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Environmental Local Public Goods: Open Space Preservation and Multi-Level Analysis

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Dedicated to my father and mother; my father and mother in law;
my husband Sangchul; and my lovely daughter Naro

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ABSTRACT

Open space preservation is a critical issue responding to undesirable sprawl. Over the past decades, responding to such trends of expansion and sprawl, open space protection has become more intense. Thus, local, regional, state governments have become increasingly concerned with growth and land preservation. More explicitly, state growth management has implemented in a broad set of social goals and policy tools in the era of smart growth (Bosselman and Callies, 1971; Gillham, 2002). State smart growth has concentrated on a mix of higher density residential development in order to protect open space and natural resources (Ingram et al, 2009). At local level, growth management has been implemented through the planning and regulatory tools of comprehensive plans, zoning ordinances, subdivision regulations, and capital improvement programs (Porter, 1997). Despite open space preservation is a political process, extant studies on the decision of land preservation fail to consider within political process.

The purpose of this dissertation investigates what factors account for local open space preservation applying political market framework. First analysis aims to examine the impact of state growth management on local open space preservation as well as the impact of the contextual factors of county governments More specifically, with advanced methodology, Hierarchical Linear Modeling (HLM), it examines whether strong involvement of state level government influence open space protection made by local level governments. Second analysis examines how local political institutions' supplies and environmental interests' demands account for local open space protection with panel data of Florida Communities Trust (FCT) applications, Florida's state-wide land acquisition program, from 2001 to 2008.

The empirical results show that, first, strong involvement of state government on local open space preservation leads to better outcomes. It theoretically and empirically means that contextual and political circumstances of state level government perform an additional explanation on the variation among county level.

Second, local political institutions play a significant role in open space preservation. In addition to formal institution, networks as an informal institution are key driver of open space

preservation. This result implies that governmental partners such as federal and states agencies and horizontal partners such as land trusts, environmental organization and non-profit organization are important in that local government can make wider array of financing mechanisms and get much of information from networks with governmental and horizontal partners.

Third, environmental preservation constituencies measured by land trusts in the first analysis and environmental specialty license tag revenue in the second analysis have positive influence on open space preservation. Unlike land use regulation, development or growth machine interests have no influence on open space preservation. In sum, this dissertation confirms that strong involvement of state government influences the effort of local government on open space preservation. Open space preservation is the outcome of political institutions and environmental demands.

This dissertation also suggests future study. First, future study will explore the link between open space preservation and various regulatory tools or strategies such as zoning ordinance, conservation easement, and impact fees to growth control. Another future study will be a national-wide study how state level government influences the outcome of local government with Intercept-As-Outcome Modeling. This study must provide in-depth and better understanding of dynamics of configuration of policy outcome.

Networks are critical element of open space preservation and more broadly smart growth and sustainable development. Thus, Network analysis will examine relationships between public, private, and nonprofit actors, such as the Trust for Public Lands to investigate the role of both formal and informal institutions in configuring open space preservation and land acquisition decisions.

CHAPTER 1

INTRODUCTION

Open Space Preservation in U.S

Open space preservation is a critical issue responding to undesirable sprawl (Myers, 1999; Myers and Puentes, 2001). Sprawl is defined as low-density residential and nonresidential development that consumes natural resource lands such as farmland, wildlife habitat or scenic sites (Bengstone et. al., 2004; Bolen et. al. 2001). It entails a wide range of social and environmental costs including higher costs for taxpayers and business to build new infrastructure, increased pollution from longer commutes, and continued erosion of open space and sensitive environmental areas (Nelson et al. 2004). According to the report of Natural Resources Inventory of the United States Department of Agricultural, 44 million acres of cropland lost between 1982 and 1997 while developed lands increased by 34%. It may double by 2025 (Alig et al. 2004).

Over the past decades, responding to such trends of expansion and sprawl, open space protection has become more intense. And local, regional, state governments have become increasingly concerned with growth and land preservation. A wide range of policies to manage growth and to preserve open space has been implemented at all level of governments including the local, regional, state, and restrictively national levels.

At local level, growth management has been implemented through the planning and regulatory tools of comprehensive plans, zoning ordinances, subdivision regulations, and capital improvement programs (Porter, 1997). Regional planning agencies have managed growth and open space protection and coordinated the fragmented efforts on individual municipalities and counties (Weitz and Seltzer, 1998). State growth management which evolved from an emphasis on environmental concerns in the 1960s and 1970s has implemented in a broad set of social goals and policy tools in the era of smart growth (Bosselman and Callies, 1971; Gillham, 2002). State smart growth has concentrated on a mix of higher density residential development in order to protect open space and natural resources (Ingram et al, 2009). Although the role of the federal

government has been minor because of a long tradition in local authority in land use decision, it has indirectly influenced land use (Fishman, 2000; Marsh et al, 1996).

Meanwhile, American voters have continued to overwhelmingly support spending for open space protection programs even after the economic crisis. In 2008, voter approval for open space protection was 63 of the 89 preservation finance measures which is a 71 percent approval rate. These measures generated roughly $7.3 billion in new public funding for parks and open space despite of the nation's severe economic recession and fiscal crisis (Trust for Public Land, 2008).

US Accounting Office report on growth issues stated that communities across the nation will face with a projected 50% increase in the US population in the next 50 years. They must "address the challenges of planning and managing for growth" (US GAO, 2000, p5). This is the challenges all level of governments face in growth management and open space preservation. However, they must pay attention and address these challenges.

Existing Research and Research Questions

The decision to preserve land has been studied, however, existing research investigate questions about how it will affect the economy and how it will affect future development and maintain environmental quality (Kline, 2006). The relationship between public land protection and the health of economy (Hunt et al, 2004), and the external benefits of farm and open space preservation on environmental quality in particular water quality (Beasley et al, 1986; Bergstrom et al, 1985; Halstead, 1984) has been studied. They found open space preservation has the economic and economic benefits. And Feather and Bernard (2003) examined farmland preservation through purchasable development rights (PDR). They found that benefits from open space preservation may outweigh the costs.

In addition to these studies, socioeconomic factors associated with land preservation have been studied. Poor and Brule (2007) explore the relationships between socioeconomic factors and preserved land and conclude that these factors are key criteria which should be considered in implementing land preservation policies. They also argue

that open space policies arise from political process. Open space referenda data to measure public demand for preserving open space has also been studied to indentify socioeconomic factors (Deacon and Shapiro, 1975; Kline and Wichelns 1994; Kahn and Matsusaka 1997; Press 2003; Salka 2003; Solecki et al. 2004). However, these studies do not address the dynamics between local conditions along with institutions and interests groups and public demand. Namely, they have limited to explain the dynamics in the configuration of open space preservation. Open space preservation must be viewed within the political process because open space preservation efforts are cast as the product of interactions among political actors. Local land use decisions, which create distributional conflicts among community members, are political processes. In the process, various actors interact and articulate their preferences in a land use decision.

Therefore, the first purpose of this dissertation is to explain and provide an in-depth understanding of dynamics in the configuration of open space preservation within political process. The political market explanation advanced in this dissertation conceptualizes open space preservation as the product of political decisions made within a set of both formal and informal political institutions (Lubell et al. 2009). According to Ostrom (1990), the formal political institutions are assumed to mediate economic and political demands in land use at the policy level. And at the operational level, the social network of relationship in which open space preservation decisions are embedded provide a factor for variation in land protection.

Second, existing studies of political institutions are limited by its focus on only single-level analysis. Applying an advanced methodology, Hierarchical Linear modeling (HLM), to examine local land use decision, this dissertation attempts to investigate what factors account for local open space preservation.

Studies of political institutions fail to consider that state governments exercise critical role on the actions of local governments, especially in land use issues (Press 2002). Under the US federalism, states have the power to define and limit the right to use land and its natural resources (Nolon, 2006). Within this US system of government, local governments not only play a role by itself but also cooperate and integrate with state government. Feiock (2001) addresses that the there are intergovernmental relations

between high level (state government) and low level (local government) indicating complementary or substitute mechanisms affected by high level governmental political circumstance. In this nested system, single-level analysis is inappropriate to reflect an accurate and realistic theoretical account (Raudenbush and Bryk 2002). The method of hierarchical linear modeling is a useful tool to explain the relationships and verifications between groups (e.g., random effects) and within groups (fixed effects) (Raudenbush & Bryk, 2002; Osborne, 2000). In a statement by McCabe and Feiock (2005) who argued the problem of one-unit level analysis, hierarchical linear modeling can reduce the problems of aggregation and disaggreagtion data combining high level units and low level units into one-unit level. This hierarchical linear modeling allows researchers to model clearly clustered variances in nested relationships (Taveres et al, 2010).

In addition, Ostrom defines *holons* (2005) as "What is a whole system at one level is a part of a system at another level" (13p). Such nested subassemblies are part-whole units in complex adaptive systems (Koestler 1973). The analyses dissect complex systems into composite holons that are then dissected further and explanation occurs at multiple levels and different spatial and temporal scales. From this perspective, open space preservation is required to be examined with multiple levels and different spatial and temporal scales. Thus, this dissertation examines the same phenomena, open space preservation, at two levels as nested part-whole units of analysis. First analysis examines open space protection efforts with a hierarchical linear modeling, describing the structure of intergovernmental relations within a federal system. In this analysis, actual acquired land acres in local level governments are examined. In other word, it estimates what factors account for the outcome, that is, performance of open space preservation in local level governments within hierarchical governmental relationship. First analysis can provide implications on the performance of open space preservation in local level governments within hierarchical governmental relationships. Second analysis focuses on local open space protection with Florida's state-wide land acquisition program which is the Florida Communites Trust (FCT)' Florida Forever program. In the second analysis, FCT application was measured as the efforts of Florida County governments to preserve open space. Submitting FCT application is the willingness to preserve open space of local government. The results from the second analysis can provide some implications on the

willingness of local governments to preserve open space through FCT applications. Therefore, two analyses address related but somewhat different questions although they deal with same phenomena, open space preservation.

Third, the hierarchical linear modeling examines whether the efforts of state based growth management with strong state involvement have more impact on the outcome of open space preservation in local level government. There have been many studies on the impacts of state growth management (Howell-Moroney 2007, Knaap and Nelson 1992, Weitz and Moore 1998, Kline and Alig 1999, Phillips and Goodsten 2000, Carruthers 2002, Anthony 2004, Ingram et al, 2009). However, these studies focus on only a few of states, that is, they are very anecdotal. Even the studies on the comparison of growth management and non-growth management states show different findings. Some studies show insignificant effect of growth management on land development outcomes. In Smart Growth Policies comprising the four smart growth states and the four other selected states, Ingram et al, 2009 conclude that there are no large or consistent differences between them. Others suggest strong state led growth management hold significant effect on reducing urban sprawl (Carruthers 2002, Howell-Moroney 2007). Thus, this dissertation aims to examine the impact of the efforts of state based growth management with strong state involvement on local open space preservation as well as the impact of the contextual factors of county governments with more advanced methodology.

Lastly, this dissertation aims to extend political market framework to distributive policy arena. Several extant studies using political market framework have examined and identified the key factors influencing the approaches of regulatory land use policies.

Jeong (2004) examines adoption of impact fees which are regulatory land use policy for new development using political market framework. With modified the political market framework, Yoo (2008) testes conservation amendment of local comprehensive plan which is constraints on development decisions. And Kang (2005) and Ramirez (2007) identify the forces influencing regulatory policy enforcement which is zoning request approval and potential delay for development based on the political

market framework. Political market framework has been applied to regulatory land use decision. Unlike zoning or land development regulations which rely on coercive regulatory mechanisms to restrict new development, land acquisition is the purchase of land or development rights to restricts new development and to preserve open space. Land acquisition has more voluntary and distributive nature compared to traditional types of growth controls. Thus, the second analysis of this dissertation examining Florida's state-wide land acquisition program extends political market framework which has applied to regulatory land use policies to voluntary and distributive policy.

In sum, this dissertation aims to provide an in-depth understanding of dynamics in the configuration of open space preservation within political process, to apply an advanced methodology which is Hierarchical Linear modeling (HLM) to investigate what factors account for local open space preservation with a view of hierarchical intergovernmental relation between state and local government, and to extend political market framework to voluntary and distributive policy.

With the purposes described right above, this dissertation investigates what factors account for local open space preservation applying political market framework. First analysis focuses on state level factors and how state level rules and politics influence local open space protection. More specifically, it examines whether strong involvement of state level government influence open space protection made by local level governments. Second analysis examines how local political institutions' supplies and environmental interests' demands account for local open space protection with panel data of Florida Communities Trust (FCT) applications, Florida's state-wide land acquisition program, from 2001 to 2008.

Significance of the Study

American voters have continued to overwhelmingly support spending for open space protection programs even after the nation's severe economic recession and fiscal crisis. Open space preservation is critical issue which local, state government and, to a

limited extent, national level must pay attention. The important theoretical advance and empirical findings of this dissertation contribute to better understand the role of state and local political institutions in the environmental local public goods. Specially, existing studies of political institutions are limited by its focus on only single-level analysis. I believe that this dissertation contributes to identify important factors to determine local open space protection within the hierarchical structure of intergovernmental relations. Again, this dissertation provides a context for understanding open space preservation and its implications for land use policy and management strategies to address open space loss and urban sprawl.

Overview of the Study

This dissertation is comprised of Six Chapters. In the First Chapter, I addressed existing research and research questions, and significance of the study. Chapter 1 explains that open space is the most important issue and element on which we must concentrate in specially the movement of smart growth and sustainable development.

Chapter 2 and 3 begins with the definition of open space and provides theoretical background for this dissertation. Chapter 2 explains the reason why land use decision on open space preservation needs to be examined within hierarchical government relationship. Chapter 3 describes the political market framework and develops general hypotheses on open space preservation based on the political market framework.

Chapter 4 explains data and methods that are used in this dissertation, and also explains how research is designed. In the first analysis of open space preservation within context of hierarchical relation, Hierarchical Linear Modeling is constructed into two models: Unconditional Model and Simple Random Intercept Model. In the second analysis of Florida Communities Trusts applications, panel Poisson model which is extended to random effect Hurdle Model is constructed.

Chapter 5 suggests the parameter estimate of the first and second analysis implanted in this dissertation to test hypotheses which are developed in chapter 3 and analyzed the results with implications.

Last Chapter 6 provides conclusion with the limitations of this research and future study to resolve them and develop this research.

CHAPTER 2

OPEN SPACE PRESERVATION POLICIES AND POLITICS

What is Open Space

Definition and Value of Open Space

Open space is defined in different ways. According to The New Illustrated Book of Development Definitions (1999), open space is land which has been "set aside, dedicated, designated, or reserve" for public use. Webster's Encyclopedic Unabridged Dictionary of the English Language (1996) defines open space is land which is "protected from development by legislation." Meanwhile, Kaiser, Godschalk and Chapin (1995) address that open space should be categorized with its purposes that the land is used. The purposes they suggest include the protection of natural and cultural amenities, protection of property and people from environmental hazards, and the provision of outdoor recreation. Hollis and Fulton (2002) define open space as "land that is not devoted to urban development." Based on the various definitions, open space includes forests, working farms, ranches, and timberlands and also includes parks, stream and river corridors, and other natural areas within urban and suburban areas.

The first analysis of this dissertation using the data from the survey of National Center for the Study of Counties (NCSC, 2004) defines open space as farms including agricultural lands, stream corridors, community based parks, and outdoor recreation. And open space in the second analysis is defined as the land identified in local comprehensive plans including a conservation element. A conservation element is the area including air, water, water recharge areas, wetlands, waterwells, estuarine marshes, soils, beaches, shores, flood plains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources.

Open space has innumerous value and provides various economic benefits. It has also ecological and social benefits. In terms of economic benefits, open space has a significant and positive impact on nearby residential property values leading to higher

property tax revenues for local governments (Nicholl 2004; Payton and et al 2008). Furthermore, preserving open space is primary and indispensible elements that grow and maintain economic health. In locating a new business, open space such as recreation areas and parks is the important element to improve the quality of life for employees (Crompton et al 1997). Open space attracts tourists, provides various recreation opportunities, and enhances tourism which is one of largest industry.

In terms of ecological benefits, open space helps control floods. Protecting floods can be a cost effect compared to other expensive flood control management. And it helps protect water quality and even helps enhance air quality. And open space is home to various population of wildlife and maintain fisheries.

In terms of social benefits, the various activities through accessibility to open space can improve the health leading to reduce health care costs. In addition to this physical health, open space improves mental health (Wang et al 2005; Gies 2006).

Public Support for Land Preservation and Development Pressures

State and local government across the U.S. vote in order to generate public funding for open space preservation. As Table 1 indicates, American voters across country have continued to overwhelmingly support spending for open space protection programs even after the economic crisis.

In the midst of the 2001-2002 recessions even when the year of 2001 was an off-year of election, American voters continued and approved preservation finance measures. In 2002, voters approved 135 preservation finance measures of 183 which is a 73.77 percent approval rate. These measures generated roughly $5.4 billion in new public funding for parks and open space.

In total, across country, state and local government raised 1488 from 1994 to 2004 and voters approved 1157 preservation finance measures. These measures generated more than $29 billion in new public funding to create parks and preserve open space.

Table1. State and local Land Preservation Ballot Measures by Year, 1994-2004

Year	Number of Measures	Passed Measures	Preservation Funds Approved
1994	51	33 (88.24%)	$621,248,511
1995	41	33 (80.49%)	$1,114,619,344
1996	98	70 (71.43%)	$1,460,316,498
1997	82	68 (82.93%)	$773,514,321
1998	175	143 (81.71%)	$5,852,872,774
1999	110	98 (89.09%)	$2,175,666,888
2000	208	170 (81.73%)	$4,993,222,298
2001	198	138 (69.70%)	$1,369,510,437
2002	183	135 (73.77%)	$5,486,074,357
2003	126	95 (75.40%)	$1,255,696,985
2004	216	162 (75.00%)	$3,972,214,265
Total	**1488**	**1157 (77.76%)**	**$29,074,956,678**

(Source: The Trust for Public Land)

The movement of land preservation has concurred to with the increasing land development pressures. Open space preservation is an issue responding to undesirable sprawl (Myers, 1999; Myers and Puentes, 2001).

According to 2007 National Resources Inventory of the U.S Department of Agriculture, between 1982 and 2007 approximately 40 million acres of rural land were newly converted into developed land. As Figure 1 shows, this brought the total developed land areas (71 million acres) to about 111 million acres, representing a 56 percent increase. This developmental trend of land means that more than one-third of all land that has ever been developed in the lower 48 states was developed during the last quarter century.

And also, according to Kolankiewicz (2001), an additional 100 million acres across the U.S states will be converted into the developed areas if the lost trend of rural

land in the 1990's continues in the year 2050.

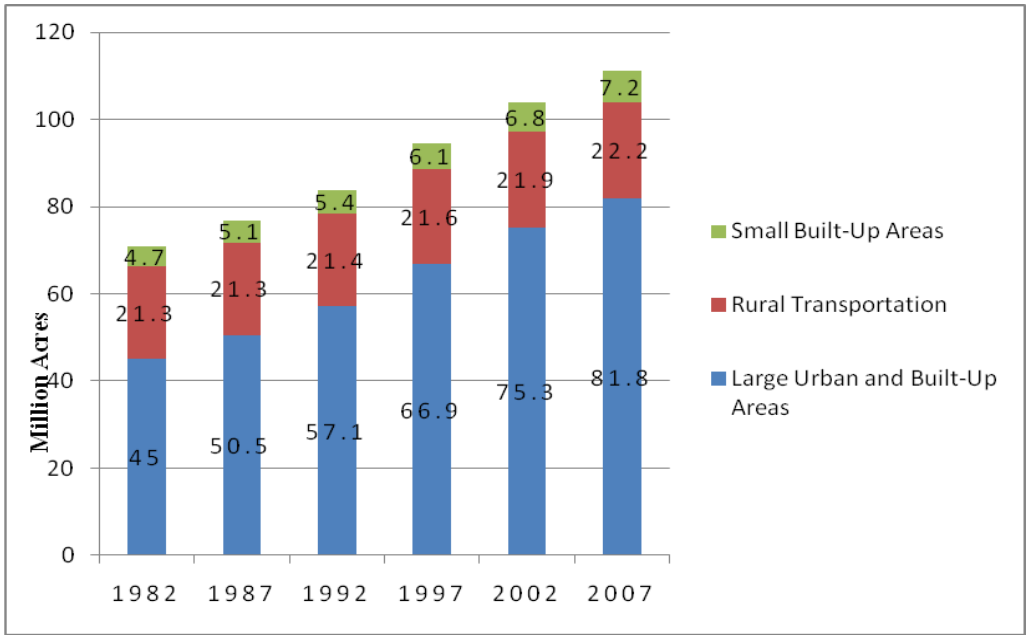


Figure 1. Developed Land between 1982 and 2007

Growth Management and Open Space Preservation Policies

State Growth Management from Quiet Revolution to Smart Growth

The root of state growth effort can be traced back to national resource planning of the Progress Era which emphasized on environmental concerns in the 1960s and 1970s. By this movement of 'quiet revolution' in state land use management, state initiated involvement in local planning. State took back powers granted to local government to use land based on the legislation in the federal government's 1924 Standard Zoning Enabling Act.

Many scholars have developed and described a model to category chronically the state growth management policies from this quiet revolution movement to contemporary smart growth (Carruthers 2002, DeGrove 1984; 1992; 2005, Ingram et al, 2009, Weitz 1999). State involvement and state led growth management has evolved as follows: the

quiet revolution (1969 to 1976), a second wave (1980 to 1988), a third wave (1989 to 1997), and a four wave, the so-called smart growth (1998 to present).

In the first wave, state growth management was based on sponsoring regional and statewide growth management and environmental protection programs subsided. Through regulation of land development, sates have extended their involvement land use management.

In the second wave, growth management moved from controlling growth to planning for growth. The second wave focused on accommodating growth with co-ordinated and well planned land use.

The third wave began with the adoption of statutes in Georgia in 1989 and states interested in comprehensive planning. Local governments in states with growth management are mandated or encouraged to plan that is mandatory or voluntary comprehensive plan. State growth management has specific consistency requirements and enforcement mechanisms; however, they vary from state to state. Vertical consistency is requirement which local plan should be consistent with policy objectives state defined. Horizontal consistency is requirement on local plans to be compatible with other local plan. Internal consistency is that local plans should be consistent with development regulations. According to Gale (1992), Burby and May (1997), and Weitz (1999), the stronger state growth management the more requirements on all three types of consistency, while the weaker state growth management requires fewer consistency or just encourage consistency. Certain states require local plans to contain specific elements such as housing, open space preservation, and economic development. And also, certain states require the use of specific policy instrument such as urban growth boundaries or concurrency to regulate the expansion of urban development. State agencies with state growth management generally prepare rules, provide technical assistance, and review on local plans.

As of 1998 state growth management program entered a fourth wave, smart growth, another revolution (Weitz 1999). Smart growth is difficult to define because each state defines in different ways and has different meanings. Downs (2005) maintains that there are various approaches to smart growth.

According to Bolen et al (2002), smart growth can be defined in four principles;

"(1) eliminating state subsidies that promote sprawl; (2) promoting infill development; (3) preserving farmland, open space, areas of environmental and recreational value; and (4) supporting local planning by providing incentives and technical assistance to local governments and encouraging them to enter into regional planning agreements. O'Connell (2009) defines smart growth as "promoting denser development and protecting agricultural and wild land from development." In smart growth management, it is axiomatic that open space preservation is an essential ingredient.

Local Growth Management and Open Space Preservation

Local government has adopted growth management regulations. Since the early 1960s, many cities and counties adopted growth management regulations. For many years, the predominant form of regulation was zoning ordinance to permit development. The 1960s and 1970s' growth controls involved downzoning land to limit the amount of future growth (Zovanyi 1999). However, this growth control was typically implemented in small suburban areas. These areas rely either economically or culturally on larger metropolitan areas. Then, this growth control brought inevitably spillover effect which accompanied development into other parcel of surrounding unrestricted areas (Navarro and Carson 1991). The 1960s and 1970s' growth controls by local zoning and restriction on residential construction inking to increased housing prices were vilified by exclusionary effects that exclude low and moderate income residents. With the fundamental problems of local zoning practices which were exclusionary, may not be sensitive to regional needs, and aggravate the surrounding areas, state led growth management were more appealing since it can be mechanism to balance between local and state needs.

Since the 1980s, a range of programmes such as development impact fees, growth boundaries and comprehensive plan as land use policies to control growth has implemented. Like zoning ordinances, development impact fees have distributive consequences by falling the burden of the fees on consumers and land owners who generate distributive impacts which exclude low and moderate income residents (Feiock 2004). Growth programs such as new development within growth boundaries have been

thought to promote the desired public ends by reducing costs for facility and service, preserving resource lands and environmentally sensitive lands from sprawl.

More specifically looking at growth measures to manage urban growth and preserve open space, the commonly used instruments can be categorized 1) public acquisition, 2) regulation, and 3) incentive based approaches (Bengston et al 2004).

The first type is public acquisition with the longest history of use in the United State which has been justified on the base of the public goods and the market failure to address the demand for public goods. It has been used to create or expand landscapes such as parks, recreation areas, forests, farmlands, greenways, environmentally sensitive areas and so on. Since it entails enormous cost, many tools such as long term bonds or lottery proceeds have been used. In land acquisition process, partnerships and networks between nonprofit organizations and governments have played important and tremendous role. (Endicott 1993, Tibbetts 1998)

A second category of instrument to manage and preserve open space is regulatory approaches. Regulatory techniques include various strategies such as subdivision exactions, cluster zoning or cluster development, downzoning or large-lot zoning, and exclusive agricultural or forestry zoning, or agricultural protection zoning. Subdivision exactions are widely used approach and require developers to reserve environmentally sensitive areas and areas for parks and playfield (Porter 1997). A community association or the local jurisdiction implementing the regulations manages the reserved land by subdivision exactions. Cluster zoning or clustered development is a strategy to preserve open space by holding down development costs and reserving farmland and forest in existing use. This technique is to build houses closely together on small lots keeping substantial land area to be devoted to open space. Unlike clustered zoning, downzoning or large-lot zoning is to discourage residential development in rural area by requiring developers to minimum lot sizes. Exclusive agricultural or forestry zoning, or agricultural protection zoning is used for restricting other types of land uses and land is zoned only for use of forestry or agriculture.

A third category of instruments to preserve open space is incentive based approaches. A range of incentive based approaches including right-to-farm laws, agricultural districts, acquisition of development right, and use-value tax assessment have

been developed and implemented (American Farmland Trust 1997). Right-to-farm laws were designed to protect agricultural operations by allowing farmers and ranchers a defense to nuisance lawsuits, although it is not precise if they have been effective strategy to keep agriculture land. Agricultural districts are designed to leave land for agricultural use and enrollment in agricultural district is voluntary unlike exclusive agricultural zoning (Heimlich 2001). Acquisition of development rights including transfer of development (TDR) and purchase of development rights (PDR) are other types of incentive based approaches. TDR allows landowners to severe from a particular parcel of land and sell to other property. Future development of the transferred parcel is then permanently prohibited. And the purchaser of the rights may assign them to a different parcel to increase density. Purchase of development rights have been used by all levels of government and private land trusts (Gustanski and Squires 2000). Although landowners sell the development right voluntary, they keep land title and future subdivision and development are restricted. Similar to PDR, use-value tax assessment offers provides landowners an incentive to keep their land from future development. Through use-value tax assessment, "land is taxed at a lower agricultural or forestry value rather than the higher values associated developed uses" (Williams et al 2004).

Hierarchical Governmental Relation in Open Space Preservation

Within the US system of government, states have the power to define and limit the right to use land and its natural resources (Nolon, 2006). Local governments not only play a role by itself but also act in cooperation and integration between state and local governments under the US federalism. The intergovernmental relations between high level (state government) and low level (local government) provide the insights of complementary mechanisms affected by high level governmental political circumstance (Feiock 2001). In this nested system, single-level analysis is inappropriate to reflect an accurate and realistic theoretical account (Raudenbush and Bryk 2002).

Specially, sing the movement of 'quiet revolution' in state land use management during the 1960s and 1970s, state initiated involvement in local planning. Bollens (1992) argues that no uniformity explains centralization of state and local authority to control regional or community growth management. However, he argues that "Among the

primary reasons for the transference of growth control policy authority from local to state government has been the unwillingness of local governments to deal adequately with growth issues that transcend local boundaries. Growth-related problems regarding environmental protection, affordable housing, or public facility siting blur the distinction between extralocal and local responsibilities and create overlapping and potentially conflicting state and local constituencies." (p.456). State governments have strongly involved in circumstances that local growth policies generate negative externalities and have shared the solutions to increase regional benefits. Anthony (2004) also has argued that "state growth management programs require all local governments within a state to adopt growth management practices and thereby ensure that benefits of growth management accrue to communities across the state. The state can assume review powers over local development polices. State legislation can help reduce the possibility of negative spillovers form growth-regulated community to those that are not." (p.378).

Within the context of state governmental involvement into local planning and land use policies to address negative effects, it is clear that hierarchical government structure is exercised in local land use policy. More explictly supporting argument, the hierarchical governance structure can be explained by Ostrom (2005). According to him, , through rules as shared understandings among humans involved a lower level of governmet are nested by a higher level of government and authoritative collective choice of rules affect the operational activities and policies of lower level government.

Within the extant state growth management stream, land use and development has been importantly considered at all level of government including local, regional and state level even federal level. State growth management has specific consistency requirements and enforcement mechanisms although they vary from state to state. Vertical consistency is requirement which local plan should be consistent with policy objectives state defined. Horizontal consistency is requirement on local plans to be compatible with other local plan. Internal consistency is that local plans should be consistent with development regulations. Especially, since the movement of smart growth which is state policymakers' response to rapid growth, sprawl, and a declining quality of life, states have pursued approaches to growing smart. Without advocacy and substantial support of state government, smart growth cannot be realized (Downs 2005). Downs argues that "only the

stat government has the Constitutional power to shift authority over certain types of land use planning from local governments to regional or state wide agencies with the scope to carry out many smart growth policies." (p. 376). According to Carruthers (2002) and Bolen et al (2002), a common purpose of state growth management policies within smart growth movement is to promote infill development and protect open space by regulating, coordinating, supporting, and encouraging the planning practices of local governments with financial and technical assistance Open space preservation is one critical and essential element within the smart growth movement. Even a few states require local plans to contain specific elements of open space preservation.

In 'Managing Community Growth (1994)', Kelly addresses "state's new policy has the potential to influence the development decisions made by local government." Thus, smart growth efforts in state government influence development decisions and implementations in local government. In sum, smart growth efforts with stronger involvement in local planning and broader range of programs are more effective in increasing open space preservation.

Open Space Preservation in Florida

Florida is an ideal and excellent research setting because Florida is one of seven states which stand out as national leaders in open space acquisition programs and have long history[1]. And also, county government is an appropriate unit of analysis for examining open space protection because counties play a key role in local land use decision and also exhibit considerable institutional variation in general and in specific how each government structures the rules of open space policies.

Florida Communities Trust's Florida Forever

The Florida Communities Trust's Florida Forever as the successor program of Preservation 2000 is Florida's state-wide land acquisition program administrated by the

[1] Seven states including California, Colorado, Florida, Maryland, New Jersey, New York, and Wisconsin stand out as national leaders in open space acquisition (Hollis and Fulton 2002).

Department of Commuity Affairs (DCA) to provide funding to local governments and non-profit environmental organizations for commnutiy based partks, open space and greenways. It has been phenomenal successes in terms of acquiring land and protecting open space. Florida Forever program is appreciated as the largest land acquisition program in the country. Since 1990 the program has annually bonded $300 million and a portion of documentary stamp which is a tax on development and land transactions is used for Florida Forever debt service. Over 2 million acres of environmentally significant lands in Florida have been purchased.

The Florida Communities Trust (FCT) for small-scale local grants recieves annually 21 percent or $63 million of the total $300 million Florida Forever appropriation. For its success, there has been popular and scholarly attention on the large-scale state land acquisitions. On the other hand, there has been less attention on the small-scale opens space preservation activities funded by FCT as well as the roles of local governments in open space preservation.

FCT provides funds for acquisition of community-based parks, open space and greenways identified in local government comprehensive plans. It means that FCT program helps communities achieve the goals of their comprehensive plans through land acquisition and non regulatory ways. The State Growth Management Act (GMA) enacted in 1985 requires every local government to create and update a comprehensive growth management plan that guides land use decisions. This comprehensive growth management plan offers a legally binding upon development decisions since land development regulations including local zoning codes and permit decisions must accord to the provisions of the comprehensive plan. The comphrehensive plans must have several certain elements and a conservation elements is one of them. According to the Florida Statutes, a conservation element is specified as follows:

> (d) A conservation element for the conservation, use, and protection of natural resources in the area, including air, water, water recharge areas, wetlands, waterwells, estuarine marshes, soils, beaches, shores, flood plains, rivers, bays, lakes, harbors, forests, fisheries and wildlife, marine habitat, minerals, and other natural and environmental resources (s.163.3177(6)(d)).

Grants are awared annually on a competitive basis to local governments and eligible non-profit environmental organizations. According to FCT, "local governments and non-profit environmental organizations that are tax exempt under section 501(c)(3) of the United States Internal Revenue Code are eligible to apply for funding. Eligible applicants may submit multiple applications, as long as the combination of awards applied for does not exceed the $5 million. Awards requested in a partnership application are divided equally among the partners for the purposes of calculating individual applicant limits. Counties with populations greater than 75,000 and municipalities with populations greater than 10,000 are required to provide a minimum match of 25% of the total project cost. Small counties and cities that are under the above thresholds, and eligible nonprofit environmental organizations, may apply for a 100% grant award. Eligible source of match can be existing or future cash from the applicant, cash or funds from a reginal, state, or federal agency, cash from a private donation, the value of real property owned by the application in a qualified preacquisition, and the value of real property donated by the landowner in a documented bargain sale or donation agreement. Following the application evaluation period, the Florida Communities Trust Governing Board will hold a public meeting to rank and select projects for funding, based on the final evaluation score of each project and actual funds available. Applicants will be provided an opportunity to discuss their project and preliminary evaluation score at this meeting." (avaliable at : http://www.floridacommunitiestrust.org/ParksandOpenSpace/ApplicationProcess.cfm)

CHAPTER 3

THE THEORETHICAL FRAMEWORK

The political Market Framework

The political market approach is an integrated theoretical framework combining the institutions, local politics, and growth machine theory. This integrated theoretical framework describes political institutions as mediator. In order to supply the land use policies, political institutions interplay demands of private actors and the willingness of public officials (Clingermayer and Feiock 2001; Lubell et al 2005). In the process of local land use decision, local government institutions play a decisive role. Policy outcomes are conseptualized as an equilibrium that is the result of interacting between the demand for environmental goods which are aggregated from residents, businesses, environmental interest groups, and homeowners and the supply of growth management which is aggregated by government officials (Alston 1996; Lubell et al 2004). Clingermayer and Feiock (2001) describe that institutions mediate these political exchanges between the aggregated demand and the aggregted supply. Institutions determining the rules of the game and generating incentives can provide opportunities for collective action to result in policy changes (Clingermayer and Feiock 2001).

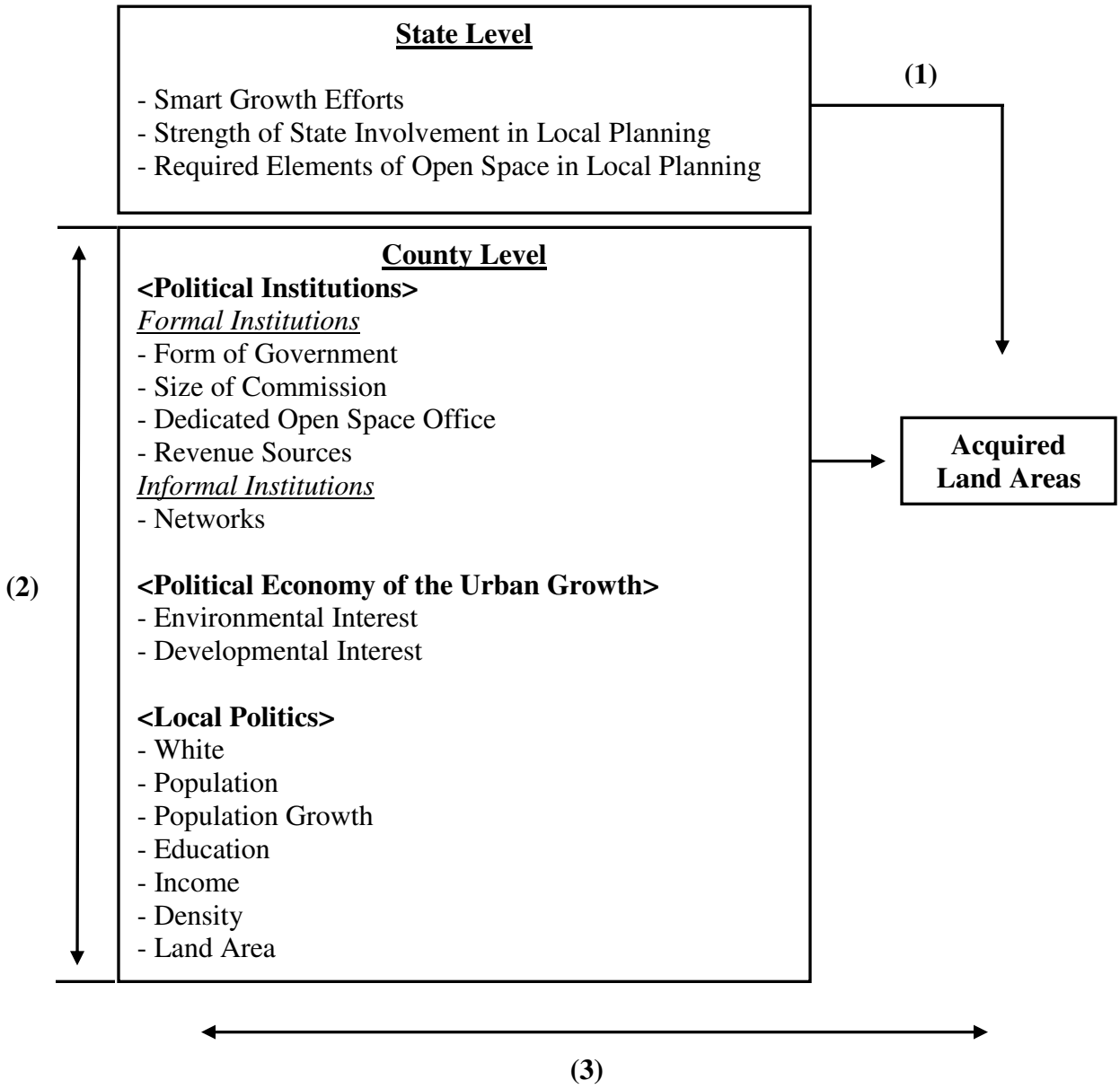
According to Lowry (1998), provsion of public good such as open space is decided and influenced by constituency demands and governmental incentives and commitment. In the political market framewok, provision of environmental public goods such as open space can be conceptualized as the result of dynamic and political process between the suppliers and demanders of policy change in a community (Lubell et al 2005). Generally, private interests in community are defined as the demanders. The government authorities are defined as the suppliers (Schneider 1989; Feiock 2006). The Interest group demands are moved and infludenced by the local economic changes. In terms of return for political resources, elected officials will provide land use policies that can influence the utility of different interests. Local political institutions which constitute the arena where political contracting occurs combine with the structure of interest group and the economics of land use to determine policy outcomes. Different types and

structure of political institutions favor different types of interests organizations. The structure of local political institutions determines the winners and losers in the land-use policy by enhancing or reducing the ability of interests that influence land use policy.

This political market framework has developed and studied building upon three distinct traditions. The first tradition originated from the study of Progressive Reform Movement of the early 20th century is the institutional reforms in government structure that Progressive Reform Movement generated (Lineberry and Fowler 1967; Ostrom, Bish and Ostrom 1988; Schneider 1989; Ruhil 2003). The second tradition is "growth machine" perspective that focuses on the political economy of growth and land use decisions. In the political market framework, growth machine theory views land use decision making as a political alliance between local government officials and development interests. The third tradition is contemporary theories of local politics and governance. They focus on property rights and the role of political institutions in aggregating individual and group preferences.

Land use decisions are not only the products of dynamic process between demanders and suppliers at local level but also the products restricted by decisions which state level madel. Accordingly, the political market framework is very well matched to multi-level analysis. Political market framework explains open space preservation decisions within a multi-level setting by including institutional, political, and economic characteristics for local and state level.

Figure 2 displays the theoretical framework of open space preservation based on political market framework within the context of hierarchical governmental relation. Figure 3 shows the theoretical framework of open space preservation efforts in Florida through land acquisition program, Florida Communities Trust (FCT)'s Florida Forever. Next followed section explains how a set of variables in the model of local land use decision on open space preservation can be hypothesized.



(1) ANOVA Model: Testing Group Variability
(2) Unconditional Model: Testing Within Group Effect
(3) Simple Random Intercept Model: Testing Focal Level Effect

Figure 2. Hierarchical Governmental Relation of Local Open Space Preservation

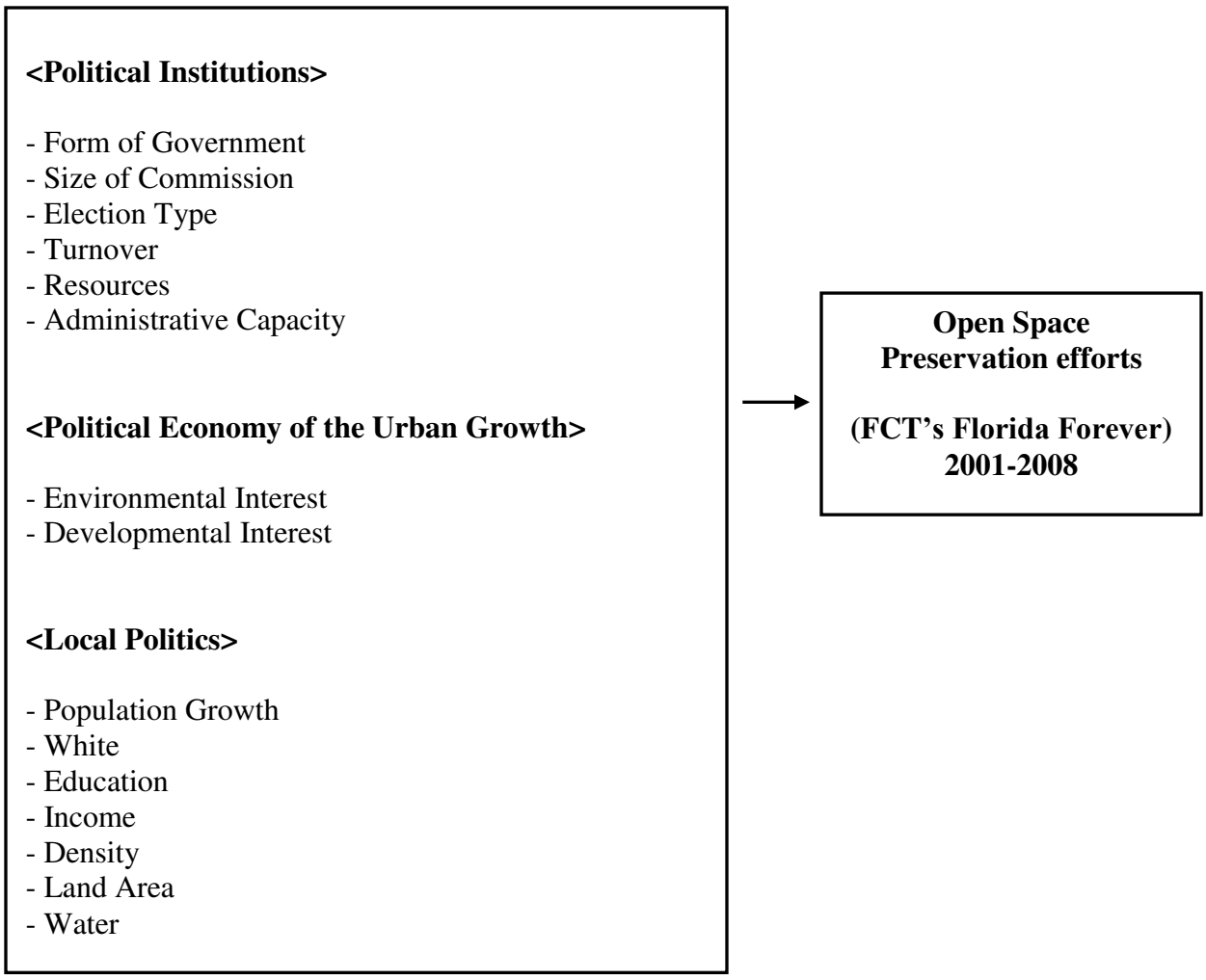


Figure 3. Random Effect Hurdle Model of Florida Communities Trust

Institutions in Political Market Framework

In the political market framework, institutions providing strategic context are essentail subject matter. In that strategic context, political actors make policy choices. That is, institutions matter because they provide incentives for political policy change and they affect political policy outcomes. As North defines (1990), institutions are "the rules of the game in a society or, more formally, the humanly devised constraints that shape human interaction." According to Clingermayer and Feiock (2001), "institutions encompass both formal rules such as the formal powers of office and also informal norms, roles, and opeating practices that are so stable, structed, and accepted that they can be said to be institutionalized." Institutions can be formal and informal. Formal institution refers to the constitutions, regulations, and organizations. Informal institution refers to a set of norms, conventions that shape, constrain or facilitate certain behaviors (North 1990; Clingermayer and Feiock 2001). These norms and conventions can be developed in social networks (Lin 2005). This study examines both formal institutions including form of government, election type, dedicated office, revenue, and administrative capacity to protect open space and informal institution such as networks with outside organizations.

Based on the political economy perspective, the government institutions play a important role in land use decision since they are the spheres in which communities' values and motives are shaped and operated. Maser (1985; 1998) also asserts that the political institutions at the local level are relational contracts providing incentives and constraints for the individual behaviors. Political institutions consisting of executive and legislative branches affect the political market of land use policy by inflencing policy dynamics that frame land use decision. Thus, it is required to understand the characteristics of different structure of governmental arrangements.

Political institutions determine the rules and procedures for making collective choices (Clingermayer and Feiock 2001). Form of government intensify public managers' credibility in collaborative settings and decrease uncertainty (Smith 2008). During the lase forty years, institutional influences on policy outcomes have been investigated as the subject of empirical studies. Most of them suggest that different types of government lead to different types of policy outputs (Lineberry and Fowler 1967; DeSantis and Renner 1994; Morgan and Kickham 1999; Clingermayer and Feiock 2001).

Lubell et al (2005) also emphasize the role of local government institutions as important mediators of political and economic forces in framing growth management decisions.

Since the Progressice Reform Movement, the structure and type of local political institutions began to vary. Due to the corruption and inefficiency of strong mayor form of governments, Progressive Reform Movement at the local level started and repalced the strong type of governments with manager council form. This reform movement led to significant changes in local government institutions. This reform movement emphasized executive leadership at the county government. It was to enhace responsiveness to the service needs of rapidly growing populations (Benton 2002). To reduce the corruption and inefficiency of strong mayor system, reform movement pursued the separation of powers and sougth to insulate the administration from elected officials. The traditional type of county government is the commision form which elected commission exercised both legislative and executive authority. On the contrary, reformed or "modernized" county government took two forms either commission-administrator or commission-elected executive forms that provided separation of powers and greater executive authority (Benton 2002). Professional county administration has been considered more emphasis on the role of local land use planning and more responsiveness to provision of environmental public goods (Feiock 2004; Benton and Feiock 2008). Executive institutions have more responsiveness of land use policy to environmental pressures and interests than other forms of county government (Denzau and Weingast 1982; Maser et al 1977). Two alternatives hypotheses have been developed in terms of the role of appointed professional managers in environmental and land use policies (Lubell et al 2007). The insulation hypothesis argues that county managers are more insulated from citizen pressures and environmental interests and their professional socialization makes them more sensitive to environmental, growth management and sustainable development concerns, leading to conservation measures and the provision of environmental public goods (see Lubell et. al. 2005). Appointed professional county government managers "are frequently trained in public administration and management programs where they learn the skills necessary to operate within the political environment and distance themselves from partisanship" (Smith 2008. P6). In theory, appointed professional county government managers have less risk averse propensity. They can surpass the political

transactions faced by elected officials. Thus, they can afford to invest in longer term policy such as environmental public goods (Nalbandian 1989).

H1-1-$_1$: Manager form of government will increase open space preservation.

Legislative structure at the local level also plays critical role in land use decision because it gives incentives and constraints for the local land use decision and land use decision making is processed in the legislative body. Legislative reforms centralized to establish a small of legislative body typically consisting of only five members and structure at-large representation system rather than district basis. Land use policy has a tendency of geographically targeted policy and affect specific constituencies (Denzau and Weingast 1982). Thus, it could give an opportunity of economic benefits to the developers or it could be a impediment to the further development. At large representation has been generally considered more responsive to demand from citizen and neighbourhood such as business and economic pressures (Clingermayer and Feiock 2001). Lubell et al. (2005) also contend that "at-large election system force local legislators to respond to broader set of political interests than are typically found in a single district. At-large representatives serve a citywide constituency, and hence, they are more likely to think in terms of aggregate welfare. For this reason, they have greater incentive to favor well organized, occupational interests that can provide instrumental political resources over terrirorial-based environmental interests. Thus, at-large election system may less favor diffuse environmental interests.

On the contrary, Cooter (2000) argues that "a larger legislature has a higher ratio of representatives to citizens. As the ratio increases, the citizens are more likely to know their representativies, and the representatives are more likely to know the citizen (p. 278)." It menas that representatives have better information and better represent constituents' preferences as the size of the body increases. For this reason, at-large election system may become a barrier to frame and merge environmental interests which generally tend to be diffused and unorganized. District election system may more reflect different community interests on land use decision. Politically, district election system may increase the possibility of articulating community interests of open space

conservation. District election system enhances the participation of citizens in decision making process because geographically concentrated group could become more politically powerful (Gerber and Phillips 2004). Representative members elected from districts are more likely to be sensitive to open space conservation interests because they are supposed to be responsive to their geographic constituencies.

H1-1-$_{2:}$ Larger commission Size will increase open space preservation.
H1-1-$_{3:}$ District-election representative system type will increase open space preservation.

In addition to embedded system described above, the actors in legislative body are not static. Since the position of commission board member and mayor can be changed or stable, the power relationship between executive and legislative bodies within the stable or changed political situation can be established. When turnover among the member of executive or legislative bodies occurs, other members could have opportunities to make policy choices that would not be approved.

The principle agency theory describes that the opportunistic behavior occurs under the situation that the monitoring cost is high since principal agents and agents have asymmetric information. In local policy making process, commission act as multiple principal agents, on the other hand, appointed managers, mayors, or executive officials act as agents. Accordingly, the monitoring costs and information asymmetries will be high when commision board is not stable resulting from rapidly changed member. Thus, when the membership of commision board is not stable resulting from the frequent turnover, executive bodies may make a new policy. When legislators as a reelection seeking actor are in the situation of high political conflict, they may delegate policy making authority to bureaucracies in order to evade the condemnation for controversial issues and its decisions (Fiorian, 1982; McCubbins, 1985). Environmental public good such as open space do not immediately generate benefits and it is generally realized. On the other hand, economic development policy can immediately generate benefits such as job creation and increased revenue sources. Accordingly, in the situation of political instability and uncertainty resulting from unstable political situation, governments may

give up providing environmental public good. And these long term benefits may be realized by the commission board members who have been seated in a long time.

H1-1-$_4$: Turnover in commision body and consequential uncertainty will decrease open space preservation.

Along with executive and legislative institutions, Press (2002) contends that administrative capacity is critical to a local government's ability to preserve open space. To perform the duties on open space protection, the government may create deparments or units and may institutionalize their responsibility of open space. Many counties perform open space programs in the planning, parks and recreation, or public works departments. The fact that county has departments or units by creating or consolidating thme indicates that open space is policy priority. Thus, we can expect that counties having dedicated open space office will more increase open space protection.

Open space protection also depends on financial wherewithal such as ability to issue bonds for land acquisition (McQueen and McMahon 2003). To carry out open space preservation, county governments have implemented local revenu collecting initiatives including dedicated portion of the slaes tax, dedicated portion of the property tax, impact fees, county budget appropriations, or general obligation bonds. Moreover, financially limited counties may look for funds from private sources, state funds or federal funds. Local governments requires a substantial financial wherewithal where land preservation is carried out. Thus, counties with more various resorces to protect open space will be likely to increase open space protection.

H1-1-$_5$: Counties that have dedicated open space office will increase open space preservation.

H1-1-$_6$: More resources to protect open space will increase open space preservation.

Networks as informal institution are important since increased collaboration and dense network relationships have a demonstrated positive effect on performance in some

policy areas. Burt (1992; 2000) contends that network structure is important element and its certain configurations bring better resources. Closure network is indicated by the number of interconnectedness among actors linked directly to each other (Burt 2000). Closure network can enhance efficiency through intensified communication. Information can freely flow in a strongly tied network. It facilitates common norms and values which is critical to collective actions to be achieved. It helps network members to collaborate more easily since it sanctions opportunistic behaviors (Coleman 1990; Burt 1992, 2000; Lin 2005). Furthermore, Erickson (2006) notes, that "rarely, if ever, is the initiators of an open-space project its sole implementer (p.280)." It is obvious that dense network relationships could lead to better performance in open space protection, specially, given that local governments face the financial limitations. Resource exchange is important in open space preservation (Press 2000). Through cooperation among governments such as federal and states agencies, county governments can produce wider range of grants, loans, and financial mechanisms meaning that they have more available financial wherewithal for open space preservation. In additon to vertical partnership, horizontal partners such as land trusts, environmental organization and private businesses are also important since they often provide much of the detailed information about the availability of land within the government's jurisdiction. Thus, counties that have dense networks with external organization are more likely to increase open space preservation.

H1-1-$_7$: Dense networks with external organizations including federal and state agencies as well as the nonprofit and for-profit organizations will increase open space preservation.

Political Economy of the Urban Growth

Growth machine perspective is the second tration in the political market framework. "Growth machine theory has proven to be a powerful conceptual tool for examining the influence of land-based elites on local developmet policies, plnning, and land use decisions (Logan and Molotch 1987; Pfeffer and Lapping 1994)" (Green et al 1996 p.428). Growth machine perspective sees land use decision making as a political

alliance between local government officials and development interests (Logan and Molotch 1987). This perspective describes the relationship between local government officals and land-based elities such as developers and businesses that get benefits and values from development and growth. Since development interests are well organized, they are in a position of advantage over the other diffused public interests and they accordingly gain concentrated benefits in pro-development policies. On the other hand, envrionmental interests tend to be diffused, fragmented and unorganized (Guerin et al. 2001).

According to Vogel and Swanson (1989), in the growth machine perspective, private actors influence the distributional consequences of land use decisions by organizing their efforts. Interests groups such as local real estate and construction interests exercise their political power to impact the costs and benefits of growth (Logan and Molotch 1987). In the urban politics and political economy literatures, political institutions are mostly transparent to the fundermental and underlying demands leading land-use policy. It provides a important oversight since political institutions are critical mediators of political and economic demands (Clingermayer and Feiock 2001). Combining together elements of the Progressive Reform in local government, local politics and urban political economy perspectives, the political market framework reflect the situation that political institutions are critical mediators of political and economic demands.

Developer interests have a significant and actual voice in land use decisions because they hav more access to local power and are often organized and well financed leading that they can control local develoment policies as influential articulators in land use decisions. Many studies show that a substantial degree of alliance between developers and businessess and public officials (Stone 1989). The growth machine perspective mainly describes local policy regimes as an alliance between government officials and development interests such as the developers, real estate, and finance industries.

Environmental interests differ from development interests in terms of their geographical based organization. Although some local environmental interests have unorganized structure like unorganized citizens who have concerned with sprawl, many

local environmental interests are territorial groups associated with a specific geographical location (Lubell et al 2005). This type of interest groups including neighborhood organizations, homeowners associations, and citizen activists are often crucial actors in Not-In-My-Backyard politics. Located within geographically defined constituencies, these type of groups fight and inhibit locally unwanted land uses. Or they strongly request environmental amenities such as parks and open space in their neighborhoods.

Contrary to local environmental interest groups, development interests are defined in accordance with functional or occupational lines such as developers, realtors, contractors, construction trade unions, and financial institutions. Functionally or occupationally organized interests try and search economic opportunities across the entire community and they have less concerned with a specific location. On the other hand, geographically diffused and defined environmental interests may not have a competitive advantage over with well organized and financed development interests except that political entrepreneurs help environmental interests mobilize (Clingermayer and Feiock 2001).

H1-1-$_{8:}$ Stronger environmental interests are positively related to open space preservation.

H1-1-$_{9:}$ Stronger development interests are negatively related to open space preservation.

Local Politics Influencing Open Space Preservation

When the scarcity and the over-consumption of land is increased and intensified, citizen support for the provision of environmental public goods is emerged. In investigating of Political Institutions and Conservation (Lubell et al (2005), "land is a common-pool resource for local communities, and as land becomes scarce, there are Pareto-benefits to creating conservation rules that protects environmental values." (p.710) As existing growth patterns intensify the scarcity of land and infrastructure resources, the benefits of environmental public goods such as open space are (Steinacker 1998; Lewis

and Neiman 2002). In other word, the demands for policies that protect and preserve environmental resources are increased when growth pressures are intensified,. Thus, we expect that land scarcity, sprawl, and population pressure will increase the demands for open space preservation.

Population growth patterns have been related to the demand for open space preservation and more generally growth controls. A number of studies represent a positive relationship between patterns of community growth or growth rates and demand for growth controls (Anglin 1990, Protash and Baldassare 1983, Baldassare and Protash 1982). In Howell-Moroney (2004)'s investigation of taxes and bonds for open space preservation, he contends that population growth rates are positively related to open space preservation efforts.

Efforts to provide environmental public goods are sometimes related to high socioeconomic status populations. According to Navarro and Carson (1991), growth management has sometimes been described as exclusionary, elitist, and status-biased. As growth controls, open space preservation has been related to income and community social status. Romero and Liserio (2002) investigated open space preservation and they found that community social status is significantly related to open-space preservation votes. They suggest that ''smaller, wealthier and whiter areas were the most likely to include open-space preservation measures" (P.343).

Many literature presen that high socioeconomic status communities may support growth controls to exclude low income people (Maser et al 1977; Feiock 2004). Low-income populations tend to less generate support for environmental amenities. This is "not because minority populations do not prefer environmental policies. Rather, it is because minority populations often lack political resources to articulate political demand (Lubell et al. 2005. P.711).

Therefore, we can expect that there is relationship between community characteristics such as wealth, education and race and the demand for environmental public goods. Navarro and Carson (1991) demonstrate that high socioeconomic status communities use environmental amenities to raise their property and generate barriers to isolate lower socioeconomic status groups from them. Higher income and education groups also show a tendency to consider preservation of open space and protection of the

natural environment as highly valuable one and they participate in environmental groups (Dunlap and Mertig 1992). Thus, we expect efforts to preserve open space are highly related to communities with a higher per capita personal income and educational attainment levels. Also, we expect that race may be related to open space preservation because minority populations often have lack political resources to articulate the demand for environmental amenities such as open space (Lubell et al. 2002).

H1-1-$_{10}$: Land scarcity, and population pressure will increase the likelihood of open space preservation.

H1-1-$_{11}$: High socioeconomic status including income, education, and white population will increase the likelihood of open space preservation.

Statewide Factors Influencing Local Open Space Preservation

County governments play a prominent role in land use decisions. However, there are statewide contextual factors that contribute to explain differences in open space preservation among counties belonging to the same state. The reason we should consider statewide factors is that state government has power to transfer authority over land use. According to Nolon (2006), states have the power to define and limit the right to use land and its natural resources under the US government system.

State policy and rules function as intergovernmental institutions and constitute constrains to local governmental actions. State level choices prescribe what actions are required, prohibited, and permitted to local actors (Ostrom 1990). Local governments as creatures of the states are dependent upon the states for financial support, regulation, and in other ways. This is because the units are nested in states and counties areas from the same states are likely to follow similar policies. Thus, state level contextual variables constitute an additional explanation for variation among county units. Policy outcomes depend on the substantive rules' provisions (McCabe and Feiock 2005). The supply of growth management by government officials is largely influenced by the structure of programs related to open space conservation. Specially, since state wide movement of

smart growth which is state policymakers' response to rapid growth, sprawl, and a declining quality of life, states have pursued approaches to growing smart. This smart growth is defined in various ways. However, it can be defined in two broad categories: land preserving and inner-city redevelopment (O'Connell 2009). Open space preservation is one critical and essential element within the smart growth movement. Downs (2005) notes that without advocacy and substantial support of state government, smart growth cannot be realized because "only the stat government has the Constitutional power to shift authority over certain types of land use planning from local governments to regional or state wide agencies with the scope to carry out many smart growth policies." (p. 376). According to Carruthers (2002) and Bolen et al (2002), a common purpose of state growth management policies within smart growth movement is to promote infill development and protect open space by regulating, coordinating, supporting, and encouraging the planning practices of local governments with financial and technical assistance. Thus, state smart growth efforts with more intensive and broader programs related to open space preservation are more likely to influence on open space preservation of county governments.

H1-2$_{-1}$: State smart growth efforts with broader programs related to open space conservation will have counties with more open space preservation.

In addition, state initiated involvement in local planning practices since the movement of 'quiet revolution' in state land use management. State growth management has specific consistency requirements and enforcement mechanisms although they vary from state to state. Vertical consistency is requirement which local plan should be consistent with policy objectives state defined. Horizontal consistency is requirement on local plans to be compatible with other local plan. Internal consistency is that local plans should be consistent with development regulations. In the study on the impacts of state growth management programmes, Carruthers (2002) finds that "state growth management programmes with strong consistency requirements and enforcement mechanisms hold much promise for reducing urban sprawl, while programmes that do not require consistency and/or have weak enforcement mechanisms may inadvertently

contribute to it. And he suggests that consistency requirements have critical role to carry out their plan. Also, Howell-Moroney (2007) argues that states that have the strongest intensity growth management success in decreasing urban sprawl and increasing population densities. Therefore, state involvement through state growth management with the stronger consistency is more likely to influence on open space preservation of county governments.

Among states which require local government to adopt comprehensive plan, a few states more require local plans to contain specific elements such as housing, economic development, transportation, air quality, open space preservation and so on. Thus, states requiring local plans to contain specific element of open space preservation are more likely to influence on open space preservation of county governments.

H1-2-$_2$: States with strong involvement in local planning will have countries with more open space preservation.

H1-2-$_3$: States that require local plan to contain element of open space preservation will have counties with more open space preservation.

CHAPTER 4

DATA AND RESEARCH DESIGN

Dependent Variables

First Analysis: Acquired Open Space

The dependent variable in this analysis is a continuous measure of approximately how many total acres of land in your county have actually been protected or acquired as public open space. This data come from the National Association of Counties' County Open Space Survey which is the first nationwide survey of county level open space protection efforts and is conducted in 2003. This survey were not sent to counties in Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont since counties in these states do not administer land use policies (Mumford and Myszewski 2004). Of the 2,993 counties, surveys were distributed to 1,298 counties. A total of 544 surveys were returned which is a 42 percent response rate.[2] Surveys were received from all states included in the survey area except Oklahoma. In addition to 6 states, I will not use 4 states including Arkansas, Delaware, North Dakota, and Hawaii since just one county in each these states responded. To use HLM analysis, each level 2 (state level) must have at least more than two of level 1 (county level). Thus, 540 counties in 39 states will be used in the first stage study (see Appendix A). In this survey, when asked if their county had made efforts to protect or acquired open space within the last ten years, the first large number of respondents (22.04%) answered protecting between 101-1,000 acres of open space while the second large number of respondents (14.81%) answered protecting between 1,001-10,000 acres of open space. Excluding N/A and Don't Know answers, it is coded by 1 (0), 2 (1-100), 3 (101-1000), 4 (1001-10000), 5 (10001-30000), and 6 (30000-).

[2] It might have a sample that underrepresents some states and types of counties. However, the National Association of Counties' County Open Space Survey is the first survey of nationwide county level providing unique information which I could not collect from other archival sources. And this survey was already used in the published article and dissertation (Matsumoto 2005; Smith 2008). Thus, the problem of representative sample can be justified.

Table 2. Frequencies of Acquired Open Space Acres within the Last 10 Years

	Frequency	Percent
N/A	167	30.93
0	27	5.00
1-100	57	10.56
101-1000	119	22.04
1001-10000	80	14.81
10001-30000	33	6.11
30000-	19	3.52
Don't Know	38	7.04
	540	**100**

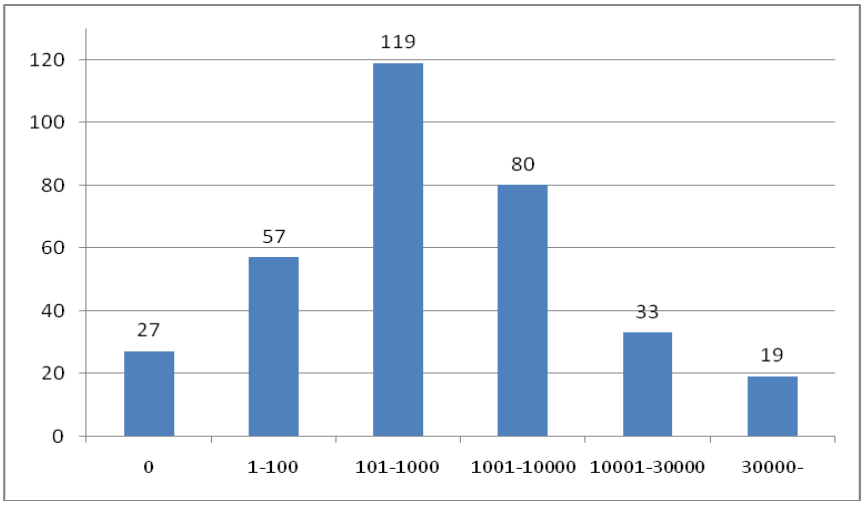


Figure 4. Acres of Land Acquired as Open Space within the Last 10 Years

Second Analysis: Florida Communities Trust Applications

The dependent variable is the efforts of open space preservation in Florida county government by applications for land acquisition grant support from the Florida Communities Trust. This data is event count data of FCT application by each Florida county government unit. The data come from the Florida Communities Trust. Grant application documents and the evaluations by FCT were examined and coded for all counties submitting applications from 2001 through 2008.

Table 3. Frequency of FCT Land Acquisition Application from 2001 through 2008

Number of application	Frequency	Percent
0	335	62.50
1	119	22.20
2	53	9.89
3	18	3.36
4	3	0.56
5	2	0.37
6	3	0.56
7	3	0.56
	536	**100**

Table 3 represents the frequencies of FCT land acquisition application during 2001 through 2008. As Table 3 indicates, 335 (62.5%) application years did not provide application. Most years indicate zero application years. One or more applications were submitted in 201 (37.5%) of the 536 county year units that I examined from 2001 to 2008.

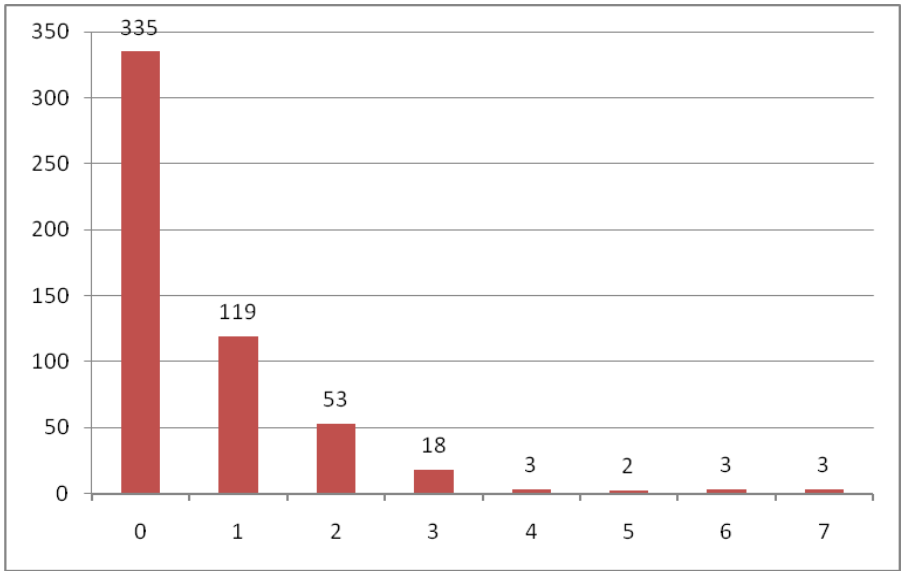


Figure 5. FCT Applications from 2001 through 2008

Table 4 additionally shows the total number of FCT applications for eight years by each county. St. Lucie County has the first largest number of application which is twenty eight applications. The second largest number of applications is twenty two applications which Palm Beach County submitted. Eighteen counties have no application over the period including Bradford, Citrus, De Soto, Gadsden, Gilchrist, Glades, Gulf, Hamilton, Hardee, Hendry, Jacksonville-Duval, Jefferson, Lafayette, Liberty, Madison, Okeechobee, Santa Rosa, and Union County.

Table 4. Total Number of FCT Application by county from 2001 through 2008

County	Total Number of Application	County	Total Number of Application
Alachua	9	Lee	7
Baker	1	Leon	6
Bay	1	Levy	1
Bradford	0	Liberty	0
Brevard	2	Madison	0
Broward	17	Manatee	9
Calhoun	1	Marion	1
Charlotte	13	Martin	15
Citrus	0	Miami-Dade	9
Clay	2	Monroe	4
Collier	7	Nassau	2
Columbia	1	Okaloosa	1
De Soto	0	Okeechobee	0
Dixie	1	Orange	6
Escambia	2	Osceola	7
Flagler	6	Palm Beach	22
Franklin	1	Pasco	3
Gadsden	0	Pinellas	8
Gilchrist	0	Polk	5
Glades	0	Putnam	2
Gulf	0	Saint Johns	9
Hamilton	0	Saint Lucie	26
Hardee	0	Santa Rosa	0
Hendry	0	Sarasota	13
Hernando	2	Seminole	2
Highlands	1	Sumter	1
Hillsborough	16	Suwannee	1
Holmes	1	Taylor	1
Indian River	19	Union	0
Jackson	1	Volusia	7

Table 4. Continued

County	Total Number of Application	County	Total Number of Application
Jacksonville-Duval	0	Wakulla	3
Jefferson	0	Walton	2
Lafayette	0	Washington	1
Lake	2		

Independent Variables

First Analysis: Acquired Open Space

Political Institutions

Political institutions variables include both formal and informal institutions. Formal institutions include form of government, size of commission, resources, and dedicated office for open space preservation.

The measurements of form of government depend on individual conducted research. This is a dichotomous variable and is coded by 1 if a county has a form of county manager. Salant (1991) describes the county manager form has three subforms: council manager, chief administrative officer, and county administrative assistant. I coded those three forms of government into 1 because of their institutional similarities.

Size of commission is the number of commissioner drawn from the National Association of Counties and individual research. It is measured by the number of commissioner.

The measurements of revenue sources and dedicated open space office are available from the National Association of Counties' County Open Space Survey in 2003. The revenue sources is measured by the number of revenue sources that each county government use to fund open space land acquisition. The survey question was: What revenue sources does your county use to fund open space land acquisition? (Please select all that apply)

- o Private sources (i.e., foundations, trusts, or individuals)
- o State funds

- o Federal funds
- o County budget appropriations
- o General obligation bonds
- o Dedicated portion of the sales tax
- o Dedicated portion of the property tax
- o Impact fees
- o Other (Please specify)

For dedicated open space office, it is measured by the number of the county offices or departments that are involved in efforts to plan, develop, acquire, or protected open space. The survey question was: Please indicate the county offices or departments that are involved in efforts to plan, develop, acquire, or protect open space. (Please select all that apply.)

- o Public works
- o Planning or zoning
- o Parks and recreation
- o Administrator's or clerk's office
- o Financial or tax assessor's office
- o Special protected lands or open space office
- o Other (Please specify)

Networks as an informal institution also come from the National Association of Counties' County Open Space Survey in 2003. The variable networks measure a number of groups that a county government cooperates to acquire or protect open space. The survey question was: Which of the following groups does your county government cooperate with to acquire or protect open space? (Please select all that apply.)

- o Private land trusts
- o Municipal government
- o Regional planning and development agencies or councils
- o State agencies
- o Federal agencies

- o Local citizen organizations or civic organizations
- o Private foundations
- o Local businesses or business organizations
- o Environmental organizations
- o Developers or real estate interests
- o Other (Please specify)

Political Economy of Urban Growths

Political economy of urban growths variables are divided into two parts: environmental interest and developmental interests. For the environmental interests, I use land trust which is a private and nonprofit organization actively working to preserve land. According to Land Trust Alliance, most land trusts are closely related to local needs and community based nonprofit organizations. Thus, these measure the strength of environmental interests of a county. Environmental interests are available from Land Trust Alliance and measured by the number of land trust that have founded and worked prior to 2002 because the dependent variable, protected land areas within the last 10 years, is from the National Association of Counties' County Open Space Survey conducted in 2003. For the developmental interests, the percentage of county establishment in construction and real-estate industries is used. The data are drawn from the 2000 US Census Zip Code Business Pattern.

Table 5. Descriptive Statistics of Variables of the First Analysis

Variables	Obs.	Means	Std. Dev.	Min.	Max.
<Dependent Variable>					
Acquired Land	325	3.28	1.26	1.00	6.00
<Independent Variables>					
State Level Predictors					
SG Effort*State Involvement	36	3.22	3.60	0.00	15.00
SG Effort*Element of Open Space	36	0.86	1.36	0.00	5.00
State Involvement* Element of Open Space	36	1.06	1.07	0.00	3.00

Table 5. Continued

Variables	Obs.	Means	Std. Dev.	Min.	Max.
Local Level Predictors					
Form of Government	325	0.55	0.50	0.00	1.00
Size of Commission	325	7.62	7.11	1.00	37.00
Revenue sources	325	2.43	1.63	0.00	8.00
Dedicated Office	325	2.25	1.12	0.00	7.00
Network	325	4.25	2.71	0.00	10.00
Environmental Interests	325	2.93	3.44	0.00	25.00
Development Interests	325	19.20	4.05	5.42	33.00
Population	325	11.28	1.26	7.92	16.07
Population Growth	325	20.88	17.56	-13.25	103.16
White	325	85.82	12.57	27.50	98.90
Education	325	21.74	9.28	3.90	57.10
Income	325	10.62	0.22	10.05	11.30
Density	325	297.67	503.92	1.79	3775.54
Land Area	325	1097.67	1819.81	105.65	18617.42

Local Politics Influencing Open Space Preservation

The measurements of local political contextual predictors include the natural log of population, population growth, white, education, natural log of income, density, and land area. The data are drawn from the US Census. Population growth is measured by the percentage of change between 1990 and 2000. White is the percentage of white population of total population. Education is the percentage of population having the degree of bachelor or higher. Income is measured by the natural log of median income. The density variable measures the number of people per square miles. Land area is the total land area where a county is placed. Table 5 and 6 represent the descriptive statistics and data sources.

Table 6. Variables and Data Sources of the First Analysis

Variables	Data Sources
<Dependent Variable>	
Acquired Land	National Association of Counties' County Open Space Survey in 2003(NACo)
<Independent Variables>	
State Level Predictors	
Smart Growth Efforts	Public Law Research Institute' Smart Growth: State by State in 2002
Strength of State Involvement	Growing Smart [SM] LEGISLATIVE GUIDEBOOK in 2002
Required Element of Open Space	Growing Smart [SM] LEGISLATIVE GUIDEBOOK in 2002
Local Level Predictors	
Form of Government	Individual Search and NACo
Size of Commission	NACo
Revenue Source	NACo
Dedicated Office	NACo
Network	Land Trust Alliance at http://findalandtrust.org/
Environmental Interests	U.S Census 2000
Development Interests	U.S Census 2000
Population	U.S Census 2000
Population Growth	U.S Census 2000
White	U.S Census 2000
Education	U.S Census 2000
Income	U.S Census 2000
Density	U.S Census 2000
Land Area	U.S Census 2000

Statewide Factors

Statewide predictors are divided into three variables: state smart growth efforts, strength of state involvement, and required element of open space in local plan. First, State smart growth efforts are drawn from the Public Law Research Institute' Smart Growth: State by State examined in 2002. In this research, smart growth is defined with four primary elements: "1) eliminating state subsidies that promote sprawl, 2) promoting infill development, 3) preserving farmland, open space, and areas of environmental and

recreational value, and 4) supporting local planning by providing financial and technical assistance to local encouraging them to enter into regional planning agreements. I used the third and fourth elements to measure state smart growth efforts because those elements are directly related to local open space preservation. To measure state smart growth efforts, the number of programs that a state is implementing is counted.

Second, the measurement of strength of state involvement in local planning is available from the Growing Smart Legislative Guidebook in 2002. In this guidebook, the strength of the state role in supporting local planning in each state is measured by the criteria: 1) similarity of the best statute on local planning to the 1920s planning laws; 2) whether the state's best planning statute mandates local planning; 3) whether the state requires consistency between plans of governments that are equal (horizontal consistency) and those that are not (vertical consistency); 4) whether the state has a land use plan or plan policies; and 5) whether the state certifies, approve, or acknowledges local plans as consistent with state plan policies, goal, standards. Then, if the state's role meets none of the criteria, it is coded by 1 as weak involvement. Of the state's role meets 1 of the criteria, it is coded by 2 as moderate involvement. And if the state's role includes 3 to 5 of the criteria, it is coded by 3 as strong involvement (see Table 7).

Table 7. The Strength of State Involvement in Local Planning

	Frequency	**Percent**
Weak	18	46.2
Moderate	16	41.0
Strong	5	12.8
	39	**100**

Third, the measurement of required element of open space preservation in local plan is also drawn from the Growing Smart Legislative Guidebook in 2002. Some states require local planning to contain element relating to open space preservation. If a state requires local planning to contain open space preservation element, it is coded by 1. If not, it is coded by 0 (see Table 8).

Table 8. Required Element of Open Space Preservation in Local Planning

	Frequency	Percent
Required	22	56.4
No Required	17	43.6
	39	**100**

Then, I created new three variables with above three variables to make more accurate predictors to capture state government involvement in open space preservation of local government. Since smart growth eforst are measured by the number of programs state government is implementing, it is just guide line and too broad to capture the strength of state government involvement. In case of strength of state involvement, it is measured by involvement in broad local planning not only in open space preservation. And in case of required element of open space in local planning, element of open space in local planning is optional even when state requires their local governments to create comphrehensive planning. Thus, I combined three variables to capture appropriately the strength of state government involvement in local government.

Second Analysis: Florida Communities Trust Applications

Political Institutions

Political institutions variables include form of government, size of commission, election type, turnover, resources, and administrative capacity. Form of government, size of commission, and election type of political institutions variables are cross sectional data because of time-invariant.

The measurements of form of government depend on Devoe Moore Center Survey of Political Institutions in 2002. This is a dummy variable and is coded by 1 if a county has a form of county manager and 0 if a county has other types.

Size of commission is the number of commissioner drawn from the National Association of Counties (NACo) and individual search. It is measured by the number of commissioners.

The measurement of election type variables is also drawn from Devoe Moore Center Survey of Political Institutions in 2002 and dummy variables. Florida counties have adopted district or at-large or district and at-large mixed forms of election types. Election type is coded by 1 if a county has adopted district election type and 0 if it has adopted other election types.

Table 9. Election Type in Florida Counties

	Frequency	Percent
At large	43	64.18
District	22	32.84
Mixed of both	2	2.99
	67	**100**

Turnover variable is estimated by percentage of new commissioners to the previous year. Turnover data was collected from the Florida Association of Counties Directory from 2001 to 2008 which is annually published and provides various information including county commissioners and district election.

For resources variable, I used annual revenue total per capita for individual county governments from 2001 to 2008. This data was gathered from Florida Office of Economic and Demographic Research.

To estimate administrative capacity influencing the local government efforts on open space preservation, I used the annual budget expenditures of conservation and resource management activities per capita for individual county government from 2001 to 2008. The data is drawn from the Florida Department of Financial Services.

Political Economy of Urban Growths

Political economy of urban growths variables includes two parts which are environmental interest and developmental interests.

To measure the environmental interests, I used environmental specialty license tag revenues. They are measured by amount of environmental specialty license tag revenues per capita from 2001 to 2008. The data is available from the Florida Department

of Highway Safety and Motor Vehicles website. There are various specialty license tags in Florida. In the second analysis, I used Florida environmental specialty license tag including animal friend, aquaculture, conserve wildlife, catch me and release me, discover Florida's ocean, everglades river of grass, fish Florida, Indian river lagoon, large mouth bass, panther, protect Florida springs, protect Florida whales, protect our reefs, protect wild dolphins, save our seas, save the manatee, save wild Florida, sea turtle, sportsmen's national land trust, St. Johns river, state wildflower, Tampa Bay estuary, and tees are cool.

For the developmental interests, I used the establishment in construction and real-estate industries. They are measured by the percentage of county establishment in construction and real-estate industries. The data are drawn from the US Census Zip Code Business Pattern from 2001 to 2008.

Table 10. Descriptive Statistics of Variables of the Second Analysis

Variables	Means	Std. Dev.	Min.	Max.
<Dependent Variable>				
Number of FCT Application	0.63	1.08	0.00	7.00
<Independent Variables>				
Form of Government	0.37	0.48	0.00	1.00
Size of Commission	5.29	0.86	5.00	9.00
Election Type	0.32	0.47	0.00	1.00
Turnover	12.57	17.30	0.00	80.00
Resources	1256.12	557.28	477.32	3824.41
Administrative Capacity	19.52	56.21	0.00	109.1
Environmental Interests	55.52	36.33	8.33	209.35
Development Interests	18.26	4.50	4.13	33.95
Population Growth	1.90	1.82	-2.67	10.73
White	82.38	9.52	42.04	95.40
Education	16.73	8.02	6.8	41.7
Income	38746.82	7994.69	24031	67238
Density	307.94	493.10	8.53	3383.66
Land Area	805.01	385.49	240.3	2025.50
Water	21.72	36.82	0.16	274.77

Local Politics Influencing Open Space Preservation

The measurements of local political contextual predictors include population growth, white, education, median household income, density, land area, and water areas. The data are drawn from the USA Census Counties from 2001 through 2008. Population growth is measured by the percentage of annual change White is the percentage of white population of total population. Education drawn from the 2000 U.S. Census is the percentage of population having the degree of bachelor or higher. Income is measured by the median household income. The density variable measures the number of people per square miles. Land area is the total land area where a county is placed. Water area variable is measured by the ratio water areas to land areas. Table 10 and 11 represent the descriptive statistics and data sources.

Table 11. Variables and Data Sources of the Second Analysis

Variables	Data Sources
<Dependent Variable>	
Number of FCT Application	Florida Community Trusts at http://www.floridacommunitiestrust.org/
<Independent Variables>	
Form of Government	Devoe Moore Center Survey of Political Institutions in 2002
Size of Commission	Individual Search and National Association of Counties
Election Type	Devoe Moore Center Survey of Political Institutions in 2002
Turnover	Florida Association of Counties Directory 2001-2008
Resources	Florida Office of Economic and Demographic Research 2001-2008
Administrative Capacity	Florida Department of Financial Services 2001-2008
Environmental Interests	Florida Department of Highway Safety and Motor Vehicles 2001-2008
Development Interests	US Census Zip Code Business Pattern 2001-2008 at http://www.census.gov/econ/cbp/index.html
Population Growth	USA Counties 2001-2008
White	USA Counties 2001-2008
Education	USA Counties 2001-2008

Table 11. Continued

Variables	Data Sources
Income	USA Counties 2001-2008
Density	USA Counties 2001-2008
Land Area	USA Counties 2001-2008
Water	USA Counties 2001-2008

Research Design

Hierarchical Governmental Relation Model of Local Open Space Preservation

First analysis focuses on state level factors and how state level rules and politics influence local open space protection. Especially, it examines whether strong involvement of state level government influence open space protection made by local level governments. The influence of local political institutions and state level institutions within a nested nature of governments on open space preservation in counties is tested by estimating the preserved land areas with Hierarchical Linear Modeling (HLM) analysis. The HLM is a useful tool which can address the natural nested structure providing the explanation on the relationships and verifications between groups (e.g., random effect), and within groups (fixed effect) (Raudenbush & Bryk, 2002; Osborne, 2000).

However, previous analytical strategies can be considered into aggregation and disaggregation across level in dealing with cross level data. In the case of aggregation, the data of lower level (county level) is aggregated up to higher level (state level) leading analytical problems such as loss of county variability and substantial change of county' protected land areas. On the other, the data of higher level (state level) can be disaggregated to lower level (county level) in the case of disaggregation leading analytical problem of non-independence of observations that all counties within a particular state have identical scores on a predictor (Osborne, 2000. 2). Those analytical problems into aggregation and disaggregation strategies arise from the differences in means and standard error across level.

Below Table 12 displays the differences in means, standard deviation and observation in case of aggregated, disaggregated, and hierarchically constructed data. Based on comparison among them, the values in aggregated and disaggregated data are quite different from those of hierarchically constructed data. It may be happened that the aggregation data ignore the characteristics of county level and the disaggregation data ignore the characteristics of state level. As a result, aggregated and disaggregated data produce a under or over estimation of mean and standard deviation.

Table 12. Differences of Mean, Standard Deviation Error, and Observation

County Level									
	Aggregated			Disaggregated			Hierarchical		
Variables	N	Mean	SD	N	Mean	SD	N	Mean	SD
FOG	36	0.467	0.378	325	0.550	0.498	325	0.550	0.498
Commission	36	7.021	5.770	325	7.618	7.108	325	7.618	7.108
N of office	36	2.215	0.552	325	2.252	1.157	325	2.252	1.157
Resources	36	2.415	0.784	325	2.427	1.626	325	2.427	1.626
State Level									
	Aggregated			Disaggregated			Hierarchical		
Variables	N	Mean	SD	N	Mean	SD	N	Mean	SD
SG*Role	36	3.222	3.602	325	4.381	3.592	36	3.222	3.602
SG*Element	36	0.861	1.355	325	1.150	1.441	36	0.861	1.355
Role*Element	36	1.055	1.067	325	1.147	1.171	36	1.055	1.067

In addition, average protected open space land areas vary across state at the range of 2.71 to 4.72 and the range of standard error is from 0.467 to 2.121 as shown Table 13. It means that there are group variations among states and the average protected open space land areas may have endogenous effect (fixed effect) and exogenous effect (random effect) form county and state level. Finally, hierarchical linear modeling is a reasonable analytical tool to handle cross data structure.

Table 13. Differences of Acquired Open Space Land Areas Across States

States	Number of County	Means	Std. Dev.	Min.	Max.
Arizona	4	4.25	1.707	2	6
Michigan	7	2.714	1.112	1	4
Montana	7	3.571	1.988	1	6
New Jersey	11	4.727	0.467	4	5
Ohio	15	2.933	0.798	1	4
Utah	6	3.166	0.983	2	4
Nevada	5	4	2.121	1	6
Florida	24	4.125	1.226	1	6
North Carolina	17	2.764	1.032	1	5
Wisconsin	20	3.15	0.875	2	5

By constructing pure effect of predictors and effect of residual and preventing the misinterpretation about predictors' coefficients (Thun 1997, Goldstein 1995, and Willams 1995), as shown above, this HLM resolves the problems of aggregation and disaggregation data combining high level units with low level units into one unit level analysis.

To deal with analytical problems, I used Hierarchical Linear Modeling to test the protected or acquired land areas within the context of hierarchical governmental relation. First analysis is constructed into two models: Unconditional Model, and Simple Random-Intercept Model. Unconditional Model as a basic model is to compare with Simple Random-Intercept Model without state level predictors.

- Unconditional Model:

1) Level 1 (County Level)

Acquired Land = β_0 + β_1(Form of Government) + β_2(Size of Commission) + β_3(Revenue Sources) + β_4(Dedicated Office) + β_5(Networks) + β_6(Environmental Interests) +β_7(Development Interests) + β_8(Population) +β_9(Population Growth) + β_{10}(White) + β_{11}(Education) + β_{12} (Income) + β_{13}(Density) + β_{14}(Land Area) + R

2) Level 2 (State Level)

$\beta_0 = \gamma_0 + u_0$
$\beta_1 = \gamma_1$
$\beta_2 = \gamma_2$
$\beta_3 = \gamma_3$
$\beta_4 = \gamma_4$
$\beta_5 = \gamma_5$
$\beta_6 = \gamma_6$
$\beta_7 = \gamma_7$
$\beta_8 = \gamma_8$
$\beta_9 = \gamma_9$
$\beta_{10} = \gamma_{10}$
$\beta_{11} = \gamma_{11}$
$\beta_{12} = \gamma_{12}$
$\beta_{13} = \gamma_{13}$
$\beta_{14} = \gamma_{14}$

And Simple Random-Intercept Model Analysis is to find the effect of both state level and local level on open space preservation. Simple Random Intercept Model is to measure the common effect of state level predictors on the average dependent variable, average protected local open space areas integrated with fixed effect of local level predictors. Simple Random Intercept Model assumes that the local level predictors are homogenous with states.

- Simple Random Intercept Model:

1) Level 1 (County Level)

Acquired Land = β_0 + β_1(Form of Government) + β_2(Size of Commission) + β_3(Revenue Sources) + β_4(Dedicated Office) + β_5(Networks) + β_6(Environmental Interests) +β_7(Development Interests) + β_8(Population) +β_9(Population Growth) + β_{10}(White) + β_{11}(Education) + β_{12} (Income) + β_{13}(Density) + β_{14}(Land Area) + R

2) Level 2 (State Level)

$$\beta_0 = \gamma_0 + \gamma_{01}(\text{Smart Growth Efforts} * \text{State Involvement}) + \gamma_{02}(\text{Smart Growth Efforts} * \text{Element of Open Space}) + \gamma_{03}(\text{State Involvement} * \text{Element of Open Space}) + u_0$$

$$\beta_1 = \gamma_1$$
$$\beta_2 = \gamma_2$$
$$\beta_3 = \gamma_3$$
$$\beta_4 = \gamma_4$$
$$\beta_5 = \gamma_5$$
$$\beta_6 = \gamma_6$$
$$\beta_7 = \gamma_7$$
$$\beta_8 = \gamma_8$$
$$\beta_9 = \gamma_9$$
$$\beta_{10} = \gamma_{10}$$
$$\beta_{11} = \gamma_{11}$$
$$\beta_{12} = \gamma_{12}$$
$$\beta_{13} = \gamma_{13}$$
$$\beta_{14} = \gamma_{14}$$

Table 14. Hypothesized Direction and Measurement of the First Analysis

Variables	Hypothesized Direction	Measurement
State Level Predictors		
Smart Growth Efforts	+	Number of open space programs
Strength of State Involvement	+	If strong 3, if moderate 2, if weak 1
Element of Open Space	+	If requiring open space element 1, if not 0
Local Level Predictors		
<Institutions>		
- Formal Institution		
Form of Government	+	County manager1, others 0
Size of Commission	+	Number of commissioner
Revenue Sources	+	Number of revenue sources
Dedicated Office	+	Number of offices involving in open space
- Informal Institution		
Networks	+	Number of networks
<Political Economy of Urban Growth>		
Environmental Interests	+	Number of land trusts
Development Interests	-	% of construction and real estate industry
<Local Politics>		
Population	+	Log population
Population Growth	+	% of population increase
White	+	% of white
Education	+	% of bachelor degree or higher
Income	+	Log dollar
Density	+	People per square miles
Land Area	+	Total land area

Random Effects Hurdle Model for the FCT Applications

To test the explanatory model, I estimated the event count of FCT application by each Florida government unit from 2001 through 2008 which is panel data. The reason I used panel data is to address the problem of bias from unobserved heterogeneity and to show dynamics that cross-sectional data cannot detect.

For the analysis of event count data, Poisson regression models provide a standard framework (Hausman et al. 1984). However, Poisson model assumes that the mean and variance of a dependent variable are equal. When Poisson model has variance that is greater than its means which means overdispersion, negative binominal regression models are appropriate (Arregle et al. 1997). Meanwhile, count data with "excess zeros" can also cause overdispersion (Long, 1997). In this case, many scholars suggest that a Zero-inflated count model or Hurdle model is appropriate for testing hypotheses (Arulampalam and Booth, 1997; Dobbie and Welsh, 2001; Lambert, 1992; Yau and Lee, 2001).

According to Min and Agresti (2005), the hurdle model is appropriate for modeling both zero inflation and deflation although zero-inflation model is only suitable for dealing with zero inflation. And they show that the hurdle model worked better than the zero-inflation model.

For this research, I used panel data and estimated random effect hurdle model since a random effect model is more efficient when the critical explanatory variable is time invariant (Winkelmann, 2000; Wooldridge, 2002). And also Hausman specification test can test whether a fixed effect or random effect is suitable. For this research, the Hausman specification test showed insignificant meaning that a random effect model is appropriate. Hence, random effect hurdle model is used in this research.

Originally introduced and developed by Mullahy (1986) hurdle model is two - stage modeling process for count data. The first stage is a binary model that estimates whether the dependent variable is zero or positive. If the dependent variable is positive, it is fallen above the hurdle. The second stage uses a truncated model which estimates the observations of positive outcome.

The specification is;

Let y_{ij} be observation j ($j = 1, \ldots, t_i$) for subject i ($i = 1, \ldots, n$).

$$u_{ij} = \begin{cases} 0, \text{ if } y_{ij} = 0 \\ 1, \text{ if } y_{ij} > 0 \end{cases}$$

and let $p_{ij} = P(y_{ij} > 0)$. Assume the positive count outcome variable follows a truncated count distribution having probability mass function g with mean μ_{ij} for the untruncated count distribution. And let $b_i = (b_{1i}, b_{2i})$ be random effects.

$$\text{logit}(p_{ij}) = x_{1ij}'\beta_1 + z_{1ij}'b_{1i}$$
$$\text{logit}(\mu_{ij}) = x_{2ij}'\beta_2 + z_{2ij}'b_{2i}$$

where x_{kij} is the set of independent variables and z_{kij} is random effects.

The marginal log likelihood for the hurdle random effect model is:

$$\ell(\psi) = \sum_{i=1}^{n} \log L_i(\psi)$$

where

$$L_i(\psi) = \int \left[\prod_{j=1}^{t_i} (1-p_{ij})^{1-u_{ij}} \left(p_{ij} \frac{g(y_{ij})}{1-g(0)}\right)^{u_{ij}} \right] \varphi(b_i) db_i$$

$$= \int \left[\prod_{j=1}^{t_i} f_1\langle u_{ij} \mid b_{1j}\rangle f_2\langle y_{ij}, u_{ij} \mid b_{2i}\rangle \right] \varphi(b_i) db_i$$

and φ indicates the normal density function for the random effects.

My econometric model specification of random effect hurdle model is;

logit (P_{ij}) = β_{10} + β_{11} Form of Government + β_{12} Size of Commission + β_{13} Election Type + β_{14} Turnover + β_{15} Revenue + β_{16} Administrative Capacity + β_{17} Environmental Interests + β_{18} Developmental Interests + β_{19} Population Growth + β_{110} White + β_{111} Education + β_{112} Income + β_{113} Land Area + β_{114} Density + β_{115} Water + b_{1i}

log (μ_{ij}) = β_{20} + β_{21} Form of Government + β_{22} Size of Commission + β_{23} Election Type + β_{24} Turnover + β_{25} Revenue + β_{26} Administrative Capacity + β_{27} Environmental Interests + β_{28} Developmental Interests + β_{29} Population Growth + β_{210} White + β_{211} Education + β_{212} Income + β_{213} Land Area + β_{214} Density + β_{215} Water + b_{2i}

where (b_{1i}, b_{2i}) have a bivariate normal distribution.

Table 15. Hypothesized Direction and Measurement of the Second Analysis

Variables	Hypothesized Direction	Measurement
Institutions		
Form of Government	+	County manager1, others 0
Size of Commission	+	Number of commissioner
Election Type	+	Election by district 1, other 0
Turnover	-	% of number of member changes
Resource	+	Revenue per capita
Administrative Capacity	+	Conservation/resource management expenditure per capita
Political Economy of Urban Growth		
Environmental Interests	+	Amount of environmental specialty license tag revenues per capita
Development Interests	-	% of construction and real estate industry
Local Politics		
Population Growth	+	% of population increase
White	+	% of white
Education	+	% of bachelor degree or higher
Income	+	Median household income in dollars
Density	+	People per square miles
Land Area	+	Total land area
Water	+	Ratio of water to land

CHAPTER 5

RESULTS AND IMPLICATION

Results

Hierarchical Governmental Relation Model of Local Open Space Preservation

To estimate the influence of the predictors on local land use decision within the context of hierarchical governmental relation, I used the Unconditional Model and Simple Random Intercept Model with continuous variable of local protected or acquired open space land areas.

Traditional regression has to be satisfied by assumption of 1) linearity, 2) normality, 3) homoscdeasticity and 4) independence of errors (Lutz, 1999), But in HLM, statistical assumptions of linearity and normality need to be occupied, whereas HLM modifies the presumptions of homoscedasticity and independence of errors.

Before I ran these two models, I tested the residual analysis and One-Way ANOVA model. According to Park et al (2008), the residual analysis suggests that "the data set has the problem of violation of assumptions denoting that the two groups are equal as homogeneity and data have to present the normal distribution with an expected mean zero and equal variance, not issued by outliers." After testing residual analysis (see Figure.6), l1resid and fitval plots, I identified that the difference between fitted and observed values for each county shows the normal distribution. Thus, it is reasonable to employ the data in these two models. l1resid plot presents the difference between the fitted and observed values for each county. fitval plot shows fitted value for every county.

The One-Way ANOVA model is to examine the variation of the outcome, local protected or acquired open space land areas, within and between state variability of each county's sample mean as an estimated mean of its true population (Raudenbush and Bryk 2002). Namely, One-Way ANOVA Model is to test the assumption which state and local government are hierarchically structured on open space preservation. With this One-Way ANOVA model, we can confirm whether the outcome data is hierarchically structured. In

the test of the One-Way ANOVA model, I identified a substantial range in average local protected or acquired open space land areas among states. More specifically looking at the estimation of variance components, the average local protected or acquired open space land areas is 1.17 among 36 states and it is statistically significant. Intra-Class Correlation (ICC)[3] is about 9.3% meaning that there is about 9.3% of the variance among 36 states. Thus, I confirmed the outcome data is hierarchically constructed.

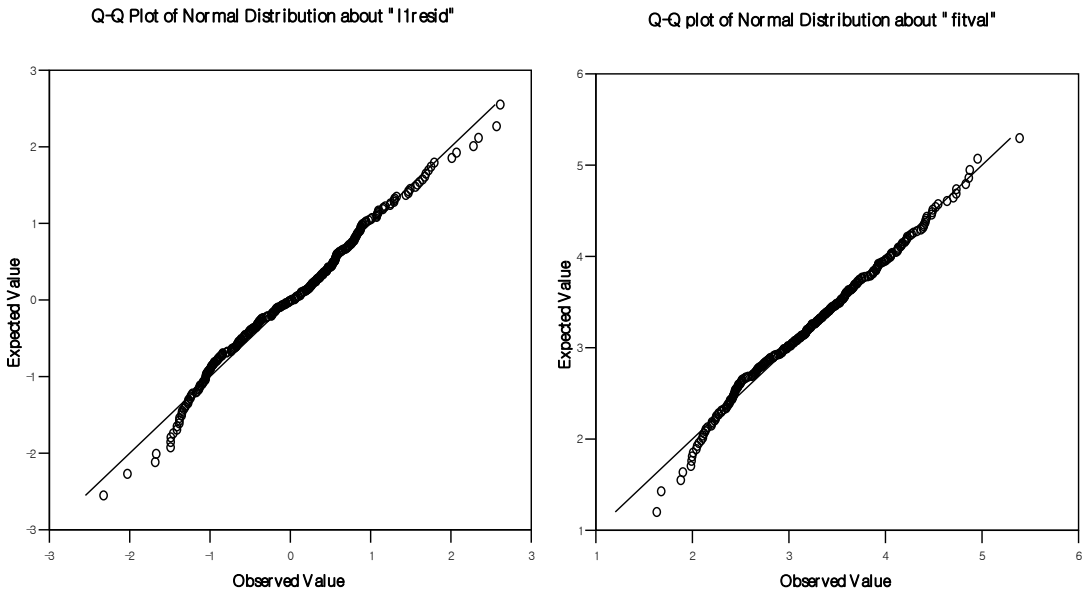


Figure 6. The Residual Analysis

Table 16. Result of One-Way ANOVA Model

Fixed Effect	**Coefficient**	**Std. Dev.**	**T-statistic**	***p-value***
Protected Land, r_{00}	3. 28	0.096	34.032	**0.000**
Random Effect	**Variance**	**df**	X^2	***p-value***
State means, u_{0j}	0.147	35	68.429	**0.001**
Level-1 (County) Effect, r_{ij}	1.430			
Reliability	42.6%			

[3] Intra-Class Correlation is calculated by equation as follows: $\hat{\rho} = \hat{\tau}_{00} / (\hat{\tau}_{00} + \hat{\sigma}^2)$

325 counties in 36 states are estimated to explain the variability of between group differences (state level) and within group differences (county level). There are average reliability estimations of the random effects for county level coefficient which are about 37.7% in Unconditional Model and 34.0% in Simple Random Intercept Model. And also, I confirmed that there are state differences to address random effects with variance component result.

Looking at the results of Intra-Class Correlation (ICC), there is still variability among states even after adding predictors of state and county level. There is about 7.5% of the variability in the Unconditional Model.

Table 17. Random Effect of Unconditional Model

Random Effect	**Variance Component**	**df**	X^2	***p-value***
State means, u_{0j}	0.0823	35	56.890	**0.011**
Level-1 (County) Effect, r_{ij}	1.022			
Reliability	37.7%			

And there is about 6.3% of the variability in the Simple Random Intercept Model. In sum, hierarchical linear structures can be explained by variability in two models.

Table 18. Random Effect of Simple Random Intercept Model

Random Effect	**Variance Component**	**df**	X^2	***p-value***
State means, u_{0j}	0.069	32	46.618	**0.046**
Level-1 (County) Effect, r_{ij}	1.018			
Reliability	34.0%			

More specifically analyzing the results of variance component between Unconditional model and Simple Random Intercept Model, the effects of state level predictors including smart growth efforts combined with state strong involvement and

elements of open space combined with state strong involvement reduce the variance. This means that there is about 17.1% of reduced variance[4] in explaining the average local protected land areas across states after addition of state level predictors. Moreover, it is logical way to compare between the One-Way ANOVA model and Simple Random Intercept Model in order to estimate how much variance is reduced in the county level because the Unconditional Model and Simple Random Intercept Model have the same variables of county level. The Simple Random Intercept Model has increased variability when adding the predictors of county level. Therefore, about 28.7% of the variance explains the protected open space land areas within states.

Table 19 indicates the statistical results of Unconditional Model. First, looking at the institutional predictors, three institutional predictors are statistically significant. As formal institutional indicators, form of government and resources has influence open space preservation. However, form of government is negatively related to open space preservation. I hypothesized that manger form of government is more likely to preserve open space. Unlike this expected hypothetical direction, manager form of government reduces open space preservation. From this result, it can be interpreted that other types of government have more success in preserving open space.

County having more revenue sources is more likely to preserve open space. As inform institutional indicator, networks are positively significant meaning that networks with other organizations such as private land trust, environmental organization, state agencies, or regional planning and development agencies are highly related to increasing open space preservation. Meanwhile, size of commission and dedicated office has no significant influence on open space preservation. There is evidence that environmental interests groups measured by the number of land trusts are more likely to increase open space preservation. This result confirms that land trust which is a private and nonprofit organization actively working to preserve land is a key driver of open space preservation. And also, population, density, and land area as the predictors of local politics are statistically significant. Population and land area are positively associated with open space preservation as expected hypothetical direction while density is negatively related to open space preservation as unexpected direction. From these results, I could say that

[4] Equation of reduced variance= (Unconditional u_o-Simple Random Intercept u_o)/Unconditional u_o

counties with larger population and larger land increase open space preservation whereas the increase in density decreases open space preservation. This is because open space preservation was taking place in unincorporated rural areas where land prices are relatively cheaper and large undeveloped land to preserve are available (Mumford and Myszewski, 2004). Meanwhile, other predictors of local political including population growth, income, white, and education have no significant influence on open space preservation efforts. In sum, the predictors of form of government, resource, networks, environmental interests, size of population, land areas, and density are critical to open space preservation in Unconditional Model.

Tablev19. Statistical Results of Unconditional Model

Variables	Unconditional Model Coefficient (p-value)
Intercept (Average local protected Areas)	**-7.221 (0.081)**
SG Efforts*State Involvement	-
SG Efforts*Element of Open Space	-
State Involvement *Element of Open Space	-
Form of Government	**-0.219 (0.086)**
Size of Commission	-0.005 (0.516)
Revenue Source	**0.139 (0.020)**
Dedicated Office	0.008 (0.844)
Networks	**0.136 (0.000)**
Environmental Interests	**0.035 (0.004)**
Development Interests	0.020 (0.199)
Population	**0.200 (0.013)**
Population Growth	-0.002 (0.486)
White	0.006 (0.175)
Education	-0.011 (0.143)
Income	0.631 (0.129)
Density	**-0.000 (0.085)**
Land Area	**0.000 (0.001)**

In the results of Simple Random Intercept Model (see Table 20), first, state level predictors including state smart growth combined with strong state involvement in local planning practices and elements of open space combined with strong state involvement are positively and statistically significant. On the other side, there is a distinguishing result that state smart growth efforts combined with elements of open space has no significant influence on the local open space preservation. Based on this result, smart growth efforts and element of open space in local plan accompanying with strong state involvement are more likely to increase open space preservation.

Table 20. Statistical Results of Simple Random Intercept Model

Variables	**Simple Random Intercept Model Coefficient (p-value)**
Intercept (Average local protected Areas)	**-8.194 (0.039)**
SG Efforts*State Involvement	**0.039 (0.015)**
SG Efforts*Element of Open Space	-0.102 (0.249)
State Involvement*Element of Open Space	**0.198 (0.023)**
Form of Government	**-0.220 (0.053)**
Size of Commission	-0.000 (0.925)
Revenue Source	**0.131 (0.023)**
Dedicated Office	-0.008 (0.835)
Networks	**0.136 (0.000)**
Environmental Interests	**0.034 (0.008)**
Development Interests	0.023 (0.166)
Population	**0.197 (0.013)**
Population Growth	-0.004 (0.261)
White	0.007 (0.177)
Education	-0.008 (0.299)
Income	**0.685 (0.083)**
Density	**-0.000 (0.066)**
Land Area	**0.000 (0.000)**

At the local level, there are statistically significant seven predictors: form of government, resources, networks, environmental interests, population, income, density, and land area. Like Unconditional Model, form of government is negatively related to open space preservation which is contrast to hypothetical direction. Resources and networks as institutional predictors are positively and statistically significant. And also, environmental interests have positive relationship with open space preservation. In the Simple Random Intercept Model, local politics predictors including population, income, density, and land area are statistically significant.

When comparing Unconditional Model and Simple Random Intercept Model, there is an interesting finding. The predictor, income, is positively and statistically significant in the Simple Random Intercept Model while it is not statistically significant in the Unconditional Model. It can be interpreted that state level predictors influence the average of county level predictors and higher level predictors may influence lower level as a moderator.

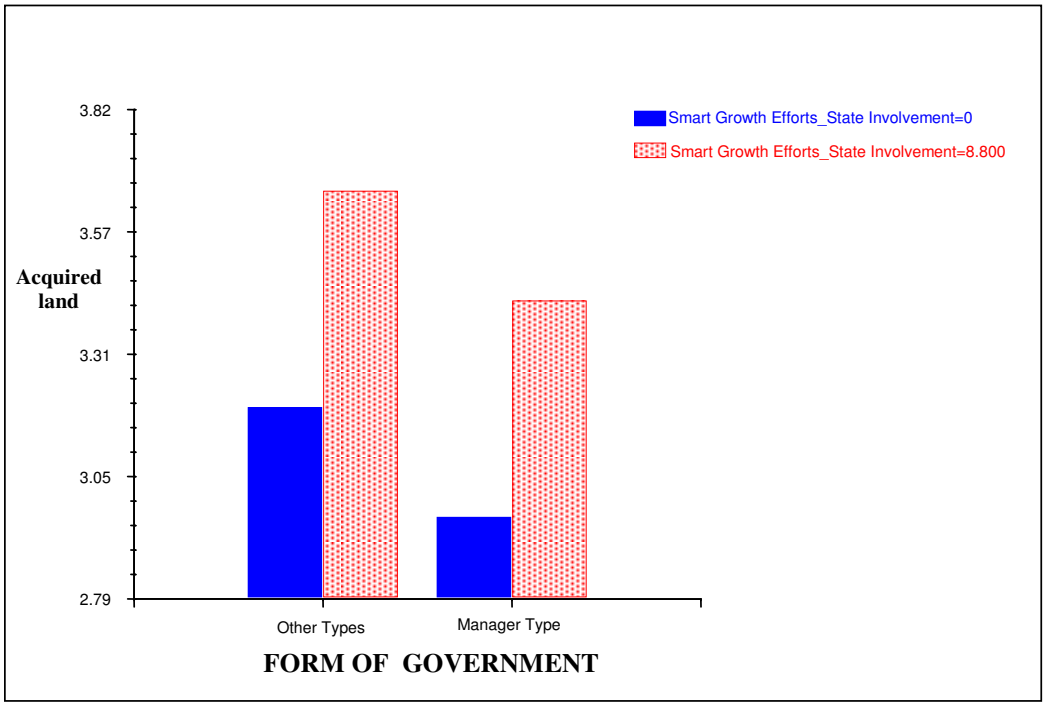


Figure 7. Cross-Level Interaction Graph: Smart Growth Efforts with Strength of State Involvement and Form of Government

And I tried to test the effects of specific predictors of state level on the specific

predictors of local level with Intercept-As-Outcome Model. However, there is no sufficient theoretical background to show the effects of specific predictors of state level on the specific predictors of local level and chi-square value is very low to estimate Intercept-As-Outcome Model because of lack of observations.

Hence, I created several Cross-Level Interaction graphs to show the different effects of specific predictor of state level on the key predictors of local level instead of Intercept-As-Outcome Model which can show statistical results (see Figure 7 and 8).

Figure 7 presents that smart growth efforts with strong involvement of state government in local government have more effect on other types of government than manager type of government.

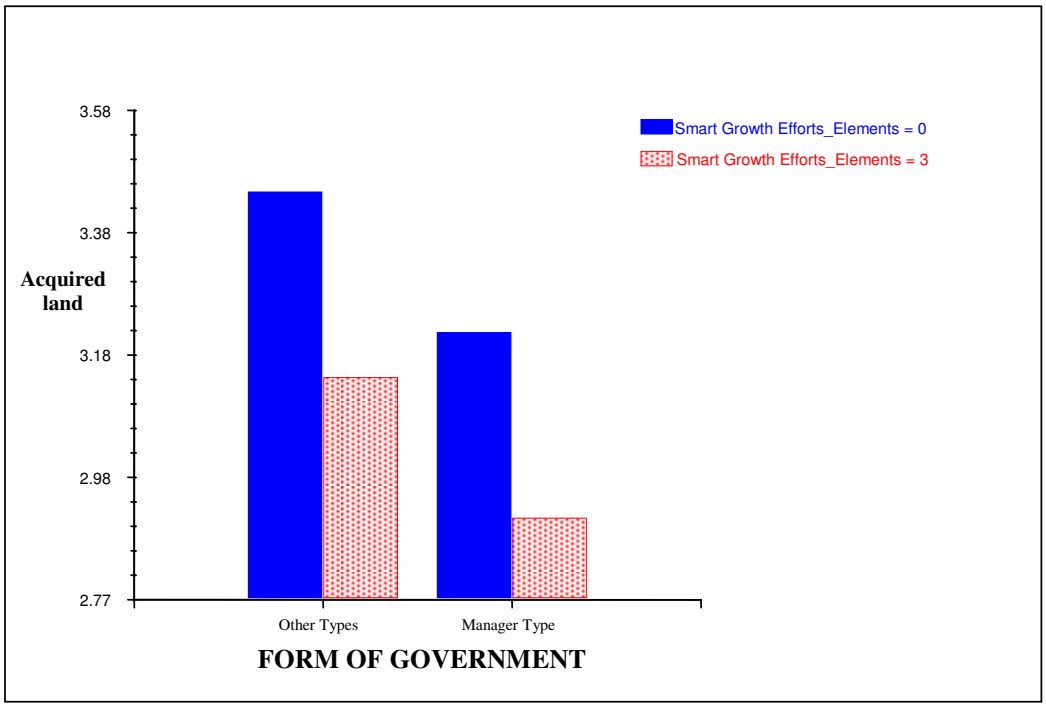


Figure 8. Cross-Level Interaction Graph: Smart Growth Efforts with Required Element of Open Space in Local Planning and Form of Government

Figure 8 shows that smart growth efforts of state government with the required element of open space in local planning from state government have larger effect on other type of government than manager type of government.

And more graphs indicating the effects of specific predictors of state level on the specific predictors of local level including size of commission, environmental interests, and developmental interests are presented in Appendix D.

Random Effect Hurdle Model for FCT Applications

To estimate the influence of the predictors on local government efforts to preserve open space land through FCT applications, I used NLMIXED in the SAS procedure. This SAS NLMIXED uses the adaptive Gauss-Hermite quadrature to estimate the integrals. And the quasi-Newton method is used as the default maximization approach (Liu and Pierce 1994; Pinheiro and Bates 1995). Before I ran random effect Hurdle Model with SAS NLMIXED, I first testified Hausman specification test to see whether fixed effects or random effects are appropriate to this research. Hausman specification test showed random effect is appropriate.

- Hausman' Specification Test

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 10.24

Prob>chi2 = 0.2489

And then, I ascertained whether the assumption of Poisson regression that the mean and variance of a dependent variable are equal is violated or not. The result presented that there is overdispersion which the variance of a dependent variable is greater than its mean (Variance: 1.178 > Mean: 0.634).

Table 21. Statistical Results of Poisson with Random Effects for FCT Applications

Variables	Coefficient (Standard Error)
Form of Government	**0.896 (0.342)****
Size of Commission	0.487 (0.247)
Election Type	0.391 (0.310)
Turnover	-0.003 (0.004)
Resource	**-0.001 (0.000)***
Administrative Capacity	0.000 (0.002)

Table 21. Continued

Variables	Coefficient (Standard Error)
Environmental Interests	**0.012(0.004)*** **
Development Interests	**-0.049 (0.028)***
Population Growth	-0.004 (0.054)
White	0.022 (0.016)
Education	**0.059 (0.020)*** **
Income	**-0.000 (0.000)***
Land areas	-0.000 (0.000)
Density	-0.000 (0.000)
Water	0.000 (0.004)
-2 Log Likelihood	**943.4**
AIC	**977.4**
BIC	**1054.9**

Note. *p=<.1; **p=<.05; ***p=<.01.

Above Table 21 represents the results of random effects Poisson model. I was able to ascertain that Poisson model violating assumption has overestimated coefficients showing that seven variables are statistically significant. And Poisson model has higher values of log likelihood (943.4), AIC (977.4), and BIC (1054.9)[5] compared to random effects Hurdle model.

Table 22 presents random effects Hurdle model for FCT applications from 2001 to 2008. As this table indicates, it has a relatively small **-**2 Log Likelihood (909.0) and smaller AIC (975.6) and BIC (1048.3) meaning that Hurdle model with random effects is adequate.

As I explained before, Hurdle model is two-stage process. The first stage is a binary model to estimate whether the dependent variable is zero or positive. Thus, this

[5] In case of estimating model parameters with maximum likelihood estimation, we can possibly get the increased likelihood by adding parameters. It may lead to result in overestimated fitting. The AIC and BIC resolves this problem by introducing a penalty term for the number of parameters in the model. AIC and BIC are a measure of the relative goodness of fit of a statistical model. Thus, the lower AIC and BIC is the preferred model.

stage is to estimate what factors influence the likelihood of submitting FCT application. The second stage is a truncated model by conditioning if the dependent variable is positive, the hurdle is crossed. This stage is to explain the observations which crossed the hurdle. Thus, this stage is to estimate what factors increase the rate of FCT application as the effort of local government to preserve open space.

When looking at the logit model to explain what factors influence the likelihood of submitting FCT application, form of government as a supplier is statistically and positively significant. It means that manager form of government is more likely to preserve open space by submitting FCT application.

Resource is also statistically significant. I hypothesized that more resources to protect open space will increase open space preservation. However, it shows opposite direction to expectation. It could be explained that local government having enough resource to preserve open space probably do not try to submit FCT application because preparing and submitting an application requires lots of time, knowledgeable and experienced human resources and so on. And since FCT application is state land acquisition grant programs provide funding to local governments to acquire parks, open space, and greenways, local government experiencing short resource to preserve open space is probably to submit FCT application. However, other institutional variables including size of commission, election type, turnover, and administrative capacity fail to achieve statistical significance at the .05 significance level.

In the logit model, environmental interest as a political demander is statistically significant meaning that environmental interest increases the likelihood to submit FCT application as the effort to preserve open space. However, developmental interest as a development or growth machine interest measured by the percentage of county establishment in construction and real-estate industries fails to get statistical significance. Although I hypothesized that stronger development interests are negatively related to open space preservation, it does not influence growth management. It could be explained that land acquisition to preserve open space depends on market mechanisms and the public goods such as open space can increase land values resulting that these developmental groups get benefits.

Except for education measured by the percentage of population having the degree

of bachelor or higher, most SES indicators including population growth, white, income, density, land areas, and water areas fail to achieve statistical significance. This result is somewhat different from the characteristics of growth regulation. In growth regulation, key drivers are population and population growth.

Next, in the zero truncated model to explain what factors influence the rate of submitting FCT application, manager form of government increases the likelihood of the rate of submitting FCT application to preserve open space. However, other political institutions including size of commission, election type, turnover, resource, and administrative capacity are not related to open space preservation. And environmental interest is highly related to submitting higher number of FCT applications to preserve open space.

In the indicators of local politics, education and income are statistically significant. Education increases the likelihood to submit higher number of FCT applications. However, income is negatively associated with submitting higher number of FCT applications to preserve open space. This is because FCT program has emphasized funding projects in low income communities. Also, it is perhaps because the high income communities have already well arranged parks, open space, and greenways. Furthermore, Gottdiener and Neiman (1981) and Baldassare and Wilson (1996) argue that residents take into account the latent influence on their standard of living if growth gets dull and is limited then resulting in negative impact on their income, jobs or the quality of life, and people with undeveloped investment property were against limiting growth and preserving open space. From these reasons, income probably has negative relation with submitting higher number of applications to preserve open space.

From the Hurdle model that is comprised of logit model and zero truncated negative binomial model, I can see that manager form of government, resource, and environmental interest and education are important drivers to explain whether local government submit FCT application to preserve open space or not. On the other hand, manager form of government, environmental interest, education and income are important in explanation on what factors increase the rate of submitting FCT application as the effort of local government to preserve open space.

Table 22. Statistical Results of Random Effects Hurdle Model for FCT Applications

Variables	Hurdle	
	Logit	Zero-Truncated Negative Binomial
Form of Government	**0.817 (0.364)****	**1.547 (0.454)*****
Size of Commission	0.136 (0.227)	0.321 (0.201)
Election Type	0.395 (0.315)	0.427 (0.371)
Turnover	-0.002 (0.005)	-0.002 (0.005)
Resource	**-0.001 (0.000)***	-0.000 (0.000)
Administrative Capacity	-0.000 (0.002)	0.002 (0.003)
Environmental Interests	**0.013 (0.006)****	**0.012 (0.005)****
Development Interests	0.046 (0.032)	0.001 (0.045)
Population Growth	-0.012 (0.061)	-0.006 (0.071)
White	0.011 (0.014)	-0.001 (0.012)
Education	**0.039 (0.023)***	**0.043 (0.024)***
Income	0.000 (0.001)	**-0.000 (0.001)*****
Land areas	0.000 (0.000)	-0.001 (0.001)
Density	0.000 (0.000)	-0.000 (0.001)
Water	0.004 (0.004)	-0.014 (0.010)
-2 Log Likelihood	**909.0**	
AIC	**975.6**	
BIC	**1048.3**	

Note. *p=<.1; **p=<.05; ***p=<.01.

Implication

This dissertation aimed at investigation what factors account for local open space preservation based on political market framework. First analysis focused on state level factors and examined whether strong involvement of state level government influence open space protection made by local level governments. This analysis used actual preserved land areas in local level governments. In other word, first analysis estimated what factors account for the outcome, that is, performance of open space preservation in local level governments within hierarchical governmental relationship. Thus, the results from the first analysis can provide several implications on performance of open space preservation in local level governments within hierarchical governmental relationship. Second analysis examined how local political institutions' supplies and environmental interests' demands account for local open space protection with Florida Communities Trust (FCT) application which is state-wide land acquisition grant program. FCT application was measured as the efforts of Florida county governments to preserve open space. Submitting a FCT application is the willingness of local governments to preserve open space Therefore, the results from the second analysis can provide some implications on the willingness of local governments to preserve open space.

First, the first analysis of this dissertation represents that strong involvement of state government on local open space preservation leads to better outcomes. This result confirms that state policy and rules perform as intergovernmental institutions and constrain local governmental actions. Smart growth efforts of state government with intensive involvement have made more success of increasing open space preservation of county governments. It theoretically and empirically means that contextual and political circumstances of state level government perform an additional explanation on the variation among county level. Also, it provides practical implication to state government. Recently, state governments have reduced and eliminated their programs to assist local government because of economic crisis and budget deficit. For example, Florida eliminated its annual funding for local government's land conservation activities in 2009 and allocated only $15 million which is just 5 percent of the traditional $300 million in

2010. As shown the result, state smart growth management efforts with strong state involvement are very important factor to increase open space. Specially, under FCT land acquisition program, more than 2 million acres were purchased land to preserve which is quite successful. Low income counties experiencing lack resources to preserve land have submitted FCT application. State role is more important to those counties. State government need to implement various programs and support supporting local planning by providing financial and technical assistance.

Second, local political institutions play a significant role in open space preservation. While the first analysis shows that manager type of county government has less likelihood to preserve open space meaning that other types of county government have more success in open space preservation, the second analysis shows that manager type of county government is more likely to preserve open space through FCT state grant program for land acquisition meaning that professional managers have better performance in FCT state grant program which is carried in high complex and professional process and requires well experienced and knowledgeable skills. FCT program is to help local governments implement comprehensive local planning. The result that professional managers have better performance in FCT state grant program confirms professional managers have more emphasis on the role of local land use planning and provision of environmental public goods (Benton and Feiock 2008).

In addition to formal institution, networks as an informal institution are key driver of open space preservation. This dissertation shows that dense network relationships lead to better performance in open space preservation. This result implies that governmental partners such as federal and states agencies and horizontal partners such as land trusts, environmental organization and non-profit organization are important in that local government can make wider array of financing mechanisms and get much of information from networks with governmental and horizontal partners. This result also implies that even though it is difficult to measure and use networks appropriately as inform institutions, informal institutions should be considered in the study of public policy.

Furthermore, this result provides important implication to local government staff. In the process of land acquisition activities, partnership with state agencies makes land transaction easier because state agencies have more credibility and well established

programs and staffs (Matsumoto 2005). Thus, county government staff should identify further collaboration and build on each other's strength from network relationships for more success of open space preservation even if there are some challenges in building and maintaining network relationships. Specially, resources to preserve open space are associated with increasing performance of open space preservation. And county government experiencing the lack of resources to acquire open space increases the likelihood to submit FCT state grant program application. Accordingly, networks between local government and governmental partners such as federal and states agencies that can make a wide array of grants, loans, and other land use financing mechanisms are meaningful to local government.

Third, environmental preservation constituencies measured by land trusts in the first analysis and environmental specialty license tag revenue in the second analysis have positive influence on open space preservation. This result proved that environmental interest groups oppose the undesirable land use and make voices for environmental amenities in their community. Unlike land use regulation, development or growth machine interests have no influence on open space preservation. I hypothesized that developmental interests have negative impact on open space preservation. I did not find that developmental interests measured by construction and real estate industry are negatively associated to open space preservation. It can be explained that probably land preservation depends on market mechanisms to accomplish its purpose. Further, open space preservation can increase nearby land value that can lead to benefits to developmental interests. In sum, this dissertation confirms that strong involvement of state government influences the effort of local government on open space preservation. Open space preservation is the outcome of political institutions and environmental demands.

CHAPTER 5

CONCLUSIONS

The goal of this dissertation was to investigate and to provide an in-depth understating of dynamics in open space preservation within political process. To better understand the phenomena of open space preservation, this dissertation was studied with multiple levels and different spatial and temporal scale. With the advanced Hierarchical Linear Modeling which resolves the problems of aggregation and diaggregation data combing high level units with low level units into one level units, this dissertation found that smart growth efforts with strong involvement at state government level influence the outcome of open space preservation at local government level. With longitudinal Florida state-wide land acquisition program data, I found that political institutions such as manager form of government and resource and environmental demands are key factors in land acquisition. And several extant studies using political market framework have examined and identified the key factors influencing the approaches of regulatory land use policies. This dissertation extended political market framework to distributive policy arena. Although this dissertation found several important findings and implications on the phenomena of local open space preservation, there are several limitations in this dissertation.

First, the first analysis which investigated outcome of open space preservation was national wide and multi-level analysis. For better estimation, the larger number of observations is required. Specially, although this dissertation showed that strong involvement of state government level increase the outcome of open space preservation, it could not test the effects of specified predictor of state level on the specific predictors of local level because chi-square value was very low to estimate Intercept-As-Outcome Model. Even though I represented several Cross-Level Interaction graphs as an alternative way to show the different effects of specific predictor of state level on the key predictors of local level, those graphs could not indicate how the effects of specified predictor of state level on the specific predictors of local level are statically significant.

Second, the first model was cross-sectional analysis. Longitudinal studies have several advantages in terms of between subject variation excluded error and more efficient estimation than cross-sectional studies with the repeated measurements from the same subject. Thus, the larger number of observations and the data set for longitudinal study are required for further study.

Third, networks as an informal institution are very important elements. They have a positive effect on performance in policy areas (Burt 2000). The role of nonprofit organizations in open space preservation has grown tremendously. Over the past decade cooperate relations among local governments and other government level and nonprofit organization have become an increasingly important part of open space preservation (Endicott 1993). This was confirmed in the first model. However, the second analysis was not able to include networks variable because it was difficult to find longitudinal data for networks variable. Thus, identifying and establishing those kinds of data is necessary for more precise estimation of the configuration of open space preservation. In addition to these network variable, there are some constrain in colleting robust data including resource and administrative capacity to preserve open space. Regarding to other political institutions, there are various relationship between executive and legislative institutions (Desantis and Renner 2002). It is required to measure political institutions more accurately with various aspects.

Based on the findings of this dissertation and its limitations which will be improved, future study will explore the link between open space preservation and various regulatory tools or strategies such as zoning ordinance, conservation easement, impact fees, and so on, to growth control. This study will investigate whether or how interest group demands or local politics are moderated by political institutions. Another future study will be a national-wide study how state level government influences the outcome of local government with Intercept-As-Outcome Modeling. This study must provide in-depth and better understanding of dynamics of configuration of policy outcome.

Networks are critical element of open space preservation and more broadly smart growth and sustainable development. Thus, Network analysis will examine relationships between public, private, and nonprofit actors, such as the Trust for Public Lands to investigate the role of both formal and informal institutions in configuring open space

preservation and land acquisition decisions. This research will employ network analysis techniques to examine how the structure or relationship among actors influences open space preservation. This analysis will use exponential random graph models (ERGM) in order to estimate the likelihood of the hypothesized network structures among local actors.

APPENDIX A

State Smart Growth Efforts, Strength of Involvement, and Element of Open Space

State	Smart Growth Efforts	Strength of State Involvement	Required Element of Open Space in Local Planning
Alaska	0	2	0
Alabama	1	1	0
Arizona	2	1	1
California	4	2	1
Colorado	2	1	0
Florida	3	3	1
Georgia	2	3	1
Iowa	0	1	1
Idaho	0	2	1
Illinois	2	1	0
Indiana	1	1	1
Kansas	0	1	1
Kentucky	0	2	1
Louisiana	0	1	1
Maryland	5	3	0
Michigan	1	1	1
Minnesota	3	2	0
Missouri	1	1	0
Mississippi	0	2	1
Montana	0	1	1
North Carolina	3	1	0
Nebraska	1	2	0

New Jersey	5	2	1
New Mexico	0	1	0
Nevada	1	2	1
New York	3	2	1
Ohio	2	1	0
Oregon	0	3	1
Pennsylvania	5	2	0
South Carolina	2	2	1
South Dakota	1	2	0
Tennessee	2	1	0
Texas	2	1	0
Utah	3	2	1
Virginia	2	1	1
Washington	2	3	1
Wisconsin	3	1	0
West Virginia	0	2	1
Wyoming	2	2	0

(Sources: Public Law Research Institute's Smart Growth: State by State in 2002 and Growing Smart Legislative Guidebook in 2002)

APPENDIX B

County Open Space Survey Used in the First Analysis

Directions:

As you proceed with the following questionnaire on county level efforts to acquire or protect open space, please respond based on your perspective as a public official and representative of your country.

1. Please name the county and state in which you work.

County _____
State _____

2. Is loss of open space a concern to residents in your county?

o Yes
o No
o Don't know

3. Approximately what percent of your county's land area is owned by:

	<10%	11-25%	26-50%	51-75%	>75%	Don't know
Federal gov't	o	o	o	o	o	o
State gov't	o	o	o	O	o	o

4. In your county, where are most of the land development activities currently occurring? (Please select only one)

o Cities and towns
o Unincorporated areas of the county near cities and towns
o Unincorporated rural areas of the county
o Little land development activity is occurring

5. In your county, where are most of the efforts to acquired or protect open space currently occurring? (Please select only one)

o Cities and towns
o Unincorporated areas of the county near cities and towns

o Unincorporated rural areas of the county
o Little land development activity is occurring

6. Does your county use any of the following types of plans to acquire or protect open space?

	Yes	No	Don't know
County comprehensive land use, general or master plan	o	o	o
County open space or green space plan	o	o	o
Multi-county or regional open space or green space plan	o	o	o
State open space or green space plan	o	o	o

7. Within the last 10 years, has your county participated in any efforts to plan, acquire, or protect open space?

o Yes
o No → Please skip to #16
o Not Sure → Please skip to #16

Protection Efforts

You have indicated that your county is either currently involved in acquiring or protecting open space or has been involved in such endeavors in the past. We would like to know more about these efforts.

8. Please indicate the county offices or departments that are involved in efforts to plan, develop, acquire, or protect open space. (Please select all that apply.)

o Public works
o Planning or zoning
o Parks and recreation
o Administrator's or clerk's office
o Financial or tax assessor's office
o Special protected lands or open space office
o Other (Please specify) _____

9a. Within the last 10 years, approximately how many total acres of land in your county

have actually been protected or acquired as public open space:

o 0 → Please skip to #16
o 101-1,000
o 1,001-10,000
o 10,001-30,000
o 30,000 or more
o Don't know

9b. Of these acres that were acquired or protected as open space, what percentage was permanently protected?

o 0
o 1-25%
o 26-50%
o 51-75%
o Over 75%

10. Within the past 10 years, what types of open space were acquired or protected in your county? (Please select all that apply.)

o Farming and agricultural lands
o Stream corridors (lands along streams and rivers)
o Historic landscapes (battlefields, etc)
o Hiking, biking, or horseback trails
o Neighborhood parks
o Natural areas or wildlife preserves
o Playgrounds for children
o Ball fields or courts (i.e., soccer or baseball)
o Town squares and village greens
o Golf courses
o Open fields for picnicking and unstructured play
o Dog parks
o Other (Please specify) _____

11. Which of the following groups does your county government cooperate with to acquire or protect open space? (Please select all that apply.)

o Private land trusts

o Municipal government
o Regional planning and development agencies or councils
o State agencies
o Federal agencies
o Local citizen organizations or civic organizations
o Private foundations
o Local businesses or business organizations
o Environmental organizations
o Developers or real estate interests
o Other (Please specify) _____
o None

12. Which of the following tools or strategies has your county actually used to acquire or protect open space?

	Used in My county	Not used in My county	Don't know
Fee simple acquisition	o	o	o
Density bonuses for open space	o	o	o
Cluster zoning ordinances	o	o	o
Floodplain ordinances	o	o	o
Environmental mitigation requirements	o	o	o
Farmland protection ordinances	o	o	o
Overlay districts	o	o	o
Conservation easements	o	o	o
Transfer of development rights	o	o	o
Purchase of development rights	o	o	o
Impact fees	o	o	o
Tax incentives for open space	o	o	o
Private land donations	o	o	o
Mandatory dedication ordinances	o	o	o

13. Over the last five years, approximately what amount of county funds was expended to acquire or protect open space?

o Less than $100,000
o Between $100,000 and $1,000,000
o Between $1,000,000 and $5,000,000
o Greater than $5,000,000

14. What revenue sources does your county use to fund open space land acquisition? (Please select all that apply.)

o Private sources (i.e., foundations, trusts, or individuals)
o State funds
o Federal funds
o County budget appropriations
o General obligation bonds
o Dedicated portion of the sales tax
o Dedicated portion of the property tax
o Impact fees
o Other (Please specify) _____
o None → Please skip to #16

15. Please select the primary source of revenue your county uses to acquire open space. (Select only one.)

o Private sources (i.e., foundations, trusts, or individuals)
o State funds
o Federal funds
o County budget appropriations
o General obligation bonds
o Dedicated portion of the sales tax
o Dedicated portion of the property tax
o Impact fees
o Other (Please specify) _____

Future Efforts

16. Within the next five years, how many acres of open space do you anticipate your county will acquire or protect?

o None
o 1-100 acres
o 101-500 acres
o 501-1,000 acres
o 1,001-5,000 acres
o More than 5,000 acres

17. What revenue sources to you anticipate using to fund acquisition of future open space? (Please select all that apply.)

o Private sources (i.e., foundations, trusts, or individuals)
o State funds
o Federal funds
o County budget appropriations
o General obligation bonds
o Dedicated portion of the sales tax
o Dedicated portion of the property tax
o Impact fees
o Other (Please specify) _____

Support and Capacity

We would now like to ask you a few questions about support for open space in your county and barriers to protecting open spaces.

18. How important are the following reasons for maintaining open space to the residents in your county? (1 = Unimportant, 5 = Important)

	1	2	3	4	5
Protects farmland	o	o	o	o	o
Promotes fitness and exercise	o	o	o	o	o
Attracts visitors and tourists	o	o	o	o	o
Promotes economic development	o	o	o	o	o
Increases the economic value of adjacent lands	o	o	o	o	o
Serves as a growth management tool	o	o	o	o	o
Creates a community social space	o	o	o	o	o
Contributes to quality of life	o	o	o	o	o
Provides environmental benefits	o	o	o	o	o

19. Please state how strongly you agree or disagree with the following statements. In my county, barriers to acquiring or creating open space include <u>a lack of</u>……

	Strongly agree	Somewhat agree	Somewhat disagree	Strongly disagree
County legal authority	o	o	o	o

Funds for land acquisition	o	o	o	o
Funds for maintenance	o	o	o	o
Knowledge about use of protection tools	o	o	o	o
Coordination among county departments	o	o	o	o
Cooperation among municipalities in your county	o	o	o	o
Multi-county or regional cooperation	o	o	o	o
Support or involvement of state government	o	o	o	o
Support or involvement of federal government	o	o	o	o
Other (Please specify)	o	o	o	o

Demographics

Finally, we would like to ask you a few questions about yourself. All responses will be kept confidential.

20. What is your job title? _____

21. In what county department or office do you work? _____

22. How many years have you spent in your current position? _____

23. How many years have you spent working for local government? _____

APPENDIX C

List of States and Counties Used in the First Analysis

State	County
Alaska	Fairbanks North Star Borough, Ketchikan Gateway Borough, Sitka Borough, Yakutat Borough
Alabama	Baldwin County, Jefferson County, Madison County, Pickens County
Arizona	Cochise County, Coconino County, Graham County, Mohave County, Navajo County, Pima County, Santa Cruz County, Yavapai County
California	Alpine County, Calaveras County, Humboldt County, Inyo County, Kings County, Los Angeles County, Merced County, Modoc County, Nevada County, San Benito County, San Diego County, San Mateo County, Santa Clara County, Solano County, Sutter County, Tehama County, Ventura County
Colorado	Archuleta County, Chaffee County, Fremont County, Garfield County, Gilpin County, Gunnison County, Lake County, Larimer County, Mesa County, Montrose County, Morgan County, Ouray County, Pitkin County, Pueblo County, Rio Grande County, Routt County, San Miguel County, Sedgwick County, Teller County, Weld County
Florida	Alachua County, Bradford County, Broward County, Citrus County, Clay County, Duval County, Flagler County, Franklin County, Gadsden County, Hamilton County, Hardee County, Highlands County, Indian River County, Jackson County, Lake County, Lee County, Madison County, Manatee County, Martin County, Nassau County, Osceola County, Pasco County, Polk County, Seminole County, St. Lucie County, Volusia County, Wakulla County
Georgia	Bartow County, Bulloch County, Carroll County, Chattahoochee County, Cherokee County, Cobb County, Columbia County, Coweta County, Dawson County, DeKalb County, Fayette County, Greene County, Hall County, Henry County, Houston County, Lee County, Madison County, McDuffie County, Peach County, Pickens County, Putnam County, Richmond County, Rockdale County, Sumter County, Tattnall County, Taylor County, Tift County, Troup County, Ware County, Whitfield County
Iowa	Buena Vista County, Butler County, Carroll County, Cerro Gordo County, Clay County, Clinton County, Hancock County, Harrison County, Johnson County, Linn County, Webster County

Idaho	Ada County, Bannock County, Boise County, Canyon County, Franklin County, Fremont County, Gem County, Latah County, Lewis County, Nez Perce County, Washington County
Illinois	Carroll County, Clinton County, Cook County, DeKalb County, Henry County, Kane County, Kankakee County, Lake County, Lee County, McHenry County, Morgan County, Ogle County, Whiteside County, Will County
Indiana	Adams County, Allen County, Benton County, Brown County, Dearborn County, Delaware County, Grant County, Hamilton County, Harrison County, Howard County, Huntington County, Jackson County, Jay County, Jennings County, Johnson County, Kosciusko County, Marion County, Marshall County, Monroe County, Randolph County, St. Joseph County, Spencer County, Steuben County, Tippecanoe County, Union County, Vanderburgh County, Vermillion County, Wabash County, Warren County
Kansas	Butler County, Crawford County, Ford County, Harvey County, Jefferson County, Johnson County, Leavenworth County, Pottawatomie County, Saline County
Kentucky	Boone County, Campbell County, Jessamine County, Marshall County, Shelby County, Washington County
Louisiana	St. Tammany Parish, Terrebonne Parish
Maryland	Caroline County, Carroll County, Cecil County, Garrett County, Harford County, Howard County, Kent County, Talbot County, Wicomico County, Worcester County
Michigan	Barry County, Calhoun County, Charlevoix County, Eaton County, Leelanau County, Luce County, Manistee County, Missaukee County, Otsego County, Ottawa County
Minnesota	Aitkin County, Beltrami County, Benton County, Carlton County, Carver County, Chisago County, Clay County, Cottonwood County, Douglas County, Houston County, Itasca County, Lake of the Woods County, Lyon County, Meeker County, Nicollet County, Norman County, Olmsted County, Otter Tail County, Redwood County, Renville County, Rice County, Scott County, Sherburne County, Stearns County
Missouri	Boone County, Clay County, Cole County, Greene County, Jefferson County, Maries County, Platte County, St. Charles County
Mississippi	DeSoto County, Forrest County, Harrison County, Hinds County, Lamar County, Madison County, Tunica County
Montana	Cascade County, Flathead County, Gallatin County, Lake County, Lewis and Clark County, Lincoln County, Powell County, Ravalli County, Sanders County, Sheridan County, Sweet Grass County, Teton County

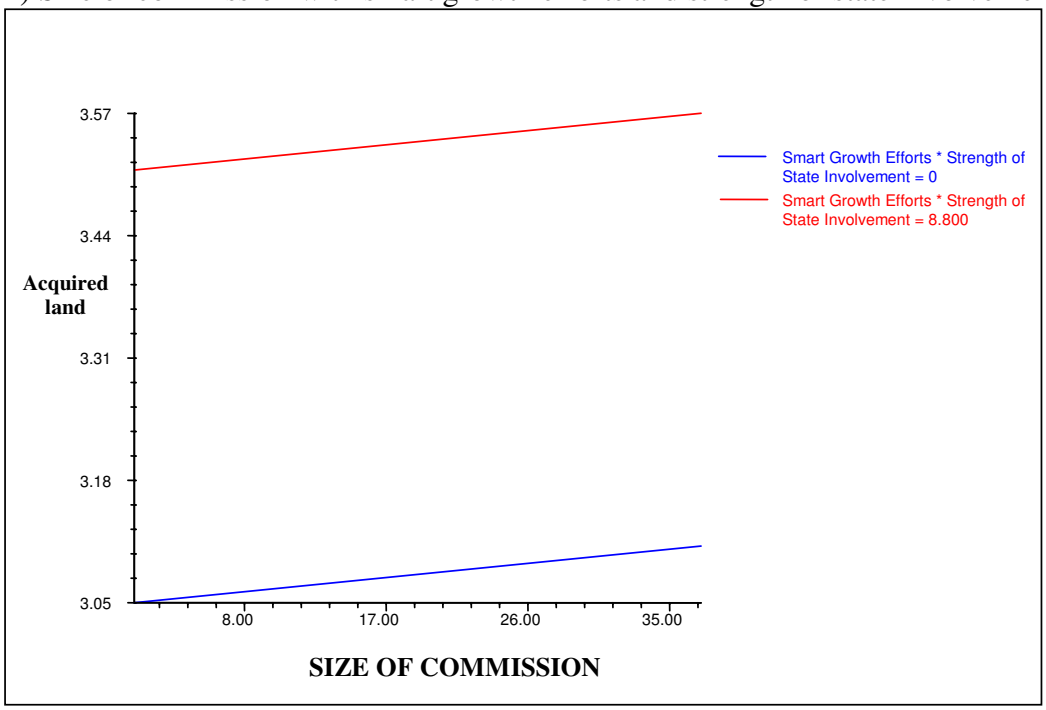
North Carolina	Ashe County, Brunswick County, Burke County, Cabarrus County, Carteret County, Craven County, Cumberland County, Dare County, Davidson County, Davie County, Guilford County, Harnett County, Johnston County, Lenoir County, Mecklenburg County, Nash County, New Hanover County, Polk County, Rowan County, Stanly County, Stokes County, Transylvania County, Watauga County, Wayne County, Wilkes County
Nebraska	Antelope County, Buffalo County, Dodge County, Douglas County, Gage County, Keith County, Keya Paha County, Lancaster County, Lincoln County, Merrick County, Polk County, Scotts Bluff County, Seward County, Stanton County, Washington County
New Jersey	Atlantic County, Bergen County, Cumberland County, Gloucester County, Mercer County, Monmouth County, Morris County, Ocean County, Passaic County, Sussex County, Warren County
New Mexico	Bernalillo County, Luna County, Mora County, Rio Arriba County, Santa Fe County, Valencia County
Nevada	Carson City, Churchill County, Clark County, Lyon County, Nye County, Washoe County
New York	Cayuga County, Chemung County, Clinton County, Columbia County, Cortland County, Dutchess County, Essex County, Genesee County, Jefferson County, Madison County, Montgomery County, Niagara County, Orange County, Otsego County, Putnam County, Rockland County, Saratoga County, Schoharie County, St. Lawrence County, Steuben County, Suffolk County, Ulster County, Warren County, Wayne County, Westchester County, Yates County
Ohio	Ashland County, Athens County, Butler County, Champaign County, Clermont County, Cuyahoga County, Fairfield County, Fulton County, Geauga County, Henry County, Jefferson County, Lake County, Mahoning County, Medina County, Ottawa County, Pickaway County, Shelby County, Trumbull County, Van Wert County, Warren County, Wayne County, Wood County
Oregon	Baker County, Clackamas County, Crook County, Douglas County, Hood River County, Lane County, Lincoln County, Polk County, Tillamook County, Umatilla County, Union County, Wallowa County, Wasco County, Washington County
Pennsylvania	Adams County, Bradford County, Butler County, Cambria County, Chester County, Crawford County, Cumberland County, Delaware County, Erie County, Franklin County, Greene County, Huntingdon County, Jefferson County, Lehigh County, Luzerne County, Lycoming County, McKean County, Mercer County, Monroe County, Northumberland County, Philadelphia County, Pike County, Snyder County, Susquehanna County, Union County, Venango County, Warren County, Westmoreland County, Wyoming County

South Carolina	Aiken County, Anderson County, Darlington County, Dorchester County, Greenville County, Greenwood County, Horry County, Lexington County, Spartanburg County, Sumter County
South Dakota	Brown County, Fall River County, Grant County, Hutchinson County, Lawrence County, Pennington County, Stanley County, Yankton County
Tennessee	Blount County, Bradley County, Franklin County, Loudon County, Rutherford County, Sullivan County, Tipton County, Williamson County, Wilson County
Texas	Cameron County, Comal County, Grayson County, Travis County
Utah	Cache County, Carbon County, Grand County, Salt Lake County, Tooele County, Uintah County, Utah County, Wasatch County, Washington County, Weber County
Virginia	Accomack County, Albemarle County, Amelia County, Bedford County, Botetourt County, Campbell County, Chesterfield County, Clarke County, Cumberland County, Dinwiddie County, Fairfax County, Giles County, Goochland County, Greene County, Greensville County, Halifax County, Highland County, James City County, Lancaster County, Montgomery County, Nottoway County Orange County, Prince William County, Rockbridge County, Shenandoah County, Smyth County, Southampton County, Westmoreland County, Wise County, York County
Washington	Benton County, Columbia County, Grays Harbor County, Kitsap County, Lewis County, Mason County, Pacific County, Pierce County, Skamania County, Stevens County, Wahkiakum County, Whitman County
Wisconsin	Adams County, Brown County, Burnett County, Calumet County, Clark County, Dodge County, Door County, Fond du Lac County, Green Lake County, Juneau County, La Crosse County, Marinette County, Oconto County, Outagamie County, Ozaukee County, Pierce County, Polk County, Portage County, Rusk County, Sauk County, St. Croix County, Taylor County, Trempealeau County, Washington County, Waukesha County, Waushara County, Winnebago County, Wood County
West Virginia	Kanawha County, Monongalia County
Wyoming	Albany County, Fremont County, Goshen County, Johnson County, Laramie County, Lincoln County, Park County, Uinta County
39	**540**

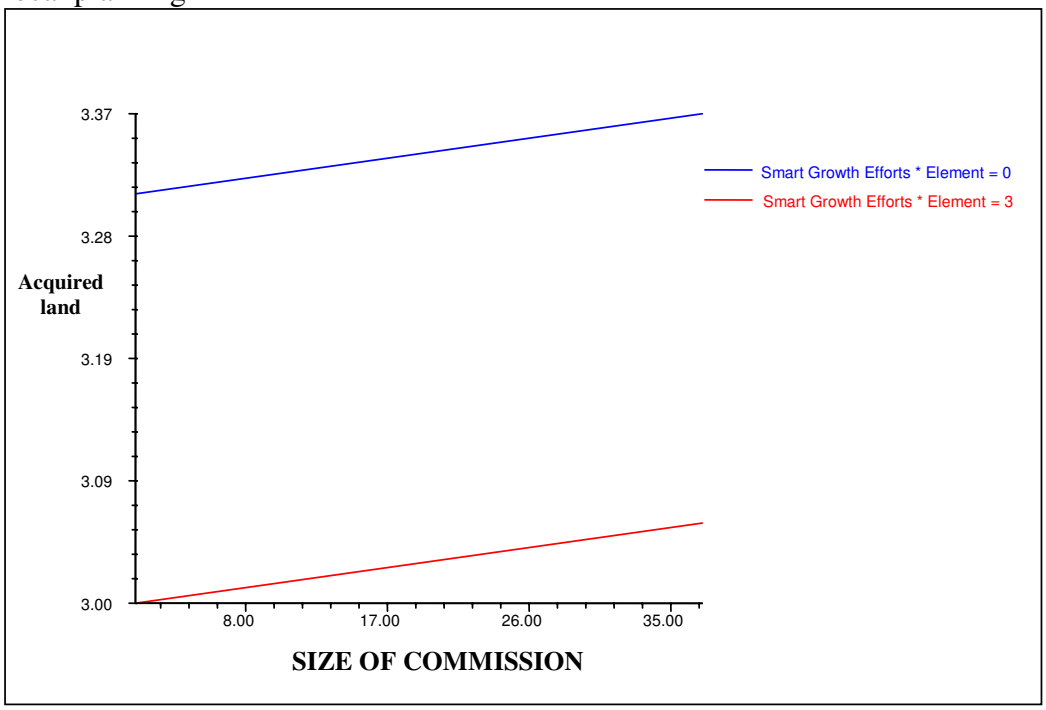
APPENDIX D

Cross-level Interaction Graphs

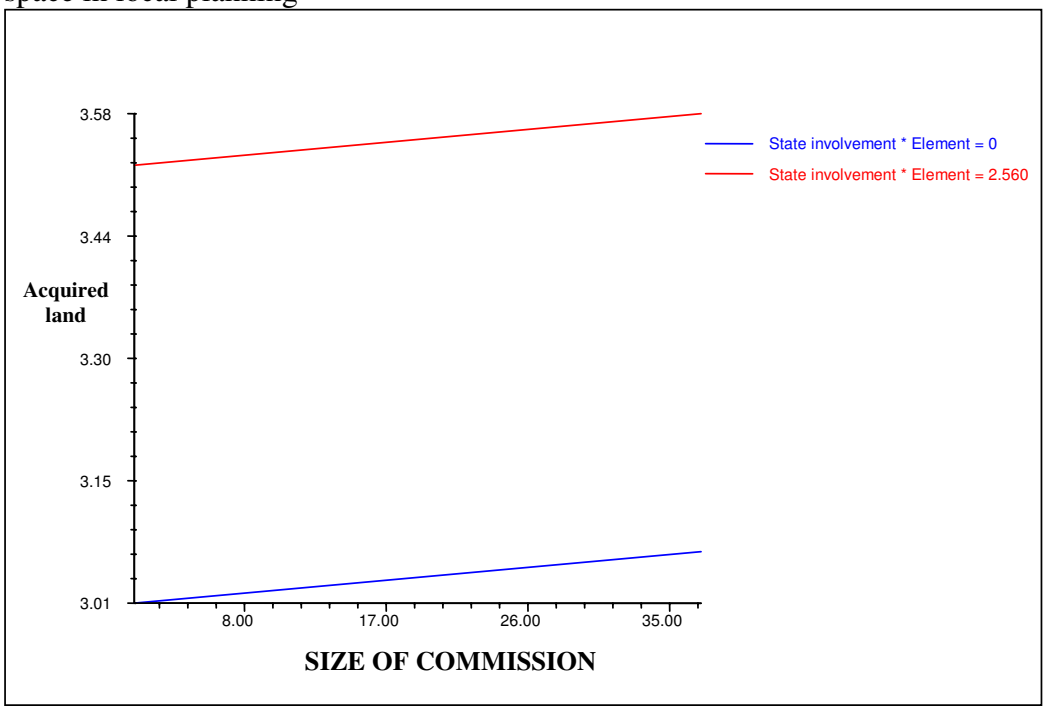
1) Size of commission with smart growth efforts and strength of state involvement



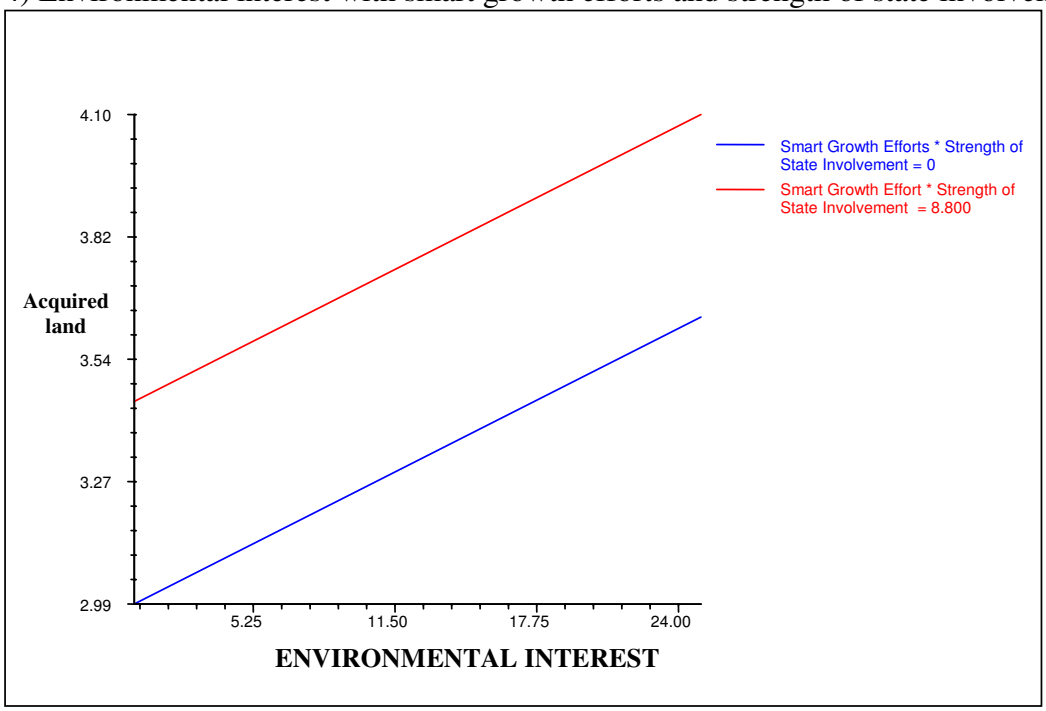
2) Size of commission with smart growth efforts and required element of open space in local planning



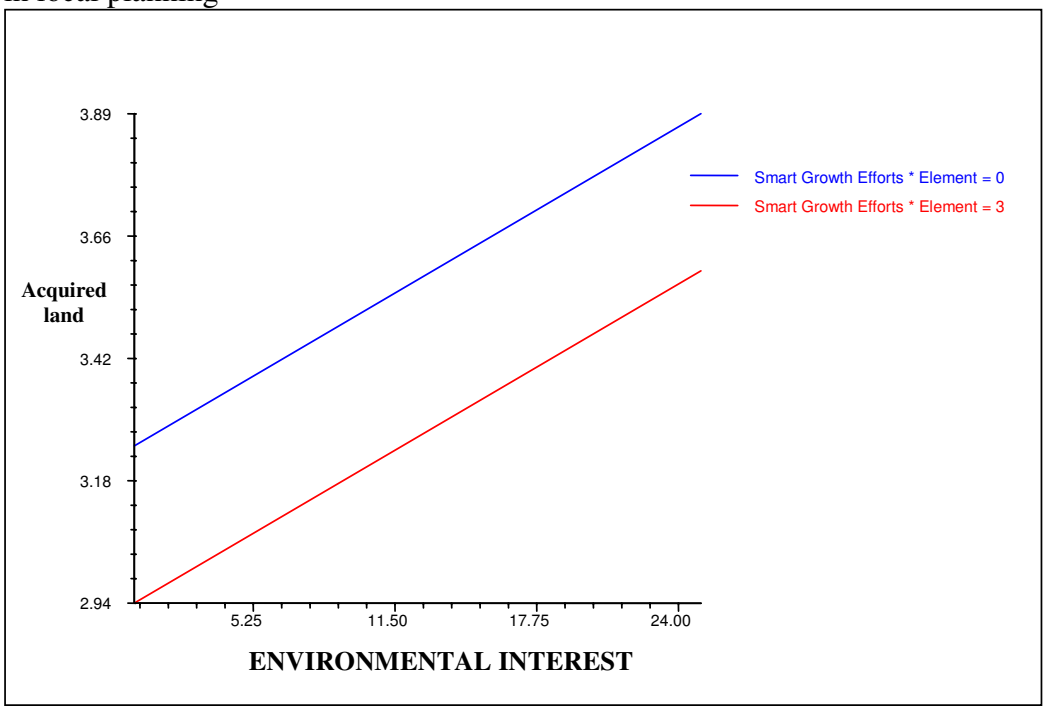
3) Size of commission with strength of state involvement and required elements of open space in local planning



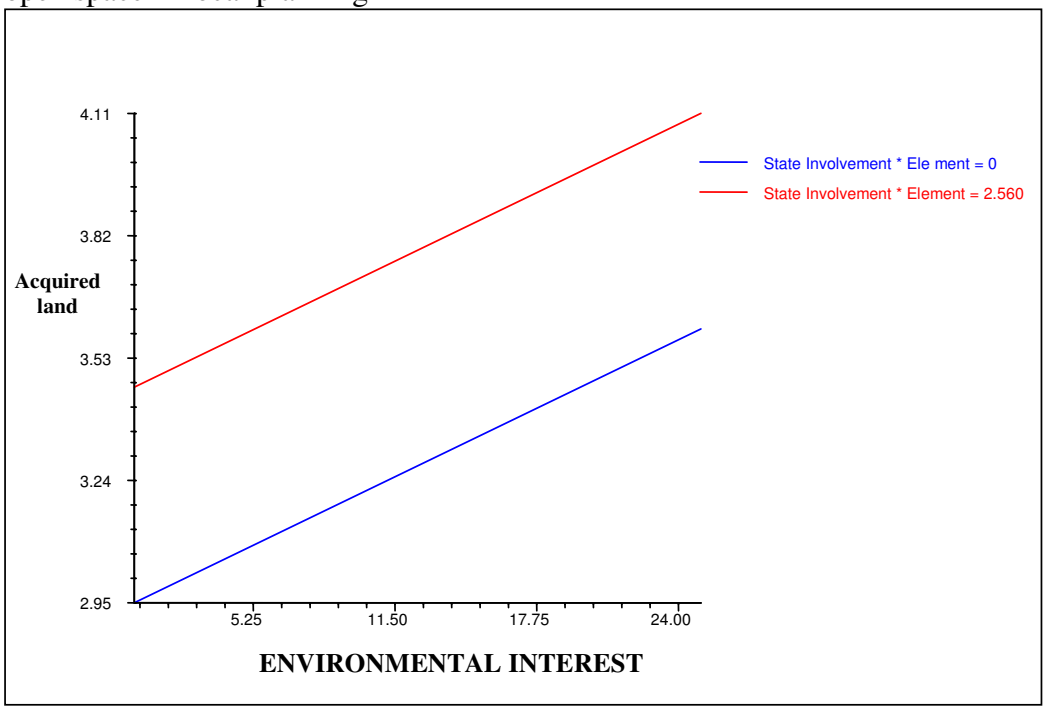
4) Environmental interest with smart growth efforts and strength of state involvement



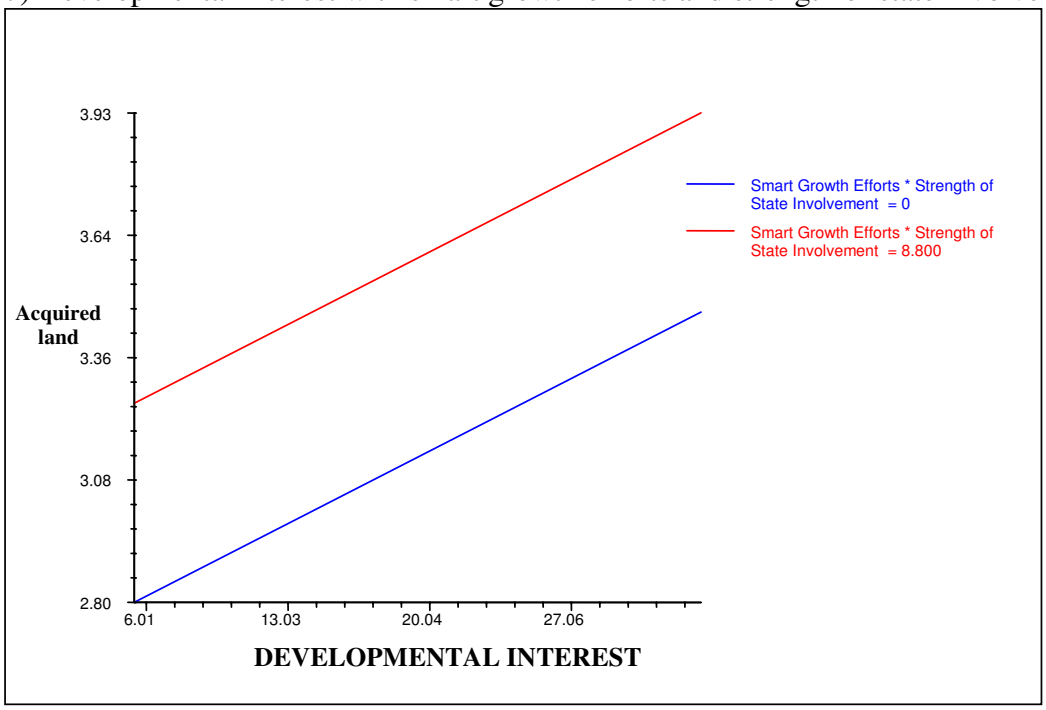
5) Environmental interest with smart growth efforts and required element of open space in local planning



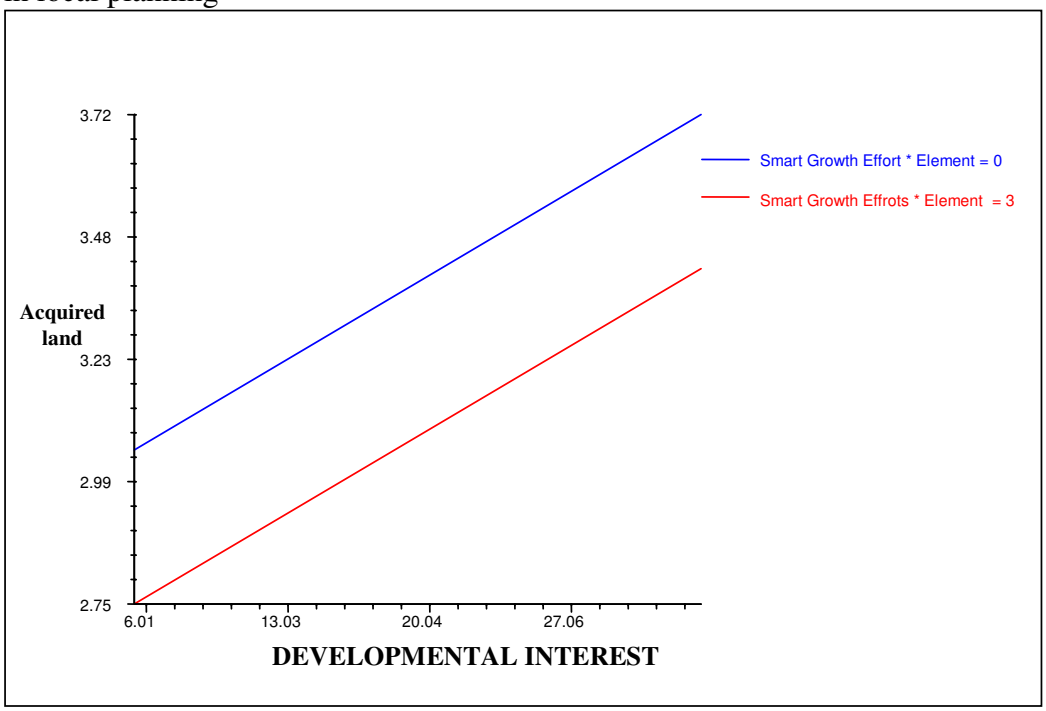
6) Environmental interest with strength of state involvement and required element of open space in local planning



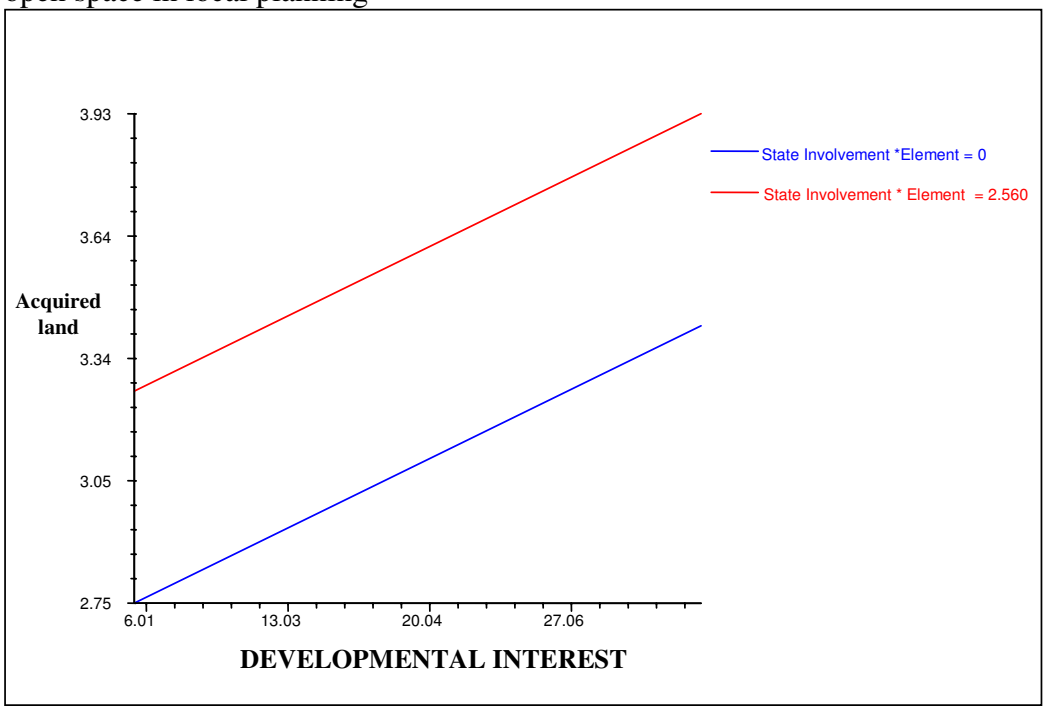
7) Developmental interest with smart growth efforts and strength of state involvement



8) Developmental interest with smart growth efforts and required elements of open space in local planning



9) Developmental interest with strength of state involvement and required element of open space in local planning



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MANUSCRIPTS

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Park, Sangchul, Lee, **Sejin**, Feiock Richard, and Lee, Keonhyung. 2010. "Growth Management Priority and Local Land Use: Structural Equation Model" To be submitted for Peer Review.