PRIVATE GOVERNMENTS, PUBLIC AUTHORITY: HOMEOWNERS' ASSOCIATIONS AND THEIR IMPACT ON LOCAL PUBLIC FINANCE

by

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Abstract

This dissertation examines the impact of homeowners' associations, an increasingly popular innovation in public service provision, on local governments and city residents.

An introductory chapter (Chapter 2) outlines the increasing role of the homeowners' association in urban housing development. It overviews the history, motivation and governance of homeowners' associations in American housing markets, and it compares them to other methods of collective decision-making. As local governments have transferred public authority to these private associations, homeowners' associations can be considered a form of residential private government.

The goal of the three papers of the thesis is to examine the interactions between residential private governments, traditional local governments and city residents. The first paper (Chapter 3) identifies the impact that homeowners' association membership has on local government expenditures. A key contribution is the construction of a thirty-year panel data set of homeowners' associations in California. Estimation results suggest that local governments have lowered their expenditures in response to the increasing membership in private governments. However, the response differs depending on the public service considered. Local governments download services that are highly substitutable by private providers, such as garbage collection and parks, but they do not download services with public good aspects, such as roads and government administration.

The second paper (Chapter 4) studies property tax limitations as a motivation for why homeowners' associations have become so popular. The paper is structured in two parts. In the first part, a theoretical model examines how the decision of whether to join a homeowners' association may be altered by the imposition of a property tax limitation. In the second part, an empirical model tests the theoretical implications by using data on homeowners' associations in the era of California's Proposition 13.

The third paper (Chapter 5) extends the canonical theoretical model of private government by introducing a housing market. Equilibrium is described in terms of the interaction between homeowners, the homeowners' association and the local government. The relative elasticities of housing and of public goods play a key role in interpreting the equilibrium conditions.

Table of Contents

List of Tables

List of Figures

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CHAPTER 1

Introduction and Overview

In recent years, cities have faced increasing fiscal and political pressures as they try to provide public services for their residents. As these pressures escalate, the formation of residential private governments is an innovation in local public finance that is blurring the distinction between what is public and what is private. In the residential setting, these private governments take the form of homeowners' associations, and they are found in planned developments, condominiums and cooperatives. Local governments transfer public authority to the boards of private associations by giving them government-like powers in service provision, taxation and enforcement.

As an institution, the homeowners' association has characteristics in common with other forms of collective decision-making. For instance, like a club, individuals who want the services the association provides pay to join. The services that the association provides are usually restricted to members. However, unlike a club, membership in a homeowners' association is tied to housing choice. If a homeowner chooses to buy a house in a development that is governed by a homeowners' association, membership is compulsory and automatic. This implies a similarity to local government, where citizenship ("membership" in the city) is also directly linked to locational choice.

The homeowners' association also shares characteristics with those of private corporations, and so it may be viewed as a manifestation of the privatization movement. Stabile (2000) notes that although homeowners' associations are usually established as nonprofit corporations with an elected governing board, they "are a product made and

sold by businesses for profit,..., a corporation, a community, and a lifestyle." The objective of the association is to maximize the welfare of its members, whether by providing excellent public services or by maintaining high property values. On the other hand, sometimes the objectives of the homeowners and those of the governing board do not match precisely. This may lead to well-publicized instances of neighbour against neighbour, where homeowners claim they are harassed by the association's stringent rules and regulations.

Finally, the homeowners' association shares many characteristics with local governments. It can tax homeowners for membership dues and can enforce payment through civil law. The board has the power to impose conditions and regulations not only on allowable architecture and landscaping, but also on acceptable behaviour. The characteristic most reminiscent of local government is that the association provides goods and services similar to those provided by a city. These include sanitation, policing, recreation facilities and many others. However, these services are meant to supplement the existing provision by the municipal government as most associations are located within city boundaries. This means that rather than considering associations as simply another layer of government, it is appropriate to analyse their interaction with the existing local government.

The homeowners' association's popularity has soared to the point where an estimated half of all new housing in the United States includes membership in one. The proliferation is phenomenal. A few hundred homeowners' associations existed in the United States in the 1960s; their number climbed to 249,000 by 2003. The Community Associations Institute (2005) states that, as of 2005, these private associations now govern roughly 54.6 million Americans in 22 million housing units. The creation of private governments arose from a combination of cash-strapped local governments and profit-minded real estate developers. But the rise of these institutions call into question the impact that they have on traditional municipal governance and city residents.

There is fierce debate about the benefits of private governments in housing development. Supporters argue that they fill the gaps left by underfunded and inefficient local governments. They claim that private governments reflect the self-help attitude of their members, who pay for and receive local services that would otherwise not be provided. Proponents also contend that transferring some responsibility to private associations

may free up public resources to be used elsewhere, so that everyone, even non-members, can benefit.

On the other hand, critics of private governments claim that homeowners' associations erode support for public institutions. Those who can afford to join can bypass the public system: homeowners who fear crime do not have to vote for tax dollars to attack the root of the problem, they can build a gate to keep the criminals out. Opponents maintain that the erosion of public support, reflected at the ballot box, leads to further deterioration of municipal services, hurting residents who do not have the resources to belong to private governments. Local governments, under pressure to cut expenditures, shift the responsibility of providing public services to private developers. Non-members experience a reduction in public service levels and may be worse off.

This dissertation contributes to the understanding of the impact of residential private governments by examining their effects on local public finance. The dissertation begins with Chapter 2, which presents a brief survey of the private government. The chapter gives a short history of homeowners' associations and overviews their structure, governance and responsibilities. The chapter closes on a discussion of how this method of public service provision differs from other forms of private provision and justifies why it can be called a private government.

With the background survey providing a motivation for the dissertation, the next three chapters shed light on the impact of residential private governments by addressing three instances of interaction between the public and private sectors. In Chapter 3, an empirical analysis examines the interaction between private governments and traditional local governments. The overarching motivation for this paper is the theoretical model of private government by Helsley and Strange (1998), who view the public and private governments engaging in mutual provision of public services to residents of a city. The major result is "strategic downloading," where the public government, recognizing that a private government exists to serve member households, cuts back on its own services. Chapter 3 tests whether local governments in California have acted consistently with this theoretical hypothesis.

Using a novel panel data set of California homeowners' associations, the paper estimates a fixed-effects model of public government expenditure. The question of interest is

whether cities that have higher rates of homeowners' association membership experience lower public expenditures. The study accounts for the endogeneity between public and private government activity with instrumental variables. The results support the view that local governments view private governments as substitute providers and so lower their expenditure accordingly. The study also finds that the types of expenditures public governments download to private governments depend on the substitutability of the service. For instance, parks and waste collection services are downloaded, but services with public-good aspects, such as roads and government administration, no downloading occurs. Interestingly, expenditures per non-private government member also falls, which may indicate that private government members are less willing to support spending on services that do not directly benefit them. This may have important implications for those residents who do not have the desire, or the resources, to join private governments.

Chapter 4 examines the impact of exogenous public government shocks on the formation and proliferation of private governments. In particular, the paper focuses on state-imposed property tax limitations. The desire to curb the perceived overspending and overtaxing of local governments culminated in the passing of property tax limitations in over half the States in the 1970s and 1980s. Previous literature has shown that property tax limitations have induced local public sector response in many ways, including reductions in expenditures and service quality, increased reliance on charges and higher dependence on state aid. This chapter proposes that the downloading of provision responsibility to private governments was also a public government response.

The motivation for the paper is the empirical observation that the years of the property tax revolt coincided with the period of the most dramatic growth in homeowners' association incorporation. The study is organized in two parts. In the first part, a theoretical model focuses on residents of a city who must choose whether or not to join a private government. Public and private government service levels by determined by the respective government budget constraints and the exogenous tax rates. Conditions for equilibrium are outlined, and a computational model provides the testable comparative static: as the property tax rate is exogenously lowered by the state, the proportion of homeowners who choose to purchase a house in a private government increases, notwithstanding the higher cost of housing within the private government.

In the second part of Chapter 4, the California homeowners' association data are

again used to test the theoretical implication. In particular, the analysis examines the effect that Proposition 13, passed in 1978, had on homeowners' association membership, growth and creation. The empirical analysis takes the form of an event study. Results indicate that cities have responded to Proposition 13 by exhibiting higher rates of membership and growth in homeowners' associations. The paper then shows mixed evidence that differences in pre-Proposition conditions can help explain why some cities experienced higher private government growth than others. In particular, pre-limit crime rate, which may be interpreted as a measure of demand for local public services, is a good predictor of homeowners' association membership post-Proposition 13. This is consistent with the view that residents may have feared that Proposition 13 would severely reduce policing effectiveness, and the rise of planned developments and gated communities was a private-sector response.

Chapter 5 examines the role of private governments in the housing market. The chapter begins first with a brief review on sorting models that combine jurisdictional choice with housing markets. This is then integrated with the literature on private governments and why housing markets may play an important role. A theoretical model is presented that is based on Helsley and Strange (1998), with the addition of a housing market into the interaction between homeowners, the private government and the public government. Equilibrium conditions are characterized, with the elasticity of demand for public services playing a key role. A numerical model is presented to show some characteristics of the equilibrium. Finally, Chapter 6 concludes the dissertation.

CHAPTER 2

A Brief Survey of Residential Private Governments

2.1 Introduction

This chapter describes the concept of residential private government and addresses its relevance in local public finance. There is an emphasis on the California experience, as much of the subsequent analysis is set in the state, although homeowners' associations are very common in many other parts of the country.[1]

The survey begins by defining the homeowners' association and introducing the concept of private government. This is followed by an overview of the motivation behind their formation and popularity. Then the survey examines what homeowners' associations do. The chapter concludes by examining theoretical background research that serves as the motivation for the three papers in the dissertation.

[1]It is estimated that Florida has the largest number of homeowners' associations in the United States, owing to its fast growth and high proportion of retirees.

2.2 Homeowners' Associations as Private Governments

A homeowners' association[2] is a body, found in certain housing developments, that manages property owned in common and charges fees for its provision. The association also establishes and enforces covenants and restrictions governing land use. Homeowners who buy property in the housing development must become members in the association.

A homeowners' association is an example of a private government, which is any organization of private individuals, bound by geography, empowered by public authority to act as a government in providing public services, taxing members and enacting and enforcing regulations. The survey begins by highlighting five characteristics of a private government and by arguing that homeowners' associations satisfy them.[3] Along the way, it will be possible to distinguish this type of institution from other forms of collective decision-making.

First, membership in the private government should be *voluntary.* This appeals to the free mobility assumption common to multi-community local public good models based in Tiebout (1956). However, "voluntary" refers to the fact that if one does not want to join the private government, one can move away from its jurisdiction. If the public services provided by the private government are consumed, there is an obligation to participate in the private government.[4] In determining membership, geography plays the foremost role, hence its inclusion in the definition of private government. Once the boundaries of a private government are set, the services that it provides are available to all members. This characteristic makes the homeowners' association distinct from a club, which is less dependent on the residence of the club member.

[2]These are also sometimes known as *community associations* (CAs). Another term that encompasses the governing association and the member households is *common interest developments* (CIDs). This dissertation uses these terms interchangeably.

[3]These five traits were formulated by Helsley and Strange (1998).

[4]Reichman (1976) notes that there is a key legal issue in the regulation and operation of private governments. While municipalities are authorized to enforce payment of property taxes and obedience of by-laws, how can institutions of private individuals do the same? The most common method of enforcement, Reichman notes, is that the private government is entitled to place a lien on the offending property. However, as Mallett (1993) states, the blurred line between private and public means that private governments may lack the authority to perform these governing activities. On the other hand, this legal situation can be subject to abuses. A primary legislative goal is thus the effective reconciliation of private institutions and public authority.

The next characteristic, which is closely related, is *exclusivity.* It must be possible to exclude the consumption of the supplementary services to non-members of the private government. An extreme example is a residential gated community, which denies even the access to its streets to non-residents. By their limited geographic nature, exclusivity is a characteristic exhibited by many local public goods. For instance, homeowners' associations can readily ensure that their swimming pools, extra garbage pickup and security patrols are consumed only by their members.

Third, private governments provide services that are *supplementary.* Indeed, Mallett (1993) cites that private governments initially arose because the public sector was perceived to be unresponsive to consumers' demands for recreational and leisure facilities. Another popular service provided is enhanced security, which supplements police services provided by the municipal government. Thus a key feature of a private government is that members remain residents of the municipality, and therefore continue to pay property taxes to the local government.[5] This characteristic differentiates homeowners' associations from simply another layer of local government, as there is no separation of powers between the public and private governments.

Fourth, private governments should also be *self-financing.* This adds to the autonomy that they enjoy. There are three main ways that private governments raise their revenues. They may require the payment of a fixed fee from each of its members. In many homeowners' associations, each homeowner pays a monthly membership fee, called an assessment. Other methods of financing include a surcharge on the property tax and user fees for the use of certain services. The revenues that homeowners' associations collect can be substantial, with the average monthly assessment for a US household being $180. (CAI Research Foundation 1999) The budget of a homeowners' association can rival that of a small municipality, particularly in very large developments.

Finally, a private government possesses is *scope for strategic interaction with the public sector.* It is this interaction that most differentiates the private government from other types of private sector provision. For instance, in most models where the consumer

[5]However, not all residential private governments coexist with public governments. This is because they may be located in unincorporated territory. While these represent a minority of existing RCAs, they can be viewed as a developer's decision to withdraw from interacting with a traditional local government.

has a choice between consuming a publicly or a privately provided public good[6], the private provider of the service has no objective of its own. Rather, these models assume that consumers can freely purchase as much or as little of the private alternative as they desire. Indeed, in most models of local public good provision, even the traditional public government is often a passive agent. In each community, the median voter decides on the level of public good that should be provided, and the government's budget constraint and production technology imply automatically the level of taxation. Yet in the study of private governments there are some reasons why governments should be viewed as strategic players in the public good provision game.

First, the nature of the services a private government provides prevents members from consuming as much or as little of the public good as they want. Residential associations sell themselves on their security patrols and their recreational facilities, and the decision of membership in a private government implies an all-or-nothing consumption of the package of services the government offers. While it is conceivable that certain services such as home security or leisure facilities can be procured in variable amounts by individuals, the purpose of the private government literature is to examine what motivates a group of private individuals to purchase services collectively. The second reason for considering strategic governments is to examine the widely-held belief that the existence of a private alternative threatens the traditional public provision. By modelling the private and the public governments as economic actors, it is possible to see if this shifting of responsibility is indeed motivated and justified.

These characteristics imply that homeowners' associations are not identical to other methods of collective decision-making, but there is clear overlap. The following sections survey association structure and history, with the goal of arguing that they have evolved into an institution that may have important impacts on urban development.

2.3 The Structure of Homeowners' Associations

Legally, a homeowners' association is found in developments in which homeowners have separate interests in their own unit and an undivided interest in common with other owners. The homeowners' association is responsible for managing the common property.

[6]See, for example, Epple and Romano (1996), Glomm and Ravikumar (1998) and Gouveia (1997)

There are three main types of housing developments with homeowners' associations: planned developments, condominiums and cooperatives. They differ in the structure of the housing and the way that ownership of the housing unit is defined. The type of development that has attracted the most controversy is the planned development. It usually consists of detached or semi-detached houses, although larger developments may also include some multi-family housing. In this case, the homeowner owns the house and the lot under it. The developer designs the entire community, often including streets, parks, security facilities and other common property; the developer then charges homeowners monthly assessments for the provision of the common facilities. Gated communities are planned developments, although not all planned developments have gates.

A condominium is a set of units attached to each other in a complex. Homeowners own the units that they occupy. Each homeowner is a tenant in common ownership of the common property, which include common hallways. The homeowners' association manages the common hallways and amenities. In recent years, many apartment buildings have been converted into condominiums because in rising housing markets, it was often more profitable for building owners to sell the units than to rent them out. Conversion entails the creation of a homeowners' association.

Finally, in cooperatives, homeowners do not own their unit, but have an exclusive right to occupy it. A corporation holds the title to the units and the common areas. Indeed, many of the first homeowners' associations were cooperatives. The Community Associations Institute (2005) estimates that of the 274,000 homeowners' associations in the United States as of 2005, planned developments account for 55-60% of the total, condominiums 35-40% of the total and cooperatives 5-7% of the total. The remainder consists of homeowners' associations in some mobile home parks, marinas and timeshare communities, but their total numbers are relatively small.

How are homeowners' associations governed? All allow for self-government; their governing board consists mostly of elected homeowners. Usually, the board of directors of the homeowners' association consists entirely of volunteer homeowners. However, when a development is newly created, local authorities usually allow the developer to have representatives on the board. This is to protect the developer's interests. As more and more properties in the development are sold, homeowners gradually replace the

developer's representatives on the board. Governing boards sometimes contract with professional management companies to oversee day-to-day issues, but the ultimate authority lies with the association. As well, the vast majority of homeowners' associations are incorporated.[7] This means that the association board members are immune from individual suits from aggrieved homeowners. This last condition has led to one of the deepest criticisms of the homeowners' association: rather than leading to the a greater sense of community, critics contend that the power that the board has over individual homeowners often pits neighbour against neighbour.

2.4 The Rise of Homeowners' Associations

The rise of the homeowners' association as a key feature of many present-day housing development can be attributed to several factors. The first is suburbanization. Housing developers took advantage of cheap land on the outskirts of cities and recognized the cost-efficiency and marketability of large-scale planned communities. Homeowners, particularly in middle-income households, were looking for affordable ways to own their own home, and they wanted safe neighbourhoods with parks, schools and recreational facilities for their families. Roland (1998) states that developers addressed these demands by reducing lot sizes and providing common services, such as swimming pools and tennis courts, through the homeowners' association.

A second factor is the growing heterogeneity in the demand for public services. Within a city, some neighbourhoods have a strong demand for police, while other neighbourhoods may demand leisure facilities. A city government that acts in the interest of the median voter is unlikely to please all residents equally; whereas Bogart (1998) states that "the advantages of private associations are their efficient decision making and the responsiveness of the 'government' to local concerns." Stabile (2000) notes that residents in a homeowners' association may agree on a service level more readily, and because they contract for services directly, they may be able to seek out the most cost-effective ways to provide the services.

A final factor in the rise of the homeowners' association is the constraints of local

[7]It is difficult to get an accurate number, but Chulak (2004) estimates that 99 per cent of California homeowners' associations are incorporated.

governments. The last thirty years have seen a period of fiscal restraint and backlash in local governments. Voters, whether spurred by ballooning deficits or inefficient bureaucracy, demanded change. Local governments grappled with drastic cuts in funding from higher levels of government or with strict limitations of property tax revenue imposed by voters. A famous example of fiscal constraints imposed on local governments was Proposition 13 in California, which was approved by two-thirds of voters in 1978 and which slashed property taxes in half and capped further tax increases to two per cent. On the other coast, Massachusetts voters approved Proposition $2\frac{1}{2}$ in 1980. This initiative imposed an immediate property tax ceiling of 2.5 per cent of assessed value, and it also limited annual nominal increases of property tax to 2.5 per cent.[8] Fiscal burdens often meant reductions in public services. This made housing developments with privately-provided public services even more attractive.

These factors made the private government a major force in urban governance. Because of their private nature, accurate data on the number and nature of homeowners' associations are limited. However, some estimated figures can be given to motivate their growing relevance in urban settings. To begin, according to the 2002 US Census of Governments, there are 87,849 units of local governments in the United States. These include county governments, general purpose local governments, special purpose districts and school districts. In comparison, the Community Associations Institute estimates that in 2002 there were 231,000 residential private governments. Yet not one of these private governments is counted by the Census of Governments, while they all provide, to some extent, services that are also provided by the traditional public sector.

The growth of homeowners' associations in housing development is driven by new construction. The Community Associations Institute (2003) says that half of all new housing construction in the United States incorporates a private government, while Barton and Silverman (1994) state that this number approached 80 per cent in fast-growing suburban California counties. These figures are estimated and may be overstated, but their fundamental claim is borne out by the 2001 American Housing Survey. Tables 2.1 and 2.2 provide some summary values for this survey. Table 2.1 reports the percentage of owner-occupied households that reported paying a homeowners' association fee in 2001,

[8]Cutler, Elmendorf, and Zeckhauser (1999) provides an excellent study of Proposition $2\frac{1}{2}$, its effects on municipal financing and why it was overwhelmingly supported. One reason for its support is that voters perceived their high tax burden as a sign of the government was inefficiently run.

Table 2.1: **Share of Homeowners Paying Homeowners' Association Fees**

(All figures are in thousands unless otherwise indicated.)

	Households paying HOA fees	Total owner-occupied units	Percentage	Median annual fee
All owner-occupied units	**6,448**	**72,265**	**8.9%**	**$312**
New vs Old Units				
New (< 4 yrs) units	1,313	4,690	28.0%	$372
Region				
Northeast	462	12,987	3.6%	$504
Midwest	1,120	18,049	6.2%	$192
South	3,207	26,715	12.0%	$300
West	1,659	14,514	11.4%	$432
Urban/Rural				
Central City	1,190	16,870	7.1%	$264
Suburbs	4,795	39,420	12.2%	$336
Non-metro	463	15,975	2.9%	$264

Source: 2001 American Housing Survey - US Bureau of the Census

while Table 2.2 adds in those homeowners that pay a condominium or cooperative fee. While nine per cent of all American homeowners belong to a housing association, if only units less than four years old are considered, then 28 per cent of these households are members of a housing association. If condominiums and cooperatives are included in the sample, then 34 per cent of new housing, or 14 per cent of overall housing, belong to residential private governments.

Regional differences also underline this proliferation. Residential private governments are most common in the South and the West. As these regions are also the fastest-growing regions in the United States, it is not surprising that the percentage of new housing in private governments has increased so dramatically. Given the proliferation of homeowners' associations in the housing market, the next section outlines some of their key responsibilities.

Table 2.2: **Share of Homeowners Paying Homeowners' Association or Condominium/Cooperative Fees**

(All figures are in thousands unless otherwise indicated.)

	Households paying HOA or condo fees	Total owner-occupied units	Percentage	Median annual HOA/condo fee
All owner-occupied units	**10,209**	**72,265**	**14.1%**	**$312/$2016**
New vs Old Units				
New (< 4 yrs) units	1,413	4,690	30.1%	$372/$1452
Region				
Northeast	1,349	12,987	10.4%	$504/$2352
Midwest	1,894	18,049	10.5%	$192/$1680
South	4,295	26,715	16.1%	$300/$2004
West	2,669	14,514	18.4%	$432/$2112
Urban/Rural				
Central City	2,361	16,870	14.0%	$264/$2268
Suburbs	7,245	39,420	18.4%	$336/$1968
Non-metro	603	15,975	3.8%	$264/$1296

Source: 2001 American Housing Survey - US Bureau of the Census

Table 2.3: **Comparison of Two California Planned Developments**

	Rinconada Hills	*Leisure World*
City	Los Gatos	Laguna Woods
Types of homes	394 townhouses and 40 single-family houses	12,736 housing units, consisting of single-family houses, townhouses and high-rises
Target homeowners	Families	Adults 55 and over
Selected amenities	Clubhouse, pools, tennis courts, landscaped parks and ponds	Six clubhouses, equestrian centre, shuttle buses, fitness and recreation classes, community college classes, libraries, all exterior landscaping
Security services	Traffic control service	Guarded gate, 24-hour mobile patrols

Source: Rinconada Hills and LW Laguna Woods web sites, 2004

2.5 The Roles of Homeowners' Associations

The primary responsibility of homeowners' associations is to provide public services for members. These vary substantially from development to development, and they can be as simple or as lavish as the developer likes. The most basic is the provision and upkeep of common hallways and thoroughfares. Many also provide landscaping and sanitation, in the form of extra street cleaning or garbage disposal. Security is popular, ranging from patrols to gates. Access may also be restricted through the construction of private streets. To give an example of the variety of planned developments, Table 2.3 compares two sample communities in California.

A brief note regarding the gated community is warranted here. The gated community is a form of planned development, where access to the community is restricted through a gate or barrier. These have become highly visible because the motivation for their popularity is rich households' fear of crime. Reich (1991) refers to this as the "secession of the successful," where the wealthy wall themselves in their secure compounds for fear of criminals and ineffective police. Figures from the American Housing Survey, shown in Table 2.4, demonstrate that while gated communities form a significant proportion of

Table 2.4: **Share of Occupied Units in Gated Communities**

(Units, owned or rented, that report that "Community access is secured with walls or fences." All figures are in thousands unless otherwise indicated.)

	Units with secured access	Total number of occupied units	Percentage with secured access
All occupied units	**7,033**	**106,262**	**6.6%**
New vs Old Units			
New (< 4 yrs) units	821	5,853	14.0%
Region			
Northeast	691	20,321	3.4%
Midwest	579	24,758	2.3%
South	2,969	38,068	7.8%
West	2,793	23,114	12.1%
Urban/Rural			
Central City	2,689	31,730	8.5%
Suburbs	3,986	53,574	7.4%
Non-metro	358	20,958	1.7%

Source: 2001 American Housing Survey - US Bureau of the Census

housing units (over ten per cent of new housing units in the West), most homeowners' associations are not gated. Interestingly, gated units are more common in central cities than in the suburbs. This may be due to the survey, which may regard condominiums with electronic access systems as a restricted access community. On the other hand, it may be reflective of gated communities being popular in high-crime areas.

To pay for the services, each homeowner must pay a monthly assessment. Generally, all homeowners pay the same monthly fee. The 2001 American Housing Survey finds that the median monthly assessment is $26 for all private governments. (American Housing Survey 2001) For condominiums in particular, the median monthly assessment is $168. This is comparable to a condominium owner's property tax liability.[9] Homeowners' associations can therefore have a considerable budget, and their spending may rival that of a local government.

[9]Condominium fees are typically higher than planned development fees because condominium fees often pay for building maintenance and repairs. Planned developments fees generally go toward service and amenity provision.

Apart from providing services, homeowners' associations also enact and enforce land use regulations. These are summarized as the association's covenants, conditions and restrictions (CC&Rs) Their goal is to limit the negative externalities neighbours' actions may impose; as Stabile (2000) states, "by joining a [community association], members have implicitly agreed to a private contract to eliminate the social costs of neighborhood effects in a prescribed way." The CC&Rs maintain order in the community by providing homeowners a way to resolve dispute among neighbours and to maintain a high standard of property values.

2.6 Related Research on Homeowners' Associations

An examination of economic research on private government reveals that there has been little theoretical research and hardly any empirical research on private governments. Perhaps this is due to the newness of the concept and the vague line between public and private. Theoretical research in economics have tended to group these governments in with more traditional models of club goods. However, as explained above, private governments have specific characteristics that distinguish them from other forms of public good provision. Besides, the tremendous growth of homeowners' associations as a method of public service provision means it is appropriate to consider them as interesting institutions in their own right. Research on private governments has instead been based largely in the political science and urban planning literature; as such, it is mostly descriptive and heavily based on case studies. This section gives a brief outline of the relevant economic research that the three papers in the dissertation use as background.

The canonical theoretical motivation comes from Helsley and Strange (1998), which identifies the private government as a distinct institution. Its main contribution is highlighting the strategic interaction that takes place between consumers, the private government and the traditional public government. This strategic policy making is attested in the planning literature. Helsley and Strange consider only one urban area, where there is a local government providing a public good. The local government's objective is to maximize the aggregate welfare of the urban population. A private government maximizes the welfare of its members and provides a supplementary level of the public good for members. Helsley and Strange think of the model as a game, in

which the three players — residents, the public government and the private government — interact strategically in determining their actions. The principal implication is that the public government scales back its provision, better suiting the desires of nonmembers, in response to the existence of a private government. The existence of this "strategic downloading" demonstrates that viewing either the public or the private government as non-strategic, passive players misses a key element of the public good provision problem.

In a followup paper, Helsley and Strange (2000) focuses on the formation of private governments due to cost differentials. Private governments are assumed to have lower costs of service provision than public governments. When this outweighs the social cost of forming the private government, it is optimal to have a private government forming. However, the public sector, seeking to protect its rent-seeking position, may have an incentive to block the formation of the private government. This may result in an inefficient outcome, where the private government ought to be formed but is not allowed to.

The interaction between public and private providers of a public good is not a new area of study. Papers in the study of local public goods, especially those that follow in the footsteps of the multi-community model of Tiebout (1956), have examined how equilibrium outcomes can change when there is a private provider. In Epple and Romer (1991), for example, consumers must choose either a public provider of health care or opt out in favour of private provision. If the consumer chooses private provision, he or she can consume as much or as little as desired. In contrast, private government studies, such as Helsley and Strange (1998) and Helsley and Strange (2000), usually assume that the private government produces a fixed amount of the public good offered to its members. That is, the governments act as separate players in this model, maximizing some objective function through its choice of public provision. There is good reason to think that this is an appropriate way to model private government activity, as they often provide local services that a consumer cannot purchase in variable amounts. Only by joining a private government can consumers enjoy the supplementary services they desire.

The previous theoretical research agrees that a key motivation for the private government literature is the interaction between the private government, the public government and city residents. The following three chapters in the dissertation focus on three sep-

arate sources of interaction involving private governments. Taken together, they show that the rise of the homeowners' association has substantial impacts on the city and on local public finance.

CHAPTER 3

The Interaction Between Local Governments and Residential Private Governments

...Homeowner associations in gated enclaves (and in the country's far more numerous un-gated private communities) are now pushing for more favorable tax treatment of the association fees homeowners pay for trash collection, street maintenance, recreational facilities, and other amenities. Some are lobbying for rebates of local property taxes, arguing that their residents do not use the full complement of local services. Others are seeking to make the fees deductible on state and federal income taxes, accorded essentially the same treatment as local property taxes. If these advocates succeed, gated communities will get a large and undeserved breath of life.

– Steven Lagerfeld, http://www.civnet.org/journal/issue5/revlager.htm

3.1 Introduction

This paper examines whether local governments alter their levels of public expenditure in response to increased membership in private residential governments. Previous theoretical research has modelled the interaction between private and public governments, but empirical analysis has been limited by the lack of data. This paper presents the first direct econometric study of the effects of private government prevalence on local

public finance. From a novel data set on homeowners' associations, this paper develops a measure of private government membership in California cities from 1970 to 1999 and employs panel data methods to test whether public and private government activities can be regarded strategic substitutes or strategic complements.

The motivation for this chapter is that the tremendous growth of private government in new housing construction has engendered fierce debate about their effects on public finance. Supporters argue that private governments are a way for those homeowners who wish supplementary levels of public services to purchase them efficiently. Opponents, on the other hand, argue that the growth of private governments erode the support for local government and encourage the bypass of public provision.

This paper sheds light on these controversies by making four contributions. Most importantly, this is the first direct empirical study of the effects of private government on public government behaviour. Previous studies relied on descriptive statistics or isolated case studies. This paper develops an empirical methodology to estimate the interaction effect and takes into account the endogeneity between public and private governments. Second, the paper generalizes the Helsley and Strange (2000) model, the theoretical framework for the empirical analysis. In the Helsley and Strange model, a public and a private government choose public good provision levels simultaneously. The supplementary nature of private provision gives rise to strategic interaction. In the Nash equilibrium, the public government scales back its provision level in response to the private government; that is, public and private government activities are strategic substitutes. This paper generalizes the theoretical model to allow for the possibility of strategic complements, and this provides a consistent framework in which the empirical findings may be applied. Third, the study constructs a panel of California cities over a thirty-year period, merging novel private government data with local government finance data. The panel allows for examination of the geography, variety and growth of private governments. Finally, the empirical analysis shows that local governments in California have reacted to private government activity, consistent with strategic substitution.

For the most part, this paper focuses on the effects of planned developments, as opposed to condominiums and cooperatives, on local public finance for three reasons. First, planned developments are more likely to provide the wide range of services typical of local governments, and so they are the most likely to be perceived as an alternative to

public government. Second, planned developments are the fastest-growing type of private government. Gordon (2004) claims that sales in planned developments represented forty per cent of new home sales in the 1990s. Finally, homeowners in planned developments know that the association has legal powers to force them to pay assessments and comply with regulations. Planned developments use these powers consistently, and the lengthy history of court challenges by individual owners has generally favoured the association. These legal precedents reinforce the notion of the planned development as a government. However, the effects of condominiums, the other major type of homeowners' associations, will not be ignored.

As a preview of the results, a 10 per cent increase in the rate of planned development membership in a city will, on average, decrease per capita total expenditures by 1.63 per cent. However, the rate of condominium membership in a city has no effect on local expenditures. The analysis also uncovers differences between various expenditure categories. Higher rates of private government membership decrease public government spending in some categories, such as police and garbage disposal, but not in others, such as roads and government administration.

The paper is organized as follows. Section 3.2 discusses relevant theoretical research on private government and outlines an extension of the Helsley and Strange model to serve as a framework to address the empirics. Section 3.3 explains the empirical methodology, and Section 3.4 the data. Section 3.5 presents the analysis. Section 3.6 gives some further directions for research. Section 3.7 concludes.

3.2 Theoretical Framework

This chapter presents an extension of Helsley and Strange (1998) and Helsley and Strange (2000), the principal models of private government. In these models a private government and a public government simultaneously provide local public services to residents of a city. Helsley and Strange treat public and private government services as perfect substitutes in consumption and find that private and public government spending are strategic substitutes. In other words, a public government, knowing that a private government exists to supplement services to some residents, provides less of the public service in equilibrium. The upshot is that city residents who do not belong to a private

government receive less of the public service, while members of the private government receive more. Helsley and Strange refer to this result as "strategic downloading."

The strategic downloading hypothesis bolsters popular claims that private government institutions are usurping authority previously held by local government. Roland (1998) and Johnston and Johnston-Dodds (2002) examine the laws that regulate homeowners' associations in California and conclude that their governance structure resembles both business enterprises and municipal governments. Like directors in a corporation, HOA board directors are not personally liable for any damages the association may incur. But like municipal governments, they can enact enforceable regulations and laws, and the association can be compensated for breach of these regulations. McKenzie (1994) argues that such broad powers mean that "CIDs [common interest developments] currently engage in many activities that would be prohibited if they were viewed by the courts as the equivalent of local governments." The transfer of public authority to private governments, and the similarity that private governments bear to local institutions, may feed back to a deterioration in the public system, as argued by Roland (1998): "These affluent communities provide not only amenities like tennis courts, but also better public services like garbage collection and security. Members of the CID communities then vote down taxes needed by local governments to provide services to the broader community."

Tax relief and secession are two more ways private governments affect local government. Anderson (1996) notes that some homeowners' association lobbies have been particularly vocal in demanding reimbursement for public services that they provide for themselves. If public governments are indeed strategically offloading responsibilities to private associations, this argument may have some merit. Ben Lambert, an attorney for the Community Associations Institute in New Jersey (quoted in Klein (1995)), argues that "if homeowners do not burden local governments with needs for services, then they should not be paying for those services." Indeed strategic downloading may push locals to the point of leaving the city altogether. In a recent example, a coalition of homeowners' associations and businesses headed a campaign to remove the San Fernando Valley, an area of 1.3 million people, from the City of Los Angeles. The most common complaint was that residents of the Valley paid more taxes to the City than they were receiving back in services. The debate culminated in a secession referendum in 2002. While the referendum was defeated, it drew attention to the growing power of the homeowners'

associations and their influence on local politics.

Finally, there is a possibility that private governments may increase public expenditure. There may be complementarities in the provision of private and public services such that members of private governments, through their participation in the voting process, demand more output from the public government. Gordon (2004) notes some evidence, although weak, that voters who live in planned developments are more politically active and are more likely to vote in state elections. In such a situation, it may be welfare-enhancing for local governments to welcome the formation of private governments. However, the models of Helsley and Strange do not admit strategic complementarity.

To address this issue, this section presents a theoretical framework in which the empirical results for interaction may be applied. It is a generalization of Helsley and Strange (2000). Assume there is a public government and a private government in a city. Residents are divided into two types: some are members of the private government, and the rest are non-members. The total population of the city can be normalized to 1, so that the population of members can be represented by a fraction μ, $0 \leq \mu \leq 1$. The membership decision is exogenous and is abstracted away by assuming that members have a higher preference for the public service.[1]

There is only one local public service, but both governments can provide it. All city residents can consume the service the public government provides, but only private government members can consume the service the private government provides. Both governments produce their services at a per capita unit cost of c. Assume that residents finance local public service provision by fees. This is consistent with empirical findings that many local services are produced with a constant returns to scale technology.[2]

The assumption is that public and private government services enter in a sub-utility function $v(g^{pub}, g^{priv})$, where g^{pub} represents public government provision, g^{priv} represents private government provision and $v(\cdot)$ is increasing and strictly concave. This is a depar-

[1]For endogenous membership decisions, see Helsley and Strange (1998).

[2]See Reiter and Weichenrieder (1997) for a comprehensive survey of studies of the demand for local public goods. They review studies in the spirit of Bergstrom and Goodman (1972) and Borcherding and Deacon (1972), and they indicate that the "large majority of these studies do not find significant economies of scale, but conclude that the crowding of publicly provided services is so high that these goods are essentially like private goods."

ture from Helsley and Strange (2000), who assume perfect substitutes: $v(g^{pub} + g^{priv})$. The more general formulation admits the possibility of complementarity in consumption. For example, $v(\cdot)$ may represent the utility from "security," so that the public governments provides police spending while the private government provides a gate and patrols. Then if the gate or private security forces increases the marginal effectiveness of police, public and private governments would be complements in consumption.

The utility of a private government member is

$$U^M = v(g^{pub}, g^{priv}) - cg^{pub} - cg^{priv}, \tag{3.2.1}$$

and the utility of a non-member is

$$U^N = \theta v(g^{pub}, 0) - cg^{pub}. \tag{3.2.2}$$

Here, θ lies strictly between 0 and 1, and so represents the lesser weight that non-members place on consuming the public good.

Governments, as the active agents in this model, maximize the aggregate welfare of their constituents. Thus, there are no income effects.[3] Each government holds a Nash conjecture about the provision level of the other government. The provision decisions are taken simultaneously. The private government's problem is straightforward:

$$\max_{g^{priv}} \mu \left[v(g^{pub}, g^{priv}) - cg^{pub} - cg^{priv} \right]. \tag{3.2.3}$$

Thus the private government's optimal provision level is determined by the first-order condition:

$$v_2(g^{pub}, g^{priv}) = c. \tag{3.2.4}$$

The subscripts denote the argument of a partial derivative. Equation (3.2.4) implies that the private government provides a service level up to where the marginal benefit of provision equals the marginal cost.

The public government maximizes the aggregate utility of the entire population, consisting of both private government members and non-members. The public government

[3]Other government objectives are possible, for instance, maximizing aggregate property values, the utility of the median voter or the size of the government budgets. As this model focuses on the strategic actions of the two governments, there is no need to introduce these elements.

solves the following problem:

$$\max_{g^{pub}} \mu \left[v(g^{pub}, g^{priv}) - cg^{pub} - cg^{priv} \right] + (1-\mu) \left[\theta v(g^{pub}, 0) - cg^{pub} \right]. \tag{3.2.5}$$

The first-order condition that determines g^{pub}, taking g^{priv} as given is

$$\mu v_1(g^{pub}, g^{priv}) + (1-\mu)\theta v_1(g^{pub}, 0) = c. \tag{3.2.6}$$

Equations (3.2.4) and (3.2.6) jointly determine the equilibrium levels of g^{pub} and g^{priv}. These two equations implicitly define the two governments' reaction functions: Equation (3.2.4) determines $\hat{g}^{priv}(g^{pub})$, while Equation (3.2.6) determines $\hat{g}^{pub}(g^{priv})$.

Totally differentiating the private government's reaction function gives:

$$\frac{\mathrm{d}g^{priv}}{\mathrm{d}g^{pub}} = -\frac{v_{12}(g^{pub}, g^{priv})}{v_{22}(g^{pub}, g^{priv})}. \tag{3.2.7}$$

Similarly, totally differentiating the public government's reaction function gives:

$$\frac{\mathrm{d}g^{pub}}{\mathrm{d}g^{priv}} = \frac{-\mu v_{12}(g^{pub}, g^{priv})}{\mu v_{11}(g^{pub}, g^{priv}) + (1-\mu)\theta v_{11}(g^{pub}, 0)}. \tag{3.2.8}$$

If $v(g^{pub}, g^{priv})$ is strictly concave, then $v_{22}(g^{pub}, g^{priv})$, $v_{11}(g^{pub}, g^{priv})$ and $v_{11}(g^{pub}, 0)$ are negative, so the following result holds:

$$sign\left[\frac{\mathrm{d}g^{priv}}{\mathrm{d}g^{pub}}\right] = sign\left[\frac{\mathrm{d}g^{pub}}{\mathrm{d}g^{priv}}\right] = sign\left[v_{12}(g^{pub}, g^{priv})\right]. \tag{3.2.9}$$

The cross-partials determine the sign of the reaction function. If the cross-partial v_{12} is positive, public and private government spending are strategic complements, while if the cross-partial is negative, they are strategic substitutes.[4]

The test for strategic interaction comes down to a test of whether the proliferation of private governments in a city has any influence on the local government's choices. *A priori*, the strategic effect can either be negative or positive, indicating strategic substitutes or complements, respectively.

[4]Helsley and Strange (2000) assume that $v_{12} = -1$, and so public and private spending are always strategic substitutes. Note that if both reaction functions are downward sloping, there exists a unique Nash equilibrium. This is not necessarily true if the reaction functions are upward sloping. A unique Nash equilibrium in this case can be ensured by assuming the appropriate condition on the relative magnitudes of the slopes of the reaction functions.

What kind of local services could be expected to be strategic substitutes in private government? An example is local police. Many homeowners' associations feature private security. In condominiums, this usually takes the form of security guards and limited access to the building. In gated communities, barriers restrict access to the roads within the community. The strategic substitutability effect arises if, for example, the local police does not send as many patrols to areas served by homeowners' associations. The marginal utility of public spending falls as policing resources are redirected away from residents in homeowners' associations.

What about strategic complements? They arise from the complementarity in consumption of private and public services. This might come from positive spillovers from one government to the other. For instance, police effectiveness may be enhanced if private associations detain suspicious persons or share information. Alternatively, strategic complementarity could come about from a reallocation of residents' demands. For example, if a large proportion of voters are very concerned about crime, they may demand more local police spending, even while they live in gated communities. Where strategic complementarity exists, public government may have an incentive to increase spending in response to private government. In this case, local authorities may welcome the formation of private governments as a way to increase the overall level of public service consumption.

3.3 Empirical Specification

The simple theoretical model outlined above suggests that, depending on the complementarity or substitutability of privately and publicly provided services, public governments may increase or decrease spending in response to private governments. This section lays out the empirical model that is subsequently used to estimate the sign and the magnitude of this effect.

The basis of empirical work is the estimation of demand functions for municipal public services. Bergstrom and Goodman (1972) and Borcherding and Deacon (1972) are seminal articles that posit demand for local services depends on traditional economic variables, such as price and income, as well as demographic characteristics of residents. Following these papers, various authors, such as Greene and Nelson (1994), focus on

non-demographic, political motivation in explaining public sector spending.

Subsequent research recognizes that local decisions do not consist simply of a city responding to the demographic changes in its population; rather the relationship between a local government and the population it serves is tightly intertwined. It is also important to account for the fact that cities respond to the presence of neighbouring cities and higher levels of government. Thus further research integrates strategic action in estimating local government choices.

Brueckner (1998) is one of the first to test a strategic model of local government spending. He asks whether cities strategically implement certain growth controls in response to neighbouring cities' actions. The key result is that policy equilibrium can be described by a set of reaction functions, and the key coefficient is the slope of the reaction function, which represents the effect of other cities' growth controls on one's own policy. The sign of the slope may be positive or negative, which indicates that if there is strategic interaction, a rival city's growth controls may be strategic substitutes (negative slope) or complements (positive slope) to a given city's controls. Subsequent studies, surveyed by Brueckner (2003), consider other local choices in similar strategic models. Most agree that local governments can and do act strategically. However, previous studies are virtually all cross-sectional analyses, so there is no way to examine questions such as the pattern of growth controls enactment, the effect of long-standing versus recently-enacted measures and other dynamic issues. Thus, the literature on strategic interaction still lacks a panel analysis on how governments respond to each other.

The literature also lacks empirical studies of homeowners' associations. Few studies have considered planned developments as rivals in a local government's provision problem, even with their similarity. A key issue is the lack of data. Because homeowners' associations are private associations, there is no oversight or regulatory agency to compile statistics. It is even unclear how many homeowners' associations exist in the United States. However, as these associations become much more commonplace and politically visible, various authors are beginning to contribute to empirical understanding. These, notably McKenzie (1998) and Gordon (2004), deal mainly with the effect of homeowners' associations on voter behaviour. However, they do not focus on the impact of homeowners' associations on the spending behaviour of local governments.

This paper addresses these gaps in the literature. The analysis focuses on local public expenditure, determined by the following equation:

$$g_{it}^{pub} = \beta g_{it}^{priv} + \delta X_{it} + d_i + d_t + d_{rt} + \epsilon_{it}, \tag{3.3.1}$$

where i indexes cities[5], r indexes regions and t indexes years. g_{it}^{pub} represents public expenditure per capita. Expenditures, rather than revenues, constitute an ideal dependent variable because local politicians make the spending decisions. Also, categorized expenditures make it possible to analyse the effect of private government on individual types of public services.

The explanatory variable of interest is g_{it}^{priv}, the measure of private government activity in city i at time t. The analysis explores two different measures of private government in this paper, which Section 3.4 will describe. The null hypothesis is the absence of interaction of private government on local spending: $\beta = 0$. If this hypothesis is rejected, then the relevant question is whether β is positive, consistent with strategic complements, or negative, consistent with strategic substitutes. The other explanatory variables, X_{it}, on the right hand side of (3.3.1) are other variables posited to affect the level of local public spending. Section 3.4 also describes these variables in detail.

The rest of the estimating equation consists of dummy variables for various unmeasured effects. d_i is the city fixed effect that absorbs permanent heterogeneity at the city level. These might come from geographic amenities, infrastructure or the efficiency of local bureaucracy. They also include political and historical idiosyncrasies. For example, a city that is the county seat may attract state and county spending. This may arise from the flypaper effect, where tax and grant revenues are capitalized into expenditures on administration. In turn, residents of the city demand complementarily higher levels of local services. The type of city government and the relationship between the executive and legislative branches can also matter. The city fixed effect also picks up the variation coming from cities with permanently high or low levels of public expenditure.

Next, d_t is a time dummy for each year from 1971 to 1999, which picks up the time-varying trend in the error that is the same for all cities in the state. These may

[5]A city is an incorporated entity with an autonomous government and self-rule. This is important because one-quarter of California's population does not live in incorporated cities. Planned developments in unincorporated areas, by definition, are excluded from the analysis.

come from business and investment cycles, election cycles and the effects of statewide budgetary limitation initiatives. Aside from the famous Proposition 13, which strictly limited local property taxes, California has had a long history of initiatives to curb perceived government overspending.

Finally, as many cities are members of an interdependent metropolitan conglomeration, it is appropriate to consider region-specific effects as well. d_{rt} is a region-year interaction dummy that absorbs region-specific, time-varying heterogeneity. Shocks of this type may arise from large scale natural disasters, regional crime and regional economic shocks. For instance, one of the most notable regional economic shocks is the technology boom that hit municipalities in the Silicon Valley in the 1990s. The region is defined by the metropolitan statistical area (MSA) in which city i is located. It is a natural choice for delineation of regions, as the Census Bureau itself defines MSAs on the basis of economic interdependence of the municipalities in them. There are sixteen MSAs in California, although not all of them are represented by cities in the sample.

Thus, with all of the dummy variables in the specification, identification is based on changes over *time* in private government proliferation *within* a city. The main source of heterogeneity not controlled for is ϵ_{it}, a time-varying city-specific shock. A key assumption in a fixed-effects estimation, therefore, is that g_{it}^{priv}, the level of private government proliferation, must be uncorrelated with the unobserved error ϵ_{it}. Therefore, a threat to identification would be a *city-specific*, *time-varying* shock to local expenditure that is correlated with private government formation. A possible source of such a shock is a common, exogenous factor that drives both public and private government activity together. This leads to an omitted variables problem. A high level of crime in a city, for instance, may spur increased police spending by the public government, while at the same time raise the demand for gated or patrolled private communities. If this common cause problem is not addressed, then the estimation of (3.3.1) may indicate a spurious positive effect of private government on police spending. To give another example, the election of a "pro-development" council might try to attract residential development by lowering development fees, encouraging private government formation, and lowering taxes, necessitating cuts in expenditure. In this case, the estimation of (3.3.1) will result in a spurious negative coefficient on g^{priv}. Then public governments would not be strategically substituting private governments for public provision; rather their provision is

correlated with private government formation through an underlying political preference for development.

Another threat to identification is the simultaneity of public and private government provision levels. The basis for this problem is that the theoretical papers of Helsley and Strange (1998, 2000) model public and private governments as players in a strategic game. Instead of an exogenous common factor that drives both public and private governments, the two provision levels are jointly determined in a Nash equilibrium. Instrumental variables estimation is an appropriate way to deal with the omitted variables and the simultaneity issue. Section 3.4.4 discusses this approach in detail.

3.4 Data

3.4.1 Public Government Variables

The dependent variable is the level of local public government expenditure, which comes from the Annual Survey of Governments, administered by the U.S. Bureau of the Census. The cities surveyed generally meet a minimum standard for population, but some smaller cities are included as well. The sample is the 110 cities that report thirty years of expenditure data from 1970 to 1999. This represents one quarter of the state's cities, yet they account for a substantial percentage of the urban population.[6] In 1999, the cities in the sample have a combined population of 16,941,390, which is 63 per cent of the state population in incorporated cities.

Because of the sampling methodology, the cities in the sample are larger than the average municipality in California. The mean population for cities in the sample is 129,745 over the period from 1970 to 1999, while it is 44,554 for all 471 cities in the state. Does this pose a serious sample selection problem? There seems to be a tradeoff. If smaller cities are more receptive to the demands of residents and developers and hence more likely to respond strategically to private governments, then this may underestimate the true impact of private governments on local spending. However, if smaller cities in fact respond to a lesser degree because economies of scale make it difficult for them to

[6] A list of the cities in the sample and the regional metropolitan areas may be obtained from the author.

adjust local spending significantly, the strategic downloading effect of private government may be overestimated. Any significant coefficient on the private government variable should then be taken with caution. However, this latter situation is unlikely to arise. There is little empirical evidence that local public service provision enjoys substantial economies of scale. In addition, the empirical model controls for population size by using per capita values for all expenditure variables.

Nine variables measure annual local public expenditure. The principal measure is total direct government expenditure per capita, including current operating expenditures, construction and capital outlays. This variable does not include payments to other governments.[7] The other eight measures are expenditures on specific services: police, fire, highways and roads, solid waste disposal, parks and recreation, housing and community development, libraries and government administration.[8] Each of these categories is used as the dependent variable in an estimating equation, but they are auxiliary tests of the main hypothesis. The motivating question for using categorized expenditures is this: if cities do engage in strategic downloading of service responsibilities to private institutions, does the effect act more strongly for some services compared to others? Intuition suggests that the substitutability of the privately-provided service for the public one plays a crucial role. The top part of Table 3.4 shows the relative importance of the eight categories of spending and provides sample statistics.

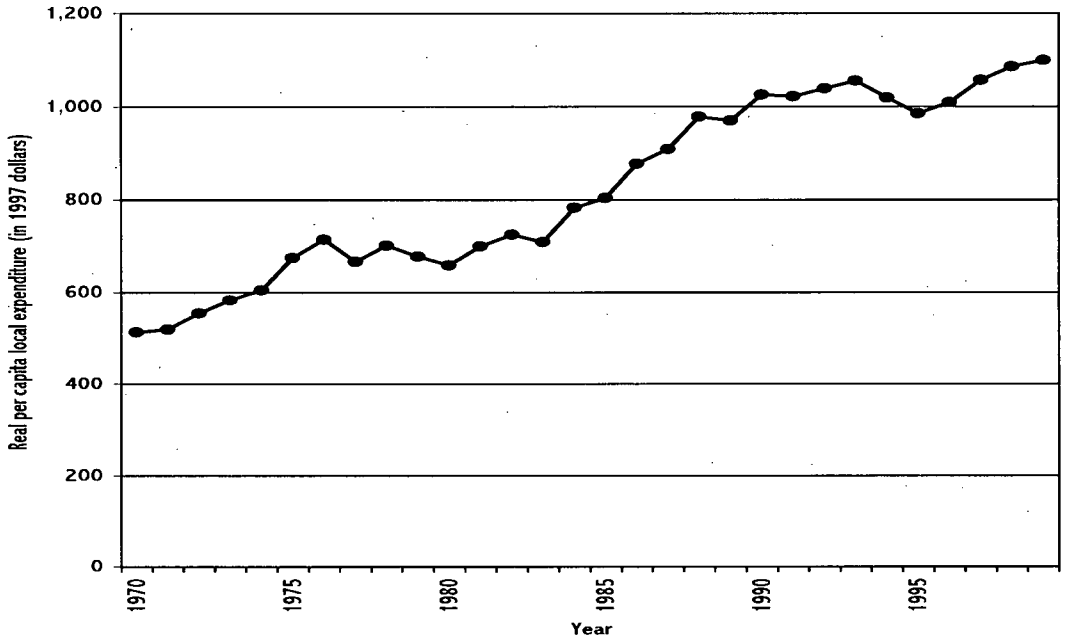
The dependent variable is log per capita real public expenditure. For the auxiliary regressions on specific categories, the dependent variable is log(per capita expenditure + 1) as some cities report zero expenditure for certain categories on occasion.[9] Throughout

[7]This is a potential source of mismeasurement. The only substantial payment to other governments made by cities is to special districts. These districts provide a substantial level of local services; however, they mainly provide water, sewerage and other public utilities. As such, they are not readily substitutable with goods provided by private governments. Total expenditures also do not include specific amounts for the water supply, electric power and public mass transit, presumably as the survey counts these as payments to separate public utility companies. The inclusion of data on special districts and public utilities would undoubtedly add to a more complete description of public government behaviour, but the difficulty in reconciling these data with municipal data places it outside the scope of this analysis.

[8]Several of these categories require additional explanation. "Highways and roads" encompasses the construction and maintenance of all public streets, including sidewalks and bridges. This includes snow removal and street lighting. "Solid waste disposal" not only includes garbage collection but also sanitation services such as street cleaning. "Housing and community development" is a broad category that mostly comprises public housing and urban renewal programs. Finally, "government administration" is the sum of financial administration, judiciary, public buildings and the central staff.

[9]Supplemental regressions showed no qualitative difference in coefficient estimates if the observations

Figure 3.1: **Mean Level of Local Expenditures in the 110-City Panel**



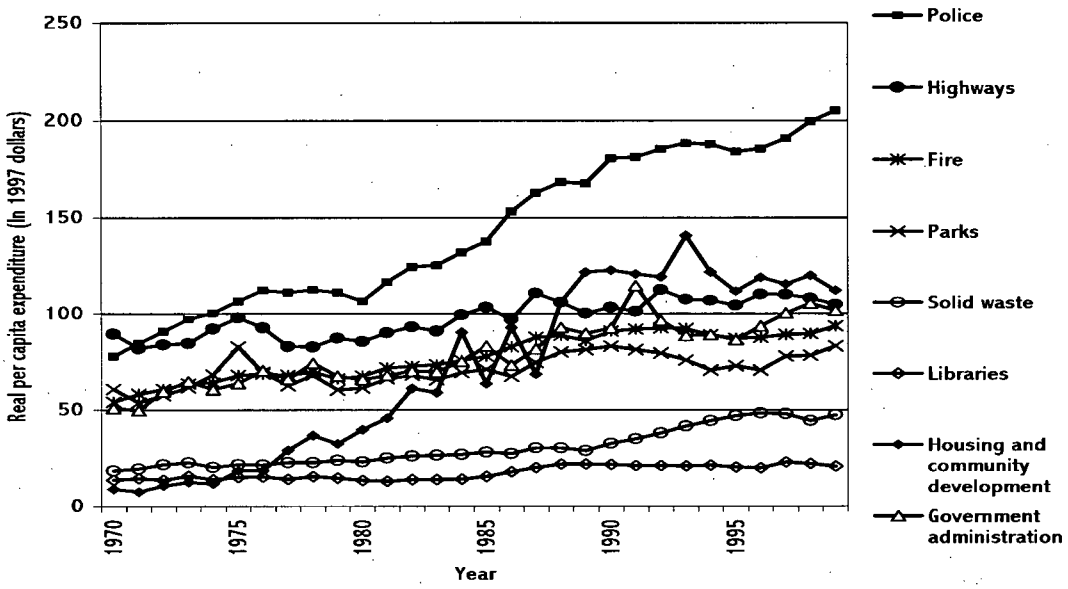
Source: U.S. Census Bureau, Annual Survey of Governments, 1970-1999

the study, all dollar values are expressed in 1997 dollars using the GDP deflator.

Examining the trend of local expenditure from 1970 to 1999 reveals something possibly unexpected. Despite the popular perception of fiscal restraint, real expenditures per capita have actually been on the rise. Figure 3.1 demonstrates this growth. Mean real local expenditure rose from $512 per capita in 1970 to $1,099 per capita in 1999 for cities in the sample. Expenditures did decline from 1979 to 1982, perhaps reflecting the immediate impact of Proposition 13 on local revenues. However, there is ample evidence that cities recovered from the bite of Proposition 13 and subsequent budget-tightening initiatives by reallocating revenue sources. Smith (1991) argues that cities moved to an increased reliance on fees and charges and notes that Proposition 13 had different effects on different expenditure categories. Figure 3.2 shows that a shift in spending priorities did occur. Public safety services such as fire and police experienced an increase in expenditures. There is also a large increase in housing and community development. On the other hand, parks and highways show little growth in real expenditures.

with zero spending are removed.

Figure 3.2: **Mean Categorized Expenditure in the 110-City Panel**



Source: U.S. Census Bureau, Annual Survey of Governments, 1970-1999

3.4.2 Private Government Variables

The key explanatory variable is the level of private government activity. The biggest obstacle to rigorous empirical study is the lack of comprehensive data on these private institutions. A novel source of information about homeowners' associations allows the development of two measures of private government.

A database of homeowners' associations in California was obtained from the accounting firm of Levy and Company in Oakland. It is a unique record of planned developments, condominiums, cooperatives and other homeowners' associations, and it is one of the most complete sources of information about residential private governments available. The database lists every one of the 37,655 incorporated homeowners' associations in the state as of May 2003 along with some information of its size, location and function.

Figure 3.3 shows the number of associations by year of incorporation and type. The figure clearly demonstrates that homeowners' associations were virtually unknown up to 1970. There is a gradual increase in the number during the 1970s, but in 1978, the number of *new* incorporations soared and remained at a very high level for about twelve years. There has been a gradual decline in recent years and a return to new incorporation

levels resembling those of the mid-1970s. The data also show a distinction between the various types of common interest development and their relative popularity. Planned developments, which generally consist of single-family houses, were the predominant form of common interest development in California until the early 1970s. Condominiums began to rise in popularity and took over as the most common form of homeowners' association.

For the major part of the analysis, only planned developments (PDs) enter the panel. Assume that the incorporation year of each development is the first year that the private government is in operation and providing services. Additionally, assume that the death rate of homeowners' associations is negligible.[10] The panel is then constructed by counting how many associations were in existence in each year. There were 3,199 planned developments in the sample as of 1999.

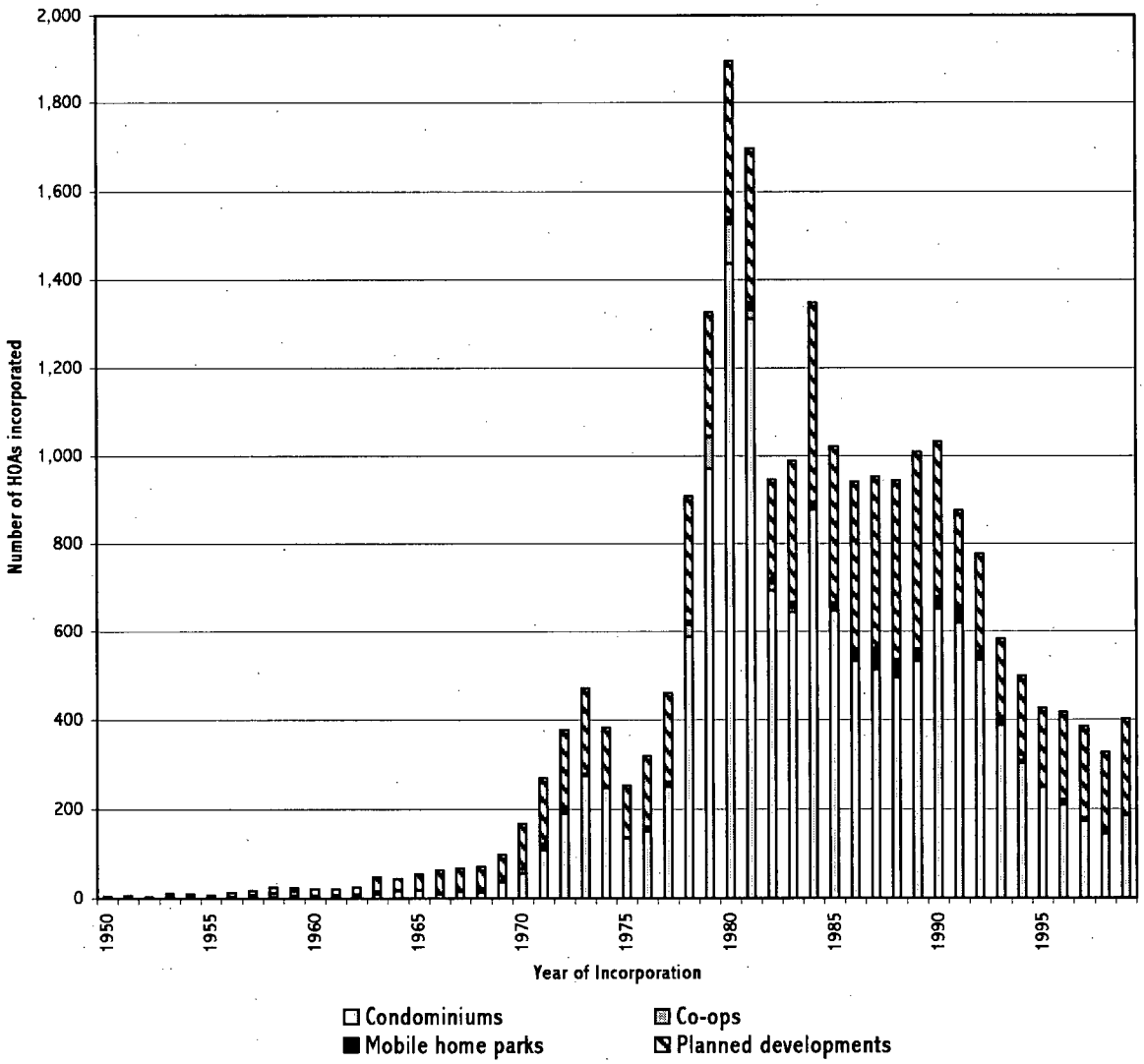
The next step is to impute the total number of PD housing units in each city and year. For confidentiality and data availability reasons, the data set does not report the number of housing units in each association. Instead, it provides a size category variable, which classifies each community association into one of twelve size categories. Each development is assumed to have a number of units equal to the median of the size category it belongs to. Table 3.1 summarizes these imputed values for the two end years of the panel, 1970 and 1999, as well as over the entire thirty-year period.[11]

The first measure of private government is the number of housing units per capita in planned developments in the city. This takes into account the large variation in associ-

[10] As the typical planned development has about 75 single-family housing units, they are unlikely to be destroyed and redeveloped. In addition, California statutes require that each development maintain a residential community association to provide services and enforce covenants. Thus, as long as the structure is still inhabited, the private government is still in existence.

[11] Comparing these imputed numbers to those of other surveys helps to check the plausibility of the imputation. First, the California Department of Finance estimates that there are 6,229,316 housing units in the 110 cities of the panel in 1999. Thus, as Table 3.1 indicates, the imputation suggests that 6.06 per cent of housing units in the state belong to a planned development in 1999. In comparison, the 1999 American Housing Survey estimates that for the Western states, 6.5 per cent of occupied housing units belong in planned developments. This figure represents the number of housing units that report paying a regular homeowners' association fee, but which are not condominiums or cooperatives. It appears that the imputed housing numbers match the actual situation quite closely. In addition, the Levy and Company data set also includes some associations for which it is unknown whether they are planned developments, condominiums or some other type. These are assumed to occur at random and are dropped from the analysis. Thus, the imputed numbers probably underestimate the true number of planned development units in the state. However, even with these plausibility checks, measurement error may be a significant source of bias in the estimated interaction effect.

Figure 3.3: **Growth in HOAs in California – Entire State, All Types**



Source: Levy and Company, 2003

ation size. It is reasonable to believe that a development with ten units should not have the same marginal effect on public spending as a development with five hundred units, especially if the two are located in relatively small municipalities. The second measure of private government is the membership rate, the number of planned development housing units as a proportion of all the housing units in the city.[12] This measure has intuitive appeal. Public governments may be more inclined to act strategically if they realize that a large proportion of their population is paying for similar private services.

The 110 cities in the panel exhibit wide variation in private governments. Table 3.1 presents some summary statistics of the private government variables. The mean rate of planned development membership from 1970 through 1999 was 5.3 per cent. In 1999, the mean was about 8.1 per cent, reflecting the upward trend in private government membership.[13] Figure 3.4 shows the membership rate from 1970 to 1999, calculated as the sum of all PD units divided by the sum of all housing units in the cities of the sample.

In addition, planned developments are not distributed equally across municipalities. In 1999, the highest rate of membership, three-fifths of all housing units, was in Auburn in Placer County. Auburn is a suburb of Sacramento. Indeed, the highest rates of membership are found in smaller suburban cities. To look at a cross-section, Figure 3.5 shows a map of the counties of California shaded with the mean rate of planned development membership in 1999; planned developments are most heavily located in suburban counties surrounding San Francisco, Los Angeles and San Diego.

[12]The denominator of the planned development rate combines different sources to obtain a reasonable time series of total housing units in each city. For 1970, 1980 and 1990, the U.S. Census Bureau provides housing unit counts. For 1991 through 1999, the California Department of Finance's Demographic Research Unit provides housing unit estimates. For the other intervening years, the number of housing units is interpolated using the Census values as anchors and assuming a constant growth rate.

[13]Out of concern for the stationarity of the time series of public and private governments, the panel unit root test given by Levin, Lin, and Chu (2002) with an individual specific mean and time trend was performed. The panel unit test soundly rejects the null hypothesis of non-stationarity for log real per capita public expenditures: the t statistic is -17.05. The private government measures also reject the null: for per capita planned development units, the t statistic is -1.82, which is significant at the 5 per cent level. For planned development membership rate, the statistic is -2.95, which is significant at the 1 per cent level. These test results indicate that the regression techniques are valid.

Table 3.1: **Summary Statistics of Planned Development Measures**

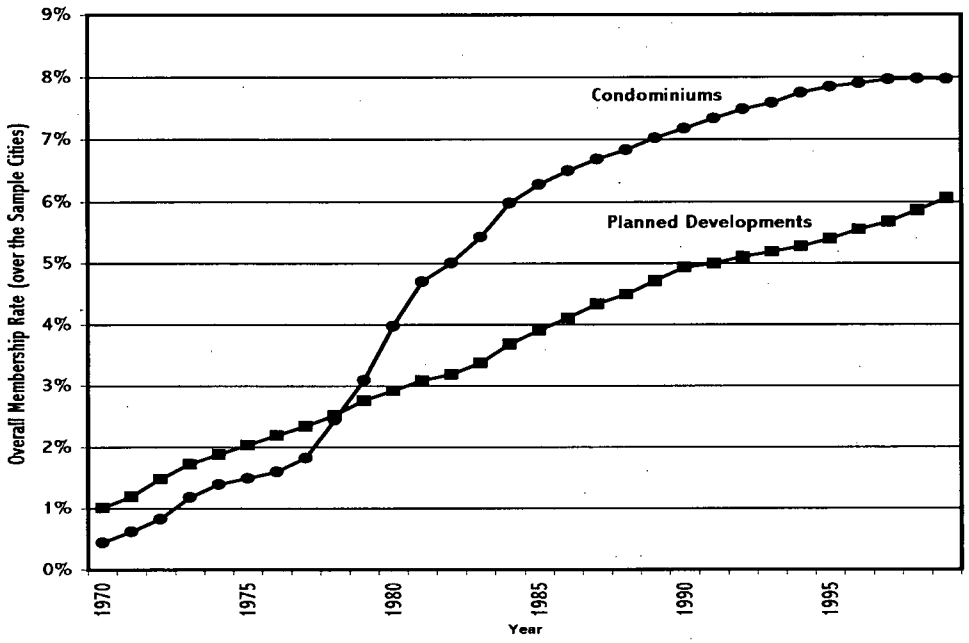
Sample: 110 cities over 30 years

Actual number of planned developments in 1970, all cities:	142
Total imputed PD units in 1970, all cities:	50,585
Actual number of planned developments in 1999, all cities:	3,199
Total imputed PD units in 1999, all cities:	377,269

Year(s)	Mean	Std. Dev.	Min.	Max.
Total PD units in city				
1970 only	382	817	0	4,557
1999 only	3,430	5,332	0	40,556
1970-1999	1,900	3,465	0	40,556
PD units per capita in city				
1970 only	.007	.057	0	.152
1999 only	.030	.091	0	.268
1970-1999	.021	.031	0	.296
PD membership rate in city				
1970 only	2.1 %	2.0 %	0 %	38.4 %
1999 only	8.1 %	3.7 %	0 %	60.2 %
1970-1999	5.3 %	7.4 %	0 %	60.2 %

Source: Levy and Company 2003, and author's own calculations

Figure 3.4: **Overall Membership Rates in Planned Developments and Condominiums in the 110-City Panel**



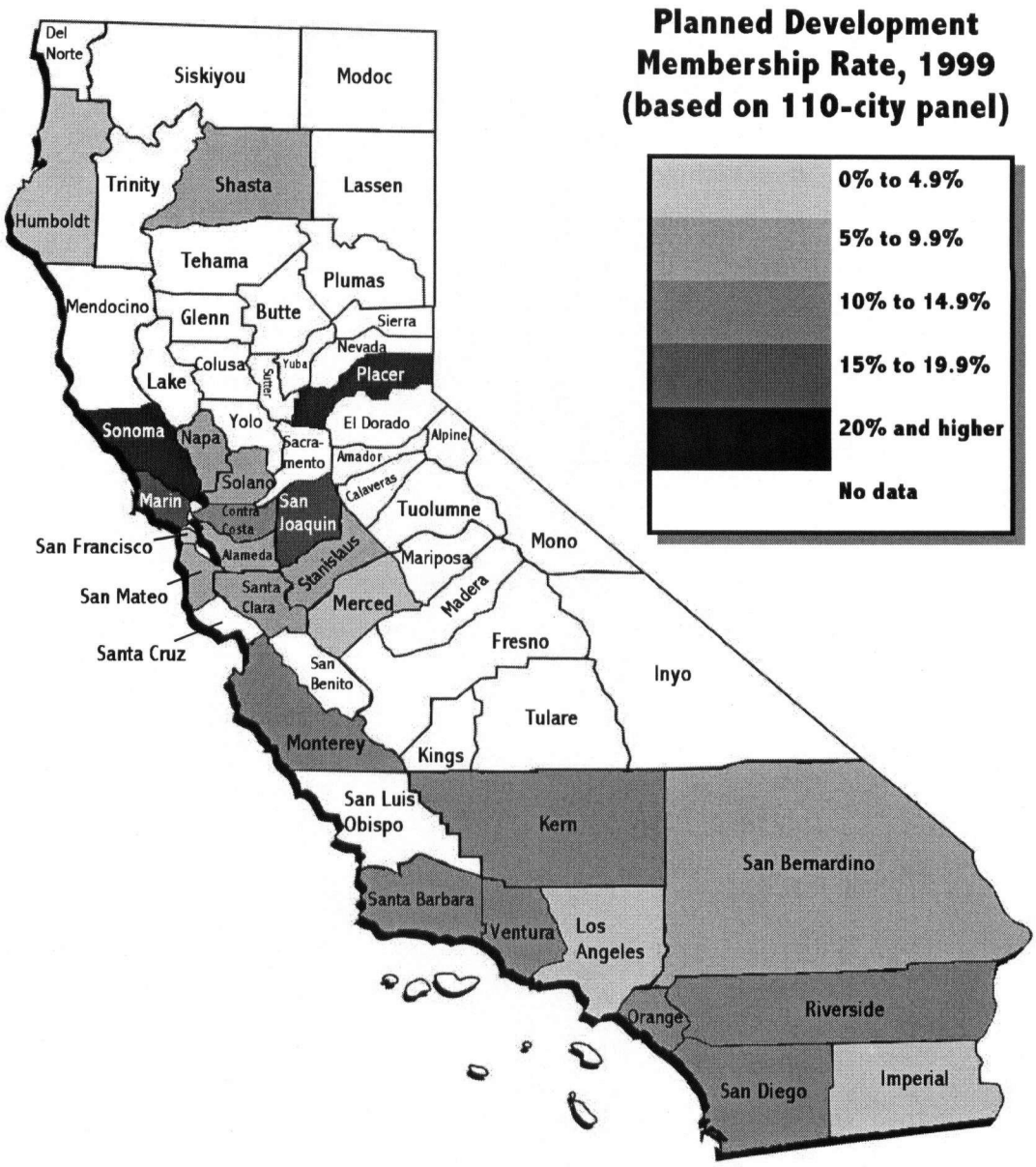
Source: Levy and Company, 2003, and author's own calculations

3.4.3 Other Covariates

The model also includes variables that are commonly encountered in empirical studies of local government spending. The covariates include population density, median household income, proportion with a college degree, proportions of blacks, Hispanics and Asians, proportion of foreign-born, proportion reporting welfare income, proportion of persons 17 and under, proportion of persons 65 and over, proportion of dwellings that are owner-occupied and 5-year population growth rate. All of these are expected to exert some pressure on the demand for local public expenditures. The data come from census sources. Finally, two sets of dummy variables absorb the yearly effect and the yearly regional effect.

Before moving to the regressions, it is useful to look at some of the correlations between PD membership rate and some of the covariates. Table 3.2 shows some selected correlations between covariates and various types of private government. For the most part, correlations between a city's PD membership rate and the covariates are weak.

Figure 3.5: **Rate of Planned Development Membership by County**



Source: Levy and Company, 2003, and author's own calculations

Table 3.2: **Correlations Between HOA Membership Rate and Selected Covariates, Selected Types**

Sample: 110 cities over 30 years

	Correlation with rate of membership		
Covariate	All HOAs	Planned Developments	Condos
Per cent Black	-.17	-.15	-.14
Per cent Asian	.02	-.05	.11
Per cent Hispanic	-.11	-.15	-.04
Per cent with 4 years college	.44	.27	.53
Per cent 65 and over	.28	.17	.33
Per cent 17 and under	-.30	-.12	-.45
Median household income	.32	.19	.39
Population density	-.30	-.35	-.10
Per cent owner-occupied dwelling	.16	.22	.03

Source: Levy and Company 2003, Census data and author's own calculations

The proportions of Blacks and Hispanics are weakly negatively related to membership rate, which may confirm the perception of PDs as a subtle means of exclusion. The proportion of elderly is somewhat positively correlated with membership rate, probably reflecting the popularity of retirement communities in some cities. Interestingly, cities with high rates of homeowners' associations are not necessarily wealthy cities. The correlation between membership rate and median family income over the sample is 0.32. While the most popular image of homeowners' associations is that of an exclusive, gated community, the data reveal that they are becoming more and more common among middle-income families. However, there is a clear positive correlation between average education levels and membership in a homeowners' association. Finally, population density is negatively correlated with membership rate, which is another reflection of the popularity of private governments in newer suburban developments.

3.4.4 Instrumenting for Endogenous Variables

The estimating equation of public spending may have an endogeneity bias. Private government activity may not be exogenous to public expenditure. Private government belongs in the public government's reaction function, but theory suggests that public

provision can affect private government activity. One demand-driven possibility is that homeowners, frustrated by the deterioration of local services, demand neighbourhoods that provide higher-quality services and pay for the privilege by joining a homeowners' association. There may also be a supply-driven reason. Many authors (Roland (1998), Johnston and Johnston-Dodds (2002)) argue that local authorities, faced with voter-imposed and state-imposed spending cuts, turn to land developers with a deal. The government unloads the cost of providing infrastructure and local services on the developer, who may receive additional tax incentives. The developer then passes the costs to homeowners by setting up a private government. The empirical estimation must address these sources of endogeneity.

In order to correct for the simultaneity and endogeneity problems, instrumental variables are needed that affect private government formation but *not* public spending. Two types of variables serve as instruments, lagged private government and city land area.

IV: Lagged Values of Private Government

The justifying assumption is that past values of private government proliferation in the city do not affect current levels of public spending. Using them as an instrument assumes there is an underlying factor about the city that encourages the growth of private governments. This can be institutional, taste-driven or developer-driven.

Lagged private government values of fifteen and twenty years serve as instruments. It is reasonable to think that private development decisions taken fifteen to twenty years ago will influence present public spending only through the creation of more private governments. The instruments are simply the lagged values of per capita planned development units or planned development membership rate, whichever happens to be the key measure of private government. The use of the lagged endogenous variable in instrumental variables estimation has a long history in econometrics.[14]

For lagged private government to serve as an appropriate instrument, it is necessary to assume that if there is any persistence in local public expenditures, it is not as long as the lag in planned development measure. As municipal councils would have turned over at least several times in fifteen years, this assumption is likely defensible.

[14]See, for instance, Villas-Boas and Winer (1999) and Aronsson, Lundberg, and Wikstrom (2000).

IV: Land Area

City land area serves as an instrument for private government prevalence because a pattern of annexations generally indicates residential development. New residential development drives the growth of private governments. Between 1970 and 1999, almost every city in the panel changed in land area. Most boundary changes result from the annexation of undeveloped land and hence add to the land area of a city.[15] Land area changes in turn reflect the feasibility of and taste for increased residential development. First, planned developments tend to require large tracts of land, so cities that border on unincorporated land have more "room to grow." A city should also have the demand for increased residential development in order to undertake the annexation process: while cities may annex for many economic and political reasons, suburban developers initiate a large proportion of annexations.[16] Fleischmann (1986) corroborates this view with historical evidence that developers use annexation as a way to shift development costs to local governments. Therefore, land area changes should, in part at least, reflect episodes of increased residential development.

California reality reflects this argument. Developers often spearhead annexation campaigns by petitioning the city they wish to join. This request must then receive approval from a county-level Local Area Formation Commission (LAFCO). The LAFCO assesses the environmental, economic and political impact of increasing city boundaries on surrounding areas before granting approval; thus, local boundary changes are usually justified by a demand for development.[17]

Evidence also suggests that increased development activity is strongly responsible for the tremendous growth of private governments. Roland (1998), for instance, notes that developers responded to the rising cost of land in the 1960s by combining smaller lots with common open areas and marketing them as a planned development. This also coincided with changes in the building industry, where large-scale corporate builders started to dominate. These builders had the capital to construct large planned communities. In a county-level analysis, McKenzie (1998) shows that developer driven action

[15]Epple and Romer (1989) notes that annexations make up 98% of all boundary changes in their survey.

[16]See Austin (1999) for an empirical example.

[17]An exploration of minutes from LAFCO meetings confirms that petitions for annexation are most often initiated by landowners and developers.

can explain much of the variance in private government popularity.

Land area changes are assumed to be uncorrelated with shocks to public spending. This is likely to be the case because land area changes tend to be incrementally small. Such small changes in land area should not result in large increases in per capita public service expenditure.

Table 3.3 gives some descriptive statistics for the land area instrument.[18] Cities vary widely in size, from barely two square miles for Fortuna to nearly 470 square miles for Los Angeles. There has been tremendous growth in city sizes, an average increase of 40.5 per cent over the period from 1970 to 1999. However, comparison with single-year growth rates demonstrates that area growth is incremental and consistent with developer-driven demand. The mean single-year change is only 0.3 square miles. The mean is pulled down by years in which cities do not change in area. For only those years in which a city experienced a change, the mean change is 1.7 square miles, and the median change is 0.35 square miles. This pattern of heavy but incremental annexation activity suggests that residential development, rather than other political motivation, is the driving force behind land area changes. As development is correlated with the formation and proliferation of private governments, its use as an instrumental variable is justified. To summarize, Table 3.4 gives a complete list of all the variables used in the analysis.

3.5 Analysis

3.5.1 Without Private Governments

First, consider a model of local public spending using all of the explanatory variables except for measures of private government. This acts as a gauge of the quality of

[18]Unfortunately, the land area variable is subject to measurement error, as it is difficult to obtain yearly land area numbers. A combination of sources is used. The U.S. Census gives accurate area measurements for 1970, 1980 and 1990. The *County and City Data Book* provides areas for 1975. The U.S. Census Bureau's Boundary and Annexation Survey provides land area data for 1976 through 1979 (U.S. Census Bureau 1980). The *California Planner's Book of Lists* provides land area for the following years: 1981, 1984, 1985 and 1995-1999 inclusive. As these are self-reported values, however, they may not be reliable as the Census measurements. If the area for a certain year is missing, it is assumed that area is that of the closest past year with data.

Table 3.3: **City Land Area Descriptive Statistics**

Sample: 110 cities over 30 years

	Mean	Std. dev.	Min.	Max.	Median
Land area (sq. mi.)	27.5	55.1	1.9	469.3	15.2
Single-year change* in area (sq. mi.)	.3	2.2	-17.6	72.3	0
Single-year percent change* in area	1.1%	7.5%	-45.6%	128.5%	0%
Change in area, 1970-1999 (sq. mi.)	7.4	14.5	-2.1	89.1	2.4
Percentage change in area, 1970-1999	40.5%	67.5%	-40.0%	344.0%	16.7%

*Single-year changes from 1970-1971 to 1998-1999. Because of data inconsistencies for years in the 1960s, the single-year change from 1969 to 1970 is omitted.
Source: U.S. Bureau of the Census and the *California Planner's Book of Lists*

the demographic and public expenditure data. Columns (1) through (3) of Table 3.5 report the estimated regression results. A Hausman test suggests that the appropriate error structure is a fixed-effects rather than a random-effects estimator. The R^2 on the regressions suggests a relatively good fit by the explanatory variables, given the cross-sectional data. They also indicate that the year dummies and the metro-year dummies have considerable explanatory power.

As both the fixed-effects and the IV estimations give similar qualitative results for the demographic covariates, they are discussed here. Population density has a strong negative coefficient, which suggests that there is a spreading of the fixed costs of services among a dense population. Median household income affects per capita spending in a positive manner, consistent with local expenditures being a normal good. The income elasticity, evaluated at the mean, is .26 for specifications (1) and (2), which include year dummies, and .15 for specification (3), which does not. This is consistent with other papers, which find an income elasticity less than one.

The proportions of Blacks and Hispanics have a positive effect on per capita spending, suggesting a redistributive element in municipal budgets; this supports the results of Bergstrom and Goodman (1972). The proportion of Asians does not have a significant impact on local spending; but as Asians have similar median family incomes to white non-Hispanics ($61,383 versus $65,342 respectively in 2000), this is not surprising. Interestingly, the proportion of young people in a city is negatively correlated with

Table 3.4: **Summary of Variables**

Sample: 110 cities over 30 years

Variable	Source	Mean	S.D.	Min	Max
Dependent Variables – per capita					
Total general expenditure	(a)	808	578	7	5,945
Police expenditure	(a)	140	100	0	1,053
Highways and roads expenditure	(a)	95	83	0	1,367
Fire expenditure	(a)	76	66	0	543
Parks and recreation expenditure	(a)	69	70	0	1,844
Waste disposal expenditure	(a)	30	40	0	342
Libraries expenditure	(a)	17	23	0	379
Housing and community development expenditure	(a)	70	126	0	2,407
Government administration expenditure	(a)	78	71	0	1,066
Explanatory Variables					
Proportion Black	(b)	.07	.11	.001	.75
Proportion Hispanic	(b)	.20	.17	0	.91
Proportion Asian	(b)	.08	.08	.001	.75
Proportion of adults with 4 years of college	(b)	.09	.06	.006	.32
Proportion 17 and under	(b)	.29	.07	.13	.48
Proportion 65 and over	(b)	.10	.04	.02	.26
Proportion reporting welfare income	(b)	.09	.04	.02	.26
Proportion foreign-born	(b)	.21	.10	.02	.59
Proportion of housing units owner-occupied	(b)	.55	.12	.19	.92
Median household income, in thousands	(b)	36.9	9.69	4.5	71.8
Population density (thousands of persons/sq. mi.)	(b,d)	5.3	3.1	.4	22.7
5-year population growth rate	(b)	.12	.19	-.13	2.93
MSA-year interaction dummies					
Year dummies					
Per capita number of PD units	(c)	.020	.031	0	.30
Rate of PD membership	(c)	.053	.074	0	.60
Instruments					
Per capita PD units lagged 15 years	(c)	.009	.021	0	.26
Per capita PD units lagged 20 years	(c)	.006	.017	0	.25
PD membership rate lagged 15 years	(c)	.023	.054	0	.56
PD membership rate lagged 20 years	(c)	.016	.046	0	.52
City land area in square miles	(d)	27.6	55.1	1.9	469.3

All dollar values are GDP deflated to 1997 values. Sources:

a = City public expenditures data from the Annual Survey of Governments, U.S. Bureau of the Census.

b = Population and demographic data from the U.S. Census of Population and Housing (1970, 1980, 1990). Yearly population data also from the California Department of Finance, Demographic Research Unit (2003).

c = Homeowners' associations data from Levy and Company (2003).

d = Land area data from the U.S. Census of Population and Housing (1970, 1980, 1990), the *County and City Data Book* (1975), the U.S. Census Boundary and Annexation Survey (1976-1979) and *The California Planner's Book of Lists* (1981, 1984, 1985, 1995-1999).

expenditures. As school expenditures are not included in a city's budget, the negative coefficient is probably a reflection of the lower tax base. On the other hand, the proportion of senior citizens in the city does not have a significant effect on local expenditures. Perhaps this is due to the nature of local services: they may be no more likely to be demanded by older persons than by younger ones. The coefficient on owner-occupied housing is significantly positive; this contradicts some previous findings that owners, being the most sensitive to property tax, are a persistent force in keeping expenditures low.

The remaining explanatory variables raise some questions. Five-year population growth varies in sign depending on the inclusion or exclusion of year dummies. How well-educated a municipality is has either no significant or a positive effect on spending. But as the positive sign comes in only on the specification without year dummies, this might simply be picking up the fact that education levels have risen over years of the sample. Also, the insignificant coefficient on education might reflect collinearity with median income. Finally, the proportion of people who are foreign-born and the proportion who receive welfare income do not have significant effects on local expenditures, but these are likely noisy measures of the effect of migrants and poverty.

Table 3.5: **Fixed-Effect Estimation Results. Private Government Measured by Planned Developments**

Sample: 110 cities over 30 years

Dependent variable: Log per capita real public expenditure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Per capita PD units				-2.149**	-1.227**	1.933**			
				(.435)	(.403)	(.42)			
PD membership rate							-.975**	-.714**	.625**
							(.171)	(.161)	(.165)
% Black	1.058**	1.272**	1.315**	1.08**	1.279**	1.3**	1.105**	1.291**	1.294**
	(.238)	(.24)	(.269)	(.237)	(.24)	(.268)	(.237)	(.24)	(.268)
% Asian	.02	.056	.037	.026	.056	.026	.052	.075	.012
	(.128)	(.129)	(.141)	(.127)	(.129)	(.14)	(.127)	(.128)	(.141)
% Hispanic	.532**	.739**	.98**	.511**	.712**	.936**	.512**	.701**	.938**
	(.135)	(.131)	(.077)	(.135)	(.131)	(.078)	(.134)	(.13)	(.078)
% with 4 years college	-.026	.523*	1.693**	-.263	.398	1.616**	-.381	.283	1.633**
	(.279)	(.266)	(.189)	(.282)	(.268)	(.189)	(.284)	(.27)	(.189)
% 17 and younger	-1.125**	-1.304**	-1.446**	-1.242**	-1.345**	-1.39**	-1.341**	-1.418**	-1.378**
	(.282)	(.279)	(.237)	(.282)	(.278)	(.237)	(.283)	(.279)	(.238)
% 65 and older	-.472	.222	.645	-.479	.257	.513	-.601	.169	.597
	(.403)	(.397)	(.411)	(.402)	(.397)	(.411)	(.402)	(.396)	(.41)
% with welfare income	-.068	-1.134*	-.936	-.149	-1.253*	-.839	-.217	-1.331*	-.836
	(.565)	(.52)	(.545)	(.563)	(.521)	(.544)	(.562)	(.521)	(.545)
% foreign-born	.045	.203	.067	-.0002	.169	.129	.009	.154	.103
	(.165)	(.162)	(.113)	(.164)	(.162)	(.113)	(.164)	(.161)	(.113)
% owner-occupied homes	1.166**	1.307**	1.309**	1.274**	1.36**	1.247**	1.282**	1.374**	1.277**
	(.158)	(.155)	(.169)	(.159)	(.155)	(.169)	(.159)	(.155)	(.169)
Median household income	.007**	.007**	.004**	.008**	.007**	.004**	.007**	.007**	.004**
	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)	(.001)
Population density	-.038**	-.027**	.005	-.04**	-.027**	.004	-.04**	-.027**	.003
	(.007)	(.007)	(.007)	(.007)	(.007)	(.007)	(.007)	(.007)	(.007)
5-year pop. growth rate	.048	.043	-.086**	.052	.048	-.089**	.066*	.059*	-.097**
	(.028)	(.027)	(.029)	(.028)	(.027)	(.029)	(.028)	(.027)	(.029)
Const.	-1.024**	-.947**	-1.297**	-.956**	-.898**	-1.29**	-.884**	-.825**	-1.313**
	(.2)	(.159)	(.157)	(.199)	(.16)	(.157)	(.2)	(.161)	(.157)
Time dummies	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No	Yes	No	No
N	3,290	3,290	3,290	3,290	3,290	3,290	3,290	3,290	3,290
R^2 within	.647	.604	.497	.650	.605	.501	.651	.606	.500
R^2 overall	.100	.147	.126	.093	.143	.129	.093	.142	.128

* and ** denote significance at the 5 and 1 per cent level, respectively.

3.5.2 Instrumental Variables Estimation

This section estimates the public expenditure equation by two-stage least squares. A Hausman test supports the use of a fixed-effect IV model versus a fixed-effect OLS model. The set of instrumental variables is city land area and fifteen- and twenty-year lagged values of the planned development measures.[19] Table 3.6 reports the results of the IV estimation of total per capita expenditure regressed on PD membership measures. In all specifications, the coefficient of the lagged private government variable and land area is positive and highly significant in the first-stage regression.[20] A Sargan overidentification test of the instruments does not reject the null hypothesis that the instruments are uncorrelated with the error term in the local government equation. This gives some confidence to the overall set of instruments used.

The instrumental variables estimation indicates the presence of a significant interaction effect. Interestingly, the sign differs depending on the inclusion or exclusion of the year and region-year dummies. Column (6) suggests that PD membership rate positively affects local spending at the ten per cent level, indicating a weak strategic complementarity. However, the private government variable, which is trending up, may simply be capturing the upward trend of local expenditure. The fact that the positive coefficient turns to negative when time effects are included suggests that they are picking up a time effect that is driving both public and private government in the same direction.

After controlling for time effects (columns 1, 2, 4 and 5), the coefficient on private government becomes negative. This is consistent with the view that public governments see private government activity as a strategic substitute. Elasticities of public expenditure with respect to private government are calculated by multiplying by the mean of the private government measure. For example, Column (4) of this table suggests that for a city with the mean rate of planned development membership of .0533, the

[19] Estimation was also performed with different combinations of lags, ranging from ten to twenty years, in the first-stage regressions. As long as the lags used are sufficiently long, they give qualitatively similar results. Tables only report the best-fitting combination of fifteen and twenty year lags.

[20] The F statistic for the joint significance of the instrumental variables in the first-stage regression using per capita PD units on the instruments is 62.4. In the first-stage regression using PD membership rate, the joint F statistic on the instruments is 49.2. (These last two statistics come from the specifications with year dummies and interacted year-MSA dummies.) Finally, in the specification with time and MSA-time dummies, the partial R^2s of the excluded instruments in the first-stage regression are .039 for per capita PD units and .038 for PD membership rate.

Table 3.6: **IV Estimation Results – All Covariates. Private Government Measured by Planned Developments**

Dependent variable: Log per capita real public expenditure
Instruments: 15 and 20 year lagged private government measure and land area of city

	(1)	(2)	(3)	(4)	(5)	(6)
Per cap PD units	-7.74**	-4.272**	.943			
	(1.63)	(1.11)	(.972)			
PD membership rate				-3.063**	-1.829**	.67
				(.726)	(.494)	(.393)
% Black	.665**	.908**	.84**	.742**	.941**	.831**
	(.224)	(.221)	(.245)	(.225)	(.221)	(.245)
% Asian	.075	.087	.022	.137	.121	.003
	(.118)	(.117)	(.126)	(.119)	(.117)	(.127)
% Hispanic	.128	.377**	.576**	.139	.32*	.504**
	(.136)	(.128)	(.082)	(.131)	(.126)	(.085)
% with 4 years college	-.404	.74*	2.537**	-.692	.523	2.579**
	(.363)	(.293)	(.2)	(.436)	(.33)	(.201)
% 17 and younger	-1.26**	-1.504**	-.985**	-1.488**	-1.597**	-1.011**
	(.307)	(.293)	(.228)	(.314)	(.294)	(.228)
% 65 and older	-.687	-.242	.098	-1.045**	-.434	.077
	(.409)	(.396)	(.391)	(.393)	(.382)	(.383)
% with welfare income	-.46	-1.677**	-.942	-.6	-1.884**	-1.046*
	(.538)	(.501)	(.506)	(.541)	(.499)	(.504)
% foreign-born	-.348*	-.143	.035	-.273	-.073	.096
	(.167)	(.161)	(.12)	(.164)	(.159)	(.117)
% owner-occupied homes	1.41**	1.402**	1.061**	1.384**	1.412**	1.114**
	(.177)	(.158)	(.165)	(.177)	(.156)	(.162)
Median household income	.006**	.002	.0004	.006**	.002	-.0003
	(.002)	(.002)	(.002)	(.002)	(.002)	(.002)
Population density	-.025**	-.01	.023**	-.025**	-.01	.023**
	(.007)	(.006)	(.007)	(.007)	(.006)	(.007)
5-year pop. growth rate	.004	.013	-.137**	.043	.034	-.145**
	(.032)	(.03)	(.031)	(.033)	(.031)	(.031)
Const.	-1.007**	-.956**	-1.122**	-.875**	-.896**	-1.118**
	(.175)	(.166)	(.149)	(.168)	(.164)	(.147)
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No
N	3140	3140	3140	3155	3155	3155
R^2 within	.646	.61	.517	.65	.612	.515
R^2 overall	.062	.118	.123	.067	.122	.123

* and ** denote significance at the 5 and 1 per cent level, respectively.

elasticity on the private government variable (with both lagged values and land area instruments) is -.163. That is, a 10 per cent increase in the rate of planned development membership in a city will, on average, decrease per capita total expenditures by 1.63 per cent. This result is consistent with the model prediction of Helsley and Strange (2000), where the slope of the public government's reaction function lies somewhere between -1 and 0, implying that strategic downloading is occurring at a less than one-for-one rate. Different combinations of instruments, year dummies and region-year dummies reveal that estimated elasticities of public government at the mean never exceed .5 in absolute value.

Next, compare the IV results with fixed-effects OLS results without instruments. Columns 4 through 9 of Table 3.5 presents the results. Ignoring the endogeneity of private government decreases the magnitude of the strategic effect greatly, with calculated elasticities several times lower than the IV case. For example, an increase in planned development membership of ten per cent will decrease local expenditures only .5 per cent on average.

IV Regressions on Expenditure Categories

Finding public sector responses to private government leads to the next question: is strategic interaction the only story that generates downloading? In addition to strategic substitution, the following alternative mechanisms could generate the empirical downloading result:

- *Competing governments*: Planned developments may act as a check on the spending of local governments. This has parallels to the Leviathan literature, where a large number of competing municipalities will better reflect the demands of median voters. In the context of this paper, public governments recognize the growing number of homeowners' associations as competitive, rival governments. This forces them to adjust expenditures downward. The self-help role of private governments is echoed by papers such as Matsusaka (1995), which demonstrates that localities with direct democracy measures can place limits on excessive government spending.

- *Political activism*: Voters in private governments may be able to better exercise

lobbying power by concentrating politically active homeowners into association boards. In Lang and Danielsen's (1997) summary of a panel discussion on gated communities, Edward Blakely, a noted researcher on urban planning, states that "it's easier to organize these people in 269 housing units through their community association than it is to go door to door and try to organize people in any other place." In other words, association boards take advantage of economies of scale in political organization, and they often encourage their members to vote as a bloc on matters that affect members and non-members. Planned community members may then be less likely to favour spending on items that benefit primarily those who live outside the community, such as redistributive spending.

- *Efficiency*: Public governments may recognize that some types of local services are actually private goods, in which case an efficiency argument may justify the private sector's provision of supplementary services. Governments may want to focus their efforts providing public services with more "socially beneficial" characteristics.

- *Cooperative bargaining*: Public and private governments may interact with each other, but not necessarily in a non-cooperative game. Bargaining between the governments often arises in the construction stage of a planned development. Municipal officials may require private developers to install municipal infrastructure in the housing development as a condition for allowing the planned development to be built. In return, the developers can set up a homeowners' association to finance the expenses.

Splitting total spending into categories helps to determine which mechanisms are more likely. Different categories of local expenditure have different characteristics, and hence some categories may be more likely to respond to private government than others. This section considers eight expenditure categories as dependent variables. Table 3.7 reports the IV results. For comparison, Table 3.8 reports OLS regressions. As in the last section, the estimated IV coefficients tend to be larger in magnitude than the fixed-effects coefficients. The IV estimates show that public expenditures on police, fire, parks, waste disposal and housing development are downloaded to private governments. There is no evidence of interaction for highways and libraries. Finally, the OLS results indicate downloading of government administration expenditures; however, when the

simultaneity is accounted for, the IV estimations do not find a downloading effect once year and metropolitan region effects are included. No category of expenditure has a significant strategic complementary effect.

The estimations show a clear distinction between two classes of the services and the effect that private government has on them. This distinction appears to be based on the substitutability between private and public providers of the service. This is consistent with the efficiency mechanism: public governments reduce their spending in services for which private governments provide close substitutes. In terms of the magnitudes, the greatest decreases in local spending occur where substitutability is likely the highest: housing and community development, police and waste disposal. These services have a high degree of substitutability between private and public providers. The strong, negative coefficient on policing suggests that residents of planned communities view privately provided security services as substitutes for city policing. It is interesting that a negative sign appears on both public safety services, police and fire protection. The results run counter to the claim in Gordon (2003) that voters in planned communities might support increased spending on public safety services while rejecting spending on redistributive and duplicative services. Waste disposal and recreation facilities have strong private good characteristics: once a homeowners' association picks up its members' garbage or provides them with a swimming pool, there is less of a need for the public government to provide these services to members of the private government.

On the other hand, planned developments have no significant effect on public road and highway spending in any specification. The most plausible explanation is that there is no private substitute for public roadways, especially those outside the homeowners' association. Alternatively, the absence of strategic downloading may be due to the considerable spending on durable infrastructure. If expenditures primarily pay for capital and equipment, it might be hard to reallocate spending away from this category even when private government is relieving some of the budget. The next section explores differences between capital and current expenditures to see if they are consistent with this explanation.

The IV estimation also shows no strategic effect for library expenditures. This could indicate a lack of substitutability between public and private provision. Planned developments rarely provide library services, and so the absence of a strategic decrease in

Table 3.7: **IV Estimation Results for Individual Expenditure Categories. Private Government Measured by Planned Developments**

Sample: 110 cities over 30 years

Instruments = 15 and 20 year lagged private government measure and city land area

	Coefficient on private government variable:					
	Per capita PD units			PD Membership rate		
↓ Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
All expenditures	-7.741**	-4.273**	.943	-3.064**	-1.830**	.670
	(1.630)	(1.110)	(.972)	(.726)	(.494)	(.393)
Police	-2.114**	-1.444**	-.356*	-1.029**	-.724**	-.165**
	(.287)	(.182)	(.117)	(.152)	(.083)	(.061)
Highways & roads	-.082	.081	.134	-.057	.004	.037
	(.360)	(.247)	(.196)	(.161)	(.110)	(.079)
Fire	-.798**	-.522**	-.250**	-.362*	-.244**	-.097**
	(.157)	(.101)	(.082)	(.071)	(.045)	(.033)
Parks & recreation	-1.214**	-.747**	-.694**	-.555**	-.370**	-.295**
	(.305)	(.205)	(.165)	(.139)	(.092)	(.066)
Solid waste disposal	-1.585**	-.955**	-.552**	-.660**	-.405**	-.199**
	(.199)	(.120)	(.092)	(.091)	(.055)	(.037)
Libraries	-.181	-.279**	-.246**	-.051	-.099**	-.082**
	(.100)	(.069)	(.055)	(.045)	(.030)	(.022)
Housing & community development	-2.092**	-1.472**	-.236	-.633**	-.689**	-.036
	(.612)	(.404)	(.325)	(.276)	(.181)	(.131)
Government administration	-.472	-.778**	-.559**	-.183	-.346**	-.221**
	(.300)	(.209)	(.168)	(.134)	(.093)	(.068)
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No
N	3,140	3,140	3,140	3,155	3,155	3,155

* and ** denote significance at the 5 and 1 per cent level, respectively.

Table 3.8: **Fixed-Effect Estimation Results for Individual Expenditure Categories. Private Government Measured by Planned Developments**

Sample: 110 cities over 30 years

	Coefficient on private government variable:					
	Per capita PD units			PD Membership rate		
↓ Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
All expenditures	-2.150**	-1.229**	1.933**	-.976**	-.715**	.625**
	(.435)	(.403)	(.420)	(.171)	(.161)	(.165)
Police	-.285**	-.298**	.161**	-.156**	-.174**	.040
	(.063)	(.057)	(.058)	(.024)	(.023)	(.023)
Highways & roads	-.014	.127	.180*	-.044	-.001	.029
	(.088)	(.081)	(.076)	(.035)	(.032)	(.030)
Fire	-.081*	-.075*	.053	-.061**	-.059**	-.0004
	(.038)	(.034)	(.032)	(.015)	(.013)	(.013)
Parks & recreation	-.272**	-.154*	-.076	-.126**	-.097**	-.057*
	(.076)	(.070)	(.066)	(.030)	(.028)	(.026)
Solid waste disposal	-.093*	-.099**	-.042	-.013	-.021	.005
	(.040)	(.036)	(.034)	(.016)	(.014)	(.013)
Libraries	-.040	-.057**	-.045*	-.015	-.028**	-.022**
	(.024)	(.022)	(.020)	(.009)	(.009)	(.008)
Housing & community development	-.436**	-.504**	-.051	-.118*	-.159**	.028
	(.148)	(.132)	(.126)	(.058)	(.053)	(.049)
Government administration	-.302**	-.298**	-.155*	-.139**	-.154**	-.086**
	(.073)	(.067)	(.064)	(.029)	(.027)	(.025)
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No
N	3,300	3,300	3,300	3,300	3,300	3,300

* and ** denote significance at the 5 and 1 per cent level, respectively.

library expenditures is not surprising. However, an alternate explanation is that about one-third of the cities in the sample do not report any library expenditures at all. In smaller municipalities, the county often provides library service. However, regardless of the level of private government, these cities would not be expected to alter their provision of libraries, and so this may contribute to an absence of a downloading effect.

Finally, the effect of private government on government administrative spending is either negative or insignificant. This category may represent association members' perception of government. If homeowners' associations are a way to return local decision-making to the neighbourhood level, then members would support tightening the budgets of bloated, inefficient municipal governments.[21] However, the empirical results give mixed evidence to support this view. The prevalence of private governments does not seem to be a way for voters to rein in bureaucratic local governments. In addition, government administration, which includes the local justice system, clearly has public good characteristics that make it difficult for private governments to provide a substitute.

Effects on Non-Member Households

The different substitutability of the various expenditure categories provide a way to examine the efficiency mechanism further. If the services that the public and the private governments provide are true private goods, then the private government's provision simply displaces the public government's provision. The negative downloading result should therefore not be surprising. However, if the only motivation for public sector downloading is to transfer provision responsibility to efficient providers, then public expenditure per *non-member* should not be affected by the rate of private government membership. In other words, the coefficient on private government membership should be statistically insignificant if the dependent variable is public expenditure per non-member.

The dependent variable is real city expenditure, divided by the number of *housing units* that are not planned development units. It is not possible to know the population

[21] Indeed, many critics of private governments point to this as a sign of the deterioration in trust of government: "A study of gated communities, most of which are CAs [community associations]...sees them as 'a dramatic manifestation of a new fortress mentality growing in America.' The exclusivity of CAs may induce their members to evade public service to a larger community. The money needed to pay for such exclusivity can increase the costs of CAs." (Stabile 2000)

of the city that does not live in planned developments, so the use of the non-planned development housing units is a justified alternative. Table 3.9 presents the fixed-effects OLS and IV results for total expenditures and the eight specific categories of expenditure.

When municipal expenditures are considered per non-member housing unit, the OLS results generally provide no evidence of downloading. Private government membership has no impact on total expenditures per non-member. When individual categories are examined, downloading is evident only for parks and recreation and housing development spending. Police, libraries and government administration spending per non-member are unaffected by the degree of private government membership. And most interesting, the planned development coefficient estimate on highways, fire protection and, to a lesser extent, garbage disposal is *positive*, indicating complementarity between public and private governments.

However, once the instrumental variables control for the endogeneity bias, an interesting result brings up additional questions. Public downloading is still present for police, parks, waste disposal and housing development spending, and, in one of the specifications, total spending. Not only is the public government responding to the increased private government membership by cutting expenditures, it cuts expenditures *per non-member*. This indicates that something beyond an efficiency motive drives the strategic downloading. The political activism mechanism may help explain this result. Voters in planned developments may be less inclined to approve funding that they know is destined for non-members. This may have serious welfare effects, as non-members experience a decrease in government expenditure that goes beyond simple displacement of private provision for public provision.

Current Expenditures Versus Capital Outlays

Not only can cities reallocate spending between expenditure categories, but they can also reallocate within them. City expenditures can be divided into current operating expenditures and capital outlays. A city can reduce spending by cutting current expenditures, such as reducing staff, providing less frequent trash pickup or street cleaning and so on. Alternatively it can lower capital outlays by postponing infrastructure investments and construction projects. Figure 3.6 separates the mean per capita total

Table 3.9: **IV Estimation Results for Individual Expenditure Categories, Measured Per *Non-Planned Development Household.* Private Government Measured by Planned Developments**

Sample: 110 cities over 30 years

Instruments = 15 and 20 year lagged private government measure and city land area

	Coefficient on private government variable:			
	Per capita PD units		PD Membership rate	
↓ Dependent variable	OLS	IV	OLS	IV
All expenditures	.098	-3.166*	.120	-1.021
	(.432)	(1.576)	(.170)	(.703)
Police	.188	-2.102**	.080	-1.133**
	(.133)	(.560)	(.052)	(.261)
Highways & roads	.543**	.850	.201**	.386
	(.197)	(.792)	(.077)	(.356)
Fire	.360**	-.596	.124**	-.271
	(.084)	(.346)	(.033)	(.156)
Parks &	-.266	-2.973**	-.125*	-1.289**
recreation	(.159)	(.636)	(.063)	(.289)
Solid waste	.086	-3.132**	.095*	-1.270**
disposal	(.096)	(.462)	(.038)	(.210)
Libraries	.031	-.187	.026	.045
	(.055)	(.221)	(.022)	(.099)
Housing & community	-.684*	-2.923*	-.120	-1.148*
development	(.316)	(1.284)	(.124)	(.577)
Government	-.203	.311	-.090	.194
administration	(.156)	(.635)	(.061)	(.285)
N	3,290	3,140	3,290	3,155

* and ** denote significance at the 5 and 1 per cent level, respectively.
All specifications include year dummies and region-year dummies.

Table 3.10: **IV Estimation Results for Current Expenditures Versus Capital Outlays. Private Government Measured by Planned Developments**

Sample: 110 cities over 30 years

Instruments = 15 and 20 year lagged private government measure and city land area

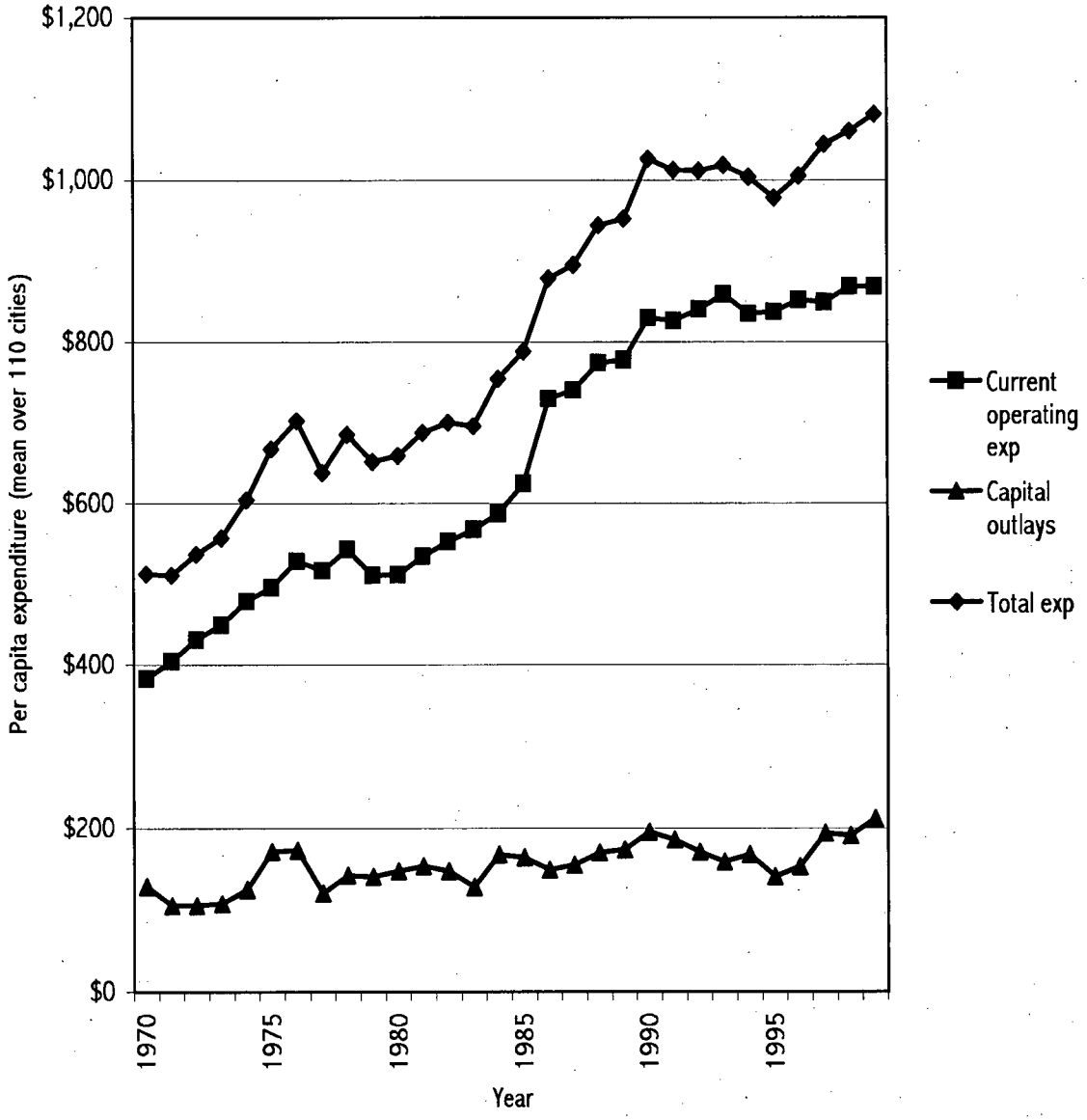
	Coefficient on private government variable:					
	Per capita PD units			PD Membership rate		
↓ Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
Capital Outlays	-5.294	-.232	-1.598	-1.233	.236	.405
	(6.498)	(4.386)	(3.524)	(2.909)	(1.959)	(1.423)
R^2 within	.151	.084	.045	.156	.084	.046
R^2 overall	.017	.015	.010	.019	.018	.012
N	3,138	3,138	3,138	3,153	3,153	3,153
Current Expenditures	-7.380**	-4.129**	2.380**	-2.929**	-1.744**	1.286**
	(1.326)	(.880)	(.839)	(.590)	(.390)	(.340)
R^2 within	.758	.747	.628	.761	.750	.625
R^2 overall	.097	.175	.180	.105	.182	.177
N	3,140	3,140	3,140	3,155	3,155	3,155
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No

* and ** denote significance at the 5 and 1 per cent level, respectively.

expenditure into current operating expenditures and capital outlays. Clearly, growth in current expenditures is driving growth in total expenditure. Real spending on capital and construction is flat over the thirty-year sample period.

To see if the proliferation of planned developments affects these two types of expenditures differently, Table 3.10 reports the results from separate IV regressions of capital and current expenditures. The estimations demonstrate that cities with high levels of planned developments have no significant effect on capital outlays, but they cause a significant decrease in current expenditures. This suggests that current spending is much more manipulable than capital spending, which provides further support for a strategic substitution interpretation for the downloading result.

Figure 3.6: **Capital Outlays Versus Current Operating Expenditures**



Source: Census of Governments and Annual Survey of Governments, 1970-1999

3.5.3 Are Planned Developments Different from Condominiums?

The results of the previous section indicate the presence of a strong, negative effect of planned developments on local public spending, even in a period of increasing expenditures. But planned developments make up only one type of residential private government. Indeed, there are more condominiums than planned developments in California. Does the spread of condominiums have a similar effect on local public expenditures? This question's motivation is that currently, local policy and laws treat planned developments and condominiums equivalently as a "common interest development." Some authors argue this is inappropriate: Rosenberry (1996) states that "legislation often treats these projects as if they have the same problems, and they do not."

How different are condominiums from planned developments in practice? Aside from the legal distinction on ownership, there are differences on the membership, size and location that would suggest different effects on local expenditures. First, condominiums are inhabited by people who place a high value on amenities, and their monthly assessments are higher in account of it. Homeowners in condominiums may therefore be more receptive to local spending, which may lead to a dampening of any strategic downloading by public authorities.

Second, condominiums are more numerous than planned developments, but they have fewer housing units on average. The median condominium development in the database has 18 housing units, while the median planned development has 76. The greater size of planned developments may confer some economies of scale in political activism. Therefore, homeowners' associations in planned developments may attract boards of directors that are more willing to get involved in local politics, compared to homeowners' associations in condominiums.

Table 3.11 presents some summary statistics of condominium prevalence, and Figure 3.4, presented earlier, graphs over time the overall condominium membership rates alongside PD rates. Like planned developments, condominiums have experienced dramatic growth. However, even in cities with the highest rates of condominium membership, condominiums make up less than a third of the housing units in the city. Compare this to some cities that have over half of their housing units in planned developments.

Table 3.11: **Summary Statistics of Condominium Measures**

Sample: 110 cities over 30 years

Year(s)	Mean rate	Std. Dev.	Min.	Max.
Number of condo units per capita				
1970 only	.003	.008	0	.062
1999 only	.029	.029	0	.214
1970-1999	.020	.026	0	.278
Condo rate as a proportion of all housing units				
1970 only	.8 %	2.6 %	0 %	21.4 %
1999 only	7.5 %	5.6 %	0 %	28.6 %
1970-1999	5.0 %	5.1 %	0 %	30.2 %

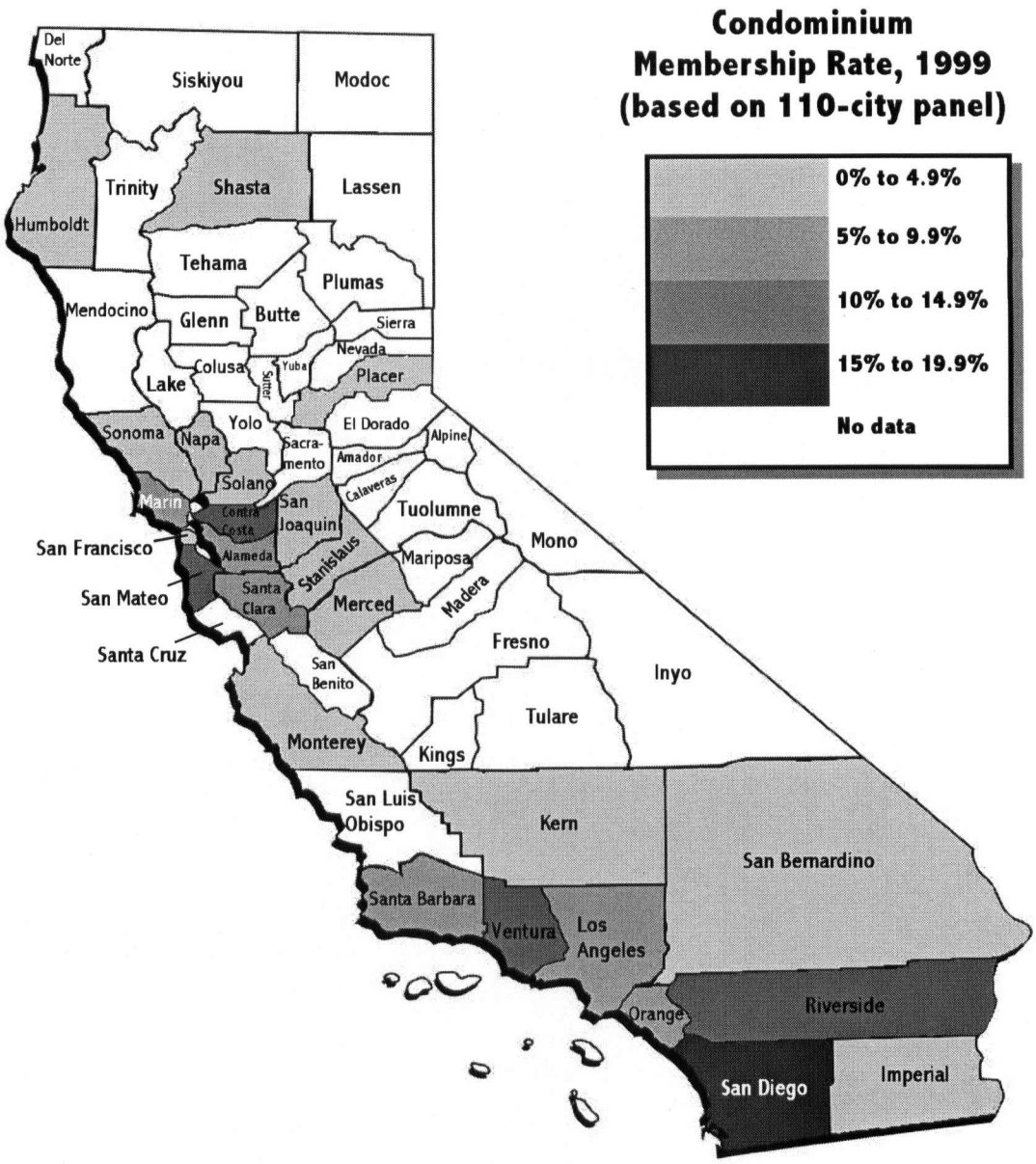
Source: Levy and Company 2003, and author's own calculations

There is also an important geographic difference between the two types of private government. Figure 3.7 shows a county map in which condominium membership rate is shaded. Condominiums are more common than planned developments in central urban counties of Los Angeles, San Diego and San Francisco, reflecting the premium for space. In suburban counties such as San Bernardino, Monterey and Sonoma, planned developments dominate.

2SLS estimations, with the same set of instruments, are run with private government measured by condominiums. Table 3.12 reports the results. The difference between condominiums and planned developments is striking. As the first row of the table indicates, there is very little evidence of strategic downloading by local governments in the face of condominium activity. Although Columns (3) and (6) show a strong, significant positive coefficient on condominium prevalence, these are specifications that do not include year dummies. As condominium growth is strongly positive during the sample period, this suggests that coefficient is simply reflecting this trend. Once the model controls for year effects, the significance disappears.

The regressions on individual service categories gives similar interpretations. Only two services show strong negative coefficients on condominium prevalence: fire and waste disposal. Police spending has a significant negative effect in one specification. Rather than reflecting genuine public downloading, these estimates may simply indicate that

Figure 3.7: **Rate of Condominium Membership by County**



Source: Levy and Company, 2003, and author's own calculations

the higher densities of condominiums produce economies of scale in emergency response and garbage pickup, rather than reflecting strategic substitution. In addition, fire codes have become more strict over the period, so a city with recent condominium development may not need to spend as much on fire protection services.

Next, a question arises as to whether or not land area is a good instrument for condominium proliferation. Land area is a suitable instrument for planned developments as it proxies for residential development. However, if condominiums tend to take up vertical space rather than lateral space, land annexations may not reflect any growth in condominiums. In addition, many condominiums are the result of apartment conversions and hence would not require additional city land. To remove the possibility of an unsuitable instrument, the condominium regressions are repeated, dropping land area from the list of instruments. Table 3.13 shows the results. They still show very little sign of strategic substitution.

Although condominiums have experienced a much more rapid growth than planned developments, the results of this section find no interaction effect by public governments. Hence, local policy that addresses these two types together as a broad class of common interest development neglects the different impacts that they have.

3.6 Further Directions

The idea of private homeowners' associations taking over roles of public authority is a rich topic for further research. This paper demonstrates that public governments do treat planned developments as providers of substitute services, and so they respond accordingly. A natural question for future research is to tie local government decisions to voter choices. This paper finds evidence of strategic downloading, but is voter behaviour consistent with this? Are local governments responding to voter preferences for lower expenditures when more of the population belong to homeowners' associations? The answers depend on the way local government decision making is modelled. This paper assumes governments that maximize aggregate welfare of constituents, but models that maximize the median voter's utility or the city budget are common as well. An interesting extension would be to be see if the difference in behaviour between planned development members and non-members can say anything about competing models of

Table 3.12: **IV Estimation Results for Individual Expenditure Categories. Private Government Measured by Condominiums**

Sample: 110 cities over 30 years

Instruments = 15 and 20 year lagged private government measure and city land area

	Coefficient on private government variable:					
	Per capita condo units			Condo membership rate		
↓ Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
All expenditures	-.830	.532	5.318**	-1.065	.322	3.750**
	(1.005)	(.928)	(.625)	(.892)	(.743)	(.704)
Police	-.397*	-.032	.948**	-.243	.010	.680**
	(.168)	(.147)	(.095)	(.148)	(.117)	(.108)
Highways & roads	-.359	-.252	-.080	-.430*	-.256	-.104
	(.234)	(.212)	(.127)	(.204)	(.171)	(.141)
Fire	-.300**	-.162	.057	-.325**	-.205**	-.011
	(.098)	(.085)	(.083)	(.092)	(.071)	(.058)
Parks &	.010	-.006	.029	.031	.002	-.003
recreation	(.190)	(.173)	(.168)	(.167)	(.138)	(.116)
Solid waste	-.565**	-.464**	-.112	-.409**	-.325**	-.029
disposal	(.110)	(.098)	(.093)	(.102)	(.081)	(.064)
Libraries	-.096	-.002	.052	-.099	-.020	.008
	(.065)	(.058)	(.035)	(.056)	(.046)	(.039)
Housing & community	-.023	.069	.062	-.051	.145	.470*
development	(.387)	(.344)	(.340)	(.341)	(.275)	(.235)
Government	-.182	-.094	.194	-.186	-.130	.052
administration	(.193)	(.177)	(.173)	(.171)	(.142)	(.119)
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No
N	3,140	3,140	3,140	3,155	3,155	3,155

* and ** denote significance at the 5 and 1 per cent level, respectively.

Table 3.13: **IV Estimation Results for Individual Expenditure Categories. Private Government Measured by Condominiums**

Sample: 110 cities over 30 years
Instruments = 15 and 20 year lagged private government measure

	Coefficient on private government variable:					
	Per capita condo units			Condo membership rate		
↓ Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)
All expenditures	-.039	1.050	5.317**	-.367	.673	3.857**
	(1.042)	(.932)	(1.030)	(.926)	(.743)	(.739)
Police	-.036	.123	1.071**	.104	.113	.827**
	(.170)	(.146)	(.157)	(.150)	(.117)	(.116)
Highways & roads	-.316	-.202	-.020	-.395*	-.221	-.048
	(.243)	(.213)	(.127)	(.208)	(.171)	(.746)
Fire	-.189	-.107	.104	-.228*	-.169*	.031
	(.100)	(.085)	(.085)	(.092)	(.071)	(.060)
Parks &	-.053	.049	.149	-.008	.039	.123
recreation	(.198)	(.173)	(.172)	(.175)	(.138)	(.121)
Solid waste	-.498**	-.440**	-.095	-.340**	-.308**	-.008
disposal	(.113)	(.098)	(.095)	(.104)	(.081)	(.067)
Libraries	-.044	.019	.105	-.049	-.005	.064
	(.067)	(.058)	(.057)	(.060)	(.046)	(.040)
Housing & community	-.378	.149	.580*	.316	.203	.451
development	(.404)	(.346)	(.346)	(.361)	(.277)	(.246)
Government	-.172	-.011	.334	-.176	-.075	.195
administration	(.201)	(.177)	(.176)	(.179)	(.142)	(.124)
Time dummies	Yes	Yes	No	Yes	Yes	No
Region-time dummies	Yes	No	No	Yes	No	No
N	3,140	3,140	3,140	3,155	3,155	3,155

* and ** denote significance at the 5 and 1 per cent level, respectively.

local government. However, data on a finer level are required to compare the voting behaviour of planned development residents versus that of non-members.

3.7 Conclusion

Residential private governments take public authority and transfer it to an association of private homeowners. As homeowners' associations become more and more the usual method of building and servicing new housing developments, questions arise as to whether they have an impact on local governments. This paper examined whether or not local public governments reacted to the presence of private governments by altering provision levels. A theoretical model underlines the conditions in which public and private government spending are strategically complements, and when they are strategically substitutes. A panel study of California municipalities from 1970 through 1999 suggests that downloading does occur. This is consistent with public and private activities being strategic substitutes. For a ten per cent increase in planned development membership in a city, local expenditures fall roughly 1.6 per cent. The result occurs even in an era of increasing public expenditure.

When local expenditures are split up into spending categories, private government activity produces a downloading effect for those categories expected to have a high degree of substitutability between public and private providers. The empirical analysis suggests that local public governments understand that homeowners' associations are taking over responsibility for providing many public services, and they therefore reduce their expenditures in account of it. Finally, the study stressed the difference between planned developments and condominiums. While both are often treated symmetrically by policy makers, the analysis shows that condominiums do not exert the same impact on local governments as planned developments do.

CHAPTER 4

The Effect of Property Tax Limitations on Residential Private Governments

4.1 Introduction

In most jurisdictions, property taxes form the primary source of local government revenue, and they are often viewed as an unfair and unpopular tax. The tax revolt era in the 1970s and the 1980s in the United States ushered in a series of attempts of voters to limit the power of local governments to increase property taxes. This chapter asks whether state-imposed property tax limitations on local governments encourage formation of and membership in homeowners' associations. It begins by proposing a theoretical model to examine the effect of a tax limitation on the decision of residents whether or not to join a homeowners' association providing supplementary services.

The implications of the model are tested with empirical data from California in the years surrounding Proposition 13. In 1978, Proposition 13 effectively constrained all residential to a one per cent property tax rate, resulting in drastic reductions in local government revenue. Using a panel of public spending in California cities and a novel data source on homeowners' associations, the empirical model tests whether or not cities that were more property-tax constrained experienced higher rates of private government formation. The study controls for the importance of state aid and user charges in city budgets. The results demonstrate the level and the growth of private government

membership were significantly increased by the imposition of Prop 13.

Referring back to Figure 3.3 shows the incredible proliferation of homeowners' associations in California over the last thirty years. The graph shows that the surge in association incorporation occurred in the late 1970s and early 1980s. This coincided with a period of fundamental change in local public finance, the property tax revolt. Voters across the United States reacted to perceived government inefficiency by passing strict limitations on property tax. California, with the approval of Proposition 13 in 1978, is often considered the birthplace of the property tax revolt. Did the stringent conditions of Proposition 13 contribute to the tremendous growth of private governments? At the same time, however, changes in the construction industry and the booming housing market also contributed to private government growth. Part of the challenge of this paper is to pull out the effect of the property tax limitation.

This chapter proposes a theoretical model to study the effect of an exogenous tax rate limitation on the behaviour of private governments. The model is based on residents who decide whether to join a homeowners' association when choosing a place to live. The comparative static of interest in how the membership margin changes with the imposition of a property tax limitation. The theoretical model leads to empirical testing. The empirical analysis combines novel data on homeowners' associations in California with property tax data to see whether cities that faced stronger property tax constraints are more likely to encourage private government growth.

The chapter is organized as follows. Section 4.2 presents an overview of state-imposed property tax limitations and their connection to private governments. Section 4.3 outlines a theoretical model of property tax limitation and derives results. The empirical evidence begins in Section 4.4 by describing the provisions and effects of Proposition 13 in California. Section 4.5 introduces the empirical framework, describes the data and provides the empirical analysis. Section 4.6 concludes.

4.2 Property Tax Limitations and Private Government

Property taxes, the main source of revenue for local governments, have never been popular. Voters often describe them as regressive and unfair, and in the late 1970s and 1980s, they unleashed the property tax revolt. This period marked a fundamental desire by voters to limit the taxing and spending authorities of municipal governments. Shadbegian (1998) notes that in that period, half the states in the country passed some kind of measure limiting the degree to which governments can raise or spend money. These measures took many forms: explicit limits on the property tax rate or level, a limitation on the amount of yearly tax increases, a limitation of the rate at which property value assessments can increase and ceilings on the level and growth rate of expenditures. Together, these measures are known as *tax and expenditure limitations* (TELs).

TELs share several similarities regardless of where they are enacted. They are almost always statewide measures that affect most, if not all, local governments in the state. TELs are generally approved through statewide ballots.[1] Finally, TELs tend to be effective: local governments suffered large decreases in property tax revenue, and they remain unable to increase property taxes beyond the mandated limit without voter approval.[2]

The effect of TELs on local public finance has generated a line of research on the way that local governments deal with their imposition. Previous research, both theoretical and empirical, has suggested three main options cities had to deal with the budget shortfall: cut expenditures, turn to the state and look for alternate sources of revenue. The following gives brief descriptions of these three options, provides some related research and proposes another approach: the shifting of public responsibility to private governments.

[1]Indeed, Vigdor (2004) argues that TELs are likely to succeed at statewide ballots rather than local ballots because voters want to have a way to control tax rates in jurisdictions where they do *not* live.

[2]In some states, such as California, the TEL has even been made part of the state constitution.

4.2.1 Expenditure Cuts

An obvious response to a revenue shortfall is to cut expenditures. The ostensible goal of most TELs is to limit perceived government inefficiency and overspending. Economic research suggests that TELs do affect spending substantially. Shadbegian (1998) uses a panel data set of local government budgets, aggregated to the state level, to show that limitations have decreased both the level and the growth rate of expenditures.

In addition Figlio and O'Sullivan (2001) provide evidence that local authorities may have an incentive to reduce spending on certain items in order to manipulate voters to override a TEL's limits. For instance, a city may cut expenditure greatly on visible "service" inputs such as police officers while reducing administrative expenditures only slightly.

Further empirical research on the effects of tax limitation analyses the impact on the quality, as opposed to the level, of local expenditures following the limitation. Figlio (1998) looks at a tax measure in Oregon and concludes that student-teacher ratios increased significantly as a result, while Bice and Hoyt (2000) predict that a fiscal limit will increase voluntary contributions to the local public sector.

4.2.2 State Aid

Cities can turn to the state for help either through state bailout funds to cover deficits or by shifting functional responsibilities back to the state. Authors such as O'Sullivan, Sexton, and Sheffrin (1995) have suggested that the blow of TELs are often cushioned by generous state grants. Shadbegian (1998) provides evidence that increased federal or state funds have acted as a substitute for local expenditure cuts. There is also a view, presented by Joyce and Mullins (1991) and Schwadron and Richter (1984), that there has been a gradual shifting of responsibility from local governments to state government.

4.2.3 Alternative Sources of Revenue

There is much research to suggest that cities have turned to alternative sources of revenues such as charges and fees. TELs caused municipalities to reduce their dependence

on the property tax and turn instead to charges, fees and sales taxes. In particular, many authors have pointed out the dramatic increase in impact fees for new development. Shadbegian (1999) demonstrates in a national analysis that TELs caused municipalities to increase their fees and charges, which partially offset the decrease in property taxes.

4.2.4 A Fourth Option: Private Providers

While empirical research supports the use of alternative revenue generating instruments after a property tax limitation, there is relatively little research on the supplementary role of private providers of public services. Theoretical research into the area of homeowners' associations suggests that they can be viewed as "private governments." A homeowners' association (HOA) is a private association that has the authority to provide public services to residents of a neighbourhood. An association can levy fees for the provision of these services and has abilities to enact regulations and to enforce them. The association has characteristics of a government because by buying a property within a neighbourhood that is governed by a homeowners' association, a resident is automatically a member and subject to all the fees and regulations imposed.

The services provided by private government associations are similar to those provided by a traditional local government. These include garbage collection, security (gates or guards), parks and recreation and even private roads. Municipal governments may even download the responsibility of providing infrastructure to private associations. Because homeowners who live in an association pay both association fees and public property taxes, the private government and the public government supplement each other's service levels. This suggests that TELs on municipal budgets may encourage the formation of private governments as a way to supplement decreased public expenditures. Indeed, to a fiscally constrained municipality, encouraging private governments not only means downloading responsibility of service provision to private providers, but also being able to collect development impact fees and surcharges. This makes the formation and proliferation of private governments even more attractive.

The option of private providers of public services as a response to TELs has not been examined thoroughly in economic literature. Yet it is an interesting question to ask as this option may have serious consequences on the quality of public services

residents experience. Sonstelie (1979) suggests that Prop 13 may prompt some parents to switch their children from public schools to private schools. While in the short run this may benefit public school students by spreading expenditures over a smaller number of students, in the long run, this may tend to erode political support for public schools. Chapter 3 of this dissertation provides empirical evidence that public governments may respond to the proliferation of private providers by reducing expenditures, especially for services where private associations provide close substitutes.[3] It also finds evidence that non-private government members may suffer disproportionately from this public response. Thus, the evidence suggests that private associations may have large impacts on areas that formerly belonged solely to the public sector.

Given that the motivation exists for studying the effect of a TEL on private government formation and membership, the next section builds a simple theoretical model to examine how private government composition can be affected by an exogenous property tax limitation. This is then followed by an empirical test of the main result, using data from California's Proposition 13.

4.3 Theoretical Model

This section presents a model of private government membership and considers the effect of an exogenous property tax decrease on membership behaviour. In this context it is not necessary to model the behaviour of the public and the private governments in order to get a testable implication for the effect of a tax and expenditure limitation on private government membership. A relatively simple housing market is incorporated into a model of private government membership choice. The model combines elements from the private government model of Helsley and Strange (1998) and the multi-community sorting model of Calabrese and Epple (2004). A major difference between this model and Helsley and Strange (1998) is that here, the public and private government tax rates will be taken as exogenous. Also, Helsley and Strange do not incorporate a housing choice. The notable departure from Calabrese and Epple (2004) is that they consider how a tax limit affects sorting *among* jurisdictions, whereas this paper examines a limit's effect on sorting *within* a jurisdiction. Here a resident has the option to join a private government

[3] As a reminder: policing, parks and waste disposal, for instance.

that supplements the municipality's services.

The focus of the model will be the membership decision of the residents of a city. The land area and the population of the city are fixed. All residents have utility function $U(G, h, x)$, where G is a level of public services, which must be obtained from a government, h is units of housing and x is a numeraire consumption good. The function U is twice differentiable, strictly concave and strictly increasing in each of its arguments.

Public services are provided by two governments: the municipal government (the *public government*) provides g to all residents of the city, whereas a homeowners' association (the *private government*) provides a supplemental level of service γ to members only. The g and γ are publicly-provided private goods, and they are perfect substitutes in consumption. This model does not explicitly model the governments' provision decisions; rather, the public good levels are determined via the governments' budget constraints and the exogenous tax rates.[4] The governments finance the provision of their goods differently: the public government levies a property tax rate t on the value all city residents' houses. The private government charges a fixed fee of τ to each member, which is presumed to exactly offset the marginal cost of providing the service to the member.

Each resident lives in a house, which is measured in units h. The house is either located inside the private government or outside; membership in the private government is thus tied to the housing choice. h may represent the quality of the house, the number of rooms, its size and so on. The housing markets for houses within and outside the private government are separate. A unit of h costs p^M if it is inside the private government and p^N if it is outside. p^M and p^N are the annualized rental cost of a unit of housing services.

Residents differ in their money income, y, and they are identified by this income level. Income is spent on taxes, housing and the numeraire good. y is distributed according to the density function $f(y)$ with support $[\underline{y}, \bar{y}]$. For simplification, $\underline{y}$ is normalized to 0 and $\bar{y}$ is normalized to 1. Thus the problem of a consumer with income y will differ depending on whether the consumer is a private government member or not. A homeowner who

[4]For papers that explicitly model the governments' provision choice, see Helsley and Strange (1998) and Helsley and Strange (2000).

belongs to a private government (hereafter called a *member*) will solve

$$\max_{h,x} U(g+\gamma, h, x) \quad \text{s.t.} \quad p^M(1+t)h + x = y - \tau. \tag{4.3.1}$$

Whereas a homeowner who does not belong to the private government (a *non-member*) will solve the following:

$$\max_{h,x} U(g, h, x) \quad \text{s.t.} \quad p^N(1+t)h + x = y. \tag{4.3.2}$$

The utility function is posited to be separable in the public good and the private goods: $U(G,h,x) = v(G)u(h,x)$, with the additional assumption that $u(h,x)$ is homogeneous of degree 1. This is consistent with empirical evidence that the income elasticity of housing is approximately 1. Solving the consumers' utility maximization problems, the linear homogeneity of $u(h,x)$ implies that the corresponding indirect utility functions are linear in net income:

$$V^M(y) = v(g+\gamma)[(y-\tau)w(p^M(1+t))] \qquad \text{for a member, and} \tag{4.3.3}$$

$$V^N(y) = v(g)[yw(p^N(1+t))] \qquad \text{for a non-member.} \tag{4.3.4}$$

where $w(p(1+t))$ is a decreasing function of the gross-of-tax housing price. For each income level y, the consumer chooses to join the private government if $V^M(y) > V^N(y)$, not join if $V^M(y) < V^N(y)$ and is indifferent if they are equal.

4.3.1 The Housing Market

The housing market must clear both inside and outside the private government. As $u(h,x)$ is homogeneous of degree 1, the demand for housing can be written as

$$(y-\tau)h_d(p^M(1+t)) \qquad \text{for a member, and} \tag{4.3.5}$$

$$yh_d(p^N(1+t)) \qquad \text{for a non-member.} \tag{4.3.6}$$

with h_d being a function that varies negatively with housing price.

Housing supply is modelled in a similar way as Calabrese and Epple (2004). Housing is produced by price-taking firms from land and non-land factors with a constant-returns

neoclassical production function. The price of non-land factors is fixed and uniform both inside and outside the private government. The land area inside and outside the private government is fixed at L^M and L^N, respectively. The housing supply functions inside and outside the private government are therefore $H_s^j(p^j) = L^j h_s(p^j), j = M$ or N, where h_s is housing per unit of land, depending positively on the *net-of-tax* price of housing.

Housing market equilibrium requires the following two equations hold:

$$h_d(p^M(1+t)) \int_{y \in M} (y - \tau) f(y) \mathrm{d}y = L^M h_s(p^M) \text{ and} \tag{4.3.7}$$

$$h_d(p^N(1+t)) \int_{y \in N} y f(y) \mathrm{d}y = L^N h_s(p^N). \tag{4.3.8}$$

Here M is the set of all the income levels that choose to be members, and N is the set of all incomes that choose not to be.

4.3.2 Equilibrium

With all the elements of the model introduced, it is possible to define an equilibrium.

Definition 1 *Given a distribution of household incomes y, an equilibrium is an allocation of households across communities such that*

1. *Consumers are maximizing their utility according to their choice of h and x. This implies that both the land inside the private government and the land outside the private government are occupied, and no one wants to move;*
2. *The housing markets inside and outside the private government clear; and*
3. *Both the private government's and the public government's budgets are balanced.*

In keeping with the traditional terminology, conditions 1 is a condition for *intercommunity equilibrium*, and conditions 2 and 3 are conditions for *internal equilibrium*.[5] The following sections present conditions that must be satisfied for equilibrium.

[5]The term *intercommunity* is somewhat imprecise here as both land inside and outside the private government is part of the city; however, this term is a holdover from models of sorting across multiple jurisdictions. It is important to remember that the public government continues to serve residents inside the private government.

4.3.3 Intercommunity Equilibrium

The following proposition presents conditions that characterize intercommunity equilibrium, which is characterized by residents choosing whether to join the private government or not.

Proposition 1 *Both land inside and land outside the private government are occupied by incomes in a single interval. There exists a unique household y^* who is indifferent between membership and non-membership. If $(1-\tau)v(g+\gamma)w(p^M(1+t)) > v(g)w(p^N(1+t))$, then those $y < y^*$ strictly prefer to be non-members, while those $y > y^*$ strictly prefer to be members.*

Proof. Using Equations (4.3.3) and (4.3.4), the difference in utility between membership and non-membership for income y is

$$\begin{aligned} \Delta V(y) &\equiv v(g+\gamma)[(y-\tau)w(p^M(1+t))] - v(g)[yw(p^N(1+t))] \qquad (4.3.9) \\ &= [v(g+\gamma)w(p^M(1+t)) - v(g)w(p^N(1+t))]y \\ &\quad - \tau v(g+\gamma)w(p^M(1+t)). \qquad (4.3.10) \end{aligned}$$

$\Delta V(y)$ is linear in y. $\Delta V(0) = -\tau v(g+\gamma)w(p^M(1+t)) < 0$, so the poorest individual never joins the private government because the private government's fixed fee is too high. On the other hand $\Delta V(1) = (1-\tau)v(g+\gamma)w(p^M(1+t)) - v(g)w(p^N(1+t))$. By assumption this is positive, so the richest individual always prefers to join the private government.

This last assumption implies that $v(g+\gamma)w(p^M(1+t)) - v(g)w(p^N(1+t)) > 0$, which is the slope of the $\Delta V(y)$ function. Using the linearity and continuity of $\Delta V(y)$ and the Intermediate Value Theorem, this implies the existence of a unique y^* for whom $\Delta V(y^*) = 0$. For $y < y^*$, $\Delta V(y) < 0$, so these consumers do not join the private government, while for $y > y^*$, $\Delta V(y) > 0$, so these consumers join the private government. □

Indeed the linearity of the indirect utility functions means it is possible to divide the households into three intervals by income:

- For those $y \in [0, \tau]$, $V^M(y)$ is always negative. The membership fee exceeds their income, and so these households would never join, regardless of the extra level

of public service provided by the private government. This is an artifact of the normalization of incomes.

- For those $y \in [\tau, y^*]$, while they can afford the membership fee, the benefit from the supplemental public service does not cover the costs of membership and the capitalized housing price differential. These individuals do not become members either.

- For those $y \in [y^*, 1]$, the marginal benefit of the extra public service covers the marginal cost of membership, as measured by the membership fee and the capitalized housing price, so they join.

The proposition implies that by identifying y^*, who can be called the *marginal member*, the population of members and non-members can be determined. The marginal member satisfies

$$\Delta V(y^*) = 0 \;\Rightarrow\; v(g+\gamma)(y^* - \tau)w(p^M(1+t)) = v(g)y^* w(p^N(1+t)). \tag{4.3.11}$$

4.3.4 Internal Equilibrium

The other four conditions constitute internal equilibrium. These are the housing market clearing conditions and the government's budget constraint. In all these conditions, the fact that residents sort according to the intercommunity equilibrium condition is used. On land within the private government, the housing market clears, giving

$$h_d(p^M(1+t)) \int_{y^*}^{\bar{y}} (y - \tau) f(y) \mathrm{d}y = L^M h_s(p^M). \tag{4.3.12}$$

On land outside the private government, the housing market equilibrium condition is

$$h_d(p^N(1+t)) \int_{\underline{y}}^{y^*} y f(y) \mathrm{d}y = L^N h_s(p^N). \tag{4.3.13}$$

Next, the two governments' budget constraints must bind. The private government's budget constraint is trivially satisfied as members pay exactly the marginal cost of providing the private supplement to them. The marginal cost of provision is normalized to 1, so the private government budget constraint is

$$\tau = \gamma. \tag{4.3.14}$$

Finally, the budget constraint of the public government must hold. It is assumed that the marginal cost of providing g is also 1. The public government's budget constraint is therefore

$$tp^N h_d(p^N(1+t)) \int_{\underline{y}}^{y^*} yf(y)\mathrm{d}y + tp^M h_d(p^M(1+t)) \int_{y^*}^{\bar{y}} (y-\tau)f(y)\mathrm{d}y = g. \quad (4.3.15)$$

Equations (4.3.11), (4.3.12), (4.3.13), (4.3.14) and (4.3.15) describe the equilibrium. In this simple model, the private government and the public government tax rates, τ and t, are taken as exogenous parameters. In other words, this paper does not model how the taxes are set, as the interest is how the private government membership decision responds to changes in tax rates.[6] The endogenous variables are therefore p^M, p^N, y^*, g and γ.

The comparative static of interest is how the membership margin changes with an exogenous decrease in the property tax rate. In other words, what is the sign of $\frac{\mathrm{d}y^*}{\mathrm{d}t}$? Unfortunately, the five equilibrium conditions do not permit the derivation of a signable comparative static. The next section presents a computational model for which an equilibrium and its comparative statics can be computed.

4.3.5 Computational Solutions

Residents' incomes y are assumed to be drawn from a uniform distribution over $[0, 1]$. Residents have identical utility functions

$$U(G, h, x) = g^\beta h^\alpha x^{1-\alpha}. \quad (4.3.16)$$

Using Equation (4.3.3), the indirect utility function of a private government member with income y is thus

$$V^M(g+\gamma, h, x) = (g+\gamma)^\beta (y-\tau) \left[\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{(p^M(1+t))^\alpha}\right]. \quad (4.3.17)$$

From Equation (4.3.4), the indirect utility function of a non-member with income y is

$$V^N(g, h, x) = (g)^\beta y \left[\frac{\alpha^\alpha (1-\alpha)^{1-\alpha}}{(p^N(1+t))^\alpha}\right]. \quad (4.3.18)$$

[6] Allowing for the endogenous determination of tax rates would complicate the equilibrium conditions and the comparative statics considerably.

The next step is to derive the housing price conditions. The housing supply functions are assumed to take the following form:

$$H_s^j(p^j) = L^j(p^j)^\mu, j = M \text{ or } N. \tag{4.3.19}$$

In the private government, the housing market equilibrium condition is

$$\frac{\alpha}{p^M(1+t)} \int_{y^*}^{\bar{y}} (y-\tau) f(y) \mathrm{d}y = L^M(p^M)^\mu. \tag{4.3.20}$$

While outside the private government, the housing market equilibrium condition is

$$\frac{\alpha}{p^N(1+t)} \int_{\underline{y}}^{y^*} y f(y) \mathrm{d}y = L^N(p^N)^\mu. \tag{4.3.21}$$

With the assumption of a uniform distribution of incomes over $[0,1]$, it is possible to calculate the net housing prices directly. They are

$$p^N = \left[\frac{\alpha}{L^N}\right]^{\frac{1}{1+\mu}} \left[\frac{1}{1+t}\right]^{\frac{1}{1+\mu}} (y^*)^{\frac{2}{1+\mu}} \quad \text{, and} \tag{4.3.22}$$

$$p^M = \left[\frac{\alpha}{L^M}\right]^{\frac{1}{1+\mu}} \left[\frac{1}{1+t}\right]^{\frac{1}{1+\mu}} \left[\frac{1-(y^*)^2}{2} - \tau(1-y^*)\right]^{\frac{2}{1+\mu}}. \tag{4.3.23}$$

Next, the membership decision condition takes the form

$$\Delta V(y) = \left\{(g+\gamma)^\beta \left[\frac{\alpha^\alpha(1-\alpha)^{1-\alpha}}{(p^M(1+t))^\alpha}\right] - g^\beta \left[\frac{\alpha^\alpha(1-\alpha)^{1-\alpha}}{(p^N(1+t))^\alpha}\right]\right\} y - \tau(g+\gamma)^\beta \left[\frac{\alpha^\alpha(1-\alpha)^{1-\alpha}}{(p^M(1+t))^\alpha}\right]. \tag{4.3.24}$$

This is linear, which implies the existence of a unique marginal member. Now in order for the slope of $\Delta V(y)$ to be positive, it is also necessary that

$$\frac{(g+\gamma)^\beta}{(p^M(1+t))^\alpha} > \frac{g^\beta}{(p^N(1+t))^\alpha}.$$

Now the marginal member y^* satisfies $\Delta V(y^*) = 0$. The value of y^* can be explicitly determined:

$$y^* = \frac{\tau(g+\gamma)^\beta(p^M(1+t))^\alpha}{(g+\gamma)^\beta(p^N(1+t))^\alpha - g^\beta(p^M(1+t))^\alpha}. \tag{4.3.25}$$

Note that in order for y^* to be positive, $(g+\gamma)^\beta(p^N(1+t))^\alpha - g^\beta(p^M(1+t))^\alpha$ must be positive. This can be written

$$\left(\frac{g+\gamma}{g}\right)^\beta > \left(\frac{p^M(1+t)}{p^N(1+t)}\right)^\alpha.$$

But this condition is exactly what is needed for the slope of $\Delta V(y)$ to be positive, so that if there is a marginal member in equilibrium, those residents with incomes less than y^* must strictly prefer not to join the private government, while those with incomes greater than y^* strictly prefer to join.

The final conditions to be satisfied are the governments' budget constraints. The private government budget constraint is trivial:

$$\tau = \gamma. \tag{4.3.26}$$

The public government's budget constraint has the form

$$\frac{\alpha t}{1+t}\left[\int_{\underline{y}}^{\bar{y}} y f(y)\mathrm{d}y - \tau \int_{y^*}^{\bar{y}} f(y)\mathrm{d}y\right] = g. \tag{4.3.27}$$

With y distributed uniformly on [0,1], $\int_0^1 y f(y)\mathrm{d}y = \frac{1}{2}$, and $\int_{y^*}^1 f(y)\mathrm{d}y = 1 - y^*$. The public government's budget constraint thus reduces to

$$\frac{\alpha t}{1+t}\left[\frac{1}{2} - \tau(1-y^*)\right] = g. \tag{4.3.28}$$

The equilibrium values of p^N, p^M, y^*, γ and g can be solved from equations (4.3.22), (4.3.23), (4.3.25), (4.3.26) and (4.3.28). To calculate the solution, the following parameter values are used: $(\alpha = 0.37, \beta = 0.111, t = 0.28, \tau = 0.05, L^M = 0.1, L^N = 0.9, \mu = 3)$.

The parameters are chosen as follows. Following Calabrese and Epple (2004), α and β are chosen such that if G, h and x were privately purchased goods, the consumer would spend one-third of gross income on housing, and ten per cent of gross income on G. μ is the ratio of non-land to land inputs in housing production; Epple and Romer (1991) give evidence that $\mu = 3$ is appropriate. A L^M/L^N ratio of 0.1 is arbitrary but is chosen to represent development in the suburban fringes of the city.[7] The private fee $\tau = 0.05$ is chosen arbitrarily, but it represents a substantial cost to join the private government but also a substantial private supplement. This should aid in pinning down a marginal member. Finally, the tax rate $t = 0.28$ is chosen because t is defined on the annualized

[7]This paper makes no attempt to endogenize the amount of land devoted to private government. In reality, of course, developers vary L^M depending on the anticipated membership, the level of service provided and other factors.

implicit rental value of housing services, whereas the property tax rate is defined as a proportion of the market value of housing. The conversion formula between the two is given by $t = t_p/k_p$, where t_p is the conventional property tax rate and k_p is the user cost of housing.[8] Evidence from California suggests that prior to Prop 13, the effective property tax rate was roughly $t_p = 2.5\%$. Thus, $t = 0.025/0.089 = 0.28$ is used.

Given these parameter values, the equilibrium values of the five endogenous variables are

$$y^* = 0.868,\ \gamma = 0.050,\ g = 0.040,\ p^N = 0.701,\ p^M = 0.762.$$

A range of starting variable values were used to ensure that there were no multiple equilibria or convergence problems[9]

With the selected parameter values, about 13 per cent of the population chooses to join the private government. Figure 4.3.5 calculates the realized utility of non-membership and membership for all income levels. While graphically the difference is quite small, the single-crossing condition is satisfied. Those with $y < y^*$ prefer not to be members, so that they receive a substantially lower level of public services, but in return for which they purchase housing at a much lower price. Those $y > y^*$ strictly prefer to be members, and they consume almost twice as much G as non-members. The high level of G is capitalized into higher housing prices, which are about 9 per cent higher than house prices outside the private government.

Comparative Statics: An Exogenous Property Tax Decrease

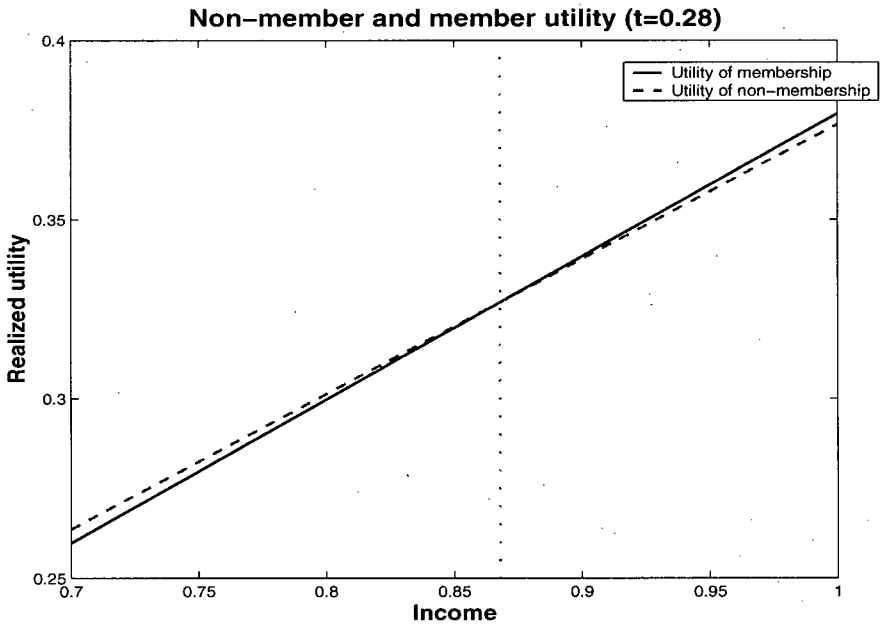
The next step in the computational exercise is to decrease the exogenous property tax rate t. Figure 4.2 shows the effect of changing t on the equilibrium values of all the endogenous variables except γ, which is trivially related to the private government's fee.

Panel (i) of Figure 4.2 provides the key comparative static of the empirical model: as t gets exogenously smaller, the income of the marginal member decreases; in other words,

[8] The formula is derived following Poterba (1992). Let R be the annualized rental value of housing services and P be the market value of the house. Then $R = k_p P$. Now $k_p = (1 - t_y)i + \zeta$, where t_y is the income tax rate, i is the nominal interest rate and ζ is the sum of the risk premium on housing investment, the maintenance rate, the depreciation rate and inflation. As $tR = t_p P$, this implies $t = t_p/k_p$. To calculate k_p, Poterba uses $t_y = 0.15$, $i = 0.1286$ and $\zeta = -0.02$.

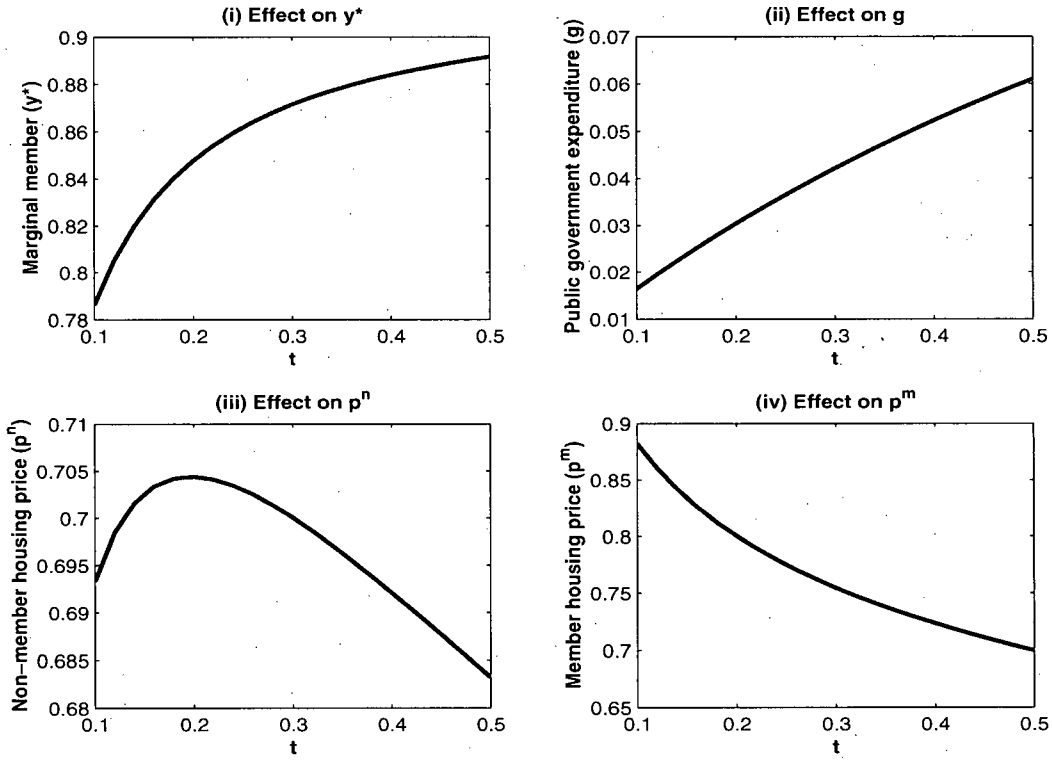
[9] Also, other sensible parameter values were tried and gave similar results.

Figure 4.1: **Computational Model: Equilibrium Membership Decisions**



Realized member versus non-member utility when $(\alpha = 0.37, \beta = 0.111, t = 0.28, \tau = 0.05, L^M = 0.1, L^N = 0.9, \mu = 3)$. The vertical dotted line indicates the income of the marginal member. The horizontal axes have been adjusted to illustrate more clearly the crossing point.

Figure 4.2: **Computational Model: Changing the Property Tax Rate**



The effect of changing t on the equilibrium values of (i) the marginal member, (ii) public government spending, (iii) non-member housing price and (iv) member housing price.

the private government membership gets bigger. Note also the relationship between t and y^* is concave: at relatively low levels of t, a tax cut results in a higher increase in private government membership. The intuition for this is that t is charged to both members and non-members. A low t hampers the public government's ability to provide services and so makes private government provision, which is invariant to the property tax rate, even more attractive.

The other panels of the Figure show the other comparative static results. A decrease in property tax leads to a decrease in public government expenditure, which is natural given the public government's budget constraint is binding. A property tax decrease leads to an increase in housing prices inside the private government. This is presumably due to the increased private government membership, which is tied to buying a house in the limited land available for the private government. Finally, it is interesting to note that there is a non-monotonic relationship between the non-member housing price and the property tax. For relatively low tax rates, a tax cut decreases p^N. This seems to be driven by the decreased non-member population. However, if taxes are relatively high, a tax cut *increases* p^N. It seems that the tax cut increases the demand for housing outside the private government, and this is strong enough to overpower the decrease in the non-member population.

4.4 Background on Proposition 13

The remainder of this paper presents an empirical investigation into the effect of statewide property tax limitations on private government activity. The focus is on California municipalities in the years surrounding the imposition of Proposition 13 in 1978. This section provides a brief overview of the Proposition's motivation and consequences before introducing the econometric model.

Proposition 13 is often cited as a prime example of the property tax revolt. The origins of the tax revolt movement were soaring land and property prices in the 1970s, which led to skyrocketing assessed values. While housing prices in California climbed, local governments were slow to lower taxes. Many homeowners saw an increase of twenty to thirty per cent in their property tax bills every year. The unpredictable housing market also meant taxpayers were uncertain about the amount of next year's tax bill.

In 1978 California voters approved Prop 13 by a two-to-one margin, despite ominous predictions of drastic cuts to public services. O'Sullivan, Sexton, and Sheffrin (1995) estimate that the immediate effect of Proposition 13 was a 57 per cent reduction in property tax revenue in fiscal year 1978-79. Besides the limitation on revenues, Proposition 13 also changed the way local taxes are collected. Before Prop 13, each local agency (county, city, school district and special district) set its own tax rate; the average total effective property tax rate was 2.5 per cent of market value just prior to 1978. Prop 13 constrained total property taxes not to exceed one per cent of market value. A system therefore had to be devised to share the total tax revenues among local agencies. The severity of Prop 13 was exacerbated because it also limited to two per cent the yearly increase in assessed value for those properties that did not change hands. This cap did not allow for growth in government revenues to match the pressures of increased demand of government services or the increasing cost of providing these services.

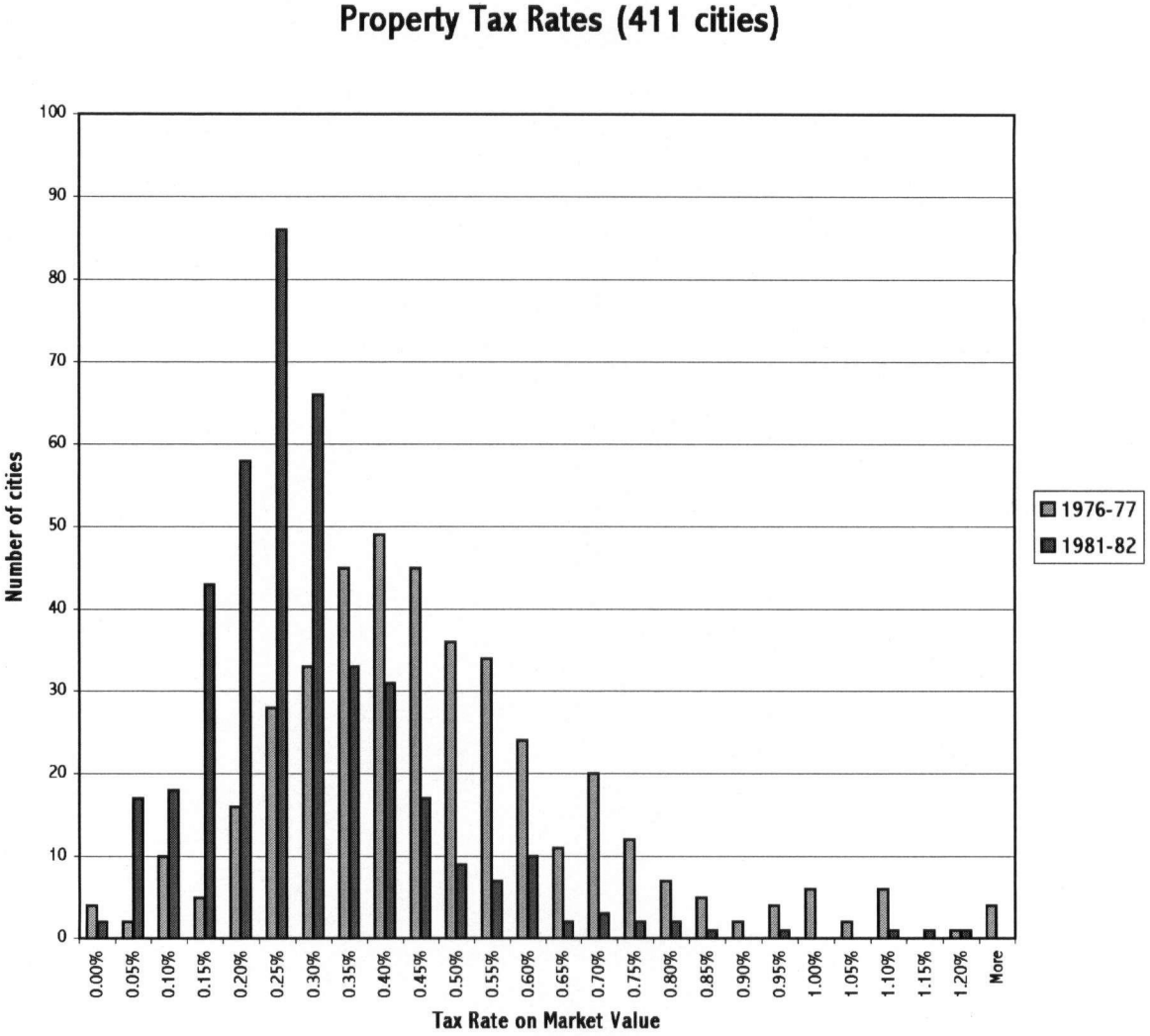
Figure 4.3 shows how Proposition 13 affected municipalities statewide by substantially shifting the property tax rate distribution downward. The figure is a histogram of effective property tax rates in fiscal year 1976-77, two years before Proposition 13 took effect, and in fiscal year 1981-82, two years after. The property tax rate is calculated for 411 cities by dividing the property tax revenue by the market value of property in the city.[10] In 1976-77, the average effective property tax rate was 0.47 per cent; in 1981-82, the average had decreased to 0.27 per cent. Compared to pre-Prop 13 years, the distribution of tax rates shifted to the left, but it also got tighter. This is because Prop 13 transferred much of the power of property tax from the city to the county, which now had to divide up revenues among various local jurisdictions in an equitable manner.

4.4.1 Local Responses to Prop 13

How did cities in California cope with Prop 13? The following summary corresponds with the options outlined in Section 4.2:

[10]This rate is the property tax rate for the city only, and it does not include property taxes paid to the county, school district or special district.

Figure 4.3: **Histogram of Property Tax Rates in 411 California Cities**



The sample is the set of all cities in California for which the assessed value of property is reported in fiscal year (FY) 1975-76.

Source: Annual Survey of Governments and the Census of Governments, U.S. Census Bureau

Expenditure Cuts

Most cities in California did reduce their expenditures, although not as dramatically as critics feared. State subventions cushioned cities' need to cut spending, but decreases were felt in most categories. O'Sullivan, Sexton, and Sheffrin (1995) note that libraries, parks and contribution to enterprises suffered the largest immediate cuts following Prop 13. Infrastructure was also affected, as ninety per cent of cities reported cutting back on capital improvement programs. On the other hand, building regulation, public safety and public works experienced *increases* following Prop 13, reflecting a shift in priorities for city budgets.

State Aid

The passage of Prop 13 was followed by a block grant from the state's surplus to cushion the decrease in property tax revenues. The grants, worth $2 billion, were designed so that no local government would experience more than a ten per cent loss in total revenue for the 1978-79 fiscal year. Subsequently the state eliminated the bailouts and shifted a portion of property tax revenues from school districts to local agencies. This was done so that cities experiencing high growth and development would have a wider source of funds. In turn, the state increased assistance to school districts. This, coupled with a contemporaneous ruling on school district equalization[11], effectively transferred control of school funding from the school district to the state. By removing the power of local governments to change their property tax rates, Prop 13 has concentrated fiscal power back to the state.

Alternative Sources of Revenue

The largest increase in government revenues after Proposition 13 came from increases in fees and charges. While fees still make up a relatively small portion of local government revenues (only 10 per cent of city revenues came from fees in 1978), most jurisdictions found them to be politically and economically effective. Cities increased building and developer fees, real estate transfer fees, licence fees, utility and sewerage fees, parks and

[11] *Serrano vs. Priest* mandated the equalization of per pupil spending across school districts.

recreation fees and many others. Residential growth has depended largely on high fees for new construction. Schwadron and Richter (1984) cite between 1978 and 1981, the fees collected by local governments increased by almost fifty per cent, and "if any one group has been a prime target for fee boosts, it has been the real estate developers."

Private Providers of Public Services

There has been little empirical research on private governments as a response to Prop 13. However, the passing of Prop 13 coincided with an explosive growth in the incorporation of homeowners' associations in the state. Roland (1998) notes that part of this popularity occurred because local governments and developers were able to come to mutually beneficial agreements. Developers agreed to take over the responsibility for infrastructure and some public services. Cities often relaxed zoning regulations to allow the developer to sell smaller lots and denser developments. Chapman (1981) notes that even before Prop 13, "local governments were finding it difficult to finance capital infrastructure...Proposition 13's passage accelerated the trend [of shifting improvements to the developer] since it virtually eliminated debt financing."

This is the response that the empirical examination seeks to identify. The next section builds the empirical model to test whether Prop 13 is an appropriate channel to explain the extraordinary growth in private governments in California.

4.5 Empirical Model

The empirical model takes the form of an event study and tests the proposition that an exogenous property tax decrease raises homeowners' association membership in a city. In the first part of the empirical examination, Prop 13 is assumed to have a similar effect on all cities in the sample. In the second part of the empirical section, the model allows some differentiation between cities and tests whether or not cities that are more constrained by Prop 13, as defined by initial conditions, experience increased growth in private government.

4.5.1 Prop 13 in an Event Study Model

In the simplest formulation, the test for the effect of Prop 13 on homeowners' association popularity can be expressed as follows:

$$y_{it} = \beta Prop13_{it} + \delta x_{it} + d_i + d_t + \epsilon_{it}. \tag{4.5.1}$$

where y_{it} is the homeowners' association membership rate in city i in year t, and $Prop13_{it}$ is an indicator variable reflecting whether city i was subject to Prop 13 in year t. Other time-varying covariates, x_{it}, control for characteristics likely to have changed over 1976-1982, the years of the study, and which are likely to affect private government membership. Particularly of interest, they include the levels of intergovernmental aid and charges to take into account the possibility that cities substitute for decreased tax revenues with these alternate sources of income. The d_i control for unobserved city fixed effects. Finally, the d_t control for year effects that are the same for all cities in the sample; to allow for flexibility in modelling the time trend, specifications are run with a set of year dummies, a linear year trend and a quadratic year trend. Equation 4.5.1 is estimated by OLS.

An alternative view of the empirical model is the role of Proposition 13 in the growth rate of HOA. An alternative dependent variable is the change in HOA membership rate in the city. Focusing on the growth in HOAs captures the way in which Prop 13 may have prompted local governments to encourage the growth of other public service providers; thus the limitation's effect would be to increase the growth rate of private governments.

However, it may be more sensible to think of each homeowners' association as an individual agent in the interaction between public and private governments. Because all common interest developments have only a single homeowners' association, regardless of the number of housing units, an appropriate measure of the HOA variable should be the number of new incorporations in a city. Each developer's decision whether to set up an HOA can be treated as a separate decision. Because this variable can only take on non-negative values, and because there are likely many observations for which the number of new incorporations in a city is zero, OLS regression would not make efficient use of the data, whereas count data models would. Count data models are well-known for their ability to accommodate a significant number of zero observations.

In a count data context, the dependent variable, y_{it}, is the number of new HOA incorporations in city i in year t. y_{it} is a non-negative integer, and its conditional mean depends on some vector or regressors x_{it}. The key regressor is a measure of the binding effect of Proposition 13.

Much of the econometric analysis comes from Cameron and Trivedi (1998). The most common way to deal with count data is to assume that y_i is independently Poisson distributed, given the vector of regressors x_i, with density

$$f(y_i|x_i) = \frac{e^{-\mu_i}\mu_i^{y_i}}{y_i!}, \quad y_i = 0, 1, 2, \ldots. \tag{4.5.2}$$

with mean parameter

$$\mu_i = \exp(x_i'\beta). \tag{4.5.3}$$

The major obstacle to using the Poisson distribution, however, is that it assumes that the conditional mean equals the conditional variance: $E[y_i|x_i] = V[y_i|x_i] = \exp(x_i'\beta)$. The parameter vector β is estimated by maximizing the log-likelihood function. Valid statistical inference requires equidispersion, that is, the conditional mean equals the conditional variance. When there is overdispersion (when the conditional variance is greater than the conditional mean), ML estimates can give seriously underestimated standard errors, leading to spurious significance of the parameters. Nevertheless, statistical inference is possible by appropriately adjusting the standard error estimates. This leads to the Poisson pseudo-ML estimator (PMLE), which is based on the correct specification of the conditional mean, while allowing for overdispersion.

An alternative way of handling the overdispersion problem is to specify a distribution that permits more flexible modelling of the variance than the Poisson. The negative binomial distribution assumes that the data are Poisson, but there is a gamma-distributed unobserved individual heterogeneity. Allow the conditional variance to be a function of the mean:

$$V[y_i|x_i] = \mu_i + \alpha\mu_i^2. \tag{4.5.4}$$

In this case, α is called the dispersion parameter and is estimated alongside β. This is a parameterization of the negative binomial distribution, which Cameron and Trivedi

(1986) call the NB2 model. The density of the negative binomial distribution is

$$f(y|\mu,\alpha) = \frac{\Gamma(y+\alpha^{-1})}{\Gamma(y+1)\Gamma(\alpha^{-1})}\left(\frac{\alpha^{-1}}{\alpha^{-1}+\mu}\right)^{\alpha^{-1}}\left(\frac{\mu}{\alpha^{-1}+\mu}\right)^{y}, \quad \alpha \geq 0, \quad y = 0,1,2,\ldots. \tag{4.5.5}$$

Note that the negative binomial density reduces to the Poisson density if $\alpha = 0$. The conditional mean is still $\mu_i = \exp(x_i'\beta)$. Maximizing the log-likelihood function gives the NB2 MLE, $(\hat{\beta}_{NB2}, \hat{\alpha}_{NB2})$. The NB2 MLE has several attractive properties. It is robust to distributional misspecification. As long as the conditional mean is correctly satisfied, the estimated coefficient vector $\hat{\beta}$ is consistent.

There is some history of count data models in empirical urban economics. McMillen and Smith (2003) examine the determinants of the number of employment subcentres in a cross-section of 62 large American urban areas. Using a Poisson regression, they find that metropolitan population and commuting costs account for nearly 80 per cent of the variation in the number of subcentres. However, McMillen and Smith do not address overdispersion of the count data. Papke (1991) examines the effect of state and local tax differentials on the location of industry. Using a panel of manufacturing firms, she models the number of firm births in a location as a Poisson count process. Finally, Congdon (1993) compares the Poisson and multinomial models of migration flows. He compares various ways of dealing with overdispersed data. He also addresses count data models when the errors are spatially correlated.

4.5.2 Public Government Data

The data for the empirical analysis come from a combination of sources. The dependent variable is a measure of private government, which requires the number of homeowners' associations in California and their membership. The time period for the analysis is fiscal year 1975-76 through fiscal year 1981-82. These are referred to simply as 1976 through 1982. Proposition 13 took effect beginning in fiscal year 1978-79. Thus, the pre-Proposition 13 years in this analysis are 1976, 1977 and 1978, and the post-Proposition 13 years are 1979, 1980, 1981 and 1982.

The data on local government revenues come from the U.S. Census Bureau's Annual Survey of Governments and Census of Governments. Cities, counties, school districts

Table 4.1: **Number of Cities in the Survey of Governments**

Year	Number of cities responding	Average population
1976	208	70,689
1977	407	41,004
1978	209	72,659
1979	402	43,051
1980	230	70,603
1981	391	45,936
1982	419	44,686

The horizontal line separates pre-Proposition 13 years from post-Proposition 13 years. *Source:* Annual Survey of Governments and the Census of Governments, U.S. Census Bureau

and special districts are surveyed on their revenues, expenditures and debt over the previous fiscal year. The cross-sectional unit of analysis is the municipality; however, not all municipalities are surveyed in each fiscal year. The two exceptions are 1977 and 1982. These are Census of Governments years, and every municipality responds to the survey. The analysis includes the two Census years in order to capture as much cross-sectional variation as possible. Table 4.1 shows the number of cities surveyed in each year along with the average population of those cities. When only a portion of the state's cities are surveyed, the survey favours larger municipalities. However, the sampling methodology guarantees that smaller cities are also represented.

The analysis uses an unbalanced panel of cities. The sample includes only cities that respond to the Survey of Governments for at least six of the seven years of the analysis. Out of 419 cities in the state as of 1982, 199 of them fit this criterion. This seems to be an adequate compromise between keeping as many cities in the sample and not having too many missing years of data. This also guarantees that every city in the sample reports at least two years before Prop 13 and two years after.[12]

[12]To check that there is not a serious sample selection problem, the analysis is also performed with a balanced panel, in which only cities that report to the Survey for all seven years are included. Estimation results are qualitatively similar and so are not reported.

4.5.3 Private Government Data

The dependent variables for the three empirical specifications measure the degree of private government activity in a city. These require the number of homeowners' associations in California and their membership. However, because of their private nature, one obstacle to empirical research into homeowners' associations is the lack of comprehensive data. This paper turns to a novel source of information about homeowners' associations to develop the measures of private government. A database of homeowners' associations in California was obtained from the accounting firm of Levy and Company in Oakland. It is a unique record of condominiums, cooperatives, planned developments and other homeowners' associations, and it is one of the most complete sources of information about residential private governments available. The database lists each of the 37,655 incorporated homeowners' associations in the state as of May 2003. Because the incorporation date of each association is known, it is possible to back out the associations that existed in each year, so a panel can be constructed. The membership of each association is aggregated to the city level using an imputation method, as the exact membership of each association is unknown. The result is a time series of the homeowners' association membership rates for each city in the sample.[13] For one city in the sample, Oakdale, the imputation method yields a homeowners' association rate of greater than 1 for some years; this city is therefore dropped from the sample, reducing the number of cities in the sample to 198.

For the count data model, no imputation is necessary as the dependent variable is simply the number of new incorporations. Each association is counted once regardless of size (associations can range from a handful of housing units to thousands of housing units) or type (planned development, condominium or cooperative). Thus an additional appeal to the count data model is that there is no measurement error owing to the imputation of the membership rates.

Recall Figure 3.3 at the beginning of the dissertation, which shows the number of associations by year of incorporation and by type. The figure clearly demonstrates that homeowners' associations were virtually unknown up to 1970. There is a gradual increase in the number during the 1970s, but in 1978, the number of new incorporations

[13]For further information on the data and the imputation method used to calculate the membership rates, consult Chapter 3.

Table 4.2: **Summary Statistics for Private Government Variables**

Summary Statistics				
HOA membership rate:	Mean:	.079	Min.:	0
	Std. dev.:	.097	Max.:	.677
% change in membership rate:	Mean:	.006	Min.:	-.063
	Std. dev.:	.019	Max.:	.299
Number of new incorporations:	Mean:	4.8	Min.:	0
	Std. dev.:	19.1	Max.:	372
Frequency Table of New Incorporations				
0 incorporations:	465	(33.6% of observ.)		
1:	232	(16.7%)		
2:	169	(12.2%)		
3:	119	(8.6%)		
4:	87	(6.3%)		
5-10:	199	(14.4%)		
11-20:	76	(5.5%)		
21-372:	39	(2.8%)		

The sample consists of 198 cities over the 1976-1982 period (1,386 observations).
Source: Levy and Company, 2004

soared and remained at a very high level for about twelve years. There has been a gradual decline in recent years and a return to new incorporation levels resembling those of the mid-1970s. The data also show a distinction between the various types of common interest development and their relative popularity. Planned developments, which generally consist of single-family houses, were the predominant form of CID in California until the early 1970s. Condominiums began to rise in popularity and took over as the most common form of homeowners' association. Roland (1998) interprets this as a deliberate decision by the building industry to "market housing with increased densities." This was combined with the support of federal and local policies, who made investment in condominiums more attractive by policies such as mortgage insurance.

Table 4.2 presents some summary statistics for three private government dependent variables. In the third panel, the frequency table of the number of new incorporations in a given year suggests the need to control for the preponderance of zero observations and the integer nature of the data by using a count data model.

4.5.4 Other Covariates

The other covariates on the right hand side of the estimating equation are variables that are posited to affect the degree of private government, and which are likely to have changed over the study period. In the previous chapter's empirical examination of private government these included demographic and economic characteristics of the community, such as ethnicity, income and education. However the study period there was a thirty-year period as opposed to a seven-year period here. Therefore, it is unlikely that many of these variables will have substantially changed, and, in practice, many of them are measured at only one or two points in the study period. Thus the effect of these variables will be subsumed into the city fixed effect d_i, and the estimation will not explicitly control for them.

On the other hand, there are variables that are likely to have changed substantially over the sample period and are observed annually, and these are included in some specifications of the fixed-effects regressions. The most notable are the levels of intergovernmental revenue and charges revenue. As mentioned earlier, some cities substituted for the loss in property tax revenue by heavy increases in fees and intergovernmental aid. In additional, three other time-varying covariates are used to proxy for residential growth: population, five-year population growth and land area. To the extent that membership rates in homeowners' associations is correlated with residential growth, it will be important to control for their effect in order to argue that the variation in private government activity that remains is attributable to Prop 13.

4.5.5 Analysis

Table 4.3 shows the fixed-effects estimation results when the dependent variable is the imputed HOA membership rate. The coefficient of interest, the effect of Prop 13, is measured by a dummy variable that takes the value 1 for all observations from 1979 through 1982, and 0 for all observations from 1976 through 1978. Because of the inclusion of city-specific, time-invariant effects, these specifications identify the effect of Prop 13 using only the within-city levels of HOA membership rate. Specifications (1), (2) and

(3) control for year effects through a set of year dummy variables.[14]

Specification (1) is the simplest specification that does not control for alternate sources of government revenue. The positive coefficient on the Prop 13 dummy suggests that the constant in the predicted HOA membership rate was shifted up by .039. To get a sense of the magnitude of the estimate, the mean of the dependent variable is about .08 over the sample period. Hence, Proposition 13 accounts for a substantial shift in the intercept. Specification (2) controls for per capita charges revenue and intergovernmental revenue to allow the possibility that property tax limitation causes cities to raise alternative types of revenue. The inclusion of these variables has little effect on the Prop 13 coefficient, although it is interesting that an increase in per capita charges revenue is positively related to an increase in HOA membership. This is consistent with the increased use of developer impact charges following Prop 13. However, once Specification (3) controls for additional time-varying covariates (population, land area and population growth) the charges revenue becomes insignificant again. This is perhaps due to the positive correlation between charges revenue and residential growth, which is proxied by these additional covariates. Still, the Prop 13 effect remains significantly positive in Specification (3).

Specifications (4) through (6) report results from various other specifications of the year trend. Specification (4) uses a linear year trend instead of year dummies, while (5) adds in a quadratic term. In (6), an interaction term, equal to the year multiplied by whether Prop 13 was in effect, allows not only Proposition to shift the intercept in the predicted HOA membership rate, but also the slope. However, in these three specifications the effect of the Prop 13 dummy is insignificant.

Table 4.4 shows the fixed-effects estimation results with the dependent variable being the *percentage point change* in the HOA membership rate. Columns (1) through (3) use year dummies to control for the year effects; the Proposition 13 dummy is insignificant. This time, however, using a linear or a quadratic year trend uncovers a positive Prop 13 effect. This suggests that not only did Prop 13 have a positive effect in HOA membership rates over the sample period, it also had a positive effect on the growth rate of membership.

[14]Note that two years have to be dropped to avoid the dummy variable trap. These are the years 1976 and 1982.

Table 4.3: **Fixed-Effects Estimation Results for HOA Membership Rate**

Sample years: 1976 through 1982
Dependent variable = HOA membership rate

	(1)	(2)	(3)	(4)	(5)	(6)
Prop 13	.039***	.038***	.037***	.002	.003	-.163
	(.003)	(.003)	(.003)	(.003)	(.003)	(.120)
Year				.006***	-.028	.005***
				(.001)	(.034)	(.001)
Year^2					.0002	
					(.0002)	
Prop 13 × year						.002
						(.002)
Charges revenue		.084***	.049*	.083***	.083***	.083***
		(.016)	(.027)	(.016)	(.016)	(.016)
IG revenue		.016	.023	.009	.012	.014
		(.017)	(.019)	(.017)	(.017)	(.017)
Year dummies	Yes	Yes	Yes			
Other controls			Yes			
R^2 within	.255	.275	.274	.253	.273	.274

There are 198 cities in the sample. Mean of dependent variable is .079.
All specifications control for city fixed effects. "Other controls" refer to population, 5-year population growth and land area. *, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

To explore the growth of HOAs further, Table 4.5 and 4.6 present count data models where the dependent variable is the number of new incorporations of homeowners' associations of any type. Again, it may be reasonable to think of the number of incorporations as a relevant dependent variable if Prop 13 encouraged city policies that made HOA formation a more feasible option for a developer. Regardless of the number of housing units, a developer would set up only one homeowners' association. Both the Poisson and the negative binomial regressions indicate there is a significant, positive Prop 13 effect on new HOA incorporations. This suggests that Prop 13 had a hand in raising membership rates in homeowners' associations, but also in the formation and growth of them.

Table 4.4: **Fixed-Effects Estimation Results for HOA Membership Change**

Sample years: 1976 through 1982
Dependent variable = Change in HOA membership rate

	(1)	(2)	(3)	(4)	(5)	(6)
Prop 13	.003	.003	.002	.003*	.002	.199**
	(.002)	(.002)	(.002)	(.002)	(.002)	(.084)
Year				-.0001	.062***	.002*
				(.0005)	(.024)	(.001)
Year^2					-.0004***	
					(.0001)	
Prop 13 × year						-.003**
						(.001)
Charges revenue		.010	.0002	.009	.009	.009
		(.011)	(.018)	(.011)	(.011)	(.011)
IG revenue		.005	.006	.008	.003	.003
		(.011)	(.013)	(.012)	(.012)	(.012)
Year dummies	Yes	Yes	Yes			
Other controls			Yes			
R^2 within	.014	.015	.019	.009	.015	.013

There are 198 cities in the sample. Mean of dependent variable is .006.
All specifications control for city fixed effects. "Other controls" refer to population, 5-year population growth and land area. *, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

Table 4.5: **Poisson Estimation Results for New HOA Incorporations**

Sample years: 1976 through 1982
Dependent variable = New HOA incorporations

	(1)	(2)	(3)	(4)	(5)	(6)
Prop 13	1.009***	.946***	.906***	.980***	.245***	54.148***
	(.068)	(.074)	(.079)	(.052)	(.058)	(3.119)
Year				.001	18.395***	.540***
				(.014)	(.880)	(.035)
$Year^2$					-.116***	
					(.006)	
Prop 13 × year						-.684***
						(.040)
Charges revenue		1.210*	1.262*	-.052	.993	.427
		(.652)	(.687)	(.611)	(.642)	(.631)
IG revenue		-.574	-.515	1.417***	-2.289***	-2.612***
		(.601)	(.620)	(.471)	(.565)	(.583)
Year dummies	Yes	Yes	Yes			
Other controls			Yes			

There are 187 cities in the sample (some cities were dropped because of all zero outcomes). Mean of dependent variable is 4.8.
All specifications control for city fixed effects. "Other controls" refer to population, 5-year population growth and land area. *, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

Table 4.6: **Negative Binomial Estimation Results for New HOA Incorporations**

Sample years: 1976 through 1982
Dependent variable = New HOA incorporations

	(1)	(2)	(3)	(4)	(5)	(6)
Prop 13	.926***	.919***	1.197***	.834***	.251***	40.099***
	(.096)	(.104)	(.093)	(.088)	(.083)	(4.486)
Year				.015	14.088***	.429***
				(.022)	(1.146)	(.052)
$Year^2$					-.088***	
					(.007)	
Prop 13 × year						-.506***
						(.058)
Charges revenue		-.513	2.400***	-1.705*	-.136	-1.349
		(.882)	(.751)	(.903)	(.840)	(.906)
IG revenue		-.647	2.093	.610	-1.324*	-1.040
		(.721)	(.593)	(.628)	(.788)	(.743)
Year dummies	Yes	Yes	Yes			
Other controls			Yes			

There are 187 cities in the sample (some cities were dropped because of all zero outcomes). Mean of dependent variable is 4.8.
All specifications control for city fixed effects. "Other controls" refer to population, 5-year population growth and land area. *, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

4.5.6 Heterogeneity in the Prop 13 Treatment Variable

The previous section generally finds a significant post-Proposition 13 effect on the levels and growth of homeowners' association membership as well as the number of new HOA incorporations in California. However, because Proposition 13 affected all municipalities in the state, the previous estimation assumes that Prop 13 has a similar effect on all cities equally. However, as the histogram of effective property tax rates shows, there is a large range in property tax rates across cities. Presumably, some cities experienced relatively large drops in property tax revenue following Prop 13, while others experienced small drops. Thus, a natural question would be to see if cities that were relatively "more constrained" by Prop 13 experienced relatively larger increases in private government levels and incorporations.[15]

To the extent that Prop 13 may have affected various municipalities differently, it is useful to devise a measure of the constraint that Prop 13 places on a city. In other words, Prop 13's bite may have differed across municipalities. This would allow cross-city comparison of the effects of Prop 13 on private government formation.

In addition, the inclusion of a heterogeneous Prop 13 treatment variable should help allay the problem of not having a counter-factual state or municipalities. Figlio (1998) includes school districts in Washington, a state that did not experience Oregon's limitation measure. In this study, all the cities in the sample experienced Prop 13, so there is no way to know what the incorporation of new HOAs would have looked like in the absence of Prop 13. However, the heterogeneous treatment variables provide a way to compare cities where the impact of Prop 13 was strong to cities where the impact was minimal.

This paper proposes three measures of the degree of constraint that Prop 13 placed on a city:

- Property tax rate: if the pre-Prop 13 property tax rate in the city is high, then it is likely that Prop 13 has a strong constraining effect on the city's revenues.

[15]Ideally, this could lead to a test of the second comparative static result derived from the computational model: If the initial tax rate in a city is low, an exogenous property tax decrease raises membership more than if the initial tax rate were high, all other things being equal. However, this assumes that the exogenous decrease is the same size for both high-initial tax and low-initial-tax cities. Prop 13 may not an appropriate tax decrease as it affected cities differently.

- Property tax dependence: if, before Prop 13, a city was highly dependent on property tax revenue and lacks alternative sources of revenue, it may turn to private government development to finance municipal infrastructure when faced with property tax cuts.
- Crime: a city with a high pre-Prop 13 crime rate may meet with less resistance from allowing planned developments and gated communities to form.

These mechanisms suggest that cities can be differentiated by interacting the Prop 13 dummy with these heterogeneous variables. Figlio (1998) suggests that the interaction of the policy dummy should be with a pre-limit variable only; this removes the possibility of property tax dependence or crime rate to be endogenous and to depend on the number of HOA incorporations.

The equation estimated is as follows:

$$y_{it} = \beta Prop13_{it} + \zeta_j Prop13_{it} Z_{ij} + \delta x_{it} + d_i + d_t + \epsilon_{it}. \tag{4.5.6}$$

where y_{it} is the dependent variable, which, as before, will be the HOA membership rate in levels, the one-year percentage point change in HOA membership rate and the number of new HOA incorporations. $Prop13_{it}$ indicates whether Prop 13 is in place, Z_{ij} is an interaction variable representing a pre-Prop 13 condition and x_{it} are time-varying covariates that affect private government activity. As in the previous section, the city fixed effect is d_i and the year effects are d_t, which may take the form of a set of year dummies, a linear time trend or a quadratic time trend.

The three pre-limit conditions are measured at the year 1976 and come from a variety of sources. The property tax rate is the property tax revenue divided by the assessed value of property. Property tax dependence is defined as the city's property tax revenue divided by total revenue. Tax revenue figures from the Annual Survey of Governments while the assessed values come from the State Board of Equalization. Crime rates are calculated by taking the FBI's crime index (which aggregates violent and property crimes) and normalizing by population.

As the goal is to identify differential effects of Prop 13 from cities with different pre-limit conditions, it is important to verify that the private government trends are similar

across all municipalities prior to Prop 13. One way to do this is to group cities into groups with similar pre-limit conditions and compare their private government variables. If the expectation is that Prop 13 affected some cities more than others, then the various groups of cities should have similar private government trends before Prop 13 but should diverge afterward.

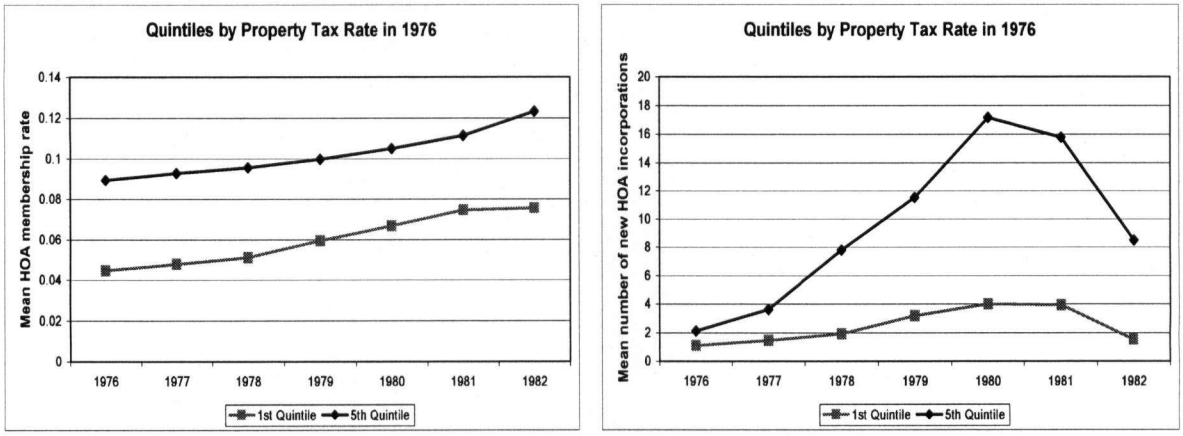
The results of this verification exercise are summarized in Figures 4.4, 4.5 and 4.6. The methodology is as follows. Cities are ranked according to the pre-limit condition of interest and grouped into quintiles. The figures plot the mean of the dependent variable of interest for cities in the first and in the fifth quintile.

The left panel of Figure 4.4 shows that cities with different property tax rates before Prop 13 react differently in the trend in the private government membership rate after Prop 13. Prior to 1979, low property tax cities (1st quintile) and high property tax cities (5th quintile) exhibited similar trends in homeowners' association membership.[16] After 1979, high-tax cities seem to show slightly faster growth in the HOA membership rate. The HOA membership rate of low-tax cities seem to be growing at a decreasing rate. This is consistent with the theory that cities with high property tax rates before Prop 13 are more likely to feel the proposition's bite. Thus, high tax rate cities may be more likely to turn to private government. However, this difference between the first and fifth quintiles seems small and may indicate that property tax rate may not be the appropriate pre-limit condition to group cities by.

The right panel of Figure 4.4 plots the mean number of new HOA incorporations for the first and fifth quintile of the 1976 property tax rate. The difference in growth between the first and fifth quintiles is evident if the number of new incorporations is the measure of private government activity. Cities with high tax rates have higher growth in HOA incorporations, consistent with the view that these cities experienced a larger bite from Prop 13. However, an important caveat is that the divergence seems to occur a year before Prop 13 took effect. This could indicate that something besides Prop 13 was driving high property-tax rate cities to turn to private government. On the other hand, as the stipulations of Prop 13 were well-known a year before the referendum, developers and municipal officials in high tax cities may have anticipated the loss in revenue and

[16]Keep in mind that it is the trend that is of interest, as identification of the Prop 13 effect comes about from changes in private government within a city.

Figure 4.4: **Quintile Plots by Pre-Limit Property Tax Rate Heterogeneity**



Left: Mean HOA membership rate by quintiles of property tax rate in 1976
Right: Mean new HOA incorporations by quintiles of property tax rate in 1976

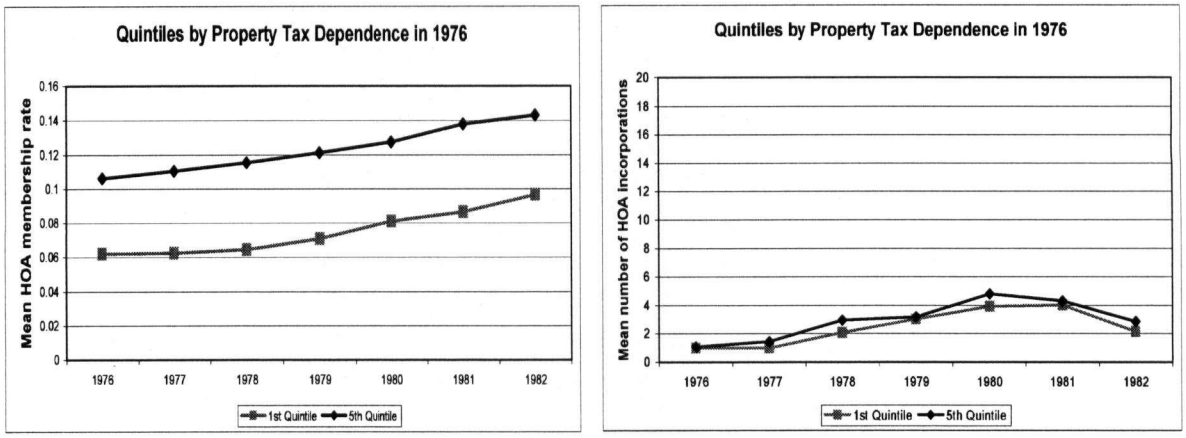
turned to private governments even before the proposition was passed.

In Table 4.7, the OLS estimation results are presented when the dependent variable is either the HOA membership rate or the percentage point change in the HOA membership rate. Table 4.8 reports the results with the Poisson and negative binomial count data models, using the number of new incorporations as the dependent variable. The only reported coefficient is that on the Prop 13 dummy, corresponding to β in Equation (4.5.6), and on the Prop 13 interaction term, corresponding to ζ.

The interaction terms give mixed evidence to the importance of pre-limit conditions on the degree of homeowners' association membership. The coefficients on the pre-limit conditions are significantly different from zero for only certain specifications. In the specifications in which both the uninteracted Prop 13 coefficient and the interaction term are different from zero, a mean effect of Prop 13 can be calculated. In general the mean effect is positive, which supports the effect that Prop 13 has on HOA membership and HOA membership growth.

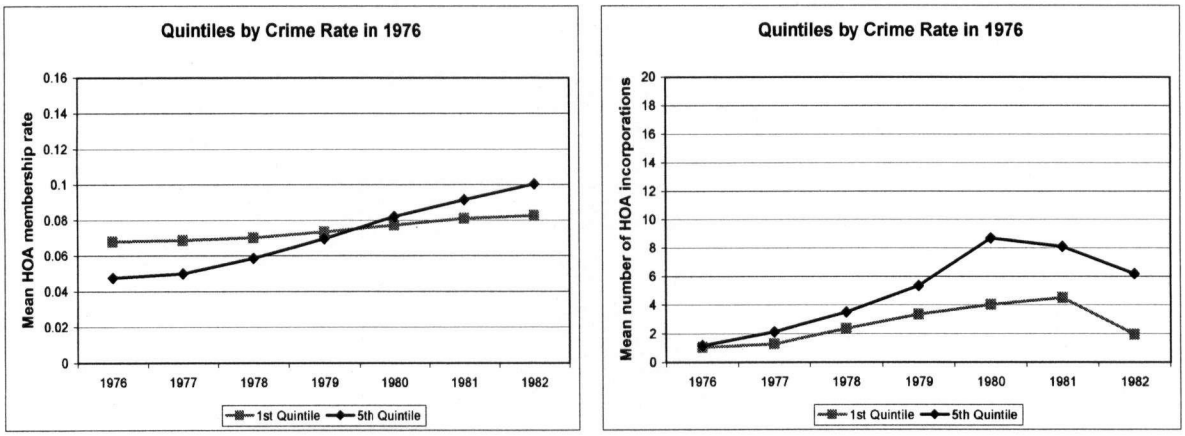
The strongest evidence for pre-limit heterogeneity is the use of crime rates. Cities with high pre-Prop 13 crime rates exhibit higher rates of homeowners' association membership and also more new HOA incorporations. This suggests that pre-limit crime rate

Figure 4.5: **Quintile Plots by Pre-Limit Property Tax Dependence Heterogeneity**



Left: Mean HOA membership rate by quintiles of property tax dependence in 1976
Right: Mean new HOA incorporations by quintiles of property tax dependence in 1976

Figure 4.6: **Quintile Plots by Pre-Limit Crime Rate Heterogeneity**



Left: Mean HOA membership rate by quintiles of crime rate in 1976
Right: Mean new HOA incorporations by quintiles of crime rate in 1976

may be acting as a proxy for local demand for public services. Residents of high crime cities may have recognized that the passing of Prop 13 may entail drastic cuts in policing and public safety[17], and this may have increased their demand for private provision of public safety.

In other specifications the sign of the interaction term is mixed. For example, the upper left corner of Table 4.7 shows when the pre-limit condition is the 1976 property tax, the estimated coefficients suggest that in cities with a high effective property tax rate in 1976, the effect of Prop 13 is lower, although the effect for the city with the average tax rate is still positive. Why would cities that have higher property tax rates, and thus for whom Prop 13 would presumably pose the greatest constraints, experience lower homeowners' association memberships? One possibility is that cities with high property tax rates are slower-growing central cities, and that instead of responding to Prop 13 by encouraging the growth of private governments, they are forced to cut government expenditures. On the other hand, Table 4.8 shows that cities with high pre-13 tax rates lead to more incorporations of HOAs. This would support the fact that these high-tax cities are slower-growing central cities if most of these incorporations took the form of condominiums or condo conversions instead of planned developments. Condominiums tend to have fewer housing units than planned developments, and so it would be possible for membership rates to rise slowly (or even fall relatively to increased residential growth in non-condominium housing) while the number of incorporations grew much more rapidly. Using the property tax as a measure of city constraint gives a mixed result; while this is unexpected, it does suggest that cities in California responded differently to Prop 13, and not all cities may have taken the route of private government development.

Finally, the use of pre-limit heterogeneity seems to have had no effect on the percentage change in HOA membership rate. Surprisingly, the coefficient on property tax dependence is negative, which suggests that cities that were highly dependent on property tax revenues had slower rates of HOA membership and formation after Proposition 13 was passed. This may indicate that property tax dependence is not an effective way to measure the revenue constraint that Prop 13 had on a city and that cities were better able at adapting to the loss in revenue that otherwise feared.

[17]And indeed during the campaign period leading up to the vote, opponents of Prop 13 used the threat of police cuts to try to convince voters to vote no.

Table 4.7: **Fixed-Effects Estimation Results with Pre-Limit Interactions. Dependent Variables Are HOA Membership Rate and Change in HOA Rate**

Sample years: 1976 through 1982

Specification:	Dep. var. = HOA membership rate			Dep. var. = Membership rate change		
	(1)	(2)	(3)	(4)	(5)	(6)
Interacted with 1976 property tax rate						
Prop 13	.057***	.017***	.018***	.002	.005	.003
	(.006)	(.006)	(.006)	(.003)	(.003)	(.004)
Prop 13 × 1976 prop. tax rate	-3.424***	-3.430***	-3.428***	.178	.179	.176
	(1.008)	(1.007)	(1.007)	(.594)	(.595)	(.593)
Interacted with 1976 property tax dependence						
Prop 13	.055***	.015**	.016**	.003	.007	.004
	(.006)	(.006)	(.006)	(.004)	(.004)	(.004)
Prop 13 × 1976 prop. tax dependence	-.063***	-.063**	-.063**	-.005	-.006	-.005
	(.025)	(.025)	(.025)	(.014)	(.015)	(.014)
Interacted with 1976 crime rate						
Prop 13	.019***	-.019***	-.017***	-.001	.001	-.0004
	(.005)	(.005)	(.005)	(.003)	(.003)	(.003)
Prop 13 × 1976 crime rate	.281***	.279***	.281***	.045	.048	.045
	(.057)	(.057)	(.057)	(.032)	(.032)	(.032)
Method of year control	Dummies	Linear trend	Quadratic trend	Dummies	Linear trend	Quadratic trend

*, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

All specifications control for city fixed effects and intergovernmental and charges revenue.

For the property tax and property tax dependence specifications, there are 199 cities in the sample. For the crime rate specification, there are 168 cities.

Table 4.8: **Fixed-Effects Estimation Results with Pre-Limit Interactions. Dependent Variables Are New HOA Incorporations**

Dep. var. = New HOA Incorporations
Sample years: 1976 through 1982

Specification:	Poisson			Negative binomial		
	(1)	(2)	(3)	(4)	(5)	(6)
Interacted with 1976 property tax rate						
Prop 13	.750***	.771***	.017	.788***	.685***	.082
	(.091)	(.077)	(.080)	(.130)	(.128)	(.127)
Prop 13 × 1976	40.922***	41.439***	44.889***	32.929*	33.561	33.437
prop. tax rate	(11.189)	(11.288)	(11.024)	(19.551)	(21.156)	(20.923)
Interacted with 1976 property tax dependence						
Prop 13	1.242***	1.288***	.536***	1.076***	.941***	.368**
	(.114)	(.102)	(.105)	(.151)	(.151)	(.145)
Prop 13 × 1976	-1.651***	-1.663***	-1.593***	-.834	-.544	-.734
prop. tax dependence	(.476)	(.477)	(.476)	(.584)	(.624)	(.591)
Interacted with 1976 crime rate						
Prop 13	.570***	.574***	-.154	.597***	.448***	-.118
	(.145)	(.137)	(.139)	(.188)	(.197)	(.187)
Prop 13 × 1976	4.814***	5.209***	4.902***	4.393***	5.226**	4.372**
crime rate	(1.570)	(1.570)	(1.570)	(2.042)	(2.216)	(2.060)
Method of year control	Dummies	Linear trend	Quadratic trend	Dummies	Linear trend	Quadratic trend

*, ** and *** denote significance at the 10, 5 and 1 per cent level, respectively.

All specifications control for city fixed effects and intergovernmental and charges revenue.

For the property tax and property tax dependence specifications, there are 187 cities in the sample. For the crime rate specification, there are 166 cities.

4.6 Conclusion

This chapter proposed an avenue by which local governments can respond to state-imposed tax and expenditure limitations. In addition to increasing fees and intergovernmental revenues, a city can download the responsibility of providing public services to private governments, in the form of homeowners' associations. The paper presented a simple theoretical model to study the effect of an exogenous tax rate limitation on the behaviour of private governments. The model is based on residents who decide whether to join a homeowners' association when choosing a place to live. The comparative static of interest in how the membership margin changes with the imposition of a property tax limitation.

The theoretical model leads to an empirical examination of the pattern of California homeowners' association growth in the years surrounding Proposition 13. The empirical analysis combines novel data on homeowners' associations in California with property tax data to see whether cities that faced stronger property tax constraints are more likely to encourage private government growth. In most specifications, Proposition 13 had a positive and significant effect of the level and the growth of homeowners' association membership, as well as on the number of new incorporations. Interaction terms try to estimate the effect of pre-Prop 13 conditions on the size of the effect of Prop 13. Cities with a high pre-Prop 13 crime rate, proxying a demand for public policing, are more likely to have higher rates and growth of homeowners' associations. This suggests that Prop 13 affected cities in California in different ways.

Of course, the ideal way to identify the effect of Prop 13 would be to find a group of cities in another state to serve as a control group. But barring better data on homeowners' associations in other states, this is not immediately feasible. Therefore, a further direction research may take is to develop a better measure of heterogeneity among cities and a better way to measure the degree of constraint that a city might have faced.

CHAPTER 5

Private Government and the Urban Housing Market

5.1 Introduction

This chapter extends the theoretical model of private government introduced in Chapter 4 and examines how, in the presence of a housing market and distortionary property taxes, a public government interacts with a private government. The motivation of this chapter is that the incorporation of housing markets adds to the understanding of why residents choose homes governed by private governments. The chapter shows that the presence of the property tax distorts two choices: the consumers' housing consumption decisions and the optimal provision of public services. A modified Samuelson rule characterizes equilibrium provision of public goods with elasticities playing a key role.

The chapter is organized as follows. Section 5.2 reviews previous research on private government as it relates to the urban housing market. This is done with the goal of integrating two strands of the local public finance literature into one view of private government. Section 5.3 outlines the model, which largely works off Helsley and Strange (1998), but which also incorporates elements of multicommunity general equilibrium models of local public good provision, after Tiebout (1956). After highlighting the basic model and its implications, Section 5.4 gives an example of equilibrium determination by performing some numerical simulations on a solved functional form. Section 5.5 concludes.

5.2 Private Governments and Housing Markets

The first step is to situate the housing market within the private government literature and to motivate its integration. Why does incorporating a housing market add to the understanding of the interaction between private and public governments? One reason is that it aids in integrating the newer private government models with the Tiebout models of local public good provision. As authors such as Rose-Ackerman (1979), Epple, Filimon, and Romer (1984) and Hansen and Kessler (2001) have noted, the addition of housing complicates these models, but they act as a stabilizing force that promotes the existence of equilibrium.

Another reason for looking in the housing market is to understand another motivation consumers have for joining a private government. Popular opinion, especially among members of homeowners' associations, is that private governments protect and increase property values. Reichman (1976) states that "The sole purpose of the general scheme is to preserve the community as planned and so to secure property values and desired living conditions." Indeed, a 1999 survey of homeowners' association members echoes this sentiment (CAI Research Foundation 1999). It reports that 85 per cent of members believe their property values are rising, and also that a primary reason for purchasing a home in a homeowners' association is that it represents a good investment. Thus, in a theoretical model it would be reasonable to expect that the value of the extra services provided by the private government be reflected in housing prices. However, in the presence of distortionary property taxes, this capitalization may not be perfect.

5.3 Model

This section outlines the private government model with housing markets and endogenous choice of public service levels. After the elements of the model are introduced, equilibrium conditions are characterized.

5.3.1 Players

The model consists of one urban area, whose land area is fixed. There are three main players: consumers who dwell in the city, the public government and the private government. The following examines each in turn.

Consumers

The population of the city is fixed and normalized to 1. Each consumer has the identical utility function $U(x, h, G)$, where h represents housing services, G is the level of government services in the form of a local public good and x is a numeraire composite good. The value of h can vary continuously and can be thought of as the quantity or quality of housing services. $U(x, h, G)$ is increasing, strictly quasiconcave and twice differentiable in all its elements. To address the issue of housing rents, make the initial usual assumption that all consumers in the city are renters, and their rents accrue to absentee landlords residing outside the city. The consumers differ in their exogenous income y^i. This exogeneity and the absentee landlord assumption imply that income does not depend on housing market conditions. The distribution of incomes is denoted $f(y)$ with support $[\underline{y}, \bar{y}]$, so that $\int_{\underline{y}}^{\bar{y}} f(y^i)\mathrm{d}y^i = 1$. Each consumer can be referred to by income, y^i. In this model, consumers must do two things: first they choose whether or not to join the private government, and then they choose utility-maximizing levels of x and h. Regardless of whether a consumer chooses to join or not to join the private government, each will nevertheless receive some level of G from the public government. A consumer can only consume a higher level of G by joining the private government.

Two assumptions about $U(x, h, G)$ are needed for the analysis, and it is useful to mention them now.

Assumption 1 *$U(x, h, G)$ is homothetic.*

Assumption 2 *$M(\tilde{r}, G, y) \equiv \frac{\mathrm{d}\tilde{r}}{\mathrm{d}G}\big|_{V=\overline{v}}$ is increasing in y.*

Assumption 1 is made for convenience in deriving the equilibrium conditions of the model. While it is not innocuous, it has been commonly assumed in other models of

local public good provision (see, for example, Hansen and Kessler (2001)) Assumption 2 is the important *single-crossing* condition (as used by Epple, Filimon, and Romer (1983) and others). This assumption states that the slope of a consumer's indifference curve in $(G, \tilde{r})$ space increases as income increases. Here $\tilde{r}$ represents the gross-of-tax price of housing. These assumptions are useful because they imply the desired sorting result – that there exists a marginal consumer who is indifferent between membership and nonmembership in the private government. This consumer partitions the population into a set of members (those with income higher than the marginal consumer) and a set of nonmembers (those with income lower than the marginal consumer).

The Public Government

The public government is obliged to provide a level of the public good to all inhabitants of the city. Denote g the level of the public good that is provided by the public government. The average cost of production for each unit of g is c. In order to finance provision, the public government levies an ad valorem property tax t on all housing services consumed in the city. As the public government's budget must balance, choosing g automatically determines the tax rate t. Remember that even private government members consume g; this model rules out instances of secession. Assume for now that the objective of the public government is to maximize the aggregate welfare of all the residents in the city.[1]

The Private Government

There exists a private government that determines the level of the public good that will be available only to members of the private government.[2] This level, denoted γ, is the "private supplement." Hence, each member of the private government will consume $G = g + \gamma$ in total, while each nonmember will only consume $G = g$.[3] There is no cost

[1]It is also possible to assume other governmental objectives, such as median voter utility maximization and property value maximization. For the numerical models later in the chapter, these alternative objectives may be invoked.

[2]Assume here that the private government exists for granted; this is not a model of private government formation. See Helsley and Strange (2000) for such a model.

[3]This model assumes that the publicly- and privately-provided public goods are pure substitutes. This follows Helsley and Strange's (1998) formulation of the public good. In this sense, the term "private supplement" is apt. However, it is plausible to think of examples of publicly-provided and privately-provided local services that are not substitutes. For example, public policing and private security services may be viewed as complementary public goods. It would then be more sensible to

advantage to the private government, which also produces γ at the constant average cost of c. Instead of financing with a property tax, however, the private government simply charges each private government member the average cost c per unit of γ produced. This is in line with the usual way in which homeowner associations are financed, through a fixed assessment that does not differ across households. One question that can be examined with this model, then, is how these two different methods of financing differ. For now, assume that the objective of the private government is to maximize the aggregate welfare of its members.

5.3.2 Timing

The model consists of two stages:

Stage 1: Suppose the pre-existence of the three players, consumers, the public and the private governments.[4] The values of three variables are determined simultaneously. First, the consumers sort themselves into members or nonmembers. This amounts to determining y^*, the income of the member who is indifferent between joining and not joining the private government. This individual may be called the *marginal member*. The determination of y^* is done taking g and γ as given. Second, the public government chooses g, taking y^* and γ as given. Third, the private government chooses γ, taking the values of y^* and g as given. Thus the equilibrium values of y^*, g and γ are resolved as a Nash equilibrium triplet.

Stage 2: In the second stage, the consumers, having decided on membership, now maximize their utility by choosing bundles of x, the composite good, and h, housing services. Finally, the housing market clears and resolves housing prices.

think in terms of a general public good function $G(g, \gamma)$ that could exploit this complementarity.

[4]This is in contrast to Helsley and Strange (1998), who add a stage before this one where the public government decides whether or not to allow the private government to form. This chapter chooses to focus only on the provision problem of the two governments as it is interested in how the private government affects the housing market. In addition, in practice public governments often do not have such unilateral authority in the creation of private governments. While their formation is promulgated by law, it is often under state regulation, not local. As well, after the law is passed, creation of private governments tends to be initiated by private individuals and not the public government.

5.3.3 Stage 2: Clearing of the Housing Market

To characterize the solution of the model, begin with the last stage. Within each stage, it is useful to examine first the case in which there is *only* a public government maximizing total welfare. This *Base Case* will be helpful in comparing the equilibrium conditions of this case with a private government.

Stage 2 Without Private Government

The second stage of the model is quite simple for the base case without a private government. There is only one nonexcludable public good financed by a property tax on housing services. Housing services have the same price throughout the city, so that the problem of each consumer y^i is simply

$$\max_{x^i, h^i} U(x^i, h^i, g) \quad \text{s.t.} \quad y^i = x^i + \tilde{r}h^i \quad \text{where } g \text{ is fixed, and } \tilde{r} = (1+t)r. \tag{5.3.1}$$

Note that in the base case, g is the level of public services, solely provided by the public government and financed by the property tax t. Only one housing price r prevails in the market. Setting up the constrained maximization problem for each household is straightforward and clearly gives rise to the usual "MRS equals price ratio condition," namely $\frac{U_h}{U_x} = \tilde{r}$. Each consumer will have a housing demand function $\hat{h}(\tilde{r}, g, y^i)$. However, because the utility function is homothetic, the housing demand function is multiplicatively separable in prices and income. Therefore it is possible write consumer y^i's housing demand in the form $\hat{h}(\tilde{r}, g, y^i) = \phi(y^i)h(\tilde{r}, g)$, where $\phi' > 0$. Note that the h function is common to everybody; only the arguments are different. This is the unit housing function. Now the indirect utility function of each consumer is

$$V(\tilde{r}, g, y^i) = U(y^i - \tilde{r}\phi(y^i)h(\tilde{r}, g), \phi(y^i)h(\tilde{r}, g), g). \tag{5.3.2}$$

Finally, clear the housing market, resolving the net-of-tax housing price. In housing equilibrium, aggregate housing demand must equal aggregate supply, characterized by the following equation:

$$\int_{\underline{y}}^{\bar{y}} \phi(y^i)h((1+t)r, g)f(y^i)\mathrm{d}y^i = H^S(r). \tag{5.3.3}$$

H^S represents a generic upward-sloping housing supply function that depends on net-of-tax house prices. Now use the separability of the housing demand function to rewrite the equilibrium housing price equation:

$$h((1+t)r, g)\Phi = H^S(r) \quad \text{where} \quad \Phi \equiv \int_{\underline{y}}^{\bar{y}} \phi(y^i) f(y^i) \mathrm{d}y^i. \tag{5.3.4}$$

At this point, introduce the shorthand Φ to represent an aggregate income measure of the population that depends only on the income distribution and its support. Equation (5.3.4) is enough to determine the equilibrium r, which depends on the variables t and g. These are chosen in the preceding stage.

Stage 2 With Private Government

When a private government exists alongside a public government, the final stage of the model is slightly more complicated. By this time consumers have already decided whether they wish to join the private government. As mentioned earlier, this is captured by the existence of y^*, the marginal consumer who is indifferent between membership and nonmembership. In this last stage, assume that y^* exists, so that the set of nonmembers is $[\underline{y}, y^*)$ and the set of members is $[y^*, \bar{y}]$. (For completeness, assume that the marginal member does join the private government.) The problem of each consumer y^i is stated as the following:

$$\max_{x^i, h^i} U(x^i, h^i, g) \qquad \text{s.t.} \qquad y^i = x^i + (1+t) r^N h^i \qquad \text{if a nonmember, and} \tag{5.3.5}$$

$$\max_{x^i, h^i} U(x^i, h^i, g+\gamma) \qquad \text{s.t.} \qquad y^i = x^i + (1+t) r^M h^i + c\gamma \qquad \text{if a member.} \tag{5.3.6}$$

Recall that g is the level of public good provision by the public government, and γ is the level of the private government supplement. The public government's tax rate is t, while r^N is the net-of-tax price of housing services for nonmembers, and r^M is the net-of-tax price of housing services for members. The notation $\tilde{r}^i, i = N$ or M indicates the gross-of-tax price of housing for nonmembers and members, respectively.

Solving (5.3.5) and (5.3.6) for each consumer gives a common housing demand function $\hat{h}(\tilde{r}^i, G, y^i)$. Again using the homotheticity of the utility function, consumer y^i's

housing demand can be written in the form

$$\hat{h}(\tilde{r}^i, g, \gamma, y^i) = \phi(y^i)h(\tilde{r}^i, G) = \begin{cases} \phi(y^i)h(\tilde{r}^N, g) & \text{if a nonmember, and} \\ \phi(y^i - c\gamma)h(\tilde{r}^M, g+\gamma) & \text{if a member.} \end{cases},$$

where $\phi' > 0$. Note that the h function is common to members and nonmembers; only the arguments are different. Hence the indirect utility function of each nonmember is

$$V(\tilde{r}^N, g, y^i) = U(y^i - \tilde{r}^N\phi(y^i)h(\tilde{r}^N, g), \phi(y^i)h(\tilde{r}^N, g), g). \tag{5.3.7}$$

While the indirect utility function of each member is

$$V(\tilde{r}^M, g, \gamma, y^i) = U(y^i - c\gamma - \tilde{r}^M\phi(y^i - c\gamma)h(\tilde{r}^M, g+\gamma), \phi(y^i - c\gamma)h(\tilde{r}^M, g+\gamma), g+\gamma). \tag{5.3.8}$$

Finally, in this stage, the housing markets clear, and this resolves the net-of-tax housing prices. The two equations that characterize the housing prices are as follows:

$$\int_{\underline{y}}^{y^*} \phi(y^i)h((1+t)r^N, g)f(y^i)\mathrm{d}y^i = H^S(r^N), \quad \text{and} \tag{5.3.9}$$

$$\int_{y^*}^{\bar{y}} \phi(y^i - c\gamma)h((1+t)r^M, g+\gamma)f(y^i)\mathrm{d}y^i = H^S(r^M). \tag{5.3.10}$$

The separability of the housing demand function implies it is possible to pull out the housing demands from the integrals in both equations above. Thus the equilibrium housing price equations are

$$h((1+t)r^N, g)\Phi^N = H^S(r^N), \quad \text{and} \tag{5.3.11}$$

$$h((1+t)r^M, g+\gamma)\Phi^M = H^S(r^M); \tag{5.3.12}$$

$$\text{where} \quad \Phi^N \equiv \int_{\underline{y}}^{y^*} \phi(y^i)f(y^i)\mathrm{d}y^i, \quad \text{and}$$

$$\text{and} \quad \Phi^M \equiv \int_{y^*}^{\bar{y}} \phi(y^i - c\gamma)f(y^i)\mathrm{d}y^i.$$

Note that Φ^N depends only on y^* while Φ^M depends only on y^* and γ. These represent aggregate income measures of the nonmembers and the members respectively. Equations (5.3.11) and (5.3.12) determine the equilibrium r^N and r^M respectively. r^N depends on y^*, t and g, while r^M depends on these parameters and c and γ as well.

5.3.4 Stage 1: Nash Equilibrium

Stage 1 Equilibrium Without Private Government

Stage 1 without a private government is quite simple. There is no need to determine a marginal member, and of course there is no private government provision. Therefore this stage simply consists of the public government's choice of g. Now the objective of the public government is to choose provision and taxes to maximize the aggregate welfare of its members, subject to the budget being balanced. The problem is thus:

$$\begin{aligned} \max_{g,t} \quad & \int_{\underline{y}}^{\bar{y}} U\left[y^i - (1+t)r\phi(y^i)h((1+t)r,g), \phi(y^i)h((1+t)r,g), g\right] f(y^i)\mathrm{d}y^i \\ \text{s.t.} \quad & trh((1+t)r,g)\Phi - cg \geq 0. \end{aligned} \tag{5.3.13}$$

The constraint simply says that the government's total property tax revenue cannot exceed the total cost of provision. Recall that for both the private and the public governments, each unit of the public good costs c of the numeraire to produce. The government's first order conditions (FOCs) for this problem are:

$$\begin{aligned} \text{FOC w.r.t. } g\text{: } & \int_{\underline{y}}^{\bar{y}} U_x\left[-(1+t)r\phi(y^i)h_2\right] f(y^i)\mathrm{d}y^i + \\ & \int_{\underline{y}}^{\bar{y}} U_h\left[\phi(y^i)h_2\right] f(y^i)\mathrm{d}y^i + \int_{\underline{y}}^{\bar{y}} U_G f(y^i)\mathrm{d}y^i + \kappa\left[trh_2\Phi - c\right] = 0. \end{aligned} \tag{5.3.14}$$

$$\begin{aligned} \text{FOC w.r.t. } t\text{: } & \int_{\underline{y}}^{\bar{y}} U_x\left[-r\phi(y^i)h - (1+t)r^2\phi(y^i)h_1\right] f(y^i)\mathrm{d}y^i + \\ & \int_{\underline{y}}^{\bar{y}} U_h\left[\phi(y^i)rh_1\right] f(y^i)\mathrm{d}y^i + \kappa\left[rh\Phi + tr^2h_1\Phi\right] = 0. \end{aligned} \tag{5.3.15}$$

where κ is the Lagrange multiplier on the constraint, and I have assumed that the budget constraint binds. For clarity, suppress the arguments of the housing function and its partial derivatives. That is, $h \equiv h(\tilde{r}, g)$, $h_1 \equiv \frac{\partial h}{\partial \tilde{r}}$ and $h_2 \equiv \frac{\partial h}{\partial G}$. Now, moving the terms involving κ to the other side and dividing (5.3.14) by (5.3.15) gives the the following equation:

$$\frac{trh_2\Phi - c}{rh\Phi + tr^2h_1\Phi} = \frac{\tilde{r}h_2\bar{U}_x - h_2\bar{U}_h - \bar{U}_G}{\left[rh + (1+t)r^2h_1\right]\bar{U}_x - rh_1\bar{U}_h}. \tag{5.3.16}$$

where $\bar{U}_x \equiv \int_{\underline{y}}^{\bar{y}} U_x \phi(y^i) f(y^i) \mathrm{d}y^i$, $\bar{U}_h \equiv \int_{\underline{y}}^{\bar{y}} U_h \phi(y^i) f(y^i) \mathrm{d}y^i$ and $\bar{U}_G \equiv \int_{\underline{y}}^{\bar{y}} U_G f(y^i) \mathrm{d}y^i$. These are summary measures that define the aggregate marginal utilities of x, h and G respectively. Because their values differ over the range of incomes, they must remain inside the integrals.

To further simplify equation (5.3.16), recall that the Stage 2 problem always implies that $\frac{U_h}{U_x} = \tilde{r}$. After substituting out the U_h terms, the following Samuelson condition describes the level of public provision:

$$c = \Phi \left[1 - \frac{t\epsilon_r}{1+t}\right] \left[\frac{\bar{U}_G}{\bar{U}_x}\right] + \Phi tr \frac{\partial h}{\partial G}. \tag{5.3.17}$$

Here $\epsilon_r \equiv -\frac{\tilde{r}h_1}{h}$, the own-price elasticity of housing. This equation, combined with the private government's balanced budget constraint

$$trh(\tilde{r}, g)\Phi - cg = 0. \tag{5.3.18}$$

characterize the public government's optimal choices of g and t, when there is no private government.

Equation (5.3.17) can be examined more carefully. This is the modified Samuelson rule for public good provision in the presence of a distortionary property tax. The left-hand side is the marginal rate of transformation between G and x — recall it takes c units of the numeraire to make one unit of the public good. The first term on the right-hand side comprises distortionary factor multiplied by a term clearly representing the sum of the marginal rates of substitution. The second term measures the effect that an extra unit of g provision has on total tax revenue via the housing market. This second term exists because of the complementarity between the public good and housing services.

What can be said about the size of the terms in equation (5.3.17)? The term $\bar{U}_G/\bar{U}_x$ by itself represents the first-best level of provision, which would occur if the public good were financed by a non-distortionary lump-sum tax. Now

$$1 - \frac{t\epsilon_r}{1+t} = 1 + \frac{tr}{h} \frac{\partial h(\tilde{r}, G)}{\partial \tilde{r}}.$$

But the Slutsky equation says

$$\frac{\partial h(\tilde{r}, G)}{\partial \tilde{r}} = S_{hh} - h \frac{\partial h(\tilde{r}, G)}{\partial y},$$

where $S_{hh} < 0$ represents the derivative of the compensated demand for housing. Now because utility is homothetic, $\frac{\partial h(\tilde{r},G)}{\partial y} = 0$. Therefore

$$1 - \frac{t\epsilon_r}{1+t} = 1 + \frac{tr}{h}S_{hh} < 1.$$

Hence the "true" benefit of the public good is scaled down from the first-best amount. So with property taxation, this term says there is underprovision of g relative to the first-best. The magnitude of the scaling-down factor depends not only on the size of the property tax and housing prices, but also on the compensated demand elasticity. If demand for housing is quite inelastic, the scaling-down factor is small. This is because although the property tax raises the price of housing for consumers, it does not cause a great substitution away from housing. Since property tax revenue is relatively unchanged, an amount of g close to the first-best can be provided. (Indeed, in the limiting case, if housing is perfectly inelastically demanded, this term is 1; since the tax revenue term is positive, the second-best level of g actually exceeds the first-best level. This will also happen if housing is very inelastically demanded and the tax revenue term is large enough.) On the other hand, if housing is relatively elastically demanded, the first term's effect will tend to dominate the second, leading to a lower level of public good provided.

What about the tax revenue term? If housing and the public good are complements, then provision of g will increase tax revenue. This will make the second term positive, which means that this distortion term tends to *overprovide* g relative to the first-best. Clearly, when both distortions are present, it is ambiguous whether the public government with property tax underprovides or overprovides g relative to the Samuelson rule. The substitutability and elasticity of housing demand are the keys to solving the puzzle.

Stage 1 Equilibrium With Private Government

After having examined the implications for a distortionary property tax without a private government, this section turns to the situation with a private government. There are simultaneous choices by the consumers, public government and private government. This stage will involve the derivation of the three players' reaction functions. The three reaction functions will characterize the three Nash equilibrium choices of y^*, g and γ, if

an equilibrium exists. (The public property tax t will fall out of the public government's budget constraint.)

It is important to state that in this stage, all the players take the values of r^N and r^M as given. That is, the marginal private government member y^*, the private government provision γ and the public government provision g are all determined on the assumption that these choices will not influence housing prices.[5] The chapter makes this admittedly myopic assumption primarily for tractability. If agents take into account the effects their collective actions have on net house prices, the model's complexity would increase substantially. In addition, for the case of private government membership decisions of individuals, it is reasonable to assume that agents do not believe their decisions are great enough to affect house prices. Of course, it is more difficult to justify the same for the public and the private governments. One would think that the private and the public governments' provision choice would be made with the knowledge that they will influence net housing prices.

Determination of the Marginal Member

The consumers' choice in Stage 1 is simple. They decide whether or not to join the private government. They take the level of provision of g and γ as given, as well as the property tax rates and house prices. A consumer of income y^i will therefore join the private government if and only if the utility of membership exceeds the utility of nonmembership. In other words, y^i will be a member if and only if

$$U\left[y^i - c\gamma - \tilde{r}^M\phi(y^i - c\gamma)h^M, \phi(y^i - c\gamma)h^M, g + \gamma\right] > U\left[y^i - \tilde{r}^N\phi(y^i)h^N, \phi(y^i)h^N, g\right]. \tag{5.3.19}$$

where $h^M \equiv h(\tilde{r}^M, g + \gamma)$ and $h^N \equiv h(\tilde{r}^N, g)$, the income-independent housing demand functions. The goal is to find the marginal income y^* for whom (5.3.19) holds with equality. It can be shown that the indifference curves of all individuals are increasing, continuous and concave in the $(G, \tilde{r})$ plane. The single-crossing assumption then implies that y^* will partition the population into two convex sets: all those $y \in [\underline{y}, y^*)$ strictly prefer not to join the private government, and all those $y \in (y^*, \bar{y}]$ strictly prefer to join

[5] Although residents and governments are not myopic in the sense that residents *will* adjust their housing consumption in response to changes in government provision or taxes.

the private government.

Determination of Private Provision

Now move on to the levels of government provision. It is simpler to begin with the private government's choice. The objective of the private government is to choose provision to maximize the aggregate welfare of its members, subject to the budget being balanced. Because the private government simply charges its members the unit cost of provision, the budget is automatically balanced. So the private government's problem reduces to the following:

$$\max_{\gamma,\tau} \quad \int_{y^*}^{\bar{y}} U\left[y^i - c\gamma - (1+t)r^M\phi(y^i - c\gamma)h((1+t)r^M, g+\gamma), \right. \\ \left. \phi(y^i - c\gamma)h((1+t)r^M, g+\gamma), g+\gamma\right] f(y^i)\mathrm{d}y^i. \tag{5.3.20}$$

The first order condition (FOC) for the private government is:

$$\int_{y^*}^{\bar{y}} U_x^M\left[-c + \tilde{r}^M\phi'(y^i - c\gamma)ch^M - \tilde{r}^M\phi(y^i - c\gamma)h_2^M\right] f(y^i)\mathrm{d}y^i \\ + \int_{y^*}^{\bar{y}} U_h^M\left[-c\phi'(y^i - c\gamma)h^M + \phi(y^i - c\gamma)h_2^M\right] f(y^i)\mathrm{d}y^i + \int_{y^*}^{\bar{y}} U_G^M f(y^i)\mathrm{d}y^i = 0. \tag{5.3.21}$$

For clarity, suppress the arguments of the housing function and its partial derivatives. That is, $h^M \equiv h(\tilde{r}^M, g+\gamma)$, $h_1^M \equiv \frac{\partial h^M}{\partial \tilde{r}^M}$ and $h_2^M \equiv \frac{\partial h^M}{\partial G}$. Now, in a similar manner to the base case, simplify the first order condition by using the envelope condition from the Stage 2 utility-maximization problem: $\frac{U_h}{U_x} = \tilde{r}^M$ for all members. The Samuelson condition results and reduces to the following:

$$c = \frac{\int_{y^*}^{\bar{y}} U_G^M f(y^i)\mathrm{d}y^i}{\int_{y^*}^{\bar{y}} U_G^M f(y^i)\mathrm{d}y^i} \equiv \frac{\bar{U}_G^M}{\bar{U}_x^M}. \tag{5.3.22}$$

The equations shows the absence of a property tax distortion. The private government sets an efficient level of the supplement, corresponding to an aggregate marginal rate of substitution. Note the private government's optimality condition is derived as if it believed that it was the only government. This is because the private government cares only about the effect of providing γ on its members; it does not account for the effect

of additional government services on housing decisions outside its gates. And since the public good is financed by a nondistortionary fee rather than a property tax, a first-best level of the private supplement is chosen.

Determination of Public Provision

The objective of the public government is to maximize the aggregate welfare of the entire population. This differs from most previous multi-community models of LPG provision because in this model the public government cares about the welfare of members of the private government. The public government cannot deny private government members the consumption of the public good. The problem of the public government is

$$\begin{aligned}\max_{g,t} \quad & \int_{\underline{y}}^{y^*} U\left[y^i - (1+t)r^N\phi(y^i)h((1+t)r^N, g), \phi(y^i)h((1+t)r^N, g), g\right] f(y^i)\mathrm{d}y^i \\ & + \int_{y^*}^{\bar{y}} U\left[y^i - c\gamma - (1+t)r^M\phi(y^i - c\gamma)h((1+t)r^M, g+\gamma),\right. \\ & \left.\phi(y^i - c\gamma)h((1+t)r^M, g+\gamma), g+\gamma\right] f(y^i)\mathrm{d}y^i \\ \text{s.t.} \quad & tr^N h((1+t)r^N, g)\Phi^N + tr^M h((1+t)r^M, g+\gamma)\Phi^M - cg \geq 0. \end{aligned} \tag{5.3.23}$$

Again, find the first order conditions for the public government's optimization problem, and after some algebra, and using the fact that the Stage 2 optimization by consumers implies that $\frac{U_h^N}{U_x^N} = \tilde{r}^N$ and $\frac{U_h^M}{U_x^M} = \tilde{r}^M$, the following equation results:

$$c = \underbrace{\left\{\left[1 - \frac{t\epsilon_{r^N}}{1+t}\right] r^N h^N \Phi^N + \left[1 - \frac{t\epsilon_{r^M}}{1+t}\right] r^M h^M \Phi^M\right\}}_{\text{(i)}} \underbrace{\left\{\frac{\bar{U}_G^N + \bar{U}_G^M}{h^N r^N \bar{U}_x^N + h^M r^M \bar{U}_x^M}\right\}}_{\text{(ii)}}$$
$$\underbrace{+ \Phi^N t r^N \frac{\partial h^N}{\partial G} + \Phi^M \tau r^M \frac{\partial h^M}{\partial G}}_{\text{(iii)}}. \tag{5.3.24}$$

where in an analogous fashion to the previous section, $\epsilon_{r^N} \equiv -\frac{\tilde{r}^N h_1^N}{h^N}$, the own-price elasticity of housing for nonmembers. Also defined are three summary measures of aggregate marginal utility, this time pertaining to nonmembers:

$$\bar{U}_x^N \equiv \int_{\underline{y}}^{y^*} U_x \phi(y^i) f(y^i)\mathrm{d}y^i; \quad \bar{U}_h^N \equiv \int_{\underline{y}}^{y^*} U_h \phi(y^i) f(y^i)\mathrm{d}y^i; \quad \bar{U}_G^n \equiv \int_{\underline{y}}^{y^*} U_G f(y^i)\mathrm{d}y^i.$$

Equation (5.3.24) is the public government's modified Samuelson rule. This equation, combined with the public government's budget constraint,

$$tr^N h((1+t)r^N, g)\Phi^N + tr^M h((1+t)r^M, g+\gamma)\Phi^M - cg = 0, \tag{5.3.25}$$

characterize the public government's optimal choices of g and t.

Examine the Samuelson condition (5.3.24). First, it is important to see that the public government takes the private government's members into its provision decision. This is unsurprising as members contribute to aggregate city welfare just as nonmembers do. Yet because members have an alternative source of public services, they are weighted differently than nonmembers. Starting from the right, term (iii) is similar to the tax revenue effect present in the optimality condition of the private government. Unlike (5.3.22), however, the public government takes into consideration the effects of public provision on the housing demands of both members and nonmembers. Again, if housing and government services are complementary enough, these tax revenue distortions imply overprovision of the public service relative to the first-best. A less clear-cut interpretation exists for terms (i) and (ii). It is obviously a weighted MRS, but because members and nonmembers are evaluating the partial derivatives of the utility function at different points, their MRSs are not summable. As a result the terms do not simplify. Rather it looks like a combination of the MRS of members and nonmembers.

Resolution of the Nash Equilibrium

The analysis above characterizes the equilibrium choices of the three players in Stage 1. Consumers choose their marginal member given the levels of provision by the two governments. The private government and the public government each choose provision, given the marginal member and the provision of the other government. The Nash equilibrium in Stage 1 will be a 4-tuple $\{y^*, \gamma, g, t\}$ such that equations (5.3.19 with equality), (5.3.22), (5.3.24) and (5.3.25) are all satisfied simultaneously. The subsequent part of the analysis gives a numerical example, derives the equilibrium conditions and demonstrates some of its properties.

5.4 A Numerical Example

As the analysis in the previous section is general, it may be difficult to see the properties of the Nash equilibrium without solving the model explicitly. Therefore this section works through an example that is solved numerically. In this section, assume consumers share the following Cobb-Douglas utility function:

$$U(x^i, h^i, G) = (x^i)^\alpha (h^i)^\beta (G)^\delta,$$

where $\beta > \delta$ to ensure stability. To get tractable results, it is necessary to alter the objectives of the public and the private government. The numerical example assumes majority voting in Stage 1 to determine the levels of g and γ. This assumption simplifies the Samuelson conditions because it no longer involves aggregating the marginal utilities over groups of consumers.

5.4.1 Stage 2

In Stage 2 the levels of g, t and γ are known and taken as given. The marginal member y^* is also exogenous. Standard utility maximization implies that nonmembers' demands for housing and the numeraire are

$$h^N = \frac{\beta}{\alpha+\beta}\frac{y^i}{(1+t)r^N} \quad ; \quad x^N = \frac{\alpha}{\alpha+\beta}y^i.$$

Members' demands for these goods are

$$h^M = \frac{\beta}{\alpha+\beta}\frac{(y^i - c\gamma)}{(1+t)r^M} \quad ; \quad x^M = \frac{\alpha}{\alpha+\beta}(y^i - c\gamma).$$

5.4.2 Stage 1

Stage 1 now involves solving for the Nash equilibrium values of g, t, γ and y^*. Begin with the marginal member condition. The marginal member y^* satisfies the following:

$$\left(\frac{\alpha^\alpha\beta^\beta}{(\alpha+\beta)^{\alpha+\beta}}\right)(y^* - c\gamma)^{\alpha+\beta}((1+t)r^M)^{-\beta}(g+\gamma)^\delta$$
$$= \left(\frac{\alpha^\alpha\beta^\beta}{(\alpha+\beta)^{\alpha+\beta}}\right)(y^*)^{\alpha+\beta}((1+t)r^N)^{-\beta}g^\delta. \quad (5.4.1)$$

Isolating y^*, the following condition determines the marginal private government member:

$$y^* = \frac{c\gamma(r^N)^{\frac{\beta}{\alpha+\beta}}(g+\gamma)^{\frac{\delta}{\alpha+\beta}}}{(r^N)^{\frac{\beta}{\alpha+\beta}}(g+\gamma)^{\frac{\delta}{\alpha+\beta}} - (r^M)^{\frac{\beta}{\alpha+\beta}}(g)^{\frac{\delta}{\alpha+\beta}}}. \tag{5.4.2}$$

Next derive the Samuelson rule for the level of private government provision. The level of γ is assumed to be chosen in pairwise elections by members of the private government. As such, the median voter theorem can be invoked because the single-crossing condition implies that members' ideal levels of $g+\gamma$ rises with income. Since g is taken as given by all members of the private government, the level of γ that prevails is that which is preferred by the median voter in the interval $[y^*, \bar{y}]$. Call this consumer the median voter-member, designated $\hat{\hat{y}}$. Note that the identity of $\hat{\hat{y}}$ depends on y^*. The private government's problem then amounts to maximizing the median voter-member's utility. It is useful to first do this in for a general utility function. The median voter-member's problem is

$$\max_{\gamma} U[\hat{\hat{y}} - c\gamma - (1+t)r^M\phi(\hat{\hat{y}} - c\gamma)h((1+t)r^M, g+\gamma), \phi(\hat{\hat{y}} - c\gamma)h((1+t)r^M, g+\gamma), g+\gamma].$$

The first-order condition is

$$U_x^M[-c - (1+t)r^M ch\phi'(\hat{\hat{y}} - c\gamma) - (1+t)r^M\phi(\hat{\hat{y}} - c\gamma)h_2] + U_h^M[-ch\phi'(\hat{\hat{y}} - c\gamma) + \phi(\hat{\hat{y}} - c\gamma)h_2] + U_G^M = 0. \tag{5.4.3}$$

Next, use the envelope condition from Stage 2, which states that for all members, $U_x^M = \frac{U_h^M}{(1+t)r^M}$. This results in the following first-order condition:

$$c = \left.\frac{U_G^M}{U_x^M}\right|_{\hat{\hat{y}}}. \tag{5.4.4}$$

Like the analysis in the previous section, the private government sets a non-distortionary level of γ. This time, the supplement is that which is preferred by the median voter-member. Back to the Cobb-Douglas example, the private government provision condition simplifies to the following:

$$\gamma = \frac{\delta\hat{\hat{y}}}{c(\alpha+\beta+\delta)} - \left(\frac{\alpha+\beta}{\alpha+\beta+\delta}\right)g. \tag{5.4.5}$$

This is written in the form of a reaction function for γ, and presents a key implication. Note that the negative sign implies that g and γ are strategic substitutes. As public government spending goes up, the equilibrium private government supplement decreases. However, due to the presence of the distortionary property tax, this decrease is not at a one-for-one rate.

The last problem to solve for in Stage 1 is the public government's provision decision. Here it is necessary to consider two cases depending on whether the median voter overall, $\hat{y}$, is or is not a member of the private government.

Case A: $\hat{y} < y^*$

First consider the case where the median voter overall is not a member of the private government. She chooses g and t to maximize utility subject to the community budget constraint and taking r^N, r^M, y^* and γ as given:

$$\max_{g,t} \quad \alpha \ln\left(\frac{\alpha}{\alpha+\beta}\hat{y}\right) + \beta \ln\left(\frac{\beta}{\alpha+\beta}\frac{\hat{y}}{(1+t)r^N}\right) + \delta \ln g$$

$$\text{s.t.} \quad tr^N \int_{\underline{y}}^{y^*} \frac{\beta}{\alpha+\beta}\frac{y^i}{(1+t)r^N} f(y^i)\mathrm{d}y^i + \tag{5.4.6}$$

$$tr^M \int_{y^*}^{\bar{y}} \frac{\beta}{\alpha+\beta}\frac{y^i - c\gamma}{(1+t)r^M} f(y^i)\mathrm{d}y^i = cg. \tag{5.4.7}$$

It is possible to simplify the budget constraint by the fact that

$$cg = tr^N \int_{\underline{y}}^{y^*} \frac{\beta}{\alpha+\beta}\frac{y^i}{(1+t)r^N} f(y^i)\mathrm{d}y^i + tr^M \int_{y^*}^{\bar{y}} \frac{\beta}{\alpha+\beta}\frac{y^i - c\gamma}{(1+t)r^M} f(y^i)\mathrm{d}y^i$$

$$cg = \left(\frac{t}{1+t}\right)\left(\frac{\beta}{\alpha+\beta}\right)\left[\int_{\underline{y}}^{\bar{y}} y^i f(y^i)\mathrm{d}y^i - c\gamma \int_{y^*}^{\bar{y}} f(y^i)\mathrm{d}y^i\right]$$

$$cg = \left(\frac{t}{1+t}\right)\left(\frac{\beta}{\alpha+\beta}\right)[E[y] - c\gamma M] \tag{5.4.8}$$

where $E[y]$ is the mean income over the whole population, and M is the population of the private government. After this simplification, the two first order conditions for the

public government's choices of g and t are the following:

$$t = \frac{\delta}{\beta} \quad \text{, and} \tag{5.4.9}$$

$$g = \frac{\beta\delta}{c(\alpha+\beta)(\beta+\delta)}\left[E[y] - c\gamma M\right]. \tag{5.4.10}$$

Note that these choices of g and t imply that there is no strategic interaction between the public and the private government. This arises as the private government's provision does not affect the median voter's objective function.

Case B: $\hat{y} \geq y^*$

The next case determines the public government's provision in the case where the median voter overall is a member of the private government. This is clearly the more interesting case, as this case is the one in which the public and private governments truly interact. This case is also increasingly relevant in many municipalities, where over half of the population belongs to a homeowners' association. This time, the median voter chooses g and t to maximize the following utility function subject to the community budget constraint and taking r^N, r^M, y^* and γ as given:

$$\begin{aligned} \max_{g,t} \quad & \alpha \ln\left(\frac{\alpha}{\alpha+\beta}(\hat{y}-c\gamma)\right) + \beta \ln\left(\frac{\beta}{\alpha+\beta}\frac{(\hat{y}-c\gamma)}{(1+t)r^M}\right) + \delta \ln(g+\gamma) \\ \text{s.t.} \quad & tr^N \int_{\underline{y}}^{y^*} \frac{\beta}{\alpha+\beta}\frac{y^i}{(1+t)r^N} f(y^i)\mathrm{d}y^i + \\ & tr^M \int_{y^*}^{\bar{y}} \frac{\beta}{\alpha+\beta}\frac{y^i - c\gamma}{(1+t)r^M} f(y^i)\mathrm{d}y^i = cg. \end{aligned} \tag{5.4.11}$$

The FOCs for this problem reduce to the following:

$$g = \frac{\delta\left[E[y] - c\gamma M\right]}{c(\alpha+\beta)(1+t)} - \gamma, \quad \text{and} \tag{5.4.12}$$

$$-c\gamma = \frac{t\beta - \delta}{(\alpha+\beta)(1+t)}\left[E[y] - c\gamma M\right]. \tag{5.4.13}$$

Note that equation (5.4.12) is expressed as a reaction function of g with respect to γ. The slope of the reaction function is clearly

$$\frac{\mathrm{d}g}{\mathrm{d}\gamma} = \frac{-\delta M}{(\alpha+\beta)(1+t)} - 1 < -1.$$

That is, there is a more than one-for-one reduction in the public government's provision as the private government provides another unit. In other words, the strategic downloading problem is greater than one-for-one. Also, note that in both of the FOCs, the income of the median voter $\hat{y}$ has disappeared, and instead the relevant income is those of the mean individual. It is interesting that the median voter takes M, the population of the private government, into account whether he is or is not a member.

5.4.3 Some Numerical Results

Exogenous Housing Prices

This section presents numerical results from the above model, shows that an equilibrium exists and discusses some of the implications. The following parameter values for the utility function are used: $\{\alpha = 0.3, \beta = 0.5, \delta = 0.2\}$.

As most of the interesting action happens in Stage 1, the first numerical exercise is to present results where the housing prices are taken as given and to demonstrate that a Stage 1 equilibrium exists. Assume that the housing prices are taken as given: $r^N = 1, r^M = 2$. The cost of provision is $c = 1$ for both governments. Finally, incomes are assumed to follow a Weibull distribution, which has a probability density function that is right-skewed (that is, the median is less than the mean). Incomes from this distribution range from zero to infinity. The Weibull distribution has a scale parameter η and a shape parameter b. The example assumes $\eta = 10, b = 3$. This results in a median income of 8.85. The mean income is given by

$$E[y] = \eta\Gamma\left(\frac{1}{\beta} + 1\right),$$

while the population of the private government, which is clearly dependent on y^*, is

$$M = \exp\left(-\frac{y^*}{\eta}\right)^{\beta}.$$

Finally, the median voter member has income

$$\hat{\hat{y}} = \eta\left[\left(\frac{y^*}{\eta}\right)^{\beta} + \ln 2\right]^{\frac{1}{\beta}}.$$

The parameter values above constitute the benchmark case. These are varied in order to examine the stability and comparative statics properties of the equilibrium.

Table 5.1: **Numerical Model: Public Property Tax, Private Fee Financing. Some Comparative Statics**

(Incomes are distributed in a Weibull distribution with parameters $\eta = 10, \beta = 3.$)

r^M	2	1	1.2	1.4	1.6	1.8	2.2	2.4
y^*	3.0036	2.6427	2.7481	2.8347	2.9044	2.9598	3.0383	3.0658
γ	1.7859	1.7684	1.7731	1.7772	1.7807	1.7836	1.7878	1.7894
g	0.0086	0.0214	0.0180	0.0150	0.0124	0.0103	0.0072	0.0061
t	0.0019	0.0048	0.0040	0.0033	0.0028	0.0023	0.0016	0.0014

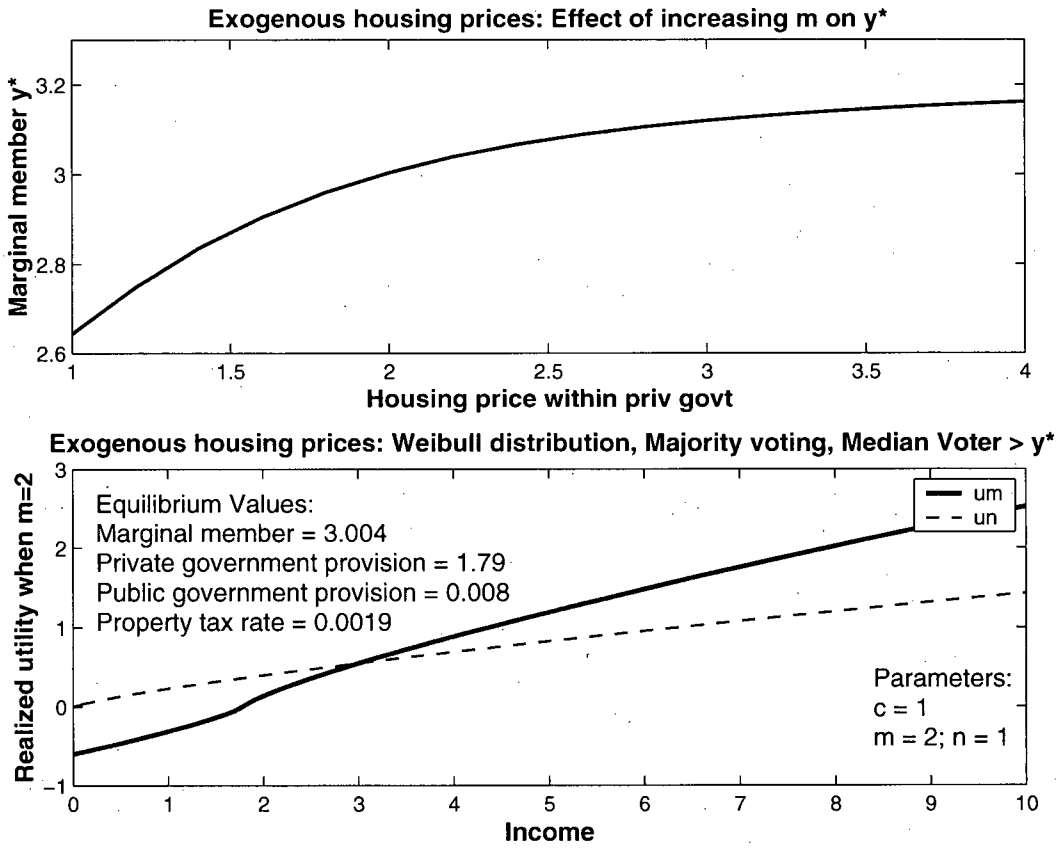
c	1	1.1	1.2	1.3
y^*	3.00364346869	3.00364346863	3.00364346863	3.00364346859
γ	1.7859	1.6236	1.4883	1.3738
g	0.0086	0.0078	0.0071	0.0066
t	0.00191029641761	0.00191029641762	0.00191029641772	0.00191029641777

Table 5.1 and Figure 5.4.3 present Stage 1 equilibrium results from the assumption of exogenous housing prices. It is assumed for these calculations that the overall median voter (the one who chooses g) is a member of the private government, that is, $\hat{y} \geq y^*$. This is the more interesting case as it highlights the interaction between the public and the private government choices. The first column of each panel represents the benchmark parameters. The figure shows two comparative static exercises: first, the price of housing within the private government increases. Second, the per unit cost of service provision changes.

The calculations show that Stage 1 equilibria do exist, and that the equilibrium values behave as theory and intuition suggests. As housing becomes more expensive within the private government, the marginal member increases; that is, fewer people join the private government. As well, voters substitute away from γ and towards g, which raises the property tax rate. This provides an interesting comparison of the two methods of financing. As the private government housing price increases, the substitution away from g happens because it reduces the property taxes paid by members. This is replaced by consumption of non-distortionary γ.

When c is varied, on the other hand the equilibrium marginal member hardly changes, and in fact the change is non-monotonic. However, other variables behave as expected.

Figure 5.1: **Numerical Model: Exogenous Housing Prices. Weibull Distribution of Incomes. Median Voter Is a Member**



Both g and γ decrease, but interestingly the property tax rate increases slightly.

Endogenous Housing Prices

The next numerical exercise is to endogenize the housing prices to see whether or not the value of public services would be capitalized into housing prices, and how that would affect Stage 1 equilibrium choices. For this exercise the incomes are assumed to be uniformly distributed on $[0, 1]$. The same utility function parameters are used: $\alpha = 0.3, \beta = 0.5, \gamma = 0.2$. However, c is assumed to be 0.05. To derive the equilibrium, it is assumed that the governments choose the level of provision via the median voter. For this exercise, assume that the median voter chooses not to join the private government: $y^* > 0.5$. Figure 5.4.3 gives the equilibrium values of the five endogenous variables.[6]

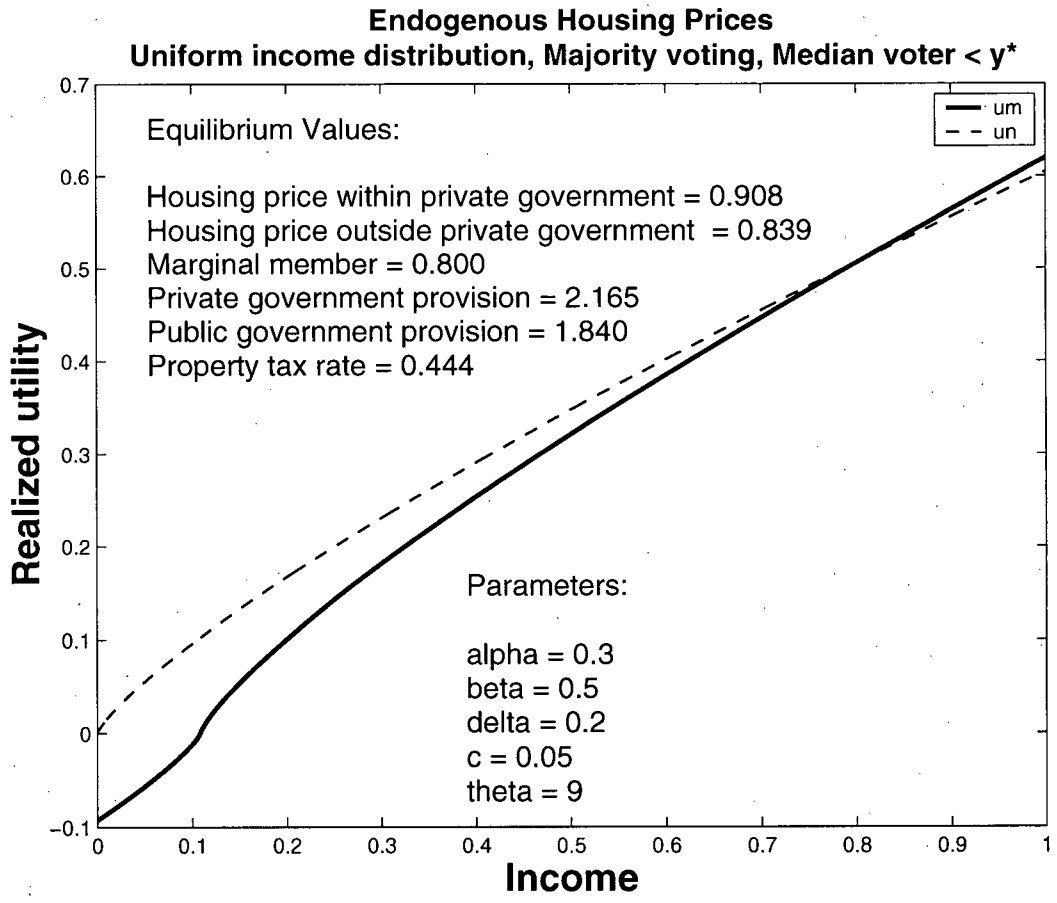
The figure also demonstrates that the residents satisfy the single-crossing condition. The marginal member has an income of 0.8, and all those with higher income choose to join the private government. The equilibrium private government provision is roughly twice that of public government provision, which represents a very high level of service that members enjoy. The equilibrium shows that indeed the housing price within the private government is higher than that outside, reflecting a capitalization of the increased level of public good.

5.5 Conclusion

As private governments take over more of the roles previously reserved for public local governments, the strategic interaction between private and public providers of public goods becomes more relevant an area of study. This paper has presented an analysis of a private government in the context of the urban housing market. By incorporating a housing market, another channel is opened for the interaction between private governments and the traditional public government. Numerical analysis showed that public and private government provision are strategic substitutes, and this can result in suboptimal provision of public goods.

[6]The derivation of the equilibrium first order conditions may be obtained from the author.

Figure 5.2: **Numerical Model: Endogenous Housing Prices. Uniform Distribution of Incomes. Median Voter Is Not a Member**



CHAPTER 6

Conclusion

The objective of this dissertation was to examine the impact that homeowners' associations have had on local public finance. The growing popularity of these associations as a dominant method of local service delivery and their roles as residential private governments underline the importance of understanding their effects on traditional public finance.

The thesis was composed of four parts. Chapter 2 presented a brief survey of homeowners' associations. It argued that these private associations share characteristics with municipal governments, and so the term private government is apt. It outlined the structure, popularity and roles of homeowners' associations and reviewed evidence that homeowners' associations have important impact on local public spending and city composition. The chapter closed on the idea that as homeowners' associations become more and more common in residential development, it is increasingly important to understand the interactions between private governments, public governments and homeowners. This idea forms the motivation for the three following chapters in the dissertation.

Chapter 3 examined the impact that homeowners' associations have had on local government expenditure. The study uses a self-compiled panel data set of planned development membership rates and public government expenditures from 1970 to 1999. The results are consistent with the view that local public governments have responded to the increased membership in private governments by reducing expenditures. However, local governments did not treat all expenditures equally. Results suggest that downloading to private governments exists for those services that are relatively substitutable, and

does not exist for services with more public good aspects. The chapters concluded by showing that condominiums did not exert the same impact that planned developments did; this also served to verify the robustness of the empirical analysis.

Chapter 4 reversed the question and asked if public government policy may have contributed to the substantial growth in private governments. The chapter examined the role of a state-imposed property tax and expenditure limitation in encouraging the membership in and the formation of private governments. A theoretical model of private government, incorporating a simple housing market, is proposed. This model generated a comparative static, which is tested using Californian data around the period of Proposition 13. Empirical estimates are consistent with the view that Proposition 13 contributed to the rise of the homeowners' association. In addition, there is some evidence that cities that anticipated a high levels of constraint due to Proposition 13 had faster growth in private government with cities with low levels of constraint.

Finally, Chapter 5 extended the theoretical private government model of Helsley and Strange (1998) by incorporating a housing market. Equilibrium conditions between a public government, a private government and homeowners are characterized. As the model is analytically untractable, a numerical model is presented and worked out, and several elements of the model are demonstrated.

Bibliography

AMERICAN HOUSING SURVEY (2001): "Table 2-13. Selected Housing Costs–Occupied Units," `http://www.census.gov/hhes/www/housing/ahs/ahs01/tab213.html`.

ANDERSON, B. L. (1996): "Common Interest Developments: CID Homeowners' Fees and the Issue of Double Taxation," Discussion Paper 5, Public Law Research Institute, University of California Hastings College of the Law.

ARONSSON, T., J. LUNDBERG, AND M. WIKSTROM (2000): "The Impact of Regional Public Expenditures on the Local Decision to Spend," *Regional Science and Urban Economics*, 30(2), 185–202.

AUSTIN, D. A. (1999): "Politics vs Economics: Evidence from Municipal Annexation," *Journal of Urban Economics*, 45, 501–532.

BARTON, S. E., AND C. J. SILVERMAN (1994): "History and Structure of Common Interest Communities," in *Common Interest Communities: Private Government and the Public Interest.* Institute of Governmental Studies.

BERGSTROM, T., AND R. GOODMAN (1972): "Private Demands for Public Goods," *American Economic Review*, 63(3), 280–296.

BICE, D. C., AND W. H. HOYT (2000): "The Impact of Mandates and Tax Limits on Voluntary Contributions to Local Public Services: An Application to Fire-Protection Services," *National Tax Journal*, 53(1), 79–104.

BOGART, W. T. (1998): *The Economics of Cities and Suburbs.* Prentice-Hall, Upper Saddle River, New Jersey.

BORCHERDING, T. E., AND R. T. DEACON (1972): "The Demand for the Services of Non-Federal Governments," *American Economic Review*, 62, 891–901.

BRUECKNER, J. (1998): "Testing for Strategic Interaction Among Local Governments: The Case of Growth Controls," *Journal of Urban Economics*, 44, 438–467.

——— (2003): "Strategic Interaction Among Governments: An Overview of Empirical Studies," *International Regioanl Science Review*, 26(2), 175–188.

CAI RESEARCH FOUNDATION (1999): *National Survey of Community Association Homeowner Satisfaction.* Community Associations Institute.

CALABRESE, S., AND D. EPPLE (2004): "On the Political Economy of Tax Limits," mimeo.

CAMERON, A. C., AND P. K. TRIVEDI (1986): "Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators," *Journal of Applied Econometrics*, 1, 29–53.

——— (1998): *Regression Analysis of Count Data*, vol. 30 of *Econometric Society Monographs*. Cambridge University Press, Cambridge.

CHAPMAN, J. I. (1981): *Proposition 13 and Land Use: A Case Study of Fiscal Limits in California*. Lexington Books, D. C. Heath and Company, Lexington, Massachusetts.

CHULAK, M. (2004): "HOA Q & A," `http://www.hoaqanda.com/Bylaws.htm`.

COMMUNITY ASSOCIATIONS INSTITUTE (2003): "Facts About Community Associations," `http://www.caionline.org/about/facts.cfm`.

——— (2005): "Data on U.S. Community Associations," `http://www.caionline.org/about/facts.cfm`.

CONGDON, P. (1993): "Approaches to Modelling Overdispersion in the Analysis of Migration," *Environment and Planning A*, 25(10), 1481–1510.

CUTLER, D. M., D. W. ELMENDORF, AND R. J. ZECKHAUSER (1999): "Restraining the Leviathan: Property Tax Limitation in Massachusetts," *Journal of Public Economics*, 71(3), 313–334.

EPPLE, D., R. FILIMON, AND T. ROMER (1983): "Housing, Voting and Moving: Equilibrium in a Model of Local Public Goods with Multiple Jurisdictions," *Research in Urban Economics*, 3, 59–90.

——— (1984): "Equilibrium Among Local Jurisdictions: Toward an Integrated Treatment of Voting and Residential Choice," *Journal of Public Economics*, 24(3), 281–308.

EPPLE, D., AND R. ROMANO (1996): "Ends Against the Middle: Determining Public Service Provision When There Are Private Alternatives," *Journal of Public Economics*, 62(3), 297–325.

EPPLE, D., AND T. ROMER (1989): "Flexibility of Municipal Boundaries," *Journal of Urban Economics*, 26, 307–319.

——— (1991): "Mobility and Redistribution," *Journal of Political Economy*, 99(4), 828–858.

FIGLIO, D. N. (1998): "Short-Term Effects of a 1990s-Era Property Tax Limit: Panel Evidence on Oregon's Measure 5," *National Tax Journal*, 51(1), 55–70.

FIGLIO, D. N., AND A. O'SULLIVAN (2001): "The Local Response to Tax Limitation Measures: Do Local Governments Manipulate Voters to Increase Revenues?," *Journal of Law and Economics*, 44, 233–257.

FLEISCHMANN, A. (1986): "The Politics of Annexation: A Preliminary Assessment of Competing Paradigms," *Social Science Quarterly*, 67, 128–142.

GLOMM, G., AND B. RAVIKUMAR (1998): "Opting Out of Publicly Provided Services: A Majority Voting Result," *Soial Choice and Welfare*, 15(2), 187–199.

GORDON, T. M. (2003): "Crowd Out or Crowd In?: The Effects of Common Interest Developments on Political Participation in California," *The Annals of Regional Science*, 37, 203–233.

——— (2004): "Planned Developments in California: Private Communities and Public Life," Discussion paper, Public Policy Institute of California.

GOUVEIA, M. (1997): "Majority Rule and the Public Provision of a Private Good," *Public Choice*, 93(3-4), 221–244.

GREENE, K. V., AND P. J. NELSON (1994): "Legislative Majorities and Alternative Theories of the Size of Government," *Public Finance*, 49(1), 42–56.

HANSEN, N., AND A. KESSLER (2001): "(Non-)Existence of Equilibria in Multicommunity Models," *Journal of Urban Economics*, 50(3), 418–435.

HELSLEY, R., AND W. STRANGE (1998): "Private Government," *Journal of Public Economics*, 69(2), 281–304.

——— (2000): "Potential Competition and Public Sector Performance," *Regional Science and Urban Economics*, 30(4), 405–428.

JOHNSTON, J. L., AND K. JOHNSTON-DODDS (2002): "Common Interest Developments: Housing at Risk?," Discussion Paper CRB-02-012, California Research Bureau, California State Library.

JOYCE, P. G., AND D. R. MULLINS (1991): "The Changing Fiscal Structure of the State and Local Public Sector: The Impact of Tax and Expenditure Limitations," *Public Administration Review*, 51(3), 240–253.

KLEIN, K. E. (1995): "Owners Complain of Double Tax," *Los Angeles Times*.

LANG, R. E., AND K. A. DANIELSEN (1997): "Gated Communities in America: Walling Out the World?," *Housing Policy Debate*, 8(4), 867–899.

LEVIN, A., C.-F. LIN, AND C.-S. J. CHU (2002): "Unit Root Tests in Panel Data: Asymptotic and Finite-Sample Properties," *Journal of Econometrics*, 108, 1–24.

MALLETT, W. J. (1993): "Private Government Formation in the DC Metropolitan Area," *Growth and Change*, 24(Summer), 385–415.

MATSUSAKA, J. G. (1995): "Fiscal Effects of the Voter Initiative: Evidence from the Last 30 Years," *Journal of Political Economy*, 103(3), 587–623.

MCKENZIE, E. (1994): *Privatopia : Homeowner Associations and the Rise of Residential Private Government*. Yale University Press, New Haven.

——— (1998): "Homeowner Associations and California Politics: An Exploratory Analysis," *Urban Affairs Review*, 34(1), 52–75.

MCMILLEN, D. P., AND S. C. SMITH (2003): "The Number of Subcenters in Large Urban Areas," *Journal of Urban Economics*, 53(3), 321–338.

O'SULLIVAN, A., T. A. SEXTON, AND S. M. SHEFFRIN (1995): *Property Taxes and Tax Revolts*. Cambridge University Press, Cambridge, New York.

PAPKE, L. E. (1991): "Interstate Business Tax Differentials and New Firm Location: Evidence from Panel Data," *Journal of Public Economics*, 45(1), 47–68.

POTERBA, J. M. (1992): "Taxation and Housing: Old Questions, New Answers," *American Economic Review Papers and Proceedings*, 82(2), 237–242.

REICH, R. (1991): "Secession of the Successful," *The New York Times*, 16-17, 42–45.

REICHMAN, U. (1976): "Residential Private Governments: An Introductory Survey," *The University of Chicago Law Review*, 43, 253–306.

REITER, M., AND A. WEICHENRIEDER (1997): "Are Public Goods Public? A Critical Survey of the Demand Estimates for Local Public Services," *Finanzarchiv*, 54, 374–408.

ROLAND, H. E. (1998): "Residential Common Interest Developments: An Overview," Discussion Paper CRB-98-006, California Research Bureau, California State Library.

ROSE-ACKERMAN, S. (1979): "Market Models of Local Government: Exit, Voting, and the Land Market," *Journal of Urban Economics*, 6(3), 319–337.

ROSENBERRY, K. (1996): "Common Interst Development Issues after Nahrstedt, Summary Report," Discussion paper, Senate Housing and Land Use Committee, Sacramento.

SCHWADRON, T., AND P. RICHTER (1984): *California and the American Tax Revolt.* University of California Press, Berkeley, California.

SHADBEGIAN, R. J. (1998): "Do Tax and Expenditure Limitations Affect Local Government Budgets? Evidence from Panel Data," *Public Finance Review*, 26(2), 118–136.

——— (1999): "The Effect of Tax and Expenditure Limitations on the Revenue Structure of Local Government, 1962-87," *National Tax Journal*, 52(2), 221–237.

SMITH, R. T. (1991): "Local Fiscal Arrangements, Home Rule, and California's Fiscal Constitution after Proposition 13," in *Proposition 13: A Ten-Year Retrospective*, pp. 51–112. The Lincoln Insitute of Land Policy.

SONSTELIE, J. (1979): "Public School Quality and Private School Enrollments," *National Tax Journal*, 32, 343–354.

STABILE, D. (2000): *Community Associations: The Emergence and Acceptance of a Quiet Innovation in Housing.* Greenwood Press.

TIEBOUT, C. (1956): "A Pure Theory of Local Expenditures," *Journal of Political Economy*, 64(5), 416–424.

U.S. CENSUS BUREAU (1980): "Boundary and Annexation Survey: 1970-1979," Report GE-30-4, U.S. Census Bureau, Washington, D.C.

VIGDOR, J. L. (2004): "Other People's Taxes: Nonresident Voters and Statewide Limitation of Local Government," *Journal of Law and Economics*, 47(2), 453–476.

VILLAS-BOAS, J. M., AND R. S. WINER (1999): "Endogeneity in Brand Choice Models," *Management Science*, 45(10), 1324–1338.