,247,981
12	San Francisco Oakland-Fremont CA	4,123,740
13	Riverside San Bernardino-Ontario CA	3,254,821
14	Phoenix Mesa Scottsdale AZ	3,251,876
15	Seattle Tacoma-Bellevue WA	3,043,878
16	Minneapolis St Paul Bloomington MN WI	2,970,573
17	St Louis MO IL	2,885,244
18	San Diego Carlsbad San Marcos CA	2,813,833
19	Baltimore Towson MD	2,656,132
20	Pittsburgh PA	2,429,320

Source: Population Division, U.S. Census Bureau, released 12-30-03.[23]

[23] Metropolitan populations are defined by Census 2000. <http://www.census.gov/population/cen2000/phc-t29/tab03a.xls> and <http://www.census.gov/population/www/cen2000/phc-t29.html>. Metropolitan jurisdictions are defined by Census 2003. Components: <http://www.census.gov/population/estimates/metro-city/03msa.txt>, Counties: <http://www.census.gov/population/estimates/metro-city/030606OMB_CBSA_CSA.xls>, Cities: <http://www.census.gov/population/estimates/metro-city/03cbsa.txt>.

Table 6 Number and Percentage of Cities and Counties included from each MSA[24]

	Metropolitan Statistical Area	City	County	City Percent	County Percent
1	New York Northern New Jersey Long Island NY NJ PA	6	22	21%	79%
2	Los Angeles Long Beach Santa Ana CA	25	2	93%	7%
3	Chicago Naperville Joliet IL IN WI	10	14	42%	58%
4	Philadelphia Camden Wilmington PA NJ DE MD	3	10	23%	77%
5	Dallas Fort Worth Arlington TX	9	12	43%	57%
6	Miami Fort Lauderdale Miami Beach FL	10	3	77%	23%
7	Washington Arlington Alexandria DC VA MD WV	5	16	24%	76%
8	Houston Baytown Sugar Land TX	4	10	29%	71%
9	Detroit Warren Livonia MI	9	6	60%	40%
10	Boston Cambridge Quincy MA NH	6	7	46%	54%
11	Atlanta Sandy Springs Marietta GA	3	28	10%	90%
12	San Francisco Oakland-Fremont CA	12	4	75%	25%
13	Riverside San Bernardino-Ontario CA	7	2	78%	22%
14	Phoenix Mesa Scottsdale AZ	4	2	67%	33%
15	Seattle Tacoma-Bellevue WA	6	3	67%	33%
16	Minneapolis St Paul Bloomington MN WI	7	13	35%	65%
17	St Louis MO IL	2	16	11%	89%
18	San Diego Carlsbad San Marcos CA	4	1	80%	20%
19	Baltimore Towson MD	2	6	25%	75%
20	Pittsburgh PA	1	7	13%	88%
	Total Cities and Counties	135	184	42%	58%
	319 Total Jurisdictions				

Source: http://www.census.gov/population/www/estimates/metrodef.html.

In table 7 the MSAs are sorted by county percentage. A slight pattern according to region can be observed. In Table 8 the MSAs are sorted by region. The Northeast and Midwest have the highest number of county jurisdictions while the West and South have the highest number of cities. The Southwest region is the most balanced between cities and counties.[25]

[24] http://www.census.gov/population/www/estimates/metrodef.html

[25] Table B1 and B2 in the Appendix list all 135 city and 184 county categorizations in 1980. Tables C1 and C2 show the jurisdictions that changed categories from 1980-1990. Tables C3 and C4 illustrate the jurisdictions that changed categories from 1990-2000. Table C5 provides a summary of the city and county categorizations by year.

Table 7 Cities and Counties in each MSA Sorted by County Percentage

Metropolitan Statistical Area	Region	City	County	City Percent	County Percent
Atlanta Sandy Springs Marietta GA	S	3	28	10%	90%
St Louis MO IL	MW	2	16	11%	89%
Pittsburgh PA	MW	1	7	13%	88%
New York Northern New Jersey Long Island NY NJ PA	NE	6	22	21%	79%
Philadelphia Camden Wilmington PA NJ DE MD	NE	3	10	23%	77%
Washington Arlington Alexandria DC VA MD WV	NE	5	16	24%	76%
Baltimore Towson MD	NE	2	6	25%	75%
Houston Baytown Sugar Land TX	SW	4	10	29%	71%
Minneapolis St Paul Bloomington MN WI	MW	7	13	35%	65%
Chicago Naperville Joliet IL IN WI	MW	10	14	42%	58%
Dallas Fort Worth Arlington TX	SW	9	12	43%	57%
Boston Cambridge Quincy MA NH	NE	6	7	46%	54%
Detroit Warren Livonia MI	MW	9	6	60%	40%
Phoenix Mesa Scottsdale AZ	SW	4	2	67%	33%
Seattle Tacoma-Bellevue WA	W	6	3	67%	33%
San Francisco Oakland-Fremont CA	W	12	4	75%	25%
Miami Fort Lauderdale Miami Beach FL	S	10	3	77%	23%
Riverside San Bernardino-Ontario CA	W	7	2	78%	22%
San Diego Carlsbad San Marcos CA	W	4	1	80%	20%
Los Angeles Long Beach Santa Ana CA	W	25	2	93%	7%
Total Cities and Counties		135	184	42%	58%
319 Total Jurisdictions					

Table 8 Cities and Counties in each MSA Sorted by Region

Metropolitan Statistical Area	Region	City	County	City Percent	County Percent
St Louis MO IL	MW	2	16	11%	89%
Chicago Naperville Joliet IL IN WI	MW	10	14	42%	58%
Minneapolis St Paul Bloomington MN WI	MW	7	13	35%	65%
Pittsburgh PA	MW	1	7	13%	88%
Detroit Warren Livonia MI	MW	9	6	60%	40%
New York Northern New Jersey Long Island NY NJ PA	NE	6	22	21%	79%
Washington Arlington Alexandria DC VA MD WV	NE	5	16	24%	76%
Philadelphia Camden Wilmington PA NJ DE MD	NE	3	10	23%	77%
Boston Cambridge Quincy MA NH	NE	6	7	46%	54%
Baltimore Towson MD	NE	2	6	25%	75%
Atlanta Sandy Springs Marietta GA	S	3	28	10%	90%
Miami Fort Lauderdale Miami Beach FL	S	10	3	77%	23%
Dallas Fort Worth Arlington TX	SW	9	12	43%	57%
Houston Baytown Sugar Land TX	SW	4	10	29%	71%
Phoenix Mesa Scottsdale AZ	SW	4	2	67%	33%
San Francisco Oakland-Fremont CA	W	12	4	75%	25%
Seattle Tacoma-Bellevue WA	W	6	3	67%	33%
Los Angeles Long Beach Santa Ana CA	W	25	2	93%	7%
Riverside San Bernardino-Ontario CA	W	7	2	78%	22%
San Diego Carlsbad San Marcos CA	W	4	1	80%	20%
Total Cities and Counties		135	184	42%	58%
319 Total Jurisdictions					

Chapter Review and Outline of the Research Questions

This chapter has provided information about how the dataset is constructed based on methods established in the literature. Population density is used to categorize city and county jurisdictions into core, inner, mature, emerging and exurban jurisdictions. The tables showing the number of cities and counties in each metropolitan area illustrate the wide differences in the number of cities and counties that make up the metropolitan areas in the dataset. Finally, Table 8 shows interesting patterns of cities and counties in different regions of the U.S.

In the next chapter, the first research question examines how economic conditions have changed in the metropolitan jurisdictions during the period 1980-2000 by examining changes in population density, employment density, and income levels in the different

metropolitan jurisdictions during the 1980 to 2000 time period. Chapter 6 looks at the changes in sectoral concentrations across jurisdictional categories through location quotient analysis. Chapter 7 and 8 use a spatial regression model to examine how economic and socioeconomic factors are associated with changes in employment concentrations. In chapters 9 and 10, the final research questions use a similar spatial regression model to examine how economic and socioeconomic factors are associated with poverty rates in metropolitan areas.

CHAPTER V

ECONOMIC CHANGES IN METROPOLITAN JURISDICTIONS

This chapter examines the changes in population density, employment density and income levels. It is hypothesized that the results will show that the core and inner jurisdictions have experienced slower population and employment density growth over the 30-year period while mature, emerging and exurban areas have experienced much faster rates of growth. It is also expected that uneven income distribution will become more evenly divided among the jurisdictions from 1980 to 2000.

Research Question: How have population density, employment density, and per capita income changed in metropolitan jurisdictions from 1980 to 2000?

Hypothesis: Population density and employment density will decrease or increase slightly in the core and inner suburbs, increase moderately in the mature suburbs and increase significantly in the emerging suburbs and exurbs. Income per capita will increase most in the core and exurban areas with much larger increases in 1980-1990 compared to the 1990-2000 period.

Analysis of Population Density, Employment Density and Income Per Capita

Changes in population density, employment density and income per capita can be seen in Tables 9 through 11. Examination of employment shows a drastic difference between core and inner suburb employment growth and the outer suburbs. In tables 9a and 9b, core and inner suburban city employment density averages a 12 percent increase from 1980 to 1990 while the county averages 9 percent. During the same period; the mature, emerging and exurban cites average a 38 percent increase with counties averaging a 25 percent increase.

From 1990 to 2000, core and inner suburban cities average a 0.5 percent increase and counties averaged a 1 percent increase. Conversely, the mature, emerging and exurban cities averaged a 31 percent increase and the counties averaged a 15 percent increase. This illustrates the dramatic difference between employment growth rates in the core and inner areas and the mature, emerging and exurban areas

Table 9a Jurisdictional Employment Density and Employment

	Average Employment Density			Total Employment		
	1980	1990	2000	1980	1990	2000
City						
Core	7,231	8,021	7,831	8,444,716	9,165,856	8,703,435
Inner Suburbs	2,778	3,229	3,336	8,221,207	9,238,297	9,551,623
Mature Suburbs	967	1,440	1,751	1,355,356	1,904,859	2,300,310
Emerging Suburbs	576	959	1,372	433,808	751,095	1,098,070
Exurbs	208	366	662	28,540	47,897	83,025
County						
Core	20,971	23,312	23,314	7,698,370	8,525,445	8,407,790
Inner Suburbs	2,159	2,523	2,687	6,584,953	7,084,613	7,145,085
Mature Suburbs	715	895	988	7,844,533	9,623,363	10,582,875
Emerging Suburbs	275	373	435	11,420,030	14,933,991	16,316,051
Exurbs	50	70	90	4,481,702	6,416,798	8,224,366

Table 9b Jurisdictional Employment Density and Employment Percent Change

	Average Employment Density Change		Employment Change	
City	1980-1990	1990-2000	1980-1990	1990-2000
Core	10%	-2%	8%	-5%
Inner Suburbs	14%	3%	11%	3%
Mature Suburbs	33%	18%	29%	17%
Emerging Suburbs	40%	30%	42%	32%
Exurbs	43%	45%	40%	42%
Counties				
Core	10%	0%	10%	-1%
Inner Suburbs	8%	2%	7%	1%
Mature Suburbs	20%	9%	18%	9%
Emerging Suburbs	26%	14%	24%	8%
Exurbs	28%	23%	30%	22%

In tables 10a and 10b it can be seen that the core and inner suburban city population density averages an 8 percent decrease from 1980 to 1990 while the county averages a 12 percent increase. During the same period, the mature, emerging and exurban cites average a 49 percent increase and a 26 percent increase in these counties.

From 1990 to 2000, core and inner suburban cities average a 35 percent increase and the counties average a 15 percent decrease. Conversely, the mature, emerging and

exurban cities averaged a 54 percent increase and the counties averaged an 8 percent increase. This illustrates the dramatic difference between population growth rates in the core and inner areas and the mature, emerging and exurban areas. Another interesting trend is that from 1980-1990 core and emerging counties grew 22 percent with the exurbs growing 52%. However, the inner and mature counties had much lower growth rates of 2 and 4 percent respectively.

Table 10a Jurisdictional Population Density and Population

	Average Population Density			Total Population		
City	1980	1990	2000	1980	1990	2000
Core	12,739	11,968	17,288	23,127,491	18,947,105	28,829,394
Inner Suburbs	4,426	4,775	7,582	12,847,450	13,560,174	21,855,317
Mature Suburbs	1,602	2,361	3,963	2,413,500	3,163,231	5,655,751
Emerging Suburbs	891	1,552	3,365	773,964	1,314,800	2,817,763
Exurbs	181	652	1,996	32,259	89,141	263,204
County						
Core	10,013	12,788	10,431	5,595,312	7,056,244	5,954,936
Inner Suburbs	2,101	2,695	2,159	7,046,294	7,164,896	6,707,689
Mature Suburbs	782	1,058	870	8,198,962	8,564,789	9,183,442
Emerging Suburbs	321	491	428	10,582,123	13,498,489	15,984,506
Exurbs	52	109	105	4,392,358	8,945,672	9,331,478

Table 10b Jurisdictional Population Density and Population Percent Change

	Average Population Density Change		Population Change	
City	1980-1990	1990-2000	1980-1990	1990-2000
Core	-23%	32%	-22%	34%
Inner Suburbs	7%	37%	5%	38%
Mature Suburbs	32%	40%	24%	44%
Emerging Suburbs	43%	54%	41%	53%
Exurbs	72%	67%	64%	66%
County				
Core	22%	-22%	21%	-18%
Inner Suburbs	2%	-8%	2%	-7%
Mature Suburbs	4%	6%	4%	7%
Emerging Suburbs	22%	14%	22%	16%
Exurbs	52%	4%	51%	4%

Tables 11a and 11b contain the per capita income levels. Income in the 1980s was fairly evenly distributed between all parts of city and county metro jurisdictions. The core had the largest growth in both jurisdiction types. Income growth slowed during the 1990s and income growth was the lowest in inner suburban cities and counties. In counties growth generally increased from the core to the exurbs, except for the inner suburbs. In cities the growth was more balanced with the most growth found in core and exurban cities.

Table 11a Per Capita Income in 1980 Dollars

	Average Per Capita Income		
City	1980	1990	2000
Core	15,837	21,137	24,204
Inner Suburbs	19,000	23,374	25,450
Mature Suburbs	18,447	23,374	25,852
Emerging Suburbs	19,508	25,830	29,402
Exurbs	14,212	18,660	21,399
County			
Core	15,158	20,908	23,350
Inner Suburbs	18,419	24,865	27,121
Mature Suburbs	21,221	28,176	31,255
Emerging Suburbs	17,506	22,988	26,053
Exurbs	14,374	18,045	21,621

Table 11b Per Capita Income Percent Change in 1980 Dollars

	Average Per Capita Income Change	
City	1980-1990	1990-2000
Core	25%	13%
Inner Suburbs	19%	8%
Mature Suburbs	21%	10%
Emerging Suburbs	24%	12%
Exurbs	24%	13%
County		
Core	27%	10%
Inner Suburbs	26%	8%
Mature Suburbs	25%	10%
Emerging Suburbs	24%	12%
Exurbs	20%	17%

Research Results

The results show major increases in population density and employment density in the 1980-1990 time period for mature, emerging and exurban cities and counties. Core cities and counties mostly experienced much smaller increases except for the decreases in population density in 1980-1990 cities and 1990-2000 counties. The results in tables 7 through 9 provide support for the hypothesis that population density and employment density will decrease or increase slightly in the core and inner suburbs, increase moderately in the mature suburbs and increase dramatically in the emerging suburbs and exurbs. The results also show income per capita with the largest increase in the core and exurban areas and much larger increases in the 1980-1990 period compared to the 1990 - 2000 period.

These results support the Metropolitan Transformation theory that metropolitan areas have been experiencing spatial restructuring with a majority of the growth occurring outside the more densely populated urban centers. Suburban areas have

experienced large increases in population and employment density levels. This has led to the increased importance of suburban locations as employment centers, generating growth in polycentric metropolitan areas.

This chapter provided a starting point for examining metropolitan areas by looking at employment density and population density trends in metropolitan areas from 1980 to 2000. The insight provided is that there are in fact changes that occurring and the level of change is different based on the type of jurisdiction. The next chapter uses analysis by jurisdiction type to look at the patterns of sectoral concentration in 11 different employment sectors. This will provide insight into whether there are changes in sectoral concentration in different metropolitan jurisdictions and potentially add further support to the theory of Metropolitan Transformation.

CHAPTER VI

LOCATION QUOTIENT ANALYSIS OF METROPOLITAN JURISDICTIONS

The second research question looks at the changes in sectoral concentrations across jurisdictional categories through location quotient analysis. The location quotient analysis includes all metropolitan areas in the study. Locations quotients are calculated for the three periods to illustrate changes in employment concentration over time. The results will show how employment concentration changes as areas evolve through the process of urbanization from rural bedroom communities to a locally focused economy to locally-focused with an emerging export base to a diverse economy to a niche-focused export based economy. Comparing location quotients between the cities and suburbs are useful for illustrating sectoral employment concentrations in each area.

Research Question: What is the pattern of sectoral concentration in metropolitan jurisdictions from 1980 to 2000?

Hypothesis: Sectoral concentrations in construction, manufacturing, retail trade and wholesale trade in city jurisdictions will be higher in all city categories than in the core. Core cities will have high concentrations in personal services, professional services and government employment. Personal services will also have high concentrations in

emerging suburban cities. Sectoral concentrations in construction, manufacturing and retail trade will be high in mature emerging and exurban counties. Inner counties will also have high concentrations of employment in personal services and professional services.

Measuring Firm Location

Location quotient analysis helps in understanding how employment is concentrated in each sector and how this employment serves local or non-local markets. Location quotients measure the level of concentration of employment in an industry locally, compared to its national concentration. Location quotients are a fraction with the numerator representing employment in the local industry compared to total employment locally and the denominator composed of industry employment in the national economy compared to total employment in the national economy. Local specialization is indicated by a location quotient above 1.0, while a result of 1.0 shows no difference in specialization and below 1.0 indicates the area has less specialization than the national economy. This measurement assists in determining the local export base and how much outside money is coming into the local economy (North 1955).

Areas with location advantages form nodes that begin to lower transportation and production costs of exported goods. Nodal centers become focal points where exported goods are shipped out and imported goods enter the area. This economic activity creates a secondary group of firms called subsidiary industries that are specifically focused on supporting the export industry, resulting in lower costs. Over time, the growth of export

industries change the makeup of the labor force as prosperous industries hire more workers and worker develop additional skills for employment in these new jobs (North 1955).

Location Quotient Analysis

Since the location quotients are calculated with the metropolitan area as the reference region and not the U.S., the interpretation is slightly different for this analysis. In this context a location quotient over 1.0 signifies a higher concentration of employment in that sector when considering employment in all other sectors compared to overall MSA employment. Therefore, high location quotients will help identify sectors with high employment concentrations within the metropolitan area.

The location quotients in tables 12a and 12b are summary tables showing city and county employment concentrations in each metropolitan categorization for 1980, 1990 and 2000. Tables 13a through 13f shows location quotient increases or decreases throughout the period. Tables 14a through 14b highlight metropolitan export sectors with location quotients over 1.0.

Table 12a City - Core, Inner, Mature, Emerging, and Exurban LQs 1980-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.95	0.90	0.94	0.87	0.93	0.91	1.02	1.16	1.19	1.01	1.10
	1990	0.98	0.92	0.92	0.84	0.93	0.86	0.96	1.16	1.19	1.21	1.00
	2000	0.95	0.86	1.01	0.85	0.96	0.82	0.97	1.06	1.17	1.30	1.01
Inner	1980	1.16	1.18	0.81	1.18	1.19	0.93	0.95	0.91	0.92	0.70	1.03
	1990	1.03	1.18	0.90	1.20	1.18	0.97	1.02	0.87	0.91	0.78	1.00
	2000	1.03	1.20	0.90	1.25	1.12	0.94	0.93	0.94	0.95	0.80	0.94
Mature	1980	1.11	1.28	0.81	0.92	1.25	0.78	0.85	0.89	1.00	0.96	1.11
	1990	1.14	1.31	0.82	1.08	1.17	0.92	0.86	0.88	0.89	1.02	0.95
	2000	1.05	1.36	0.80	1.09	1.05	0.91	0.86	0.91	0.98	1.12	0.89
Emerging	1980	1.25	1.17	0.69	1.05	1.03	0.95	0.97	0.98	0.93	1.04	0.90
	1990	1.16	1.23	0.83	1.13	1.15	0.95	1.16	0.90	0.89	0.43	1.12
	2000	1.05	1.21	0.85	1.16	1.33	0.93	0.97	0.97	1.00	0.62	0.97
Exurbs	1980	1.50	1.30	0.90	0.64	1.07	1.29	0.74	1.02	0.87	0.49	1.15
	1990	1.26	1.25	0.71	0.66	1.20	1.09	0.83	1.20	0.87	0.70	1.21
	2000	1.26	1.12	0.56	0.80	1.28	0.99	0.88	1.25	0.96	0.85	0.99

Table 12b County - Core, Inner, Mature, Emerging, and Exurban LQs 1980-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.90	0.80	1.30	0.90	0.90	1.10	0.90	1.00	1.10	1.20	0.85
	1990	0.88	0.82	1.25	0.87	0.85	0.99	0.91	0.99	1.10	1.46	0.89
	2000	0.89	0.78	1.19	0.85	0.86	1.05	0.91	1.02	1.09	1.32	1.00
Inner	1980	1.10	1.20	0.90	1.20	1.10	0.90	1.00	1.00	1.00	0.80	0.80
	1990	0.97	1.20	0.91	1.10	1.13	0.89	0.98	1.06	0.96	0.82	0.97
	2000	0.97	1.17	0.94	1.08	1.07	0.89	0.97	1.02	1.02	0.91	1.00
Mature	1980	1.10	1.10	0.90	1.10	1.10	0.90	1.10	0.90	1.00	0.90	0.95
	1990	1.02	1.09	0.95	1.16	1.04	0.96	1.04	0.95	0.98	0.83	0.97
	2000	1.01	1.11	0.99	1.13	0.99	0.96	1.00	0.94	0.99	0.88	0.95
Emerging	1980	1.20	1.00	0.90	0.80	1.10	0.80	0.90	1.00	1.00	1.10	1.20
	1990	1.19	0.98	0.94	0.92	1.14	0.87	0.94	1.04	0.97	0.81	1.20
	2000	1.14	1.02	0.89	1.01	1.11	0.88	0.95	1.02	0.98	0.99	1.02
Exurbs	1980	1.30	1.20	0.70	0.90	1.00	0.80	0.80	1.00	1.00	0.80	1.50
	1990	1.40	1.32	0.75	0.85	1.08	0.64	0.73	0.99	0.99	0.90	1.25
	2000	1.32	1.20	0.74	0.80	1.08	0.67	0.70	1.02	1.04	1.04	1.40

Tables 13a through 13f illustrate different approaches to examining concentrations. Table 13a through 13d below shows increases and decreases of location quotients over time. Construction employment generally decreased during this time with increases in a few jurisdictions including the core city 1980-1990 and core county 1990-2000. Manufacturing employment showed growth in mature cities and core and exurban counties in the 1980-1990 period. The 1990-2000 period showed an increase in inner and

mature cities with increases in mature and emerging counties. Transportation showed increases in 1980-1990 in inner, mature and emerging cities as well as in inner mature, emerging and exurban counties. In the 1990-2000 period there were increases in core and emerging cities and core, inner and mature counties.

In the wholesale sector there were increases in inner, mature, emerging and exurban cities and mature and emerging counties. The 1990-2000 period showed increases in all cities along with increases in emerging counties. Retail employment increased in the 1980-1990 emerging and exurban cities. It also increased in the inner, emerging and exurban counties. In the 1990-2000 period, retail employment increased in core, emerging and exurban cities and core counties.

FIRE employment increased in 1980-1990 inner and mature cities and mature and emerging counties. In 1990-2000, there were increases in core, emerging and exurban counties and no city increases. Business services increased in all 1980-1990 cities beside the cores and core and emerging counties.

Personal services in 1980-1990 only increased in exurban cities while in 1990-2000 it increased in emerging and exurban cities. In 1980-1990 counties it increased in inner, mature and emerging counties and in 1990-2000 it increased in core, inner and exurban counties.

Professional services in 1980-1990 decreased in inner, mature and emerging cities while in 1990-2000 it only decreased in the core cities. In 1980-1990 counties it decreased in all areas except the core and in 1990-2000 it increased in all jurisdictions except the core. Government services increased in all areas except emerging suburbs in

1980-1990 cities and increased in core and inner and exurban counties. In 1990-2000, all areas increased except core cities and emerging counties.

Table 13a City--Sectoral Increase or Decrease 1980-1990

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1990	↑	↓	↓	↓	↔	↓	↓	↔	↔	↑	↓
Inner	1990	↓	↔	↑	↑	↓	↑	↑	↓	↓	↑	↓
Mature	1990	↑	↑	↑	↑	↓	↑	↑	↓	↓	↑	↓
Emerging	1990	↓	↓	↑	↑	↑	↔	↑	↓	↓	↓	↑
Exurbs	1990	↓	↓	↓	↑	↑	↓	↑	↑	↔	↑	↑

Table 13b County--Sectoral Increase or Decrease 1980-1990

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1990	↓	↑	↓	↓	↓	↓	↑	↓	↔	↑	↑
Inner	1990	↓	↔	↑	↓	↑	↓	↓	↑	↓	↑	↑
Mature	1990	↓	↓	↑	↑	↓	↑	↓	↑	↓	↓	↑
Emerging	1990	↓	↓	↑	↑	↑	↑	↑	↑	↓	↓	↔
Exurbs	1990	↑	↑	↑	↓	↑	↓	↓	↓	↓	↑	↓

Table 13c City--Sectoral Increase or Decrease 1990-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	2000	↓	↓	↑	↑	↑	↓	↑	↓	↓	↑	↑
Inner	2000	↑	↑	↔	↑	↓	↓	↓	↓	↑	↑	↓
Mature	2000	↓	↑	↓	↑	↓	↓	↑	↓	↑	↑	↓
Emerging	2000	↓	↓	↑	↑	↑	↓	↓	↑	↑	↓	↓
Exurbs	2000	↔	↓	↓	↑	↑	↓	↑	↑	↑	↑	↓

Table 13d County--Sectoral Increase or Decrease 1990-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	2000	↑	↓	↑	↓	↑	↑	↔	↑	↓	↓	↑
Inner	2000	↔	↓	↑	↓	↓	↔	↓	↑	↑	↑	↑
Mature	2000	↓	↑	↑	↓	↓	↔	↓	↓	↑	↑	↑
Emerging	2000	↓	↑	↓	↑	↓	↑	↑	↓	↑	↑	↓
Exurbs	2000	↓	↓	↓	↓	↔	↑	↓	↑	↑	↑	↑

Table 13e City—Size of Sectoral Increase or Decrease 1980-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.95	0.90	0.94	0.87	0.93	0.91	1.02	1.16	1.19	1.01	1.10
	1990	0.02	0.02	(0.02)	(0.03)	0.00	(0.05)	(0.06)	0.00	(0.00)	0.20	(0.10)
	2000	(0.03)	(0.06)	0.09	0.01	0.03	(0.03)	0.01	(0.10)	(0.02)	0.09	0.01
Inner	1980	1.16	1.18	0.81	1.18	1.19	0.93	0.95	0.91	0.92	0.70	1.03
	1990	(0.12)	0.00	0.09	0.01	(0.02)	0.04	0.07	(0.04)	(0.01)	0.08	(0.04)
	2000	(0.01)	0.02	0.00	0.05	(0.06)	(0.04)	(0.09)	0.07	0.04	0.01	(0.05)
Mature	1980	1.11	1.28	0.81	0.92	1.25	0.78	0.85	0.89	1.00	0.96	1.11
	1990	0.03	0.03	0.01	0.16	(0.08)	0.14	0.01	(0.01)	(0.11)	0.06	(0.16)
	2000	(0.09)	0.05	(0.02)	0.01	(0.12)	(0.01)	(0.01)	0.03	0.09	0.10	(0.07)
Emerging	1980	1.25	1.17	0.69	1.05	1.03	0.95	0.97	0.98	0.93	1.04	0.90
	1990	(0.09)	0.06	0.13	0.08	0.12	(0.00)	0.19	(0.08)	(0.04)	(0.61)	0.22
	2000	(0.11)	(0.02)	0.02	0.02	0.18	(0.02)	(0.19)	0.06	0.11	0.19	(0.15)
Exurbs	1980	1.50	1.30	0.90	0.64	1.07	1.29	0.74	1.02	0.87	0.49	1.15
	1990	(0.24)	(0.05)	(0.18)	0.02	0.13	(0.20)	0.09	0.18	0.00	0.21	0.06
	2000	(0.00)	(0.13)	(0.15)	0.14	0.08	(0.10)	0.05	0.05	0.09	0.15	(0.22)

Table 13f County—Size of Sectoral Increase or Decrease 1980-2000

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.90	0.80	1.30	0.90	0.90	1.10	0.90	1.00	1.10	1.20	0.85
	1990	(0.02)	0.02	(0.05)	(0.03)	(0.05)	(0.11)	0.01	(0.01)	0.00	0.26	0.04
	2000	0.01	(0.04)	(0.07)	(0.02)	0.01	0.06	(0.00)	0.03	(0.01)	(0.13)	0.11
Inner	1980	1.10	1.20	0.90	1.20	1.10	0.90	1.00	1.00	1.00	0.80	0.80
	1990	(0.13)	0.00	0.01	(0.10)	0.03	(0.01)	(0.02)	0.06	(0.04)	0.02	0.17
	2000	(0.00)	(0.03)	0.03	(0.02)	(0.06)	0.00	(0.01)	(0.04)	0.06	0.09	0.03
Mature	1980	1.10	1.10	0.90	1.10	1.10	0.90	1.10	0.90	1.00	0.90	0.95
	1990	(0.08)	(0.01)	0.05	0.06	(0.06)	0.06	(0.06)	0.05	(0.02)	(0.07)	0.02
	2000	(0.01)	0.03	0.04	(0.03)	(0.04)	0.00	(0.04)	(0.00)	0.01	0.06	(0.02)
Emerging	1980	1.20	1.00	0.90	0.80	1.10	0.80	0.90	1.00	1.00	1.10	1.20
	1990	(0.01)	(0.02)	0.04	0.12	0.04	0.07	0.04	0.04	(0.03)	(0.29)	(0.00)
	2000	(0.05)	0.04	(0.04)	0.09	(0.03)	0.01	0.00	(0.01)	0.01	0.18	(0.18)
Exurbs	1980	1.30	1.20	0.70	0.90	1.00	0.80	0.80	1.00	1.00	0.80	1.50
	1990	0.10	0.12	0.05	(0.05)	0.08	(0.16)	(0.07)	(0.01)	(0.01)	0.10	(0.25)
	2000	(0.08)	(0.12)	(0.00)	(0.05)	0.01	0.03	(0.03)	0.02	0.05	0.14	0.15

Table 14a and 14b illustrate sectoral concentrations in each year. Construction, manufacturing and retail trade are above 1.0 in all city jurisdictions besides the core. Wholesale trade is above 1.0 in the inner, mature and emerging cities, except mature 1980. In core cities, strong sectors include personal services, professional services and

government employment. Personal services are also over 1.0 in all years for emerging exurban cities.

Table 14a City--Export Sectors with LQ over 1.0

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.95	0.90	0.94	0.87	0.93	0.91	1.02	1.16	1.19	1.01	1.10
	1990	0.98	0.92	0.92	0.84	0.93	0.86	0.96	1.16	1.19	1.21	1.00
	2000	0.95	0.86	1.01	0.85	0.96	0.82	0.97	1.06	1.17	1.30	1.01
Inner	1980	1.16	1.18	0.81	1.18	1.19	0.93	0.95	0.91	0.92	0.70	1.03
	1990	1.03	1.18	0.90	1.20	1.18	0.97	1.02	0.87	0.91	0.78	1.00
	2000	1.03	1.20	0.90	1.25	1.12	0.94	0.93	0.94	0.95	0.80	0.94
Mature	1980	1.11	1.28	0.81	0.92	1.25	0.78	0.85	0.89	1.00	0.96	1.11
	1990	1.14	1.31	0.82	1.08	1.17	0.92	0.86	0.88	0.89	1.02	0.95
	2000	1.05	1.36	0.80	1.09	1.05	0.91	0.86	0.91	0.98	1.12	0.89
Emerging	1980	1.25	1.17	0.69	1.05	1.03	0.95	0.97	0.98	0.93	1.04	0.90
	1990	1.16	1.23	0.83	1.13	1.15	0.95	1.16	0.90	0.89	0.43	1.12
	2000	1.05	1.21	0.85	1.16	1.33	0.93	0.97	0.97	1.00	0.62	0.97
Exurbs	1980	1.50	1.30	0.90	0.64	1.07	1.29	0.74	1.02	0.87	0.49	1.15
	1990	1.26	1.25	0.71	0.66	1.20	1.09	0.83	1.20	0.87	0.70	1.21
	2000	1.26	1.12	0.56	0.80	1.28	0.99	0.88	1.25	0.96	0.85	0.99

Construction and manufacturing are above 1.0 in mature, emerging and exurban county jurisdictions except for emerging manufacturing in 1990 and 2000. Wholesale trade is above 1.0 for inner and mature areas. Retail trade is above 1.0 for mature, emerging and exurban areas except 2000 mature. Inner suburbs are also above 1.0 in personal services and professional services except for 1990 professional services. Finally, the other employment category is strong for emerging and exurban counties.

Table 14b County--Export Sectors with LQ over 1.0

		Con.	Man.	Tran.	Whol.	Ret.	FIRE	Bus. S.	Pers. S.	Prof S.	Govt.	Other
Core	1980	0.90	0.80	1.30	0.90	0.90	1.10	0.90	1.00	1.10	1.20	0.85
	1990	0.88	0.82	1.25	0.87	0.85	0.99	0.91	0.99	1.10	1.46	0.89
	2000	0.89	0.78	1.19	0.85	0.86	1.05	0.91	1.02	1.09	1.32	1.00
Inner	1980	1.10	1.20	0.90	1.20	1.10	0.90	1.00	1.00	1.00	0.80	0.80
	1990	0.97	1.20	0.91	1.10	1.13	0.89	0.98	1.06	0.96	0.82	0.97
	2000	0.97	1.17	0.94	1.08	1.07	0.89	0.97	1.02	1.02	0.91	1.00
Mature	1980	1.10	1.10	0.90	1.10	1.10	0.90	1.10	0.90	1.00	0.90	0.95
	1990	1.02	1.09	0.95	1.16	1.04	0.96	1.04	0.95	0.98	0.83	0.97
	2000	1.01	1.11	0.99	1.13	0.99	0.96	1.00	0.94	0.99	0.88	0.95
Emerging	1980	1.20	1.00	0.90	0.80	1.10	0.80	0.90	1.00	1.00	1.10	1.20
	1990	1.19	0.98	0.94	0.92	1.14	0.87	0.94	1.04	0.97	0.81	1.20
	2000	1.14	1.02	0.89	1.01	1.11	0.88	0.95	1.02	0.98	0.99	1.02
Exurbs	1980	1.30	1.20	0.70	0.90	1.00	0.80	0.80	1.00	1.00	0.80	1.50
	1990	1.40	1.32	0.75	0.85	1.08	0.64	0.73	0.99	0.99	0.90	1.25
	2000	1.32	1.20	0.74	0.80	1.08	0.67	0.70	1.02	1.04	1.04	1.40

Policy Implications

The outcomes provided in this location quotient analysis provides evidence in support of the hypotheses that sectoral concentration in construction, manufacturing and retail trade in city jurisdictions are high except for the core. Core cities are found to have high concentrations in personal services, professional services and government employment. Personal services also have high concentrations in emerging suburban cities. Wholesale trade is high in inner and mature counties. Inner counties do also have high concentrations if employment in personal services and professional services. Sectoral concentrations in construction, manufacturing and retail trade are high in mature emerging and exurban counties.

These results provide support for the Metropolitan Transformation theory that metropolitan areas have experienced economic restructuring with agglomeration

occurring in suburban areas as these locations have become employment centers. The most support is provided by the results showing a high concentration of construction manufacturing and retail trade outside core counties and cities and also the high concentration of personal services in emerging suburban cities. This location quotient analysis has provided insight into the location of employment concentrations in metropolitan areas and has shown that metropolitan areas are undergoing economic restructuring with suburbs increasing their employment base with the metropolitan area.

The location quotient analysis in this chapter has been useful to provide an initial look at employment concentrations in metropolitan areas over the three time periods. Location quotient analysis is a basic economic analytic tool that provides results that are easily interpreted. It is often employed when examining relatively simple economic questions. However, this approach can lack the sophistication to investigate complex problems and provide inconclusive results. Even though this dissertation examines the complex topic of Metropolitan Transformation, including location quotient analysis is useful. If similar results are found using different types of methods, the conclusions will be supported by more than one methodology. A more rigorous approach is conducted in the following chapters through the use of spatial regression models.

CHAPTER VII

SPATIAL REGRESSION RESULTS FOR EMPLOYMENT AND URBANIZATION IN METROPOLITAN JURISDICTIONS

This chapter provides the results of the spatial regression modeling of the relationship between sectoral employment change and economic/socioeconomic changes. Research questions three, four and five examine this relationship using an all-inclusive base model, a dummy variable model and an interactive model. The results reported in this chapter can be found in tables 18 through 20. Tables 18a through 18g are the aggregate tables. Tables 18a through 18d present the aggregate tables with the actual variables in the row so that an easier comparison can be made between the significant variables in each model. Due to space constraints the last dummy and all interactive tables have positive/negative signs. The information in these tables includes the dependent variable, the type of model (base, dummy or interactive) and the independent variables. The independent variables have plus or minus signs indicating if they were positively or negatively associated with the dependent variable.[26]

[26] Contiguities and spatial solution model types can be found in the appendix tables, D17-D20.

Methodology

Three spatial regression models are used to examine the relationship between the dependent variable sectoral employment change and the independent variables, that include economic/socioeconomic factors. The same dependent variable is used in all three models. The three models are distinct due to the use of different independent variables. The base model is an overall model that includes all jurisdictions. The second model includes the first model plus the five dummy jurisdictional variables; core, inner suburbs, mature suburbs, emerging suburbs and exurbs. In the third model interactive variables are created by multiplying each independent variable from the base model with each of the five jurisdiction types. Each of these three models is run for the 1980-1990 and 1990-2000 periods for cities and counties.

Dependent and Independent Variable Definitions

All dependent variables are the changes (1980-1990 and 1990-2000) in sectoral employment across all jurisdictions. Population density is the population in the jurisdiction divided by the area of the jurisdiction in square miles. Population density change is the difference between the 1990 and 1980 value and the difference between the 2000 and 1990 value. Employment density is the employment in the jurisdiction divided by the area of the jurisdiction in square miles. Employment density change is the difference between the 1990 and 1980 value and the difference between the 2000 and 1990 value. Employment is the aggregate employment level in the jurisdiction. Employment change is the aggregate change in employment between the 1990 and 1980

level and the change between the 2000 and 1990 level. Population is the aggregate population level in the jurisdiction. Population change is the aggregate change in population between the 1990 and 1980 level and between the 2000 and 1990 level.

Per capita income is income per person in 1980 dollars. Per capita income change is the difference between the 1990 and 1980 levels and the 2000 and 1990 level. There are two variables for education, people with a high school education or less and people with more than a high school education. Education change is the difference between the 1990 and 1980 level and the 2000 and 1990 level. Median home value is the median value of houses in the jurisdiction. Median home value change is the difference between the 1990 and 1980 level and the 2000 and 1990 level. Median rent is the median level of rent paid in the jurisdiction. Median rent change is the difference between the 1990 and 1980 level and the 2000 and 1990 level. Poverty is the poverty rate in the jurisdiction. Poverty rate change is the difference between the 1990 and 1980 level and the 2000 and 1990 level.

Sectoral Employment Base Models

Research Question: What is the relationship between changes in selected economic/socioeconomic factors and employment and for all jurisdictions from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) population density change, population change, employment density change and employment change will be the main significant variables in these models.[27]

Hypothesis: In Counties (1990-2000) population density change, population change, employment density change and employment change will be the main significant variables in these models.

Hypothesis: In Cities (1980-1990) population density change, population change, employment density change and employment change will be the main significant variables in these models.

Hypothesis: In Cities (1990-2000) population density change, population change, employment density change and employment change will be the main significant variables in these models.

Sectoral Employment Base Model Description

This model includes all jurisdictions. One regression model is calculated for each of the ten employment sectors in the cities and counties for the period 1980-1990. One regression model is calculated for each of the ten employment sectors in the cities and counties for the period 1990-2000. Therefore, there are 10 regressions run for both cities and counties for the 1980-1990 period and 10 regressions run for both the cities and counties for the 1990-2000 period for a total of 40 models.

[27] As previsouly mentioned the "main"significant variable(s) refers to the variable(s) that are significant the most number of time across all the sectoral models.

Sectoral employment change is the dependent variable. The independent variables are: population density change, employment density change, population change, employment change education high school and below, education above high school, income per capita change, median home value change, median rent change, population density, employment density, population, employment, income per capita, median home value change and median rent. The ten employment sectors are: Construction, Manufacturing, Transportation, Wholesale Trade, Retail Trade, FIRE, Business Services, Professional Services, Public Administration and Not Otherwise Categorized.

Table 15a Base Employment Model Variables 1980-1990

Dependent Variable	Independent Variables			
		1980-1990		1980
Employment Δ in Sector	1	Population Density Δ	10	Population Density
	2	Employment Density Δ	11	Employment Density
	3	Population Δ	12	Population
	4	Employment Δ	13	Employment
	5	Education – High School and Below Δ	14	Education – High School and below
	6	Education – Above High School Δ	15	Education – Above High School
	7	Income Per Capita Δ	16	Income Per Capita
	8	Median Home Value Change Δ	17	Median Home Value Change
	9	Median Rent Δ	18	Median Rent

Table 15b Base Employment Model Variables 1990-2000

Dependent Variable	Independent Variables			
		1990-20000		1990
Employment Δ in Sector	1	Population Density Δ	10	Population Density
	2	Employment Density Δ	11	Employment Density
	3	Population Δ	12	Population
	4	Employment Δ	13	Employment
	5	Education – High School and Below Δ	14	Education – High School and below

	6	Education – Above High School Δ	15	Education – Above High School
	7	Income Per Capita Δ	16	Income Per Capita
	8	Median Home Value Change Δ	17	Median Home Value Change
	9	Median Rent Δ	18	Median Rent

Table 15c Dependent Variables for Base Employment Model

Construction Employment Δ
Manufacturing Employment Δ
Transportation Employment Δ
Wholesale Employment Δ
Retail Employment Δ
FIRE Employment Δ
Business Services Employment Δ
Professional Services Employment Δ
Personal Services Δ
Public Administration Employment Δ
Not Otherwise Categorized Δ

Sectoral Employment Dummy Models

Research Question: What is the relationship between changes in selected economic/socioeconomic factors including jurisdictional dummy variables and sectoral employment from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) a higher level of personal services employment change will be found in core, inner and mature cities. Also, mature, emerging and exurban counties will have higher levels of retail and public administration employment change.

Hypothesis: In Counties (1990-2000) a higher level of transportation, wholesale and FIRE employment change will be found in mature and emerging suburbs compared to other metro jurisdictions. A higher level of professional services employment change will be found in inner, mature, emerging and exurban counties than in the core counties.

Hypothesis: In Cities (1980-1990) a higher level of wholesale employment change will be found in the core compared to other metro jurisdictions.

Hypothesis: In Cities (1990-2000) a lower level of wholesale, FIRE and Retail employment change will be found in the core compared other metros. A higher level of business service employment change will be found in emerging suburbs compared to other metro areas.

Sectoral Employment Dummy Model Description

This model includes all jurisdictions. This model attempts to capture the location effects by including dummy independent variables for each of the five types of jurisdictions: the core, inner suburbs, mature suburbs, emerging suburbs and exurbs. One regression model is calculated for each of the ten employment sectors in both the cities and counties for the period 1980-1990. One regression model is calculated for each of the ten employment sectors in both the cities and counties for the period 1990-2000. Therefore, ten regressions are run for the cities and counties in the 1980-1990 period and 10 regressions run for the cities and counties in the 1990-2000 period for a total of 40 models.

Sectoral employment change is the dependent variable. The independent variables are: population density change, employment density change, population change, employment change, education high school and below change, education above high school change, income per capita change, median home value change, median rent change, population density, employment density, population, employment, education

high school and below, education above high school, income per capita, median home value change, median rent, core dummy, inner suburb dummy, mature suburb dummy, emerging suburb dummy and exurban dummy. The ten employment sectors are: Construction, Manufacturing, Transportation, Wholesale Trade, Retail Trade, FIRE, Business Services, Professional Services, Public Administration and Not Otherwise Categorized.

Table 16a Dummy Employment Model Variables 1980-1990

Dependent Variable	Independent Variables			
		1980-1990		1980
Employment Δ in Sector	1	Population Density Δ	13	Employment
	2	Employment Density Δ	14	Education – High School and below
	3	Population Δ	15	Education – Above High School
	4	Employment Δ	16	Income Per Capita
	5	Education – High School and Below Δ	17	Median Home Value Change
	6	Education – Above High School Δ	18	Median Rent
	7	Income Per Capita Δ	19	Core Dummy
	8	Median Home Value Change Δ	20	Inner Suburb Dummy
	9	Median Rent Δ	21	Mature Suburb Dummy
	10	Population Density	22	Emerging Suburb Dummy
	11	Employment Density	23	Exurb Dummy
	12	Population		

Table 16b Dummy Employment Model Variables 1990-2000

Dependent Variable	Independent Variables			
		1990-2000		1990
Employment Δ in Sector	1	Population Density Δ	13	Employment
	2	Employment Density Δ	14	Education – High School and below
	3	Population Δ	15	Education – Above High School
	4	Employment Δ	16	Income Per Capita
	5	Education – High School and Below Δ	17	Median Home Value Change
	6	Education – Above High School Δ	18	Median Rent
	7	Income Per Capita Δ	19	Core Dummy
	8	Median Home Value Change Δ	20	Inner Suburb Dummy

	9	Median Rent Δ	21	Mature Suburb Dummy
	10	Population Density	22	Emerging Suburb Dummy
	11	Employment Density	23	Exurb Dummy
	12	Population		

Table 16c Dependent Variables for Dummy Employment Model

Dependent Variables:
Construction Employment Δ
Manufacturing Employment Δ
Transportation Employment Δ
Wholesale Employment Δ
Retail Employment Δ
FIRE Employment Δ
Business Services Employment Δ
Professional Services Employment Δ
Personal Services Δ
Public Administration Employment Δ
Not Otherwise Categorized Δ

Sectoral Employment Interactive Models

Research Question: What is the relationship between changes in selected interactive jurisdictional economic/socioeconomic factors and employment from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) employment density change will be the main significant variable in the mature, emerging and exurban counties.

Hypothesis: In Counties (1990-2000) employment density change will be the main significant variable in mature, emerging and exurban counties.

Hypothesis: In Cities (1980-1990) population density change will be the main significant variable in core, inner and mature cities.

Hypothesis: In Cities (1990-2000) population density change will be the main significant variable in the core, inner and mature cities.

Sectoral Employment Interactive Model Description

This model includes all jurisdictions. There are 10 city and county jurisdictional regressions run for the 1980-1990 period, totaling 20 regressions. There are 10 city and county regressions run for the 1990-2000 period, totaling 20 regressions. One regression model is calculated for each of the ten employment sectors for both the cities and counties for the period 1980-1990. One regression model is calculated for each of the ten employment sectors for both the city and county for the period 1990-2000. Sectoral employment change is the dependent variable. The independent variables were created by multiplying each of the following independent variables by each of the five jurisdictional dummy variables: population density change, employment density change, population change, employment change education high school and below, education above high school, income per capita change, median home value change, median rent change, population density, employment density, population, employment, income per capita, median home value and median rent. The ten employment sectors are: Construction, Manufacturing, Transportation, Wholesale Trade, Retail Trade, FIRE, Business Services, Professional Services, Public Administration and Not Otherwise Categorized. Since there are an unmanageable number of independent variables, the base model results were used to inform that variables might tend to be significant. These

variables that offered more promise were tested in the interactive model, however, all variables presented below were created as potential independent variables.

Table 17a Interactive Employment Model Variables 1980-1990

Dependent Variable	Potential Independent Variables			
		1980-1990		1980
Employment Δ in Sector	1	Population Density Δ * Core	10	Population Density * Core
	2	Employment Density Δ* Core	11	Employment Density * Core
	3	Population Δ* Core	12	Population * Core
	4	Employment Δ* Core	13	Employment * Core
	5	Education – High School and Below Δ* Core	14	Education – High School and below * Core
	6	Education – Above High School Δ* Core	15	Education – Above High School * Core
	7	Income Per Capita Δ* Core	16	Income Per Capita * Core
	8	Median Home Value Change Δ* Core	17	Median Home Value Change* Core
	9	Median Rent Δ* Core	18	Median Rent * Core
	19	Population Density Δ * Inner Suburbs	28	Population Density * Inner Suburbs
	20	Employment Density Δ * Inner Suburbs	29	Employment Density * Inner Suburbs
	21	Population Δ * Inner Suburbs	30	Population * Inner Suburbs
	22	Employment Δ * Inner Suburbs	31	Employment * Inner Suburbs
	23	Education – High School and Below Δ* Inner Suburbs	32	Education – High School and below * Inner Suburbs
	24	Education – Above High School Δ * Inner Suburbs	33	Education – Above High School * Inner Suburbs
	25	Income Per Capita Δ * Inner Suburbs	34	Income Per Capita * Inner Suburbs
	26	Median Home Value Change Δ * Inner Suburbs	35	Median Home Value Change * Inner Suburbs
	27	Median Rent Δ * Inner Suburbs	36	Median Rent * Inner Suburbs
	37	Population Density Δ * Mature Suburbs	46	Population Density * Mature Suburbs
	38	Employment Density Δ* Mature Suburbs	47	Employment Density * Mature Suburbs
	39	Population Δ * Mature Suburbs	48	Population * Mature Suburbs
	40	Employment Δ * Mature Suburbs	49	Employment * Mature Suburbs
	41	Education – High School and Below Δ * Mature Suburbs	50	Education – High School and below * Mature Suburbs
	42	Education – Above High School Δ * Mature Suburbs	51	Education – Above High School * Mature Suburbs
	43	Income Per Capita Δ * Mature Suburbs	52	Income Per Capita * Mature Suburbs
	44	Median Home Value Change Δ * Mature Suburbs	53	Median Home Value Change * Mature Suburbs
	45	Median Rent Δ * Mature Suburbs	54	Median Rent * Mature Suburbs
	55	Population Density Δ * Emerging Suburbs	64	Population Density * Emerging Suburbs
	56	Employment Density Δ * Emerging Suburbs	65	Employment Density * Emerging Suburbs
	57	Population Δ * Emerging Suburbs	66	Population * Emerging Suburbs
	58	Employment Δ * Emerging Suburbs	67	Employment * Emerging Suburbs
	59	Education – High School and Below Δ * Emerging Suburbs	68	Education – High School and below * Emerging Suburbs
	60	Education – Above High School Δ * Emerging Suburbs	69	Education – Above High School * Emerging Suburbs
	61	Income Per Capita Δ * Emerging Suburbs	70	Income Per Capita * Emerging Suburbs
	62	Median Home Value Change Δ * Emerging Suburbs	71	Median Home Value Change * Emerging Suburbs
	63	Median Rent Δ * Emerging Suburbs	72	Median Rent * Emerging Suburbs

	73	Population Density Δ * Exurbs	82	Population Density * Exurbs
	74	Employment Density Δ * Exurban Suburbs	83	Employment Density * Exurbs
	75	Population Δ * Exurbs	84	Population * Exurbs
	76	Employment Δ * Exurbs	85	Employment * Exurbs
	77	Education – High School and Below Δ * Exurbs	86	Education – High School and below * Exurbs
	78	Education – Above High School Δ * Exurbs	87	Education – Above High School * Exurbs
	79	Income Per Capita Δ * Exurbs	88	Income Per Capita * Exurbs
	80	Median Home Value Change Δ * Exurbs	89	Median Home Value Change * Exurbs
	81	Median Rent Δ * Exurbs	90	Median Rent * Exurbs

Table 17b Interactive Employment Model Variables 1990-2000

Dependent Variable	Potential Independent Variables			
		1990-2000		1990
Employment Δ in Sector	1	Population Density Δ * Core	10	Population Density * Core
	2	Employment Density Δ* Core	11	Employment Density * Core
	3	Population Δ* Core	12	Population * Core
	4	Employment Δ* Core	13	Employment * Core
	5	Education – High School and Below Δ* Core	14	Education – High School and below * Core
	6	Education – Above High School Δ* Core	15	Education – Above High School * Core
	7	Income Per Capita Δ* Core	16	Income Per Capita * Core
	8	Median Home Value Change Δ* Core	17	Median Home Value Change* Core
	9	Median Rent Δ* Core	18	Median Rent * Core
	19	Population Density Δ * Inner Suburbs	28	Population Density * Inner Suburbs
	20	Employment Density Δ * Inner Suburbs	29	Employment Density * Inner Suburbs
	21	Population Δ * Inner Suburbs	30	Population * Inner Suburbs
	22	Employment Δ * Inner Suburbs	31	Employment * Inner Suburbs
	23	Education – High School and Below Δ* Inner Suburbs	32	Education – High School and below * Inner Suburbs
	24	Education – Above High School Δ * Inner Suburbs	33	Education – Above High School * Inner Suburbs
	25	Income Per Capita Δ * Inner Suburbs	34	Income Per Capita * Inner Suburbs
	26	Median Home Value Change Δ * Inner Suburbs	35	Median Home Value Change * Inner Suburbs
	27	Median Rent Δ * Inner Suburbs	36	Median Rent * Inner Suburbs
	37	Population Density Δ * Mature Suburbs	46	Population Density * Mature Suburbs
	38	Employment Density Δ* Mature Suburbs	47	Employment Density * Mature Suburbs
	39	Population Δ * Mature Suburbs	48	Population * Mature Suburbs
	40	Employment Δ * Mature Suburbs	49	Employment * Mature Suburbs
	41	Education – High School and Below Δ * Mature Suburbs	50	Education – High School and below * Mature Suburbs
	42	Education – Above High School Δ * Mature Suburbs	51	Education – Above High School * Mature Suburbs
	43	Income Per Capita Δ * Mature Suburbs	52	Income Per Capita * Mature Suburbs
	44	Median Home Value Change Δ * Mature Suburbs	53	Median Home Value Change * Mature Suburbs
	45	Median Rent Δ * Mature Suburbs	54	Median Rent * Mature Suburbs
	55	Population Density Δ * Emerging Suburbs	64	Population Density * Emerging Suburbs
	56	Employment Density Δ * Emerging Suburbs	65	Employment Density * Emerging Suburbs
	57	Population Δ * Emerging Suburbs	66	Population * Emerging Suburbs
	58	Employment Δ * Emerging Suburbs	67	Employment * Emerging Suburbs
	59	Education –	68	Education –

		High School and Below Δ * Emerging Suburbs		High School and below * Emerging Suburbs
	60	Education – Above High School Δ * Emerging Suburbs	69	Education – Above High School * Emerging Suburbs
	61	Income Per Capita Δ * Emerging Suburbs	70	Income Per Capita * Emerging Suburbs
	62	Median Home Value Change Δ * Emerging Suburbs	71	Median Home Value Change * Emerging Suburbs
	63	Median Rent Δ * Emerging Suburbs	72	Median Rent * Emerging Suburbs
	73	Population Density Δ * Exurbs	82	Population Density * Exurbs
	74	Employment Density Δ * Exurban Suburbs	83	Employment Density * Exurbs
	75	Population Δ * Exurbs	84	Population * Exurbs
	76	Employment Δ * Exurbs	85	Employment * Exurbs
	77	Education – High School and Below Δ * Exurbs	86	Education – High School and below * Exurbs
	78	Education – Above High School Δ * Exurbs	87	Education – Above High School * Exurbs
	79	Income Per Capita Δ * Exurbs	88	Income Per Capita * Exurbs
	80	Median Home Value Change Δ * Exurbs	89	Median Home Value Change * Exurbs
	81	Median Rent Δ * Exurbs	90	Median Rent * Exurbs

Table 17c Dependent Variables for Interactive Employment Model

Dependent Variables:
Construction Employment Δ
Manufacturing Employment Δ
Transportation Employment Δ
Wholesale Employment Δ
Retail Employment Δ
FIRE Employment Δ
Business Services Employment Δ
Professional Services Employment Δ
Personal Services Δ
Public Administration Employment Δ
Not Otherwise Categorized Δ

Based on the dependent and independent variables in the base, dummy and interactive models, there could be some concern about the occurrence of multicollinearity since it is possible that some of the variables may be highly correlated and the existence of multicollinearity can affect the t-statistic which is used to test for statistical significance. This could be especially true, for example, when population change and population density change are in the sameregression model. This is an acknowledged

issue since these regression models are being used as predictive models to analyze the the positive and negative relationships between the dependent and independent variables and not the actual level of changes, the occurrence of multicollinearity not a major deficiency in these models.

The models presented are predictive models and the intention is to use these models to analyze the the relationships between the dependent and independent variables. Therefore, the actual values of the independent variables are not reported and are not meaningful within the framework of the analysis which is to discern which independent variables are positively or negatively significant in the sectoral employment regression models. Additional statistical findings are reported in Table 18j through 18m, which includes a correlation matrix of all the dependent and independent variables. Appendix D, also includes a Global Moran I analysis, contiguity and model soultions that correct for spatial autocorrelation and regression output results for the multicollinearity and heteroscedacticity tests. It should be noted that the focus of these spatial regression models is to correct for spatial autocorrelation through queen contiguity and either spatial lag or error models. It is difficult to correct for both spatial autocorrelation and heteroscedacticity in the same model. Therefore, the strength of final models is the correction for spatial autocorrelation, but as seen in Appendix D, the models contain varying levels of heteroscedacticity.

Regression Results of Sectoral Employment County 1990

Construction Employment – County 1990

The base model uses a spatial error model with contiguity 1-2, the dummy model requires a spatial lag model with contiguity 1-2 and the interactive model uses a spatial error model with contiguity 1-2. In the 1990 county construction **base model** an increase in population density change and population change is associated with an increase in construction employment. Also, an increase in high school education and below is associated with a decrease in construction employment. The 1990 county construction **dummy model** shows an increase in population density change and population change is associated with an increase in construction employment. It also shows an increase in high school education and below is associated with a decrease in construction employment. The dummy model illustrates a lower level of construction employment change is found in exurban counties than the other jurisdictions in the metro area. In the 1990 county construction **interactive model** an increase in employment density change is associated with an increase in construction employment change in **core counties**. Also, an increase in high school education and below is associated with a lower level of construction employment change in the **inner suburbs**.

Manufacturing Employment – County 1990

Therefore, all models use OLS regression. In the 1990 county manufacturing **base model** an increase in high school education and the income per capita is associated

with an increase in manufacturing employment change. Also, an increase in employment density change is associated with a decrease in manufacturing employment change. The 1990 county manufacturing **dummy model** shows an increase in employment density change is associated with a decrease in manufacturing employment change. There is also a higher level of manufacturing employment change found in emerging and exurban counties compared to the other metro jurisdictions. In the 1990 county manufacturing **interactive model** an increase in employment density change is associated with an increase in manufacturing employment change in **emerging suburbs**. The model also shows an increase in employment change and the college educated is associated with an increase in manufacturing in **exurban counties**.

Transportation Employment – County 1990

No significant models could be generated for the dummy and interactive variables. In the 1990 county transportation **base model** an increase in employment density change and population change is associated with a decrease in transportation employment change. There were no significant variables in the **dummy** and **interactive model**s.

Wholesale Employment – County 1990

The base model uses a spatial error model with contiguity 2 and the dummy model requires a spatial lag model with contiguity 2. The interactive model does not have any spatial issues and uses OLS regression. In the 1990 county wholesale **base**

model an increase in employment density change is associated with a decrease in wholesale employment change. An increase in employment change is associated with an increase in wholesale employment change. In the 1990 county wholesale **dummy model** an increase in employment density change is associated with a decrease in wholesale employment change. An increase in employment change is associated with an increase in wholesale employment change. A higher level of wholesale employment change is found in the inner suburbs than the other metro areas. In the 1990 county wholesale **interactive model** an increase in employment density change and the college educated is associated with an increase in wholesale employment change in **inner, mature, emerging** and **exurban** counties.

FIRE Employment – County 1990

The base model uses a spatial lag model with contiguity 1-2, the dummy model requires a spatial error model with contiguity 1 and the interactive model requires a spatial lag model with contiguity 1-2. In the 1990 county FIRE **base model** an increase employment density change, the college educated and income per capita change is associated with an increase in FIRE employment change. An increase in median home value change is associated with a decrease in FIRE employment change. The 1990 county FIRE **dummy model** shows an increase employment density change, the college educated and income per capita change is associated with an increase in FIRE employment change. An increase in median home value change is associated with a decrease in FIRE employment change. A higher level of FIRE employment change is

found in the mature suburbs than the other metro counties. The 1990 county FIRE **interactive model** shows an increase in employment density change is associated with an increase in FIRE employment change in **mature counties**. An increase in population density change and employment change is associated with a decrease in FIRE employment change in **emerging counties**. An increase in employment density change and employment change is associated with an increase in FIRE employment change in **exurban counties**.

Retail Employment – County 1990

The base model uses a spatial lag model with contiguity 1-2 and the dummy model requires a spatial lag model with contiguity 1-2. No significant models could be generated for the interactive variables. In the 1990 county retail **base model** an increase employment change and the population is associated with an increase in retail employment change. A higher level of population density is associated with a decrease in retail trade employment change. The 1990 county retail **dummy model** shows an increase in population density change and the college educated is associated with an increase retail employment change. A higher level of retail employment change is found in inner, mature and emerging suburbs.

Business Services Employment – County 1990

The base model uses a spatial error model with contiguity 1, the dummy model requires a spatial error model with contiguity 1 and the interactive model utilizes a spatial

lag model with contiguity 1. In the 1990 county business services **base model** an increase population density change, the college educated, the poverty level and the income per capita is associated with an increase in business services employment change. An increase in median home value change is associated with a decrease in business services employment change. In the 1990 county business services **dummy model** an increase population density change, the college educated, income per capita change, median value change and the poverty level is associated with an increase in business services employment change. A higher level of business services change is found in inner suburban counties. In the 1990 county business services **interactive model** an increase in the population density change and college educated is associated with an increase in business services employment change in **mature counties**. An increase in population density change is associated with an increase in business services employment change in **emerging jurisdictions**. An increase in population density change, population change and the college educated is associated with a decrease in business services employment change in **exurban counties**.

Personal Services Employment – County 1990

The base and the dummy model use OLS regression. The interactive model requires a spatial lag model with contiguity 1-2. In the 1990 county personal services **base model** an increase in employment change is associated with an increase in personal service employment change. An increase in those with high school and below educations is associated with a decrease in personal service employment change. The 1990 county

personal services **dummy model** shows an increase in population density change is associated with a decrease in personal service employment change. An increase in population change is associated with an increase in personal service employment change. A lower level of personal service employment change is found in core counties, inner suburbs and mature suburbs compared to the other metro jurisdictions. In the 1990 county personal services **interactive model** shows an increase in employment density change is associated with an increase in personal service employment change in **core counties** and **mature suburbs**. An increase in population density change and employment change is associated with an increase in personal service employment change in the **emerging suburbs**. An increase in employment density change and employment change is associated with a decrease in personal service employment change in **exurbs**.

Professional Services Employment – County 1990

In the 1990 county professional services **base model** an increase in population density change and employment change is associated with an increase in professional services employment change. An increase in population change and the high school educated is associated with a decrease in professional services employment change. The 1990 county professional services **dummy model** shows an increase in population density change and employment change is associated with an increase in professional services employment change. An increase in the high school educated is associated with a decrease in professional services employment change. A lower level of professional

service employment change is found in the mature, emerging and exurban counties than other metro jurisdictions. In the 1990 county professional services **interactive model** shows a higher level of poverty is associated with an increase in professional services employment change in **mature** counties. An increase in employment change and poverty is associated with a decrease in professional services employment change in **emerging suburbs**. An increase in income per capita change and poverty is associated with a decrease in professional services employment change in the **exurbs**.

Public Administration Employment – County 1990

The base model uses a spatial lag model with contiguity 1 and the dummy model uses a spatial error model with contiguity 2. The interactive model has no spatial issues and uses OLS regression. In the 1990 county public administration **base model** a higher level of population density and population change is associated with an increase public administration employment change. An increase in the college educated is associated with a decrease in public administration employment change. In the 1990 county public administration **dummy model** a higher level of population density is associated with an increase public administration employment change. An increase in the college educated is associated with a decrease in public administration employment change. A higher level of public administration employment change is found in the mature, emerging and exurban counties compared to the other metro areas.

In the 1990 county public administration **interactive model** shows an increase in population change and the college educated is associated with an increase in public

administration employment change in the **inner suburbs**. An increase in the college educated is associated with a decrease in public administration employment change in the **mature** counties. An increase in population density change and the college educated is associated with an increase in public administration employment change in the **emerging suburbs**. An increase in employment change and the college educated is associated with an increase in public administration employment change in the **exurbs**

Other Employment – County 1990

The base model and dummy model use OLS regression. The interactive model requires a spatial lag model with contiguity 2. In the 1990 other **base model,** an increase in employment change and the college educated is associated with an increase in other employment change. The 1990 other **dummy model** shows an increase in employment change is associated with an increase in other employment change. A higher level of other employment change is found in the inner suburbs compared to other jurisdictions in the metro. A lower level of other employment change is found in the mature suburbs compared to other metro jurisdictions. In the 1990 other **interactive model** shows an increase in the college educated is associated with an increase in other employment change in the **inner**, **mature** and **exurban** counties. An increase in employment density change and the college educated is associated with an increase in employment density change in the **emerging suburbs**.

Regression Results of Sectoral Employment County 2000

Construction Employment – County 2000

The base model uses a spatial error model with contiguity 1-2, the dummy model and the interactive model use OLS regression. In the 2000 county construction **base model** an increase in population density change and employment change is associated with an increase in construction employment change. A higher level of 1990 poverty and 1990 income per capita is associated with a decrease in construction employment change. In the 2000 county construction **dummy model** an increase in population density change, the college educated and median home value change is associated with an increase in construction employment change. An increase in the high school educated is associated with a decrease in construction employment change. A lower level of construction employment change is found in mature, emerging and exurban counties than the other jurisdictions in the metro area.

In the 2000 county construction **interactive model** an increase in population density change, employment density change and income per capita change is associated with an increase in construction employment change in the **core counties**. An increase in employment density change, college educated and median home value change is associated with an increase in construction employment change in the **mature suburbs**. An increase in college educated is associated with a decrease in construction employment change in the **mature suburbs**. An increase in the high school educated, employment density change and median home value change is associated with an increase in construction employment change in the **emerging suburbs**.

Manufacturing Employment – County 2000

The base model and dummy model use a spatial error model with contiguity 1. The interactive model uses OLS regression. In the 2000 county manufacturing **base model** an increase in employment change, the high school educated, median home value change and the 1990 income per capita is associated with an increase in manufacturing employment change. An increase in employment density change, the college educated and the 1990 employment density is associated with a decrease in manufacturing employment change. In the 2000 county manufacturing **dummy model** an increase in employment change, the high school educated and median home value change is associated with an increase in manufacturing employment change. An increase in employment density change, the college educated and employment density is associated with a decrease in manufacturing employment change. A lower level of manufacturing employment is found in mature, emerging and exurban counties compared to the other metro jurisdictions.

The 2000 county manufacturing **interactive model** shows an increase in employment density change is associated with an increase in manufacturing employment change in the **core**, **mature** and **emerging suburbs**. An increase in population change is associated with a decrease in manufacturing employment change in the **inner suburbs**. An increase in employment change is associated with an increase in manufacturing employment change in the **emerging suburbs**. An increase in the high school educated is associated with an increase in manufacturing employment change in the **emerging suburbs**. An increase in median rent change is associated with a decrease in

manufacturing employment change in the **emerging suburbs**. An increase in income per capita change is associated with an increase in manufacturing employment change in the **emerging suburbs** and **exurbs**. A higher level of 1990 poverty is associated with an increase in manufacturing employment change in the **exurbs**.

Transportation Employment – County 2000

The 2000 county transportation **base model** shows an increase in population density change and population change is associated with a decrease in transportation employment change. An increase in population change, employment change and income per capita is associated with an increase in manufacturing employment change. In the 2000 county transportation **dummy model** an increase in population change, employment change and income per capita is associated with an increase in manufacturing employment change. An increase in the college educated is associated with a decrease in transportation employment change. A higher level of transportation employment change is found in the inner, mature, emerging and exurban counties compared to the core.

The 2000 county transportation **interactive model** shows an increase in employment density change is associated with an increase in transportation employment change in the **emerging suburbs**. An increase in population change is associated with a decrease in transportation employment change in the **mature suburbs**. An increase in employment change is associated with a decrease in transportation employment change in the inner and **mature suburbs**. An increase in the high school educated is associated

with a decrease in transportation employment change in the **inner**, **mature** and **emerging suburbs**. An increase in income per capita change and population change is associated with an increase in transportation employment change in the **exurbs**.

Wholesale Employment – County 2000

The 2000 county wholesale **base model** an increase in population change and the high school educated is associated with an increase in wholesale employment change. The model also shows an increase in population density change is associated with a decrease in wholesale employment change.

In the 2000 county wholesale **dummy model** an increase in population change, employment change and the high school educated is associated with an increase in wholesale employment change. A higher level of wholesale employment change is found in the mature, emerging and exurban counties than the other metro counties. In the 2000 county wholesale **interactive model** an increase in employment density change and the college educated is associated with an increase in wholesale employment change in the **mature suburbs**. An increase in income per capita change is associated with a decrease in wholesale employment change in the **mature suburbs**. A higher level of 1990 population and employment change is associated with an increase in wholesale employment change in the **emerging suburbs.**

FIRE Employment – County 2000

The base model uses a spatial error model with contiguity 2, the dummy model requires a spatial lag model with contiguity 1 and the interactive model requires a spatial error model with contiguity 1-2. In the 2000 county FIRE **base model** an increase employment change, the high school educated and poverty level change is associated with an increase in FIRE employment change. An increase in employment density change, population change and median home value change is associated with a decrease in FIRE employment change. In the 2000 county FIRE **dummy model** an increase in population density change and population change is associated with a decrease in FIRE employment change. An increase in the college educated is associated with an increase in FIRE employment change in the mature suburbs. A higher level of FIRE employment change is found in the mature suburbs compared to the other metro jurisdictions. In the 2000 county FIRE **interactive model** shows an increase in population density change and employment density change is associated with a decrease in FIRE employment change in the **core**. An increase in employment density change is associated with an increase in FIRE employment change in **mature counties**. An increase in employment change is associated with an increase in FIRE employment change in **inner**, **emerging** and **exurban counties**.

Retail Employment – County 2000

The base model and the dummy model use OLS regression. The interactive model requires a spatial error model with contiguity 1. In the 2000 county retail **base**

model a higher level of employment density change, population change, employment change, income per capita change, 1990 employment density and the high school educated is associated with an increase in retail employment change. A higher level of 1990 population density is associated with a decrease in retail trade employment change. In the 2000 county retail **dummy model** a higher level of employment density change, population change, employment change, income per capita change, 1990 employment density and the high school educated is associated with an increase in retail employment change. A higher level of 1990 population density is associated with a decrease in retail trade. A higher level of retail employment change is found in emerging suburbs than other counties in the metro. A lower level of retail employment change is found in core than other counties in the metro.

The 2000 county retail **interactive model** shows an increase in population density change and employment density change is associated with an increase in retail employment change in the **core**. An increase in population change, employment change and median rent change is associated with an increase in retail employment change in the **emerging counties**. An increase in the college educated is associated with an increase in retail employment change in the **exurbs**. An increase in income per capita change is associated with a decrease in retail employment change in the **exurbs**.

Business Services Employment – County 2000

The base model uses a spatial error model with contiguity 1-2. The dummy and the interactive model use OLS regression. The 2000 county business services **base**

model shows a higher level of population change, employment change, income per capita change, 1990 median home value and 1990 employment density is associated with an increase in business services employment change. An increase in population density change and the high school educated is associated with a decrease in business services employment change. In the 2000 county business services **dummy model** a higher level of population change, employment change, income per capita change, 1990 median home value and 1990 employment density is associated with an increase in business services employment change. An increase in population density change and the high school educated is associated with a decrease in business services employment change. A higher level of business services change is found in mature suburban counties.

The 2000 county business services **interactive model** shows an increase in employment density change is associated with an increase in business services employment change the **core**. An increase in population change is associated with an increase in business services employment change in the **inner** and **emerging counties**. An increase in employment change is associated with an increase in business services employment change in the **mature suburbs** and **exurbs**. An increase in the high school educated is associated with a decrease in business services employment change in the **inner** and **emerging counties**. An increase in income per capita change is associated with an increase in business services employment change in the **mature suburbs**. An increase in income per capita change is associated with a decrease in business services employment change in the **exurbs**.

Personal Services Employment – County 2000

The base and the dummy model use OLS regression. The interactive model requires a spatial error model with contiguity 2. The 2000 county personal services **base model** shows an increase in population density change, population change and the high school educated is associated with an increase in personal service employment change. In the 2000 county personal services **dummy model** an increase in population density change, population change and the high school educated is associated with an increase in personal service employment change. A higher level of personal service employment change is found in the inner suburbs and mature suburbs compared to the other metro jurisdictions.

In the 2000 county personal services **interactive model** an increase in population change is associated with a decrease in personal service employment change in the **inner, mature** and **exurban counties**. An increase in the high school educated is associated with an increase in personal service employment change in the **core, inner, emerging** and **exurban counties**. An increase in employment change is associated with a decrease in personal service employment change in the **core**. An increase in income per capita change and median rent change is associated with a decrease in personal service employment change in the **mature suburbs**. An increase in income per capita change is associated with an increase in personal service employment change in the **emerging counties**.

Professional Services Employment – County 2000

These models use OLS regression. The interactive model uses a spatial error model with contiguity 1. The 2000 county professional services **base model** shows an increase in employment density change, population change an employment change is associated with an increase in professional services employment change. An increase in income per capita change is associated with a decrease in professional services employment change. In the 2000 county professional services **dummy model** an increase in employment density change, population change an employment change is associated with an increase in professional services employment change. An increase in income per capita change is associated with a decrease in professional services employment change. A higher level of professional service employment change is found in the inner, mature, emerging and exurban counties compared to core jurisdictions. In the 2000 county professional services **interactive model** an increase in population density change is associated with a decrease in professional services employment change in **core** areas. An increase in employment density change is associated with an increase in professional services employment change in the inner and **mature suburbs**. An increase in employment change is associated with an increase in professional services employment change in the **emerging suburbs**. An increase in population change is associated with an increase in professional services employment change in the **exurbs**.

Public Administration Employment – County 2000

No significant models could be generated for the dummy and interactive models. In the 2000 county public administration **base model** an increase in population density

change and the high school educated is associated with a decrease public administration employment change. An increase in population change and employment change is associated with an increase in public administration employment change. There were no significant variables in the 2000 county public administration **dummy** and **interactive models**.

Other Employment – County 2000

No significant models could be generated for the base model. The dummy and interactive models use a spatial error model with contiguity 1-2. There are no significant models in the 2000 **base model.** In the 2000 other **dummy model** an increase in employment change, employment density and the high school educated is associated with an increase in other employment change. A lower level of other employment change is found in the inner, mature, emerging and exurban suburbs compared to core jurisdictions. In the 2000 other **interactive model** an increase in population change is associated with an increase in other employment change in the **inner suburbs**. An increase in the college educated is associated with a decrease in other employment change in the **mature suburbs**. An increase in income per capita change is associated with an increase in other employment change in the **mature suburbs.** An increase in population change is associated with a decrease in other employment change in the **emerging suburbs**. An increase in employment change is associated with an increase in other employment change in the **emerging suburbs**. An increase in employment change is associated with

a decrease in other employment change in the **exurbs**. An increase in the high school educated is associated with an increase in other employment change in the **exurbs**.

Regression Results of Sectoral Employment City 1990

Construction Employment – City 1990

All models use OLS regression. In the 1990 City construction **base model** an increase in employment change, employment and median rent change is associated with an increase in construction employment. In the 1990 City construction **dummy model** a higher level of employment change, 1980 employment and 1980 median rent change is associated with an increase in construction employment change. A higher level of construction employment change is found in core cities compared to other jurisdictions in the metro area. The 1990 City construction **interactive model** shows an increase in employment density change and the high school educated is associated with a decrease in construction employment change in **core cities.** An increase in employment change is associated with an increase in construction employment change in **core cities.** An increase in population density change, population change, employment change and the college educated is associated with an increase in construction employment change in **inner cities.** An increase in the high school educated is associated with a decrease in construction employment change in **inner cities.**

Manufacturing Employment – City 1990

The base model uses a spatial error model with contiguity 2. No significant model could be generated for the dummy model. The interactive model uses OLS regression. The 1990 City manufacturing **base model** shows an increase in employment change and employment density is associated with an increase in manufacturing employment change. A higher level of 1980 employment is associated with a decrease in manufacturing employment change. There are no significant variables in the 1990 City manufacturing **dummy model.** In the 1990 City manufacturing **interactive model** an increase in employment density change and the high school educated is associated with an increase in manufacturing employment change in the **core cities.** An increase in employment change and the high school educated is associated with an increase in manufacturing employment change in **inner cities.** An increase in employment change is associated with an increase in manufacturing employment change in **mature cities.**

Transportation Employment – City 1990

Both models use OLS regression. No significant model could be generated for the dummy model. In the 1990 City transportation **base model** an increase in employment change is associated with an increase in transportation employment change. A higher level of 1980 population and 1980 employment density is associated with a decrease in manufacturing employment change. There are no significant variables in the 1990 City transportation **dummy model.** In the 1990 City transportation **interactive model** a higher level of population density change, employment change, poverty change

and 1980 poverty is associated with a decrease in transportation employment change in **core cities.** An increase in the college educated is associated with an increase in transportation employment change in **core cities**. An increase in employment change and the high school educated is associated with an increase in transportation employment change in **inner cities**. An increase in income per capita change is associated with an increase in transportation employment change in **mature cities**. An increase in the college educated is associated with a decrease in transportation employment change in **mature cities**.

Wholesale Employment – City 1990

The base model and dummy mode use OLS regression. The interactive model uses a spatial error model with contiguity 1. The 1990 City wholesale **base model** shows a higher level of population density change and 1980 population is associated with a decrease in wholesale employment change. An increase in employment change is associated with an increase in wholesale employment change. In the 1990 City wholesale **dummy model** a higher level of 1980 population density and population is associated with a decrease in wholesale employment change. An increase in employment change is associated with an increase in wholesale employment change. A lower level of wholesale employment change is found in inner, mature, emerging and exurban cities than in the core cities. In the 1990 City wholesale **interactive model** an increase in population change and employment change is associated with a decrease in wholesale employment change in **core cities**. An increase in the high school educated is associated with an

increase in wholesale employment change in **core cities**. An increase in the college educated and employment change is associated with an increase in wholesale employment change in **inner cities**. An increase in employment density change and population change is associated with an increase in wholesale employment change in **mature cities**.

FIRE Employment – City 1990

No significant models could be generated for the dummy model. The interactive model uses OLS regression. The base model requires a spatial error model with contiguity 1. In the 1990 City FIRE **base model** an increase in population change and 1980 population is associated with an increase in FIRE employment change. A higher level of 1980 population density is associated with a decrease in FIRE employment change. There are no significant variables for the 1990 City FIRE **dummy model.** In the 1990 City FIRE **interactive model** an increase in employment density change is associated with a decrease in FIRE employment change in **core cities**. An increase in population change and employment change is associated with an increase in FIRE employment change in **core cities**. An increase in employment density change is associated with a decrease in FIRE employment change in **inner cities**. An increase in employment change is associated with an increase in FIRE employment change in **inner cities**. An increase in employment change is associated with an increase in FIRE employment change in **mature cities**.

Retail Employment – City 1990

The base model and the dummy model use OLS regression. The interactive model requires a spatial error model with contiguity 1. In the 1990 City Retail **base model** an increase in population change, employment change and employment is associated with an increase in retail employment change. A higher level of 1980 employment density is associated with a decrease in retail trade. There are no significant variables in the 1990 City Retail **dummy model.** In the 1990 City Retail **interactive model** an increase in employment change and the college educated is associated with an increase in retail employment change in **core cities**. An increase in the high school educated is associated with a decrease in retail employment change in **core cities**. An increase in population density change is associated with a decrease in retail employment change in **inner cities**. An increase in population change, employment change and the high school educated is associated with an increase in retail employment change in **inner cities**. An increase in employment change and the college educated is associated with an increase in retail employment change in **mature cities**.

Business Services Employment – City 1990

All models use OLS regression. In the 1990 City business services **base model** a higher level of 1980 poverty and 1980 median rent is associated with an increase in business services employment change. A higher level of employment change and 1980 employment density is associated with a decrease in business services employment change. In the 1990 City business services **dummy model** a higher level of 1980 poverty

and 1980 median rent is associated with an increase in business services employment change. A higher level of employment change is associated with an increase in business services employment change. A lower level of business service employment change is found in core cities than in other metro jurisdictions. In the 1990 City business services **interactive model** an increase in population change and employment change is associated with a decrease in business services employment change in **core cities**. An increase in employment change is associated with an increase in business services employment change **mature cities**. An increase in median rent is associated with a decrease in business services employment change in **mature cities**.

Personal Services Employment – City 1990

The base uses OLS regression. No significant models could be generated for the dummy model. The interactive model requires a spatial error model with contiguity 1. In the 1990 City personal services **base model** a higher level of population change, employment change, 1980 population and 1980 median value is associated with an increase in personal service employment change. There are no significant variables in the 1990 City personal services **dummy model**. In the 1990 City personal services **interactive model** an increase in population change, employment change and median home value is associated with an increase in personal service employment change in the **core cities**. An increase in employment density change, the high school educated and median rent change is associated with a decrease in personal service employment change in **core cities**. An increase in employment density change and the high school educated

is associated with a decrease in personal service employment change in **inner cities**. An increase in employment change is associated with an increase in personal service employment change in **inner cities**. An increase in employment change is associated with an increase in personal service employment change in **mature cities**.

Professional Services Employment – City 1990

These models use OLS regression. No significant models could be generated for the dummy model. The 1990 City professional services **base model** shows a higher level of employment change, population change, 1980 employment and 1980 employment density is associated with an increase in professional services employment change. There are no significant variables in the in the 1990 City professional services **dummy model.** In the 1990 City professional services **interactive model** an increase in employment density change, employment change and the high school educated is associated with a decrease in professional services employment change in **core cities**. An increase in median rent change is associated with an increase in professional services employment change in **core cities**. An increase in population change and employment change is associated with an increase in professional services employment change in the **inner cities**. An increase in employment density change and the high school educated is associated with a decrease in professional services employment change in the **inner cities**. An increase in employment change is associated with an increase in professional services employment change in **mature cities**.

Public Administration Employment – City 1990

No significant model could be generated for the dummy model. In the 1990 City public administration **base model** a higher level of population change, 1980 population and 1980 employment density is associated with a decrease public administration employment change. An increase in population change and employment change is associated with an increase in public administration employment change. There are no significant variables in the 1990 City public administration **dummy model.** In the 1990 City public administration **interactive model** a higher level of employment density change, population change, employment change and the college educated is associated with an increase public administration employment change in **core cities**. A higher level of population change is associated with a decrease public administration employment change in **inner cities**.

Other Employment – City 1990

No significant models could be generated for the dummy model. The base model requires a spatial lag model with contiguity 2. The interactive model uses OLS regression. In the 1990 other **base model** an increase in population change and employment change is associated with a decrease in other employment change. A higher level of 1980 population is associated with an increase in other employment change. There are no significant variables in the 1990 other **dummy model**. The 1990 other **interactive model** shows an increase in employment density change, population change

and the high school educated is associated with a decrease in other employment change density change in the **core cities**. An increase in income per capita change is associated with an increase in other employment change density change in the **core cities**. An increase in population change and employment change is associated with an increase in other employment change in the **inner cities**. An increase in the high school educated is associated with a decrease in other employment change in the **inner cities**. An increase in population change is associated with an increase in other employment change in the **mature cities**. An increase in employment change is associated with an increase in other employment change in the **emerging cities**.

Regression Results of Sectoral Employment City 2000

Construction Employment – City 2000

The base model uses a spatial error model with contiguity 1-2. The dummy and interactive models use OLS regression. In the **2000 City construction base model** an increase in population density change and employment change is associated with an increase in construction employment. A higher level of 1990 poverty and 1990 income per capita is associated with an increase in construction employment. In the **2000 City construction dummy model** a higher level of population density change, the college educated and median home value change is associated with an increase in construction employment change. A higher level of the high school educated is associated with a decrease in construction employment change. A lower level of construction employment change is found in mature, emerging and exurban cities compared to other jurisdictions in

the metro area. The **2000 City construction interactive model shows** an increase in population density change and income per capita change is associated with an increase in construction employment change in **core cities**. An increase in the population density change, employment density change, median home value and college educated is associated with a decrease in construction employment change in **mature cities**. An increase in the population density change, median home value and the high school educated is associated with a decrease in construction employment change in **emerging cities**.

Manufacturing Employment – City 2000

The base and dummy model both use a spatial error model with contiguity 1. The interactive model uses OLS regression. In the 2000 City manufacturing **base model** a higher level of employment change, the high school educated, median value change and 1990 income per capita is associated with an increase in manufacturing employment change. A higher level of employment density change, the college educated and 1990 employment density is associated with a decrease in manufacturing employment change. In the 2000 City manufacturing **dummy model** an increase in employment change, the high school educated and median value change is associated with an increase in manufacturing employment change. A higher level of employment density change, the college educated and 1990 employment density is associated with a decrease in manufacturing employment change. A lower level of manufacturing employment change

is found in mature, emerging and exurban cities compared to other jurisdictions in the metro area.

The 2000 City manufacturing **interactive model shows** an increase in employment density change is associated with an increase in manufacturing employment change in **core** and **mature cities**. An increase in population change is associated with a decrease in manufacturing employment change in **inner cities**. An increase in employment density change, the high school educated, employment change and income per capita change is associated with an increase in manufacturing employment change in **emerging cities**. An increase in median rent change is associated with a decrease in manufacturing employment change in **emerging cities.** A higher level of 1990 poverty and income per capita change is associated with an increase in manufacturing employment change in **exurban cities**.

Transportation Employment – City 2000

In the 2000 City transportation **base model** an increase in population change, employment change and income per capita change is associated with an increase in transportation employment change. An increase in population density change is associated with a decrease in transportation employment change. In the 2000 City transportation **dummy model** an increase in population change, employment change and income per capita change is associated with an increase in transportation employment change. An increase in the college educated is associated with a decrease in transportation employment change. A higher level of transportation employment change

is found in inner, mature, emerging and exurban cities compare to core cities. The 2000 City transportation interactive **model shows** an increase in employment change and the high school educated is associated with a decrease in transportation employment change in **inner cities**. A higher level of population change and the high school educated is associated with a decrease in transportation employment change in **mature cities**. An increase in employment density change is associated with an increase in transportation employment change in **emerging cities**. An increase in employment density change is associated with a decrease in transportation employment change in **emerging cities**. An increase in population change and income per capita change is associated with an increase in transportation employment change in **exurban cities**.

Wholesale Employment – City 2000

In the 2000 City wholesale **base model** a higher level of population density change and 1990 population is associated with a decrease in wholesale employment change. An increase in population change and the high school educated is associated with an increase in wholesale employment change.

In the 2000 City wholesale **dummy model** a higher level of population change, employment change and the high school educated is associated with a decrease in wholesale employment change. A higher level of wholesale employment change is found in mature, emerging and exurban cities than in core and inner cities. The 2000 City wholesale **interactive model** shows an increase in the high school educated is associated with an increase in wholesale employment change in **core cities.** An increase in the employment change is associated with a decrease in wholesale employment change in

core cities. An increase in employment density change, employment change and the high school educated is associated with an increase in wholesale employment change in **inner cities**. An increase in income per capita change is associated with a decrease in wholesale employment change in **inner cities**. An increase in population change and the high school educated is associated with an increase in wholesale employment change in **mature cities**. An increase in poverty levels is associated with an increase in wholesale employment change in **emerging cities**.

FIRE Employment – City 2000

All models use OLS regression. The 2000 City FIRE **base model** shows an increase in employment change and the high school educated is associated with an increase in FIRE employment change. An increase in median home value change is associated with a decrease in FIRE employment change. In the 2000 City FIRE **dummy model** an increase in employment change and median home value change is associated with an increase in FIRE employment change. An increase in the high school educated is associated with a decrease in FIRE employment change. A lower level of wholesale employment change is found in core cities than in other types of metro cities. The 2000 City FIRE **interactive model** shows an increase in population change is associated with a decrease in FIRE employment change in **core cities**. An increase in employment change is associated with an increase in FIRE employment change in **inner cities**. An increase in the college educated is associated with a decrease in FIRE employment change in **inner cities**. An increase in employment change, median value change and the high

school educated is associated with an increase in FIRE employment change in **mature cities**. An increase in employment change and the college educated is associated with a decrease in FIRE employment change in **emerging cities**.

Retail Employment – City 2000

The base model requires a spatial error model with contiguity 1. The dummy model and the interactive models use OLS regression. In the 2000 City retail **base model** a higher level of employment change, 1990 population density and 1990 employment level is associated with an increase in retail employment change. A higher level of 1990 employment density is associated with a decrease in retail trade. In the 2000 City Retail **dummy model** a higher level of employment change, 1990 population density and 1990 employment level is associated with an increase in retail employment change. A lower level of retail employment change is found in core cities than in other types of metro cities. In the 2000 City retail **interactive model** an increase in employment change is associated with an increase in retail employment change in **core cities**. An increase in employment change and the college educated is associated with a decrease in retail employment change in **inner cities**. An increase in income per capita change and employment change is associated with an increase in retail employment change in **mature cities**. An increase in the high school educated is associated with a decrease in retail employment change in **emerging cities**. An increase in the college educated is associated with an increase in retail employment change in **emerging cities**.

Business Services Employment – City 2000

The dummy model uses OLS regression. The base model uses a spatial lag model with contiguity 1. The interactive model requires a spatial error model with contiguity 1. In the 2000 City business services **base model** a higher level of population change, employment change, income per capita change and 1990 employment density is associated with an increase in business services employment change. An increase in median rent change is associated with a decrease in business services employment change. In the 2000 City business services **dummy model** a higher level of population change, employment change, income per capita change and 1990 employment density is associated with an increase in business services employment change. An increase in 1990 median rent is associated with a decrease in business services employment change. A higher level of business service employment change is found in emerging cities compared to other types of metro jurisdictions. The 2000 City business services **interactive model** shows an increase in population change and employment change is associated with an increase in business services employment change in **core cities**. An increase in employment change and population change is associated with an increase in business services employment change in **inner cities**. An increase in employment density, change population change and income per capita change is associated with an increase in business services employment change in **mature cities**. An increase in the high school educated is associated with a decrease in business services employment change in **mature cities.** A higher level of 1990 median home values is associated with an increase in business services employment change in **emerging cities**. An increase in

employment change and high school educated is associated with a decrease in business services employment change in **emerging cities**.

Personal Services Employment – City 2000

The base and interactive models use OLS regression. No significant models could be generated for the dummy model. In the **2000 City personal services base model** a higher level of population change is associated with a decrease in personal service employment change. There are no significant variables in the 2000 City personal services **dummy model**. In the **2000 City personal services interactive model** an increase in income per capita change is associated with a decrease in personal service employment change in **core cities**. An increase in the college educated is associated with a decrease in personal service employment change in **inner cities.** An increase in the high school educated is associated with an increase in personal service employment change in **mature** and **emerging cities**.

Professional Services Employment – City 2000

These models use OLS regression. The 2000 City professional services **base model** shows a higher level of employment density change and employment change is associated with an increase in professional services employment change. A higher level of income per capita change, 1990 population density and 1990 employment is associated with an increase in professional services employment change. In the 2000 City professional services **dummy model** a higher level of employment density change and

employment change is associated with an increase in professional services employment change. A higher level of income per capita change, 1990 population density and 1990 employment is associated with an increase in professional services employment change. A higher level of professional services employment change is found in inner cities compared to other types of metro jurisdictions. In the 2000 City professional services **interactive model** an increase in population change is associated with a decrease in professional services employment change in **core**, **inner** and **emerging cities**. An increase in employment change is associated with an increase in professional services employment change in inner and **mature cities**. An increase in income per capita change and population change is associated with a decrease in professional services employment change in **mature cities**. An increase in the high school educated and employment change is associated with an increase in professional services employment change in **emerging cities**.

Public Administration Employment – City 2000

The base and interactive models both require a spatial error model with contiguity 1. No significant models could be generated for the dummy model. In the 2000 City public administration **base model** a higher level of employment change and the college educated is associated with an increase public administration employment change. There are no significant variables in the 2000 City public administration **dummy model.** In the 2000 City public administration **interactive model** a higher level of the college educated and employment change is associated with an increase public administration employment

change in **inner cities**. A higher level of the high school educated, college educated and employment change is associated with an increase public administration employment change in **mature cities**. A higher level of income per capita change is associated with a decrease public administration employment change in **mature cities**. A higher level of employment change is associated with an increase public administration employment change in **emerging cities**.

Other Employment – City 2000

No significant models could be generated for the dummy or interactive models. The base model requires a spatial error model with contiguity 2. In the 2000 other **base model** a higher level of employment change and 1990 employment density is associated with an increase in other employment change. A higher level of employment density change is associated with a decrease in other employment change. There are no significant variables in either the **dummy** or **interactive** models.

Analysis the Findings

This chapter has presented the framework for the analysis of sectoral employment in metropolitan areas from 1980 to 2000. The extensive output illustrates the need to aggregate the findings so that informative conclusions can be drawn about the economic changes that have occurred during the process of Metropolitan Transformation during the 1980s and 1990s.

The analysis in the next chapter focuses on the main independent variables in the employment sectoral models across time and jurisdiction type by comparing city 1990 to city 2000, county 1990 to county 2000, city 1990 to county 1990 and city 2000 to county 2000. This leads to a discussion of the results in the context of Metropolitan Transformation. The spatial analysis of poverty levels is the final topic addressed in this dissertation. These results and analysis are presented in Chapters IX and X.

CHAPTER VIII

SPATIAL ANALYSIS OF EMPLOYMENT AND URBANIZATION IN METROPOLITAN JURISDICTIONS

This chapter analyzes the results of the sectoral spatial analysis. The first two sections examine the changes that have occurred in cities and counties over time. The next sections look at the changes in cities and counties during the same time period. An aggregate analysis then looks at these results to determine if there are common finding across cities and counties in both time periods. This leads into a discussion of the results for the hypotheses in the base, dummy and interactive models. The policy implications are then discussed in the context of Metropolitan Transformation.

Analysis of Differences and Similarities in City 1990 and City 2000

City 1990 and 2000 Construction Employment

In the base model, an increase in employment change is associated with an increase in construction employment change in 1990 and 2000. In the dummy model a higher level of construction employment change is found in core cities compared to other

metro jurisdictions in 1990. In 2000, a lower level of construction employment change is found in mature, emerging and exurban cities than in inner and core cities in 2000. In the interactive model there were no significant variables in 1990 and 2000.

City 1990 and 2000 Manufacturing Employment

In the base model, an increase in employment change is associated with an increase in manufacturing employment change in 1990 and 2000. In the dummy there were no variables that were significant in 1990 and 2000. In the interactive model an increase in employment change in inner cities is associated with an increase in manufacturing employment change in 1990 and 2000.

City 1990 and 2000 Transportation Employment

In the base model, an increase in employment change is associated with an increase in transportation employment change in 1990 and 2000. In the dummy model, there were no significant models for 2000. The interactive model shows that in core and inner cities an increase in employment change is associated with an increase in transportation employment change in 1990 and 2000.

City 1990 and 2000 Wholesale Employment

In the base model, an increase in employment change is associated with an increase in wholesale employment change in 1990 and 2000. Population density change is associated with a decrease in wholesale employment change in 1990 and 2000. In the

dummy model, an increase in employment change is associated with an increase in wholesale employment change in 1990 and 2000. The interactive model shows that in inner cities an increase in employment change is associated with an increase in wholesale employment change in 1990 and 2000. The interactive model shows that an increase in the high school educated in core and inner cities is associated with an increase in wholesale employment change in 1990 and 2000.

City 1990 and 2000 FIRE Employment

In the base model, there were no variables that were significant in 1990 and 2000. In the dummy model, there were no significant models for 1990 or 2000. The interactive model shows that in core cities an increase in population change is associated with an increase in FIRE employment change in 1990 but a decrease in 2000. Finally, in inner and mature cities an increase in employment change is associated with an increase in FIRE employment change in 1990 and 2000.

City 1990 and 2000 Retail Trade Employment

In the base model, a higher level of employment change and 1990 employment is associated with an increase in retail employment change in 1990 and 2000. A higher level of employment density change is associated with a decrease in retail trade employment change in 1990 and 2000. In the dummy model, there were no significant models for 1990. The interactive model shows that in core and mature cities an increase

in employment change is associated with an increase in retail employment change in 1990 and 2000.

City 1990 and 2000 Business Services Employment

In the base model, an increase in employment change is associated with a decrease in business services employment change in 1990 and an increase in 2000. In the dummy model, an increase in employment change is associated with an increase in business services employment change in 1990 and 2000. Also, a lower level of business service employment change is found in core cities than in other metro jurisdictions in 1990 while a higher level is found in exurban areas compared to other metro jurisdictions in 2000. The interactive model shows that in core cities an increase in employment change and population change is associated with a decrease in business services employment change in 1990 and an increase in 2000.

City 1990 and 2000 Personal Services Employment

In the base model, an increase in population change is associated with an increase in personal service employment change in 1990 and a decrease in 2000. In the dummy model, there were no significant models for 1990. In the interactive model there were no variables that were significant in 1990 and 2000.

City 1990 and 2000 Professional Services Employment

In the base model, an increase in employment change is associated with an increase in professional services employment change in 1990 and 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. The interactive model shows that in inner cities an increase in employment change and population change is associated with an increase in professional services employment change in 1990 while it is associated with an increase in employment change and a decrease in population change in 2000. The interactive model also shows that in mature cities an increase in employment change is associated with an increase in professional services employment change in 1990 and 2000.

City 1990 and 2000 Public Administration Employment

In the base model, there were no significant models in 1990 and 2000. In the dummy model, there were no significant models in 1990 and 2000. In the interactive model there were no significant models in 1990 and 2000.

City 1990 and 2000 Other Employment

In the base model, an increase in employment change is associated with a decrease in professional services employment change in 1990 and an increase in 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. In the interactive model there were no variables that were significant in 1990 and 2000.

Summary Analysis of City 1990 and City 2000

The analysis in this section focuses on the main independent variable in the set of models for each time period. For city base models, employment change was found to be the main independent variable in the 1990 models and population change was the main independent variable in the 2000 models. In the interactive models, employment change was found to be the main independent variable in both years.

In the 1990 city base models, employment change was positively associated with construction, manufacturing, transportation, wholesale, retail, personal services and professional services while negatively associated with business services. In the city 2000 base model, population change was positively associated with wholesale, retail, business services, personal services and professional services. Employment change was positively associated with all dependent variables except personal services.

In the city 2000 dummy models, a lower level of wholesale, FIRE and Retail employment change is found in the core than other metro counties. A lower level of wholesale and a higher level of professional services are found in inner counties. A higher level of business service employment change is found in emerging suburbs than other metro counties.

In the interactive city 1990 model, an increase in employment change is positively significant in construction, FIRE, retail, personal services and public administration and negatively associated with transportation, wholesale trade, business services and professional services. In inner cities employment change is positively significant in all models except business services and public administration. In mature cities employment

change is positively significant in manufacturing, FIRE, retail trade, business services, personal services and professional services. In 2000 core cities, the interactive employment change is positively associated with manufacturing, transportation, retail, and business services while negatively associated with wholesale trade. In inner cities, the interactive employment change is positively associated with manufacturing, transportation, wholesale, FIRE business services, professional services and public administration while negatively associated with retail. In mature cities, the interactive employment change is positively associated with FIRE, retail and professional services.

Analysis of Differences and Similarities in County 1990 to County 2000

County 1990 and 2000 Construction Employment

In the base model, an increase in population density change is associated with an increase in construction employment change in 1990 and 2000. In the dummy model, an increase in population density change is associated with an increase, while the high school educated is associated with a decrease in construction employment change in 1990 and 2000. In both periods, a lower level of construction employment is found in exurban jurisdictions than in other metro jurisdictions. The interactive model shows that in core counties an increase in employment density change is associated with an increase in construction employment change in 1990 and 2000.

County 1990 and 2000 Manufacturing Employment

In the base model, an increase in employment density change is associated with a decrease in manufacturing employment change 1990 and 2000. In the dummy model, employment density change is associated with a decrease in manufacturing employment change 1990 and 2000. In both periods, a higher level of manufacturing employment is found in emerging and exurban jurisdictions than in other metro jurisdictions. The interactive model shows that in emerging counties an increase in employment density change is associated with an increase in manufacturing employment change in 1990 and 2000.

County 1990 and 2000 Transportation Employment

In the base model, an increase in employment change is associated with an increase in transportation employment change in 1990 and 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. In the interactive model there were no variables that were significant in 1990 and 2000.

County 1990 and 2000 Wholesale Employment

In the base model, there were no variables that were significant in 1990 and 2000. In the dummy model, an increase in employment change is associated with an increase in wholesale employment change in 1990 and 2000. A higher level of wholesale employment change is found in inner suburbs in 1990 and a higher level of wholesale employment change is found in mature, emerging and exurban counties in 2000. The

interactive model shows that in mature counties a higher level of employment density change and the college educated is associated with an increase in wholesale employment change in 1990 and 2000.

County 1990 and 2000 FIRE Employment

In the base model, an increase in employment density change is associated with an increase in FIRE employment change in 1990 and 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. The interactive model shows that in mature counties an increase in employment density change is associated with an increase in FIRE employment change in 1990 and 2000. The interactive model shows that in emerging and exurban counties an increase in employment change is associated with a decrease in FIRE employment change in 1990 and but associated with an increase in 2000.

County 1990 and 2000 Retail Trade Employment

In the base model, an increase in employment change is associated with an increase in retail trade employment change in 1990 and 2000. In the dummy model, a higher level of retail trade employment change is found in emerging counties in 1990 and 2000. In the interactive model there were no variables that were significant in 1990 and 2000.

County 1990 and 2000 Business Services Employment

In the base model, an increase in population density change is associated with an increase in business employment change in 1990 and 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. The interactive model shows that in mature counties, a higher level of the college educated is associated with an increase in business service employment change in 1990 and 2000.

County 1990 and 2000 Personal Services Employment

In the base model, there were no variables that were significant in 1990 and 2000. In the dummy model, an increase in population change is associated with an increase in personal services employment change in 1990 and 2000. In 1990 an increase in population density change is associated with a decrease in personal services employment change in 1990 and is associated with an increase in 2000. A higher level of retail personal services employment change is found in inner and mature counties compare to other metro counties in 1990 and 2000.

In the interactive model there were no variables that were significant in 1990 and 2000.

County 1990 and 2000 Professional Services Employment

In the base model, an increase in employment change is associated with an increase in professional services employment change in 1990 and 2000. In the dummy model, an increase in employment change is associated with an increase in professional services employment change in 1990 and 2000. The interactive model shows that in

emerging suburbs in 1990, an increase in employment change is associated with a decrease in professional services employment change while in 2000 it is associated with a higher level of professional services employment change.

County 1990 and 2000 Public Administration Employment

In the base model, there were no variables that were significant in 1990 and 2000. In the dummy model, there were no variables that were significant in 1990 and 2000. In the interactive model there were no variables that were significant in 1990 and 2000.

County 1990 and 2000 Other Employment

In the base model, there were no variables that were significant in 1990 and 2000. In the dummy model, an increase in employment change is associated with an increase in other employment change in 1990 and 2000. A lower level of other employment change is found in mature suburbs compared to other metro counties. The interactive model shows that in mature counties an increase in income per capita change is associated with an increase other employment change in 1990 and 2000.

Summary Analysis of County 1990 and 2000

The analysis in this section focuses on the main independent variable in the set of models for each time period. For county base models, employment change was found to be the main independent variable in 1990 and 2000. In the interactive models, employment density change was found to be the main independent variable in both years.

In the 1990 county base models, employment change was positively associated with transportation, wholesale, retail, personal services and professional services. In the county 2000 base model, employment change was positively associated with increase in all sectors except wholesale and personal services. Population change was positively associated with all sectors except construction, manufacturing and FIRE.

In the 1990 dummy model; core, inner and mature counties are found to have a higher level of personal services employment change. Mature, emerging and exurban counties are found to have a higher level of retail employment and public administration employment change; while a lower level of professional services employment change is found in these counties. Also a lower level of manufacturing employment change is found in emerging and exurban counties than other metro counties. In the county 2000 models, a higher level of transport, wholesale and FIRE employment change is found in mature and emerging suburbs compared to other metro counties. A higher level of professional service employment change is found in the inner, mature, emerging and exurban areas than in the core. A lower level of construction, manufacturing and other employment change is found in mature, emerging and exurban counties than in inner and core counties.

In the interactive county 1990 model, an increase in employment density change in emerging, mature and exurban counties is associated with increases in manufacturing, wholesale, FIRE and personal services employment. In County 2000, the interactive employment density change and employment change are significant in many models. In 2000 core counties, employment density change is positively associated with

construction, manufacturing, retail and business services while negatively associated with FIRE. In mature counties, employment density change is positively associated with construction, manufacturing, wholesale, FIRE and professional services. In emerging counties, employment density change is positively associated with construction, manufacturing, and transportation. In 2000 emerging counties, employment change is positively associated with manufacturing, wholesale, FIRE, retail and professional services. In exurban counties, employment change is positively associated with FIRE and business services employment.

Analysis of Differences and Similarities in City 1990 and County 1990

City and County 1990 Construction Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. The interactive model shows that in core counties an increase in employment density change is associated with an increase in FIRE employment change. In core cities an increase in employment density change is associated with a decrease in construction employment change. The interactive model also shows that in inner cities and counties a higher level of the college educated is associated with an increase in construction employment change in 1990.

City and County 1990 Manufacturing Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990.

City and County 1990 Transportation Employment

In the base model, an increase in employment change is associated with an increase in wholesale employment change in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. In the interactive model, there were no variables that were significant in city and county 1990.

City and County 1990 Wholesale Employment

In the base model, an increase in employment change is associated with an increase in wholesale employment change in city and county 1990. In the dummy model, an increase in employment change is associated with an increase in wholesale employment change in city and county 1990. A higher level of wholesale employment change is found in inner cities compared other metro cities. A lower level of wholesale employment change is found in inner counties compared to other metro counties. The interactive model shows that in mature cities and counties an increase in employment density change is associated with an increase in FIRE employment change. The

interactive model shows that in inner cities and counties a higher level of the college educated is associated with an increase in wholesale employment change in 1990.

City and County 1990 FIRE Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. In the interactive model, in core, inner and mature cities, an increase in employment change is associated with an increase in FIRE employment change. In inner, emerging and exurban counties, an increase in employment change is associated with an increase in FIRE employment change.

City and County 1990 Retail Trade Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990.

City and County 1990 Business Services Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990.

City and County 1990 Personal Services Employment

In the base model, an increase in employment change is associated with an increase in personal services employment change in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. The interactive model shows that an increase in employment density change is associated with an increase in personal services employment in core cities and is associated with a decrease in retail employment change in core counties. An increase in employment change is associated with an increase in personal services employment in core, inner and mature cities and counties.

City and County 1990 Professional Services Employment

In the base model, an increase in employment change is associated with an increase in professional services employment change in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. The interactive model shows there were no variables that were significant in city and county 1990.

City and County 1990 Public Administration Employment

In the base model, an increase in population change is associated with an increase in public administration employment change in county 1990 and is associated with a decrease in public administration in city 1990. In the dummy model, there were no variables that were significant in city and county 1990. The interactive model shows that

an increase in population change is associated with an increase in public administration employment in core counties and is associated with a decrease in retail employment change in core cities. A higher level of the college educated is associated with an increase in public administration employment in core cities and counties.

City and County 1990 Other Employment

In the base model, there were no variables that were significant in city and county 1990. In the dummy model, there were no variables that were significant in city and county 1990. The interactive model shows there were no variables that were significant in city and county 1990.

Summary Analysis of City and County 1990

The analysis in this section focuses on the main independent variable for cities and counties in 1990. For county and city base models, employment change was found to be the main independent variable in these models. In the interactive models, employment density change was found to be the main independent variable in these the county model while employment change was the main independent variables in the city models.

In the 1990 county base models, employment change was positively associated with transportation, wholesale, retail, personal services and professional services. In the 1990 city base models, employment change was positively associated with construction,

manufacturing, transportation, wholesale, retail, personal services and professional services while negatively associated with business services.

In the 1990 dummy model; core, inner and mature counties are found to have a higher level of personal services employment change. Mature, emerging and exurban counties are found to have a higher level of retail employment and public administration employment change; while a lower level of professional services employment change is found in these counties. Also a lower level of manufacturing employment change is found in emerging and exurban counties than other metro counties.

In the interactive county 1990, an increase in employment density change in emerging, mature and exurban counties is associated with increases in manufacturing, wholesale, FIRE and personal services employment. In the interactive city 1990, an increase in employment change is positively significant in construction, FIRE, retail, personal services and public administration and negatively associated with transportation, wholesale trade, business services and professional services. In inner cities employment change is positively significant in all models except business services and public administration. In mature cities employment change is positively significant in manufacturing, FIRE, retail trade, business services, personal services and professional services.

Analysis of Differences and Similarities in City 2000 and County 2000

City and County 2000 Construction Employment

In the base model, an increase in employment change is associated with an increase in construction employment change in county and city 1990. In the dummy model, a higher level of the college educated and median value change is associated with an increase in construction employment change in county and city 1990. A lower level of the high school educated is associated with an increase in construction employment change in county and city 1990. A lower level of construction employment change is found in the mature, emerging and exurban counties and cities. The interactive model shows that an increase in population density change, employment density change and median home value change is associated with an increase in construction employment in mature cities and counties. An increase in median home value change is associated with an increase in construction employment in emerging cities and counties.

City and County 2000 Manufacturing Employment

In the base model, a higher level of employment change and the high school educated is associated with an increase in manufacturing employment change in city and county 2000. In the dummy model, there were no variables that were significant in city and county 2000. The interactive model shows that a decrease in population change is associated with an increase in manufacturing employment in inner counties and cities.

City and County 2000 Transportation Employment

In the base model, an increase in employment change, population change and income per capita change is associated with an increase in transportation employment change in county and city 1990. An increase in population density change is associated with a decrease in transportation employment change in county and city 1990. In the dummy model, there were no variables that were significant in city and county 2000. The interactive model shows that an increase in employment change is associated with an increase in transportation employment in inner and mature cities and counties.

City and County 2000 Wholesale Employment

In the base model, there were no variables that were significant in city and county 2000.In the dummy model, an increase in population change is associated with an increase in wholesale employment change in city and county 2000.

The interactive model shows that an increase in employment change is associated with an increase in wholesale employment in emerging counties and cities.

City and County 2000 FIRE Employment

In the base model, a higher level of employment change and the high school educated is associated with an increase in transportation employment change in county and city 1990. In the dummy model, there were no variables that were significant in city and county 2000. The interactive model shows that an increase in employment change is associated with an increase in FIRE employment in inner cities and counties.

City and County 2000 Retail Trade Employment

In the base model shows that an increase in employment change is associated with an increase in retail employment in emerging counties and cities. In the dummy model shows that an increase in employment change is associated with an increase in retail employment in counties and cities. A lower level of retail employment change is found in core cities and counties. The interactive model shows there were no variables that were significant in city and county 2000.

City and County 2000 Business Services Employment

In the base model shows that a higher level of employment change, population change, the college educated and the 1990 employment density level is associated with an increase in business service employment in counties and cities. In the dummy model shows that a higher level of employment change, population change and the college educated is associated with an increase in business service employment in counties and cities. A higher level of business service employment change is found in emerging cities and mature counties. The interactive model shows an increase in population change is associated with an increase in business service employment change in inner cities and counties. An increase in income per capita change is associated with an increase in business service employment change in mature suburbs. A higher level of the high school educated is associated with a decrease in business service employment change.

City and County 2000 Personal Services Employment

In the base model, there were no variables that were significant in city and county 2000. In the dummy model, there were no variables that were significant in city and county 2000. The interactive model shows there were no variables that were significant in city and county 2000.

City and County 2000 Professional Services Employment

In the base model shows that a higher level of employment change and population change is associated with an increase in business service employment in counties and cities. In the dummy model there were no variables that were significant in city and county 2000. The interactive model shows there were no variables that were significant in city and county 2000.

City and County 2000 Public Administration Employment

In the base model, there were no variables that were significant in city and county 2000. In the dummy model, there were no variables that were significant in city and county 2000. The interactive model shows there were no variables that were significant in city and county 2000.

City and County 2000 Other Employment

In the base model there were no variables that were significant in city and county 2000. In the dummy model there were no variables that were significant in city and

county 2000. The interactive model shows there were no variables that were significant in city and county 2000.

Summary Analysis of City 2000 and County 2000

The analysis in this section focuses on the main independent variable for cities and counties in 2000. For county base models, employment change was found to be the main independent variable while population change was the main independent variable in the city models. In the interactive models, employment density change was found to be the main independent variable in the county model while employment change was the main independent variables in the city models.

In the county 2000 base model, employment change was positively associated with increase in all sectors except wholesale and personal services. Population change was positively associated with all sectors except construction, manufacturing and FIRE. In the city 2000 base model, population change was positively associated with wholesale, retail, business services, personal services and professional services. Employment change was positively associated with all dependent variables except personal services.

In the county 2000 models, a higher level of transport, wholesale and FIRE employment change is found in mature and emerging suburbs compared to other metro counties. A higher level of professional service employment change is found in the inner, mature, emerging and exurban areas than in the core. A lower level of construction, manufacturing and other employment change is found in mature, emerging and exurban counties than in inner and core counties. In the city 2000 dummy models, a lower level

of wholesale, FIRE and Retail employment change is found in the core than other metro counties. A lower level of wholesale and a higher level of professional services are found in inner counties. A higher level of business service employment change is found in emerging suburbs than other metro counties.

In the 11 interactive modes for county 2000, the interactive employment density change and employment change are significant in many models. In 2000 core counties, employment density change is positively associated with construction, manufacturing, retail and business services while negatively associated with FIRE. In mature counties, employment density change is positively associated with construction, manufacturing, wholesale, FIRE and professional services. In emerging counties, employment density change is positively associated with construction, manufacturing, and transportation. In 2000 emerging counties, employment change is positively associated with manufacturing, wholesale, FIRE, retail and professional services. In exurban counties, employment change is positively associated with FIRE and business services employment.

In 2000 core cities, the interactive employment change is positively associated with manufacturing, transportation, retail, and business services while negatively associated with wholesale trade. In inner cities, the interactive employment change is positively associated with manufacturing, transportation, wholesale, FIRE business services, professional services and public administration while negatively associated with retail. In mature cities, the interactive employment change is positively associated with FIRE, retail and professional services.

Sectoral Employment Trends in Cities and Counties in 1990 and 2000

This section examines the similarities and differences in the significant variables across cities and counties in 1990 and 2000. The purpose is to provide a summary of the findings by sector across jurisdictions and time. These summary results provide context for the research findings presented in the next section for each of the hypotheses in the base, dummy and interactive models.

In the dummy **construction** models a larger increase in construction employment is found towards the center of the metro and less is found in the exurbs. In the base **manufacturing** models areas with increases in employment and employment density change are associated with increases in manufacturing change. In the county dummy model employment density is associated with less manufacturing employment and more manufacturing employment is found in the emerging suburbs and exurbs. In the **transportation** base models an increase in employment change is associated with an increase in transportation employment change. The city models show that in core and inner cities an increase in employment change is associated with an increase in transportation employment change. In the **wholesale** dummy models, an increase in employment change is associated with an increase in wholesale employment change in 1990 and 2000. In the county models, a higher level of wholesale employment change is found in inner suburbs in 1990 and a higher level of wholesale employment change is found in mature, emerging and exurban counties in 2000.

In the **FIRE** county base models, an increase in employment density change is associated with an increase in FIRE employment change in 1990 and 2000. In the

interactive city models in inner and mature cities an increase in employment change is associated with an increase in FIRE employment change in 1990 and 2000. While in the county models, in emerging and exurban counties an increase in employment change is associated with a decrease in FIRE employment change in 1990 and associated with an increase in 2000. In the **retail trade** base models, an increase in employment change is associated with an increase in retail trade employment change. In the county dummy models a higher level of retail trade employment change is found in emerging counties in 1990 and 2000. The city interactive models show that in core and mature cities an increase in employment change is associated with an increase in retail employment change in 1990 and 2000. In the **business services** city base model, an increase in employment change is associated with an increase in business services employment change in 2000 while in the county base model, an increase in population density change is associated with an increase in business employment change in 1990 and 2000. In the city dummy model, a lower level of business service employment change is found in core cities than in other metro jurisdictions in 1990 while a higher level is found in exurban areas compared to other metro jurisdictions in 2000. The county interactive model shows that in mature counties, a higher level of the college educated is associated with an increase in business service employment change in 1990 and 2000.

In the **personal services** city base models, an increase in population change is associated with an increase in personal service employment change in 1990 and a decrease in 2000. In the county dummy models, an increase in population change is associated with an increase in personal services employment change. A higher level of

personal services employment change is found in inner and mature counties compare to other metro counties. In the **professional services** base models, an increase in employment change is associated with an increase in professional services employment change. The city interactive models show that in mature cities an increase in employment change is associated with an increase in professional services employment change in 1990 and 2000. In the **other employment** city base model, an increase in employment change is associated with a decrease in other employment change in 1990 and an increase in 2000. In the county dummy model, an increase in employment change is associated with an increase in other services employment change in 1990 and 2000. A lower level of other employment change is found in mature suburbs compared to other metro counties. The interactive model shows that in mature counties an increase in income per capita change is associated with an increase other employment change in 1990 and 2000.

Analysis of the Sectoral Employment Research Questions and Hypotheses

The first sectoral employment research question seeks to determine the overall relationship between socioeconomic factors and sectoral employment in all jurisdictions. This provides a starting point for investigating the relationship between socioeconomic factors and sectoral employment in metropolitan areas. The next two research questions address sectoral employment in different types of jurisdictions.

The research question asks, what is the relationship between changes in selected economic/socioeconomic factors and employment and for all jurisdictions from 1980-1990 and 1990-2000 at the County and City level? The hypothesis is that, population density change, population change, employment density change and employment change will be the main significant variables in these models. The hypotheses focuses on whether population or employment change will be the main factors associated with sectoral employment change. The question also investigates if the level of population/employment change will be more significant in sectoral employment change or if changes in population/employment density are more significant in sectoral employment change.

The results show that the employment change is the main significant variable in the 1980-1990 and 1990-2000 county models. The results for the city 1980-1990 show that employment change is the main significant variable in these models. The 1990-2000 city model shows that employment change and population change are the main significant variables in these models. These results show that the level of employment change is highly associated with sectoral employment change across jurisdictions and time. This is an interesting finding because of the debate in the economic literature about the relationship between population and employment.[28] Based on that literature it might be expected that population would be more significantly associated with sectoral employment change than is seen in the results of this analysis.

[28] A more thorough discussion of this relationship between population and employment can be found in the 2005 meta-analysis of Carlino-Mills studies by G. Hoogstra, R. Florax and J. van Dijk. Additional discussion is provided in K. Seetharam's 2007 study of density gradients and their determinants.

The dummy model research question asks, what is the relationship between changes in selected economic/socioeconomic factors including jurisdictional dummy variables and employment from 1980-1990 and 1990-2000 at the County and City level? This research question includes dummy variables to assess the changes in sectoral employment in the five jurisdiction types. In the 1980-1990 county model, support is provided for the hypothesis since a higher level of personal services employment change is found in core, inner and mature cities. This shows that even though less dense areas are growing rapidly, the market for personal services is strongest in more dense, urban locations. Also, there is support for the second part of the hypothesis since a higher level of retail and public administration employment change is found in mature, emerging and exurban counties. This finding provides support for the suburban migration theory in that as population level increase in less dense areas, retail businesses are growing to support the new demand being created in these areas. The growth of public administration shows that the public sector is responding to these population shifts by locating jobs near these new population centers.

The results in the 1990-2000 counties provides support for the hypothesis since a higher level of transportation, wholesale and FIRE employment change is found in mature and emerging suburbs compared to other metro jurisdictions. It is also found that there was a higher level of professional services employment change in inner, mature, emerging and exurban counties than in the core counties. These results further supports Metropolitan Transformation as employment expands in less dense areas of the metropolitan area.

The results for the 1980-1990 cities show support for the hypothesis since a higher level of wholesale employment change in the core compared to other metro jurisdictions. The results of this model do not provide an easily interpretable answer relating to Metropolitan Transformation. The results in the 1990-2000 city model show support for the hypothesis since a lower level of wholesale, FIRE and retail employment change is found in the core compared other jurisdictions. Therefore, areas outside the core are experiencing increases in these sectors as agglomeration occurs and the suburbs generate employment growth. Also, a higher level of business service employment change is found in emerging suburbs compared to other metro areas. Metropolitan Transformation is further supported as emerging suburban areas offer lower land prices but are located close enough to qualified workers that it becomes advantageous for businesses to locate in these areas.

The interactive research question asks, what is the relationship between changes in selected interactive jurisdictional economic/socioeconomic factors and employment from 1980-1990 and 1990-2000 at the County and City level? The hypothesis is that employment and employment density will be the main significant variables in the county models and population and population density will be the main significant variables in city models. This hypothesis is based on the results from the analysis of the changes in population and employment in Chapter V. These results showed that cities experienced a larger increase in population than employment over the 20-year period. Conversely, counties experienced a larger increase in employment than population during this time.

The results clearly show that employment and employment density are the main significant variables in all the interactive models.

The results for 1980-1990 counties show that employment density change is the main significant variable in mature, emerging and exurban counties. The results clearly show that growth was the strongest in these jurisdictions and that increases in employment density were associated with increases in sectoral employment during this time. This supports the Metropolitan Transformation theory in that suburban expansion is shown to take place in less dense jurisdictions.

The hypothesis for counties 1990-2000 is that employment density change will be the main significant variable in mature, emerging and exurban counties. The results show that the main significant variable in core, inner and mature jurisdictions is different than in emerging and exurban areas. Employment density change is the main significant variable in core, inner and mature jurisdictions. Employment change is the main significant variable in emerging and exurban jurisdictions. Therefore, during the 1990s employment density was more important in higher density areas and the level of employment change was more influential in the less dense jurisdictions. Within the framework of Metropolitan Transformation, the different roles of agglomeration are seen in higher density compared to less dense areas. As agglomeration occurs in urban counties it appears that density plays a large role in this growth process. However, as less dense areas expand, increasing the level of employment is more important than density levels.

The hypothesis for cities 1980-1990 is that population density change will be the main significant variable in the core, inner and mature cities. The results show that population and density are not as important in core, inner and mature cities as employment change. The models do not provide conclusive results for the emerging and exurban city jurisdictions. The hypothesis for cities 1990-2000 is that population density change will be the main significant variable in the core, inner and mature cities. The results reinforce the findings from the 1980-1990 period as employment change is the main independent variable in core, inner and mature cities. The models do not provide conclusive results for the emerging and exurban city jurisdictions.[29] The hypothesis that population change is an important factor in sectoral employment change at the city level is not confirmed by the results. As in the county models, the level of employment change has the strongest association with sectoral employment change.

Sectoral Employment Findings

This chapter has provided the results for the three research questions posed at the beginning of this chapter. These questions seek to determine the relationship between the main independent variables of population density change, population change,

[29] It should be noted that modifiable areal unit problem (MAUP) could be a contributing source to the lack of results. MAUP affects spatial studies that use aggregate data. MAUP refers to how sensitive data can be to the level of aggregation of spatial data. The two effects are scale and aggregation. The scale effect refers to the ability to obtain different statistical outcomes from the same dataset based on grouping data at different levels. The aggregation effect refers to the result from data being categorized by somewhat arbitrary boundaries such as cities and counties. This is the case in this research as counties and cities are aggregated and categorized according to their level of population density. While this research does not attempt to provide a solution for this potential issue, MAUP is acknowledged as once possible cause of the non-conclusive findings for city emerging and exurban results. Further information on MAUP can be found in Oppenshaw and Taylor 1981 and Dusek 2005.

employment density change and employment change and the eleven sectoral employment categories. Additionally, location variables are used in the dummy and interactive models to examine differences in employment changes between the core, inner, mature, emerging and exurban cities and counties during the 1980s and the 1990s.

The results of the base model show that the employment change is the main significant variable in the 1980-1990 and 1990-2000 county models. The results for the city 1980-1990 show that employment change is the main significant variable in these models. The 1990-2000 city model shows that employment change and population change are the main significant variables in these models.

In the 1980-1990 county dummy model, a higher level of personal services employment change is found in core, inner and mature cities. A higher level of retail and public administration employment change is found in mature, emerging and exurban counties. In the 1990-2000 counties, a higher level of transportation, wholesale and FIRE employment change is found in mature and emerging suburbs compared to other metro jurisdictions. The results for 1980-1990 cities show support for the hypothesis since a higher level of wholesale employment change is found in the core compared to other metro jurisdictions. The 1990-2000 city model shows a lower level of wholesale, FIRE and retail employment change is found in the core compared other jurisdictions. A higher level of business service employment change is found in emerging suburbs compared to other metro areas.

The results for 1980-1990 county interactive model show that employment density change is the main significant variable in mature, emerging and exurban counties.

In the county 1990-2000 model employment change is the main significant variable in emerging and exurban counties. Employment density change is the main significant variable in core, inner and mature jurisdictions. In the city 1980-1990 and 1990-2000 models show that employment change is the main significant variable in the core, inner and mature cities.

The next chapter explores the issue of poverty through spatial regression modeling. The methodology utilizes a similar approach to the analysis in this chapter. The final chapter includes a summary of this dissertations finding within the context of Metropolitan Transformation.

Table 18a County and City 2000 Base Models

2000 County																	
Dep Var	PopDenCh	EmpDenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PovCh	Pov	IncPC	MedVal	MedRenCh	EmpDen			
Const	PopDenCh			EmpCh						Pov	IncPC						
Man		EmpDenCh		EmpCh	HSLess	CollMore		MedValCh			IncPC			EmpDen			
Trans	PopDenCh		PopCh	EmpCh			IncPcCh										
Whole	PopDenCh		PopCh		HSLess												
FIRE		EmpDenCh	PopCh	EmpCh	HSLess				PovCh			MedVal					
Ret		EmpDenCh	PopCh	EmpCh	HSLess		IncPcCh							EmpDen			
BusSer	PopDenCh		PopCh	EmpCh	HSLess		IncPcCh					MedVal		EmpDen			
Per Ser	PopDenCh		PopCh		HSLess												
Pro Ser		EmpDenCh	PopCh	EmpCh			IncPcCh										
Pub Adm	PopDenCh		PopCh	EmpCh	HSLess		IncPcCh										
Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a			
2000 City																	
	EmpDenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PovCh	PopDen	MedVal	Emp	MedRen	MedRenCh	EmpDen	Pop Den Ch	Pov	Inc Pc
Const			EmpCh			IncPcCh					Emp		MedRenCh		Pop Den Ch	Pov	
Man	EmpDenCh		EmpCh	HSLess	CollMore		MedValCh							EmpDen			Inc Pc
Trans			EmpCh	HSLess		IncPcCh				MedVa					Pop Den Ch		
Whole		PopCh	EmpCh					PovCh							Pop Den Ch		
FIRE	EmpDenCh	PopCh	EmpCh	HSLess				PovCh		MedVa							
Ret	EmpDenCh	PopCh	EmpCh	HSLess		IncPcCh											
BusSer		PopCh	EmpCh	HSLess		IncPcCh				MedVa				EmpDen	Pop Den Ch		
Per Ser		PopCh		HSLess											Pop Den Ch		
Pro Ser	EmpDenCh	PopCh	EmpCh			IncPcCh			PopDen		Emp				Pop Den Ch		
Pub Adm	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

*Non-Significant variable in the County models: Pop Den, Pop, Emp. & Med Rent

Table 18b County and City 1990 Base Models

1990 County

Dep Var	Pop DenCh	Emp DenCh	PopCh	EmpCh	HS Less	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	Med Val				
Const	Pop DenCh		PopCh		HS Less													
Man		Emp DenCh			HS Less							IncPC						
Trans		Emp DenCh	PopCh	EmpCh										Med Val				
Whole		Emp DenCh		EmpCh														
FIRE		Emp DenCh				Coll More	IncPc Ch	Med ValCh										
Ret				EmpCh							Pop Den		Pop					
BusSer	Pop DenCh					Coll More		Med ValCh		Pov		IncPC						
Per Ser				EmpCh	HS Less													
Pro Ser	Pop DenCh		PopCh	EmpCh	HS Less													
Pub Adm	Pop DenCh		PopCh			Coll More								Med Val				
Other				EmpCh		Coll More												

1990 City

Dep Var	Pop DenCh	Emp DenCh	PopCh	Emp Ch	HS Less	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	MedVal	Emp	MedRen	Med RenCh	EmpDen
Const				Emp Ch											Emp		Med RenCh	
Man				Emp Ch											Emp			EmpDen
Trans				Emp Ch									Pop					EmpDen
Whole	Pop DenCh			Emp Ch									Pop					
FIRE			PopCh								PopDen		Pop					
Ret			PopCh	Emp Ch											Emp			EmpDen
BusSer				Emp Ch						Pov						MedRen		EmpDen
Per Ser			PopCh	Emp Ch									Pop	MedVal				
Pro Ser			PopCh	Emp Ch											Emp			EmpDen
Pub Adm			PopCh										Pop					EmpDen
Other			PopCh	Emp Ch									Pop					

Table 18c County and City 2000 Dummy Models

2000 County

Dep Var	Dum	PopDenCh	EmpDenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PovCh	Pov	Inc PC	MedVal	MedRenCh	EmpDen
Const	-M, -E, -X	PopDenCh				HSLess	CollMore		MedValCh						
Man	-M, -E, -X		EmpDenCh		EmpCh	HSLess	CollMore		MedValCh						EmpDen
Trans	+I, +M, +E, +X			PopCh	EmpCh		CollMore	IncPcCh							
Whole	+M, +E, +X			PopCh	EmpCh	HSLess									
FIRE	+M	PopDenCh		PopCh			CollMore						MedVal		
Ret	-C, +E		EmpDenCh	PopCh	EmpCh	HSLess		IncPcCh							EmpDen
BusSer	+M	PopDenCh		PopCh	EmpCh	HSLess		IncPcCh					MedVal		EmpDen
Per Ser	+I, +M	PopDenCh		PopCh		HSLess									
Pro Ser	+I, +M, +E, +X		EmpDenCh	PopCh	EmpCh			IncPcCh							
Pub Adm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other	-I, -M, -E, -X				EmpCh	HSLess									EmpDen

2000 City

Dep Var	Dum	Emp DenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	Med ValCh	PovCh	Pop Den	Med Val	Emp	Med Ren	MedRenCh	EmpDen
Const	-C											Emp		MedRenCh	
Man	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trans	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Whole	-I, -C			EmpCh											
FIRE	-C			EmpCh	HSLess			Med ValCh							
Ret	-C			EmpCh						Pop Den		Emp			
BusSer	+E		PopCh	EmpCh			IncPcCh						Med Ren		EmpDen
Per Ser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pro Ser	+I	Emp DenCh		EmpCh			IncPcCh			Pop Den		Emp			
Pub Adm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

*Non-Significant variables: Pop Den, Pop, Emp. & Med Rent

Table 18d County and City 1990 Dummy Models

1990 County

Dep Var	Dum	Pop DenCh	Emp DenCh	PopCh	Emp Ch	HS Less	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	Med Val				
Const	-X	Pop DenCh		PopCh		HS Less													
Man	+E,+X		Emp DenCh																
Trans	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s				
Whole	+I		Emp DenCh		Emp Ch														
FIRE	+M		Emp DenCh				Coll More	IncPc Ch	Med ValCh										
Ret	+M, +E, +I	Pop DenCh					Coll More												
BusSer	-I	Pop DenCh					Coll More	IncPc Ch	Med ValCh		Pov								
Per Ser	+C,+I, +M	Pop DenCh		PopCh															
Pro Ser	-M,-E-X	Pop DenCh			Emp Ch	HS Less													
Pub Adm	+M,+E,+X	Pop DenCh					Coll More								Med Val				
Other	+I,-M				Emp Ch														

2000 City

Dep Var	Dum	Pop DenCh	Emp DenCh	PopCh	Emp Ch	HS Less	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	Med Val	Emp	Med Ren	Med RenCh	Emp Den
Const	+C				Emp Ch											Emp		Med RenCh	
Man	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Trans	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Whole	-I, -M, -E, -X				Emp Ch							Pop Den		Pop					
FIRE	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Ret	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
BusSer	-C				Emp Ch						Pov						Med Ren		
Per Ser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pro Ser	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Pub Adm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Table 18e Aggregate County/City 1990 and 2000 Dummy Models

			City 1990							City 2000					
Dep Var	Type		Dum	Core	Inner	Mature	Emerging	Exurban		Dum	Core	Inner	Mature	Emerging	Exurban
Const	Dummy		+C	+						n/a					
Man	Dummy		n/a							n/a					
Trans	Dummy		n/a							n/a					
Whole	Dummy		-I, -M, -E, -X		-	-	-	-		-I, -C	-	-			
FIRE	Dummy		n/a							-C	-				
Ret	Dummy		n/a							-C	-				
BusSer	Dummy		-C	-						+E				+	
Per Ser	Dummy		n/a							n/a					
Pro Ser	Dummy		n/a							+I		+			
Pub Adm	Dummy		n/a							n/a					
Other	Dummy		n/a							n/a					
			County 1990							County 2000					
Dep Var	Type		Dum												
Const	Dummy		-X					-		-M, -E, -X			-	-	-
Man	Dummy		+E,+X				+	+		-M, -E, -X			-	-	-
Trans	Dummy		n/s							+I, +M, +E, +X		+	+	+	+
Whole	Dummy		+I		+					+M, +E, +X			+	+	+
FIRE	Dummy		+M			+				+M			+		
Ret	Dummy		+M, +E, +I			+	+	+		-C, +E	-			+	
BusSer	Dummy		-I		-					+M			+		
Per Ser	Dummy		+C,+I, +M	+	+	+				+I, +M		+	+		
Pro Ser	Dummy		-M,-E-X			-	-	-		+I, +M, +E, +X		+	+	+	+
Pub Adm	Dummy		+M,+E ,+X			+	+	+		n/a					
Other	Dummy		+I,-M		+	+				-I, -M, -E, -X		-	-	-	-

Table 18f County and City 2000 Interactive Models

2000 County

Dep Var	PopDenCh	EmpDenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PovCh	Pov	IncPC	MedVal	MedRenCh	EmpDen
Const	+M	+M, +E, +C			+E	-M	-C	+M, +E						
Man		+M, +E, +C	-I	+E	+E		+E, +X			+X			-E	
Trans		+E	-M, +X	-I, -M	-I, -M, -E		+X							
Whole		+M	+E	+E		+M	-M							
FIRE	-C	+M, -C		+I, +E, +X										
Ret	+C	+C	+E	+E		+X	-X						+E	
BusSer		+C	+I, +E	+M, +X	-I, -E		+M, -X							
Per Ser			-I, -M, -X	-C	+I, +E, +X, +C		-M, +E						-M	
Pro Ser	-C	+I, +M	+X	+E		+M								
Pub Adm	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Other			+I, -E	+E, -X	+X	-M	+M							

*Non-Significant variables: Pop Den, Pop, Emp. & Med Rent

2000 City

Dep Var	Emp DenCh	PopCh	EmpCh	HSLess	CollMore	IncPcCh	Med ValCh	PovCh	Pop Den	Med Val	Emp	Med Ren	MedRenCh	EmpDen
Const	+M			-E	-M	-C	+M, +E							
Man	+M		+I, +C											
Trans			+I, +C											
Whole	+I	+M	+I, -C	+I, +M, +C		-I		+E						
FIRE		-C	+I, +M, -E	+M	-I, -E		+M							
Ret			-I, +M, +C	-E	-I, +E	+M								
BusSer	+M	+I, +M, +C	+I, -E, +C	-M, -E		+M				+E				
Per Ser				+M, +E	-I	-C								
Pro Ser		-C, -I, -M, -E	+I, +M, +E	+E		-M								
Pub Adm			+I, +M, E	+M	+I, +M	-M								
Other	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

*Non-Significant variables: Pop Den Ch, pov, InPC & Pop

Table 18g County and City1990 Interactive Models

1990 City																	
Dep Var	Pop DenCh	Emp DenCh	PopCh	EmpCh	HS Less	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	Med Val	Emp	Med Ren	Med RenCh	Emp Den
Const	+I	-C	+I	+C, +I	-C, -I	+I												
Man		+C		+I, +M	+C, +I													
Trans	-C, -I			-C, +I	+I	+C, -M	+M		-C	-C								
Whole		+M	-C +M	-C , +I	+C	+I												
FIRE		-C, -I	+C	+C, +I, +M														
Ret	-I		+I	+C, +I, +M	-C, +I	+C												
BusSer			-C	-C, +M												-M		
Per Ser		-C, -I	+C	+C, +I, +M	-C, -I			+C									-C	
Pro Ser		-C, -I	+I	-C, +I, +M	-C, -I												+C	
Pub Adm		+C	-I, +C	+C		+C												
Other		-C	+I, +M, -C	+I, +E	-C, -I		+C											
1990 County																		
Dep Var	Pop DenCh	Emp DenCh	PopCh	EmpCh	HSLess	Coll More	IncPc Ch	Med ValCh	PovCh	Pov	Pop Den	IncPC	Pop	Med Val				
Const		+C			-I													
Man		+E		+X		+X												
Trans	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s				
Whole		+I,+M, +E,+X				+I,+M, +E,+X												
FIRE	+E	+M, +X		-E, -X														
Ret	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s	n/s				
BusSer	+M,+E, +X		-X			+M,+X												
Per Ser	+E	+C,+M ,+X		-E,-X														
Pro Ser				-E			-X		+M,+E, +X									
Pub Adm	+E		+I	+X		-I,-M,-E,-X												
Other		+E				+I,+M, +E,+X												

Table 18h County and City 1990 Dependent Variable Correlations

City 1990											
Dep Var	Const	Man	Trans	Whole	Ret	FIRE	BusSer	Per Ser	Pro Ser	Pub Adm	Other
Const	1.0										
Man	-.26	1.0									
Trans	.12	.36	1.0								
Whole	.14	.54	.73	1.0							
Ret	.54	.02	.36	.41	1.0						
FIRE	.57	-.47	-.01	-.18	.64	1.0					
BusSer	.38	-.05	.58	.6	.70	.31	1.0				
Per Ser	.69	-.49	-.19	-.33	.57	.89	.13	1.0			
Pro Ser	.67	-.56	-.03	-.20	.67	.87	.40	.87	1.0		
Pub Adm	-.52	.38	.26	.30	-.30	-.63	.08	-.70	-.68	1.0	
Other	.83	-.37	.29	.25	.66	.56	.70	.57	.71	-.35	1.0
County 1990											
Const	1.0										
Man	-.36	1.0									
Trans	.42	.37	1.0								
Whole	.33	.49	.80	1.0							
Ret	.78	.07	.73	.67	1.0						
FIRE	.87	-.32	.54	.43	.80	1.0					
BusSer	.72	.12	.76	.74	.91	.79	1.0				
Per Ser	.73	.02	.72	.68	.86	.82	.91	1.0			
Pro Ser	.90	-.53	.36	.18	.72	.90	.68	.72	1.0		
Pub Adm	-.26	-.12	-.38	-.44	-.40	-.34	-.38	-.58	-.30	1.0	
Other	.90	-.15	.61	.54	.89	.89	.88	.90	.85	-.42	1.0

Table 18i County and City 2000 Dependent Variable Correlations

City 2000											
Dep Var	Const	Man	Trans	Whole	Ret	FIRE	BusSer	Per Ser	Pro Ser	Pub Adm	Other
Const	1.0										
Man	.34	1.0									
Trans	.41	.07	1.0								
Whole	.49	.62	.48	1.0							
Ret	.40	-.05	.72	.37	1.0						
FIRE	.53	.76	.12	.68	-.06	1.0					
BusSer	.10	-.63	.43	-.23	.61	-.50	1.0				
Per Ser	.19	.63	-.31	.32	-.59	.77	-.72	1.0			
Pro Ser	.51	.54	.25	.65	.02	.78	-.43	.57	1.0		
Pub Adm	.17	-.28	.53	.08	.70	-.32	.57	-.66	.00	1.0	
Other	.41	.33	.09	.10	.39	.28	.10	.04	-.01	.17	1.0
County 2000											
Const	1.0										
Man	.24	1.0									
Trans	.45	.31	1.0								
Whole	.64	.41	.55	1.0							
Ret	.69	-.19	.53	.58	1.0						
FIRE	.56	.66	.51	.57	.13	1.0					
BusSer	.28	-.58	.29	.17	.79	-.26	1.0				
Per Ser	-.18	.29	-.25	-.34	-.48	.06	-.58	1.0			
Pro Ser	.57	.34	.46	.65	.39	.62	-.07	-.25	1.0		
Pub Adm	.52	.05	.51	.65	.61	.42	.38	-.63	.74	1.0	
Other	.26	-.37	.11	-.24	.41	-.16	.58	.16	-.29	-.16	1.0

Table 18j City 2000 Independent Variable Correlations

2000 City																		
Dep Var	Pop DenCh	PopCh	Emp DenCh	EmpCh	IncPc Ch	HS Less	Coll More	Med ValCh	Med RenCh	PovCh	Pov	Pop Den	Emp Den	Pop	Emp	IncPC	Med Val	Med Ren
Pop DenCh	1.0																	
PopCh	.56	1.0																
Emp DenCh	-.11	-.07	1.0															
EmpCh	-.14	-.06	.75	1.0														
IncPc Ch	-.21	-.09	.22	.13	1.0													
HS Less	-.56	-.88	.19	.32	.07	1.0												
Coll More	.56	.99	-.06	-.03	-.05	-.89	1.0											
Med ValCh	-.27	-.02	.08	.13	.58	.01	.02	1.0										
Med RenCh	-.08	.02	.20	.17	.75	.03	.06	.55	1.0									
PovCh	.24	.25	-.01	-.05	-.37	.04	-.01	-.36	-.23	1.0								
Pov	.33	.47	-.35	-.24	-.30	-.34	.23	-.09	-.17	-.01	1.0							
Pop Den	.81	.14	-.23	-.26	-.06	-.61	.46	-.18	-.02	.11	.46	1.0						
Emp Den	.58	.98	-.21	-.23	.01	-.31	.13	-.12	.04	.13	.33	.79	1.0					
Pop	.57	.90	-.11	-.15	-.07	-.94	.98	-.01	.01	.00	.29	.55	.22	1.0				
Emp	.46	-.12	-.16	-.19	-.06	-.88	.89	.02	.00	-.02	.37	.50	.32	.92	1.0			
IncPC	-.16	-.06	.22	.12	.28	.16	-.11	-.04	.13	.07	-.69	-.19	.00	-.13	-.16	1.0		
Med Val	.19	-.06	.13	.00	.04	.08	-.06	-.47	-.01	.22	-.38	.19	.23	-.05	-.1	.63	1.0	
Med Ren	.08	-.12	.05	-.09	.12	.05	-.13	-.19	-.12	.18	-.18	.13	.05	-.09	-.14	.18	.52	1.0

Table 18k County 2000 Independent Variable Correlations

2000 County																		
Dep Var	Pop DenCh	PopCh	Emp DenCh	EmpCh	IncPc Ch	HS Less	Coll More	Med ValCh	Med RenCh	PovCh	Pov	Pop Den	Emp Den	Pop	Emp	IncPC	Med Val	Med Ren
Pop DenCh	1.0																	
PopCh	.45	1.0																
Emp DenCh	-.07	-.11	1.0															
EmpCh	-.16	.63	.32	1.0														
IncPc Ch	-.20	-.24	.23	.08	1.0													
HS Less	-.57	-.15	.08	.22	.23	1.0												
Coll More	.33	.91	-.10	.70	-.07	-.09	1.0											
Med ValCh	-.27	-.11	-.33	.02	.20	.29	.02	1.0										
Med RenCh	.07	-.03	.13	.06	.19	.03	.05	.45	1.0									
PovCh	.38	.35	-.06	.03	-.38	-.28	.21	-.46	-.37	1.0								
Pov	.62	.28	-.03	-.05	-.38	-.49	.16	-.18	.1	.13	1.0							
Pop Den	.65	.14	.38	-.07	-.07	-.56	.07	-.56	.19	.20	.55	1.0						
Emp Den	.34	.02	.55	.01	.12	-.28	-.03	-.57	.20	.02	.29	.84	1.0					
Pop	.45	1.0	-.11	.63	-.24	-.15	.91	-.11	-.03	.35	.28	.14	.02	1.0				
Emp	-.16	.63	.32	1.0	.08	.22	.70	.02	.06	.03	-.05	-.07	.01	.63	1.0			
IncPC	.04	.10	.25	.19	.42	-.1	.12	-.53	-.37	.37	-.27	.12	.16	.10	.19	1.0		
Med Val	.19	.12	.35	.13	.29	-.25	.08	-.69	-.23	.44	-.05	.43	.39	.12	.13	.85	1.0	
Med Ren	.03	.16	.14	.19	.30	-.08	.15	-.50	-.53	.43	-.25	.04	.01	.16	.19	.93	.81	1.0

Table 18l City 1990 Independent Variable Correlations

1990 City																		
Dep Var	Pop DenCh	PopCh	Emp DenCh	EmpCh	IncPc Ch	HS Less	Coll More	Med ValCh	Med RenCh	PovCh	Pov	Pop Den	Emp Den	Pop	Emp	IncPC	Med Val	Med Ren
Pop DenCh	1.0																	
PopCh	.70	1.0																
Emp DenCh	.15	0.0	1.0															
EmpCh	-.23	-.51	.39	1.0														
IncPc Ch	-.01	.03	.25	.06	1.0													
HS Less	.09	-.13	.10	.05	.06	1.0												
Coll More	.46	.51	.11	-.35	.20	.62	1.0											
Med ValCh	-.06	-.08	.21	.05	.59	.03	.06	1.0										
Med RenCh	.04	-.03	.09	-.05	.58	.08	.16	.70	1.0									
PovCh	0.0	-.02	-.16	-.05	-.03	-.04	-.09	-.05	.03	1.0								
Pov	-.19	-.11	-.23	-.02	-.37	-.30	-.39	-.17	-.10	.24	1.0							
Pop Den	-.35	-.28	.12	.14	-.05	-.55	-.52	.31	.07	.01	.44	1.0						
Emp Den	-.18	-.06	.09	-.03	.04	-.34	-.20	.31	.06	-.01	.36	.80	1.0					
Pop	-.48	-.64	.03	.57	-.05	-.57	-.85	.07	-.04	.04	.27	.59	.22	1.0				
Emp	-.38	-.43	-.07	.48	-.009	-.72	-.86	0.0	-.09	.06	.38	.62	.37	.91	1.0			
IncPC	.03	.02	.15	.03	.46	.17	.19	.23	-.04	-.25	-.69	-.24	-.13	-.14	-.19	1.0		
Med Val	.11	-.01	.32	.08	.44	.23	.21	.54	.17	-.09	-.56	-.05	-.04	-.11	-.20	.68	1.0	
Med Ren	.18	.05	.25	.07	.32	.27	.26	.15	-.04	-.21	-.74	-.28	-.25	-.17	-.26	.74	.76	1.0

Table 18m County 1990 Independent Variable Correlations

1990 County																		
Dep Var	Pop DenCh	PopCh	Emp DenCh	EmpCh	IncPc Ch	HS Less	Coll More	Med ValCh	Med RenCh	PovCh	Pov	Pop Den	Emp Den	Pop	Emp	IncPC	Med Val	Med Ren
Pop DenCh	1.0																	
PopCh	.61	1.0																
Emp DenCh	.53	.02	1.0															
EmpCh	.58	.65	.49	1.0														
IncPc Ch	.28	.06	.25	.36	1.0													
HS Less	.05	.27	-.24	-.09	-.14	1.0												
Coll More	.50	.65	.17	.86	.28	-.16	1.0											
Med ValCh	.37	.04	.40	.36	.78	-.24	.29	1.0										
Med RenCh	.15	.12	-.03	.19	.76	.05	.16	.63	1.0									
PovCh	-.07	-.03	-.02	-.20	-.58	-.03	-.12	-.53	-.72	1.0								
Pov	0.0	-.05	.28	.07	-.45	-.21	-.05	-.15	-.32	.18	1.0							
Pop Den	.47	-.05	.85	.40	.18	-.43	.20	.42	-.04	.02	.48	1.0						
Emp Den	.49	-.01	.99	.45	.23	-.25	.14	.37	-.05	.01	.27	.83	1.0					
Pop	.26	.15	.13	.39	.71	-.09	.35	.64	.61	-.80	-.34	.05	.09	1.0				
Emp	.13	.02	.30	.52	.21	-.70	.64	.33	.03	-.02	.28	.56	.28	.17	1.0			
IncPC	.50	.21	.85	.70	.28	-.51	.50	.39	-.01	.02	.30	.79	.85	.18	.64	1.0		
Med Val	.20	.33	-.06	.19	-.04	.16	.19	-.45	-.08	.09	-.10	-.10	-.05	.08	-.06	.04	1.0	
Med Ren	.28	.24	.07	.44	.75	-.08	.45	.68	.64	-.74	-.41	.06	.04	.94	.25	.17	.07	1.0

CHAPTER IX

SPATIAL REGRESSION RESULTS FOR POVERTY IN METROPOLITAN JURISDICTIONS

The final research questions examine the relationship between poverty levels and economic/socioeconomic changes. Research questions six, seven and eight examine this relationship using an all-inclusive model, a dummy variable model and an interactive model. The results examined in this chapter can be found in Table 24a and 24b that aggregates all the poverty model results. These tables include the dependent variables by city and year, the type of model and the independent variables.[30]

The first two sections of this chapter examine the changes that occurred with the cities and counties over time. The following sections look at the changes in cities and counties during the same time period. The final section analyzes the overall trends in cities and counties in both time periods.

[30] Contiguities and spatial solution model types can be found in the appendix, Table D21.

Methodology

Three spatial regression models are used to examine the relationship between the dependent variable, poverty and independent variables, change in economic/socioeconomic factors. The same dependent variable is used in all three models. The three models are distinct due to the use of different independent variables. The first model is the most general model and the independent variables include all jurisdictions. The second model includes the first model plus the five dummy jurisdictional variables; core, inner suburbs, mature suburbs, emerging suburbs and exurbs. In the third model interactive variables are created by multiplying each independent variable from model one with each of the five jurisdiction types. Each of these three models is run for the 1980-1990 and 1990-2000 periods at the City and County level.

Poverty Base Models

Research Question: What is the relationship between poverty rates and changes in selected economic/socioeconomic factors for all jurisdictions from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) an increase in income per capita will be associated with lower poverty levels.

Hypothesis: In Counties (1990-2000) an increase in income per capita change will be associated with lower levels of poverty.

Hypothesis: In Cities (1980-1990) an increase in employment density change, the number of college educated, income per capita and median rents will be associated with lower poverty levels.

Hypothesis: In Cities (1990-2000) an increase in income per capita change will be associated with lower levels of poverty.

Base Model Description

This model includes all jurisdictions. There is one regression run for both the cities and counties for the 1980-1990 period with 1990 poverty rate as the dependent variable. One regression is run for both the cities and counties for the 1990-2000 period with 2000 poverty rate as the dependent variable. The independent variables are: population density change, employment density change, population change, employment change education high school and below, education above high school, income per capita change, median home value change, median rent change, population density, employment density, population, employment, income per capita, median home value change and median rent.

Table 19a Poverty Base Model Variables 1980-1990

Dependent Variable	Independent Variables			
		1980-1990		1980
1990 Poverty Rate	1	Population Density Δ	10	Population Density
	2	Employment Density Δ	11	Employment Density
	3	Population Δ	12	Population
	4	Employment Δ	13	Employment
	5	Education –High School and Below Δ	14	Education – High School and below
	6	Education – Above High School Δ	15	Education – Above High School
	7	Income Per Capita Δ	16	Income Per Capita

	8	Median Home Value Change Δ	17	Median Home Value Change
	9	Median Rent Δ	18	Median Rent

Table 19b Poverty Base Model Variables 1990-2000

Dependent Variable	Independent Variables			
		1990-20000		1990
2000 Poverty Rate	1	Population Density Δ	10	Population Density
	2	Employment Density Δ	11	Employment Density
	3	Population Δ	12	Population
	4	Employment Δ	13	Employment
	5	Education – High School and Below Δ	14	Education – High School and below
	6	Education –Above High School Δ	15	Education – Above High School
	7	Income Per Capita Δ	16	Income Per Capita
	8	Median Home Value Change Δ	17	Median Home Value Change
	9	Median Rent Δ	18	Median Rent

Poverty Dummy Models

Research Question: What is the relationship between poverty rates and selected economic/socioeconomic factors including jurisdictional dummy variables from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) mature, emerging and exurban counties will have lower levels of poverty than inner and core counties.

Hypothesis: In Counties (1990-2000) mature, emerging and exurban counties will have lower levels of poverty than inner and core counties.

Hypothesis: In Cities (1980-1990) higher levels of poverty will be found in core and inner cities.

Hypothesis: In Cities (1990-2000) lower levels of poverty will be found in inner and mature cities.

Dummy Poverty Model Description

This model includes all jurisdictions. This model attempts to capture location effects by including dummy independent variables for each of the five types of jurisdictions: the core, inner suburbs, mature suburbs, emerging suburbs and exurbs. There is one regression run for both the cities and counties for the 1980-1990 period with 1990 poverty rate as the dependent variable. One regression is run for both the cities and counties for the 1990-2000 period with 2000 poverty rate as the dependent variable. The independent variables are: population density change, employment density change, population change, employment change education high school and below, education above high school, income per capita change, median home value change, median rent change, population density, employment density, population, employment, income per capita, median home value change, median rent, core dummy, inner suburb dummy, mature suburb dummy, emerging suburb dummy and exurban dummy.

Table 20a Poverty Dummy Model Variables 1980-1990

Dependent Variable	Independent Variables			
		1980-1990		1980
1990 Poverty Rate	1	Population Density Δ	13	Employment
	2	Employment Density Δ	14	Education – High School and below
	3	Population Δ	15	Education – Above High School
	4	Employment Δ	16	Income Per Capita

	5	Education – High School and Below Δ	17	Median Home Value Change
	6	Education – Above High School Δ	18	Median Rent
	7	Income Per Capita Δ	19	Core Dummy
	8	Median Home Value Change Δ	20	Inner Suburb Dummy
	9	Median Rent Δ	21	Mature Suburb Dummy
	10	Population Density	22	Emerging Suburb Dummy
	11	Employment Density	23	Exurb Dummy
	12	Population		

Table 20b Poverty Dummy Model 1990-2000

Dependent Variable	Independent Variables			
		1990-20000		*1990*
2000 Poverty Rate	1	Population Density Δ	13	Employment
	2	Employment Density Δ	14	Education – High School and below
	3	Population Δ	15	Education – Above High School
	4	Employment Δ	16	Income Per Capita
	5	Education –High School and Below Δ	17	Median Home Value Change
	6	Education –Above High School Δ	18	Median Rent
	7	Income Per Capita Δ	19	Core Dummy
	8	Median Home Value Change Δ	20	Inner Suburb Dummy
	9	Median Rent Δ	21	Mature Suburb Dummy
	10	Population Density	22	Emerging Suburb Dummy
	11	Employment Density	23	Exurb Dummy
	12	Population		

Poverty Interactive Models

Research Question: What is the relationship between poverty rates and selected interactive jurisdictional economic/socioeconomic factors from 1980-1990 and 1990-2000 at the City and County level?

Hypothesis: In Counties (1980-1990) an increase in income per capita will be associated with lower levels of poverty in inner, mature, emerging and exurban counties.

Hypothesis: In Counties (1990-2000) an increase in income per capita and population density will be associated with lower poverty levels in inner, mature, emerging and exurban counties.

Hypothesis: In Cities (1980-1990) an increase in the number of college educated and income per capita will be associated with lower levels of poverty in core, inner, mature and emerging cities.

Hypothesis: In Cities (1990-2000) an increase in population density change will be associated with higher levels of poverty in core, inner and mature cities.

Interactive Poverty Model Description

This model includes all jurisdictions. There is one regression run for both the cities and counties for the 1980-1990 period with 1990 poverty rate as the dependent variable. One regression is run for both the cities and counties for the 1990-2000 period with 2000 poverty rate as the dependent variable. Poverty rate is the dependent variable. The independent variables were created by multiplying each of the following independent variables by each of the five jurisdictional dummy variables: population density change, employment density change, population change, employment change education high school and below, education above high school, income per capita change, median home value change, median rent change, population density, employment density, population, employment, income per capita, median home value change and median rent. Since there are an unmanageable number of independent variables, the base model results were used to inform that variables might tend to be significant. These variables that offered more

promise were tested in the interactive model, however, all variables presented below were created as potential independent variables.

Table 21a Poverty Interactive Model Variables 1980-1990

Dependent Variable	Potential Independent Variables			
		1980-1990		1980
1990 Poverty Rate	1	Population Density Δ * Core	10	Population Density * Core
	2	Employment Density Δ* Core	11	Employment Density * Core
	3	Population Δ* Core	12	Population * Core
	4	Employment Δ* Core	13	Employment * Core
	5	Education – High School and Below Δ* Core	14	Education – High School and below * Core
	6	Education – Above High School Δ* Core	15	Education – Above High School * Core
	7	Income Per Capita Δ* Core	16	Income Per Capita * Core
	8	Median Home Value Change Δ* Core	17	Median Home Value Change* Core
	9	Median Rent Δ* Core	18	Median Rent * Core
	19	Population Density Δ * Inner Suburbs	28	Population Density * Inner Suburbs
	20	Employment Density Δ * Inner Suburbs	29	Employment Density * Inner Suburbs
	21	Population Δ * Inner Suburbs	30	Population * Inner Suburbs
	22	Employment Δ * Inner Suburbs	31	Employment * Inner Suburbs
	23	Education – High School and Below Δ* Inner Suburbs	32	Education – High School and below * Inner Suburbs
	24	Education – Above High School Δ * Inner Suburbs	33	Education – Above High School * Inner Suburbs
	25	Income Per Capita Δ * Inner Suburbs	34	Income Per Capita * Inner Suburbs
	26	Median Home Value Change Δ * Inner Suburbs	35	Median Home Value Change * Inner Suburbs
	27	Median Rent Δ * Inner Suburbs	36	Median Rent * Inner Suburbs
	37	Population Density Δ * Mature Suburbs	46	Population Density * Mature Suburbs
	38	Employment Density Δ* Mature Suburbs	47	Employment Density * Mature Suburbs
	39	Population Δ * Mature Suburbs	48	Population * Mature Suburbs
	40	Employment Δ * Mature Suburbs	49	Employment * Mature Suburbs
	41	Education – High School and Below Δ * Mature Suburbs	50	Education – High School and below * Mature Suburbs
	42	Education – Above High School Δ * Mature Suburbs	51	Education – Above High School * Mature Suburbs
	43	Income Per Capita Δ * Mature Suburbs	52	Income Per Capita * Mature Suburbs
	44	Median Home Value Change Δ * Mature Suburbs	53	Median Home Value Change * Mature Suburbs
	45	Median Rent Δ * Mature Suburbs	54	Median Rent * Mature Suburbs
	55	Population Density Δ * Emerging Suburbs	64	Population Density * Emerging Suburbs
	56	Employment Density Δ * Emerging Suburbs	65	Employment Density * Emerging Suburbs
	57	Population Δ * Emerging Suburbs	66	Population * Emerging Suburbs
	58	Employment Δ * Emerging Suburbs	67	Employment * Emerging Suburbs
	59	Education – High School and Below Δ * Emerging Suburbs	68	Education – High School and below * Emerging Suburbs
	60	Education – Above High School Δ * Emerging Suburbs	69	Education – Above High School * Emerging Suburbs
	61	Income Per Capita Δ * Emerging Suburbs	70	Income Per Capita * Emerging Suburbs
	62	Median Home Value Change Δ * Emerging Suburbs	71	Median Home Value Change * Emerging Suburbs
	63	Median Rent Δ * Emerging Suburbs	72	Median Rent * Emerging Suburbs
	73	Population Density Δ * Exurbs	82	Population Density * Exurbs
	74	Employment Density Δ * Exurban Suburbs	83	Employment Density * Exurbs
	75	Population Δ * Exurbs	84	Population * Exurbs
	76	Employment Δ * Exurbs	85	Employment * Exurbs
	77	Education – High School and Below Δ * Exurbs	86	Education – High School and below * Exurbs
	78	Education – Above High School Δ * Exurbs	87	Education – Above High School * Exurbs

	79	Income Per Capita Δ * Exurbs	88	Income Per Capita * Exurbs
	80	Median Home Value Change Δ * Exurbs	89	Median Home Value Change * Exurbs
	81	Median Rent Δ * Exurbs	90	Median Rent * Exurbs

Table 21b Poverty Interactive Model Variables 1990-2000

Dependent Variable	Potential Independent Variables			
		1990-2000		1990
2000 Poverty Rate	1	Population Density Δ * Core	10	Population Density * Core
	2	Employment Density Δ* Core	11	Employment Density * Core
	3	Population Δ* Core	12	Population * Core
	4	Employment Δ* Core	13	Employment * Core
	5	Education – High School and Below Δ* Core	14	Education – High School and below * Core
	6	Education – Above High School Δ* Core	15	Education – Above High School * Core
	7	Income Per Capita Δ* Core	16	Income Per Capita * Core
	8	Median Home Value Change Δ* Core	17	Median Home Value Change* Core
	9	Median Rent Δ* Core	18	Median Rent * Core
	19	Population Density Δ * Inner Suburbs	28	Population Density * Inner Suburbs
	20	Employment Density Δ * Inner Suburbs	29	Employment Density * Inner Suburbs
	21	Population Δ * Inner Suburbs	30	Population * Inner Suburbs
	22	Employment Δ * Inner Suburbs	31	Employment * Inner Suburbs
	23	Education – High School and Below Δ* Inner Suburbs	32	Education – High School and below * Inner Suburbs
	24	Education – Above High School Δ * Inner Suburbs	33	Education – Above High School * Inner Suburbs
	25	Income Per Capita Δ * Inner Suburbs	34	Income Per Capita * Inner Suburbs
	26	Median Home Value Change Δ * Inner Suburbs	35	Median Home Value Change * Inner Suburbs
	27	Median Rent Δ * Inner Suburbs	36	Median Rent * Inner Suburbs
	37	Population Density Δ * Mature Suburbs	46	Population Density * Mature Suburbs
	38	Employment Density Δ* Mature Suburbs	47	Employment Density * Mature Suburbs
	39	Population Δ * Mature Suburbs	48	Population * Mature Suburbs
	40	Employment Δ * Mature Suburbs	49	Employment * Mature Suburbs
	41	Education – High School and Below Δ * Mature Suburbs	50	Education – High School and below * Mature Suburbs
	42	Education – Above High School Δ * Mature Suburbs	51	Education – Above High School * Mature Suburbs
	43	Income Per Capita Δ * Mature Suburbs	52	Income Per Capita * Mature Suburbs
	44	Median Home Value Change Δ * Mature Suburbs	53	Median Home Value Change * Mature Suburbs
	45	Median Rent Δ * Mature Suburbs	54	Median Rent * Mature Suburbs
	55	Population Density Δ * Emerging Suburbs	64	Population Density * Emerging Suburbs
	56	Employment Density Δ * Emerging Suburbs	65	Employment Density * Emerging Suburbs
	57	Population Δ * Emerging Suburbs	66	Population * Emerging Suburbs
	58	Employment Δ * Emerging Suburbs	67	Employment * Emerging Suburbs
	59	Education – High School and Below Δ * Emerging Suburbs	68	Education – High School and below * Emerging Suburbs
	60	Education – Above High School Δ * Emerging Suburbs	69	Education – Above High School * Emerging Suburbs
	61	Income Per Capita Δ * Emerging Suburbs	70	Income Per Capita * Emerging Suburbs
	62	Median Home Value Change Δ * Emerging Suburbs	71	Median Home Value Change * Emerging Suburbs
	63	Median Rent Δ * Emerging Suburbs	72	Median Rent * Emerging Suburbs
	73	Population Density Δ * Exurbs	82	Population Density * Exurbs
	74	Employment Density Δ * Exurban Suburbs	83	Employment Density * Exurbs
	75	Population Δ * Exurbs	84	Population * Exurbs
	76	Employment Δ * Exurbs	85	Employment * Exurbs
	77	Education – High School and Below Δ * Exurbs	86	Education – High School and below * Exurbs
	78	Education – Above High School Δ * Exurbs	87	Education – Above High School * Exurbs

	79	Income Per Capita Δ * Exurbs	88	Income Per Capita * Exurbs
	80	Median Home Value Change Δ * Exurbs	89	Median Home Value Change * Exurbs
	81	Median Rent Δ * Exurbs	90	Median Rent * Exurbs

Poverty Regression Results City 1990

There are no spatial issues associated with the 1990 city models. Therefore, all the models use OLS regression. In the 1990 city poverty **base model** an increase in employment density change, the number of college educated persons, income per capita and median rents is associated with lower poverty levels in 1990. The model also shows an increase in employment density in 1980 is associated with higher poverty levels in 1990. When examining the 1990 city poverty **dummy model** an increase in employment density change, the number of college educated persons and income per capita is associated with lower poverty levels in 1990. It also shows higher levels of poverty are found in core counties and inner suburban cities compared to cities in other jurisdictions in 1990. In the 1990 city poverty **interactive model** an increase in income per capita change and median rent change is associated with higher poverty in **core cities** in 1990. An increase in employment density change, the number of college educated persons and median home value change in the **inner suburban cities** is associated with lower poverty levels in 1990. An increase in income per capita change is associated with lower poverty in **mature cities** in 1990. An increase in college educated persons is associated with lower poverty levels in **emerging cities** in 1990.

Poverty Regression Results City 2000

There are no spatial issues associated with the 1990 city models. Therefore, all the models use OLS regression. In the 2000 city poverty **base model** an increase in income per capita change is associated with lower poverty levels in 2000. An increase in population density in 1990 is associated with higher poverty levels in 2000. In the 2000 city poverty **dummy model** an increase in income per capita change is associated with lower poverty levels in 2000. An increase in population density in 1990 is associated with higher poverty levels in 2000. Lower levels of poverty are found in inner suburban cities compared to other metro jurisdictions. In the 2000 city poverty **interactive model** an increase in the number of college educated is associated with higher levels of poverty in **core cities**. An increase in population density change is associated with higher poverty levels in **inner** and **mature cities**.

Poverty Regression Results County 1990

There are spatial multicollinearity issues associated with these models. The base model uses OLS, the dummy model requires a spatial error model with contiguity 1-3 and the interactive model needs a spatial error model with contiguity 1-4. The 1990 county poverty base model shows that areas with higher poverty levels are associated with higher levels of employment density change. In the 1990 county poverty **base model** an increase in employment density change, median home value change and median rent change is associated with higher poverty levels. An increase in income per capita change is associated with lower poverty levels. In the 1990 county poverty **dummy model** an

increase in employment density change and median rent change is associated with higher poverty levels. An increase in income per capita change is associated with lower poverty levels. Mature, emerging and exurban counties have lower poverty levels than the inner and core counties. In the 1990 county poverty **interactive model** an increase in employment density change and income per capita in **inner counties** change is associated with lower poverty levels. An increase in median home value change in **inner counties** is associated with higher poverty levels. An increase in median home value change and income per capita is associated with lower poverty levels in **mature counties**. An increase in income per capita is associated with lower poverty in **emerging suburbs**. An increase in income per capita is associated with lower poverty in **exurban counties**. An increase in median home value change is associated with higher poverty in **exurban counties**.

Poverty Regression Results County 2000

There are spatial multicollinearity issues associated with these models. The base and dummy models require a spatial error model with contiguity 1-3 and the interactive model needs a spatial error model with contiguity 1-4. The 1990 county poverty base model shows that areas with higher poverty levels are associated with higher levels of employment density change. In the 2000 county poverty **base model** an increase in population density change is associated with higher poverty levels and an increase in income per capita change is associated with lower poverty levels. The 2000 county poverty **dummy model** shows an increase in population density change is associated with

an increase in poverty levels. An increase in income per capita change is associated with lower poverty levels. Also, poverty levels in the inner, mature, emerging and exurban counties have lower poverty levels than in core counties. In the 2000 county poverty **interactive model** an increase in employment change is associated with higher poverty levels in the **inner suburbs**. An increase in income per capita is associated with lower poverty levels in **the inner suburbs**. An increase in population density change is associated with lower poverty levels in **mature counties**. An increase in high school education and below is associated with higher poverty levels in **mature counties**. An increase in population density change and income per capita is associated with lower poverty levels in **emerging suburbs**. An increase in median rent change is associated with higher poverty in **emerging suburbs**. Finally, an increase in population density change and income per capita is associated with lower poverty in **exurban counties**.

Analysis of Change between City 1990 and 2000

In the base model income per capita change was a significant variable in 1990 and 2000. Income per capita has an inverse relationship to poverty levels so that overall for all jurisdictions an increase in income per capita is associated with a decrease in poverty levels. Unlike the 1990 dummy model where higher levels of poverty were found in the inner and core cities, by 2000 the inner cities experienced lower levels of poverty than the other jurisdictions. The interactive model shows an increase in population density change in the inner cities in 1990 and higher population density change in inner and mature cities in 2000 are associated with higher poverty levels. The interactive model

also shows that an increase in the college educated is associated with higher levels of poverty in core cities.

While not providing conclusive proof these models weakly suggest that by 2000 inner suburban and mature cities began experiencing a decrease in poverty in more dense areas and core cities began to attract higher educated populations. This is in line with the trend that younger more educated workers have begun to move closer to cities near the center of the metro to be close to jobs, leisure amenities and decrease commuting times as time outside of the work environment has become more important to this segment of the population.

Analysis of Change between County 1990 and 2000

In the base model, overall, increases in density are associated with higher levels of poverty. An increase in employment density change in 1990 and increase in population density change in 2000 is associated with an increase in poverty levels. In both years an increase in income per capita is associated with a decrease in poverty levels. In the dummy model, the 1990 model showed a lower level of poverty in the mature, emerging and exurbs compared to the inner and core, while the 2000 model showed a lower level of poverty in the inner, mature, emerging and exurbs compared to the inner and core. This suggests the possibility of decreasing poverty rates in inner suburbs to more closely group with the mature, emerging and exurban counties. In the interactive model an increase in income per capita change is associated with lower poverty levels in inner suburbs in 1990 and 2000. Income per capita change in 1990 is

also associated with lower poverty levels in mature suburbs while in 2000 population density change is also associated with lower poverty levels. Income per capita change in 1990 is again associated with lower poverty levels in emerging suburbs while in 2000 income per capita change and population density change are associated with lower poverty levels. In exurban counties 2000 income per capita change and population density change are also associated with lower poverty levels.

Comparison of City 1990 and County 1990

In the 1990 base model, an increase in income per capita change is associated with a decrease in poverty levels in city and county jurisdictions. In the 1990 dummy model, an increase in income per capita change is associated with a decrease in poverty levels. Higher levels of poverty are found in core and inner cities and counties compared to other city and county jurisdictions. In the 1990 interactive model, an increase in employment density change is associated with a lower level of poverty in inner cities and inner counties. In the 1990 interactive model, an increase in income per capita change is associated with a lower level of poverty in mature cities and mature counties.

Comparison of City 2000 and County 2000

In the 2000 base model, an increase in income per capita change is associated with a decrease in poverty levels in city and county jurisdictions. In the 2000 base model, an increase in 1990 city population density and county population density change is associated with an increase in poverty levels in city and county jurisdictions. In the

2000 dummy model, an increase in income per capita change is associated with a decrease in poverty levels in city and county jurisdictions. In the 2000 base model, an increase in 1990 city population density and county population density change is associated with an increase in poverty levels in city and county jurisdictions. Lower levels of poverty are found in inner cities and inner, mature, emerging and exurban counties compared to other city and county jurisdictions. In the 2000 interactive model, an increase in population density change is associated with a lower level of poverty in mature, emerging and exurban counties. In the 2000 interactive model, an increase in population density change is associated with a higher level of poverty in inner and mature cities.

Summary of Findings for the Poverty Analysis

The results provided in this chapter provide support for the hypotheses regarding poverty. For the poverty base models, the results show support for the hypothesis that in Counties (1980-1990) and (1990-2000) an increase in income per capita is associated with lower poverty levels. In Cities (1980-1990) an increase in employment density change, the number of college educated, income per capita and median rents is associated with lower poverty levels. In Cities (1990-2000) an increase in income per capita change is associated with lower poverty levels.

The results for the base model provide evidence that in cities and counties an increase in income per capita are associated with lower poverty levels in both time periods. Also in city jurisdictions, 1980-1990, an increase in employment density change

and the number of college educated are associated with lower poverty levels for 1980-1990.

In the poverty dummy models, the results show support for the hypothesis that in counties (1980-1990) mature, emerging and exurban counties have lower levels of poverty than inner and core counties. The hypothesis stated that in Counties (1990-2000) mature, emerging and exurban counties will have lower levels of poverty than inner and core counties. It was found that inner, mature, emerging and exurban counties will have lower levels of poverty than core counties. In Cities (1980-1990) higher levels of poverty are found in core and inner cities. In Cities (1990-2000) lower levels of poverty are found in inner and mature cities.

For the poverty interactive models, the results show that in Counties (1980-1990) an increase in income per capita is associated with lower levels of poverty in inner, mature, emerging and exurban counties. The hypothesis stated that in Counties (1990-2000) an increase in income per capita and population density will be associated with lower poverty levels in inner, mature, emerging and exurban counties. The results show that lower levels of poverty are associated with an increase in income per capita in inner counties, an increase in population density in mature counties and an increase in population density and income per capital in emerging and exurban counties. In Cities (1980-1990) an increase in the number of college educated and income per capita is associated with lower levels of poverty in core, inner, mature and emerging cities. In Cities (1990-2000) an increase in population density change is associated with higher levels of poverty in core, inner and mature cities.

This chapter has analyzed the factors associated with poverty within the context of Metropolitan Transformation. The final chapter includes the main findings and research implications. This chapter provides the final conclusions based on the outcomes of the three different methodologies used to examine Metropolitan Transformation.

Table 22a Poverty Model Summary by Jurisdiction

Pov	Type	Dum	PopDenCh	EmpDenCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PopDen	IncPC	MedRenCh	EmpDen
City90	Base			EmpDenCh			CollMore				IncPC	MedRenCh	EmpDen
City90	Dummy	+C, +I		EmpDenCh			CollMore	IncPcCh					
City90	Interact			-I			-I, -E	-M, -C	-I			+C	
City00	Base							IncPcCh		PopDen			
City00	Dummy	-I						IncPcCh		PopDen			
City00	Interact		+M, +I				+C						
County90	Base			EmpDenCh				IncPcCh	+			MedRenCh	
County90	Dummy	-M, -E, -X		EmpDenCh				IncPcCh				MedRenCh	
County90	Interact			-I				-I, -M, -E, -X	+I, -M, +X				
County00	Base		PopDenCh					IncPcCh					
County00	Dummy	-I, -M, -E, -X	PopDenCh					IncPcCh					
County00	Interact		-M, -E, -X		+I	+M		-I, -E, -X				+E	

Table 22b Poverty Model Summary by Year

Pov	Type	Dum	PopDenCh	EmpDenCh	EmpCh	HSLess	CollMore	IncPcCh	MedValCh	PopDen	IncPC	MedRenCh	EmpDen
City90	Base			EmpDenCh			CollMore				-	MedRenCh	+
City90	Dummy	+C, +I		EmpDenCh			CollMore	IncPcCh					
City90	Interact			-I			-I, -E	-M, -C	-I			+C	
County90	Base			EmpDenCh				IncPcCh	+			MedRenCh	
County90	Dummy	-M, -E, -X		EmpDenCh				-				MedRenCh	
County90	Interact			-I				-I, -M, -E, -X	+I, -M, +X				
City00	Base							IncPcCh		PopDen			
City00	Dummy	-I						IncPcCh		PopDen			
City00	Interact		+M, +I				+C						
County00	Base		PopDenCh					IncPcCh					
County00	Dummy	-I, -M, -E, -X	PopDenCh					IncPcCh					
County00	Interact		-M, -E, -X		+I	+M		-I, -E, -X				+E	

CHAPTER X

RESEARCH FINDINGS AND IMPLICATIONS

The pattern of growth in metropolitan areas has favored jurisdictions outside of the traditional urban core since the 1930s, when suburban population growth first exceeded city growth. This created a historical trend where suburbs seemingly benefited at the expense of cities. The continued concentration of growth in suburbs led to the economic and socioeconomic restructuring of metropolitan areas over the last 80 years. This economic restructuring is known as Metropolitan Transformation; the changing economic and socioeconomic changes in metropolitan economies over time. Metropolitan Transformation has caused changes in economic and socioeconomic conditions in the suburbs which must be addressed by policymakers faced with seemingly conflicting public requests for increased economic development and growth management. The process of Metropolitan Transformation has also led to decreased tax revenues in cities; resulting in increased socioeconomic problems such as crime and poverty. Some argue this can also cause negative spillover effects from cities to suburbs where crime and poverty spreads from cities to inner suburbs, pushing people to move even further toward the periphery metropolitan areas (Lahr 2004).

Metropolitan Transformation

During Metropolitan Transformation process, areas have an equilibrium point for wages and rents that cause people and firms to relocate. When city rents become too high, people demand higher wages to compensate, which drives up costs for firms. This incentivizes people to begin looking for less expensive housing in the suburbs. Firms follow this population shift and begin to relocate to the suburbs seeking cheaper rents and proximity to a larger pool of qualified/skilled labor. This relocation of people and jobs leads to rapid growth in the suburbs at the expense of cities. Furthermore, spatial restructuring creates the need to understand the size, scope and factors that affect and are affected by Metropolitan Transformation. As cities and suburbs experience changes in economic and socioeconomic conditions, policymakers' knowledge of these changes can play an important part in crafting informed local economic development policies to deal with emerging needs in local jurisdictions.

Research Objectives

The objective of this dissertation is to examine the process of Metropolitan Transformation. This is accomplished through a spatial regression analysis of how economic and socioeconomic changes are correlated with changes in sectoral employment and poverty levels in city and county metropolitan jurisdictions in the 1980s and 1990s. The results provide information about how economic and socioeconomic

factors change in association with changes in sectoral employment and poverty levels during the process of Metropolitan Transformation.

Research Findings

One of the key contributions of this research is the inclusion of socioeconomic measures in the modeling of metropolitan economic change. Including socioeconomic factors like poverty contribute to a more complete analysis of metropolitan transformation. The key findings in this section examine the results of the sectoral employment and poverty models. Five major findings are presented below. Additional results are then presented along with a discussion of how these results provide insight into the process of Metropolitan Transformation.

Research Findings

1. **Poverty Results and Metropolitan Transformation**
    - *Increases in employment and population density resulted in lower poverty levels in counties.*
    - *Increases in population density resulted in higher levels of poverty in cities.*
    - *Poverty rates decreased in inner city jurisdictions during the 1980s and 1990s.*
2. **Population Change and Employment Change in Metropolitan Economics**

- *Population growth exceeded employment growth in cities during the 1980s and 1990s.*
- *Employment growth exceeded population growth in counties during the 1980s and 1990s.*

3. **Sectoral Employment Results in all Metropolitan Jurisdictions**
   - *Employment change is the most frequently significant variable in the city and county models, during the 1980-1990 and 1990-2000 periods.*
4. **Sectoral Employment Results by Metropolitan Jurisdiction**
   - *Employment density change is the most frequently significant variable in county jurisdictions during the 1980s period in mature, emerging and exurban counties and in core, inner and mature jurisdiction during the 1990s. Employment change is the main significant variable in emerging and exurban counties in the 1990s.*
   - *Employment change is the most frequently significant variable in city jurisdictions during the 1980s and 1990s in the core, inner and mature cities in cities.*

Discussion of Research Findings and Metropolitan Transformation

Poverty and Metropolitan Transformation

Populaion density affects poverty levels in city and county jurisdictions differently. In county jurisdictions, increases in employment and population density

resulted in lower poverty levels in counties. Conversely, increases in population density resulted in higher levels of poverty in cities. Other findings from this model confirm existing thought about the factors that affect poverty levels. These include the findings that increases in income per capita and education are associated with lower poverty. Also, in city and county jurisdictions, there are higher levels of poverty in core and inner jurisdictions than in mature, emerging and exurban jurisdictions. The decrease in poverty rates in inner city jurisdictions shows that these areas experienced revitalization throughout the 1980s and 1990s. This is evidence that Metropolitan Transformation occurred not only in the less dense jurisdictions but also in urban areas.

Population Change and Employment Change in Metropolitan Economies

The percentage change analysis shows that cities experienced a larger increase in population than employment over the 20-year period. Conversely, counties experienced a larger increase in employment than population during this time. These findings confirm current thinking about Metropolitan Transformation. As population growth occurs in cities due to the effects of agglomeration; people are attracted to dense, urban areas where more job opportunities are concentrated within city boundaries. In counties, employers locate or relocate in metropolitan counties to access a more qualified workforce and take advantage of lower rents. The literature shows that these higher income and qualified workers move to areas that have lower rents as long as these savings are not eliminated by the cost of transportation to employment centers.

Therefore, it would be expected that population would be a variable, which is frequently significant in the sectoral employment models. [31]

Sectoral Employment Results in All Metropolitan Jurisdictions

Examining all jurisdictions in one model provides a starting point for investigating the relationship between socioeconomic factors and sectoral employment in metropolitan areas. The hypothesis is that population density change, population change, employment density change and employment change will be the main significant variables in these models. The hypotheses focuses on whether population or employment change will be the most frequently significant factors associated with sectoral employment change. The question also investigates if the level of population/employment change will be more significant in sectoral employment change or if changes in population/employment density are more significant in sectoral employment change.

The results show that employment change is the most frequently significant variable in cities and counties in the 1980s and 1990s. These results show that the level of employment change is highly associated with sectoral employment change across jurisdictions and time. This is an interesting finding because of the debate in the

[31] A more thorough discussion of this relationship between population and employment can be found in the 2005 meta-analysis of Carlino-Mills studies by G. Hoogstra, R. Florax and J. van Dijk. Additional discussion is provided in K. Seetharam's 2007 study of density gradients and their determinants.

economic literature about the relationship between population and employment.[32] Based on that literature it might be expected that population would be more significantly associated with sectoral employment change than is seen in the results of this analysis.

Sectoral Employment Results by Metropolitan Jurisdiction

Examining sectoral employment in the core, inner, mature, emerging and exurban jurisdictions shows the differences in the relationships between socioeconomic factors and sectoral employment in each jurisdiction type. The hypothesis is that employment and employment density will be statistically significant in most models at the county level while population and population density will be the main significant variables in cities. This hypothesis is based on the results from the analysis of the changes in population and employment in Chapter V. These results showed that cities experienced a larger increase in population than employment over the 20-year period. Conversely, counties experienced a larger increase in employment than population during this time. The results clearly show that employment and employment density are the most frequently significant variables in all the interactive models.

The results for counties in the 1980-1990 period shows that employment density change is the most frequently significant variable in mature, emerging and exurban counties. The results clearly show that growth was the strongest in these jurisdictions and that increases in employment density were associated with increases in sectoral

[32] A more thorough discussion of this relationship between population and employment can be found in the 2005 meta-analysis of Carlino-Mills studies by G. Hoogstra, R. Florax and J. van Dijk. Additional discussion is provided in K. Seetharam's 2007 study of density gradients and their determinants.

employment during this time. This supports the Metropolitan Transformation process in that suburban expansion has taken place in less dense jurisdictions.

The results for counties in the 1990-2000 period shows that employment density change is the most frequently significant variable in core, inner and mature jurisdictions. Employment change is the most frequently significant variable in emerging and exurban jurisdictions. Therefore, during the 1990s employment density was more frequently associated with sectoral employment change in higher density areas and the level of employment change was more frequently associated with sectoral employment change in the less dense jurisdictions. Within the framework of Metropolitan Transformation, different roles of agglomeration are seen in higher density compared to less dense areas. As agglomeration occurs in urban counties it appears that density plays a large role in this growth process. However, as less dense areas expand, increasing the level of employment is more frequently associated with sectoral employment change than density levels.

The results for cities in the 1980-1990 and 1990-2000 periods show that population and population density are not as frequently significant in core, inner and mature cities as employment change. The hypothesis that population and population density change are important factors in sectoral employment change at the city level is not confirmed by the results. As in the county models, the level of employment change has the strongest association with sectoral employment change.

Research Contributions and Implications

This dissertation confirms the commonly accepted roles and trends of cities/suburbs and population/employment in metropolitan economies. Also, it contributes to the understanding of metropolitan economies by adding to the established research methods and examining metropolitan economies in the context of Metropolitan Transformation. This dissertation creates a more comprehensive framework for analysis by including economic/socioeconomic measures and city/county jurisdictional analysis. One of the underlying themes of the research is the spatial differences of cities and counties within the metropolitan area. Therefore, the methodology is distinguished by categorizing each metropolitan area according to the level of population density. This creates the opportunity to analyze different parts of the transforming metropolitan area.

Research Contributions

1. Inclusion of Economic and Socioeconomic Measures in Spatial Regression Models

One of the key contributions of this research is the inclusion of socioeconomic measures in the modeling of metropolitan economic change. Since one of the effects of transforming metropolitan economies is changes in poverty in central cities and surrounding jurisdictions, this research examines what economic/socioeconomic factors are associated with poverty rates. Understanding what factors are associated with changes in poverty is one public policy issue that can assist local governments in determining what steps should be taken to proactively deal with changing poverty levels

as their jurisdictions transform over time. This knowledge can help local governments facilitate continued development while maintaining current residents' quality of life.

2. City and County Level Analysis

County and city level analysis provides a more detailed view of changes in metropolitan economies than city-suburb or county only comparisons. Creating a dataset that includes city and county data fills gaps that would exist in a county only metropolitan analysis. Some metropolitan areas have a large number of cities. Therefore, including city data provides a more complete picture of Metropolitan Transformation.

3. Categorizing Jurisdictions by Population Density Levels

The theory of Metropolitan Transformation has evolved out of a need to explain and understand the importance of the changing roles of cities and suburbs in metropolitan areas. The changing location of people and firms leads to a change in the economic structure of metropolitan areas. These changes are not uniform and thus differences can be observed based on certain characteristics of jurisdictions within the metropolitan area. Population density is one key indicator that can show commonality between jurisdictions in metropolitan areas. Therefore, this categorization is used to rank and categorize metropolitan jurisdictions and is also used as a main independent variable in the economic and poverty spatial regression models.

4. Creation of a More Comprehensive Framework for Analyzing Metropolitan Economies

A more comprehensive framework for analyzing metropolitan economies is created through the inclusion of economic and socioeconomic measures in spatial regression models, a city and county level analysis and categorization of jurisdictions by population density levels. This framework also allowed for better documentation and understanding of the Metropolitan Transformation that occurred during the 1980s and 1990s. This research provides a platform for future analysis of variables affecting new location decisions. Future analysis will be aided by the availability of additional and more accurate economic/socioeconomic measures such as ethnicity, commuting patterns, generational shifts and tenure patterns of the population. More detailed sectoral employment information available through the NAICS classification system will also assist in future analysis.

100 Years of Metropolitan Transformation: 1940 to 2040

The History of Metropolitan Economies: 1940-1980

The economic transformation of the American economy led to the growth of economic activity outside the confines of major cities since the 1940s. Metropolitan economies have become polycentric with not one central business district but many concentrations of employment and population that are self-supporting economic centers. The movement of labor and commerce to these locations caused the economic

contribution of central cities to decrease over time. The ability of the suburbs to generate growth internally has led to a decentralization of important economic functions once dominated by central cities. This is partially due to new technology allowing firms to locate in low-cost locations without affecting their ability to meet customer needs and grow their businesses. This trend has been aided by the rise of the service-based economy and online technologies making location less important within regions. Economic structural changes also increased the importance suburbs as the industrial mix of sub-economies has become increasingly complex. Regionally specific factors such as quality of life and local amenities have also contributed to this shift.

Metropolitan Economies: 1980-2000

As Metropolitan Transformation continued through the 1980s and 1990s many suburbs gained their own downtowns and became edge cities. Many of these suburban jurisdictions and edge cities developed the qualities of central cities, making them more attractive to employers because of lower operating costs and labor cost advantages. Employers in these suburban areas hired qualified employees for lower wages due to a lower cost of living. This trend was accelerated by the internet revolution in the 1990s as many back office functions not requiring face to face customer interaction moved to these lower cost locations.

The Future of Metropolitan Economies: 2000-2040

Suburban migration was made possible and sustainable through increased mobility, highway infrastructure and transportation systems, structural changes in U.S. employment sectors and the desire for better quality of life amenities. Following suburban population migration, businesses relocated toward the periphery for access to cheaper land/rents and access to qualified workers. Agglomeration economies were created as higher skilled workers and newer businesses clustered in suburban areas. The service-based economy and online technologies played a major role in this metropolitan decentralization and agglomeration in suburban jurisdictions. This changing structure of metropolitan economies decreased the need to locate in the urban center. The resulting economic transformation continued as an increasing industrial mix of firms migrated to suburban areas at the expense of central cities.

It should not be concluded that this somewhat linear trend of metropolitan transformation from the core to the periphery will continue into the future. Preliminary analysis of data from the 2010 Census already shows that the newest generation of workers, the Millennial generation, is not following the path of their parents in terms of work and lifestyle.[33] This generation's decisions are beginning to have an impact on metropolitan economies and this impact will increase over time. If the data for this

[33] Baby Boom generation refers to those born between 1946 and 1964. Generation "X" refers to those born roughly between the 1964 and 1980. Generation "Y" or Millennial or Echo Boomers refers to those born roughly between the 1980 and 2000. Generation "Z" refers to those born roughly in the last decade.

dissertation were available in 5-year increments, the results might begin to more strongly reflect this trend of revitalization in inner and core cities and counties.

Millenials who often grew up in suburban locations are familiar with lifestyles that include long commutes and an inflexibility of employers towards the work/life balance. Trends are beginning to show that large numbers of Millennials are rejecting this lifestyle and are opting for flexible employment where work can be performed away from the office and does not need to take place during traditional work hours. If in-office work is required this group is opting to live close to their place of employment that often means locating in more urban locations. Due to higher rent costs in these areas, Millennials do not view homeownership as easily attainable. They also do not place as high a value on it as the Baby Boom generation. Millennials are more mobile so homeownership is not necessarily beneficial and could be detrimental in a job market that can require workers to relocate to take advantage of better employment opportunities. This generation also tends to have smaller families so the space requirements are not as larger as the Baby Boomers. This also lends itself to the Millenials continuing to reside in more urban areas. These factors will continue the trend of urban revitalization and contribute to a nonlinear process of Metropolitan Transformation.

Currently, many Baby Boomers are near retirement or retired and are downsizing their housing requirements. This will also contribute to urban revitalization as this generation seeks to live closer to retail, personal and professional services to cut down on transportation costs. Another contributing factor is the continuing trend that governments

at all levels have limited their investment in expanding transportation infrastructure. This has increasingly led to higher levels of traffic congestion in most metropolitan areas.

Taking into account changing lifestyle preferences including living closer to places of employment and retail, personal and professional services, an increased value placed on leisure time, increased transportation costs and increased traffic congestion; the benefit to workers of living in the less dense suburbs is decreasing.

People respond to the costs and incentives they encounter in metropolitan economies. Historically, metropolitan economies incentivized purchasing larger housing in less dense suburbs as transportation costs were lower and the work/life balance was not valued as highly by workers. It appears that current and future metropolitan economies will incentivize shorter commutes, more renting/less homeownership, a more flexible work schedule and an increased value placed on the work/life balance.

It will be at least ten more years before generation "Z" begins entering the workforce. This is a generation that will never know a time when there was no internet or social media. This generation will place a very different value on location as technology may be so advanced that the notion of being physically present for work will not even be an option. If this is the case, metropolitan economies will surely transform as location decisions will not take into account issues like access to places of employment. This generation's residential location decisions may be influenced even more by the leisure amenities and lifestyle choices in metropolitan areas. By 2040 this generation's location decisions might be driven by factors unimaginable in 2011 and these are the factors that will truly drive the next phase of Metropolitan Transformation.

APPENDICES

APPENDIX A: AGGREGATING EMPLOYMENT SECTORS

Employment sectors were built from the 1980 Census categorizations. The table below shows the categories provided and the subsequent combination of categories. The 1980 and 1990 merges were fairly straightforward while the 2000 categorizations required more attention as the 2000 Census uses NAICS classifications. Continuity issues have been minimized between the 1980 and 1990 SIC and 2000 NAICS through the extensive aggregation of sectors into 10 major classifications.

Table A1 Migrating 1980 and 1990

1980 Raw	1990 Raw
Agriculture, Forestry, Fisheries, and Mining	Agriculture, Forestry, Fisheries
Construction	Mining
NonDurable Goods	Construction
Durable Goods	Manufacturing NonDurable Goods
Transportation	Manufacturing Durable Goods
Communications and Other Public Utilities	Transportation
Wholesale Trade	Communications and Other Public Utilities
Retail Trade	Wholesale Trade
Finance, Insurance, and Real Estate	Retail Trade
Business and Repair Services	Finance, Insurance, and Real Estate
Personal, Entertainment, and Recreation Services	Business and Repair Services
Health Services	Personal Services
Educational Services	Entertainment, and Recreation Services
Other Professional and Related Services	Health Services
Public Administration	Educational Services
	Other Professional and Related Services
1980 Merge	Public Administration
1980 and 1990 Merge	1990 Merge
Agriculture, Forestry, Fisheries, and Mining	1990 Merge
Construction	1990 Merge
Manufacturing	
Transportation	
Communications and Other Public Utilities	
Wholesale Trade	
Retail Trade	
Finance, Insurance, and Real Estate	
Business and Repair Services	
Personal, Entertainment, and Recreation Services	
Health Services	
Educational Services	
Other Professional and Related Services	

Table A2 2000 Sectors

2000 Raw
Agriculture, Forestry, Fishing, Hunting, and Mining
Construction
Manufacturing
Wholesale Trade
Retail Trade
Transportation, Warehousing and Utilities
Information
Finance, Insurance,Real Estate, Rental, and Leasing
Professional, Scientific, Management, Administrative, and Waster Management Services
Educational Services
Healthcare and Social Assistance
Arts, Entertainment, Recreation, Accomodation, and Food Services
Other Services
Public Administration
2000 Merge Based on Census Corresponding Table
2000 Merge Based on Census Corresponding Table
http://www.census.gov/epcd/www/naicsusr.html#TABLE2

Table A3 1980, 1990, and 2000

1980 and 1990 Merge for 2000	Sectoral Categorizations
Agriculture, Forestry, Fisheries, and Mining	Agriculture-Min
Construction	Constuction
Manufacturing	Manufacturing
Transportation	Transport--Comm
Communications and Other Public Utilities	Whole Trade
Wholesale Trade	Retail Trade--Ent.
Retail Trade	FIRE
Finance, Insurance, and Real Estate	Bus Serv
Business and Repair Services	Prof Serv-H, E, O
Personal, Entertainment, and Recreation Services	Public Admin
Health Services	
Educational Services	
Other Professional and Related Services	
Public Administration	
2000 Merged	
Agriculture, Forestry, Fishing, Hunting, and Mining	
Construction	
Manufacturing	
Transportation, Warehousing, Utilities, Information, and Utilities	
Wholesale Trade	
Retail Trade, Arts, Entertainment, Personal, Recreation, Accomodation, and Food Services	
Finance, Insurance,Real Estate, Rental, and Leasing	
Professional, Scientific, Management, Administrative, and Waster Management Serv.	
Health, Education and Other Services	
Public Administration	
1980 and 1990 Merged for 2000	
1980 and 1990 Merged for 2000	
1980 and 1990 Merged for 2000	

APPENDIX B: CITY AND COUNTY CLASSIFICATIONS

Table B1 City Classifications 1980

1980 City Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Baltimore city	244000	1.00	0.00	0.00	0.00	0.00
Berkeley city	066000	1.00	0.00	0.00	0.00	0.00
Boston city	257000	1.00	0.00	0.00	0.00	0.00
Cambridge city	2511000	1.00	0.00	0.00	0.00	0.00
Camden city	3410000	1.00	0.00	0.00	0.00	0.00
Chicago city	1714000	1.00	0.00	0.00	0.00	0.00
Evanston city	1724582	1.00	0.00	0.00	0.00	0.00
Los Angeles city	0644000	1.00	0.00	0.00	0.00	0.00
Miami Beach city	1245025	1.00	0.00	0.00	0.00	0.00
Miami city	1245000	1.00	0.00	0.00	0.00	0.00
New York city	3651000	1.00	0.00	0.00	0.00	0.00
Newark city	3451000	1.00	0.00	0.00	0.00	0.00
Philadelphia city	4260000	1.00	0.00	0.00	0.00	0.00
San Francisco City	0667000	1.00	0.00	0.00	0.00	0.00
Santa Monica city	0670000	1.00	0.00	0.00	0.00	0.00
Washington city	115000	1.00	0.00	0.00	0.00	0.00
Anaheim city	062000	0.00	1.00	0.00	0.00	0.00
Arcadia city	062462	0.00	1.00	0.00	0.00	0.00
Arlington Heights	172154	0.00	1.00	0.00	0.00	0.00
Atlanta city	134000	0.00	1.00	0.00	0.00	0.00
Bellevue city	535210	0.00	1.00	0.00	0.00	0.00
Bethesda CDP	2407125	0.00	1.00	0.00	0.00	0.00
Bloomington city	2706616	0.00	1.00	0.00	0.00	0.00
Boynton Beach city	1207875	0.00	1.00	0.00	0.00	0.00
Burbank city	068954	0.00	1.00	0.00	0.00	0.00
Carson city	0611530	0.00	1.00	0.00	0.00	0.00
Cerritos city	0612552	0.00	1.00	0.00	0.00	0.00
Compton city	0615044	0.00	1.00	0.00	0.00	0.00
Costa Mesa city	0616532	0.00	1.00	0.00	0.00	0.00
Dallas city	4819000	0.00	1.00	0.00	0.00	0.00
Dearborn city	2621000	0.00	1.00	0.00	0.00	0.00
Deerfield Beach city	1216725	0.00	1.00	0.00	0.00	0.00
Delray Beach city	1217100	0.00	1.00	0.00	0.00	0.00
Des Plaines city	1719642	0.00	1.00	0.00	0.00	0.00
Detroit city	2622000	0.00	1.00	0.00	0.00	0.00
Edison CDP	3420260	0.00	1.00	0.00	0.00	0.00
Elgin city	1723074	0.00	1.00	0.00	0.00	0.00
Fort Lauderdale city	1224000	0.00	1.00	0.00	0.00	0.00
Fountain Valley city	0625380	0.00	1.00	0.00	0.00	0.00
Framingham CDP	2524960	0.00	1.00	0.00	0.00	0.00
Fullerton city	0628000	0.00	1.00	0.00	0.00	0.00
Gaithersburg city	2431175	0.00	1.00	0.00	0.00	0.00
Gardena city	0628168	0.00	1.00	0.00	0.00	0.00
Gary city	1827000	0.00	1.00	0.00	0.00	0.00
Glendale city	0630000	0.00	1.00	0.00	0.00	0.00

Table B1 City Classifications 1980 (continued)

1980 City Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Hayward city	0633000	0.00	1.00	0.00	0.00	0.00
Houston city	4835000	0.00	1.00	0.00	0.00	0.00
Joliet city	1738570	0.00	1.00	0.00	0.00	0.00
Kendall CDP	1236100	0.00	1.00	0.00	0.00	0.00
Livonia city	2649000	0.00	1.00	0.00	0.00	0.00
Long Beach city	0643000	0.00	1.00	0.00	0.00	0.00
Minneapolis city	2743000	0.00	1.00	0.00	0.00	0.00
Montebello city	0648816	0.00	1.00	0.00	0.00	0.00
Monterey city	0648914	0.00	1.00	0.00	0.00	0.00
National City city	0650398	0.00	1.00	0.00	0.00	0.00
Newport Beach city	0651182	0.00	1.00	0.00	0.00	0.00
Newton CityMA	2545560	0.00	1.00	0.00	0.00	0.00
Oakland city	0653000	0.00	1.00	0.00	0.00	0.00
Orange city	0653980	0.00	1.00	0.00	0.00	0.00
Paramount city	0655618	0.00	1.00	0.00	0.00	0.00
Pasadena city	0680000	0.00	1.00	0.00	0.00	0.00
Pittsburgh city	4261000	0.00	1.00	0.00	0.00	0.00
Pomona city	0636770	0.00	1.00	0.00	0.00	0.00
Pompano Beach city	1258050	0.00	1.00	0.00	0.00	0.00
Pontiac city	2665440	0.00	1.00	0.00	0.00	0.00
Quincy city	2555745	0.00	1.00	0.00	0.00	0.00
Redwood City city	0660102	0.00	1.00	0.00	0.00	0.00
Reston CDP	5166672	0.00	1.00	0.00	0.00	0.00
Richardson city	4861796	0.00	1.00	0.00	0.00	0.00
San Diego CityCA	0666000	0.00	1.00	0.00	0.00	0.00
San Leandro city	0668084	0.00	1.00	0.00	0.00	0.00
San Mateo city	0668252	0.00	1.00	0.00	0.00	0.00
San Rafael city	0668364	0.00	1.00	0.00	0.00	0.00
Santa Ana city	0669000	0.00	1.00	0.00	0.00	0.00
Schaumburg village	1768003	0.00	1.00	0.00	0.00	0.00
Seattle city	5363000	0.00	1.00	0.00	0.00	0.00
Skokie village	1770122	0.00	1.00	0.00	0.00	0.00
South San Francisco city	0673262	0.00	1.00	0.00	0.00	0.00
Southfield city	2674900	0.00	1.00	0.00	0.00	0.00
St. Louis CityMO	2965000	0.00	1.00	0.00	0.00	0.00
St. Paul city	2758000	0.00	1.00	0.00	0.00	0.00
Tacoma city	5370000	0.00	1.00	0.00	0.00	0.00
Taylor city	2679000	0.00	1.00	0.00	0.00	0.00
Tempe city	0473000	0.00	1.00	0.00	0.00	0.00
Torrance city	0656000	0.00	1.00	0.00	0.00	0.00
Towson CDP	2478425	0.00	1.00	0.00	0.00	0.00
Troy city	2680700	0.00	1.00	0.00	0.00	0.00
Tustin city	0680854	0.00	1.00	0.00	0.00	0.00
Union CityNJ	3474510	0.00	1.00	0.00	0.00	0.00
Walnut Creek city	0683346	0.00	1.00	0.00	0.00	0.00

Table B1 City Classifications 1980 (continued)

1980 City Classifications Continued						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Waltham city	2572600	0.00	1.00	0.00	0.00	0.00
Warren CityMI	2684000	0.00	1.00	0.00	0.00	0.00
White Plains city	3681677	0.00	1.00	0.00	0.00	0.00
Wilmington city	1077580	0.00	1.00	0.00	0.00	0.00
Arlington CityTX	484000	0.00	0.00	1.00	0.00	0.00
Baytown city	486128	0.00	0.00	1.00	0.00	0.00
Boca Raton city	1207300	0.00	0.00	1.00	0.00	0.00
Chino city	0613210	0.00	0.00	1.00	0.00	0.00
Everett city	5322640	0.00	0.00	1.00	0.00	0.00
Farmington Hills city	2627440	0.00	0.00	1.00	0.00	0.00
Fort Worth city	4827000	0.00	0.00	1.00	0.00	0.00
Frederick city	2430325	0.00	0.00	1.00	0.00	0.00
Fremont city	0626000	0.00	0.00	1.00	0.00	0.00
Galveston city	4828068	0.00	0.00	1.00	0.00	0.00
Irvine city	0658072	0.00	0.00	1.00	0.00	0.00
Irving city	4837000	0.00	0.00	1.00	0.00	0.00
Marietta city	1349756	0.00	0.00	1.00	0.00	0.00
Minnetonka city	2743252	0.00	0.00	1.00	0.00	0.00
Ontario city	0653896	0.00	0.00	1.00	0.00	0.00
Phoenix city	0455000	0.00	0.00	1.00	0.00	0.00
Pleasanton city	0657792	0.00	0.00	1.00	0.00	0.00
Renton city	5357745	0.00	0.00	1.00	0.00	0.00
San Bernardino City	0665000	0.00	0.00	1.00	0.00	0.00
St. Charles city	2964082	0.00	0.00	1.00	0.00	0.00
Wayne CDP	3477870	0.00	0.00	1.00	0.00	0.00
Carlsbad city	0611194	0.00	0.00	0.00	1.00	0.00
Carrollton city	4813024	0.00	0.00	0.00	1.00	0.00
Denton city	4819972	0.00	0.00	0.00	1.00	0.00
Eagan city	2717288	0.00	0.00	0.00	1.00	0.00
Eden Prairie city	2718116	0.00	0.00	0.00	1.00	0.00
Hemet city	0633182	0.00	0.00	0.00	1.00	0.00
Kent city	5335415	0.00	0.00	0.00	1.00	0.00
Mesa city	0446000	0.00	0.00	0.00	1.00	0.00
Naperville city	1751622	0.00	0.00	0.00	1.00	0.00
Plano city	4858016	0.00	0.00	0.00	1.00	0.00
Plymouth city	2751730	0.00	0.00	0.00	1.00	0.00
Redlands city	0659962	0.00	0.00	0.00	1.00	0.00
San Marcos city	0668196	0.00	0.00	0.00	1.00	0.00
Sandy Springs CDP	1368516	0.00	0.00	0.00	1.00	0.00
Scottsdale city	0465000	0.00	0.00	0.00	1.00	0.00
Sugar Land city	4870808	0.00	0.00	0.00	1.00	0.00
West Palm Beach city	1276600	0.00	0.00	0.00	1.00	0.00
Mckinney city	4845744	0.00	0.00	0.00	0.00	1.00
Temecula city	0678120	0.00	0.00	0.00	0.00	1.00
Victorville city	0682590	0.00	0.00	0.00	0.00	1.00

Table B2 County Classifications 1980

1980 County Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Baltimore city	244000	1.00	0.00	0.00	0.00	0.00
Bronx County	36005	1.00	0.00	0.00	0.00	0.00
Hudson County	34017	1.00	0.00	0.00	0.00	0.00
Kings County	36047	1.00	0.00	0.00	0.00	0.00
New York County-Manhattan	36061	1.00	0.00	0.00	0.00	0.00
Philadelphia city	4260000	1.00	0.00	0.00	0.00	0.00
Queens County	36081	1.00	0.00	0.00	0.00	0.00
San Francisco City	06073	1.00	0.00	0.00	0.00	0.00
Suffolk CountyMA	25025	1.00	0.00	0.00	0.00	0.00
Washington city	115000	1.00	0.00	0.00	0.00	0.00
Alexandria City	51510	0.00	1.00	0.00	0.00	0.00
Arlington CountyVA	51013	0.00	1.00	0.00	0.00	0.00
Bergen County	34003	0.00	1.00	0.00	0.00	0.00
Camden County	34007	0.00	1.00	0.00	0.00	0.00
Cook County	17031	0.00	1.00	0.00	0.00	0.00
Delaware County	42045	0.00	1.00	0.00	0.00	0.00
Essex CountyMA	25009	0.00	1.00	0.00	0.00	0.00
Nassau County	36059	0.00	1.00	0.00	0.00	0.00
Passaic County	34031	0.00	1.00	0.00	0.00	0.00
Ramsey County	27123	0.00	1.00	0.00	0.00	0.00
Richmond County	36085	0.00	1.00	0.00	0.00	0.00
St. Louis CityMO	2965000	0.00	1.00	0.00	0.00	0.00
Union CountyNJ	34039	0.00	1.00	0.00	0.00	0.00
Wayne County	26163	0.00	1.00	0.00	0.00	0.00
Westchester County	36119	0.00	1.00	0.00	0.00	0.00
Alameda County	06001	0.00	0.00	1.00	0.00	0.00
Allegheny County	42003	0.00	0.00	1.00	0.00	0.00
Dallas County	48113	0.00	0.00	1.00	0.00	0.00
DeKalb CountyGA	13089	0.00	0.00	1.00	0.00	0.00
Du Page County	17043	0.00	0.00	1.00	0.00	0.00
Essex CountyNJ	34013	0.00	0.00	1.00	0.00	0.00
Fairfax County	34003	0.00	0.00	1.00	0.00	0.00
Harris County	48201	0.00	0.00	1.00	0.00	0.00
Hennepin County	27053	0.00	0.00	1.00	0.00	0.00
Macomb County	26099	0.00	0.00	1.00	0.00	0.00
Middlesex CountyMA	25017	0.00	0.00	1.00	0.00	0.00
Middlesex CountyNJ	34023	0.00	0.00	1.00	0.00	0.00
Montgomery CountyPA	42019	0.00	0.00	1.00	0.00	0.00
Norfolk County	25021	0.00	0.00	1.00	0.00	0.00
Prince George's County	24033	0.00	0.00	1.00	0.00	0.00
Rockland County	33015	0.00	0.00	1.00	0.00	0.00
St. Louis CountyMO	29189	0.00	0.00	1.00	0.00	0.00
Suffolk CountyNY	36103	0.00	0.00	1.00	0.00	0.00
Anne Arundel County	24003	0.00	0.00	0.00	1.00	0.00
Anoka County	27003	0.00	0.00	0.00	1.00	0.00
Baltimore County	24005	0.00	0.00	0.00	1.00	0.00
Beaver County	42007	0.00	0.00	0.00	1.00	0.00
Broward County	12011	0.00	0.00	0.00	1.00	0.00

Table B2 County Classifications 1980 (continued)

1980 County Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Bucks County	42017	0.00	0.00	0.00	1.00	0.00
Burlington County	34005	0.00	0.00	0.00	1.00	0.00
Chester County	42029	0.00	0.00	0.00	1.00	0.00
Clayton County	13063	0.00	0.00	0.00	1.00	0.00
Cobb County	13067	0.00	0.00	0.00	1.00	0.00
Contra Costa County	06013	0.00	0.00	0.00	1.00	0.00
Dakota County	27037	0.00	0.00	0.00	1.00	0.00
Fulton County	13121	0.00	0.00	0.00	1.00	0.00
Galveston County	48167	0.00	0.00	0.00	1.00	0.00
Gloucester County	34015	0.00	0.00	0.00	1.00	0.00
Gwinnett County	13135	0.00	0.00	0.00	1.00	0.00
Harford County	24025	0.00	0.00	0.00	1.00	0.00
Howard County	24027	0.00	0.00	0.00	1.00	0.00
Jefferson CountyMI	29099	0.00	0.00	0.00	1.00	0.00
Kane County	17089	0.00	0.00	0.00	1.00	0.00
Kenosha County	55059	0.00	0.00	0.00	1.00	0.00
King County	53033	0.00	0.00	0.00	1.00	0.00
Lake CountyILL	17097	0.00	0.00	0.00	1.00	0.00
Lake CountyIN	18089	0.00	0.00	0.00	1.00	0.00
Los Angeles County	60037	0.00	0.00	0.00	1.00	0.00
Madison County	17119	0.00	0.00	0.00	1.00	0.00
Marin County	06041	0.00	0.00	0.00	1.00	0.00
Miami- Dade County	12086	0.00	0.00	0.00	1.00	0.00
Monmouth County	34025	0.00	0.00	0.00	1.00	0.00
Montgomery CountyMD	24031	0.00	0.00	0.00	1.00	0.00
Morris County	34027	0.00	0.00	0.00	1.00	0.00
New Castle County	10003	0.00	0.00	0.00	1.00	0.00
Oakland County	26125	0.00	0.00	0.00	1.00	0.00
Ocean County	34029	0.00	0.00	0.00	1.00	0.00
Plymouth County	25023	0.00	0.00	0.00	1.00	0.00
Prince William County	51153	0.00	0.00	0.00	1.00	0.00
Putnam County	36079	0.00	0.00	0.00	1.00	0.00
San Diego CountyCA	06071	0.00	0.00	0.00	1.00	0.00
Somerset County	34035	0.00	0.00	0.00	1.00	0.00
St. Clair CountyIL	17163	0.00	0.00	0.00	1.00	0.00
Tarrant County	48439	0.00	0.00	0.00	1.00	0.00
Washington CountyMN	27163	0.00	0.00	0.00	1.00	0.00
Westmoreland County	42129	0.00	0.00	0.00	1.00	0.00
Will County	17197	0.00	0.00	0.00	1.00	0.00
Armstrong County	42005	0.00	0.00	0.00	0.00	1.00
Austin County	48015	0.00	0.00	0.00	0.00	1.00
Barrow County	13013	0.00	0.00	0.00	0.00	1.00
Bartow County	13015	0.00	0.00	0.00	0.00	1.00
Bond County	17005	0.00	0.00	0.00	0.00	1.00
Brazoria County	48039	0.00	0.00	0.00	0.00	1.00
Butler County	42019	0.00	0.00	0.00	0.00	1.00
Butts County	13035	0.00	0.00	0.00	0.00	1.00
Calhoun County	17013	0.00	0.00	0.00	0.00	1.00
Calvert County	24009	0.00	0.00	0.00	0.00	1.00
Carroll CountyGA	13045	0.00	0.00	0.00	0.00	1.00

Table B2 County Classifications 1980 (continued)

1980 County Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Carroll CountyMD	24013	0.00	0.00	0.00	0.00	1.00
Carver County	27019	0.00	0.00	0.00	0.00	1.00
Cecil County	24015	0.00	0.00	0.00	0.00	1.00
Chambers County	48071	0.00	0.00	0.00	0.00	1.00
Charles County	24017	0.00	0.00	0.00	0.00	1.00
Cherokee County	13057	0.00	0.00	0.00	0.00	1.00
Chisago County	27025	0.00	0.00	0.00	0.00	1.00
Clarke County	51043	0.00	0.00	0.00	0.00	1.00
Clinton County	17027	0.00	0.00	0.00	0.00	1.00
Collin County	48085	0.00	0.00	0.00	0.00	1.00
Coweta County	13077	0.00	0.00	0.00	0.00	1.00
Crawford County	29055	0.00	0.00	0.00	0.00	1.00
Dawson County	13085	0.00	0.00	0.00	0.00	1.00
DeKalb CountyILL	17037	0.00	0.00	0.00	0.00	1.00
Delta County	48119	0.00	0.00	0.00	0.00	1.00
Denton County	48121	0.00	0.00	0.00	0.00	1.00
Douglas County	13097	0.00	0.00	0.00	0.00	1.00
Ellis County	48139	0.00	0.00	0.00	0.00	1.00
Fauquier County	51061	0.00	0.00	0.00	0.00	1.00
Fayette CountyGA	13113	0.00	0.00	0.00	0.00	1.00
Fayette CountyPA	42051	0.00	0.00	0.00	0.00	1.00
Forsyth County	13117	0.00	0.00	0.00	0.00	1.00
Fort Bend County	48157	0.00	0.00	0.00	0.00	1.00
Franklin County	29071	0.00	0.00	0.00	0.00	1.00
Frederick County	24021	0.00	0.00	0.00	0.00	1.00
Grundy County	17063	0.00	0.00	0.00	0.00	1.00
Haralson County	13143	0.00	0.00	0.00	0.00	1.00
Heard County	13149	0.00	0.00	0.00	0.00	1.00
Henry County	13151	0.00	0.00	0.00	0.00	1.00
Hunt County	48231	0.00	0.00	0.00	0.00	1.00
Hunterdon County	34019	0.00	0.00	0.00	0.00	1.00
Isanti County	27059	0.00	0.00	0.00	0.00	1.00
Jasper CountyGA	13159	0.00	0.00	0.00	0.00	1.00
Jasper CountyIN	18073	0.00	0.00	0.00	0.00	1.00
Jefferson CountyWV	54037	0.00	0.00	0.00	0.00	1.00
Jersey County	17083	0.00	0.00	0.00	0.00	1.00
Johnson County	48251	0.00	0.00	0.00	0.00	1.00
Kaufman County	48257	0.00	0.00	0.00	0.00	1.00
Kendall County	17093	0.00	0.00	0.00	0.00	1.00
Lamar County	13171	0.00	0.00	0.00	0.00	1.00
Lapeer County	26087	0.00	0.00	0.00	0.00	1.00
Liberty County	48291	0.00	0.00	0.00	0.00	1.00
Lincoln County	29113	0.00	0.00	0.00	0.00	1.00
Livingston County	26093	0.00	0.00	0.00	0.00	1.00
Loudoun County	51107	0.00	0.00	0.00	0.00	1.00
Macoupin County	17117	0.00	0.00	0.00	0.00	1.00
Maricopa County	40013	0.00	0.00	0.00	0.00	1.00
Mchenry County	17111	0.00	0.00	0.00	0.00	1.00
Meriwether County	13199	0.00	0.00	0.00	0.00	1.00

Table B2 County Classifications 1980 (Continued)

1980 County Classifications						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Monroe County	17133	0.00	0.00	0.00	0.00	1.00
Montgomery CountyTX	48339	0.00	0.00	0.00	0.00	1.00
Newton CountyIN	18111	0.00	0.00	0.00	0.00	1.00
NewtonCounty GA	13217	0.00	0.00	0.00	0.00	1.00
Orange County	60059	0.00	0.00	0.00	0.00	1.00
Palm Beach County	12099	0.00	0.00	0.00	0.00	1.00
Parker County	48367	0.00	0.00	0.00	0.00	1.00
Paulding County	13223	0.00	0.00	0.00	0.00	1.00
Pickens County	13227	0.00	0.00	0.00	0.00	1.00
Pierce CountyWA	53053	0.00	0.00	0.00	0.00	1.00
Pierce CountyWI	55093	0.00	0.00	0.00	0.00	1.00
Pike CountyGA	13231	0.00	0.00	0.00	0.00	1.00
Pike CountyPA	42103	0.00	0.00	0.00	0.00	1.00
Pinal County	04021	0.00	0.00	0.00	0.00	1.00
Porter County	18127	0.00	0.00	0.00	0.00	1.00
Queen Anne's County	24035	0.00	0.00	0.00	0.00	1.00
Riverside County	06065	0.00	0.00	0.00	0.00	1.00
Rockdale County	06065	0.00	0.00	0.00	0.00	1.00
Rockingham County	13247	0.00	0.00	0.00	0.00	1.00
Rockwall County	36087	0.00	0.00	0.00	0.00	1.00
Salem County	48397	0.00	0.00	0.00	0.00	1.00
San Bernardino	34033	0.00	0.00	0.00	0.00	1.00
San Jacinto County	0667000	0.00	0.00	0.00	0.00	1.00
San Mateo County	06081	0.00	0.00	0.00	0.00	1.00
Scott County	27139	0.00	0.00	0.00	0.00	1.00
Sherburne County	27141	0.00	0.00	0.00	0.00	1.00
Snohomish County	53061	0.00	0.00	0.00	0.00	1.00
Spalding County	13255	0.00	0.00	0.00	0.00	1.00
Spotsylvania County	51177	0.00	0.00	0.00	0.00	1.00
St. Charles County	29183	0.00	0.00	0.00	0.00	1.00
St. Clair CountyMI	26147	0.00	0.00	0.00	0.00	1.00
St. Croix County	55109	0.00	0.00	0.00	0.00	1.00
Stafford County	51179	0.00	0.00	0.00	0.00	1.00
Strafford County	33017	0.00	0.00	0.00	0.00	1.00
Sussex County	34037	0.00	0.00	0.00	0.00	1.00
Waller County	48473	0.00	0.00	0.00	0.00	1.00
Walton County	13297	0.00	0.00	0.00	0.00	1.00
Warren CountyMI	29219	0.00	0.00	0.00	0.00	1.00
Warren CountyVA	51187	0.00	0.00	0.00	0.00	1.00
Washington CountyMO	29221	0.00	0.00	0.00	0.00	1.00
Washington CountyPA	42125	0.00	0.00	0.00	0.00	1.00
Wise County	48497	0.00	0.00	0.00	0.00	1.00
Wright County	27171	0.00	0.00	0.00	0.00	1.00

APPENDIX C: JURISDICTIONAL CHANGE

Table C1 1990 City Jurisdictional Change

1990 City Jurisdictional Change						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
Paramount city	0655618	1.00	(1.00)	0.00	0.00	0.00
Santa Ana city	0669000	1.00	(1.00)	0.00	0.00	0.00
Carrollton city	4813024	0.00	1.00	0.00	(1.00)	0.00
Mesa city	0446000	0.00	1.00	0.00	(1.00)	0.00
Naperville city	1751622	0.00	1.00	0.00	(1.00)	0.00
Boca Raton city	1207300	0.00	1.00	(1.00)	0.00	0.00
Chino city	0613210	0.00	1.00	(1.00)	0.00	0.00
Everett city	5322640	0.00	1.00	(1.00)	0.00	0.00
Farmington Hills city	2627440	0.00	1.00	(1.00)	0.00	0.00
Frederick city	2430325	0.00	1.00	(1.00)	0.00	0.00
Fremont city	0626000	0.00	1.00	(1.00)	0.00	0.00
Irvine city	0658072	0.00	1.00	(1.00)	0.00	0.00
Irving city	4837000	0.00	1.00	(1.00)	0.00	0.00
Marietta city	1349756	0.00	1.00	(1.00)	0.00	0.00
Ontario city	0653896	0.00	1.00	(1.00)	0.00	0.00
Pleasanton city	0657792	0.00	1.00	(1.00)	0.00	0.00
San Bernardino CityCA	0665000	0.00	1.00	(1.00)	0.00	0.00
St. Charles city	2964082	0.00	1.00	(1.00)	0.00	0.00
Carlsbad city	0611194	0.00	0.00	1.00	(1.00)	0.00
Eagan city	2717288	0.00	0.00	1.00	(1.00)	0.00
Hemet city	0633182	0.00	0.00	1.00	(1.00)	0.00
Kent city	5335415	0.00	0.00	1.00	(1.00)	0.00
Plano city	4858016	0.00	0.00	1.00	(1.00)	0.00
Plymouth city	2751730	0.00	0.00	1.00	(1.00)	0.00
Redlands city	0659962	0.00	0.00	1.00	(1.00)	0.00
San Marcos city	0668196	0.00	0.00	1.00	(1.00)	0.00
Sandy Springs CDP	1368516	0.00	0.00	1.00	(1.00)	0.00
Temecula city	0678120	0.00	0.00	0.00	1.00	(1.00)
Victorville city	0682590	0.00	0.00	0.00	1.00	(1.00)
Galveston city	4828068	0.00	0.00	(1.00)	1.00	0.00
Baltimore city	244000	(1.00)	1.00	0.00	0.00	0.00
Los Angeles city	0644000	(1.00)	1.00	0.00	0.00	0.00

Table C2 1990 County Jurisdictional Change

1990 County Jurisdictional Change						
Name	FIPS	Core	Inner	Mature	Emerging	Exurban
DeKalb CountyGA	13089	0.00	1.00	(1.00)	0.00	0.00
Du Page County	17043	0.00	1.00	(1.00)	0.00	0.00
Dallas County	48113	0.00	1.00	(1.00)	0.00	0.00
Middlesex CountyNJ	34023	0.00	1.00	(1.00)	0.00	0.00
Fairfax County	34003	0.00	1.00	(1.00)	0.00	0.00
Los Angeles County	06037	0.00	1.00	0.00	(1.00)	0.00
Cobb County	13067	0.00	0.00	1.00	(1.00)	0.00
Tarrant County	48439	0.00	0.00	1.00	(1.00)	0.00
Montgomery CountyMD	24031	0.00	0.00	1.00	(1.00)	0.00
San Mateo County	06081	0.00	0.00	1.00	0.00	(1.00)
Douglas County	13097	0.00	0.00	0.00	1.00	(1.00)
Fayette CountyGA	13113	0.00	0.00	0.00	1.00	(1.00)
Rockdale County	13247	0.00	0.00	0.00	1.00	(1.00)
Rockingham County	33015	0.00	0.00	0.00	1.00	(1.00)
Mchenry County	17111	0.00	0.00	0.00	1.00	(1.00)
Porter County	18127	0.00	0.00	0.00	1.00	(1.00)
Collin County	48085	0.00	0.00	0.00	1.00	(1.00)
Denton County	48121	0.00	0.00	0.00	1.00	(1.00)
Palm Beach County	12099	0.00	0.00	0.00	1.00	(1.00)
Pierce CountyWA	53053	0.00	0.00	0.00	1.00	(1.00)
St. Charles County	29183	0.00	0.00	0.00	1.00	(1.00)
Orange County	06059	0.00	1.00	0.00	0.00	(1.00)
Baltimore city	244000	(1.00)	1.00	0.00	0.00	0.00

Table C3 2000 City Jurisdictional Change

2000 City Jurisdicational Change						
Name	StCoFIPS	00ChCore	00ChInner	00ChMature	00ChEmerging	00ChExurban
Anaheim city	062000	1.00	(1.00)	0.00	0.00	0.00
Baltimore city	244000	1.00	(1.00)	0.00	0.00	0.00
Compton city	0615044	1.00	(1.00)	0.00	0.00	0.00
Costa Mesa city	0616532	1.00	(1.00)	0.00	0.00	0.00
Detroit city	2622000	1.00	(1.00)	0.00	0.00	0.00
Fountain Valley city	0625380	1.00	(1.00)	0.00	0.00	0.00
Frederick city	2430325	1.00	(1.00)	0.00	0.00	0.00
Gardena city	0628168	1.00	(1.00)	0.00	0.00	0.00
Glendale city	0630000	1.00	(1.00)	0.00	0.00	0.00
Long Beach city	0643000	1.00	(1.00)	0.00	0.00	0.00
Los Angeles city	0644000	1.00	(1.00)	0.00	0.00	0.00
Minneapolis city	2743000	1.00	(1.00)	0.00	0.00	0.00
Montebello city	0648816	1.00	(1.00)	0.00	0.00	0.00
National City city	0650398	1.00	(1.00)	0.00	0.00	0.00
Oakland city	0653000	1.00	(1.00)	0.00	0.00	0.00
Pomona city	0636770	1.00	(1.00)	0.00	0.00	0.00
San Leandro city	0668084	1.00	(1.00)	0.00	0.00	0.00
San Mateo city	0668252	1.00	(1.00)	0.00	0.00	0.00
Seattle city	5363000	1.00	(1.00)	0.00	0.00	0.00
Skokie village	1770122	1.00	(1.00)	0.00	0.00	0.00
South San Francisco city	0673262	1.00	(1.00)	0.00	0.00	0.00
Torrance city	0656000	1.00	(1.00)	0.00	0.00	0.00
Wilmington city	1077580	1.00	(1.00)	0.00	0.00	0.00
Eden Prairie city	2718116	0.00	1.00	0.00	(1.00)	0.00
Sugar Land city	4870808	0.00	1.00	0.00	(1.00)	0.00
Temecula city	0678120	0.00	1.00	0.00	(1.00)	0.00
West Palm Beach city	1276600	0.00	1.00	0.00	(1.00)	0.00
Baytown city	486128	0.00	1.00	(1.00)	0.00	0.00
Carlsbad city	0611194	0.00	1.00	(1.00)	0.00	0.00
Eagan city	2717288	0.00	1.00	(1.00)	0.00	0.00
Fort Worth city	4827000	0.00	1.00	(1.00)	0.00	0.00
Hemet city	0633182	0.00	1.00	(1.00)	0.00	0.00
Kent city	5335415	0.00	1.00	(1.00)	0.00	0.00
Minnetonka city	2743252	0.00	1.00	(1.00)	0.00	0.00
Phoenix city	0455000	0.00	1.00	(1.00)	0.00	0.00
Plano city	4858016	0.00	1.00	(1.00)	0.00	0.00
Plymouth city	2751730	0.00	1.00	(1.00)	0.00	0.00
Redlands city	0659962	0.00	1.00	(1.00)	0.00	0.00
Renton city	5357745	0.00	1.00	(1.00)	0.00	0.00
San Marcos city	0668196	0.00	1.00	(1.00)	0.00	0.00
Sandy Springs CDP	1368516	0.00	1.00	(1.00)	0.00	0.00
Wayne CDP	3477870	0.00	1.00	(1.00)	0.00	0.00
Mckinney city	4845744	0.00	0.00	1.00	0.00	(1.00)
Denton city	4819972	0.00	0.00	1.00	(1.00)	0.00
Galveston city	4828068	0.00	0.00	1.00	(1.00)	0.00
Scottsdale city	0465000	0.00	0.00	1.00	(1.00)	0.00
Victorville city	0682590	0.00	0.00	1.00	(1.00)	0.00

Table C4 2000 County Jurisdictional Change

2000 County Jurisdictional Change						
Name	FIPS	00ChCore	00ChInner	00ChMature	00ChEmerging	00ChExurban
Baltimore city	244000	1.00	(1.00)	0.00	0.00	0.00
Clayton County	13063	0.00	0.00	1.00	(1.00)	0.00
Fulton County	13121	0.00	0.00	1.00	(1.00)	0.00
Gwinnett County	13135	0.00	0.00	1.00	(1.00)	0.00
Lake CountyILL	17097	0.00	0.00	1.00	(1.00)	0.00
Oakland County	26125	0.00	0.00	1.00	(1.00)	0.00
Broward County	12011	0.00	0.00	1.00	(1.00)	0.00
Monmouth County	34025	0.00	0.00	1.00	(1.00)	0.00
Contra Costa County	06013	0.00	0.00	1.00	(1.00)	0.00
Cherokee County	13057	0.00	0.00	0.00	1.00	(1.00)
Forsyth County	13117	0.00	0.00	0.00	1.00	(1.00)
Henry County	13151	0.00	0.00	0.00	1.00	(1.00)
Carroll CountyMD	24013	0.00	0.00	0.00	1.00	(1.00)
Strafford County	33017	0.00	0.00	0.00	1.00	(1.00)
Rockwall County	48397	0.00	0.00	0.00	1.00	(1.00)
Fort Bend County	48157	0.00	0.00	0.00	1.00	(1.00)
Maricopa County	40013	0.00	0.00	0.00	1.00	(1.00)
Loudoun County	51107	0.00	0.00	0.00	1.00	(1.00)
Stafford County	51179	0.00	0.00	0.00	1.00	(1.00)

Table 9 illustrates the increasing level of population density in metro jurisdictions. At the county level most of the increases occurred in the emerging suburbs and exurbs. The emerging suburbs category increase from 23 percent to 28 percent. Population density decreased the number of exurban jurisdictions from 54 percent to 42 percent, a decrease of 23 jurisdictions. In 1980, most city jurisdictions were inner suburbs with more mature and emerging cities than core cities in 1980. In 2000, 129 of 135 cities were either inner suburbs or cores and there were no exurban or emerging cities and few mature jurisdictions.

Table C5 City and County Categorizations by Year

Counties	1980	1990	2000	1980	1990	2000
Core	10	9	10	5%	5%	5%
Inner	15	23	22	8%	12%	12%
Mature	18	17	25	9%	9%	13%
Emerging	44	51	53	23%	27%	28%
Exurban	103	90	80	54%	47%	42%
Cities	1980	1990	2000	1980	1990	2000
Core	16	16	39	12%	12%	29%
Inner	78	94	90	58%	70%	67%
Mature	21	16	6	16%	12%	4%
Emerging	17	8	0	13%	6%	0%
Exurban	3	1	0	2%	1%	0%

APPENDIX D:
MORAN I ANALYSIS OF DEPENDENT AND INDEPENDENT VARIABLES, CONTIGUITY AND MODEL SOLUTIONS, UNIQUE MULTICOLLINEARITY RESULTS AND HETEROSCEDASTICITY RESULTS

Dependent and Independent Variable Correlations

This section of Appendix D examines the Moran I for all the variables used in the spatial analysis models. The focus is to show the levels of spatial autocorrelation contiguities for the 1990 and 2000 cities and counties for the base model, dummy model and interactive models. The analysis provides a sense of how much of a factor spatial autocorrelation is in the employment and poverty spatial analysis models.

Moran I for County 1990

All dependent variables have significant autocorrelation contiguities at level 1 and 2. The independent variables: poverty, poverty change, income per capita change, median home value change and median rent change have significant autocorrelation contiguities ranging from up to 4 to 14. This shows there is a lot of spatial clustering of these variables. The dummy variables do not have a high level of significant autocorrelation contiguities. The interactive variables do not have a high level of significant autocorrelation except in the emerging and exurban counties. In the emerging counties population change and median home value change have autocorrelation up to 4 and 8. In the exurbs, employment change and median home value change have autocorrelations up to 4 and 5. This shows there is a lot of spatial clustering of the variables in these jurisdictions.

Table D1 County 1990 Dependent Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Const	2	0
Man	1	0
Trans	2	0
Whole	2	0
Ret	2	0
FIRE	2	0
BusSer	2	0
PerSer	2	0
ProfSer	2	0

Table D2 County 1990 Independent Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Pov	1-4	7-16
PopDenCh	1	
EmpDenCh	1	
HSLess	2	
CollMore	2	
IncPcCh	14	
MedValCh	6	8
MedRentCh	4	
PovCh	6	
PopCh	2	
EmpCh	2	
PopDen	1	
EmpDen	1	
IncPC	1	
Pop	3	
Emp	1	
MedVal	3	
MedRent	4	

Table D3 County 1990 Dummy Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Core	1	
Inner	0	
Mature	0	
Emerging	0	
Exurban	1	

Table D4 County 1990 Interactive Variables

Interactive	Indp Var	A-C Contiguities	A-C Recurr.
Core	PopDenCh	1	
Core	EmpDenCh	1	
Core	HS	1	
Core	Coll	1	
Core	IncPCch	1	
Core	PopCh	1	
Core	EmpCh	1	
Core	MedValCh	0	
Core	MedRenCh	1	
Core	PovCh	1	
Inner	PopDenCh	0	
Inner	EmpDenCh	0	
Inner	HS	0	
Inner	Coll	0	
Inner	IncPCch	0	
Inner	PopCh	0	
Inner	EmpCh	0	
Inner	MedValCh	0	
Inner	MedRenCh	0	
Inner	PovCh	0	
Mature	PopDenCh	0	
Mature	EmpDenCh	0	
Mature	HS	0	
Mature	Coll	2nd Cont. Only	
Mature	IncPC	0	
Mature	PopCh	0	
Mature	EmpCh	0	
Mature	MedRenCh	0	
Mature	MedRenCh	0	
Mature	PovCh	0	

Interactive	Indp Var	A-C Contiguities	A-C Recurr.
Emerging	PopDenCh	0	
Emerging	EmpDenCh	0	
Emerging	HS	0	
Emerging	Coll	0	
Emerging	IncPC	0	
Emerging	PopCh	4	7
Emerging	EmpCh	0	
Emerging	MedValCh	8	
Emerging	MedRenCh	0	
Emerging	PovCh	0	
Exurbs	PopDenCh	0	
Exurbs	EmpDenCh	0	
Exurbs	HS	1	
Exurbs	Coll	1	
Exurbs	IncPC	1	
Exurbs	PopCh	2	
Exurbs	EmpCh	4	
Exurbs	MedValCh	5	
Exurbs	MedRenCh	1	
Exurbs	PovCh	1	

Moran I for County 2000

All the dependent variables have significant autocorrelation contiguities of 1 and up to 2. The independent variables: median value change, median value, median rent change and median rent all have significant autocorrelation contiguities up to and over 5. This shows there is a lot of spatial clustering of these variables. The exurban dummy variable has significant autocorrelation contiguity up to 2 compared to 1 for the other jurisdictions. The interactive variables mostly have significant autocorrelation contiguities of 0 or 1 except for emerging high school, population change, employment change, median rent change and poverty change that all have significant autocorrelation contiguities at 2. In the exurbs population density change and employment density change have significant autocorrelation contiguities at 3 with employment density change also at 2. This shows there is a lot of spatial clustering of the variables in exurban jurisdictions.

Table D5 County 2000 Dependent Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Const	2	-
Man	1	-
Trans	1	-
Whole	2	-
Ret	1	-
FIRE	Only at 2nd Cont. (1st not sign.)	-
BusSer	1	-
PerSer	2	-
ProfSer	1	-
PubAdm	2	-
Oth	2	-

Table D6 County 2000 Independent Variables

Indp Variable	Autocorrelation Contiguities	A-C Recurrence
Pov	1	3
PopDenCh	1	
EmpDenCh	1	
HSLEss	1	
CollMore	1	
IncPcCh	2	
MedValCh	7	
MedRentCh	6	
PovCh	5	
PopCh	2	
EmpCh	Only 2nd Contg.	
PopDen	1	
EmpDen	1	
IncPC	4	
Pop	2	
Emp	Only 2nd Contg.	
MedVal	5	
MedRent	5	

Table D7 County 2000 Dummy Variables

	Autocorrelation Contiguities	A-C Recurrence
Core	1	
Inner	1	
Mature	0	
Emerging	0	
Exurban	2	

Table D8 County 2000 Interactive Variables

Interactive	Indp Var	A-C	A-C Recur.
Core	PopDenCh	1	
Core	EmpDenCh	0	
Core	HS	1	
Core	Coll	1	
Core	IncPCch	0	
Core	PopCh	1	
Core	EmpCh	3rd Cont. only	
Core	MedValCh	1	
Core	MedRenCh	1	
Core	PovCh	1	
Inner	PopDenCh	0	
Inner	EmpDenCh	0	
Inner	HS	0	
Inner	Coll	0	
Inner	IncPCch	0	
Inner	PopCh	0	
Inner	EmpCh	0	
Inner	MedValCh	Only 2nd Cont.	
Inner	MedRenCh	0	
Inner	PovCh	0	
Mature	PopDenCh	0	
Mature	EmpDenCh	0	
Mature	HS	0	
Mature	Coll	0	
Mature	IncPC	0	
Mature	PopCh	1	
Mature	EmpCh	0	
Mature	MedRenCh	0	
Mature	MedRenCh	1	
Mature	PovCh	1	

Interactive	Indp Var	A-C	A-C Recur.
Emerging	PopDenCh	0	
Emerging	EmpDenCh	0	
Emerging	HS	2nd Cont. Only	
Emerging	Coll	1	
Emerging	IncPC	0	
Emerging	PopCh	2nd Cont. Only	
Emerging	EmpCh	2nd Cont. Only	
Emerging	MedValCh	3	
Emerging	MedRenCh	2nd Cont. Only	
Emerging	PovCh	2nd and 3rd Cont. Only	
Exurbs	PopDenCh	3rd Cont. only	
Exurbs	EmpDenCh	2nd and 3rd Cont. Only	
Exurbs	HS	2	
Exurbs	Coll	0	
Exurbs	IncPC	7	
Exurbs	PopCh	1	
Exurbs	EmpCh	0	
Exurbs	MedValCh	6	
Exurbs	MedRenCh	6	
Exurbs	PovCh	4	

Moran I for City 1990

All the dependent variables have no significant autocorrelation contiguity except retail and other employment change that are at 2. The independent variable median rent change has significant autocorrelation contiguities at 7 and 8. This shows there is a high level of spatial clustering for median rent. Median value change has significant autocorrelation contiguities at 2, 4 and 6. Income per capita change has significant autocorrelation contiguities at 3 and 4. The core and exurban dummy variables have significant autocorrelation contiguities at 1 while the other jurisdictions are at 0. The interactive variables college educated, population change in the core have significant autocorrelation contiguities at 2. In the inner cities, employment density change has significant autocorrelation contiguities up to 4. This shows there is a lot of spatial clustering of the variables in inner city jurisdictions.

Table D9 City 1990 Dependent Variables

Summary	Autocorrelation Contiguities
Ret	Only At 2nd Cont.
Other	Only At 2nd Cont.

Table D10 City 1990 Independent Variables

Indp Variable	Autocorrelation Contiguities	A-C Recurrence
Pov	1	
IncPcCh	3	
EmpCh	2	
MedValCh	2	4 & 6
MedRentCh	7 & 8	
PopDen	1	
EmpDen	1	
IncPC	3 & 4	
Pop	2	

Table D11 City 1990 Dummy Variables

	Autocorrelation Contiguities	A-C Recurrence
Core	1	
Inner	0	
Mature	0	
Emerging	0	
Exurban	1	

Table D12 City 1990 Interactive Variables

Interactive	Indp Var	A-C Contiguities	A-C Recur.
Core	PopDenCh	0	
Core	EmpDenCh	1	
Core	HS	0	
Core	Coll	Only 2nd Cont.	
Core	IncPCch	1	
Core	PopCh	Only 2nd Cont.	
Core	EmpCh	0	
Core	MedValCh	0	
Core	MedRenCh	1	
Core	PovCh	1	
Inner	PopDenCh	0	
Inner	EmpDenCh	4	
Inner	HS	0	
Inner	Coll	0	
Inner	IncPCch	2	4-6
Inner	PopCh	Only 2nd Cont.	
Inner	EmpCh	0	
Inner	MedValCh	1	3-6
Inner	MedRenCh	1	3-4
Inner	PovCh	0	
Mature	PopDenCh	0	
Mature	EmpDenCh	0	
Mature	HS	1	
Mature	Coll	0	
Mature	IncPC	0	
Mature	PopCh	1	
Mature	EmpCh	Only 2nd Cont.	
Mature	MedRenCh	0	
Mature	MedRenCh	0	
Mature	PovCh	0	

Interactive	Indp Var	AC	A-C Recur.
Emerging	PopDenCh	0	
Emerging	EmpDenCh	0	
Emerging	HS	0	
Emerging	Coll	0	
Emerging	IncPC	0	
Emerging	PopCh	Only 2nd Cont.	
Emerging	EmpCh	1	
Emerging	MedValCh	0	
Emerging	MedRenCh	0	
Emerging	PovCh	0	
Exurbs	PopDenCh	Not Enough "N" for Result	

Moran I for City 2000

The city dependent variables: retail trade, FIRE and other employment change have significant autocorrelation contiguities at 2. Wholesale trade employment change has significant autocorrelation contiguities up to 2. For the independent variables, median value change and median rent change have has significant autocorrelation contiguities up to 3. Income per capita has significant autocorrelation contiguities at 3 and 4 while median home value has significant autocorrelation contiguities up to 5. This shows there is a lot of spatial clustering of these variables. For the dummy variables the core, mature and exurbs has significant autocorrelation contiguities up to 2. Inner jurisdictions have has significant autocorrelation contiguities up to 4, while emerging is at 1. In the core and the suburbs, there are seven variables that have significant autocorrelation contiguities over three. In the mature and emerging cities there are no significant autocorrelation contiguities over 2. This provides evidence that there is a higher level of clustering in core and inner cities than in mature and emerging cities.

Table D13 City 2000 Dependent Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Const	1	0
Man	0	0
Trans	0	0
Whole	2	0
Ret	only on the 2nd Cont	0
FIRE	only on the 2nd Cont	0
BusSer	0	0
PerSer	0	0
ProfSer	0	0
PubAdm	1	0
Oth	only on the 2nd Cont	0

Table D14 City 2000 Independent Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Pov	1	
PopDenCh	2	
EmpDenCh	0	
HSLEss	0	
CollMore	0	
IncPcCh	1	3-4
MedValCh	3	
MedRentCh	3	
PovCh	0	
PopCh	0	
EmpCh	2	
PopDen	1	
IncPC	3-4	
Pop	Only 2nd Cont.	
Emp	0	
MedVal	5	
MedRent	2	

Table D15 City 2000 Dummy Variables

Summary	Autocorrelation Contiguities	A-C Recurrence
Core	2	
Inner	4	
Mature	2	
Emerging	1	
Exurban	2	

Table D16 City 2000 Interactive Variables

Interactive	Indp Var	A-C Contiguities	A-C Recurrence		Interactive	Indp Var	A-C Contiguities	A-C Recurrence
Core	PopDenCh	2	0		Mature	PopDenCh	2	0
Core	EmpDenCh	0	0		Mature	EmpDenCh	2	0
Core	HS	0	0		Mature	HS	2	0
Core	Coll	0	0		Mature	Coll	2	0
Core	IncPC	4	0		Mature	INcPC	2	0
Core	PopCh	0	0		Mature	PopCh	1	0
Core	EmpCh	2	0		Mature	EmpCh	2	0
Core	MedValCh	3	0		Mature	MedVal	1	0
Core	MedRen	3	0		Mature	MedRen	2	0
Inner	PopDenCh	6	0		Emerging	PopDenCh	1	0
Inner	EmpDenCh	0	0		Emerging	EmpDenCh	0	0
Inner	HS	0	0		Emerging	HS	0	0
Inner	Coll	0	0		Emerging	Coll	0	0
Inner	IncPC	4	0		Emerging	IncPC	0	0
Inner	PopCh	0	0		Emerging	PopCh	0	0
Inner	EmpCh	1	0		Emerging	EmpCh	2	0
Inner	MedValCh	4	0		Emerging	MedVal	1	0
Inner	MedRen	3	0		Emerging	MedRent	2	0
Inner	PovCh	0	0		Emerging	PovCh	0	0

Contiguity and Model Solutions for the Employment Models

The spatial analysis using the Moran I calculation shows the levels of spatial autocorrelation contiguities for the 1990 and 2000 cities and counties for the base model, dummy model and interactive models. The spatial analysis results provide evidence of how much of a factor spatial autocorrelation are in the employment and poverty spatial analysis models. The results presented for the models below are significant at the $\alpha < 0.05$ level.

Table D17 2000 County Employment Contiguity

Dep Var	Type	Contiguity	Lag	Error	Significant Solution
Const	Base	1-2	No	Yes	E
Const	Dummy	1	No	No	OLS
Const	Interact	1	No	No	OLS
Man	Base	1	No	Yes	E
Man	Dummy	1	No	Yes	E
Man	Interact	1	No	No	OLS
Trans	Base	1	No	No	OLS
Trans	Dummy	1	No	No	OLS
Trans	Interact	1	No	No	OLS
Whole	Base	1	No	No	OLS
Whole	Dummy	1	No	No	OLS
Whole	Interact	1	No	No	OLS
FIRE	Base	2	No	Yes	E
FIRE	Dummy	1	Yes	No	L
FIRE	Interact	1-2	No	Yes	E
Ret	Base	1	No	No	OLS
Ret	Dummy	1	No	No	OLS
Ret	Interact	1	No	Yes	E
BusSer	Base	1-2	No	Yes	E
BusSer	Dummy	1	No	No	OLS
BusSer	Interact	1	No	No	OLS
Per Ser	Base	1	No	No	OLS
Per Ser	Dummy	1	No	No	OLS
Per Ser	Interact	2	No	Yes	E
Pro Ser	Base	1	No	No	OLS
Pro Ser	Dummy	1	No	No	OLS
Pro Ser	Interact	1	No	Yes	E
Pub Adm	Base	1-2	Yes	No	L
Pub Adm	Dummy	n/a	n/a	n/a	n/a
Pub Adm	Interact	n/a	n/a	n/a	n/a
Other	Base	n/a	n/a	n/a	n/a
Other	Dummy	1-2	No	Yes	E
Other	Interact	1-2	No	Yes	E

Table D18 2000 City Employment Contiguity

Dep Var	Type	Contiguity	Lag	Error	Significant Solution
Const	Base	1			OLS
Const	Dummy	n/a	n/a	n/a	n/a
Const	Interact	n/a	n/a	n/a	n/a
Man	Base	1	No	No	OLS
Man	Dummy	n/a	n/a	n/a	n/a
Man	Interact	1	No	No	OLS
Trans	Base	1	No	No	OLS
Trans	Dummy	n/a	n/a	n/a	n/a
Trans	Interact	2	No	Yes	E
Whole	Base	1-2	Yes	No	L
Whole	Dummy	2	No	Yes	E
Whole	Interact	1	No	Yes	E
FIRE	Base	1	No	No	OLS
FIRE	Dummy	2	No	No	OLS
FIRE	Interact	3	No	No	OLS
Ret	Base	1	No	Yes	E
Ret	Dummy	1	No	No	OLS
Ret	Interact	1	No	No	OLS
BusSer	Base	1	Yes	No	L
BusSer	Dummy	1	No	No	OLS
BusSer	Interact	1	No	Yes	E
Per Ser	Base	1	No	No	OLS
Per Ser	Dummy	n/a	n/a	n/a	n/a
Per Ser	Interact	1	No	No	OLS
Pro Ser	Base	1	No	No	OLS
Pro Ser	Dummy	1	No	No	OLS
Pro Ser	Interact	1	No	No	OLS
Pub Adm	Base	1	No	Yes	E
Pub Adm	Dummy	n/a	n/a	n/a	n/a
Pub Adm	Interact	1	No	Yes	E
Other	Base	2	No	Yes	E
Other	Dummy	n/a	n/a	n/a	n/a
Other	Interact	n/a	n/a	n/a	n/a

Table D19 1990 County Employment Contiguity

Dep Var	Type	Contiguity	Lag	Error	Significant Solution
Const	Base	1-2	No	Yes	E
Const	Dummy	1-2	Yes	No	L
Const	Interact	1-2	No	Yes	E
Man	Base	1	No	No	OLS
Man	Dummy	1	No	No	OLS
Man	Interact	1	No	No	OLS
Trans	Base	1	No	No	OLS
Trans	Dummy	n/a	n/a	n/a	n/a
Trans	Interact	n/a	n/a	n/a	n/a
Whole	Base	2	No	Yes	E
Whole	Dummy	2	No	Yes	E
Whole	Interact	1	No	No	OLS
FIRE	Base	1-2	Yes	No	L
FIRE	Dummy	1	No	Yes	E
FIRE	Interact	1-2	Yes	No	L
Ret	Base	1-2	Yes	No	L
Ret	Dummy	1-2	Yes	No	L
Ret	Interact	n/a	n/a	n/a	n/a
BusSer	Base	1	No	Yes	E
BusSer	Dummy	1	No	Yes	E
BusSer	Interact	1	Yes	No	L
Per Ser	Base	1	No	No	OLS
Per Ser	Dummy	1	No	No	OLS
Per Ser	Interact	1-2	Yes	No	L
Pro Ser	Base	1	No	No	OLS
Pro Ser	Dummy	1	No	No	OLS
Pro Ser	Interact	1	No	No	OLS
Pub Adm	Base	1	Yes	No	L
Pub Adm	Dummy	2	No	Yes	E
Pub Adm	Interact	1	No	No	OLS
Other	Base	1	No	No	OLS
Other	Dummy	1	No	No	OLS
Other	Interact	2	Yes	No	L

Table D20 1990 City Employment Contiguity

Dep Var	Type	Contiguity	Lag	Error	Significant Solution
Const	Base	1	No	No	OLS
Const	Dummy	1	No	No	OLS
Const	Interact	1	No	No	OLS
Man	Base	2	No	Yes	E
Man	Dummy	n/a	n/a	n/a	n/a
Man	Interact	1	No	No	OLS
Trans	Base	1	No	No	OLS
Trans	Dummy	n/a	n/a	n/a	n/a
Trans	Interact	1	No	No	OLS
Whole	Base	1	No	No	OLS
Whole	Dummy	1	No	No	OLS
Whole	Interact	1	No	Yes	E
FIRE	Base	1	No	Yes	E
FIRE	Dummy	n/a	n/a	n/a	n/a
FIRE	Interact	1	No	No	OLS
Ret	Base	1	No	No	OLS
Ret	Dummy	n/a	n/a	n/a	n/a
Ret	Interact	2	Yes	No	L
BusSer	Base	1	No	No	OLS
BusSer	Dummy	1	No	No	OLS
BusSer	Interact	1	No	No	OLS
Per Ser	Base	1	No	No	OLS
Per Ser	Dummy	n/a	n/a	n/a	n/a
Per Ser	Interact	1	No	Yes	E
Pro Ser	Base	1	No	No	OLS
Pro Ser	Dummy	n/a	n/a	n/a	n/a
Pro Ser	Interact	1	No	No	OLS
Pub Adm	Base	1	No	No	OLS
Pub Adm	Dummy	n/a	n/a	n/a	n/a
Pub Adm	Interact	1	No	No	OLS
Other	Base	2	Yes	No	L
Other	Dummy	n/a	n/a	n/a	n/a
Other	Interact	1	No	No	OLS

Contiguity and Model Solutions for the Poverty Models

Table D21 City and County 1990 and 2000 Poverty Contiguity

Pov	Type	Contiguity	Lag	Error	Significant Solution
City90	Base	1	No	No	OLS
City90	Dummy	1	No	No	OLS
City90	Interact	1	No	No	OLS
City00	Base	1	No	No	OLS
City00	Dummy	1	No	No	OLS
City00	Interact	1	No	No	OLS
County90	Base	1	No	No	OLS
County90	Dummy	1-3	No	Yes	E
County90	Interact	1-4	No	Yes	E
County00	Base	1-3	No	Yes	E
County00	Dummy	1-3	No	Yes	E
County00	Interact	1-4	No	Yes	E

Multicollinearity and Heteroscedacticity Results

Table D22 2000 County Employment Heteroscedacticity and Multicollinearity

		Multicollinearity	Heteroscedacticity
Dep Var	Type	Condition Number	Koenker-Basset
Const	Base	10.2	.01
Const	Dummy	9.0	0.0
Const	Interact	4.4	.99
Man	Base	8.6	0.0
Man	Dummy	8.3	0
Man	Interact	4.3	.93
Trans	Base	5.5	0
Trans	Dummy	13.6	0
Trans	Interact	3.8	0
Whole	Base	2.3	0
Whole	Dummy	7.7	0
Whole	Interact	2.8	.99
FIRE	Base	5.6	0
FIRE	Dummy	4.6	0
FIRE	Interact	1.6	0
Ret	Base	5.7	0
Ret	Dummy	6.1	0
Ret	Interact	3.1	.005
BusSer	Base	6.5	0
BusSer	Dummy	6.7	0
BusSer	Interact	3.6	0
Per Ser	Base	2.3	0
Per Ser	Dummy	2.6	0
Per Ser	Interact	2.8	.59
Pro Ser	Base	5.4	0
Pro Ser	Dummy	12.3	0
Pro Ser	Interact	2.3	0
Pub Adm	Base	5.7	.48
Pub Adm	Dummy	n/a	n/a
Pub Adm	Interact	n/a	n/a
Other	Base	n/a	n/a
Other	Dummy	11.1	0
Other	Interact	2.5	.05

Table D23 1990 County Employment Heteroscedacticity and Multicollinearity

		Multicollinearity	Heteroscedacticity
Dep Var	Type	Condition Number	Koenker-Basset
Const	Base	1.9	0
Const	Dummy	3.5	0
Const	Interact	1.2	.98
Man	Base	6.8	0
Man	Dummy	4.1	.01
Man	Interact	2.8	.48
Trans	Base	4.8	.03
Trans	Dummy	n/a	n/a
Trans	Interact	n/a	n/a
Whole	Base	1.8	.0002
Whole	Dummy	1.9	0
Whole	Interact	3.0	.84
FIRE	Base	5.6	.89
FIRE	Dummy	5.8	.01
FIRE	Interact	3.7	.8
Ret	Base	2.77	0
Ret	Dummy	6.2	0
Ret	Interact	n/a	0
BusSer	Base	13	.10
BusSer	Dummy	10.5	.35
BusSer	Interact	2.6	.55
Per Ser	Base	1.7	0
Per Ser	Dummy	2.0	.003
Per Ser	Interact	3.5	0
Pro Ser	Base	4.3	0
Pro Ser	Dummy	7.6	0
Pro Ser	Interact	3.2	.95
Pub Adm	Base	3.9	0
Pub Adm	Dummy	7	0
Pub Adm	Interact	4.3	0
Other	Base	5.2	0
Other	Dummy	1.8	0
Other	Interact	2.1	0

Table D24 2000 City Employment Heteroscedacticity and Multicollinearity

		Multicollinearity	Heteroscedacticity
Dep Var	Type	Condition Number	Koenker-Basset
Const	Base	4.1	.56
Const	Dummy	n/a	n/a
Const	Interact	n/a	n/a
Man	Base	1.6	0
Man	Dummy	n/a	n/a
Man	Interact	1.1	.04
Trans	Base	2.8	.55
Trans	Dummy	n/a	n/a
Trans	Interact	1.1	0
Whole	Base	1.5	.63
Whole	Dummy	3.4	.02
Whole	Interact	2.6	.005
FIRE	Base	3.8	0
FIRE	Dummy	4.0	0
FIRE	Interact	1.9	.26
Ret	Base	6.7	0
Ret	Dummy	3.9	0
Ret	Interact	2.6	.002
BusSer	Base	4.3	0
BusSer	Dummy	4.5	0
BusSer	Interact	2.3	1
Per Ser	Base	1.4	0
Per Ser	Dummy	N	n/a
Per Ser	Interact	1.6	.02
Pro Ser	Base	4.1	0
Pro Ser	Dummy	4.9	0
Pro Ser	Interact	3.3	0
Pub Adm	Base	1.5	.07
Pub Adm	Dummy	n/a	n/a
Pub Adm	Interact	3.0	0
Other	Base	3.1	1
Other	Dummy	n/a	n/a
Other	Interact	n/a	n/a

Table D25 1990 City Employment Heteroscedacticity and Multicollinearity

		Multicollinearity	Heteroscedacticity
Dep Var	Type	Condition Number	Koenker-Basset
Const	Base	4.1	0
Const	Dummy	4.3	0
Const	Interact	4.1	0
Man	Base	3.7	.02
Man	Dummy	n/a	n/a
Man	Interact	1.8	.03
Trans	Base	3.4	0
Trans	Dummy	n/a	n/a
Trans	Interact	3.4	0
Whole	Base	4.5	0
Whole	Dummy	18.5	0
Whole	Interact	3.9	.03
FIRE	Base	3.9	.07
FIRE	Dummy	n/a	n/a
FIRE	Interact	3.99	0
Ret	Base	3.8	0
Ret	Dummy	n/a	n/a
Ret	Interact	4.6	.004
BusSer	Base	18.1	0
BusSer	Dummy	18.1	0
BusSer	Interact	3.5	.88
Per Ser	Base	6.23	0
Per Ser	Dummy	5.7	0
Per Ser	Interact	5.68	0
Pro Ser	Base	3.8	0
Pro Ser	Dummy	n/a	n/a
Pro Ser	Interact	4.7	0
Pub Adm	Base	2.8	.19
Pub Adm	Dummy	n/a	n/a
Pub Adm	Interact	4.5	.003
Other	Base	2.68	0
Other	Dummy	n/a	n/a
Other	Interact	3.67	.94

Table D26 Poverty Heteroscedacticity and Multicollinearity

		Multicollinearity	Heteroscedacticity
Pov	Type	Condition Number	Koenker-Basset
City90	Base	12.1	.90
City90	Dummy	10.7	.63
City90	Interact	3.1	.15
City00	Base	7.9	.01
City00	Dummy	8.0	.02
City00	Interact	2.5	.58
County90	Base	7.7	.21
County90	Dummy	8.6	.04
County90	Interact	4.3	.10
County00	Base	5.9	0
County00	Dummy	18.5	0
County00	Interact	5.15	.96

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