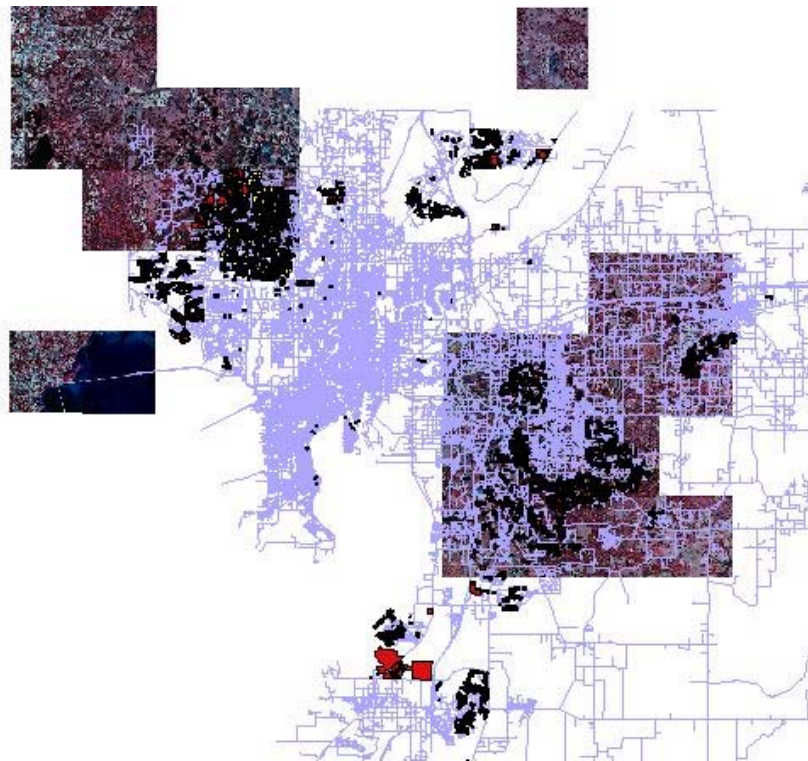


The Community Benefits of Large-scale Development



Wayne Archer
Professor of Real Estate
University of Florida

December 7, 2004



The Community Benefits of Large Scale Development

Executive Summary

Introduction – Florida’s Need for Housing and the Role of Large-scale Development

Florida’s housing stock will need to increase by a third in the first fifteen years of the 21st century. While strong voices among planners argue that greater reliance should be placed on infill and high-density residential development to meet Florida’s future housing needs, there is little evidence to support this strategy. At the same time, Florida’s network of land use controls on housing development has greatly increased. Thus, as the need for additional conversion of undeveloped land continues, the role of regulations in shaping the result has strengthened.

This study is concerned with an important dimension of new residential development that can be heavily influenced by land use regulation, namely scale of development. There is reason to believe that the community -- including homeowners, government, and citizens in general -- may better served by larger scale in residential development.

There are several potential economic advantages to larger scale in residential development. First is the containment of land use externalities. These include a myriad of effects, ranging from watershed disturbances, to environmental and ecological damage, to stress on community infrastructure and streets. For all of these concerns larger scale of development causes more of the negative effects of development to remain within the development envelope, giving greater incentive to the developer to account for them efficiently in the development plan.

A second advantage to large development may be economies of scale, both private and public. As a private example, larger scale of development appears more able to utilize, and therefore pay for, sophisticated and creative land planning. Larger scale development also is asserted to have purchasing advantages that can reduce the cost of a given quality of development, or enable higher quality for a given cost. On the public side, to the extent that public permitting and controls are a fixed cost of the development process, more is achieved with the same cost in public administration and public hearings if the projects reviewed are larger. From both a public and private perspective, the management of storm water and water conservation can be more efficient with larger scale of development.

A third potential advantage of larger scale is the reduction of risk. Community planners can be more certain as to where infrastructure will be needed with larger scale development. At least as important, homebuyers may find that larger developments reduce risks of home investment. They may more easily evaluate what is available in terms of neighborhood, services and homes in a larger scale development. Further, they may have more confidence in the future stability and direction of a larger scale development, thus reducing the very risk of value stability that compelled the introduction of zoning in years past.

Finally, larger scale development has a better opportunity to preserve undeveloped spaces, and to orchestrate effective community benefit of open spaces and natural systems. This advantage can auger for greater energy efficiency, better conservation of water, more efficient and beneficial management of storm runoff, and better preservation of natural habitats.

The goal and approach of this study

The challenge of this study has been to find measurable indicators to test for the presence of the benefits that appear possible with larger scale development. The study would not be possible without the emerging capacity of geographic information systems (GIS) and the data becoming available electronically from county offices. It was feasible, possibly for the first time, to bring together aerial photography, county property appraiser data on individual land parcels and a variety of other essential data from multiple counties in Florida. From these data some 600 developments in seven counties were defined and evaluated for use in the study.

The Database

Building the database for the study involved a number of major challenges. Perhaps foremost was defining what was meant by a development. No pre-existing database provides a consistent, well-defined set of residential developments. Thus it was necessary to determine what constitutes a development and to implement the criteria to identify the units of the study. Part of this challenge was in defining the physical boundaries of a development, which, among other complications, often change with time. At Several other major challenges were in devising measures of heretofore-unmeasured non-monetary effects of development. Several proxies for these effects had to be defined, as described below.

The study settled on 477 developments selected from seven counties where data were reasonably certain to be available as needed and a wide range of development scale was in practice. Because development standards have changed over time, the study

restricted the sample to developments begun around the middle of the 1980s or later, with a majority of the residences being built after 1990.

Measures of Development Effects

Many effects of development scale are likely to be captured in the price of the residences sold within the development. This will happen to the extent that larger development scale successfully manages neighborhood level externalities such as traffic flows, storm runoff, and recreational needs to create “more livable” neighborhoods, or results in economies of scale in delivering quality, or results in risk reductions for homebuyers. Therefore, an investigation of the price premiums associated with larger scale development is a central part of this study. It is conducted using a core tool of economic research known as hedonic analysis.

Non-price Measures of Development Effects

A major point of this study, however, is to examine the non-price effects of scale in development. This poses the immediate challenge of identifying or devising measures in place of prices. The study has adopted a variety of measures of non-price effects: First are two gauges of compactness of development. The focus on compactness follows the planning literature, which pays heavy attention to compactness as a central factor in energy efficiency, preservation of the environment, preservation of natural systems and preservation of natural habitats. The two measures adopted are street length per residential lot and percentage of “free space.” The latter is measured as the ratio of total area used for residential lots divided by the total development area or envelope, after netting out non-residential and multifamily improvements. The first ratio is a measure of infrastructure efficiency, and proxies for utilities as well as streets since utilities generally

follow the streets. If the streets-per-lot ratio is high, the development is likely to be inefficient. If it is low, the meaning is not clear. A low ratio could represent great development efficiency, or simply ruthlessly high density. The second measure focuses on the extent of land preservation and is less ambiguous. If it is high, not much area is left for open, community space. If the ratio is low, one still does not know how the “free” space is used, but it is preserved for some use other than private lots.

Because of the remaining ambiguity in the two ratios above, there was motivation to devise yet another ratio to address development “quality.” For this purpose we adopted the percentage of residential lots that are back-to-back with another. It appears that this characteristic may be a fundamental aspect of residential land planning, and is a significant signal of development quality, particularly at Florida’s emerging urban level densities. Statistically, it is very powerful as an explanatory variable for value.

Another critical non-monetary effect of development is external traffic generation. This very complex phenomenon normally is addressed through so-called “gravity” models that predict trips based on relative attractiveness of the destination and relative distance from the household. However, such models were not within the resources of this study, and hold uncertain promise in any case.¹ In their place the study relies on a “low-budget” proxy for the gravity logic. It uses two measures of trip distance: distance from the perimeter of the development to the nearest supermarket/neighborhood shopping center and distance from the perimeter to the nearest elementary school. As the distance is lower for each of these measures, it signals less external traffic being generated by the development.

¹ At best, gravity models of traffic generation produce predictions of traffic. They do not measure actual traffic flow.

Results

The hedonic analysis of price effects, after controlling for the effect of lot and structure characteristics, reveals an extremely strong positive effect of development scale on the value of houses in the development. On average, over the seven counties, if the median development size of 147 were doubled, it would result in a 1.25 percent increase in the average value of houses involved. A ten-fold increase in development scale would result in a 12.5 percent increase in the average value of the houses involved.

The non-price measures of development produced unambiguous results. All of the measures exhibit a pronounced decline with scale of development. In all cases this is a positive result, consistent with the conclusion that larger scale development results in beneficial non-price effects for the homeowners, and for the community at large. Adding to these results is the potential effect of larger scale development on property tax revenue. To the extent that property values are greater with larger scale development, because of the fixed nature of Florida's homestead exemption, the property tax base is increased by an even greater percentage than the increase in average house value.

Acknowledgments

This study was sponsored by the Association of Florida Community Developers, and their support and interest is gratefully acknowledged. Many members of the organization offered valuable suggestions, insights, data and contacts for the project. Still more remained available to assist where needed. At the same time, all of those involved maintained an admirable respect for the prerogatives and responsibility of the researcher to “go where the facts led,” and to address the project in the manner that seemed most appropriate in terms of research.

The project would not have been possible without the emerging availability of county parcel databases and related “GIS” data. Our access to such data depended almost entirely on the generous assistance of Dr. Edgar McDougall and his assistant, Kim Haven at KeyInSites.

The project also would not have been possible without the assistance of graduate students. In particular, Larry Squires, as GIS manager, devoted an inspiring level of thought and energy to the project.

Finally, I am grateful to my wife, who graciously endured my absence for many more days than was reasonable in the interest of allowing me to complete this exceptionally interesting and challenging endeavor.

Table of Contents

Executive Summary

Acknowledgement

1. Introduction - The need for New Housing Developments in Florida

2. Economic Effects of Scale in Development

3. Measuring Non-priced Effects of Scale in Development

4. The Data Base

5. The Effect of Development Scale on Prices of Homes

6. Results for Non-price Effects of Scale

7. Conclusions

Bibliography

1. Introduction - The need for New Housing Developments in Florida

In the coming decades Florida faces formidable challenges in housing its citizens. The state's population increased by 135 percent from 1970 to 2000, with only a slight moderation in the growth rate, at 23.5 percent, during the 1990s. The growth rates in population are exceeded by the growth in size and number of residences. A more than 30 percent increase since 1980 in the average size of house demanded has exacerbated the depreciation of the existing stock, and further fueled demand for new.² With increasing home ownership rates and declining household size, the growth in Florida's owner occupied housing from 1990 to 2000 was 28.5 percent. It is projected to increase by some 33 percent in the subsequent 15 years, and these figures omit replacement demand for housing units.³

The challenge is how to provide needed, affordable housing in the years ahead. As Floridians have grown more sensitive to the environmental and ecological effects of development, the housing industry has accepted a growing net of constraints in developing "raw" land into sites for new residences. Few would question that such constraints are important. But however essential, and however beneficial to the community and the environment, they tend to raise the price threshold of homes.

Strong voices in the world of planning have called for urban infill and increased use of multi-family housing as solutions to the growing strains on housing supply. However, the facts are a sobering tonic to these proposed solutions. First, it is apparent that most homeowners have a strong desire for some form of single-family home.

² In 1980 the average size of a new house was 1,740 square feet whereas in 2000 it was 2,324 square feet. In 1980 the median size of a new house was 1,595 while in 2000 it was 2,103. (See Statistical Abstract of the United States, 2002, Table 923.)

³ Projection of the University of Florida Bureau of Economic and Business Research, 2002.

Among major urban areas, only in Hawaii, in New York City, or in the land-constrained, retirement intensive, coastal areas of south Florida do concentrations of owner occupied multi-family ever reach double digit percentages.⁴ In such cities as Orlando and Tampa the multi-family portion of owner occupied housing is no greater than the national average, less than 4 percent. Thus, it seems apparent that only particular sub-populations of households find owning a residence in high-density housing to be desirable, and only under special circumstances.

Can urban infill and urban redevelopment meet an important portion of the future housing needs of Floridians? The evidence is bleak. In contrast to the United States as a whole, where almost half of the housing stock is “old,” or built before 1960, in Florida, less than 30 percent is “old,” and in the high growth urban areas of the state a fourth or less of the stock is “old.” Are there non-residential areas to accommodate infill? Using the principal county of Orlando (Orange County) as an example, one finds a startlingly unpromising answer. In the author’s examination of undeveloped parcels within an area roughly representing developed Orange County in 1980, no parcels appeared vacant and usable for housing development as indicated by official land use codes in the property tax records of 2002. The vast majority of undeveloped parcels in the investigation were designated as submerged, water, or wetlands. Are there non-residential parcels in Orange County that are ripe for redevelopment? The same investigation by the author revealed that of non-residential, privately held parcels with improvements built before 1980 (and thus potentially amenable to conversion), there were only 78 with more than 10 acres, 33

⁴ Based on data from the 2000 Census of the United States. Multi-family refers here to a structure with three units or more.

with more than 20 acres and 10 with more than 40 acres.⁵ Probably only a minority of these will actually be available for redevelopment.

The message in Florida appears clear. In the first 15 years of the 21st century the housing stock must grow by approximately a third, and more in high growth parts of the state. There is no evidence to support the idea that this will be achieved through urban infill, or through condominium multifamily structures. It is believable that *at least* 80 percent of the new housing stock will need to be provided through “greenfield” development, or development of vacant land. Thus, a dominating question for residential development of the future is what features of new development are likely to bring better housing for buyers, and a better community. This question is important from a public policy standpoint because the elaborate, growing network of land use controls will influence the type of development that occurs.

Our argument in this study is that scale of development is an important aspect affecting development quality, and one that can be greatly influenced by policies of land use controls. In this study we first present the reasons why larger scale in development may be preferable to homebuyers, to the community, and to taxpayers. We then use an unprecedented base of data to examine the effects of development scale. Finally we state our several conclusions.

2. Economic Effects of Scale in Development

There are a number of reasons to believe that land development can be more beneficial to a community as the scale of the development is larger. These include the

⁵ An unusual exception to this bleak story for infill development is the approximately 1,000 acre former Orlando Naval Training Center, now being redeveloped.

presence of economic externalities in land use, potential private and public economies of scale, risk reduction for homeowners, and more effective preservation of natural systems and the environment.

Externalities Central to the case for larger scale in development is the existence of externalities in land use. The recognition of land use externalities reaches back in economic literature at least to the work of Nobel laureate, R.H. Coase, who focused on the example of factory smoke effects upon neighboring properties (1960).⁶ Subsequent literature has addressed, among other concerns, a wide range of industrial emissions, the effect of toxic wastes upon surrounding property values (Kohlhase, 1991; Michaels and Smith, 1990), traffic congestion, the effect of non-residential uses on adjacent residential property values (Grether and Mieszkowski, 1980; Cao and Cory, 1981), the effect of multifamily development on single-family neighborhoods (Crone, 1983), traffic noise (Palmquist, 1992) and access to parks and to appealing vistas, open spaces and golf courses (Asarbere and Huffman, 1996; Grudnitski and Do, 1997; Benson et. al., 1998; Weicher and Zerbst, 1973). Additionally, in the practice of land use controls there has been widespread recognition of watershed problems such as the effect of upstream development upon downstream runoff and flooding. Also, the effect of development upon vistas (both positive and negative) and in generating sound, light, or odor pollution has received significant attention in discussions of planning and land use control. While analysis of congestion externalities usually has focused on traffic, there also may be congestion in public services, such as overcrowding of schools.

⁶ For examples of contributions to the estimation of land externalities, see T.M Crone, 1983; Grether and Mieszkowski, 1980; Greison and White, 1989; Kain and Quigley, 1970; Li and Brown, 1980.

The externalities mentioned above might be thought of as cross-sectional externalities in that the effect is simultaneous with the cause. However, in land development there may be significant longitudinal externalities as well. If one accepts that not all homebuyers have perfect information about the future, then smaller developments, which typically are completed in a shorter span of time, are less likely to experience “market discipline” regarding the effects that they create for subsequent development. Important examples would include all manner of congestion effects for public infrastructure. That is, relatively early small developments relying on existing roads, schools, parks and open spaces may be able to exploit the time myopia of buyers who fail to completely recognize the congestion effects to be expected from subsequent developments. By this logic, the values of residences in both the early developments and subsequent developments may be diminished as congestion rises. By contrast, if all the developments in question are under single ownership, the developer has incentive to find a more balanced development plan to minimize the negative effects of progressive congestion, which should include provision of at least some additional infrastructure.

There may be an important public component of longitudinal externalities. If public infrastructure is needed to provide for future development, and if voters are myopic, i.e. “short-sighted,” on the issue, current elected officials may be reluctant to accept responsibility for providing the public infrastructure in a timely manner out of fear that raising taxes may violate campaign promises or jeopardize reelection. By contrast, the developer of a larger scale project, recognizing the cost that the development will incur in the future from inadequate infrastructure, may have incentive to support infrastructure development in the interest of greater profits in the future. Put another

way, an elected official, even with complete foresight, may have a higher discount rate on the future than a fully knowledgeable developer due to the threat of elections.

Economies of Scale Economies of scale are a second factor that may favor larger scale land development. It is arguable that professional services such as architecture and land planning involve some economies of scale. If so, larger scale development may be able to obtain more services (better quality) per unit of cost, thereby reducing the development “soft” cost per unit of quality. Moreover, to the extent that larger scale development displaces the constraints of land planning and development, a larger set of development solutions should be available to “solve” the development puzzle. Finally, it has been asserted by some large developers that larger scale development is able to negotiate lower cost suppliers due to the volume of purchases that they offer. All else equal, the availability of more development solutions or lower cost suppliers should lower the actual “hard” costs of development.

Economies of scale may occur at the public level as well. From the public perspective of development review, regulation, and permitting, larger scale may reduce certain public costs. For example, to the extent that the number of public hearings is independent of the size of the development, then larger scale developments should reduce the community cost of public hearings. Similarly, to the extent that regulatory staff time required for a development permit application is fixed, the same amount of development done with fewer permit applications reduces public costs. Further, to the extent that larger scale development encompasses infrastructure and externality issues that would fall to public planning agencies in the case of multiple small developments, the public

may shed some costs of development to the private sector. Important examples of the latter would include planning for roads and storm drainage systems.

In addition to possible planning and regulatory efficiencies from larger scale development, there may be “hard cost” advantages for the public as well. If urban sprawl is taken to mean “leap frog” or scattered development, then large-scale development can mitigate some costs of urban sprawl. In particular, to the extent that large-scale development concentrates development, it enables concentration in the provision of public infrastructure. This concentration could reduce the cost of uncertainty and of over investment or duplication in public infrastructure. Further, a major public cost of development is storm water management. It generally is feasible to achieve more cost-efficient solutions to storm water management in larger scale development. This cost reduction can both reduce the private cost of development and reduce the public cost of storm water management for areas outside the development.

Risk Reduction A last potential private effect of larger scale development is in risk reduction. It is widely accepted, for example, that a principal historic motivation of zoning has been to increase the stability of values in residential neighborhoods by preventing intrusion of land uses generating negative externalities. However, larger scale development has the potential to achieve the same result through master planning. In fact, it may be more effective than zoning to the extent that it provides more assured long-term protection of open spaces and natural areas in addition to controlling the mixture of developed land uses. Stated differently, one component of the value of larger scale development may be that buyers believe they have better information about what they are buying into, and greater confidence in its long-term value stability.

Natural Systems A final community benefit of larger scale development may be the opportunity to preserve natural systems. It generally is recognized that many natural systems are better preserved when they retain continuity, that is, are linked together into a larger network. This can be accomplished at lower cost as the development is larger, due to greater degrees of land planning freedom.

3. Measuring Non-priced Effects of Larger Scale Development

In Section 5 we examine the price effects of scale in development. These are extremely important because competitively determined prices are the fundamental measure of all economic and social benefits that can be captured privately.⁷ However, prices cannot be expected to capture all of the broader community effects of development that we refer to as externalities. The latter are extremely diverse, and include effects on external traffic, impact on community infrastructure, impact on community development management costs, and preservation of natural systems and habitats. Many of these effects are difficult, if not impossible to price meaningfully.

In planning literature many of these community externalities of development are associated with development density. That is, more compact development is viewed as better. For example, in *Principles of Smart Development*, a statement of the American Planning Association (APA, 1996), the case is stated as follows:

...At the local scale, compact building patterns preserve land for city and neighborhood parks as well as local woods and wetlands. Furthermore, compact development shortens trips, lessening dependence on the automobile, and therefore reducing levels of energy consumption and air pollution. Finally, a

⁷ The importance of competitively determined prices as a measure of economic and social value can scarcely be overstated. Two centuries of economic theory attest to this conclusion.

compact development pattern supports more cost-effective infrastructure than does low-density fringe development.⁸

In short, a smaller development “footprint” is consistent with the desired quality of compactness. With this widely held view in mind, we focus this investigation on two proxy indicators of compactness: street footage per residential lot and percentage of “free space” within the development.⁹

Street Length Per Lot Several considerations point to street length per lot as an interesting proxy measure of development compactness and efficiency. First, streets correlate very strongly with the length of utility systems since utilities normally are laid in conjunction with the streets. Second, individual lot size as well as lot configuration are at least partially captured in this measure since smaller or narrower lots result in less street per lot. Thus, we believe that the length of street per owner residence proxies the compactness of the development. Stated differently, streets per owner residence is an indication of the amount of land disturbed by development. As it is smaller, the developer is afforded greater opportunity to preserve natural systems and habitats, to manage storm water efficiently, and to provide common area open spaces. All of these results may be regarded as benefits that potentially extend beyond the development itself.

It should be recognized that while streets per owner residence may proxy for compactness of development, it does not indicate how that compactness is exploited. The configuration and use of the resulting open spaces must be examined explicitly to determine the actual result. Compactness resulting from low street length per lot may be used to preserve open spaces, representing the best of development practice, or it may be

⁸ Page 7.

⁹For both indices, we restrict our analysis to areas containing single-family home or cluster homes, excluding condominiums, townhouses and multifamily rental.

used simply to raise the number of lots created, the worst of development practice. Thus, it can be thought of as a necessary condition of compact development, but not a sufficient condition of quality development.

If our street length per lot ratio is computed strictly within the boundaries of developments, the results entail a bias against larger development. This is because some secondary streets that are incorporated in larger developments lie outside of smaller developments (and, in fact, may be provided by the community at large). For that reason we adjust the streets per owner residence ratio for distance to arterials. We do this as follows: We measure the average distance from each development to the nearest state road. We then allocate this additional road distance to developments on the basis of a ratio that roughly indicates the portion of the feeder or connecting road(s) attributable to the development in question.¹⁰

“Free space” Ratio Our second index of development compactness addresses the amount of “free space” within the development. It is self-evident that the ability of a developer to provide community open space, to use natural systems in mitigating pollution, to control runoff or to preserve and support natural habitats depends on the amount of the development land unencumbered as private lots. We proxy this free space by the ratio of total area in private lots divided by the total area within the net development envelope. Net development area is the total development envelope less parcels improved with other than single family or cluster home residential. These non-

¹⁰ The connector road is allocated to a development in proportion to the average of two ratios. The first is the ratio of the number of parcels in the development to all other parcels in the connector road corridor that share the entire road segment(s) used by the development. The second is the ratio of the number of parcels in the development to *all* parcels in the road corridor. The idea of this blended ratio is to allocate first among all users sharing the full length of the road between the development and the arterial road, and then to allocate further for all users sharing any use of the road, however limited. The resulting average ratio can be regarded as an average of the extremes in allocating the use of the connecting road.

single family uses include commercial buildings, public schools, clubhouses, offices, and any multi-family, townhouses or condominiums. The area of streets is an important land use as well. However, it correlates relatively closely with the area of the lots. Thus, arguably, while street area is important in determining an absolute measure of “free” space, it will wash out of our comparisons across development size and does not significantly affect our comparative results whether it is removed from the net development area or left in. For simplicity, we leave it in.

One final point concerning the effect of development scale on free space is fairly apparent. For preservation of natural systems and habitats, larger space is better. Therefore, even if larger developments have the same free space ratio as smaller developments, the potential community value of the larger development is greater per unit of space.

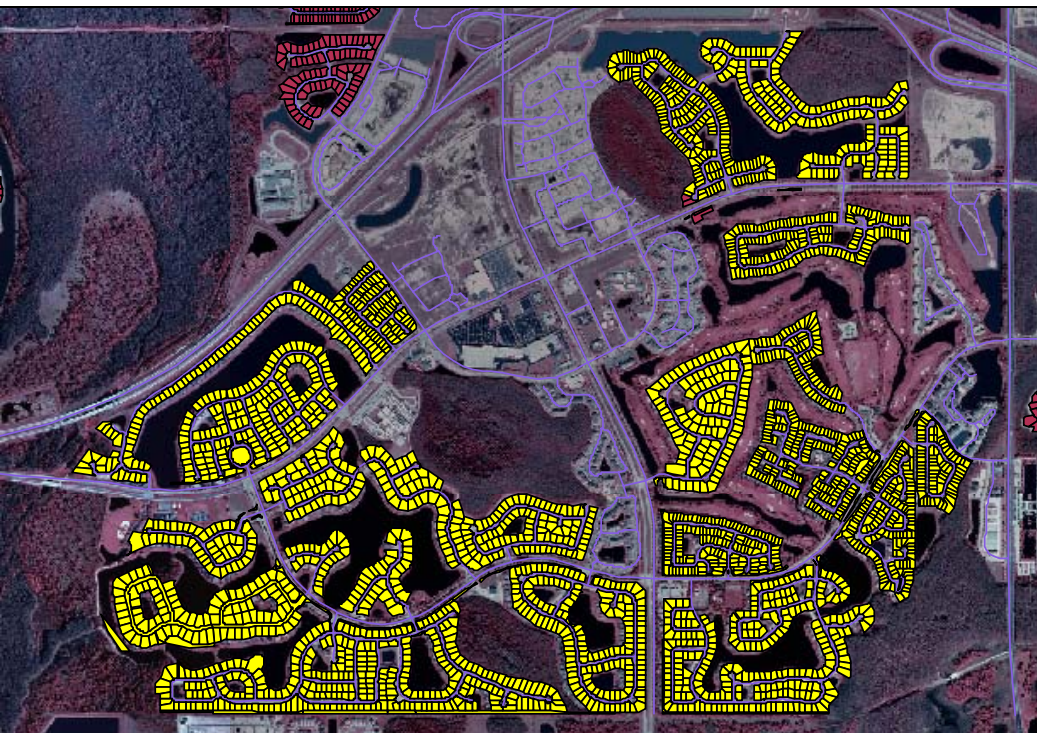
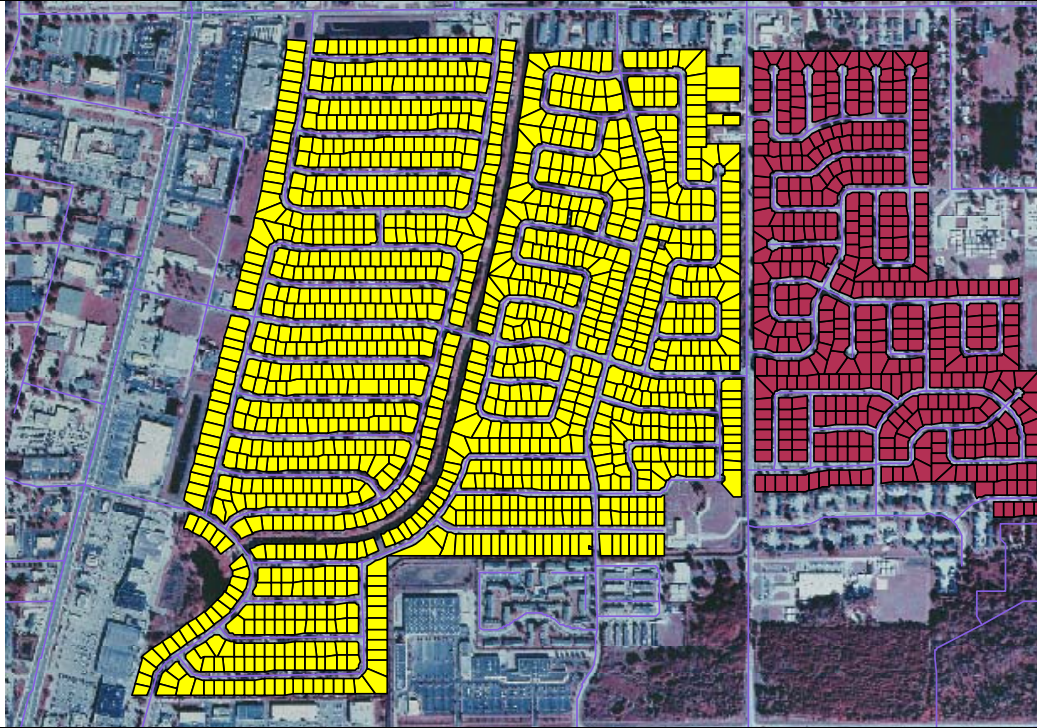
The “free space” ratio captures somewhat different aspects of development than the streets per lot ratio. Where the streets per lot ratio focuses on how much land per lot is disturbed by development, the free space ratio focuses on what is left after all lots are developed. Where lower streets per lot is a necessary condition to compactness and efficiency in development, the free space ratio is a better measure of what is left from development for the community. It comes closer to being a “sufficient” indicator of quality development.

Defining Development Envelopes Some comments on the definition of development envelope are important. Where a development is not adjacent to another one, the boundaries of the development often are less than clear. They may, in fact, change during the development process as a parcel of land is acquired and then portions of it are

conveyed either to other land developers, or to government agencies or a trust for the purpose of preservation. Our envelope probably is the smallest of the possibilities as we seek to encompass the final developed parcels. This tends to bias downward the amount of free space, but it is not clear that it biases the variation in the ratio across developments by scale. Another issue arises when a development is only partially complete. In such cases, there is a temporary excess of free space until the subsequent lots are platted. Where we detected these cases, we reduced the development envelopment proportionately to reflect only the platted portion of the development.

Back-to-back Lot Ratio Neither our streets-per-lot ratio nor our free space ratio can capture an important element of quality development, which is quality land planning. The importance of this component is shown in the two images of Exhibit 1. In the course of this investigation, we found that a simple ratio, percentage of residential lots that are back-to-back, offers a significant, manageable proxy for this important aspect of quality development. This difference is strongly apparent in Exhibit 1, where the percentage of back-to-back lots in the traditional development is 60 percent while in the modern master-planned community (Hunter's Creek, in Orlando) the percentage of back-to-back lots is 22 percent. Reducing the percentage of back-to-back lots is an important, challenging and valuable aspect of land planning in itself. But, in addition, we believe that the effort to achieve a low back-to-back ratio is symptomatic of a higher level of land planning quality in general. Thus, we use the ratio to serve as a proxy for development quality, and examine its relationship to development scale.

Exhibit 1
Traditional and Modern Approaches to Development:
Larger Scale Development Has a Better Chance of Minimizing Back-to-back Lots



The importance of the back-to-back lot arrangement depends, of course, on size of the lots. We make the judgment here that for lots of an acre or larger, this issue is not significant. Therefore we automatically classify any lot of an acre or larger as not back-to-back.

Traffic Congestion Effects One of the most critical effects of new development is the generation of traffic. It is our hypothesis that larger scale development, which tends to incorporate public and commercial services within the development envelope, will result in lower generation of external traffic per residence.

The measurement of traffic generation is extremely complex. The state of the art in established transportation planning is the use of simulation models known as gravity models. It would be impossible in practical terms to account for the travel plans and decisions of current and future residents in a traffic planning area. Gravity models seek to solve the problem by weighing the relative attraction (“gravity”) of destinations against accessibility or travel cost to determine the probable generation of trips from a given residential location. Thus, as a shopping center is more accessible to a subdivision, or is a relatively more attractive center, it will generate more trips from the subdivision.

While such models of traffic generation are supported and used virtually universally by the transportation planning community, there are two reasons why we do not use them in this study. First, for the 477 developments that are part of this study, the cost of using established gravity models appears to be several orders of magnitude beyond the budget of this investigation due to the data requirements involved. Second,

the result would still be a simulated approximation of the effect, without empirical verification.

It is our belief that we still can apply the spirit of the gravity model to our problem with a “low budget” substitute. Because the gravity model is driven by relative accessibility, we can approximate this determinant of trips by focusing on the distance of each development to the closest among similar destinations. We focus on distance to the nearest supermarket (as of October 2003), and distance to the nearest elementary school. Our choice of these two destinations clearly reflects an assumption of neighborhoods with young children. Were we to focus, for example, on professional households, we might be more attentive to access to coffee shops, fitness centers and restaurants. Giving some reinforcement to our choice is that in residential areas coffee shops, fast food restaurants and local “diners” tend to cluster in neighborhood shopping centers along with supermarkets. As for dinner restaurants, because households tend to seek variety, we are compelled, in the absence of additional evidence, to assume that the search for variety creates a randomness of trips that will negate any attempt to relate dinner restaurants trips to proximity within the confines of the market areas studied. As for fitness centers, we simply lack good information at this time to assess their relationship to development scale. Our casual observation, however, suggests that a choice of fitness center may be influenced by the journey to work and the qualities of the center as much as by proximity to residential location.

Another development scenario might be to focus on trips of retirees and empty nesters. In this case, in addition to restaurants, we might wish to identify proximity to financial institutions, to drugstores and to medical offices. Unfortunately, data

limitations prevent us from exploring these possibilities. Somewhat comforting is that these services cluster, to some extent, at the same general locations as supermarkets.

We omit consideration of the journey to work in our investigation. In general, we believe that employment is widely dispersed in the areas that we are studying. We believe that the distances separating the developments within our market areas are too short to be a significant factor in determining place of work for most of the residents in our samples. Thus, though larger developments may contain places of work, most of the jobs involved are just as likely to be held by someone from outside the development as by someone living within. It is important, however, to note possible exceptions to this. For example, Lakewood Ranch, in Manatee County, not only has developed over five thousand residential units, but has created some 2.8 million square feet of office, retail and industrial space. Further, it has 8,600 residential units and nearly 12 million square feet of commercial and industrial space in prospect at buildout. Thus, it has to be regarded as a major employment center to a unique degree, and is likely to contain a very high proportion of internal journeys to work.

In summary, our approach to examining the potential effect of development scale upon traffic generation is as follows: We assume that trips to elementary schools, and to supermarkets or affinity destinations, are taken to the nearest available location. Thus, we investigate whether larger scale developments tend to be associated with shorter external distances to these destinations. If so, then more of the roundtrip will be within the development rather than on external roads, reducing the external traffic impact per household.

4. The Data Base

The data used in this paper are from seven counties of Florida representing six different local housing sub-markets within the state. The submarkets include north Tampa, south and southwest Orlando, the I-75 corridor of Sarasota and Manatee counties, the inland areas of Volusia, St Lucie and Lee counties. All of these are relatively high growth counties, having experienced close to a 40 percent growth in housing units during the 1990s. The features of each sample are shown in Exhibits 3 - 9 at the end of this section. These areas were selected because they all contain a mixture of small and large-scale developments, and could provide sufficient data to conduct the study. In addition, a very large portion of development in these areas represents “greenfield” development.

Characteristics of the market areas are summarized in Exhibit 2. The populations of the metropolitan areas involved, in 2002, range from approximately 338,000 in St Lucie County to 2,490,000 in Tampa (Tampa-St. Petersburg-Clearwater MSA). The land areas of the MSAs range from 803 square miles in the Fort Myers MSA to 2,537 square miles in the Orlando MSA. Within the MSAs, sub-markets were defined based on a combination of opinions of local housing market experts and judgments of the author after examination of housing location patterns, water barriers, road networks, and non-residential land uses. In all of the coastal counties, the housing sub-market was selected to exclude any housing developments with direct access to the coastline.

The database included the complete GIS (geographical information systems) parcel database for each county used. In addition, compatible GIS data were obtained for golf courses, road and street networks, locations of schools and locations of major

grocery stores. Finally, a complete set of GIS compatible aerial photos was obtained for each locality.

Exhibit 2 Sub-market Summary Characteristics					
Sub-market	County	MSA Population: 2002 (000s)	MSA Land Area (Square miles)	MSA Housing Units (000s)	
North Tampa	Hillsborough	2,490	2,553	1,184	
Sarasota-Manatee		620	1,313	337	
	Manatee				
	Sarasota				
South and Southwest Orlando	Orange	1,752	3,490	734	
Fort Myers	Lee	476	804	245	
St Lucie County	St Lucie	338	1,129	164	
Volusia County	Volusia	517	1,588	248	
Source: Selected Tables, <i>Florida Statistical Abstract 2003</i> , University of Florida Bureau of Economic and Business Research					

From the property parcel records, all single family lots were selected, including single family detached, and single family attached. Townhouses and condominiums were excluded, as were multiunit residential rental properties.

Developments For the study it was necessary to identify residential developments of varying size. However, a major challenge was that the concept of a development is not one recognized or used in the usual course of local area land use data management. A subdivision, for example, is a legal concept, and numerous sub-divisions commonly are involved in a particular development. Integrated ownership is not a reliable indicator since developments, even before lots are sold, may be assembled in stages, with the owner of record being different as ownership of the project changes over time.

Neighborhood, a concept used by appraisers and property tax authorities, often represents

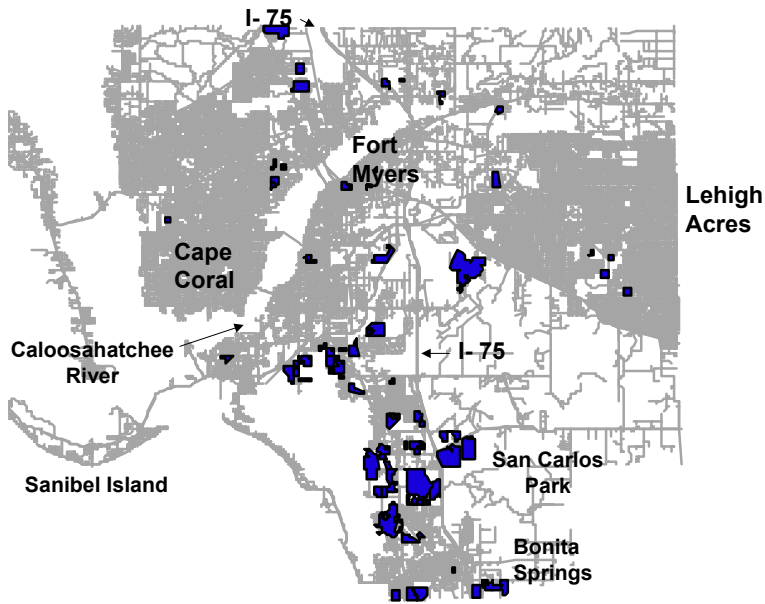
properties with similar structural and lot features but not necessarily contiguous. Not surprisingly, subdivisions of the U.S. Census such as blocks or tracts have no relationship to historic land developments. Traffic analysis zones, used in transportation planning, normally are built from the U.S. Census subdivisions. For this study, therefore, it was necessary to create criteria for identifying residential developments. This involved numerous judgment calls both in constructing criteria and in applying them. The criteria evolved included the following:

- Contiguous land parcels.
- Integrated street system with internal circulation.
- Common theme in subdivision names (where it existed).
- Absence of internal barriers (water, highways).
- Common land planning characteristics.
- Developed and marketed within a common time interval.
 - Substantial percentage of houses built in mid-1990s (at least 30 percent).
 - Average year of house construction 1990 or later.
 - Having achieved substantial sales (approaching 50 percent, at least).
- Predominantly single family, owner occupied. (As opposed to townhouse, condominium or rental.)

The developments used here are further restricted to exclude mobile home communities, ocean-side developments and “ranchettes” or semi-rural developments with over two acres per lot. Another exclusion, somewhat unique to three of our study counties is the presence of post-World War II interstate land sales developments. Vast areas of Florida were platted into grids and sold by firms such as General Development

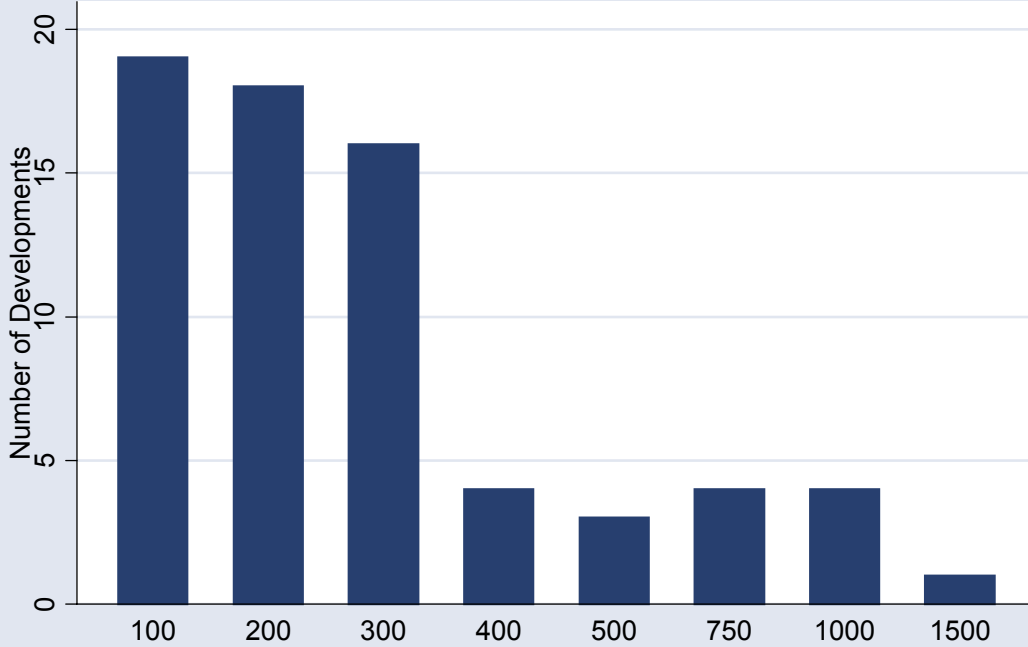
during the 1960s and 1970s. In Volusia, St Lucie and Lee counties large sections of the county were subdivided, but remained sparsely populated for decades. In the late 1980s and 1990s, the period covered by our investigation, many clusters within these vast grids have experienced a revival, and extensive homebuilding. However, in most cases the development infrastructure remains as it was several decades earlier. Thus, despite the presence of predominantly new homes, the development does not reflect modern practices and standards. Therefore, unless we see evidence of replatting or evidence of newly developed land within these grids, we exclude them from our study.

Exhibit 3 Lee County Sample of Developments



Lee County Developments By Size

Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 69

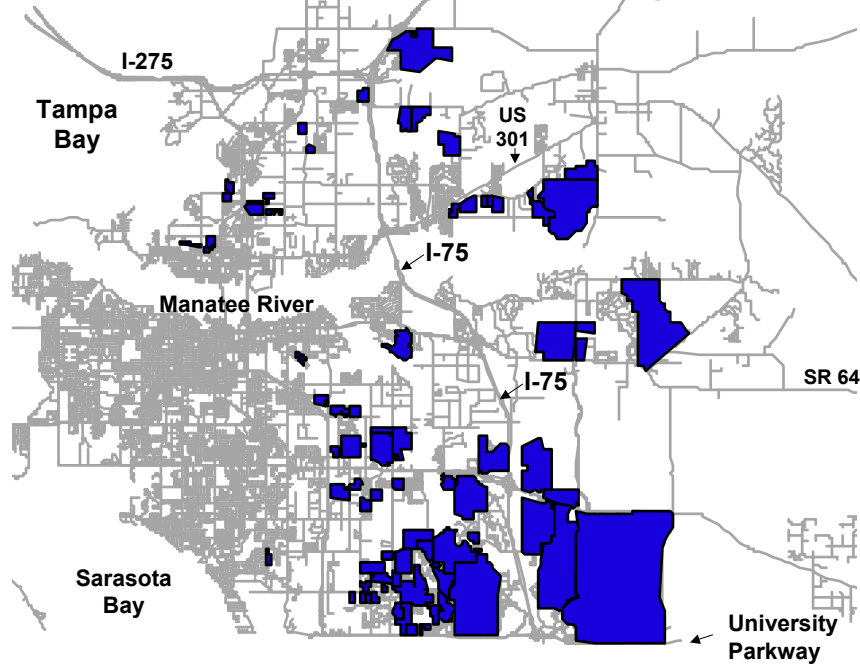
Mean Development Size: 264

Median Development Size: 169

Minimum Size: 48

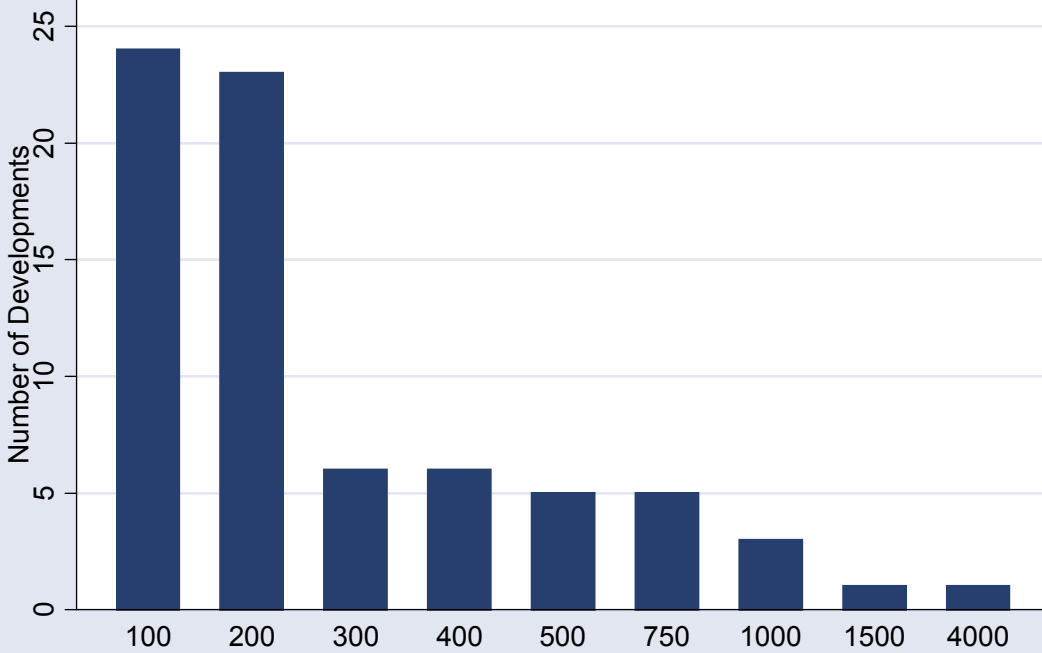
Maximum Size: 1,758

**Exhibit 4
Manatee County Sample of Developments**



Manatee County Developments By Size

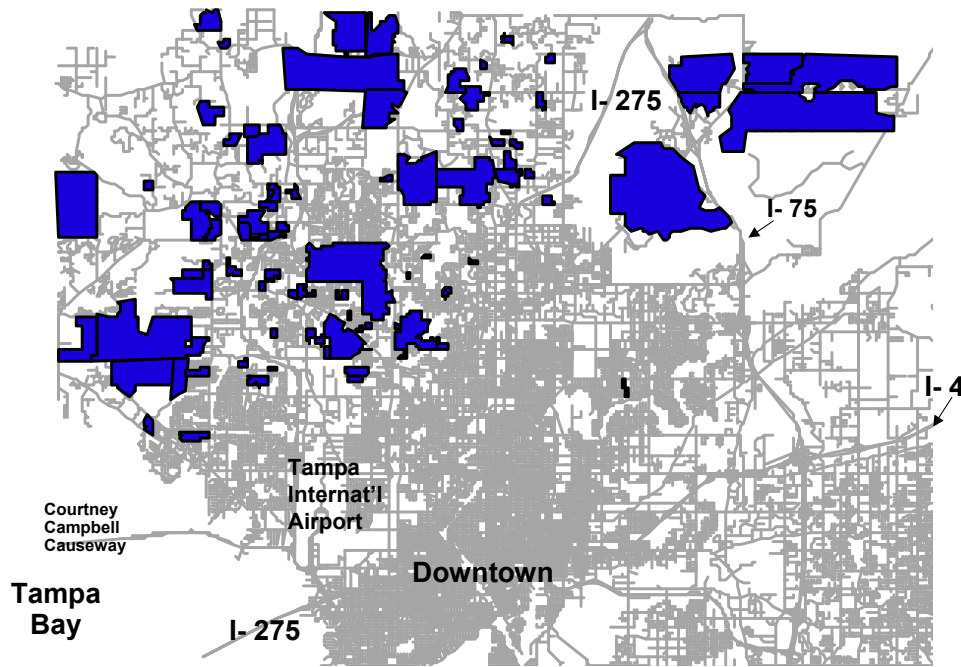
Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 74
 Mean Development Size: 285
 Median Development Size: 148

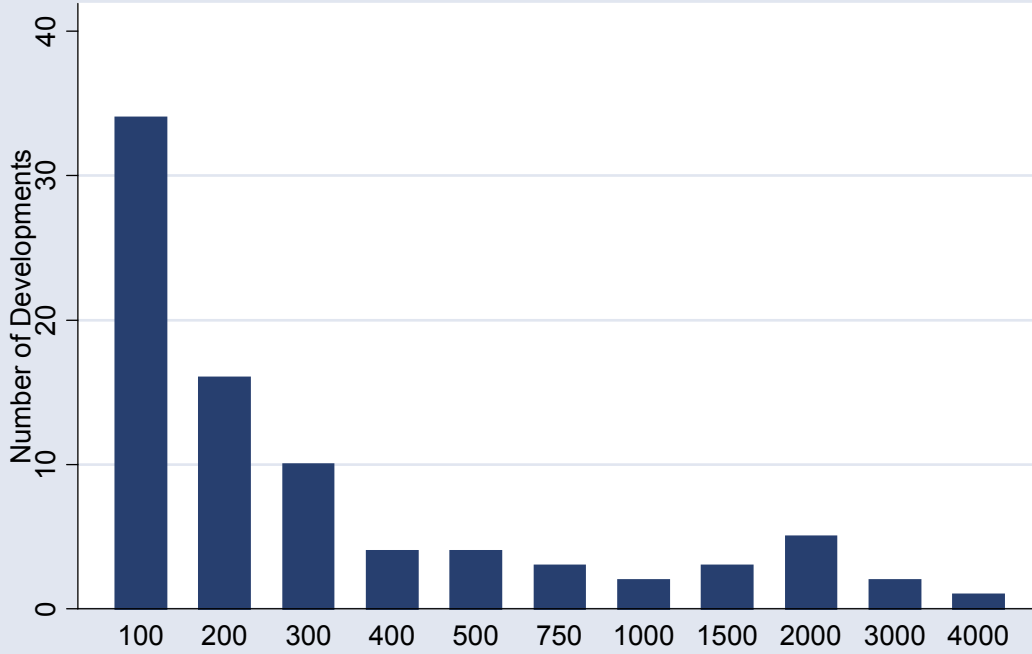
Minimum Size: 32
 Maximum Size: 4,176

**Exhibit 5
North Tampa Sample of Developments**



North Tampa Developments By Size

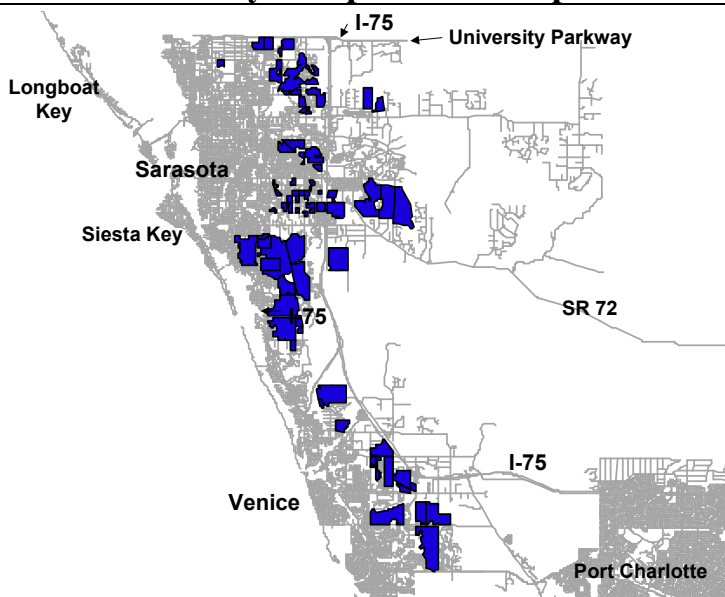
Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 84
 Mean Development Size: 393
 Median Development Size: 144

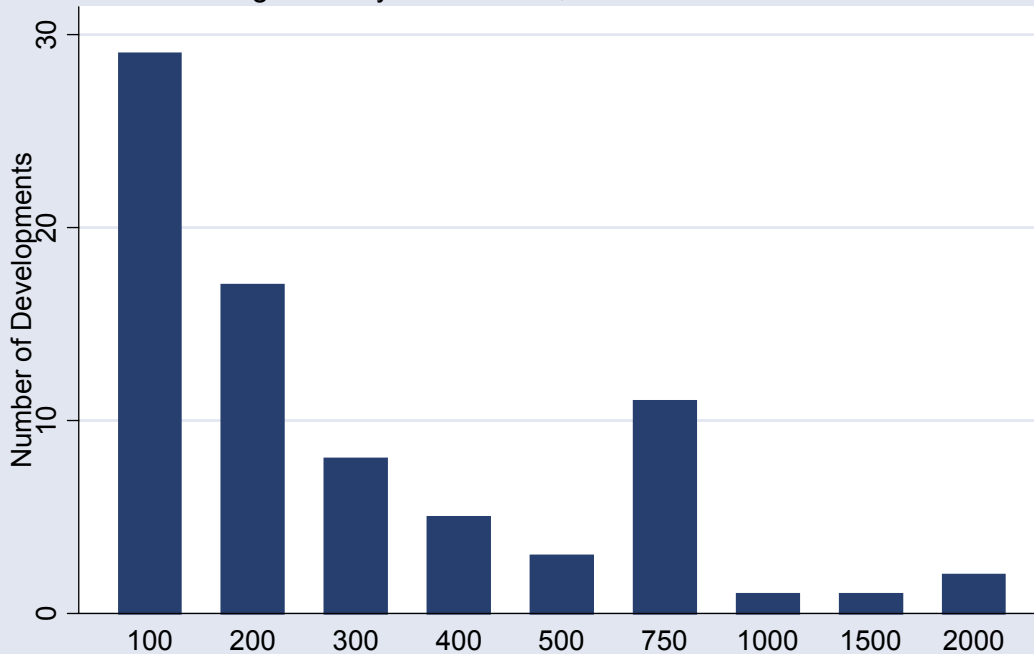
Minimum Size: 18
 Maximum Size: 3,157

Exhibit 6 Sarasota County Sample of Developments



Sarasota County Developments By Size

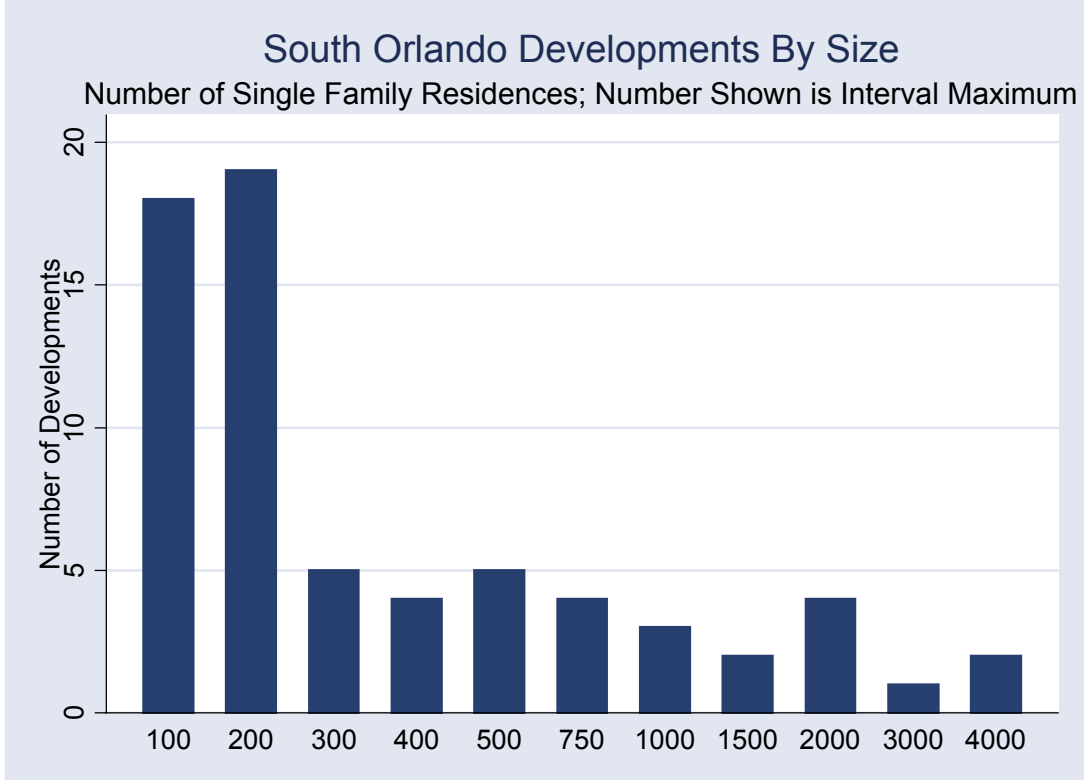
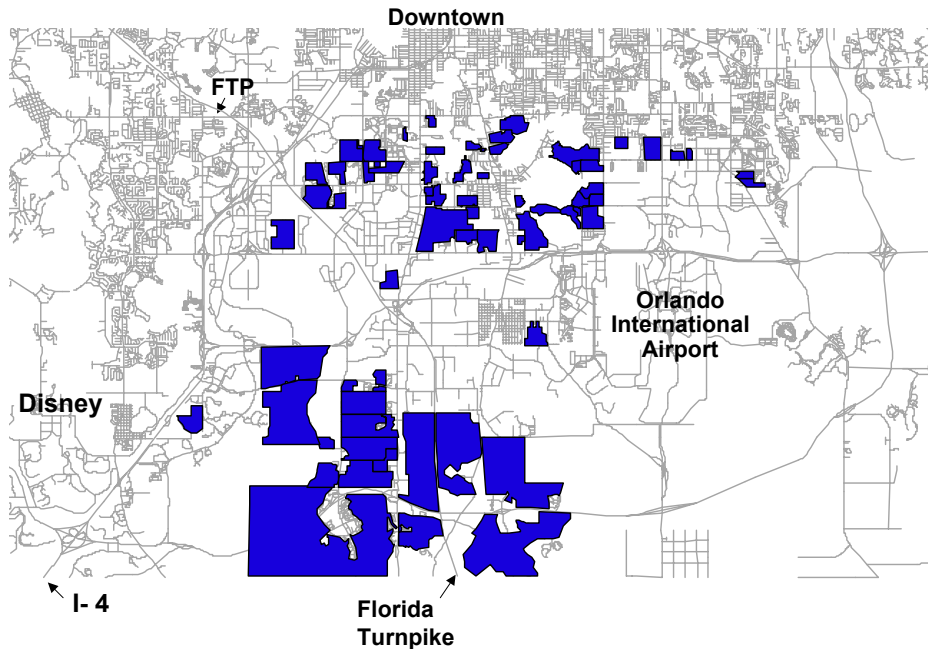
Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 72
 Mean Development Size: 290
 Median Development Size: 148

Minimum Size: 19
 Maximum Size: 1,702

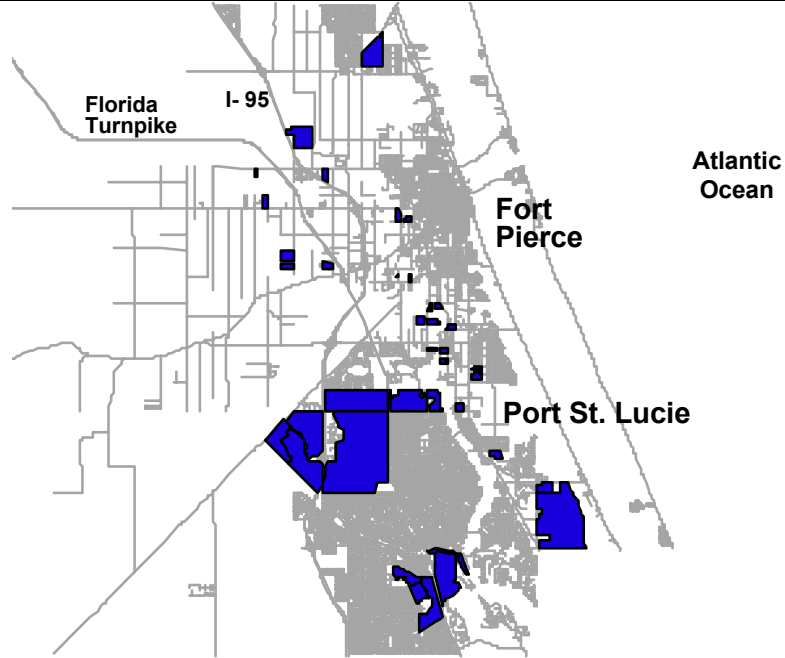
Exhibit 7 South Orlando Sample of Developments



Total Number of Developments in Sample: 67
 Mean Development Size: 496
 Median Development Size: 174

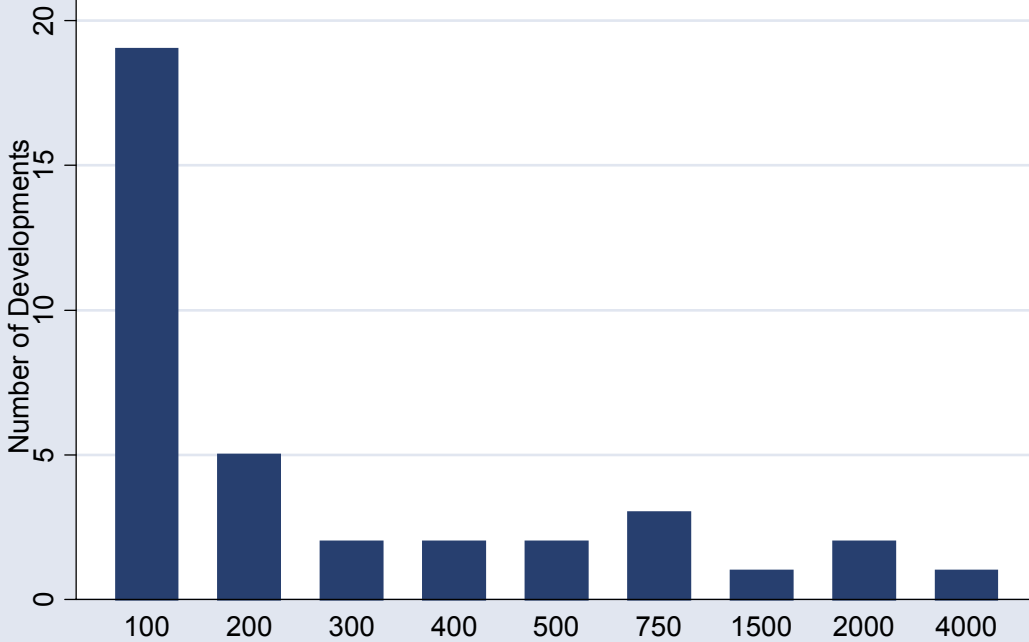
Minimum Size: 37
 Maximum Size: 4,634

**Exhibit 8
St Lucie County Sample of Developments**



St. Lucie County Developments By Size

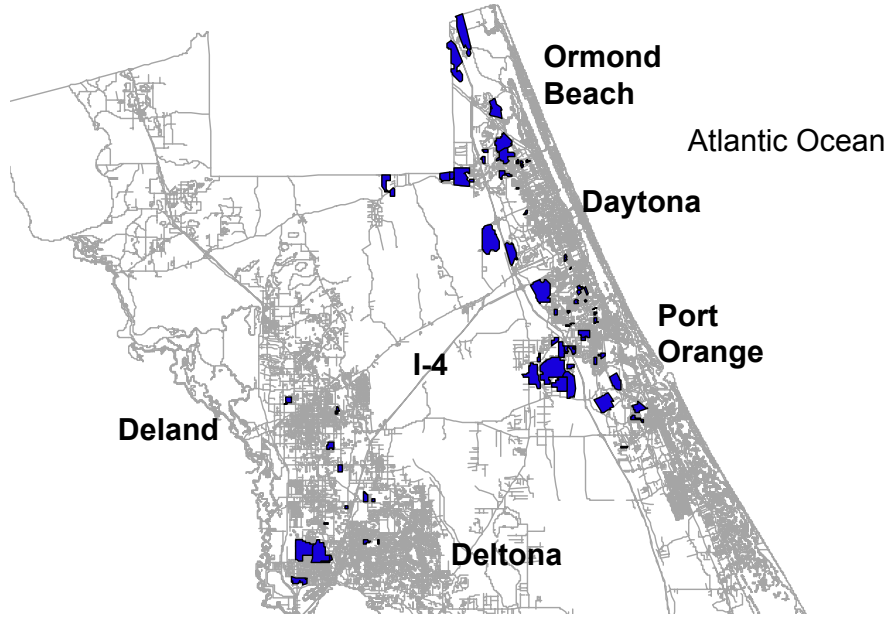
Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 37
 Mean Development Size: 431
 Median Development Size: 89

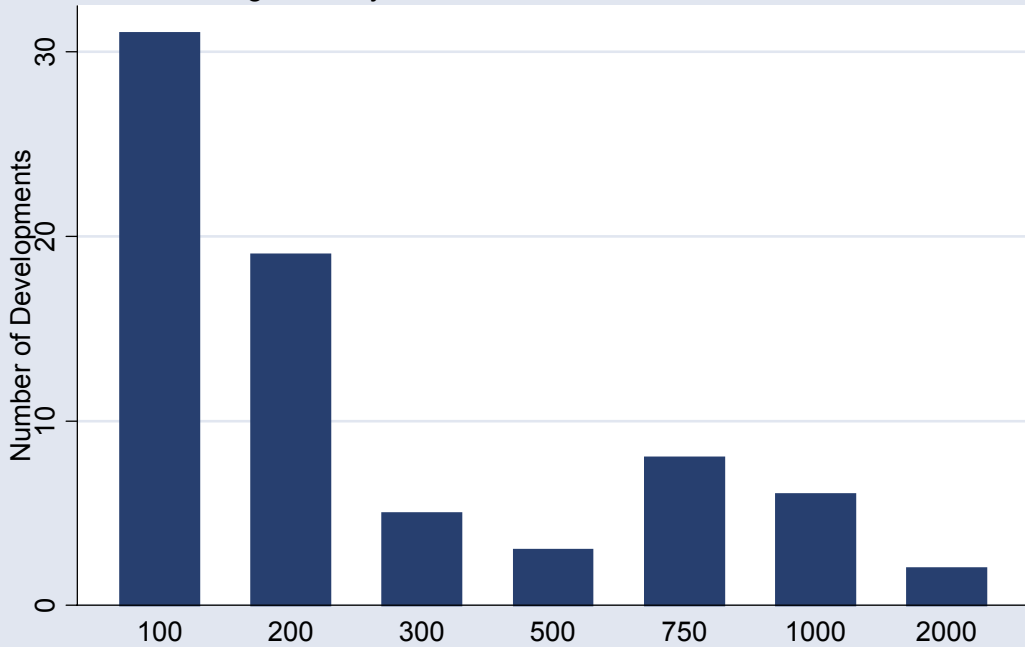
Minimum Size: 12
 Maximum Size: 5,752

**Exhibit 9
Volusia County Sample of Developments**



Volusia County Developments By Size

Number of Single Family Residences; Number Shown is Interval Maximum



Total Number of Developments in Sample: 74
 Mean Development Size: 291
 Median Development Size: 112

Minimum Size: 13
 Maximum Size: 1630

5. The Effect of Development Size on Prices of Homes

The most comprehensive measure of residential development “value added” is the effect of the development on the price or value of the residences within. A primary effort of this study is to examine the “value added” associated with development size. For the developments previously identified in the seven counties of the study, all available records of residential sales were considered for use in multivariate regression analysis.

The application of statistical regression analysis to housing prices is a long established approach of housing economists and property appraisers. Known as hedonic analysis, it is based on the idea that the price of a complex good can be decomposed into its component influences. The approach enables us to isolate the effect of scale upon price by first measuring and controlling for other major factors that we know affect the price of housing.

The samples of the study have been restricted in several important respects. First, sales at prices below \$70,000 were eliminated. This is in part because the lower threshold of “arms-length,” unsubsidized housing transactions appears to have been somewhere around that figure in recent years. Further, experience of the author with sale prices significantly below \$70,000 suggest that the recorded prices become subject to a number of distortions, such as the effect of contracts for deeds, installment sales, and even data errors. Sales with prices above \$2,000,000 also were excluded under the assumption that these sales are not part of the same markets as those in lower ranges. Finally, sales of residences built before 1985 were excluded since many of them are associated with development older than we want to use.

For this study, a relatively small set of “hedonic” variables are selected.¹¹ From the records of the respective property tax authorities these variables are used:

- Most recent sale price in log form (dependent variable)
- Year of the recorded sale. (Each year is used as a separate indicator variable.)
- Number of years between effective year built and year of sale. (Also use as a separate indicator variable for the number of years)
- Effective size in square feet of heated area, in log form.
- Property appraiser’s assessed value of the structure for the latest date available, in log form.

The assessed value is used to serve as a proxy for the hedonic characteristics of the structure.¹² Using only structure assessed value rather than total assessed value is an effort to account for structure characteristics only rather than location characteristics, since the latter would include development effects. A disadvantage of using a single-year assessed value is that the structure may have changed since the last recorded sale. Despite this, the variable has persuasive attraction. The core argument for it is that the property tax assessor has far more information about the structure characteristics than is available in large-scale public data sets such as are used here. Further, the appraiser already accounts for the specification problem always present in evolving a hedonic equation. That is, it absolves us from needing to decide precisely how the many features of a house interact to create value, such as number of rooms, size of rooms, layout, materials quality and so forth. Thus, we can exploit the superior data and specification knowledge of the local property tax appraiser by using the structure assessed value as an argument in our equation.

¹¹ Hedonic is the term economists use to refer to the analysis of an item’s price by dissolving the total price into the result of multiple components with individual component prices. The analysis is accomplished using multivariate statistical regression analysis. For an example and explanation see Ling and Archer, 2005. The method is further explained in any basic econometrics text such as William H. Greene, *Econometric Analysis*, Prentice Hall, multiple editions.

¹² The use of structure appraised value follows work of Clapp, Giacotto and Tirtiroglu, 1991.

In addition to data from the local property tax appraisers, we add seven original variables to our regression:

- Development size, in log form. (Created as the sum of all lots within each development.)
- Golf course (An indicator variable created for lots adjacent to a golf course.)
- Nature view (An indicator variable created for lots adjacent to permanent natural areas)
- Water (An indicator variable created for lots adjacent to a pond or other water body.)
- Main road (An indicator variable created for lots adjacent to a major arterial road)
- Back-to-back (An indicator variable created for lots that are back-to-back with another lot.)
- Vintage of the development, as indicated by the average year built for the houses within it.

The most important of these is our primary test variable, development size. This variable represents the number of ownership residential lots (single family detached, and single family attached) within each defined development. The next five variables are lot features derived from lot-by-lot inspection of the included developments. Using aerial photos and other GIS-based data, we have sought to identify lots that are on a golf course, on substantial water, adjacent to natural areas, or adjacent to a main arterial road. In addition, we have distinguished lots that “back up” to another residential lot. The first three lot characteristics are expected to add value to lots, while proximity to a main arterial road is expected to decrease lot value. Finally, to control for possible variation in development characteristics over time we created vintage. Its expected effect is not clear.

The identifier of lots backing up to another residential lot has special significance. As discussed above, inspection of a large number of our 500 plus sample developments suggested that this variable could be an important index to development quality. Having a lot that affords privacy and possibly open space adjacent to the back yard hardly needs

to be defended as a positive feature. But it may also correlate with a general commitment to higher quality land planning in other dimensions as well. It is tested here for its effect on value, and then examined more carefully for its relationship to development scale. We believe that the effect of our “back-to-back” measure is more important as development lots are smaller. Thus, for lots of an acre or more, we would not expect the variable to be a significant factor.

Inevitably, some judgment is required in classifying lots, especially with respect to being adjacent to water or natural areas. Retention ponds and sinkholes with water had to be several times the size of the adjacent lots for us to recognize them in our classification. With respect to natural areas, if an undeveloped area in question appeared to be “ripe for development” it was not classified as a permanent natural area. For this purpose, we relied on the best available information in the property appraiser parcel files, upon aerial photos of the surrounding area, and upon county land use plans.

In addition to the variables above in the hedonic equation, binary indicators of the year of sale are included for sales in 1985 through 2002. Similarly, indicator variables for the age of the structure at time of sale were created. Since both of these types of variables are for the purposes of controlling influences on prices irrelevant to the study, we do not report their coefficients here. With some exceptions, both sets of indicators are highly statistically significant, and have a plausible pattern in that the year of sale coefficients increase through time in a reasonable progression while the age at sale variables show a pattern of declining price with age.

One concern that might arise with the adequacy of our price data is the effect of fees charged by homeowners associations. Such fees can range from nothing to several

hundred dollars per month. Unless the services generated by these fees substitute for ones that the homebuyer would have purchased voluntarily, the fees represent added cost for the residence, and will tend to be “capitalized” into the price. That is, a homebuyer will pay less for the same residence and services as the fee is greater. Fortunately, an industry source enabled us to examine homeowners fees for about seventy different current residential developments in Orlando.¹³ We conclude that there is no pattern in the fees that would affect our study in an adverse manner. Fees appear to vary as much across individual developments as they do among developments. Further, a substantial part of the services offered in high fee developments is for yard service, which many homeowners would voluntarily seek.

Exhibit 10 reports hedonic regression results for the seven counties of the study. Each equation uses the same variables. The most important result is that in all of the seven samples, development size has a positive effect on observed prices, with six of seven cases being statistically significant. (Five cases are significant at beyond the one-percent level of confidence, indicating that there is less than a one percent chance that the result is accidental.)

While the remaining variables on the hedonic regressions are essentially for the purpose of control, their coefficients deserve some comment. In all cases the structure appraised value has a positive and highly significant explanatory power. In six of seven samples the log of structure size has a significantly positive effect on sale price, as expected. It is not completely surprising that in one case (Orlando) this variable has a negative effect. This could arise because appraised value can largely account for size, causing the size variable to be redundant, and to become a proxy for other, unknown

¹³ Data on fees were provided to us by the Orlando firm, ResDev.

influences. Vintage of the development is significant in all counties except Manatee, with the effect being negative in St Lucie County and Sarasota.

Results for the lot characteristic variables generally follow expectations. In five counties golf course lots show a very significant positive premium. For the Sarasota and Tampa samples, the effect of golf course access is insignificant. Waterside lots show a significant positive premium in four of the seven samples. In Manatee, on the other hand, for reasons not yet understood, they show a significant negative effect. Being adjacent to a main road results in a significant negative effect on price in five of the seven samples, with no significant effect in the remaining two. Proximity to a natural area has a significant positive effect in five counties, while it has a significant negative effect in Sarasota, and an insignificant effect in Volusia.

The results of our back-to-back lot variable are particularly interesting. In every case it exhibits a highly significant negative effect. This appears to confirm our idea that the variable is a significant measure of development quality. If, as we later show, the incidence of back-to-back lots decreases with development scale, we should regard it as a dimension of the effect of development scale, and should expect it to preempt some of the influence of the scale variable. However, only in the case of Sarasota do we see this occur. When the back-to-back variable is dropped from that regression, the scale coefficient increases slightly, and becomes significant at a higher level.

Broadly, our assessment of the regressions is that the resulting coefficients have a pattern which, with few exceptions, is very consistent with our expectations. This give us considerable confidence in the meaningfulness of the results.

Table 3
 Regression Analysis of Individual Residence Sale Prices
 (Dependent variable is log of sale price. Lower number is t-value)

Sub-market	County	Develop- ment Size	Structure Appraised Value (2003)	Vintage of Develop- ment	Structure Size (Sq. Ft.)	On Golf Course	Adjacent To Water	Close to Main Road	Nature View	House Back- to-back with Another	Adj. R ²	Sample Size
Sarasota – Manatee	Sarasota	0.0076† 1.79	7.38e-07 8.51**	-0.0027 -2.34*	0.1995 6.42**	0.0002 0.0012	0.0319 4.18**	0.0095 0.55	-0.0233 -2.03*	-0.0339 -3.49**	0.4948	10,259
Sarasota – Manatee	Manatee	0.0011 0.36	0.3645 21.74**	0.0015 1.20	0.1042 4.38**	0.0404 4.46**	-0.0246 -3.56**	-0.0602 -2.68**	-0.0214 1.39**	-0.0237 -3.07**	0.402	13,509
Fort Myers	Lee County	0.0078 2.27*	0.5886 41.86**	0.007 6.29**	0.1490 7.08**	0.0927 14.32**	0.0183 2.89**	-0.0437 -2.45**	0.0198 1.99*	-0.1046 -7.55**	0.56	11,273
North Tampa	Hills- borough	0.0092 6.52**	0.3684 33.18**	0.0066 10.14**	0.5534 37.91**	-0.0066 -0.78	-0.0088 -1.63	-0.0344 -2.26*	0.0139 2.02*	-0.0288 -7.97**	0.698	19,597
South Orlando	Orange	0.0098 10.61**	1.1389 93.92**	0.0058 16.24**	-.2875 -21.33**	0.0498 14.42**	0.0281 11.19**	-0.0114 -2.60**	0.0090 2.82**	-0.0174 -8.56**	0.891	15,881
St Lucie Co.	St Lucie	0.0194 7.51**	0.4735 28.53**	-0.0064 -4.74**	0.4668 21.41**	0.0902 8.11**	0.0349 5.19**	-0.1070 8.11**	0.0561 6.73**	-0.0267 -3.49**	0.713	4,939
Volusia Co.	Volusia	0.0252 10.81**	0.5820 36.82**	0.0036 5.12**	0.3193 16.81**	0.0767 12.20**	0.0036 0.68	0.0055 -0.30	0.0071 1.00	-0.0273 -4.16**	0.706	8,642

Samples are restricted to sales within identified developments.

Sample is restricted to structures build after 1984 with less than 5000 square feet under roof.

Sales are restricted to sale prices greater than \$70,000 and less than \$2,000,000.

†Coefficient increases to 0.0090, with 3 percent significance, when “back-to-back” variable is excluded from the regression.

**Statistically significant at beyond the 1 percent level.

*Statistically significant within the 2 to 6 percent level.

Effect of Development Scale To illuminate our central results, the effect of scale on prices, we perform some simple simulations. The coefficient shown for scale of development can be viewed as an elasticity, that is, it shows the percentage change in price related to a one percent change in scale. In Exhibit 11, we explore this effect for a hypothetical case where development size is either at the market median or at 1000 units. We explore what difference this makes in the price per residence. We can find the answer by simply calculating the ratio of the larger to the smaller development size, and multiplying this ratio by the regression coefficient. The results range from a low of 0.7 percent in Manatee County to 22.5 percent in Volusia County. The average result across the samples is a very large 9.45 percent. The interpretation is this: Developments with 1,000 residences in the counties studied should, on average, result in a 9.45 percent higher house price than for the same house in a median size development.

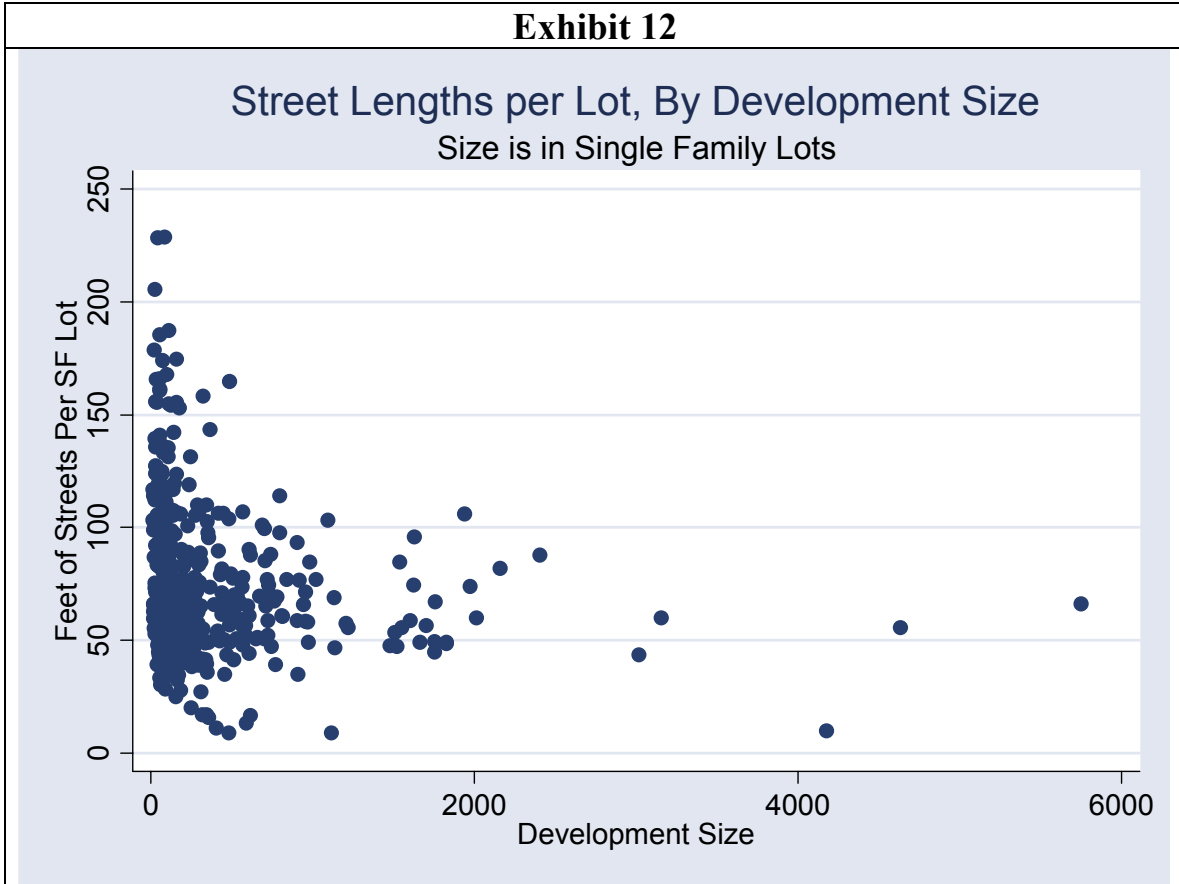
Exhibit 11 Exploratory Simulation of Increase in Average House Price Resulting from 1,000 unit Development Instead of Median Size					
Sample	Median Size of Developments	Assumed Size of Larger Scale Development	Ratio of Median to Larger Scale Development Size	Coefficient of Effect of Scale	Projected Percentage Increase in Value Per House
Sarasota County	147	1,000	6.80	0.0076	5.2 percent
Manatee County	148	1,000	6.76	0.0011	0.7 percent
Lee County.	169	1,000	5.91	0.0078	4.6 percent
North Tampa	144	1,000	6.94	0.0092	6.4 percent
South Orlando	174	1,000	5.75	0.0098	5.6 percent
St. Lucie County	89	1,000	11.24	0.0194	21.8 percent
Volusia County	112	1,000	8.93	0.0252	22.5 percent
Average Percentage Increase					9.45

6. Results for Non-price Effects of Scale

We have focused on three aspects of development which we believe proxy for non-price, community effects resulting from larger development. First is the compactness of the development, or minimizing of disruption of the development site. Second is overall investment in land planning, which we proxy by the ratio of lots back-to-back. Third is effect on external traffic. In addition, we should note the possible effect of our findings for the property tax base of a community. We report results below.

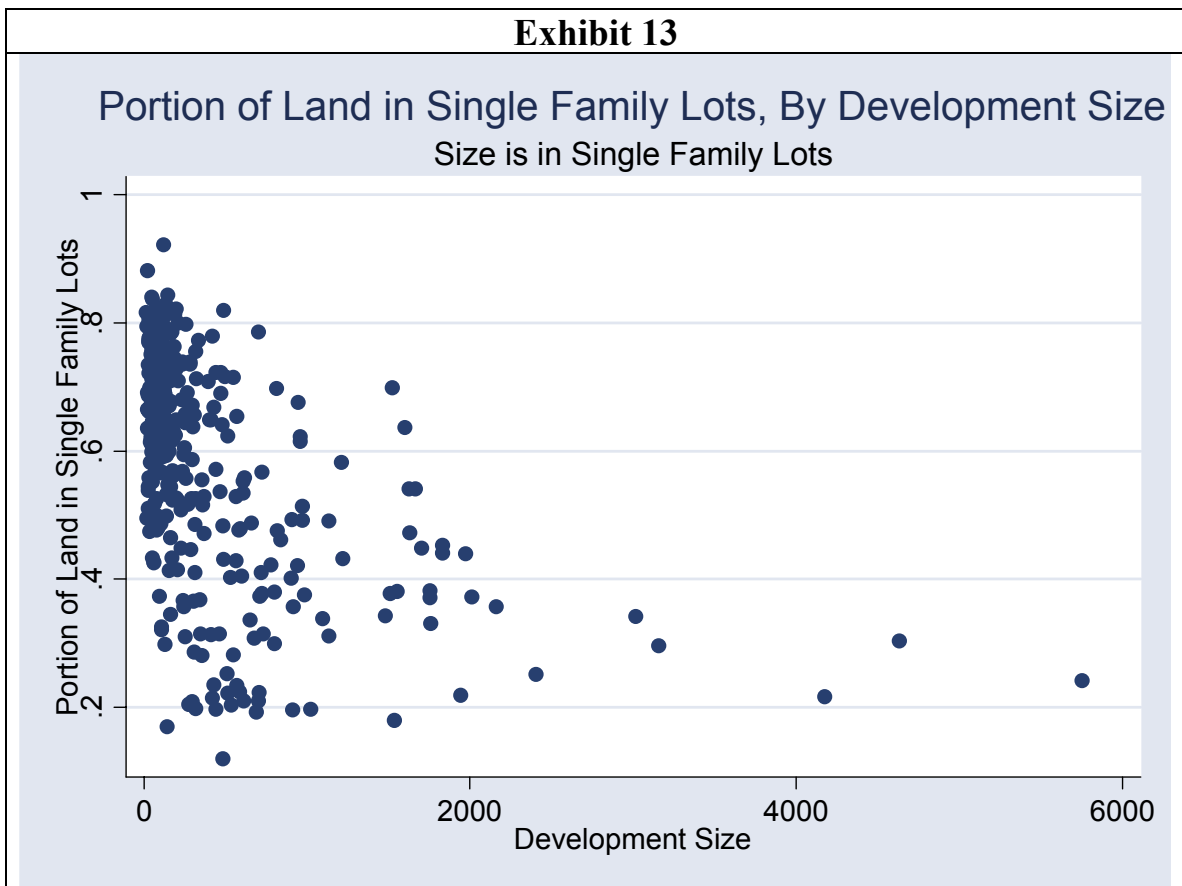
Compactness To examine compactness we first devised a ratio of the length of streets per lot. While very instructive, it is not a perfect measure. In particular, it will “reward” not only efficient layout of a good development, but it also will “reward” highly compacted, low quality development wherein all of the space is converted to small lots. Nevertheless, it represents a necessary condition, so to speak, for quality development in that high street length per lot seems unambiguously to indicate very land consumptive development practice. Exhibit 12 shows our results for our final sample of 477 developments. We see that there is, as expected, a decline in the maximum street length per lot as the scale of development increases. This is a clear positive effect. However, it is still ambiguous relative to the smaller developments with low streets per lot. We believe that some of the smaller developments have, indeed, engaged in effective land planning to achieve their low ratio. However, others, as noted, have attained the low ratio by conserving very little open space.

Exhibit 12



Our second measure of development efficiency or compactness gets more directly at open space conservation. We construct the ratio of the total area of platted lots to total area of the development. Thus, as this ratio is lower, the development is preserving more open space for uses without structures. We cannot, in the present study, examine the detailed mix of uses. Quite simply, what our ratio indicates is what portion of the land the developer retains for all open space uses, including parks, preservation areas, golf courses, water, and other uses. In Exhibit 13 we show how this ratio varies with development size for our 477 developments. We find the results quite dramatic. There is a clear, very strong (highly statistically significant) decline in the percentage of land used

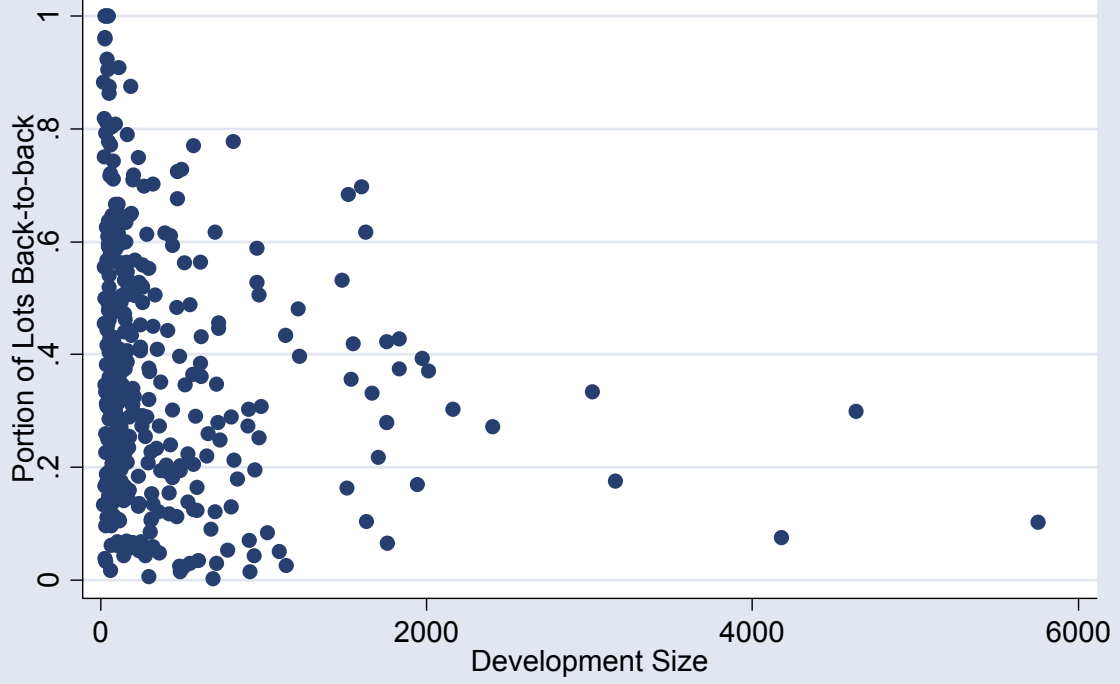
for private lots as development size increases. As with any ratio in the richly varied world of land development, this one has much variation. Nevertheless, it declines from a rough average of 67 percent among developments smaller than median (147) to under 40 percent for all developments larger than 500 single family homes. This represents a near doubling of free space as scale goes from below to above median size. We take this to be dramatic evidence that larger developments generally are motivated and able to design with a larger community in mind, one which may extend beyond the confines of the development itself to the extent that the “free space” is put in public parks, preservation areas, to management of water flows, and to energy preserving uses.



Quality of Land Planning Neither compactness ratio addresses directly how well a development is planned. As discussed above, we have concluded that a significant indicator of the thoughtfulness and creativity in land planning – perhaps even the degree of awareness of community – is the percentage of lots that are placed so that they are not back-to-back to another lot. Indeed, as noted above, we find there to be a strong and persistent effect of this characteristic upon the value of residences, as measure in section 5. In Exhibit 14 we show the relationship between this proxy for land planning and development scale. We see in our sample a rather strong relationship between the incidence of lots with “private” backyards and development size. We take that to be an indication that one way that larger development implements its advantages is through higher quality planning, part of which is an arrangement of lots that support greater privacy, and, likely a more comfortable community.

Exhibit 14

Portion of Lots Placed Back-to-Back, By Development Size
Size is in Single Family Lots



External Traffic Effects Our third proxy for community benefits of larger development concerns generation of external traffic. As discussed earlier, it was not feasible in our study to analyze traffic flows in the same manner as transportation planners do, using “gravity” models, because of cost. However, we feel that we have been able to identify two indicators that serve as reasonable proxies for the gravity model analysis, namely distance to the nearest supermarket and distance to the nearest elementary school. Again, the idea is that trips to these two locations represent a major component of the external traffic that can be influenced by development scale. Exhibits 14 and 16 show our results, and, again are rather dramatic. We see a very strong decline in the estimated “external” travel to the two destinations. We take this to be a powerful indicator that larger developments tend to provide for supermarkets (neighborhood shopping centers) and elementary schools within the development envelope, with the result that reliance on external roads can be significantly reduced.

Effect of Scale on Property Tax Base Our analysis of effect of scale on prices, in Section 5 has implications for the property tax base of the local community. To the extent that larger scale residential development increases prices paid for residences it also increases the taxable value of the residence even more. For example, following our example in Exhibit 11, if a house bringing \$200,000 in a median size development were offered in a development of 1,000 units, it would be expected to sell for 9.45 percent more, or \$218,900. We will assume that the house is valued for taxes at about 85 percent of market value, or \$170,000 in the median development and \$186,000 in the larger one. But the owner-occupied home normally enjoys a Florida homestead exemption of \$25,000. Thus, the taxable value in the median development is \$145,000, while the

taxable value in the large development is \$161,000. This increase in taxable value from the median development to the larger one is 11 percent. While the magnitude of the property tax effect depends entirely on the comparison chosen, in all cases the effect on property taxes due to a development scale premium is magnified by valuation conventions of county property appraisers and by the Florida homestead exemption.

Exhibit 15

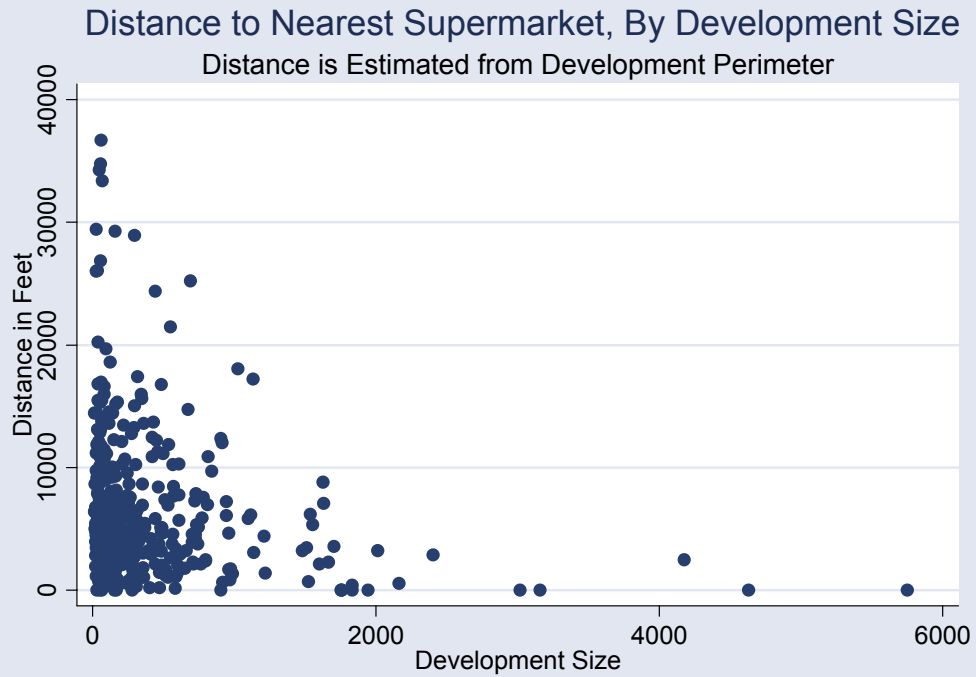
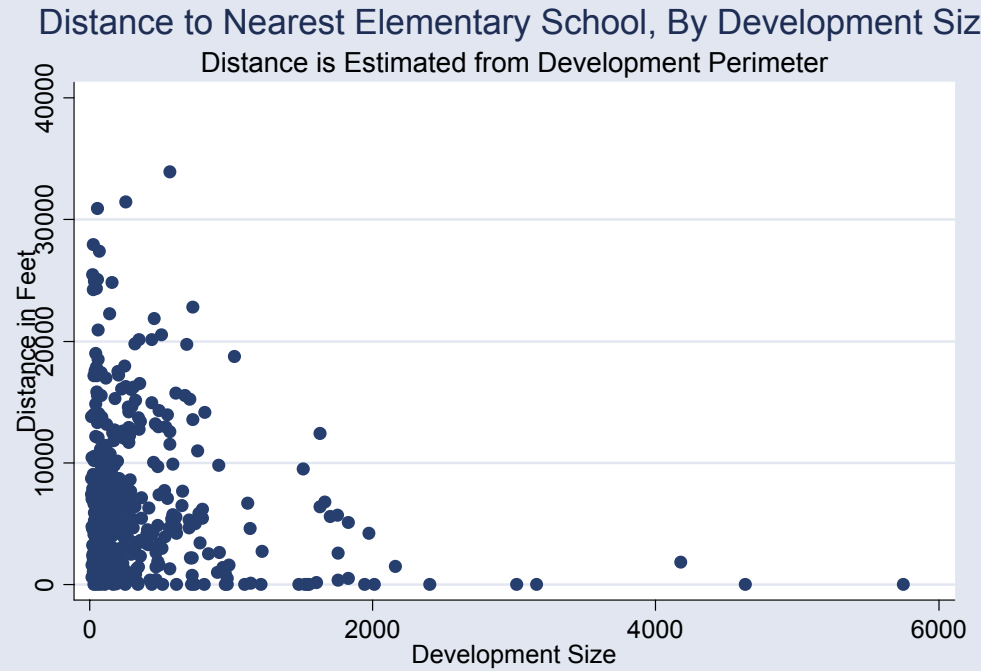


Exhibit 16



7. Conclusions

There is little doubt that most of the residential development in Florida's future will need to be "Greenfield," or on undeveloped land. The form and character of that development will be greatly affected by policy and practice in land use controls. This study was prompted by the recognition that encouraging larger scale "greenfield" development may be preferable for several reasons both for residents and for the community. These reasons include the fact that larger scale development should mitigate widely recognized externalities in land use, it may benefit from both private and public efficiencies or economies of scale, it may reduce the risks of homeowners in ways that zoning and other local controls are less effective in accomplishing, and it can facilitate more compact land use with resulting benefits to the environment, to natural systems, and to the quality of community life.

Due to the enormous complexity and variation in development it is very hard to test the hypotheses posed above. Nevertheless, by assembling an unprecedented amount of data on actual developments, we believe we have been able to derive important evidence concerning effects of development scale. We have shown that an unambiguous premium in price is associated with larger development. Comparing to the median size development in the market, the average of this effect, over our sample of developments from seven counties is about 1.25 percent for a development twice the median size, or 12.5 percent for a development ten times the median size. We interpret this to mean that homebuyers find residences preferable in larger scale developments, all else equal, for some combination of the reasons we have enumerated.

Recognizing that house prices do not fully capture the effects of development scale on the community at large, we have sought to devise and examine proxies for important community effects. As indicators of compact development and of conservation of open spaces, we have used the length of streets per residential lot and the percentage of the total development space, net of non-residential improvements, that is used by residential lots. As a proxy for quality planning in development we use the percentage of lots that are back-to-back. Finally, to proxy for the generation of external traffic, we compared the distance from each development to the nearest supermarket/neighborhood shopping center and to the nearest elementary school. For every one of these proxies of non-price effects of development scale, we find a clear and strong pattern among our 477 sample developments indicating that scale has a beneficial effect on the ratio in question. Finally, we note that the price premium which our data reveals implies a corresponding increase in the property tax base associated with larger scale development, and that this premium is amplified slightly by the combination of current property tax valuation guidelines and by the Florida homestead exemption.

References

- P. K. Asarbere, F. E. Huffman, Negative and Positive Impacts of Golf Course Proximity on Home Prices, *The Appraisal Journal* (October 1996) 351-355.
- J. M. Clapp, C. Giaccotto and D. Tirtiroglu, Housing Price Indices Based on All Transactions Compared to Repeat Samples," *AREUEA Journal*, 19 (1991) 270-285.
- E. D. Benson, J. L. Hansen, A. L. Schwartz, G. T. Smersh, Pricing Residential Amenities: the Value of a View, *Journal of Real Estate Finance and Economics*, 16 (1) (1998) 55-73.
- R.H. Coase, The Problem of Social Cost, *Journal of Law and Economics*, 3 (1960) 1-44.
- T. M. Crone, Elements of an Economic Justification for Municipal Zoning, *Journal of Urban Economics*, 14, (1983) 168-183.
- T. V. Cao, D. C. Cory, Mixed Land Uses, Land-Use Externalities, and Residential Property Values: A Re-evaluation, *Annals of regional Science* 16 (1981) 1-24.
- D. M. Grether and P. Mieszkowski, The Effects of Nonresidential Land Uses On the Prices of Adjacent Housing: Some Estimates of Proximity Effects, *Journal of Urban Economics*, 8 (1980) 1-15.
- R. E. Greison and J. R. White, The Existence and Capitalization of Neighborhood Externalities: A Reassessment, *Journal of Urban Economics*, 25, (1989) 783-786.
- G. T. Grudnitski, A. Q. Do, Adjusting the Value of Houses Located on a Golf Course, *The Appraisal Journal*, (July 1997) 261-266.
- J. F. Kain, J. M. Quigley, Measuring the Value of Housing Quality, *Journal of American Statistical Association*, 65, (1970).
- J. E. Kohlhase, The Impact of Toxic Waste Sites on Housing Values, *Journal of Urban Economics*, 30, (1991) 154-173.
- M. M. Li, H. J. Brown, Micro-Neighborhood Externalities and Hedonic Prices, *Land Economics*, 56 (May, 1980).
- R.G. Michaels and V. K. Smith, Market Segmentation and Valuing Amenities With Hedonic Models: The Case of Hazardous Waste Sites, *Journal of urban Economics*, 28, (1990) 223-242.
- R.B. Palmquist, Valuing Localized Externalities, *Journal of Urban Economics*, 31 (1992) 59-68.

Y. Song and G.-J. Knapp, New Urbanism and Housing Values: a Disaggregated Approach, *Journal of Urban Economics*, 54 (2003) 218-238.

J. Weicher and R. Zerbst, The Externalities of Neighborhood Parks: An Empirical Investigation, *Land Economics* 49 (Feb, 1973) 99-105.

