EXURBAN DYNAMICS: AN ANALYSIS OF MIGRATION AND URBAN CONTAINMENT POLICIES

Jeffery L. Osgood, Jr., PhD, Assistant Professor of Political Science, West Chester University

Abstract:

Exurban research has yielded little in the way of providing information as to neither the rates of migration from urban to exurban areas or an understanding of the effects of urban containment policies on this form of development vis-à-vis migration. This article is an attempt to provide localities and policy makers in the United States with a better understanding of the exurban form and which policies may be most effective in stemming the outward migration of individuals from urban to exurban areas. The article first traces the rates of exurban migration within larger metropolitan areas in the US over a twenty-year period from 1984 to 2005. Next, the article analyzes the effects of state and local urban containment policies on this type of migration. The findings suggest that exurban migration is an uneven process that varies considerably by region. More importantly, the results demonstrate that urban containment plans as currently designed vary in their effectiveness in reducing exurban migration.

1. Introduction

Exurban development is a relatively young phenomenon, meaning those who recognize and act on the immediate opportunity can influence the progression of this trend: now is the time to formulate theoretical constructs and practical policy options. What we now know is that, "the process of exurbanization adds a new dimension to the debate on the effects and inefficiencies associated with urban sprawl and the role of planning policy in its management" (Nelson, 1992, p. 350). In light of these implications, it is becoming increasingly important to ascertain the levels of exurban migration and the relative efficacy of available policy options to control its growth.

Exurbia is precipitously growing in size and influence. In 2000, 10.8 million people lived in exurban areas of metropolitan statistical areas (MSAs) of 500,000 or more (Berube et al., 2006). Those same metropolitan areas contained over 245 counties where at least one-fifth of their populations reside in exurban areas. Exurbia has grown by more than double the rate of their respective metropolitan areas. In the 1990s, exurban areas grew by more than 31 percent. In the same period, they accounted for over 61 percent of new manufacturing jobs (Nelson, 1990). These astounding growth rates, compared to urban areas, combined with central city population losses indicate an evolving spatial structure not likely to fade without policy intervention.

It has been over twenty years since William H. Frey (1987) declared the "decade of the exurbs," and yet relatively little is known about exurbia. The time has arrived to refine our understanding of its development within the United States vis-à-vis migrations from urban to exurban areas and to determine the effectiveness of state and local urban containment policies on this more narrow form of development.

1.1 Objectives of the Article

Individuals migrating away from urban areas in pursuit of a different sort of living have largely fueled exurban development. Through this understanding, and for the purposes of this article, exurban development is examined by way of migrations from core urban areas to exurbia.

In response to these types of low-density development, urban containment strategies have increasingly been adopted by localities to address concerns related to the costs and negative externalities associated with lower density development. A number of studies have demonstrated that these policy options have been effective in reducing urban sprawl (Anthony, 2004; Carruthers, 2002, 2003; Nelson and Dawkins, 2004; Wassmer, 2006). Nevertheless, little is known about the effects of urban containment strategies upon the migration of individuals to surrounding areas. To that end, the article tests for the effects of state and local containment plans on exurban migration.

A secondary objective of this article is to determine whether conditions generally associated with sprawl are similarly associated with outward exurban migration. In doing so, a number of control and dynamic indicator (CDI) variables are selected from the sprawl literature and utilized in models designed to test for statistical significance. These variables fall into four broad categories: Jeffersonian Impulses, flight-from-blight, age of metropolitan area and public choice theory.

Thomas Jefferson dreamed "of a nation of small, independent farms" located near urbanized areas, a vision closely related to exurbia (Chernow, 2004, p. 362). Thus, Jeffersonian Impulses includes those conditions associated with the expansion of urban areas through less dense development brought on by increasing densities, incomes and housing prices, which are generally attenuated by distance (Burgess, 1925; Mieszkowski and Mills, 1993). Flight-from-blight prioritizes real and perceived indicators of blight as most influential in the size of urban areas (Drier, Mollenkopf and Swanstrom, 2000; Massey and Denton, 1993). Age of the metropolitan area accounts for historical planning influences related to the development of urban areas (Razin and Rosentraub, 2000). Finally, in a very narrow sense, the article examines public choice theory by measuring the impact of municipal tax levels on exurban migration (Tiebout, 1956; Vedder, 2003; Wallace, 1996).

In summary, the following are the broad questions the article seeks to answer:

1) What are the rates of exurban migration?
2) What conditions are associated with exurban migration? And;
3) How effective are state and local urban containment strategies in restricting exurban migration?

2. Exurbia & Urban Containment

2.1 Exurbia

Exurbia has been poorly defined and under-studied despite it being one of the fastest growing segments of the landscape (Nelson & Sanchez, 1999, p. 137; Theobald, 2004). "In 2000 roughly 38 million acres were settled at urban densities, and nearly ten times that much land was settled at rates from low, exurban density (as low as one house per 40 acres) to higher rates (up to one per 10 acres)" (Theobald, 2001, p. 544). This newer urban form, whether it be up and coming suburban development or not, is having a major impact on the landscape and the communities in which they develop. Nevertheless, as Nelson and Sanchez (1999) and Theobald (2004) point out, the research on exurbia is lacking and worthy of further investigation. Exurban scholarship has yet to converge on a unified operationalization or even at what scale it should be applied. Table 1

provides a description of eleven works on exurbia. These works are selected to demonstrate the vast diversity in previous definitions and operationalization.

Table 1 Exurban Literature

Author	Semantic	Scale	Description
Spectorsky (1955)	Exurbanites	Counties & Places	Beyond the commuter shed of a large metropolitan area
Patel (1980)	Exurbs	Place	A discrete subdivision aerially organized on an internal street pattern and located in a rural setting far enough beyond the frontier of suburban development that it will not be engulfed by the expanding city within the foreseeable future (p. 1).
Lamb (1983)	Exurban Sprawl	Growth Regions	All counties or parts of counties within 50 miles of an urbanized are of 250,000 or larger population that had experienced a growth rate of at least 5 percent during the 1960s and which were not part of an urbanized area in 1970 (p. 41)
Blumenfeld (1986)	Metropolitan Fringe	Regions	Outside of Standard Metropolitan Statistical areas within 70 miles MSAs with more than 2 million people or 50 miles of an MSA with between 500,000 and 2 million (p. 347)
Nelson and Dueker (1990)	Exurbia	Counties	For all MSAs except those of less than 1.5 million, exurban counties are all MSA counties outside the central city county and MSA counties defined as metropolitan in 1960. Outside of the MSA they are within 80 miles from the outermost circumferential limited access highway or 100 miles from the center of the central city (p. 93)
Nelson (1992)	Exurbs	Counties	Exurban counties are within 50 miles of central city boundaries of MSAs of between 500,000 and 2 million persons, or 70 miles of central city boundaries of an MSA with a population exceeding 2 million, but not otherwise classified as a central county or traditional suburban county.
Morrill (1992)	Exurban	Counties	Counties with over 10% commuting to a metro area (p. 282)
Theobald (2005)	Exurban Areas	Densities	Exurban density is .68 to 16.18 hectare acres per unit (p. 32)
Lang and Sanchez (2006)	Exurbs	Counties	Most far flung counties with the lowest-essentially rural--population densities. Large-scale suburbanization is just about to take hold in these places, as they offer competitive bargains. Share a functional relationship via commuting with neighboring counties (p. 4)

Clark, Munroe, Irwin (2006)	Exurbia	Grid Cells	Density of 100 to 1,000 persons per square mile. (n/p)
Berube, Singer, Wilson, and Frey (2006)	Exurbia	Counties	Economic connection, housing density, population growth (p. 5-6)

To date the most comprehensive and methodologically rigorous definition of exurbia is that of Berube, Singer, Wilson, and Frey (2006) of the Brookings Institute. This article utilizes their definition because it incorporates all the criterions employed in the divergent exurban literature: density, growth and economic connection. Their classification process begins at the census tract level by determining economic connection through the Census 2000 tract-to-tract commuting files. A census tract satisfies this criterion if 20 percent of workers or more within a tract commute to a larger urban area. This minimum threshold closely matches that of the Office of Management Budget that utilizes a threshold of 25 percent or more when incorporating counties into an MSA. Next, the tract is examined for a minimum housing density of roughly 2.6 acres per unit. 2.6 acres per unit or more captures roughly one third of the nation's housing stock. Furthermore, housing density is a better measure of the built environment and the pastoral lifestyle envisioned by Jefferson than population density. Lastly, the tract must have exceeded either the growth rate of their surrounding metropolitan area or at least 3 times the national rate in the 1990s (39.6 percent). The growth criterion is important because the literature and previous studies describe exurban areas as places in transition. Moreover, the growth criterion helps to exclude places essentially retaining their rural character. Through this approach, census tracts are labeled exurban when they have satisfied all three criteria.

Census tracts, however, are generally not as useful a unit of analysis as cities and counties. Nevertheless, for a more meaningful evaluation of exurban areas, those census tracts must be aggregated in a way that allows for the classification of counties as exurban. In pursuit of this, Berube et. al. devised a procedure to reduce the amount of error when classifying counties as exurban:

> To determine a threshold for identifying exurban counties (the authors) ranked all U.S. counties on the percentage of their populations living in exurban census tracts. Overall, 574 counties contained at least one exurban tract. Of these, 329 counties had less than 20 percent of their populations living in exurban areas, containing 5.1 million people (47 percent of total exurban population). A lower-bound threshold of 20 percent to identify exurban counties, then, captures a slight majority (53) percent of all people living in exurban areas. Furthermore, there exists a significant drop between the numbers of counties that are 15 to 20 percent exurban, suggesting that a sort of natural break exists at this threshold (Berube et. al., 2006, p. 19)

The authors conclude that the least amount of error is introduced when classifying counties as exurban if at least 20 percent or more of residents reside in exurban census tracts.

Based on this definition the authors find over 10.8 million people living in exurban areas of MSAs with populations of 500,000 or more. More alarmingly, these areas are growing by more than double the rate of their respective metropolitan areas. The exurbanization of land brings a

new lens through which to view the effects and inefficiencies associated with urban sprawl (Nelson, 1992, p. 350). On a number of fronts, it is the least efficient and most costly form of urban development (Nelson and Sanchez, 2005).[1]

Nelson and Dueker (1990) lay out four behavioral explanations regarding reasons why individuals migrate to exurban areas. The first is the flight-from-blight orientation discussed earlier. Second is the pursuit of a "Jeffersonian" lifestyle that includes living in isolation on large lots in the countryside. Next, similar to the previous reason, individuals move to exurbia in pursuit of homes near areas of open space and recreation. Finally, they point to the "Tiebout effect." This effect stems from underlying motivations of exurban households who are pursuing housing and lands where fewer public services are offered within a given budget (Nelson and Dueker, 1990, p. 96). Interestingly, the case is made that individuals move in pursuit of a better match in goods and services. It is believed that this is especially true for larger cities that provide services the more affluent neither desire nor use.

The literature investigating the effects of urban containment plans on exurban development is relatively nonexistent. Nelson and Sanchez (2005) present the only available study related to the effectiveness of containment policies and exurban sprawl. They found strong containment plans were most effective in reducing the exurbanization of rural lands.[2] However, they did not address their effectiveness in retaining residents within core or urbanized areas.

2.2 Urban Containment Plans & Smart Growth Initiatives

In 1958, Lexington, Kentucky enacted the first urban containment plan and since that time similar smart growth initiatives have found their way into municipal codes across America (Ding, Knaap, and Hopkins, 1999). Growth management strategies, including urban containment plans, are attempts at achieving more compact and least costly forms of urban development (Brower, Godschalk, and Porter, 1989). Growth management goals have evolved over the years (Zovanyi, 1998). Initially environmental concerns precipitated the first materialization of growth management programs. Fiscal issues regarding infrastructure and service provision later eclipsed those concerns. And, later, sustainability and social justice issues came to the forefront.

The differences between smart growth initiatives are best understood through their intended purpose (Easley, 1992).[3] These include urban growth areas (UGAs), which explicitly provide requirements for where growth can occur. Urban growth boundaries (UGBs) and urban containment plans (UCPs) are planned areas where growth may not occur beyond the specified boundary; colloquially they may be referred to as green belts. Urban service areas (USVAs) are those places where urban services are provided and any areas outside will not be provided with infrastructure or service support by municipalities. Moreover, urban containment plans are scalable at three levels: local, county, or regional. Local plans are the most common and are put in place by municipalities and generally do not consider inter-jurisdictional cooperation unless mandated by the state. County plans cover larger areas and, of course, are the product of county

[1] See Nelson and Sanchez, 2005 for a fuller discussion of the similarities in costs associated with urban and exurban sprawl.

[2] See section on urban containment plans for a description of strong containment plans.

[3] The following examples are meant to be representative and not exhaustive.

governments. Regional containment plans are the third scale and come in two forms: unbounded and bounded. Regional unbounded metropolitan plans are those with active inter-jurisdictional cooperation at the metropolitan level. They utilize urban service boundaries to designate areas where services will be provided. Any development outside is not strictly prohibited.

While not specifically a scale in and of itself, many instances of growth management programs are state induced (Weitz, 1999). Currently nine states require comprehensive growth management planning be enacted by localities. Furthermore, these requirements can be sorted into three types of consistency requirements. State plans qualifying as comprehensive and thus included in this study (See Table 2) are: Florida, Hawaii, Maine, Maryland, New Jersey, Oregon, Rhode Island, Vermont, and Washington (Dawkins and Nelson, 2003; Howell-Moroney, 2008; Porter, 2008; Wassmer, 2006; Weitz, 1999).

Table 2 List of State Growth Management Plans Included (Wassmer, 2006, p. 32)

State	Year	Vertical Consistency	Horizontal Consistency	Internal Consistency
Florida	1985	X	X	X
Hawaii	1961	X	X	X
Maine	1988	X	X	X
Maryland	1992			X
New Jersey	1986			X
Oregon	1973	X		X
Rhode Island	1988	X	X	X
Vermont	1988		X	X
Washington	1990		X	X

One way state plans can be understood is through the types of consistency they require: vertical consistency, horizontal consistency, and internal consistency (Bengston, Fletcher, and Nelson, 2003; Nelson and Dawkins, 2004; Wassmer, 2006). Vertical consistency requires plans to be consistent between local and state governments. Horizontal consistency requires inter-jurisdictional consistency between adjacent municipalities. Internal consistency requires municipalities to base local land use decisions on their comprehensive land-use plan.

"There is some scholarly debate about what constitutes a state growth management plan" (Anthony, 2004, p. 379). Of contention is whether the plan is comprehensive and required. Tennessee and Georgia have been excluded from this analysis for differing reasons. Tennessee's Growth Policy Act is excluded because it merely requires city-county definitions of growth areas in order to engage in annexation. The objective of the policy is not growth management in the traditional sense even though it may semantically feature growth. Georgia's plan is excluded because the state's mandate is not enforced and thus is optional. Unlike other states, Georgia has not reasserted control in the planning process.

Nelson and Dawkins (2004) conducted one the most comprehensive inventory and analysis to date of urban containment plans in the United States. In limiting their analysis to metropolitan areas, counties, and occasionally cities with populations exceeding 20,000, the authors identify 131 growth management plans.[4] Utilizing their inventory, the authors create an urban containment typology based on the results of a cluster analysis. "This method of analysis uses a family of algorithms designed to identify clusters of cases by examining patterns in case characteristics. Although a wide variety of algorithms can be used, most identify clusters using some procedure that minimizes variation within and maximizes variation across cluster" (p. 23). The authors have created a comparatively superior framework utilizing this statistical procedure and find that urban containment plans fall into one of four groups: weak-accommodating, strong-accommodating, weak-restrictive, or strong-restrictive. For the purposes of this study, the important aspects of Nelson and Dawkin's framework are the strong and weak classifications. Weak plans fail to restrict growth outside of specified areas, while strong plans do restrict growth. The classifications of accommodating or restrictive are concerned with the comprehensiveness of planning for development within boundaries.

The extent to which urban containment plans have demonstrated effectiveness varies considerably within the literature. Carruthers (2002) finds state growth management plans with strong consistency requirements and enforcement mechanisms better reduces urban sprawl. Wassmer (2006), however, found all three forms of statewide growth management exhibit some level of effect on the size of urban areas (p. 49). Similarly, Anthony (2004) found states with growth management plans experience a smaller decline in density than those without, but those effects are not statistically significant.

3. Methods & Data

3.1 Units of Analysis & Defining Core and Exurban Counties

The units of analysis for this study are all metropolitan statistical areas, as defined by the Office of Management and Budget (OMB), with populations of 500,000 or more that have related exurban counties. The population threshold of 500,000 or more ensures some similarity between MSAs, as smaller ones are less likely to be similar (Razin and Rosentraub, 2000; Rothenberg Pack, 1998).

Core counties are classified by identifying the principal city of each MSA, which is in analogous with U.S. Census Bureau practices. The principal city is always defined as the most populous city within a given MSA. In limited circumstances, the Census Bureau identifies multiple principal cities within an MSA. However, the most populous principal city defines the core county for the purposes of this study. Additionally, principal cities do transcend boundaries in very limited circumstances. In these cases, only the county with the largest proportion of the principal city's population is considered the core county.

Each MSAs is examined for the presence of related exurban counties and in those cases where none are identified, they are excluded from further consideration. Exurban counties are

[4] Although the authors identified 131 examples of growth management plans with an urban containment framework that meet their selection criteria, they cannot say that they identified all such plans now in place in the United States (Nelson and Dawkins, 2004, p. 16).

identified using the previously mentioned procedure devised by Berube et al. (2006).[5] Exurban counties are related to the core county with which they have the most significant commuting ties as identified by the US Census county-to-county worker flow files. This relation is different than method utilized by Berube et. al. (2000). Instead, this is believed to be the more salient relation when attempting to identify the interactions occurring between spatial forms and the breadth at which the migration is occurring. This conclusion is based upon the literature and the objective of providing targeted policy recommendations.

3.2 Exurban Migration

The measurement of exurban migration is accomplished using data from the Internal Revenue Service's (IRS) Statistics of Income Division. The division collects information on county-to-county migration patterns. These patterns are measured through an examination of individual IRS 1040 forms.[6] During this process, the agency identifies the number of migrants between all counties within the United States and its' territories. The IRS accepts the number of returns as proxies for households migrating and number of exemptions (taxpayer plus dependents) as the total number of migrants.

The focus of this article is a twenty-year period from 1984-2005. There are a few limitations in utilizing IRS data. First, the data only measures individuals filing an annual return (Gross, 2005). Second, using IRS data as a true representation of population numbers introduces a small amount of error into the study. Salier and Weber (2000) completed a comparative study to determine the similarity between the IRS population and US Census counts. They conclude IRS population counts account for 97.36 percent of the Census estimate. Strictly adhering to their findings, the error introduced is less than three percent, which is generally considered acceptable in the social sciences. Each of the aforementioned practices is considered standard by the Statistics of Income Division of the IRS.

3.3 State and Local UCPs

In order to test for the effects of UCPs on exurban migration, the presence and year of enactment of state and local UCPs for each MSA included in the study is determined through the works of Nelson and Dawkins (2004) and Wassmer (2006). Two variables are employed to measure the presence and type of local urban containment plans: UCP Strategy and UCP Scale. The first variable indicates the presence and strategy of the urban containment plan within each MSA. It is coded as an ordinal variable representing none, weak, or strong[7]. The second variable indicates the scale at with the plan is enacted. It also is coded as an ordinal variable representing

[5] See section 2.1 for a discussion of the procedure.

[6] The IRS classifies all returns as either movers or non-movers. They do so through comparison of address information on matched returns between two consecutively available filling years. Matches are made using the social security number of the primary filer only. Following the classification of the filer as a mover or non-mover the migration status is then determined. A non-mover is automatically classified as a non-migrant. A mover however is not automatically classified as a migrant. When a filer is classified as a mover then a comparison of the two Filing Year's state and county geographic codes are performed. If there is a difference between the two codes then a mover is classified as a migrant.

[7] See section on urban containment plans in 2.2 for an explanation of the different types of urban containment plans.

none, central city, core county, or regional. Three dummy variables indicate the presence and type of state urban containment plans: Horizontal, Internal, and Vertical.[8]

3.4 Control and Dynamic Indicator Variables

There are a number of theoretical orientations explaining the expansion of urbanized areas. They can be classified into four broad categories: 1) Jeffersonian Impulses 2) flight-from-blight 3) age of metropolitan area and 4) public choice theories. Each of the four categories is included to identify what if any effect they have on exurban migration and to control for differences among MSAs when testing for the effects of policies.

Jeffersonian Impulses are incorporated into the model using four interval variables: core county population, core county median household income, core county median housing value, and MSA distance. These variables represent factors that may provide impetus for individuals to move further away in search of a more Jeffersonian type lifestyle typical of the exurbs (Marx, 1964; Nelson and Dueker, p. 95, 1990). Distance is included because it has the ability to attenuate those impulses due to increased transportation costs associated with further distances.

Core county population and median household income is the median income of households within the core county are included as a number of studies identify individual preference for less dense living comes with increasing populations and incomes (Burgess, 1925; Gordon and Richardson, 1997, 1998; Nelson and Dueker, 1990). Core county median housing value is including due to two competing theories regarding housing cost effects on urban areas (Nelson and Dawkins, 2004; Razin and Rosentraub, 2000). First, higher housing values are considered a representation of demand. Thus, higher prices indicate individuals are more likely to stay in an area because they are preferable. Second, increasing land prices are also thought to increase the rate at which individuals leave urbanized areas. As land prices increase within core urban areas, individuals will search for lower prices at the fringes of those urban areas. Lastly, MSA distance measures the number of miles from the center of the core county to the center of the furthest exurban county.[9] Because individuals are influenced by overall transportation costs and as distance increases, so does transportation costs, it is expected that distance will attenuate the effects of these variables.

Flight-from-blight is incorporated into the model utilizing three interval variables: percentage of core county poor, violent crime rate, and percentage of county non-white. Each of these variables represents a form of real or perceived blight, which push residents further out in search of respite (Jackson, 1985; Massey and Denton, 1993). The first variable, percentage of core county poor, measures the percentage of core county residents who are impoverished[10]. The

[8] See section on urban containment plans in section 2.2 for an explanation of the differing types of statewide growth management plans.

[9] This measurement is made utilizing the ArcGIS software program.

[10] "Following the Office of Management and Budget's (OMB) Statistical Policy Directive 14, the Census Bureau uses a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty. The official poverty thresholds do not vary geographically, but they are updated for inflation using Consumer Price Index (CPI-U). The official poverty definition uses money income before taxes and does not include capital gains or noncash benefits (such as public housing, Medicaid, and food stamps)" (Census, 2008).

second variable, violent crime rate, measures the number of violent crimes per 100,000 persons within the principal city.[11] The third variable, percentage core county non-white, measures the percentage of core county residents who are classified as non-white[12].

Age of metropolitan area is included by measuring the percentage of housing stock built before 1939 (Razin and Rosentraub, 2000). Areas built before 1940 tend to be densely built and populated and less influenced by automobile dependent development. Therefore, these areas tend to exhibit a less sprawling nature. The variable directly measures the percentage of historic homes within an area, which has become an amenity.

The final orientation, public choice, is measured by an interval variable: tax burden. As discussed earlier, this variable represents public choice theory in a very narrow sense by accounting only for municipal revenue patterns. Higher tax rates have been shown to increase the number of individuals moving to other jurisdictions with lower rates (Wallace, 1996; Vedder, 2003; Rider, 2006). Tax burden is a summation of the core county and principal city's average tax burden. Tax burden is determined by calculating the dollar amount of the general revenue of own source from taxes divided by the population of the respective geographic unit (i.e. county or principal city). [13]

3.5 Empirical Model

This analysis utilizes ordinary least squares regression to explore the correlations between variables for the period 1984 to 2005. The empirical models are generally specified as follows depending upon the question:

Outward Exurban Migration[14] = f (Jeffersonian Impulses, Flight-from-blight, Age of the metropolitan area, Public choice theory, Urban containment plans, Territorial scale, Locational fixed effects)

---

[11] "Violent crime is composed of four offenses: murder and nonnegligent manslaughter, forcible rape, robbery, and aggravated assault. According to the Uniform Crime Reporting (UCR) Program's definition, violent crimes involve force or threat of force" (FBI, 2008). Moreover, violent crime rates are reported by policing agency. Core counties perceived and real safeness are generally thought of in terms of their respective principal cities safeness. Thus, it is believed the principal city violent crime rate is a better measure of violence with the core county.

[12] The US Census classifies persons based on race. All individuals who indicate a race other than white are included when calculating the percentage of core county residents who are non-white.

[13] "Taxes consist of compulsory contributions exacted by governments for public purposes" (Census, 2008). A summation of the principle city and the core county tax burden is utilized because county governments are typically not the primary taxing entity; instead, municipalities pose the greatest tax burden on residents. By itself, the core county average tax burden is an underestimation of the average tax burden for core county residents. However, for those areas where the core county and principal city are coterminous or the principal area is an independent city a summation is not required.

[14] Outward exurban migration is modeled as exemptions.

4. Results: Migration & Policy

4.1 Rates of Exurban Migration

Nationally, during the period of study, exurban migration averaged 3,476 people or approximately half of one percent of a core county's population per year. In absolute numbers, it ranges from nonexistent (multiple MSAs) to as much as 17,657 people in Houston, Texas during 2005. Put another way, as a percentage of core county population, it ranges from zero (multiple MSAs) to as much as 2.45 percent in Columbia, South Carolina during 1984. These numbers indicate that at a minimum exurban migration is not a serious demographic process for some areas, while for others having lost upwards of 2.5 percent of their populations it is significant.

Regionally, the numbers tell a broader story of exurban migration.[15] The Pacific region had the lowest average percentage of core county population loss to exurban counties per year, averaging only 0.07 percent loss. This region includes Alaska, California, Hawaii, Oregon and Washington. What is interesting about this result is Portland, Oregon is located in this region, and as was described earlier, contains the only popularly elected regional council with broad planning powers. Washington is one of only nine states to require more than one type of consistency for local growth management plans.[16] It is no surprise when one considers all of these characteristics specific to the Pacific region that it loses on average the lowest percentage of its core county population to exurban migration. The West, East South Central, and South Atlantic regions lost the highest percentage of their populations to exurban migration, losing on average .8, 1.0, and .6 percent of their population per year respectively. These three regions contain some of the most sprawled areas. In fact, in a report done by Ewing, Pendall, and Chen (2004) these regions contain eight of the top ten most sprawling metropolitan areas in the United States.[17] Considering these findings, we should expect these three regions to lose more of their populations to exurban migration. This finding supports the hypothesis that sprawl and exurbia are closely related.

---

[15] For the purposes of this study, the results are presented by census division and not regionally in the truest sense. Census divisions are a more salient grouping of states because they divide the four census regions into smaller groupings that are more similar in terms of geography. Throughout this study, the divisions will be referred to as regions. They are as follows: **New England**: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont**; Middle Atlantic**: New Jersey, New York, Pennsylvania; **East North Central**: Illinois, Indiana, Michigan, Ohio, Wisconsin; **West North Central**: Iowa, Kansa, Minnesota, Missouri, Nebraska, North Dakota, South Dakota; **South Atlantic**: Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia; **East South Central**: Alabama, Kentucky, Mississippi, Tennessee; **West South Central**: Arkansas, Louisiana, Oklahoma, Texas; **Mountain**: Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Wyoming; **Pacific**: Alaska, California, Hawaii, Oregon, Washington.

[16] See section 2.2 for a description of consistency requirements by state growth management programs.

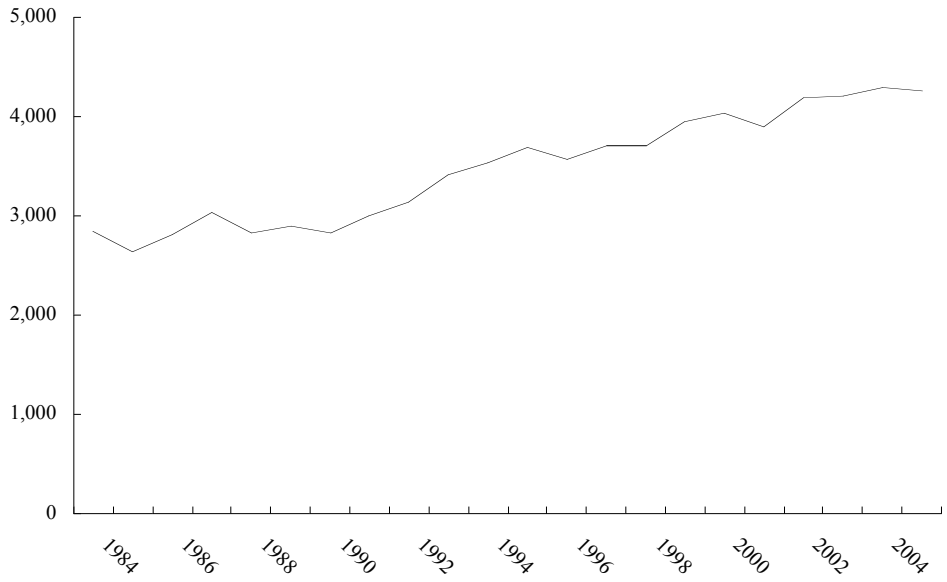
[17] See report for their methodology.

Table 3 Rates of Exurban Migration (National and Regional) 1984 - 2005

Geography		Outward Exurban migrants	% of Core County Population	Geography		Outward Exurban migrants	% of Core County Population
United States	Min.	0	0.00%	South Atlantic	Min.	0	0.00%
	Avg.	3476	0.50%		Avg.	2740	0.60%
	Max.	17657	2.45%		Max.	12326	2.45%
New England	Min.	0	0.00%	East South Central	Min.	2071	0.31%
	Avg.	1597	0.21%		Avg.	6277	1.06%
	Max.	4553	0.54%		Max.	11125	2.09%
Middle Atlantic	Min.	323	0.01%	West South Central	Min.	0	0.00%
	Avg.	1980	0.14%		Avg.	6581	0.80%
	Max.	10582	0.34%		Max.	17657	2.43%
East North Central	Min.	571	0.06%	Mountain	Min.	0	0.00%
	Avg.	3165	0.30%		Avg.	1353	0.20%
	Max.	10109	0.58%		Max.	3395	0.65%
West North Central	Min.	569	0.14%	Pacific	Min.	251	0.04%
	Avg.	3547	0.54%		Avg.	562	0.07%
	Max.	12847	1.15%		Max.	1015	0.21%

Source: IRS Statistics of Income Division, US Census Bureau

Figure 1 Average Outward Exurban Migration 1984 - 2005



The average national rate of outward exurban migration over the length of the study is traced in Figure 1. The national average appears relatively stable from 1984 until about 1992, after which it began to trend upward. Interestingly, this trend is somewhat expected when contextualized against Johnson & Beale's (1998) finding of an increase in non-metropolitan growth during the 1970s that subsided throughout the 1980s. However, beginning with the first half of the 1990s rural area growth rates once again exceeded that of metropolitan areas. The graph indicates exurban migration followed a similar trajectory. Likewise, the average percentage of core county population loss to exurbia produces an identical trend line.

Table 4 Net Migration (National & Regional) 1984 – 2005

Geography		Net Migrants	Geography		Net Migrants
United States	Min.	-7958	South Atlantic	Min.	-5174
	Avg.	-1353		Avg.	-892
	Max.	2333		Max.	214
New England	Min.	-1444	East South Central	Min.	-5734
	Avg.	-446		Avg.	-2423
	Max.	38		Max.	518
Middle Atlantic	Min.	-7731	West South Central	Min.	-7649
	Avg.	-1225		Avg.	-2350
	Max.	907		Max.	2333
East North Central	Min.	-6478	Mountain	Min.	-2272
	Avg.	-1474		Avg.	-523
	Max.	532		Max.	397
West North Central	Min.	-7958	Pacific	Min.	-692
	Avg.	-1539		Avg.	-214
	Max.	301		Max.	28

Source: IRS Statistics of Income Division

Outward exurban migration is just one part of the exurban migratory process. One must also look at net migration to realize more completely the implications of exurban migration. Net migration takes into account the number of individuals moving from exurban counties into core counties. Nationally, we see a deficit of as much as 8,000 people in Minneapolis, MN during 2002. These numbers indicate that for the core county of the Minneapolis, MN MSA in the year 2002 there were approximately 8,000 more outward exurban migrants than there were inward. Conversely, we see a surplus of 2,333 people in Baton Rouge, LA during 1984. Thus, for the core county in the Baton Rouge, LA MSA in 1984 they had 2,333 more inward exurban migrants than outward. On average, nationally, the MSAs examined lost approximately 1,353 more persons to exurban migration annually.

Regionally, the results tell a similar story as those of outward exurban migration. The Pacific region had the lowest average net migration with an average loss of 214 people per year. It

is believed the reasons for the Pacific region's low average net migration are similar to those reasons stated earlier regarding outward exurban migration. The East and West South Central regions had the highest average net migration with an average loss of 2,423 to 2,350 people per year respectively. Again, because these regions are considered the most sprawled it is not surprising they have the highest average loss per year. The regional results continue to indicate that exurban migration is a policy concern for some areas while not for others.

The next step in understanding what the rates of exurban migration are is to explore the dynamic conditions associated with outward exurban migration. In order to accomplish this task the results of bivariate correlations between outward exurban migration and the variables selected for inclusion as control and dynamic indicator (CDI) variables are presented. Furthermore, the results from a multivariate regression model utilizing the same variables are presented to understand the explanatory power of the traditionally accepted causal reasons for the expansion of urban areas. A brief discussion of the descriptive statistics for the CDI variables is presented first.

Table 5 Descriptive Statistics of CDI Variables (1990 & 2000; dollar values held constant)

Theoretical Orientation	Variable	Min.	Avg.	Max.
Jeffersonian Impulses	Core County Population	197,755	941,847	8,089,537
	Core County Median Household Income	$11,978	$27,447	$56,362
	Core County Median House Value	$30,794	$77,052	$202,352
	Avg. Distance from Core to Exurban Counties	21	39	150
Flight-from-blight	Pctg. Core County Poor	5.8	13.8	31.6
	Violent Crime Rate per 100,000	221	1358	4,085.0
	Pctg. Core County Non-white	1.5	30.7	71.9
Age of Metropolitan Area	Pctg. Core County Housing Stock built before 1939	0.1	17.4	56
Public Choice	Tax Burden	$203	$784	$4,819

Source: US Census Bureau, ArcGIS, Federal Bureau of Investigation

Table 5 provides the statistical dispersion of the CDI variables. These variables tell much about the MSAs included in the article. For instance, the average core county has a population of 941,847. However, core county populations range from as low as 197,755 to as high as 8,089,537 million. In constant dollars, the average median household income of core counties is $27,447 and the median house value is $77,052. The average core county has close to 14 percent of its population living in poverty and has a violent crime rate of 1,358 violent crimes per 100,000

people. Additionally, on average, core counties have a non-white population of almost 31 percent and approximately 17.4 percent of their housing stock was built before 1939. Lastly, the average core county has a per person tax burden of close to $800.

Table 6 Outward Exurban Migration Multivariate Regression Analysis (Log-Log)

Theoretical Orientation	Variable	1990	2000	Cumulative
		Coefficient (std. error)	Coefficient (std. error)	Coefficient (std. error)
Jeffersonian Impulses	Core County Population	.686** (.338)	.793*** (.228)	.761*** (.180)
	Med. Income	1.247n/s (2.811)	1.581 n/s (1.457)	1.416** (.609)
	Med. House Value	-.613n/s (.925)	-.721 n/s (.669)	-.532 n/s (.510)
	Avg. Distance	-1.686** (.746)	-1.259** (.460)	-1.414*** (.412)
Flight-from-blight	Pctg. Poor	-.213n/s (1.223)	.269 n/s (.901)	-.057 n/s (.497)
	Violent Crime Rate	.353 n/s (.350)	.242 n/s (.301)	.310 n/s (.212)
	Pctg. Non-white	.231 n/s (.463)	.079 n/s (.356)	.127 n/s (.278)
Age of Metro Area	Housing Stock	-.418** (.177)	-.374* (.194)	-.338** (.117)
Public Choice	Tax Burden	-.474 n/s (.524)	.080 n/s (.382)	-.249 n/s (.300)
	Constant	-.454n/s (26.688)	-9.476 n/s (13.116)	-6.384n/s (4.772)
	R2	0.59	0.71	0.60
	Adjusted R2	0.41	0.57	0.52
	Probability	0.001	0.000	0.000
	N	57	57	114

*Notes: *indicates significant at the 10 percent level; **indicates significant at the 5 percent level ***indicates significant at the 1 percent level; n/s indicates not significant*

The results of the three regression models utilized to identify the impact of each of the theoretical orientations are presented in Table 6. [18] The models examine the years 1990 and 2000 and a cumulative model encompassing both. The first model, 1990, accounts for approximately 41 percent of the variation in outward exurban migration. The 2000 model accounts for approximately 57 percent of the variation in outward exurban migration while the cumulative model accounts for 52 percent. This is surprising as research using similar models for explaining the expansion of urbanized areas reported much larger adjusted R^2's, many reporting as high as 90 percent (Carruthers, 2002; Wassmer, 2006). This indicates that the traditionally accepted orientations toward sprawl do not account for similar amounts in the variation of exurban migration. The results also indicate there are other factors that account for larger percentages of the variation in outward migration, some of which may be personal attitudes, which cannot be examined with aggregate level data.

Each model reports relatively similar results. Core county population was a significant predictor in every model. For instance, for every 10 percent increase in the population of a core county it can be expected exurban migration will increase by approximately 6.8 percent (1990), 7.9 percent (2000) and 7.6 percent (cumulative) respectively when holding all other variables constant. The average distance to exurban counties also remained significant in each model. On average, for every 10 percent increase in distance, it can be expected exurban migration will decrease by 16.8 percent, 12.5 percent, and 14.1 percent respectively when holding all other variables constant. The results relating to the percentage of housing stock built before 1939 are perhaps the more interesting of the significant relationships. For every 10 percent increase in the housing stock built before 1939 within core counties exurban migration decreases by 4.2 percent, 3.7 percent and 3.4 percent respectively. The variables measuring flight-from-blight were insignificant in all three models. The percentage poor, violent crime rate and the percentage of residents who were non-white all were insignificant predictors of exurban migration when controlling for other variables. The average tax burden of core counties also proved to be an insignificant predictor when controlling for the other variables.

The one major difference between models is the finding of significance for median household income. This suggests that within a larger context income is a significant predictor, which is expected. The cumulative model finds that a 10 percent increase in the median income of households within core counties yields an approximate increase in exurban migration of 14.2 percent. These findings suggest that financial considerations play a role in exurban migration. More specifically, it provides evidence that as the median household income of core counties increases, the number of exurban migrants increases.

Overall, the models provide some interesting findings regarding the conditions associated with exurban migration. As populations and incomes of core counties increase so too does exurban migration. Conversely, as the average distance to exurbia and the age of the

[18] Log-Log coefficients are percentage changes based upon a one percent increase in the independent variable. Each of the three models included eight of the nine census region dummy variables to account for locational fixed effects. The Pacific region was designated the reference region. There were between one and three regions with significant coefficients suggesting differences between them and the Pacific region. These results are not surprising as the descriptive statistics suggested regional differences existed. The cumulative model holds those variables with dollar values constant.

metropolitan area increase exurban migration decreases. Perhaps the most interesting finding is traditional indicators of blight are not significant predictors of exurban migration.

4.2 Urban Containment Policies

Table 7 MSAs with Urban Containment Policies

	Local UCPs			Statewide	
MSA	Year Enacted	Scale	Strategy	Year Enacted	Type(s)
Albuquerque-Bernalillo, NM	1987	Regional	Weak		
Austin-Travis, TX	1997	City	Strong		
Baltimore City, MD	1967	Regional	Weak	1992	I,V
Charleston-Charleston, SC	1995	County	Weak		
Charlotte-Mecklenburg, NC	1994	Regional	Weak		
Denver, CO	1997	County	Strong		
Jacksonville-Duval, FL	1992	City	Strong	1985	I,V,H
Knoxville-Knox, TN	1994	City	Strong		
Little Rock-Pulaski, AR	1988	City	Weak		
Madison-Dane, WI	1981	Regional	Weak		
Milwaukee, WI	1981	County	Weak		
Minneapolis-Hennepin, MN	1975	Regional	Weak		
Orlando-Orange, FL	1980	City	Strong	1985	I,V,H
Portland-Multonmah, OR	1980	Regional	Strong	1973	I,V,H
Providence, RI	1988	-	-	1988	I,V,H
Raleigh-Wake, NC	1986	City	Weak		
Seattle-King, WA	1992	Regional	Strong	1990	I,H
Tampa-Hillsborough, FL	1993	City	Strong	1985	I,V,H
Virginia Beach, VA	1979	City	Weak		
Wichita-Sedgwick, KS	1990	Regional	Weak		

Note: I= Internal consistency, V= Vertical consistency, and H= Horizontal consistency

Listed in Table 7 is a list of MSAs included in the study having a local or statewide growth management policy. Of the 57 MSAs, 19 had some form of local urban containment plan and seven had some form of statewide growth management plan. The following correlations and regressions test for the effects of both local and statewide plans on exurban migration. Local plans are tested both for the effects of the scale and strategy and for whether there is an interaction between the two. Statewide plans are tested for the effects of the three different types.

Table 8 Outward Exurban Migration Multivariate Regression Analysis (Log)[19]

UCP Policy & Theoretical Orientation	Variable	1984-2005	1990 & 2000
		Coefficient (std. error)	Coefficient (std. error)
Local Policies	Urban Containment Strategy	.582*** (.159)	-.032n/s (.399)
	Urban Containment Scale	.287** (.112)	.079n/s (.269)
	Urban Containment Type & Scale Interaction	-0.408** (0.129)	.070n/s (.312)
Statewide Policies	Internal Consistency	-1.800** (0.583)	-1.042n/s (1.200)
	Vertical Consistency	.538n/s (.431)	-.632n/s (.874)
	Horizontal Consistency	1.205*** (.308)	.995n/s (.772)
Jeffersonian Impulses	Core County Population	-	.937*** (.159)
	Med. Income	-	2.441*** (.570)
	Med. House Value	-	-1.650*** (.490)
	Avg. Distance	-	-1.929*** (.379)
Flight-from-blight	Pctg. Poor	-	.630n/s (.485)
	Violent Crime Rate	-	.489** (.218)
	Pctg. Non-white	-	.025n/s (.272)
Age of Metro Area	Housing Stock	-	-.388*** (.108)
Public Choice	Tax Burden	-	-.139n/s (.274)
	Constant	7.5980***	-7.703

[19] Locational fixed effects were again included in both models with the Pacific region serving as reference. Once again, the West & East South Central regions were significant.

	(.043)	(4.606)
R2	0.062	0.54
Adjusted R2	0.057	0.47
Probability	0.000	
N	1257	114

*Notes: *indicates significant at the 10 percent level; **indicates significant at the 5 percent level; ***indicates significant at the 1 percent level; n/s indicates not significant*

The models presented in Table 8 test the effects of urban containment policies on outward exurban migration. The first model tests for the effects without any controls, while the second model includes control variables. The first model examines the entire period of the study, as data regarding exurban migration and urban containment policies are available. All three variables testing for the effects of local policies are significant. The results of the strategy and scale were both positive, which was not expected. According to the model, as the strategy strengthens (none, weak, strong) outward exurban migration is increased by close to 60 percent. This finding suggests that as the urban containment policy increases its open space preservation outside specified boundaries it may in fact be pushing development further out. This could easily be the case where stronger open space preservation is enacted at lower scales such as city or county. Exurban development and migration is typically a regional process. Thus, an urban containment policy enacted at the city or county regional level can only preserve open space within their jurisdiction. In those instances, they may be pushing development out further into other jurisdictions, which would explain these results. The model also shows as the scale of the policy increases outward migration does as well by 29 percent. This supports the suggestion that containment plans may be pushing development out further.

However, the interaction between the two is the most interesting finding. The results indicate that as strategy strengthens and scale of enactment increases, outward exurban migration decreases by 40 percent. For instance, policies with strong open space protection enacted at the regional level are more effective in reducing outward exurban migration. Conversely as strategy weakens and scale decreases so too does the effectiveness of the urban containment plan. These findings indicate the importance of the interaction between strategy and scale of the local urban containment plan. It also points to a relative ineffectiveness of a strong strategy at lower levels.

Of the statewide policies, only internal and horizontal consistencies were significant. States requiring land use decisions of cities and counties to follow their own comprehensive land-use plans (internal consistency) experience a 180 percent decrease in outward exurban migration. Comprehensive plans are a set of approved areas where future growth and infrastructure will occur. Thus, it appears, states requiring local land use decisions to conform to comprehensive plans are more effective in reducing outward exurban migration.

Conversely, states requiring cooperation and consistency in land-use planning between adjacent cities, and cities and the unincorporated portions of a county (horizontal consistency) appear to increase outward exurban migration by approximately 120 percent. Horizontal consistencies require intra-county cooperation and not inter-county cooperation. Therefore, localities required to cooperate may do so to push unwanted development further out to a

neighboring county. Perhaps the weakness in horizontal consistency is that it fails to require cooperation between counties and not only within.

The effects of the urban containment policies become insignificant in the second model when controlling for differences among the MSAs. In building the model urban containment policies remained significant with every control variable except with the addition of median household income of the core county. This indicates as the median income increases within the core county the effects of the urban containment policies disappear. Urban containment policies restrict development to a certain geographic limit; however, they only have a finite area in which to restrict. Thus, it appears rising incomes allow exurban migrants to incur increased transportation costs associated with living further out and in particular beyond the boundaries of urban containment plans.

5. POLICY RECOMMENDATIONS

First, and foremost, there is a direct need for regional cooperation in terms of development. The results indicate that urban containment policies with strong open space preservation outside their boundaries enacted at the regional level are the most effective in reducing exurban migration. Therefore, regions should seek to enact urban containment policies with strong strategies in addition to their local plans. Attempts at controlled growth will also need to be done at the local level. As a result, it is important to view this as an overarching policy recommendation and not one meant to supplant local efforts.

Similarly, states should require comprehensive land use plans for their localities and that land used decisions conform to them. Horizontal consistency appears to be effective in reducing exurban migration. Perhaps more importantly, these requirements force sustainable development onto the agenda of localities. Public policy initiatives often fail to achieve a place on the agenda. In this way, the agenda is set by the state. Additionally, it is recommended that states and localities analyze the effectiveness of their current growth management policies. This research found certain containment policies to be associated with higher levels of outward exurban migration. Indeed, the outcomes of such examinations may find their policies to be effective in other areas of growth containment and not so for others (i.e. exurban growth).

Relative to each of the policy findings, the results can only be applied to exurban migration, not necessarily to other forms of urban development, sprawl, and outward migration. It can only be assumed based on these findings and previous studies, however, that if these policies are effective in this narrow sense there is a greater probability the effectiveness persists in a broader context.

6. EXURBAN DYNAMICS: A CONCLUSION

Exurban migration is a process that is uneven across the nation's geography. At the national level, core counties lost approximately a one-half percent of their populations to exurbia annually in the MSAs examined. This amount seems relatively small, but cumulatively this number represents much more. Over a ten-year period, core counties lost five percent of their populations assuming rates remained stable. These numbers represent a loss in a variety of taxing opportunities, with taxes on income being the more direct one.

The trajectory of the national average of outward exurban migration provides evidence that over time exurban migration has vacillated with larger economic conditions. Johnson & Beale (1998) found the exodus of individuals from metropolitan to non-metropolitan areas was connected to the national economy. They found that after the severe economic disruptions of the 1980s non-metropolitan growth once again exceeded that of metropolitan areas. Exurban migration has followed a similar trajectory. After the late 80s, exurban migration slowly progressed upward and leveled out during the latter part of the study, which reflects a similar trend of the national economy. These findings indicate that overall exurban migration is impacted by financial considerations.

Overall, the results support the theory behind Jeffersonian Impulses. As core county populations and incomes increased so too did the amount of people leaving for exurbia. The data used to arrive at these findings are aggregate in nature and thus provide no indication of individual level preferences. However, on a more speculative level, it appears that core county population increases motivate individuals to leave for exurbia in a search for less dense Jeffersonian living. Similarly, incomes would allow this move as the financial costs associated with living further away are found in the longer commutes associated with exurbia.

The suggestion that exurban development is tied to economic considerations is supported by the results of the distance variable. The impulses were in fact attenuated by distance and the decreases were quite remarkable. For instance, for every ten percent increase in the distance between core and exurban counties we can expect exurban migration to decrease by close to 15 percent. The findings of distance provided early evidence that urban containment strategies would work. If distance reduced exurban migration, then urban containment strategies would increase the distance between exurban development and core areas and thus reduce exurban migration.

Median housing value was the only variable in the Jeffersonian Impulse category to exhibit nonsignifcance in each statistical model. Theoretically, the expectation was as housing values increase, the number of exurban migrants would increase because of lower value housing at the periphery. However, this proved not to be the case. Instead, the results support the notion that housing value represents more than the dollar value of homes. Instead, housing value appears to encompass a component of attractiveness and desirability of a home's location. The coefficients of median housing value were negative, albeit insignificant. Nevertheless, other studies have pointed to insignificant coefficient signs as partial evidence (Nelson and Foster, 1999). Based on these negative coefficients, it may be the case that housing prices do not necessarily increase the rates of outward migration from high housing value areas.

Flight-from-blight measured both real and perceived indicators of blight within core counties. It was assumed that core counties experiencing increased levels of blight would similarly have higher levels of exurban migration. The results, however, do not provide any support for these postulations. There are a number of speculative reasons for these findings, some of which include changing attitudes regarding traditional indicators of blight. These findings begin to question whether exurban migration may be different from suburbanization and other forms of sprawl. The literature reflects blight factors as motivators for short distance moves from central cities to suburbia. A move to exurbia is more evasive and further, however. Instead, it appears as if exurban migration is driven by other factors not captured by sprawl and suburbanization's traditional orientations. In fact, the statistical models barely account for half the variation in

exurban migration. This indicates that over half the variation is accounted by other reasons not captured by the models.

Age of the metropolis was the third category assumed to influence exurban migration. The influences are connected to whether or not an area was planned during the advent and presence of en masse use of the private automobile. For that reason, areas built before 1939 are believed to be denser and less sprawled. The results do indicate that on average older areas experience lower levels of exurban migration. There exist a great number of possibilities for this finding. However, only a few of the more salient reasons are worth mentioning. First, generally pre-war planning viewed downtowns as centers of social interaction for residents. Thus, the variable may indirectly be measuring the presence of a viable downtown. Second, the counter argument is the oldest MSAs are in the heavily built up and dense Northeastern corridor and thus will exhibit less exurban migration overall. Either argument is equally plausible and any conclusion can be easily faulted on a number of levels.

The article also applied a narrow definition of public choice theory on exurban migration. In particular, the aim was to measure the effect of municipal tax burden on outward exurban migration. The results show that core county outward exurban migration is not affected by municipal tax burden. This finding counters others that have found increased levels of outward migration based upon higher tax rates. These results may support Tiebout's larger hypothesis that is sometimes missed by looking narrowly at tax rates alone. Tiebout postulated that individuals went beyond nominal tax rates and looked for the value they received for those taxes. His postulation stated that individuals look for localities best matching their revenue (taxes) and expenditure (service) patterns. Thus, while areas may indeed have higher tax rates, if individuals find value from those monies they do not find fault with those rates. The article's findings appear to support the larger theory.

Collectively the results indicate that exurban migration and development are closely related to sprawl. However, the traditional theoretical orientations used to explain sprawl do not completely hold here. Generally, the findings indicate that exurban development is tied to larger financial conditions. This is supported by the finding of the restrictive effect of distance and the trajectory of exurban migration over the period of study. Empirically, the results indicate that exurban migration is mostly affected by variables included in the Jeffersonian Impulses category. Based on these findings, exurban migration appears to be driven by conditions that push individuals "toward a landscape dominated by neither hinterland activities nor urban development, but rather by a gentrified 'middle landscape'" (Marx, 1964; Nelson and Dueker, 1990, p. 95). This new postulation will need to be tested further by studies examining individual-level movements.

The results show the current public policy responses to urban growth are varied in their effectiveness in relation to exurban migration. Moreover, they appear to be negated by income, which is a new development within the containment literature. Strategy was found to increase the amount of exurban migration as it strengthened. In other words, as the strategy went from none to weak to strong exurban migration increased by 50 percent. This is contrary to the findings suggested by the literature. The reasons for these increases are easily explained by the nature of exurban migration. Because exurban migration is a larger regional process, as the containment strategy strengthens its open space preservation outside specified boundaries it pushes development out further. In addition, because containment strategies can only restrict

growth within their jurisdiction they are in fact pushing development either within the boundary or to other localities outside their jurisdictions.

The findings that exurban migration increases under certain plans are further supported by scale. Exurban migration increases by roughly 30 percent as the scale of the plan increases. In other words, as the scale of the containment plan increases it can push development even further out, especially in the case of county and regional plans. When the interaction between scale and strategy is considered, however, exurban migration decreases by 40 percent when holding strategy and scale at zero. In other words, as the policy strengthens in strategy and increases in scale the more effective it is in reducing exurban migration. Thus a policy enacted at the regional level with strong open space preservation outside its boundaries is more effective in reducing exurban migration than a similar policy at a lower level i.e. city or county.

Statewide policies tell a similar story of mixed effectiveness. Internal and horizontal consistency requirements were the only two types of plans to exhibit significant effects on outward exurban migration. States requiring jurisdictions to conform their land use decisions to local comprehensive land use plans (internal consistency) experience a 180 percent decrease in the number of outward exurban migrants. This finding is particularly helpful when it comes to making policy recommendations. The implication is that states requiring localities to develop comprehensive plans and require those same localities to make all development decisions follow the plan's directives experience less exurban migration. Based on this finding, two suppositions are worth noting. The first is that states requiring local comprehensive land use plans encourage a culture of growth management within their respective localities. The second supposition is there may be value in requiring localities to develop comprehensive land use plans. In effect, internal consistency also requires the development of a comprehensive land use plan before decisions can be made. This plan may have some positive unintended effects. For instance, by requiring a comprehensive plan it allows localities the opportunity to review their current efforts and to plan and project how they would like development to occur. Either by requirement or choice, the simple act of reviewing one's development can be productive. If states go even further by mandating the standards and level of detail needed for these comprehensive plans the outcome may be even higher levels of sustainable development.

Horizontal consistency is the requirement that land use planning occur between neighboring cities, and cities and the unincorporated portions of a county (Wassmer, 2006, p. 32). This form of statewide growth management policy was found to be associated with a 120 percent increase in the number of outward exurban migrants. This appears to confirm the earlier findings of the increase in scale being associated with increased levels of outward exurban migration. Localities within a county that engage with one another in land use planning are in effect creating a larger policy web via cooperation. This web acts as a county level policy vis-à-vis this statewide requirement.

Each of type of policies was negated by median household income, however. This is an interesting theoretical development. Previous research has found urban containment policies to be still effective in spite of income. Thus, it appears rising incomes allow exurban migrants to incur increased transportation costs associated with living beyond the boundaries of urban containment plans. This finding contributes to the overall conclusion that exurban migration is tied to financial considerations. It is important to note that while the effects disappear the policy effects are nonetheless real.

7. References

Anthony, J. (2004). Do state growth management regulations reduce sprawl? *Urban Affairs Review, 39*(3), 376-397.

Bengston, D., Fletcher, J., & Nelson, K. (2003). Public policies for managing urban growth and protecting open space: Policy instruments and lessons learned in the united states. *Landscape and Urban Planning, 6*(2), 271-286.

Berube, A., Singer, A., Willson, J., & Frey, W. (2006). *Finding exurbia: America's fastest growing communities at the metropolitan fringe*. Washington, DC: The Brookings Institution.

Blackwood, L., & Carpenter, E. (1978). The importance of antiurbanism in determining residential preferences and migration patterns. *Rural Sociology, 43*(1), 31-47.

Blumenfeld, H. (1986). Metropolis extended. *Journal of the American Planning Association, 52*(3), 346-348.

Brower, D., Godschalk, D., & Porter, D. (1989). *Understanding growth management: Critical issues and a research agenda*. Washington, DC: Urban Land Institute.

Burgess, E. (1925). The growth of the city: An introduction to a research project. In R. T. LeGates & F. Stout (Eds.), *The city reader* (3rd ed.). London: Routledge.

Carruthers, J. (2002). The impact of state growth management programmes: A comparative analysis. *Urban Studies, 39*(11), 1959-1982.

Carruthers, J. (2003). Growth at the fringe: The influence of political fragmentation in united states metropolitan areas. *Papers in Regional Science, 82*(4), 475-499.

Clark, J., Munroe, D., & Irwin, E. (2006). *Exurban settlement pattern and the exurban condition: A typology of us metropolitan areas*. Paper presented at the 53rd Annual North American Meetings of the Regional Science Association.

Dawkins, C., & Nelson, A. (2003). State growth management programs and central-city revitalization. *Journal of the American Planning Association, 69*(4), 381-396.

Ding, C., Knaap, G., & Hopkins, L. (1999). Managing urban growth with urban growth boundaries: A theoretical analysis. *Journal of Urban Economics, 46*(1), 53-68.

Downs, A. (2004). *Growth management and affordable housing : Do they conflict?* Washington, D.C.: Brookings Institution Press.

Dreier, P., Mollenkopf, J., & Swanstrom, T. (2004). *Place matters : Metropolitics for the twenty-first century* (2nd ed.). Lawrence, Kan.: University Press of Kansas.

Easley, V. (1992). *Staying inside the lines: Urban growth boundaries*. Chicago, IL: American Planning Association.

Elazar, D. (1987). *Building cities in America: Urbanization & suburbanization in a frontier society*. Lanham, MD: Hamilton Press.

Frey, W. (1987). Migration and depopulation of the metropolis: Regional restructuring or rural renaissance? *American Sociological Review, 52*(2), 589-608.

Gordon, P., & Richardson, H. (1997). Are compact cities a desirable planning goal? *Journal of the American Planning Association, 63*(1), 95-106.

Gordon, P., & Richardson, H. (1998). Prove it. *Brookings Review, 16*.

Greenwood, M. (1988). Changing patterns of migration and regional economic growth in the us: A demographic perspective. *Growth and Change, 19*(4), 68-87.

Gross, E. (2005). *Internal revenue service area-to-area migration data: Strengths, limitations, and current trends*. Paper presented at the American Statistical Association.

Howell-Moroney, M. (2008). A mixed method look at state growth management policy. *The American Review of Public Administration, 38*(3), 339-361.

Jackson, K. (1985). *Crabgrass frontier*. Oxford: Oxford University Press.

Johnson, K., & Beale, C. (1998). The rural rebound. *Wilson Quarterly, 22*(2).

Lamb, R. (1983). The extent and form of exurban sprawl. *Growth and Change, 14*(1), 40-47.

Lang, R., & Dhavale, D. (2005). *America's megapolitan areas*: Lincoln Land Institute.

Lang, R., & Sanchez, T. (2006). *The new metro politics: Interpreting recent presidential elections using a county-based typology*. Alexandria, VA: Metropolitan Institute at Virginia Tech.

Massey, D., & Denton, N. (1993). *American apartheid*. Cambridge, MA: Harvard University Press.

Mieszkowski, P., & Mills, E. (1993). The causes of metropolitan suburbanization. *The Journal of Economic Perspectives, 7*(3), 135-147.

Morril, R. (1992). Population redistribution within metropolitan regions in the 1980s: Core, satellite, and exurban growth. *Growth and Change, 23*(3), 277-302.

Nelson, A. (1990). Regional patterns of exurban industrialization. *Economic Development Quarterly, 4*(4), 320-333.

Nelson, A. (1992). Characterizing exurbia. *Journal of Planning Literature, 6*(4), 350-368.

Nelson, A., & Dawkins, C. (2004). *Urban containment in the United States: History, models, and techniques for regional and metropolitan growth management*. Chicago: American Planning Association.

Nelson, A., & Dueker, K. (1990). The exurbanization of America and its planning implications. *Journal of Planning Education and Research, 9*(2), 91-100.

Nelson, A., & Sanchez, T. (1999). Debunking the exurban myth: A comparison of suburban households. *Housing Policy Debate, 10*(3), 689-709.

Patel, D. (1980). *Exurbs: Urban residential developments in the countryside*. Washington, DC: University Press of America.

Pendall, R., Martin, J., & Fulton, W. (2002). *Holding the line: Urban containment in the united states*. Washington, DC: The Brookings Institution Center on Urban and Metropolitan Policy.

Porter, D. R. (2008). *Managing growth in America's communities*. Washington, D.C.: Island Press.

Razin, E., & Rosentraub, M. (2000). Are fragmentation and sprawl interlinked? North American evidence. *Urban Affairs Review, 35*(6), 821-836.

Rider, M. (2006). *The effect of personal income tax rates on individual and business decisions - a review of the evidence* (No. 06-15). Atlanta: Georgia State University: Andrew Young School of Policy Studies.

Rothenberg Pack, J. (1998). Metropolitan areas, regional differences. *The Brookings Review, 16*(3), 26-31.

Sailer, P., & Weber, M. (2000). *The IRS population count: An update.*

Spectorsky, A. (1955). *The exurbanites*. Philadelphia: Lippincott.

Theobald, D. (2001). Land-Use Dynamics Beyond The American Urban Fringe. *Geographical Review, 91*(3), 544-564.

Theobald, D. (2004). Placing exurban land use change in a human modification framework. *Frontiers in Ecology and Environment, 2*(3), 139-144.

Theobald, D. (2005). Landscape patterns of exurban growth in the USA from 1980 to 2020. *Ecology & Society, 10*(1), 32.

Tiebout, C. (1956). A pure theory of local expenditures. *Journal of Political Economy, 64*(5), 416-424.

Vedder, R. (2003). *Taxation and migration*. Cedarburg, WI: The Taxpayers Network.

Wallace, S. (1996). The effects of state personal income tax differentials on wages. *Regional science and urban economics, 46*(1), 25-65.

Wassmer, R. (2006). The influence of local urban containment policies and statewide growth management on the size of the United States urban areas. *Journal of Regional Science, 46*(1), 25-65.

Weitz, J. (1999). From quiet revolution to smart growth: State growth management programs, 1960 to 1999. *Journal of Planning Literature, 14*(2), 266-337.

Weitz, J., & Moore, T. (1998). Development inside urban growth boundaries: Oregon's empirical evidence of contiguous urban form. *Journal of the American Planning Association, 64*(4), 424-440.

Zovanyi, G. (1998). *Growth management for a sustainable future: Ecological sustainability as the new growth management focus for the 21st century*. Westport, CT: Praeger.