

TARGET Competition:

How local government competition
for retail sales can lead to sprawl

A statistical analysis

by

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April 25, 2002

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Executive Summary.

Within the last ten years, experts throughout California have raised concerns about what they call the “fiscalization of land use.” As a result of the passage of Proposition 13 in 1978, urban and environmental policy experts in California are concerned that land use decisions at the local level have been skewed towards retail as a result of the competition for retail sales and sales tax revenues between cities. As an example of an externality, it seems likely that this “fiscalization of land use” may be perpetuating urban sprawl. In this paper, I have attempted to explain population growth as a function of a city’s expenditures and revenues and the average expenditures or revenues of their neighbors.

Despite the fact my regressions were not successful in modeling the complex relationships between communities and retail establishments like Wal-Mart, Home Depot and Target, anecdotal evidence and studies performed by the Public Policy Institute of California suggests that community planners in California do favor retail development over all other types. In order to continue to deal with the problem of urban sprawl in California, it seems safe to assume policy needs to be created in order to account for the “free-rider” phenomenon between cities and their neighbors’ retail development decisions, and thus decrease the amount of potential competition between communities for retail uses. For example, California Assembly Bill 680 (AB 680), passed in February 2002, is one example of an attempt to create a system in which cities share future sales tax revenue so the incentive to develop retail over residential or light industrial uses will be less strong in the future.

While the first-difference model I used has not helped me to explain the effect of retail sales and sales tax revenue on population growth for cities or their neighbors, it has indicated average neighborhood highway expenditures have a positive and significant effect on a city's population growth. This supports the hypothesis that decreased commuting costs will perpetuate suburbanization, but also adds to economic literature the effect of neighbors' spending behavior has on population growth in the region. To make my model more sophisticated, I would include all cities in California, as opposed to including only those cities which had populations greater than 25,000 in 1980. After analyzing the data, it seems likely that many of the people who are moving to the suburbs and fringe areas in California are moving to those jurisdictions that are much smaller than those included in this original study. Furthermore, I would try to deal with the neighborhood effect in a more sophisticated manner: perhaps, with the use of additional or alternative geographical models and by ensuring that neighborhood designations were appropriate given their topographical locations. For further changes, please see Chapter 5.

Despite the lack of significant estimators of the neighborhood effect, I believe that my model and anecdotal evidence does suggest that it does exist. I believe future, more sophisticated analyses will find that competition between jurisdictions for sales tax revenue, causing the "fiscalization of land use," does perpetuate urban sprawl at the city level. It is thus apparent to me that this issue is an interesting one, and one worth spending additional time and resources studying.

Chapter 1: Introduction and History

California has experienced intense population growth since the first gold rush of the 1850s. Since then, the weather, abundance of land, appearance of unlimited opportunities have induced millions of people to abandon their roots in the East to start anew in the Western frontier. Since World War II, California's lure became the promise of a single-family detached home for every middle class family. Especially in Los Angeles in the 1940s and 1950s, land speculators created suburban tract development after suburban tract development, in a seemingly haphazard fashion across the varied topography of the region because the land was available and cheap and they could



Picture courtesy of Catherine Opie

become rich from exploiting it. Granted, the demand for these homes was not imagined: these land speculators supplied

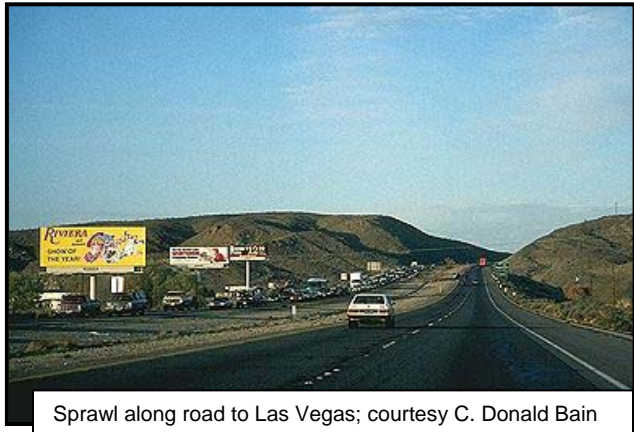
the single-family homes to people who couldn't afford them in the built-out suburbs of the East. However, in the process, California has had its precious natural resources become more and more scarce, as its booming population ever expands its concrete version of Paradise.

California's history of land development has not been typical of traditional urban growth: from a central transportation node outwards concentrically. Californian's intense independent streak and passion for the private automobile has encouraged a unique, if leapfrog and seemingly unplanned, suburban development. Furthermore, the

proliferation of fragmented local governments and unique political environment has created a complex fiscal structure that makes the relationship between it and local government planning decisions an interesting case study of suburban development.

1.1 City Living and Regional Responsibility: Planning in California

A sense of “regional responsibility” is essential when both planning for future land use and especially while making the daily development decisions that affect the long-term regional character of our cities. Population growth is inevitable, and 40% of today’s US population live within cities, and that trend will most likely continue throughout this century as urban fringes expand across the landscape. These land use and planning decisions affect the economic environment of the region and the city’s fiscal reality. One city’s development of a new Wal-Mart will affect their neighbors



Sprawl along road to Las Vegas; courtesy C. Donald Bain

subsequent traffic management and land use decisions, and vice versa.

Connecting local concerns to regional, and even global planning, is not only popular way of attempting to create environmental protection, but essential for

a community that desires to attempt to control the direction and composition of their future growth.

For example, one way the interconnectedness of regional local governments has been expressed in the last 20 years is in the intense development pressures on Californian communities. Throughout California, local governments have swung on a pendulum between courting real estate developers to increase retail sales in their

jurisdictions and instituting planning policies that made growth nearly impossible economically. In their attempt to preserve both a sense of community and rapidly depleting open space, some communities have been particularly active in instigating growth controls and other developmental regulations at the local level. However, most growth controls are directed towards residential developments. These growth controls coupled with continued population growth in sunny California has created inflated

Oxnard, CA attempts to lure motorists off the freeway to an outlet mall along the 101 freeway



property values in many local communities in and around the major Southern California metropolitan areas: San Diego, Los Angeles, Orange County, Santa Barbara; and also in San Francisco and Silicon Valley in Northern California; thus driving people to unincorporated fringe towns.

1.2 Municipal Governance in California

Most cities in California are governed by a city council, elected representatives of the community, or a mayor. Usually, the system each city chooses depends on its charter, and usually on how large the community is. Cities then appoint or elect a planning commission, and they are responsible for working with potential developers. These planning commissions oversee the permitting process, some sort of environmental impact analysis, if so required by the city charter. Their purpose is to

ensure the development that occurs within that community's borders is commensurate with the desired local and regional character. The comprehensive plan is supposed to be the backbone of the community's growth over the years as it outlines basic policy for all issues concerning the community and its governance. Cities try to define exactly what they want development to look like or act like within their comprehensive plan and implement that plan through their zoning and subdivision regulations. Comprehensive plans also deal with housing, natural resource protection, traffic circulation, police and fire protection, waste management, etc. While in California, these plans are considered legislative, that is, they have the same power as law, it is for that very reason the language with which they are written tends to be very vague. How successful communities are in accomplishing their community growth plans is a function of the complex bureaucratic relationships between local government players.

This system of municipal governance creates several main "characters" whose actions significantly affect the kind of development and sense of community character that cities achieve over time: mayor/city council, city planner or planning commission, city bureaucrats that deal with the day to day workings of the city, with the developers themselves. While all these characters have power to affect the kind of development or policy accepted in the community, they are all constrained by one another in a familiar checks and balances system. City bureaucrats and developers must exist within the rules established by city ordinances or comprehensive plans, and they are held accountable in public meetings mandated by comprehensive plans. Furthermore, while the city planner or planning commission is in charge of dealing with developers with their specific projects, accepting or rejecting proposals, mediating changes, their

ultimate weapon is only a recommendation. The city council or mayor is the only one who has the power to vote on that recommendation. While truly, this system of governance changes between individual communities, this is the general, yet complicated, system within which development plans are selected and rejected based on an infinite, unquantifiable and extremely complicated set of expectations, requirements, and decisions.

1.3 California's post-1970s Political Climate: Use of the Initiative.

In response to the highly partisan political conflicts that characterized life in the California State Assembly in the late 1970s, Californians began to use the initiative and referendum as a way to institute state and local policy. According to Peter Schrag, "...because of gridlock, special interest influence sometimes bordering on outright corruption, and extreme in-your-face partisanship and ideology...normal legislative government does not work. Only the initiative works" (189). Depending on your perspective, the passage of Proposition 13 was caused by, or marked the beginning of, a new civic paradigm that would rule the institution of public policy in California in the next 30 years. Passing and blocking such initiatives has become a huge business in California since the late 1970s: it supports thousands of consultants and political advisors, whose specialties include how to run an effective direct-mail campaign, for example.

1.4 Circumstances Leading to the Passage of Proposition 13

In addition to the political climate of the 1970s that heralded the initiative's heyday, one important political personality and three important circumstances led to the passage of Proposition 13 in 1978. Howard Jarvis, long known as both tenacious and

pugnacious, in some ways changed California history in 1977 he collaborated with Paul Gann, a former Sacramento realtor, to write an initiative that would curb property taxes, which he called, “felony grand theft”. He had been working on the issue since 1972, but it wasn’t until he teamed up with Gann that he was able to achieve success in the elections of 1978. However, Jarvis’ success should be seen as the culmination of several trends that created the political climate of which he was able to take advantage.



Coast of California

For one, the environmental lobby was stronger than ever in the 1970s, thanks to the hippies and other activist movements of the era. This new concern for the preservation of natural resources spawned a slow-growth movement in Southern California that caused property values to skyrocket throughout this region, despite efforts by the state legislature to curb the inflation of property values. In addition, California was also undergoing a population spurt during this time period. Both of these trends would culminate in the 1980s in an unprecedented real estate boom. This meant that in the 1970s, the property values of residential properties were grossly inflated, which meant as a homeowner you were worth more on paper, however your property tax payments also rose significantly over a few years time.

Furthermore, in 1977-1978 the state of California was enjoying a fiscal surplus that would eventually exceed \$5 billion. As homeowners had to pay higher and higher property tax payments as a result of the rising values of their homes, they began to wonder who was benefiting from these increased payments. The state would later use

this fiscal surplus to bail out many of the communities who would default on their loans as a result of the severe constriction of revenue caused by Prop 13. However, at the time, it seemed unfair to continue to pay taxes to a state that had no apparent need for the extra cash.

The final straw was perhaps the passage of Assembly Bill 65 (AB 65), which passed in 1977 in response to two major state Supreme Court cases on education spending. William A. Fischel (2002) claims it was this ruling that instigated Proposition 13's overwhelming approval in 1978. Both decisions, *Serrano I* (1971) and *Serrano II* (1976) (both listed as *Serrano v. Priest*) found, "California's property-tax based school financing system [is] an unconstitutional violation of equal protection principles" (Schrag 148) and instructed the legislature to change it. Assembly bill 85 (AB 65) equalized school expenditures between cities over a period of several years.

Before this court decision, property taxes were seen as a necessary evil: if you paid relatively higher property tax payments it meant your local public schools were better funded. In effect, *Serrano I* and *Serrano II* completely divorced property taxes from expenditures on education. So, the median voters in California (the rich, white folks that were paying the higher property taxes in the first place) responded by refusing to continue to pay property taxes at the levels they once were comfortable with. After all, if the public education system depreciates (which it would in the next 30 years), they could afford to send their children to private schools.

1.5 Proposition 13

Proposition 13 capped property taxes 1% of the total appraised value of a residential property at a time when most property taxes throughout the state were close

to 2%. It also restricted yearly property assessment increases to 2% of the full value unless except in the case of sale. Furthermore, the amendment rolled back property value assessments to their 1975 levels, thus significantly reducing the total appraised value of many residential properties whose values had been inflating over the last few years. This halved local government revenues from property taxes.

The formula devised in Assembly Bill 8 (AB 8) allocates property tax revenues among the various local government entities that serve each property, including the city, county, school and special districts, and agreed that the state would determine the split.

1.6 Sources of Municipal Revenue

The major sources of revenue for local governments are property and sales taxes, intergovernmental grants coming primarily from the state government, and fees from locally provided services. In California, the extent to which local government revenues were tied to local property values decreased significantly with the institution of Proposition 13. Since then, communities have turned to sales tax as their primary source of revenue.




Furthermore, since the 1970s, Californians have used the initiative process to additionally restrict their local governments revenues and expenditures. For example, in 1979, Californian voters approved Proposition 4, which limited the growth of state and local spending; yet in 1988 Proposition 98 set minimum spending levels on K-14 public education (Shires 1999). However, when adjusted for inflation, overall public revenues are at 85% of what they were before Proposition 13 passed in 1978 (Shires 1999). Shires (1999) concluded in his study, "Patterns in California Government Revenues

since Proposition 13,” that restrictions on both revenue sources and expenditures have significantly decreased local governments ability to control revenues and respond to local preferences for amenities.

1.7 Uniform Local Sales Tax

In 1955, California’s legislature passes the Bradley-Burns Sales and Use Tax that created a uniform local government sales tax at 1% of the total sale (county and state sales taxes raise this total percentage). The total sales taxes per sale are collected in a lump sum by the state, and then the 1-cent per dollar of revenue is redistributed to the city *in which the sale took place*, which is referred to as “*in situ*”. Californians pay approximately 4% of their personal income in the form of state and local sales taxes, with the state claiming three-fourths of that (Lewis 1999, 3) to fund education and other state funded services. The average total sales tax varies slightly among cities in California from 7.25 to 8% of the total sale; however the local government in which the sale occurs will only see a small percentage of this amount. While this is in fact true, it has been argued that local government operators do favor retail development over residential or industrial development because of their financial incentives.

1.8 Post-Proposition 13

 After the passage of Proposition 13 in 1978, local governments begin to raise funds in other creative manners, like development fees and through sales taxes. Sales tax revenues are now the largest single source of discretionary revenues for local governments. “Big-box” stores like Wal-Mart, Target, Home Depot, and car lots are huge sources of revenue for local governments and they require few public goods in

return. In FY 1991, 16% of local government's total revenues from taxes were from those sales that took place within their jurisdiction. Furthermore, commercial establishments do not require as many public goods as residents do with their subsequent increase in children needing education, sewage and water necessities, and increases in policing. Furthermore, because sales tax revenues are distributed based on where the sale took place, this means that cities, to some extent, can control the supply of this revenue source: more retail establishments within the jurisdiction means more sales tax revenues.

1.9 “Fiscalization of Land Use”

In 1997, Kotin and Peiser published a paper that officially made the allegation that Proposition 13 and the manner in which sales tax are allocated in California have created a situation in which local governments are making land use decisions based on fiscal necessity. They described the phrase “fiscalization of land use” as, “the tendency of communities to establish land uses based on the net tax revenues they will generate



Picture Courtesy of Catherine Opie

for the city” (1975). The source of much contention regarding the so-called “fiscalization of land use” is the redistribution of the revenue *in situ*. The money a local government receives is dependent not on its population or the residence of the consumer, but on the jurisdiction where the sale takes place, creates an incentive for local governments to favor retail development. Anecdotal evidence, along with some statistical studies,

demonstrate government officials create incentive agreements with developers of retail establishments, big box shopping centers, strip malls, and auto centers to generate sales tax revenues for their cities. Furthermore, while the total sales tax revenue in the state of California has been relatively steady since the passage of Proposition 13, it is still apparent that local governments are engaged in competition over their share of a fixed pie.

Approximately 9.6% of city's total revenue comes from sales taxes, although this number varies slightly over cities in California. However, this source of revenue is still important from the perspective of local governments because it is the largest source of discretionary income they have access to and is also responsive to inflation; most funds that come from property taxes or from the state are earmarked for a specific purpose, thus restricting a municipalities' ability to match their supply of public goods to their population's preferences.

Furthermore, this sort of relationship between jurisdictions seems reminiscent of a "free-rider" problem: simply, if community A places a new shopping center on the edge of its jurisdiction, it is counting on drawing not only its own residents to its new stores, but also those residents of surrounding communities, B, C and D. So, while community A "steals" some of the sales tax revenues from surrounding communities B, C, and D, with its new Wal-Mart, Home Depot, and K-Mart stores, it is not responsible for educating or protection those residents who shop in their town, but don't live there. Communities B, C, and D perhaps lose sales tax revenue, but more importantly, community A has, in effect, cornered the market for the sorts of cheap goods these stores supply in its neighborhood, decreasing the opportunity for surrounding

communities to bring in more sources of retail sales for themselves. Community A is free-riding on residents (potential consumers) and the public goods they necessitate of the surrounding communities in its neighborhood. The inclusion of the neighborhood effect is an attempt to deal with this problem of free-riding.

These developments often seem contrary to that community's comprehensive growth plan, whose adoption was intended to control the future growth patterns of that community and protect the vast array of natural resources that surround the budding metropolises



Santa Clara farms with houses in foreground

throughout California. This problem is essentially that of an externality that is not considered within the traditional market system that drives development decisions from an economic perspective. My inclusion of the neighborhood effect in my model is my attempt to control for this affect while explaining a community's population growth over ten years.

1.10 Sales Tax Revenue and Retail Growth

In a recent study on the 61 metropolitan areas in the western United States by Wassmer (2001b), it was found, "the quest for local sales-tax revenue, in particular, is statistically linked to retail activities on the urban fringes ever farther from the downtowns of California"(2). He concluded that central cities have less retail activity

than they should considering the history of city growth. Furthermore, Wassmer found that a 1% increase in reliance on self-generated share of sales taxes statewide, retail sales in urban fringes rose by nearly .11%. “The results of this ‘fiscalization’ of land use are excessive driving in metropolitan areas, greater air pollution, loss of downtown vitality, and perhaps greater

congestion on the metropolitan area’s streets and highways”

(2). It is my intention to

examine the influence of

neighboring local governments

on this phenomenon and how

that might affect population change.



Downtown Los Angeles

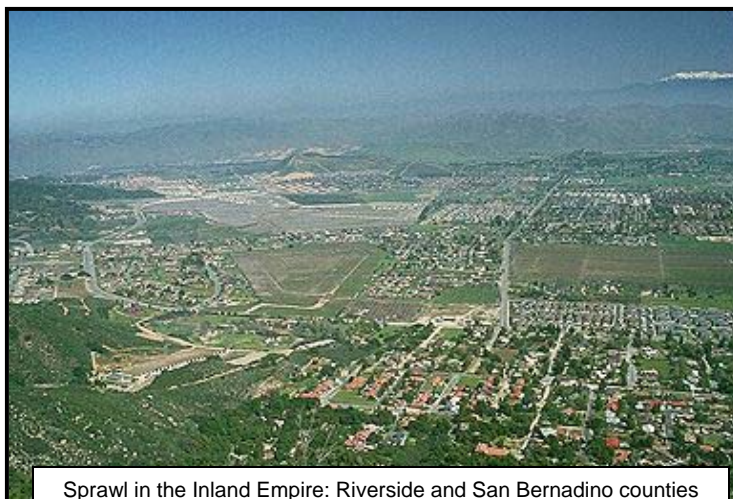
In another study, “California and the Local Sales Tax,” Lewis (1999) concluded it was probable that competition between local governments exists for the location of large retail establishments particularly because retail represents a certain source of income and has few infrastructure or public goods requirements and no readily apparent environmental effects. Furthermore, “most jurisdictions trying to maximize sales tax revenues choose to encourage these types of development over residential development which generates sales tax revenue only to the extent that they new residents shop in the same city in which they live” (Chapman 12).

In a survey of city managers throughout California, conducted by the Public Policy Institute of California, and analyzed by Paul Lewis in 1999, Lewis found that no specific type of city favored retail more consistently over another (97). With a 70%

response rate, Lewis found, “retail development is the most favored type of land use for both vacant land and

redevelopment. A two-tailed t test indicates that in both cases, retail’s mean rating differs from the runner-up category, office development, at the .0001 level of statistical significance” (26).

However, Lewis also found that



Sprawl in the Inland Empire: Riverside and San Bernadino counties
Picture courtesy of G. Donald Bain

the portion of revenue cities were competing over was essentially fixed in per capita terms, which makes the quest for retail sales seem reminiscent of a tragedy of the commons. Overall, the competition for retail has created an urban built environment that is dominated by retail land uses, at the expense of light industrial or residential, than would have existed without the passage of Proposition 13.

1.11 Tax Revenue Competition

Accordingly, it appears that cities actually compete with one another within regional areas for these important sources of revenues. It is my intention to look at the effects of this perceived competition by attempting to explain the population growth of cities between 1980 and 1990 while considering that city’s revenue sources and those of its neighbors. Should this effect be found significant, it would indicate that the behavior of one’s neighbors does affect that city’s population growth, which has important implications for public policy.

Chapter 2: Literature Review

2.1 Alonso-Muth-Mills.

The basic assumptions underlying this model's foundations are generally referred to as the Alonso-Muth-Mills model of suburbanization. Generated in 1969, this model

San Francisco



was intended to describe the process by which a town becomes a city, and how that city accommodates increases in population and employment opportunities. At the time, it was used to explain the history of such suburban growth: its exponential model was deemed to

accurately represent the past, the closer that its predicted results matched up the observed density and housing prices of the day.

Before the democratization of the automobile, business centers were clustered around a port or railroad station so they could minimize transportation costs. After the 1940s and 1950s, when trucks became the cheapest way of transporting goods, the proximity to transportation hubs tends to have become less important, however the Central Business District has survived for other reasons.

The urban density gradient, as the Alonso-Muth-Mills model came to be known, is a good measure of suburbanization for several reasons. First, it doesn't matter if the city's boundaries have changed over time because the model simply predicts density to decrease exponentially as the distance to the Central Business District increases. Furthermore, most often this model is not used to describe what we currently see as cities, or municipalities. Usually, it is used to describe the growth that occurs from a

central urbanized area of a Metropolitan Statistical Area. At the time the model was developed, urbanized areas usually only consisted of one city. Now it is not uncommon for what used to be referred to as one city, to be really a combination of many jurisdictions that share one area as a Central Business District. For example, while San Diego has only one area that would be deemed a Central Business District in the traditional sense of the term, San Diego's densest employment center is fed by many jurisdictions' worth of laborers. The model's simplicity is its best feature: it simply predicts decreasing density of jobs, population, and lower housing and land prices with increasing distance from the city center.

These are the assumptions that the model used on this paper builds upon, although the actual model itself is not the same. The AMM model is a good tool,



Downtown Los Angeles

however as I mentioned before, it's best use tends to be for data generated at the MSA-level. In this analysis, I have chosen to use city-level data because of the type of questions I wanted to address in this analysis and the availability of

data. In this paper I am not challenging the accepted trends predicted by the AMM model. While I take as given the propensity of suburbanization and the trends by which it is accepted that this occurs, as outlined in previous chapters, I wish to examine more closely the way in which cities affect one another in their growth.

2.2 Mieskowski and Mills (1993)

While Mieskowski and Mills (1993), summarized the causes of suburbanization as population growth, improvements in transportation availability and speed, and the increase in individual incomes; however, little attention has been paid to the role of competitive public goods provision at the local level on individual location choices with their econometric model analyzing MSAs throughout the United States. They estimate, “the United States is approaching the time when only about one-third of the residents within an MSA will live in central cities and only about 40 percent of MSA jobs will be located there” (135).

2.3 Bradford and Kelejian

An example of the wide variety of econometric models designed to aid in the interpretation and explanation of the suburbanization of residents and firms can be found in, “An Econometric Model of Flight to the Suburbs,” by Bradford and Kelejian (1973). While this paper provided results that added excellently to the literature regarding this subject, like most urban economists, they performed their analysis at the MSA-level. While this was the most comprehensive they could have been at the time, as there was very limited information available at the city-level, they utilize the AMM model which is predicated on the assumption that population density decreases log linearly from the CBD outwards concentrically until the price of housing equals the price of agricultural land. Furthermore, Mieskowski and Mills acknowledge it is increasingly unlikely that cities have only one employment center, and in fact, it may be that cities no longer necessarily follow the AMM model of decreasing concentric population density with the same intensity as when transportation was centered on ports or train stations.

Nevertheless, the results of this study are still useful for their explanation of the general trends regarding population decentralization, even if the model used to gain these insights is not the one that I intend to mimic in this paper.

2.4 Challenges to the AMM model of Suburbanization

While the monocentric model accurately represents historical suburbanization, one must question the accuracy of this model's underlying assumptions given the reality of today's cities. This model attempts to predict population density as a function of distance from some central city. Is this monocentric model accurate given the multiple government jurisdictions that comprise today's complex metropolitan areas or the recent creation of "Edge cities"? (Mieszkowski, Mills 1993). In addition, in an econometric analysis by Glaeser and Kahn (2000), commute times rarely increased with distance from the CBD because that increase in distance was often offset by increased speed of transportation. This seems to challenge the traditional finding that decreases in commuting costs (like resulted from the democratization of the automobile after World War II) will increase suburbanization. Also, Glaeser and Kahn found housing prices did not necessarily fall with increased distance from the central city (2000). This reflects the higher demand for suburban homes given the state of America's inner cities.

Glaeser, Kahn and Rappaport (2000) have challenged the traditional urban economic view and argued, "the income elasticity of demand for land is too low for urban poverty to the result of wealthy individual's wanting to live where the land is cheap,"(1) and thus asserts that housing market assumptions are insufficient explanations for the concentration of poverty in central cities. They concluded the poor tend to live in the central cities because the provision of public goods and proximity to

public transportation plays a role in income sorting and perhaps in exacerbating some aspects of “flight from blight.” Furthermore, their models seemed to show perhaps older central city governments are more redistributive; thus, the poor are attracted to central cities by these public goods. While Glaeser challenges the assumptions of the AMM model, it appears that his results do support Tiebout’s predictions of income sorting and location choice as being dependent on the provision of certain public goods by local governments.

2.5 A Neo-Classical Economist’s Definition of Sprawl

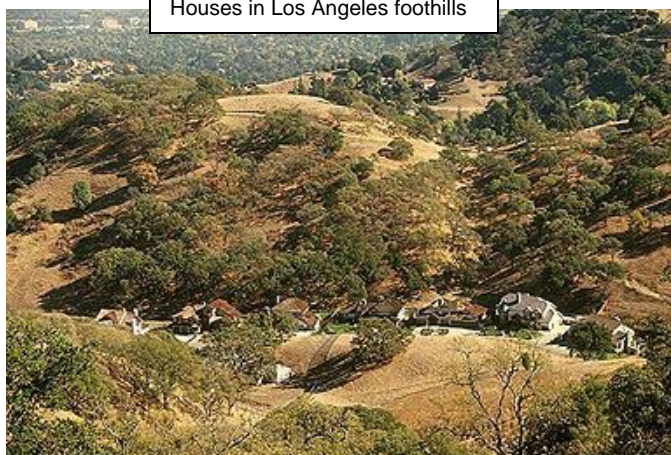
A Neo-classical economist like Alonso, Muth or Mills might claim that “urban sprawl” only exists when the costs of suburbanization outweigh the benefits. While they are concerned with costs associated with suburbanization, it is apparent they believe sprawl falls within the definition of a market failure: agricultural land or open space is wantonly developed because the full value of that land is unaccounted for within the market. For example, the ability of agricultural land and open space to act as recharge areas for groundwater, naturally cleanse contaminated water through the percolation and dissolution process through soil, its biodiversity or its inherent aesthetic value is not easily determined in a free market so the price that that particular land elicits in the market is lower than it should be. Thus, development may occur where it wouldn’t if the full value of that land were accounted for within the traditional market system. For the very reason that sprawl occurs, it is very difficult to create a measure that accurately reflects the degree to which one community or another is contributing to urban sprawl through its expenditure patterns within that competitive system. Therefore, if according to neoclassical economic theory urban growth is guided by an “invisible hand,” then it is

logical to assume the excessive conversion of agricultural land that results from sprawl is the result of the following market failures: lack of information regarding the economic, aesthetic, ecological, or existence value associated with open space, biological diversity, agricultural land, permeable land, and farm culture; failure of the market to fully capitalize the real costs of transportation by private automobile; failure of the real estate market to fully capitalize the real costs of infrastructure development and over-use.



Farmland in Salinas

However, some economists agree that it is very difficult to quantify these costs and benefits, making capitalization of these issues into land and housing prices difficult or impossible. Furthermore, Ewing (1997), Downs (1999), Myers and Kituse (2000), point out this market-regulated view of sprawl ignores the bureaucracy within which land-use decisions are made and the possible inability of local bureaucracies to fully understand the local, regional and global effects of their land use decisions.



Houses in Los Angeles foothills

One definition of urban sprawl, used by Wassmer in his report, "Influences of the 'Fiscalization of Land Use' and Urban-Growth Boundaries: Part II" is low density, strip, scattered, and leapfrog

development, non-compact development, unlimited outward extension of new development, low-density developments in new areas, and transportation that is dominated by private automobiles (4). This particular definition is an example of normative ideals regarding the development and growth of cities and is not associated with a certain quantifiable level of population density. I will use population growth as my dependent variable because of the inherent difficulty in quantifying normative principles.



2.6 Tiebout's Location Decision Theory

Tiebout, in his landmark 1956 paper, "A Pure Theory of Local Expenditures," examines the individual location decisions between competing suburban communities. Tiebout determined rational people would choose to live in a particular suburban community given their preferences for the provision of local public goods and the subsequent taxes to finance these goods. Thus, homogenous communities of a certain average income will be created as every individual will chose to live in or create the community that most accurately provided their desired bundle of public goods. In this model, Tiebout assumes perfect mobility, and thus this model predicts at equilibrium each city will be maintained at its optimal size. Furthermore, Brueckner's (2000) analysis of Tiebout's theory in conjunction with a tax competition model found those fleeing high income residents will rationally choose to live in communities with low taxes

because they have a low demand for public services, thus creating income-stratification between suburban and urban neighborhoods like Tiebout predicted.

Tiebout's 1956 prediction of the stratification of local communities because of income and demand for public goods has caused much debate in the study of urban economics. He theorized that since poor people have low incomes, they have a smaller demand for public goods because they can not afford to pay high taxes while the rich will have a higher demand for public schools. Therefore, he theorized that because people with higher incomes subsidize the public good used by primarily low income people, they would attempt to create their own communities. These communities would charge a lower tax rate because they had a higher tax base and would provide better education, especially, but also a better bundle of public goods that satisfied their demands most specifically.

This implies the plight of the poor left in the central city is not very equitable. Because the poor community has a smaller tax base, they are not able to generate as much local revenue, which decreases their total per capita public good expenditure. In addition, this creates a situation in which the poor will gain some utility as they incrementally begin to closer to the rich community. This situation has created some arguments about the legality of exclusionary zoning, which can potentially zone the poor out of the community by making housing prices higher than they would otherwise be. It seems unfair to relegate to poorer residents the shoddy



5th and Pine Streets in San Francisco

infrastructure resulting from low public goods provision, while the rich are allowed to move to the suburbs to provide themselves with great public education and safe neighborhoods, while destroying natural resources. Not only does this situation have implications in terms of considerations of equity, but one also has to wonder about the environmental effects of this perpetual dispersal from the central business district. In many ways, *Serrano I* and *Serrano II* attempted to deal with these differences in public education expenditures. However, it seems they were unable to predict the severity of the suburbanite's response to the change in the system of education expenditure, in the form of Proposition 13.

2.7 Cullen and Levitt Model

The model I used to predict and explain the population dispersion between city boundaries is a simple difference model very similar to one used by Cullen and Levitt (1999). In this paper, they sought to analyze the effect of changes in city crime on city population using a simple difference model using three different datasets.

$$\Delta(\ln CITY_POP)_{it} = \beta \Delta CITY_CRIME_{it} + X'_{it} \Gamma + \lambda_{it} + \gamma_{it} + \varepsilon_{it} \quad (1)$$

In this equation the natural log of the change in city population is regressed on a change in per capita reported crime rates, where subscripts i and t index cities and years.

X' represents a vector of covariates that will be included in order to control for endogenous factors that would influence a city's population density like income, percent black, and other demographic and socioeconomic variables. In addition, one-year lags will be used for all included independent variables to also attempt to account for endogeneity. λ and γ represent year and region dummies. Cullen and Levitt used variables collected in the County and City Data Books for 1970, 1980, and 1990 by the

US Census. In fact, because they used three time periods they were able to include the abovementioned city, county, and year fixed effects. This is because in a difference model, one's dummy variables are subtracted out of the equation if only two time periods are modeled. (Cullen and Levitt 1999) Unfortunately, this fact was overlooked at the beginning of this study, and therefore my model does not include these dummy variables.

2.8 Cullen and Levitt's Conclusions

In the paper by Cullen and Levitt (1999), they found each additional reported crime (which they acknowledge probably underestimates the actual crime rate due to unreported crimes) corresponded with a one-person decline in city population.

Throughout the rest of the analysis, using PUMS data, they concluded the decrease in urbanized area population was a result of a migration from the urbanized area to those parts of the MSA designated as fringe, or suburban. Furthermore, they found the groups most responsive to changes in crime were those highly educated households and people with children. (Cullen, Levitt 162) In order to examine how their neighbors affect the population densities of cities, the model above will be slightly altered for my purposes.

2.9 Recreation of Cullen and Levitt

My first regressions will attempt to recreate the results that Cullen and Levitt (1999) report in their paper. This step is necessary because of the differences between the dataset used in the relevant portion of their paper and the one I will be using for this analysis. In the first section of their paper, Cullen and Levitt use Census-year data from the CCDB, for 127 American cities with populations greater than 100,000 in 1970. In

this study, I will be using Census-year data for 153 California cities with populations greater than 25,000. The summary statistics from the Cullen and Levitt paper have been recreated next to those that I obtained in my analysis. (See Appendix II) Furthermore, I recreated the two regressions described in Table 2 of the Cullen and Levitt paper (163), and ran the same regression using my dataset. The estimated coefficients with their standard errors are compared next to one another in Appendix II.

As you can see, there are a couple significant differences. When attempting to recreate the Cullen and Levitt regressions that they published in their 1999 paper, I found many of the independent variables they included were auto-correlated. Therefore, when I included all of these variables in my model, with my different data set, I found that some of the signs of the covariates were opposite those reported in the Cullen and Levitt paper. First, the variable representing the unemployment rate is consistently positive throughout all of my regressions. In most economic literature, and indeed logically, this variable should be negative. Second, when included, the variables representing Medium Family Income in 1980 is consistently negative, while the Cullen and Levitt paper reports this variable positive. However, while this is perhaps not the norm, it seems logical that the higher the medium family income, the more likely the community will restrict the amount of development it allows within its boundaries, and thus its population will not grow as much. After massaging the data for some time, I have to conclude that these differences result from not including city, region, and year dummy variables (because I was only using two points in time).

Chapter 3: My Model

3.1 My Definition of Urban Sprawl.

A key feature of sustainable living is more compact development that enables citizens to decrease their dependency on cars, recreate a lost sense of community culture, and decrease the degree to which population growth causes urban sprawl and the degradation of our natural environment.

However, between 1980 and 1990 the

average population density of a city has decreased, while the populations of these cities has increased.

View above Watsonville: a city encroaching on farmland



Economists interested in sprawl usually conduct their studies on the MSA-level. At this level of aggregation, they are able to separate the landscape into “urbanized areas” and “fringe areas.” Thus, population growth in the fringe area is their measure of urban sprawl. However, because I was interested in dealing with the impacts of local government’s revenues and expenditures, I had to conduct my study at the city-level. It is very difficult to create an adequate measure of sprawl when conducting a study at the city-level, so I resigned myself to use population growth as a proxy. While I understand this no real measure of sprawl, I believe that introducing the neighborhood variable is a decent substitute because each city’s analysis included the effects of all neighbors within a 60-miles radius. Therefore, population growth of the cities on the edge of the suburbs is included, just as those in the central business district.

3.2 My Hypothesis

My hypothesis is that a community's population growth is influenced positively by the amount of money surrounding communities spend on different public amenities.

Tiebout's 1956 thesis posited that people make location decisions between similar sets of communities



based on the level of public goods that city provides and the price at which it provides them (tax price). I hypothesize that neighboring communities affect each other's population growth through their public good expenditures, their tax policies, and their opportunities to "free ride" off the retail and fiscal behaviors of their neighbors. For example, if one city increases its spending on highways, making their community more accessible, its population will grow. However, as its population grows, i.e. demand for land in that city increases, the cost of housing and land in that city will also increase, albeit, along with low-paying jobs in the retail sector. Therefore, people may chose to locate in surrounding communities because there they can take advantage of the spillover benefits of near-by shopping while avoiding some of the tax costs and higher prices of housing, in other words, "free-riding" off the development decisions of neighboring communities.

I also hypothesize that a community's population growth over ten years will be positively affected by the degree to which neighboring communities compete and gain retail sales. For example, if one city is able to place a Wal-Mart store on the edge of its jurisdiction, it will probably lure some of the retail sales away from its neighbors while collecting increased sales tax revenues, without having to provide public goods for those neighbor-resident shoppers. This is what I will call in this paper, the

“neighborhood effect.” Should this variable prove to positively effect population growth, it would provide additional statistical evidence that a competitive framework exists within which communities compete for residents and commercial entities. One could also argue this competition and population spillover is detrimental to community identities and regional open space by increasing sprawl. The implications of this conclusion could support the creation of regional governments or regional sales tax sharing agreements (see discussion of AB 680) that would be better able to control the effects of development and urban sprawl both between communities and on the environment within which those communities coexist and depend.

3.3 Scope of Study

While I initially intended to use all cities in the United States with populations greater than 25,000 as my sample population, because of time considerations and the availability of more specific financial information on city revenue categories for cities in California, my sample population includes the 156 cities in California who had populations greater than 25,000 in 1980. In addition, California is an exemplary place to base a study of this subject given its fiscal history for the following reasons: one, in 1978 local municipalities in California lost almost one-half of their total revenues when their ability to exert property taxes was severely constricted; two: extensive documentation and publication of local government revenues and expenditures are publicly available from the California’s Office of the State Controller.

3.4 Data Sources

The data used in this econometric analysis was collected in the 1980 and 1990 censuses and collated together on a city-level basis by the US Census in the County

and City Data Books, published in 1983 and 1994 respectively. Furthermore, the Report of Local Government Transactions, as published by the California State Controller's Office, supplemented this data. This report provided the information on the following two variables: Revenues obtained from Sales and Use taxes, and Expenditures on Planning. All the variables collected for this model can be found in the Appendix, along with their descriptions and sources.

3.6 Structure of My Model

Therefore, the form of the model I will use in this paper is the following:

$$\Delta(\ln CITY_POP) = \beta_1 Index_City_Expenditure_{it} + \beta_2 Neigh_Expenditure_{jt} + X'_{it}\Gamma + \varepsilon_{it}$$

In this model subscript j is used to designate those variables that represent what I call, the "neighborhood effect." This variable is an average of the revenues of those jurisdictions within a 60-mile radius of the index city. In later versions of this paper I may find that it is necessary to control for other exogenous neighborhood variables.

3.7 Absence of Instruments

It would have been eminently desirable to include city and region fixed effects in order to account for *a priori* differences between cities. Unfortunately, for this paper I only used two points of time. Therefore, when using a first-difference model with only two points in time, if one were to include city and region fixed effects (i.e. dummy variables for every city and/or region), their effects would disappear in the calculation of the regression. In future versions of this paper and analysis, adding variables from either Census 1970, or preferably, 2000, will be done in order to include those city fixed

effects. Furthermore, I believe that some of the interesting relationships depicted in my regressions are a result of these unaccounted-for between city variations.

3.8 Definition of “Neighbor”

Obviously, I must determine a priori how I should define the conditions upon which I will determine if a given city is the neighbor of another. In her 1989 work, “Copycatting: Fiscal Policies of States and their Neighbors,” Case et al determined that a state “neighbor” could be defined in three ways: geographically, by state income level, and proportion of blacks within the population. Her results found all of these measures suggest consideration of the fiscal situations of a state’s “neighbors” is a factor in a state’s fiscal appropriations. In addition, Case found, “racial composition has an important impact on state expenditure patterns, and states with similar racial compositions look to each other as points of reference” (Case 25). In spite of the fact her work focused on state-level expenditure patterns, I believe that similar assumptions about the definitions of “neighbors” can be made on a city-level basis. However, because of time considerations I will run my models with each city’s neighbors defined by geography. Each neighborhood was defined as all those cities located within a sixty-mile radius of the index city. While each city only has one neighborhood itself, each city may be included in many city’s neighborhoods.

3.9 Creation of the “Neighborhood Effect”

To create the neighborhood variables, I used Geographical Information Systems (GIS) to calculate the distance between each city. For each “index” city, I selected all those neighboring cities located within sixty miles of it and designated them “neighborhood.” Once I transferred that data into the statistical program I used

throughout the analysis (STATA-7), I attached all the relevant socio-economic data to each city within each of the 156 neighborhoods. The actual “neighborhood effect” is crudely defined as the average of the characteristics associated with each city’s neighborhood. This is obviously not the most sophisticated of variables; it does not take into account any of the variation between cities within a neighborhood. However, in order to use regular statistical software, one figure per index city per neighborhood effect had to be determined.

Chapter 4: Estimation

4.1 Revenue from Sales Taxes

This regression was one of the more disappointing. While anecdotally it seems the neighborhood effect would surely be significant and positive, that covariate was never significant. Several difficulties with the data influenced this result: first, many of the socioeconomic variables and the variables representing retail sales and sales tax revenue are highly correlated with one another. In order to preserve the integrity of the model, one cannot include independent variables that are highly correlated with one another, and therefore it was difficult to devise a model that could properly calculate the population effect of increased sales tax revenue while controlling for various socioeconomic factors.

Furthermore, throughout my study it became apparent that reported sales tax revenue is not a good measure of the degree to which retail is favored over another land use, nor is it a really good measure of simple retail activity. Anecdotal evidence suggests that oftentimes in order to attract developers to a city, cities offer to return a portion of the sales tax revenues gained from that new business to its owners. For example, the city of Oxnard, CA agreed to return \$1 million of sales tax revenues to Wal-Mart in return for its location within Oxnard's jurisdiction. Similar incentive packages have been created to induce big-box retailers to a jurisdiction who desires to increase their total retail sales.

4.2 Regression on Revenues from Sales Taxes

Dependent Variable: Log Population of Index City in 1990-Log Population of Index City in 1980		
Independent Variable		
Total Revenue from Sales Taxes in 1980 <i>RevSalesTax80</i>	-1.15E-08 (5.50E-09)	P-value 0.04 *
Change in Average Neighborhood Revenue from Sales Taxes 1990-1980 <i>NCRRevSales</i>	5.21E-09 (8.36E-09)	0.535
Log Population 1980 <i>pop80ln</i>	6.17E-02 0.0160	<.0001 *
Log Unemployment rate 1980 <i>ln_unemp80</i>	0.2024 (0.0386)	<.0001 *
Change in % Black <i>Cblack</i>	2.7520 (0.8470)	0.002 *
% Homeowner <i>OwnerHU80</i>	0.2933 (0.1478)	0.05 *
Adjusted R²	0.7556	
Number of Observations	103	
Note: Coefficients are in bold, with standard deviations within parenthesis underneath * denotes probability less than .05		

The P-value represents the probability that the observed coefficient will be more or less than that estimate of the true value of the represented relationship. A low P-value will allow one to reject their null hypothesis: that is, it will allow one to state with 95% confidence that the two variables are related to one another. Statistical significance is achieved when the P-value is less than .05. The P-value is determined by the t-statistic and the standard error of the observed estimator; the t-statistic is determined by how different most of the observed values of the variables are from their mean. Unfortunately, for the variable, Change in Average Neighborhood Revenue from Sales Taxes, this model calculated a coefficient whose standard error was too large to render it statistically significant. In other words, the values of that variable were too

often different from the mean of those values. Therefore, its t-statistic was low and its P-value was too high.

However, this regression did find there is a negative, statistically significant relationship between Total Revenue from Sales Taxes of the index city in 1980 and that city's population growth in the next ten years. This seems logical considering that the more a city's land uses are dedicated to retail uses in the first time period, the less able to absorb future population growth the city will be between the first and second time period. However, there was not a statistically significant relationship between the average neighborhood revenues from sales taxes and the index city's population growth. While this negates my hypothesis, it seems possible that revenue from sales taxes is not necessarily the best, most accurate measure of a city's competition or preference for retail land uses.

4.3 Correlations of Retail Sales

Because of anecdotal evidence seems to suggest reported sales tax revenue is not always a good representation of the total sales tax revenues that should have been earned by the city given its retail sales, I performed regressions on the change in total retail sales between 1980 and 1990. I found retail sales of the index city in 1980 was highly correlated with that city's population in 1990; however it was negatively correlated with that city's population change. It is obvious retail sales is a function of population: obviously, bigger towns need more retail establishments to support its given population. However, the data also seems to indicate the more retail establishments you have in your town, the less your population will grow over the next ten years. This could be indicative of the fact that either development of retail is preferred over housing (the

claim of those who believe in the “fiscalization of land use”), or that people do not desire to live in proximity to retail establishments.

Furthermore, I found that the change in average neighborhood retail sales is negatively associated with the index city’s population in 1990; however, it is positively associated with its change in population from 1980 to 1990. This evidence seems to contradict my hypothesis that increases in retail sales in the neighborhood will increase the populations of surrounding cities. However, it did seem that more change in neighborhood retail sales is associated with more of a change in the index city population: in other words, there is a neighborhood effect, but it isn’t clear how that effect affects population growth.

However, average retail sales of the neighborhood in 1980 is negatively correlated with the number of new housing units in the index city in 1980 and 1990. As neighbors increase their retail sales, cities around them build fewer housing units and thus have less potential for an increase in resident population. While one might assume there is some sort of “magnet” effect happening between index cities and their neighbors, there is also a negative relationship between retail sales of an index city in 1980 and that city’s population change between 1980 and 1990. Therefore, the data seems to be indicating that as an index city’s neighbors increase their total retail sales, those index cities lose population to locations other than those cities included in this model. In order to more accurately understand the relationships involved in this scenario, it would be necessary to include all cities in California so to account for those smaller and unincorporated cities that seem to be absorbing this population loss.

4.4 Regression on Retail Sales (a).

Dependent Variable: Log Population of Index City in 1990-Log Population of Index City in 1980		
Independent Variable		
Total Retail Sales 1980 <i>RetailSales80</i>	0.0067 (.007)	P-value 0.343
Average Neighborhood Retail Sales 1980 <i>NRetail80</i>	0.0376 (.01578)	0.019 *
Log Unemployment rate 1980 <i>ln_unemp80</i>	0.0979 (.0315)	0.002 *
Change in % Black <i>Cblack</i>	2.7600 (.9216)	0.004 *
% Homeowner <i>OwnerHU80</i>	0.5890 (.1372)	<.0001 *
Adjusted R²	0.7130	
Number of Observations	103	

Note: Coefficients are in bold, with standard deviations within parenthesis underneath

* denotes probability less than .05

In this regression, Average Neighborhood Retail Sales in 1980 is positive and significant, indicating that neighborhood retail sales does affect population growth. In other words, this regression relates that the more retail sales the index city's surrounding communities are in 1980, the more the population of the index city will grow over the next ten years. However, it is interesting that in this regression Total Retail Sales of the index city in 1980 is both not significant and positive given that my previous regression showed that Total Sales Tax Revenue of the index city in 1980 is negative and statistically significant in relation to that index city's population growth between the first and second time period. Furthermore, these two variables are highly correlated with one another, for good reason. Perhaps the difference stems from the different ways cities attempt to make their jurisdictions more attractive to retail interests. This variable of Total Retail Sales of the index city in 1980 could be capturing some sort of size effect: larger cities will obviously tend to have more retail sales. Furthermore, this

regression found that a neighborhood effect did exist between Average Neighborhood Retail Sales in 1980 and the index city's population growth over ten years. The relationship is positive and significant and thus lends credence to my hypothesis that neighborhood retail levels will cause an increase in population in the index city, despite the results of the sales tax revenue regressions.

4.5 Regression on Retail Sales (b)

Dependent Variable: Log Population of Index City in 1990-Log Population of Index City in 1980		
Independent Variable		
Total Retail Sales 1980	0.0061	P-value
<i>RetailSales80</i>	(.007)	0.378
Average Neighborhood Retail Sales 1980	0.0306	
<i>NRetail80</i>	(.0164)	0.064
Change in Average Neighborhood Retail Sales 1990-1980	3.77E-08	
<i>NCRetailSales</i>	(4.34E-08)	0.388
Log Unemployment rate 1980	0.0979	
<i>ln_unemp80</i>	(.0313)	0.002 *
Change in % Black	2.6980	
<i>Cblack</i>	(.9147)	0.004 *
% Homeowner	0.6096	
<i>OwnerHU80</i>	(.1379)	<.0001 *
Adjusted R²	0.7213	
Number of Observations	102	
Note: Coefficients are in bold, with standard deviations within parenthesis underneath		
* denotes probability less than .05		

Unfortunately, in this regression Average Neighborhood Retail Sales in 1980 is no longer significant once I include Change in Average Neighborhood Retail Sales between 1980 and 1990. While these two variables were not highly correlated with one another, it is possible that one or the other is capturing some sort of unforeseen effect.

4.6 Highway Expenditures

One of the more interesting regressions I was able run dealt with the influence of increased neighborhood expenditures on highways on population growth. The

neighborhood effect of these expenditures is significant in all the regressions I ran. Furthermore, this regression models an interesting causal story that seems to be linked with that of the “fiscalization of land use.” It seems logical that those communities that put new “Big box” retail stores on the fringes of their jurisdictions (where logically they might have the most open space available to accommodate these larger developments) might have to spend more money on their street and highway infrastructure. Furthermore, retail growth requires ready access to highways and freeway off-ramps. Kroll and Marrinan found, “For regional and super-regional centers, this often implies proximity to a freeway off-ramp; for small centers traffic circulation on adjoining traffic routes is important” (25). Retail establishments must be easily accessible and readily visible to the public, so often “Big-Box” stores and auto dealerships are located along freeways. The result of this commercial and residential growth is the existing highway infrastructure is overwhelmed and thus from the beginning of retail development dealings, street and highway maintenance is a required of developers in the form of impact fees. However, in their effort to lure development away from neighboring jurisdictions, local governments sometimes agree to shoulder some of the responsibilities of traffic management. Therefore, it is likely that expenditures on highways will increase for cities that experience an increase in retail establishments. As William Fulton describes in his book, *The Reluctant Metropolis*,

While continuing to pay lip service to the need to strengthen their downtowns, and to preserve agricultural land, all three cities [Ventura, Oxnard, and Camarillo, CA] began to figure out how to set up the large-scale retailers at strategic locations along the freeway. And so they went into competition with one another for stores. (263)

Furthermore, if neighboring communities increase the accessibility to their town, it is likely that surrounding areas will experience a growth in population as well. In a

study by Glaeser and Shapiro in 2001, they found that increased local government spending on highways was associated with population growth. In my study I will attempt to replicate those findings with my different dataset, and then determine how neighborhood spending on highways affects the index city. In order to understand this effect more fully, research was done on the suburbanization of employment.

4.7 Suburbanization of Employment

The suburbanization of firms has also been analyzed as one other influence on the suburbanization of population and resulting urban sprawl. Like in the case of residential suburbanization, it is apparent this suburbanization occurred initially as a result of the transportation advances of the 1950s. Firms that were initially constrained to the central city because of necessary proximity to transportation hubs like train stations and shipping ports, with the growth of highways and decrease in trucking costs, were able to move to cheaper land in the suburbs. (I will ignore other reasons for firm centralization like information spillovers.) Therefore, while firms and residents suburbanize simultaneously, it was unclear which exacerbated which. Much work has been done in an attempt to determine the direction of causality. The general conclusion is that firms have followed people. (Stiennes '77, Mills '84 Greenwood '80)

In a recent study, Glaeser and Kahn (2001), and found the primary explanation for the suburbanization of employment was the residential preferences of workers. Furthermore, Glaeser and Kahn also found that political borders (expressed by the number of political jurisdictions within a Metropolitan Statistical Area (MSA), their level of analysis) impacted employment density and argued that local government policies

thus significantly influenced the location of industry. Therefore, given that the general consensus among urban economists is that firm decentralization have mirrored resident suburbanization to a certain extent, perhaps Glaeser's findings in this study regarding the effects of political jurisdictions on location decisions can be applied to resident location decisions as well. Therefore, since there appears to be no reason for us to not apply similar reasoning to the expenditures on highways data:

4.8 Correlations of Highway Expenditures

The index city's population in 1980 was found to be positively correlated with the average expenditures on highways of that city's neighbors. This seems to be logical, considering the more highly populated your city is, the more likely that your neighbors will have to play their part in supporting the travel needs of your population. Furthermore, this logic follows because higher density cities tend to be clustered together.

Furthermore, population of the index city in 1980 is negatively correlated with the change in average neighborhood expenditures on highways between 1980 and 1990. The more dense your city is the less your neighbor's average expenditures on highways will change over the next ten years because their expenditures will probably be mostly on renovation of the existing infrastructure, as opposed to building new arteries of transportation in an already built-up environment.

4.9 Regression on Highway Expenditures

Dependent Variable: Log Population 1990-Log Population 1980
Independent Variables

Independent Variable	Coefficient	Standard Error	P-value
Change in Exp. On Highways 1990-1980 <i>Chighway</i>	0.33 *	(.166)	0.052
Change in Average Neighborhood Exp on Highways 1990-1980 <i>NCHighway</i>	2.37 *	(.819)	0.005
Average Neighborhood Change in Population Density 1990-1980 <i>NCPopden</i>	0.00	(.00004)	0.169
Log of 1980 population <i>pop80ln</i>	0.047 *	(.010)	<.0001
Log of 1980 unemployment rate <i>ln_unemp80</i>	0.146 *	(.032)	<.0001
Change in % Black 1990-1980 <i>CBlack</i>	1.84 *	(.743)	0.015
Population Density 1980 <i>PopDens80</i>	-0.00003 *	(7.67e-06)	0.001
% Married Households 1980 <i>MarriedHH80</i>	0.54 *	(.143)	<.0001
Adjusted R ²	0.8206		
Number of Observations	97		

The results of this set of regressions was consistently the most promising. Not only were changes in highway expenditures by the index city significant, but also were those of their neighborhoods. Also, the presence of a high adjusted R-squared indicated that my model did a very good job of capturing the variance of the dependent variable.

4.10 Interpretation of Highway Regression

According to the following regressions, a one-percent change in the average neighborhood expenditures on highways (on average \$4000) would cause the index city's population to increase by eleven people. While the effect of the index city's expenditures on highways is not significant, it is still positive, and a 1% increase in its expenditures would increase its population by 1 person.

Increased accessibility in neighboring towns seems to draw population to the index city because costs of commuting decrease for all in the area, although increasing

traffic congestion and thus air pollution. Furthermore, increased expenditures on highways can also be an indicator of increases in the total development in the area. Either way, it seems that this regression is a good indication that population growth will occur in all cities as their neighbor's increase their expenditures on highways.

4.11 Data Qualifications

The benefit of using Census-collected data is the amount of data available on a city-level basis. Furthermore, it is appropriate to use data collected in 10-year cycles because it is probable that many of the changes within cities will only affect changes in its populations in the long run. However, the data is problematic on a spatial level. The census data used for this model treats city variable values as consistent within the spatial jurisdiction of that city. However, it is possible to envision cases in which the city is more densely populated on one side, relative to the other.

Furthermore, from estimates of city size obtained by the census, it is apparent that many cities increased their total acreage, on average. Furthermore, Census information does not tell us from where that added or lost acreage came from or went. It is likely additional acreage was formerly unincorporated territory within that particular county. It is unlikely territory previously within one city's boundaries was annexed into another's.

Some changes have been made to the variables' initially reported values or formats. Where this occurred there is a note in the Appendix. In most cases, the only changes were to put the figure in proportions instead of absolute numbers.

Chapter 5: Conclusion

5.1 What I Learned

Performing any sort of research project is a valuable learning experience. I especially found that taking an amorphous, complicated policy issue and attempting to quantify its relationships in a way that allowed the analyst (me) to answer this question was both highly difficult and immensely rewarding. Then, rethinking the basic problem and the relationships themselves when the data wasn't returning the expected results also made me work harder at understanding the causal relationships between the various variables and phenomena described in the real world outside of statistical analyses. While learning that a neighborhood effect does exist, although perhaps not in the form that I originally hypothesized, is rewarding, on the other hand, I felt it was necessary to understand the sort of policy responses that could be imagined once further research on this issue is completed in a more sophisticated form. The following is a description of some of the different bills the California legislature has enacted in the attempt to control for the externalities I called the "neighborhood effect."

5.2 Legislation to Restrict Sales Tax Revenue Competition

In response to concerns about the fiscalization of land use in California, the state legislature has attempted to pass a variety of bills and amendments that intended to curb this inter-jurisdictional competition. For example, in 1994, Assembly Bill 3505 (AB 3505) proposed the distribution of local sales taxes on the basis of a city's relative population, but this bill was not passed in either the House or the Senate. In 1998, AB 1835 attempted to halt the outright bribery of firms to locate within a particular city; this bill passed in the House and yet died in the Senate. Also, once passed, Proposition 11

would allow two or more cities or counties to share sales tax revenue with a two-thirds vote of their governing boards, but many feel that this is not likely to affect much change because of the independent, fief-like nature of many local governments.

5.3 Assembly Bill 680

This issue of sales tax revenue competition is currently being examined in much detail and argument since AB 680 passed in the California State Assembly in February 2002. This bill only pertains to the county of Sacramento, but it has successfully put revenue-sharing on the political map. This bill would change the sales tax revenue distribution formula so that some sales tax would be distributed to those cities that have increased residential housing, and not just increased retail uses. According to Bill Fulton in an article published in the Ventura County Star newspaper,

One-third of the growth in future sales tax revenue is still given to cities based on where retail transactions take place. But one-third would be given to cities based on their total population, and the final third would be give to cities (according to the traditional retail sales formula) only if they meet certain regional housing targets...In essence, then...[this bill] provides cities with an incentive to generate more housing and more retail sales together. (2)

This bill has met with opposition in the Senate and has increased political infighting between Sacramento county, local governments and with the State. One reason for this distrust of revenue-sharing is there seems to be little evidence to suggest that retail competition generates sprawl on a regional level and it is practically political suicide for an elected official. Should this study find evidence that local government expenditures and revenues do affect population growth on a regional neighborhood level, it would further support efforts to create “responsible regionalism.”

5.4 For the Future

The following is an outline of steps that should be done in order to further examine the nuances of the “neighborhood effect” while making the results of this thesis ready for publication and use:

- Include cities from all across the United States in order to further examine the neighborhood effects of expenditures on population growth
- Include all cities in California in model
- Redefine the neighborhoods themselves, go back through the neighborhoods and ensure that they are represented accurately geographically
- Further investigate the usage of geographical models to help make the construction of the neighborhood effect more sophisticated with the purpose of maintaining the variance in expenditures and revenues between neighbors
- Add a third point in time so I might include city and region fixed effects. I believe that this will prove to be very important for my model in effecting some of the sign of the covariates.
- Add more specific categories of expenditures to the California dataset. The expenditure categories in this study sourced from the US Census. In future studies, I will supplement them with more data from the State Controller’s Office of California

5.5 Implications of this Thesis: So What?

Much of the sprawl problem arises from three factors: externalities, free riding, and California’s tax policy. In this thesis, I have tried to represent these externalities and free riding with the inclusion of the neighborhood effect in my model. In order to address these problems of sprawl, one must focus on internalizing these externalities; in

other words, diminishing these negative neighborhood effects. For example, changes in California state tax policy would make a difference in quality and system of relationships between neighboring jurisdictions. For example, AB 680 is an attempt at legalizing sales tax revenue sharing so that future development decisions will no longer prefer retail uses over those that are more community enhancing. For Sacramento County, its passage would mean that in the future, there would be less of an incentive to increase retail sales within your jurisdiction because your rewards would be smaller.

Furthermore, this bill attempts to link sales tax revenue and the burden of residential population so that cities with relatively more residents and relatively fewer retail establishments will get some of the benefits of neighboring jurisdictions developmental decisions.

It is obvious to many Californians that there is much work to be done on renovating and replacing existing infrastructure which has depreciated greatly since local government revenue sources dried up with the passage of Prop 13. The state government must take a leading role in creating a viable situation in which local governments can revitalize their public goods. Furthermore, because the sources of these problems are externalities the traditional market system and existing regulations do not deal with, we cannot expect the existing market system to curb detriments of either sprawl or decaying infrastructure. Considering the state of California's history of top-down civic management (that is, it doesn't really work) and Californian's use of the initiative, there must be major work done to educate people and attempt to internalize some of these externalities problems. Bills like AB 680 are a beginning, but are certainly not the solution.

5.6 Acknowledgements

I would like to thank especially my three thesis advisors: Dr. Toby Page of Brown University, Dr. Antonio Bento of the Donald L. Bren School at the University of California at Santa Barbara. Both Professor Page and Professor Bento have played important roles as advisors, sounding boards, and editors throughout this yearlong process. I would also like to thank my academic advisor, Dr. Harold Ward of Brown University for his support throughout my last four years as an undergraduate Environmental Studies concentrator at Brown University, class of 2002. Furthermore, I could not have finished this thesis without the constant support and affirmation from my parents and friends here at Brown University.

All pictures are courtesy of G. Donald Bain unless otherwise noted.

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Appendix I

The following list of variables will be collected from the 1983 and 1994 County and City Data Books as published by the Department of Commerce.

Population and Demographic Variables:

City population	% Age 0-17 years
City density	% Age 65 and over
% Black	% With 12 or more years of schooling, of persons age 25 and over
% Hispanic	% With 16 or more years of schooling, of persons age 25 year and over

Socioeconomic variables:

Unemployment rate	Means of transportation to work, drive alone
Median household income	Means of transportation to work, public transportation
% Working in manufacturing positions	
% Persons below poverty level	

Regional Variables:

Number of serious crimes known to police
Average July temperature
Average January temperature
Average yearly precipitation

Business Variables:

Total number of retail establishments
Total retail sales, all establishments

Housing variables:

% Owned by homeowner	% of housing units without complete plumbing
Housing stock, % change in total units 1970-1980, 1980-1990	% of housing units vacant
% of year-round housing built 1970-1980, 1980-1990	Median value of owner-occupied housing units
% of housing built before 1939	Median monthly costs of owner-occupied housing units
	Median gross rent of renter-occupied housing units

Fiscal variables:

City government, General Revenue	Total city government expenditure, % for education
Total city government revenue from taxes	Total city government expenditure, % for highways
Total city government revenue, % from property taxes	Total city government expenditure, % for health and hospitals
Total city government revenue from federal government	Total city government expenditure, % for police protection

The two variables, Total City Expenditures on Planning, and Total City Revenues from Sales and Use Taxes, were collected from the California State Controller's Office report, titled, "Financial Transactions Concerning Local Governments in California," FY 1979-1980 and FY 1990-1991.