

GREEN SPACE: A CATALYST FOR ECONOMIC DEVELOPMENT?

By

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To change

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Cities are constantly looking to attract economic development to create jobs and increase revenue within their jurisdictions. In turn, cities can use this increased tax base to improve the amenities and quality of life within the municipality. To attract this economic development, cities often offer firms large tax breaks and incentive packages to assist in the location decision. Research shows that these methods have recently backfired with the communities, due to the primary focus on business rather than on improving the quality of life for residents. Research also reveals the growing impact of a community's quality of life factors on a firm's location decision-making process. Focusing on green space is one method of increasing the quality of life within a community and making it a more desirable among current and future residents. Taking into account the multitude of human and ecological benefits of green space, this study provides additional economic justification of the importance and value of green space. By running correlation and regression models analyzing the number of firms located in a city and the percent of the population with at least a college degree in relation to park data and other economic location variables, this study indicates green space is a viable economic recruitment strategy for municipalities. The results indicate a causal

relationship between percent of city land occupied by parks and the percent of population with at least a college degree—one of the main factors correlated with the location of firms.

CHAPTER 1 INTRODUCTION

Cities are continuously looking to better themselves, focusing on economic development, especially in recessions. By attracting businesses to locate within their jurisdiction, cities are able to provide jobs, increase their tax base and revenue and, in turn, better their community through expenditures such as city beautification projects, parks, and other amenities that improve the residents' quality of life. However, when the economy experiences a downturn, as it currently is, much of this 'non-essential' spending is cut from budgets (Pincetl & Gearin, 2005). In order to attract these coveted businesses, a city might use several different tactics to make itself more enticing than other competing cities. Recently these tactics have included tax breaks, infrastructure assistance, and other elements included in incentive packages meant to create the competitive edge for one city over another (Salvesen & Renski, 2003). Because they are focused solely on making a city appear more attractive to a business than another city, these tactics completely overlook factors that would improve the community for current and future residents. These factors would be a result of the increased revenue caused by firms deciding to locate within the jurisdiction.

Due to lack of success and the detrimental affects to the community landscape, these incentive tactics have recently been met by fierce opposition from local community citizens (Salvesen & Renski, 2003). Often those plans focused on business recruitment increased sprawl and rarely had the desired positive impact on quality of life amenities. More recent research recommends inverting this more traditional approach to luring businesses to locate within a jurisdiction (Salvesen & Renski, 2003). An inversion of tactics calls for a focus on developing the community as an attractive place

to live with high-quality amenities, appealing both to current and future residents, and effectually attracting businesses to locate within the community because of its high quality of life.

An element that enhances a community's high quality of life is green infrastructure. The Environmental Protection Agency (2009) refers to green infrastructure as the matrix of park and open space that provides both ecological and human benefits, such as habitat connectivity and clean air and water. This study examines the importance of green infrastructure, in the form of public urban parks and green spaces, and its relationship to economic development, more specifically the role of attracting business to a community. Specifically, it addresses the question of whether green infrastructure can act as a viable recruitment strategy to attract economic development to municipalities. Thus providing evidence beyond the ecological importance of green space, and showing green space is an important economic factor within a community.

Providing economic justification for the preservation of existing green space and potential system additions is incredibly important given the recent development patterns of cities—resulting in the rapid depletion of green space outside the city core—and the “public good” aspect of parks. This standard of low density development in suburban greenfields caused the significant loss of environmentally fragile lands, reduced regional open space, diminished farmland, reduced species diversity, decreased aesthetic appeal of landscape, and caused severe ecosystem fragmentation (Johnson, 2001; Wolf, 2004b). Consequently, cities have seen increased air pollution, energy consumption, stormwater runoff, and risk of flooding (Johnson, 2001). Although all of

these consequences are negative externalities of development that can be mitigated by the preservation of critical parkland, the overall importance of green space is still overlooked by many. Thus, it is imperative to economically quantify the benefits of green space.

Green space tends to be viewed simply as a city entity with positive externalities. Yet due to the numerous intangible benefits of green space, it is considered a non-market good—the benefits haven't been directly quantified and thus cannot be traded on the market. Because the benefits and services provided by green spaces can't be entirely captured in commercial markets, they do not receive the attention deserved in planning and policy decisions (Costanza et al., 1997). This is seen especially during times of economic downturns. To begin with, most cities lack a comprehensive green space planning and management framework, which can be considered acceptable if there are sufficient budgetary funds to support park development, tree plantings, and natural area management. However, in times of budgetary crisis or cuts, the programs viewed as amenities, including green space projects, are the first to receive cuts (Wolf, 2004).

Additionally, the costs of park programs and maintenance can be directly tallied and quantified, which is why those programs are some of the first to be cut (Wolf, 2004). For example, it cost the city of North Ft. Lauderdale \$350,000 to build a new community recreation area adjacent to a school (Cavanagh, 1999). In Chicago, it cost the city an estimated \$450 million to design and build Millennium Park, and its maintenance costs are estimated to approach \$10 million (Neighborhood Capital Budget Group, 2005). Both of these projects were behind schedule, over budget, and lucky not to get scrapped.

Many projects are not so lucky, mostly because the calculation of the benefits of these green space projects is less straightforward. Nevertheless, before this study looks at the relationship between urban green space and economic development and attracting businesses to municipalities, a review of the existing related literature is necessary.

The main objective of this study is to provide additional and more substantial justification for parks and green space. In order to provide substantial justification, this study aims to produce theoretical and empirical evidence of the human, ecological, and economic impacts of green infrastructure by specifically addressing the question of whether green infrastructure is a viable recruitment strategy to attract economic development to municipalities. The following chapter presents the theoretical background, which frames this study's roots more explicitly and includes a discussion of location theory, historic determinants of business location, quality of life, and an introduction to green infrastructure and the resulting benefits. Chapter 3 discusses previous methodologies used to attempt to value parks and green space and details the methods used by this study. The results from this study's analysis are presented in Chapter 4, and the implications of these results are discussed in Chapter 5. Finally, Chapter 6 provides a discussion of limitations, possibilities for future research, and concluding remarks.

CHAPTER 2 LITERATURE REVIEW

Location Theory

Although this study aims to look at the impact of open space on economic development, it is necessary to examine the traditional determinants influencing industrial location. Classical economics generally views location decisions as a minimization of the transportation costs of raw materials to the location and the output to the market. Early research assumed industries located where profits are maximized, thus where there are the lowest transportation costs. Over time, researchers realized the need to take into account other factors affecting profit-maximization, such as wages, energy, and land costs. If a location with low land or labor costs could offset higher transportation costs, then the location decision would be affected. However, if the difference was minimal and insufficient in offsetting higher transportation costs, firms located where there was the lowest transportation costs (Blair & Premus, 1987).

This location theory assumes that a firm, such as a manufacturing plant, is sensitive to transportation costs. While relevant in the early 1900s through the post-World War II era, this minimization of transportation costs theory is not as applicable to more modern-day industries. Current day firms are much more knowledge based, relying on the transportation of ideas and data rather than materials and, in turn, significantly less affected by transportation costs of raw materials and factory outputs. Consequently, these newer industries are also more mobile, being able to locate nearly anywhere in the world. Additionally, although using profit maximization to choose a location is still germane to many firms' location decisions, it will be shown that other

factors, such as the personal preference of executives, can have a significant impact on location.

In their review of major factors affecting industrial location, Blair and Premus (1987) state, "Perhaps the most important aspect of the locational decision is that it is seldom *only* a location decision" (p.74). They continue by explaining the location decision is usually a multi-stage planning process by corporations, often involving an in-house site selection team made up of such departments as "transportation, distribution, personnel, engineering, real estate, and planning" (Blair & Premus p. 74, 1987) or even a contracted location consulting firm. The first step in determining the location for a new facility is to create a prioritized list of the economic and noneconomic variables that will affect the decision. As potential locations are considered, those not meeting the criteria developed by the firm can be systematically eliminated. These first elimination decisions are generally made on a state or regional level (Rast & Carlson, 2006). Although individual cities may have desired localized advantages, such as low land costs, the city may not be practical because of its location at the state or regional level (Blair & Premus, 1987).

Historic Determinants of Location

Researchers have used two main methods to determine what factors affect firm location. The first method, surveys, enables researchers to determine the significance of a long list of location variables and yields comprehensive results even among qualitative variables. Overall, survey results show market factors, labor force, transportation, and raw materials are historically the most significant variables affecting location decisions, especially from the early 1900s through the post-World War II era. During this time period, state and local taxes, financial incentives, and noneconomic

factors such as quality of life showed little or no significance (Blair & Premus, 1987; Rast & Carlson, 2006). While more recent surveys show the traditional location variables—market factors, labor force, transportation, and raw materials—continue to have a significant impact on location decisions, the importance placed on using them as the sole determinants has declined. In these more recent surveys, other variables such as the business climate, state and local taxes, and noneconomic factors such as education and quality of life are becoming more significant factors in the location decision (Johnson & Rasker, 1995; Festervand, 2004).

A second method used for measuring location determinants is econometric studies: for the purpose of this study, those focusing on specific variables affected by state and local policy decisions. The econometric studies reinforce the survey results regarding the increasing significance of taxes on location decisions. Specifically, high personal income tax and high state corporate tax showed negative impacts on an area's growth, yet property taxes showed only some significance on a micro-geographic level (Blair & Premus, 1987; Salvesen & Renski, 2003).

High Tech

When looking at individual industries, survey results show high technology companies differ significantly than manufacturing firms in the priority of location determining variables. Blair and Premus (1987) describe the high technology companies as “typically R[esearch] & D[esign] oriented and a high percentage of the employees are scientists, engineers, and technicians” (p.79). For these firms, access to highly skilled labor and the cost of that labor appeared most significant, while the “proximity to a university system” and taxes ranked third and fourth in significance. Perhaps more interestingly, high technology firms generally rated quality of life factors

ahead of the traditional location factors, considering such variables as transportation of goods and raw materials as not important (Blair & Premus, 1987). Combined, these results suggest the location of high technology firms can be heavily influenced by public policy.

Quality of Life

Quality of life is a rather ambiguous term that encompasses many different, often subjective and value-based variables. It can refer to an individual's well-being or his happiness toward a place and its positive and negative attributes. Quality of life is a growing field of research in relationship to business location as the result of the relatively recent shift from a manufacturing economy to a service and knowledge-based economy. One of the most significant factors influencing the location of these new economy firms is access to a highly skilled or educated workforce, as seen with the high technology firms discussed earlier. Researchers argue a region able to attract and maintain human capital—a population of these highly skilled, highly educated, and productive workers—will tend to be more competitive when compared to other regions. New economy firms will be more attracted to the regions that support this human capital and, thus, will experience greater growth and development. It argued through this line of research that it is quality of life factors that attract and maintain these people to a region (Morias, Miguéis, & Camancho, 2011; Florida, 2002).

When researchers analyze cities regarding their quality of life, different methods can be used to isolate relative significance of individual factors to the place's quality of life. Completing a comprehensive study of secondary data, Liu (1976) compiled an extensive list of quality of life indicators broken into broad categories: economic, political, environmental, health and educational, and social satisfaction of place. Within

these broad categories, Liu (1976) analyzed more than 100 indicators including: both the economic vitality of an individual and the community; individual political activities and overall government satisfaction; pollution, water and air quality, and recreation and open space amenities; personal health and education attainment, and regional healthcare and educational quality; and social indicators such as equity and the social opportunities of a community. These broad quality of life categories and the specific indicators are common measures of analyzing a place's quality of life (Dissart & Dellar, 2000).

For this study, and for planners in general, it is essential to look outside of those factors deemed to only affect place. Rather, an analysis of both individual quality of life factors and those affecting place is imperative, considering the interaction between individuals and place. Thus, Dissart and Dellar (2000) compiled a general list of pertinent factors to consider when measuring an individual's quality of life, including "personality, social support, personal satisfaction in several domains (e.g., employment or marital life), personal skills, environmental factors, economic factors, and stressful events" (p. 137). Where a person lives affects the opportunities she has, the people she meets, how much stress she feels, and as Florida stated, "In many ways, it is the precursor to everything else" (Florida, 2008, p. 148). Consequently, the interaction between people and place is crucial. This relationship is fundamental to the objectives of this study given the role of green space in shaping both people and place. Body Text goes here. If you need more chapters copy and paste this "chapter" as many times as needed.

Place and Happiness

Much of the research completed on happiness focuses on the persons or things that influence happiness. Researchers agree money alone does not create happiness; instead happiness seems to result from a combination of strong social and personal connections, good health, and job satisfaction. The question of *where?* and the effects of place rarely get discussed in happiness research, yet “plays a fundamental role in our endeavors to be happy” (Florida, 2008, p. 148). In a partnership with the Gallop Organization, Richard Florida (2008) completed a survey of more than 27,000 people measuring the connection of place to happiness, referred to as the Place and Happiness Survey. The survey divided happiness into typical subgroups of happiness research—personal life, job, and financial satisfaction—and a fourth subgroup was added: happiness with one’s place. The results of this study show the significance of place to happiness, as place ranked more important than education and income. Additionally, researchers found place as a low cause of stress, with only 3% of respondents listing location as a stressor (the lowest of all measured factors).

The Place and Happiness Survey also looked specifically at what people value in the places they live. Similar to the quality of life surveys discussed, researchers formed broader categories of the different community factors influencing happiness associated with place. Florida (2008, p. 163) explained the categories that emerged from the results:

The first is *physical and economic security*—perceptions of crime and safety, the overall direction of the economy, and availability of jobs.

The second is *basic services*—schools, healthcare, affordable housing, roads, and public transportation.

The third category is *leadership*—the quality and efficacy of elected and unelected (business and civic) leadership and the opportunity for public and local engagement.

The fourth is *openness*—the level of tolerance for and acceptance of diverse demographic groups including families with children, ethnic and racial minorities, senior citizens, immigrants, and gays and lesbians.

The fifth cluster is *aesthetics*—physical beauty, amenities, and cultural offerings.

Florida reported each of these categories affected satisfaction levels of place, yet found aesthetics and basic services were the most important. While most residents have come to expect the cities they live in to provide satisfactory basic services, the aesthetic aspect of cities is held as more of a premium.

People's satisfaction with the beauty, open and recreational space, and environmental quality of a community directly corresponds to their level of overall satisfaction with the community reported. When asked to rank which aspects of the aesthetic qualities matter most, respondents order physical beauty first, followed by parks and trails and then climate and air quality. Aesthetic features, especially physical beauty, may seem like a predetermined, uncontrollable characteristic for cities, such as the bay and mountain vistas of San Francisco or the snow covered peaks of Boulder, offering no hope for cities such as Pittsburgh or Cleveland. However, Florida explained beauty goes beyond these more apparent features and can be found by residents in the mixture of historic architecture and districts, weaved between a network of Olmstead's or other pioneering landscape architects' urban park systems. (Florida, 2008)

As seen, a quality place—a place that contributes significantly to people's happiness and desire to locate there—is a complex mixture of several different aesthetic, recreational, social, and economics attributes. One attribute interwoven

within each of these categories is a city's green infrastructure. The parks, trails, and open spaces of a city contribute most obviously to the recreational and aesthetic characteristics of a location, yet they also contribute significantly to the social and economic success of a place. Directly related to this study, this literature suggests these amenities are a viable recruitment strategy to be used by municipalities.

Migration

Examining the factors that affect an individual's quality of life is even more paramount given the research regarding the effects of quality of life on migration. Research found amenities and quality of life to be significantly important in an individual's decisions to migrate. Nearly half of the respondents of a survey conducted by Reicher and Rudzitis (1992) reported accepting lower wages in exchange for migrating to a county with higher amenities. Crompton (2007) described the same concept in reverse, reporting companies need to pay higher salaries when located in an area with a lower quality of life in order to attract the same quality of labor, a concept termed "disamenity compensation." Disamenity compensation is exemplified by the Mercer Quality of Living Survey & Report (2011) published each year to provide reference for corporate firms to determine how to fairly and competitively compensate transfers to an area with a lower quality of living. The report provides an allowance grid, translating the city's quality of living index into a benefit and compensation percentage. The Mercer Quality of Living Survey ranks cities using similar variables mentioned earlier. In particular, Mercer used 39 individual indicators that fell under the following 10 umbrella categories: political and social environment, economics environment, socio-cultural environment, medical and health considerations, schools and education, public

services and transport, recreation, consumer goods, housing, and the natural environment.

Brueckner, Thisse, and Zenou (1999) also reported the effects of amenities on the spatial distribution of people, focusing on the individual patterns of cities based on income. More specifically, the research attempted to explain why European city centers, such as Paris, are financially more successful than American city centers, such as Detroit. Brueckner et al. (1999) presented a mathematical model explaining the spatial distribution of income within cities based on amenities. Traditional economic models explain personal location decisions based on the relationship of housing consumption to opportunity costs of commuting—factors that could explain the distribution pattern disparity across countries. However, Brueckner et al. (1999) found this traditional explanation accounting for the difference among highly developed countries improbable and, thus, proposed the importance of amenities. They argued if the central city “has a strong advantage over the suburbs in exogenous amenities [natural and historical features], and when valuation of these amenities rises rapidly with income, the rich are likely to live at central locations” (Brueckner et al., 1999, p. 105). This explained that in countries with a strong central government such as France, there are large government expenditures within the capital city, creating infrastructural amenities such as great parks and preserved historic buildings and monuments. Given the more decentralized government in the United States, researchers argued the capital city of Washington D.C. does not receive the funding for such strong investment in amenities, much less a city such as Detroit. Therefore, American central cities do not have strong enough amenities to outweigh the traditional theory presented by Alonso for

determining the spatial patterns of a city. Alonso's model suggested the rich are more attracted to live in the suburbs than the poor, given higher consumption and cheaper housing, but the rich also face higher opportunity costs commuting, thus also value accessibility to the city center. The significance of this study to the current report is the reiteration of the importance of amenities, most notably that of parks, on the location decisions of people. Additionally, public policy and funding can impact these amenities and ultimately the location of people.

Quality of Life & Location

In a study conducted by Love and Crompton (1999), researchers surveyed the major decision makers from newly established, expanded, or relocated companies to Colorado. Love and Crompton obtained questions by interviewing economic development officials and decision makers from recently located businesses regarding opinions on the location process. A review of the previous literature provided additional survey questions. Of the 174 companies included in the results, interesting trends prevailed. Companies relocating from outside of Colorado rated factors of quality of life, labor and cost issues, government involvement and taxes, and daily living concerns all higher than companies relocating from within Colorado, who placed significantly more importance on the proximity of people (customers, competitors, suppliers, corporate headquarters). Quality of life was also more important to those firms who located in remote urban areas than those locating in Denver or rural areas. Small companies, for this survey those with less than eight employees, rated quality of life significantly more important when determining location than large companies. Footloose companies, as defined by Love and Crompton (1999) "as businesses whose financial performance is relatively independent of location decisions" (p.220) also place significantly more

importance on quality of life when compared to those companies that don't consider themselves footloose. Finally, those companies relocating a large percentage of management and executive level employees and companies looking to recruit new professional personnel also considered quality of life significantly more important than those companies seeking neither of these actions.

Although the more traditional factors of an office or plant's cost and business operating costs registered as the most important factors of location decisions, the Love and Crompton (1999) study shows the continued significance of quality of life factors. In addition to noting characteristics of firms that placed greater significance on quality of life factors when deciding where to locate as they expanded, relocated, or developed a new firm in Colorado, Love and Crompton (1999) isolated some of the most important quality of life factors in the location decisions. These include environmental quality, natural environment of Colorado, ambiance of area, and quality of education. Each of these factors is highly influenced by public policy, thus paramount to planners and economic development officials. Furthermore, other than education, these factors are also influenced by the presence of parks and open space, making the study relevant to this report.

In a study of business owners in the rural counties of the Greater Yellowstone Ecosystem, Johnson & Rasker (1995) reported the significant importance of quality factors on both new business location decisions and business retention. In survey responses, current business owners in the Greater Yellowstone Ecosystem counties ranked the economic factors of business location (tax structure, cost of doing business, and proximity to the university) the lowest of all 15 measured factors. Each

recreational, qualitative, and community value factor measured received a higher relative importance ranking than the economic factors. Scenic beauty ranked highest among all factors, followed by quality of the environment. Each additional qualitative, recreational, and community attribute, such as proximity to public lands, wildlife-based recreation, crime rate, and small town atmosphere, ranked above the economic factors according to the business owners surveyed. These results show quality of life—most often green infrastructure amenities—have a higher significance in business location decisions, especially those of a “footloose” business, than usually credited with, particularly with regard to a business’s decision to locate or expand in rural areas. However, this study is unable to determine whether these factors are generally more important in rural areas than in urban areas, or if businesses more concerned with quality of life factors decided to locate in this rural area because of the high environmental and community amenities, ultimately leaving many questions for further research. This study also brings up the topic of scale in relation to the location decisions of businesses. Location theory research discussed location decisions on local, state, and regional levels, and the interplay of incentives, policies, amenities, and taxes in these decisions. Thus, it is important to note quality of life amenities, such as those just discussed, are relevant on a regional and municipal level, attracting firms to the area. The industries and businesses generally discussed throughout the literature do not need to locate directly proximate to amenities. However, people can be attracted by amenities on a smaller more parcel-sized scale that will be discussed later.

Green Infrastructure

As seen, quality of life has many implications regarding individuals, firms, and cities. For this study, quality of life variables are narrowed to the amenities of green

infrastructure. The Environmental Protection Agency (2009) refers to green infrastructure as the matrix of park and open space that provide both ecological and human benefits, such as habitat connectivity and clean air and water. Green infrastructure includes everything from street trees and small pocket parks to large recreational parks and open spaces. Benefits—ecological, economical, and human—of green infrastructure are found at every level and thus are covered in the study.

Social Elements of Parks

Beyond the typical narrow view that parks only serve as areas of passive or active recreation and add to the beauty of cities, parks and green spaces serve other vital roles in a city. Walker (2004) in a publication for the Urban Institute explained the impact of parks on local youth development and employment opportunities. Parks and the programs they facilitate provide physical, intellectual, emotional, and social assets that are necessary for a healthy development and “helping youth choose rewarding paths to adulthood” as Walker (2004, p.2) stated. The Empowering Youth Initiative in Chicago’s Garfield Park is an example of such a program. Each year, fourth through seventh graders budget, design, model, choose a winning team, and create a permanent horticultural display within the park. Activities such as this one in Garfield Park develop necessary teamwork in addition to critical and creative thinking skills in a fun environment.

Assisting in the development of a community’s youth and lower skilled residents, parks provide entry-level employment opportunities. These opportunities are continually needed and provide youth and adults with “marketable skills and experience” (Walker, 2004, p. 2). Parks such as Prospect Park in New York City have welfare-to-work programs assisting recent welfare recipients by providing low skill maintenance work

around the park. Such programs not only contribute to the strengthening of an area's social characteristics, but also to an area's economic success by offering entry-level employment opportunities.

Additionally, parks can encourage and provide motivation for community involvement, strengthening not only the social element of place happiness described by Richard Florida, but also the social spectrum in the quality of life analysis of locations. Florida discussed the "third place" in the books *The Rise of the Creative Class* and *Who's Your City*. This "third place" is a location outside of the work place and home, which fosters social interaction "where people meet, congregate, and connect" (Florida 2002, 2008 p. 183). Often considered the social and cultural venues of a neighborhood or city, such as Bourbon Street, a coffee house, or a music venue, parks and open spaces provide an arena for such activity to take place. These open spaces provide a venue for interaction across all social and demographic divides that many times different cultural and social establishments are unable to provide (Florida, 2008; Walker, 2004). In fact, Florida (2008) stated "In most cases, the park gets better, safer, and more exciting when more runners, cyclists, roller-bladers, strollers, dog-walkers, young parents with children, picnickers, and sport players of every sort and persuasion congregate together"(p. 184). Research shows green spaces can even encourage social interaction and long-term bonds in residents of low-income housing developments (Pincetl & Gearin, 2005;Walker, 2004). This research is crucial given that residents who reported feeling socially isolated increased significantly in the past 20 years, disproportionately in the educated middle class (McPherson, Smith-Lovin, & Brashears, 2006). Assumed to be the result of longer commutes and working times

(Florida, 2008; McPherson et al, 2006), the development patterns could also be partially to blame. Florida (2008) explained these results could help clarify the interviewee's desire to live in an area more conducive to meet and bond with others during the Place and Happiness Survey (Florida, 2008). As demonstrated, parks and green space can provide this needed and desired venue for social interactions, thus strengthening a community's quality of life and its residents' happiness.

Natural Amenities and Migration

The impact of quality of life factors, including natural and recreational variables, on migration was discussed earlier yet there is additional evidence that green infrastructure alone can also impact migration. In a review of studies focused on the interaction of natural amenities, such as conservation land, and regional migration, Waltert and Schläpfer (2010) suggested, "amenity-rich regions tended to grow faster in terms of population than other areas" (p. 147). Although they resisted making significant conclusions and generalizations about the economic development impact of landscape amenities due to limiting empirical evidence, they found natural amenities had as much lure impact as low tax burdens on the migrants to the region. Additionally, this review did not analyze the effects of all natural amenities and green infrastructure, most notably excluding "non-natural" open spaces such as city parks, and possibly omitting additional significant economic impacts.

Retirees

One of the most documented groups of citizens migrating based on natural and recreation amenities are retirees. In a recent study, Poudyal, Hodges, and Cordell (2008) found the location decisions of retirees was based significantly on the availability of natural amenities. In the study, they isolated certain natural amenities more likely to

attract retirees, stating, “warm and sunny climates, open lands, scenery, and water are important natural resource amenities to attract retirees” (Poudyal et al. 2008, p. 246). They also suggested investments that foster parks and facilities for nature-based activities, as well as golf courses, can provide additional attractiveness toward an area. Poudyal et al. (2008, p. 246) summarized their findings and much of the basis of this study when they explained growth.

Growth is not simply determined by proximity to highways and shopping. As far as retirees are concerned, their choice of residence location is also driven by natural amenities—forests, open land, water, scenery, and recreation opportunities. In addition to providing stimulus to local rural economies, perhaps strategies to provide close substitutes for nature-based outdoor recreation opportunities in metro counties may be needed.

Some cities have started focusing on attracting retirees more than business because of the benefits retirees bring to communities. As of now, social security provides a stable income that comes from outside of the municipality, yet it is spent within the community, increasing local revenue and creating jobs. Also, Crompton (2007) explained retirees tend to pay for more municipal services than they use, creating a surplus in the community as a result of their taxes. Even though research has shown retirees tend to remain where they spent much of their lives, communities that do not offer a wide array of amenities catering toward the desired recreation-oriented lifestyle risk losing this population (Crompton, 2007).

Health

Another vital aspect of the impacts of green infrastructure is the effect on human health. One study, conducted by Takano, Nakamura, and Watanabe (2002), found a significantly positive relationship between green infrastructure and the longevity of senior citizens. The impact of having a green space or a pedestrian friendly, tree-lined

street within walking distance of the participant's residence in densely populated urban Tokyo significantly and positively affected the longevity of the participant over a five-year period. Takano et al. (2002) and Tzoulas, Korpela, Venn, Yli-Pelkonen, Kazmierczak, Niemala, and James (2007) explain that these results could potentially correspond to the idea that the participants' access to walkable green infrastructure increases the likelihood of physical activity, and thereby affecting the overall health of senior citizens.

Researchers also report the effects of proximate green spaces on the health of youth. When analyzing sedentary behavior in youth, Epstein et al. (2006) suggested parks may be a motivating factor for children to go outside of the home and participate in physical activity. The research also showed better park accessibility was associated with more physical activity. While obesity-related hospital costs for youth ages 6–17 were estimated at \$35 million between 1979 and 1981, they had nearly tripled to \$127 million between 1997 and 1999 (Wolf, 2004). Taking this substantial increase into consideration, proximate park space could create great economic savings.

Senior citizens and youth are not the only residents shown to benefit from close proximity to green spaces. A study conducted in the Netherlands found residents, regardless of age, race, and socio-economic status, living within 3 kilometers of a green space, including urban parks, agricultural land, or natural open space, had significantly higher perceived health than residents without a green space within 3 kilometers (Maas, Verheij, Groenewegen, de Vries, & Spreeuwenberg, 2006).

With the current obesity epidemic, the Center for Disease Control has started consulting with urban planners on how the urban form, including green space, can

influence a person's activity levels. Relevancy to green infrastructure is in the recreational value provided; people who participate in routine physical activity have significantly lower medical costs than those who live a sedentary lifestyle. For adults, participating in regular moderate activity can reduce median medical costs by \$865 per person per year (Wolf, 2004).

One significant limitation associated with the reported health benefits is the possible self-selection bias. People who tend to have healthier habits, such as higher rates of walking and physical activity, are more likely to choose to live in an area where those activities are more accessible or valued. This self-selection bias impacts the generalized health benefits of those people living in closer proximity to parks, in that those choosing to live in closer proximity to parks had preexisting healthier habits.

Although physical health and the obesity epidemic are incredibly relevant topics, green space can also affect mental health. Recent studies have shown that having trees in public housing neighborhoods lowers levels of fear, contributes to less violent behavior, and encourages better relationships. Also, when school children are exposed to natural settings, children with ADHD show fewer symptoms, and girls show more self-discipline (Wolf, 2004). In a study combining the physical and mental benefits of green space, it has been shown that hospital patients in a room that overlooks a green space have a 10% faster recovery time and take 50% less pain medication (Bolund & Hunhammar, 1999). Additionally, natural settings have even been shown to help productivity for businesses, with workers reporting fewer illnesses, higher job satisfaction, and increased productivity (Wolf, 2004).

Stress

Also reviewed for the purpose of this study, Stigsdotter et al. (2010) studied the health-related benefits of urban green spaces, in an effort to combat the problem of urban green spaces being under constant threat of conversion to other uses. This conversion from green spaces is problematic since more humans live in urban areas; thus, their time spent outdoors and participating in recreation takes place in the city, creating an increased need in green space. Stigsdotter et al. (2010) suggested there was a relationship between distance from green spaces and health-related quality of life, and between the number of visits to a green space and stress levels. Therefore, availability and distance to green space contributed to good self-reported health quality of life. Additionally, the authors claimed reasons for visiting green space differ between stress individuals and nonstressed individuals and, as a result, suggested some of the public money used to combat stress should be incorporated into park planning. Although this suggestion is unique, the Stigsdotter et al. (2008) study did explain much of the stress-related mitigation urban parks provide.

Economic Valuation of Green Space

The health benefits of urban green spaces began to discuss and analyze parks in economic terms, but there are more direct ways of looking at parks in economic terms. Urban green space is made up of different urban ecosystems that provide a variety of services to humans and the environment. It is through analyzing these different services that a semblance of a value has been placed on the benefits of urban green infrastructure. There are different types of ecosystems present in the urban environments, including street trees, parks and green space, urban forests, wetlands, rivers and streams, and lakes, bays, and seas (Bolund & Hunhammar, 1999). These

ecosystems are recognized as providing a significant contribution to human welfare as purely public goods that accrue directly to humans without ever passing through the money economy (Costanza et al., 1997).

Additionally, arguments for the protection of ecosystems—provided by green spaces—are typically based on moral and aesthetic reasons (Costanza et al., 1997). People like parks because the parks are aesthetically pleasing. Protecting them is the “right” thing to do because cities need green space and kids need a place to play. Unfortunately, these arguments do not hold much value in regard to policy making. Furthermore, they occasionally conflict with other moral arguments, including the idea that no person should be without a place to sleep. In essence, does creating a park outweigh using the space to build a shelter? Because the moral and aesthetic arguments are not enough to push for the preservation of green space, ecosystem services must be analyzed. In one study, the value of 17 different ecosystem services provided by 16 biomes was measured. These services were not limited to urban ecosystems, but instead included worldwide ecosystems, such as open oceans, deserts, and even frozen tundra. The services provided included: climate regulation, gas regulation, soil formation, waste treatment, nutrient cycling, food production, raw materials, recreation, and culture. The total value of the 17 services provided was estimated between \$16–54 trillion per year with an average of \$33 trillion (Costanza et al., 1997). Although these values are not strictly due to urban ecosystems, they begin to show the importance of protecting green space and ecosystems in general.

Park Value

One of the earliest forms of measuring the value of parks was through travel cost. Researchers asked park visitors how far they travelled to reach the park. The park

value was assigned with respect to the user that had travelled the farthest. The economic reasoning being the benefit this user received by travelling to the park must be equal to the cost. Otherwise, the user had no incentive to travel as far. However, this model did not equate well with parks having a small variance of travel distances, such as neighborhood parks, thus is not a completely sufficient tool (Dwyer et al., 1977; More, Steven, & Allen, 1988).

Over time the travel cost analysis has been expanded by researchers into a direct use value. This is a simple sum of all the expenses sustained by park system visitors and users, not just the travel costs. This value is tallied as a result of travel costs, such as fuel, meals, accommodations, local purchases from onsite gift shops, and equipment and classes purchased relating to the park visit (Wolf, 2004b). The problem with this measure is the need for significant amounts of detailed information. Furthermore, it again does not work well in situations like a neighborhood park, where travel costs are minimal (McPherson, 1992).

Contingent valuation is another way researchers have measured the value of green spaces. Contingent valuation is simply a measure of the consumer's willingness to pay for certain amenities. By asking community residents how much they would be willing to pay for a non-market item such as trees and parks, and conservation lands researchers can assume an economic value, given the residents' responses. However, this approach also creates problems because opinions given to these hypothetical circumstances do not necessary align with actual actions. (More, Steven, & Allen, 1988)

Another slightly different way value has been assigned to parks is what is called existence value, that is people value something just knowing it is there and having the

option to use it at a later date (More, Steven, & Allen, 1988). This idea of existence value stems from the theories of option demand, people are willing to pay for an amenity for the option of future use, and existence demand, people are willing to pay simply for the amenity to exist with no expectation of use (Walsh, Loomis, & Gillman, 1984). De Sousa saw this value method appear in a 2006 study, where the majority of respondents to a survey valued the newly created park even if they had not used it. In the study, De Sousa (2006) examined the benefits of brownfield to greenfield projects, examining newly created parks in Chicago and Minneapolis. The problem addressed in this research was cities' emphasis on direct economic benefits as a result of a brownfield project, therefore limiting the likelihood of a brownfield to greenfield conversion. Based on strongly supported data evidence collected through surveys, De Sousa (2006) made several key claims, including: brownfield to greenfield projects have positive impacts on all measured quality of life factors, and there are significant perceived economic benefits of brownfield to greenfield conversions. Authors suggested these benefits are paramount since people and businesses tend to invest in communities that are perceived to have a higher quality of life. Other claims made by De Sousa (2006) include: the brownfield to greenfield conversion is a good use for the land, backed by both park users and non-users overwhelmingly (90% and 89% respectively) stating they felt the new park is a good use for the land. In addition, the author suggested green spaces are more than simple play areas for children before and after school, and that green spaces are steps toward broader community revitalization (De Sousa 2006).

Hedonic Pricing

Hedonic pricing, also known simply as amenity pricing, is one of the most common ways to measure the value of green infrastructure. This method of analysis is able to apply a value to the green space from the price of related products that are traded on the market. Prices of proximate properties are analyzed in order to apply an economic value for the park that accounts for both on- and offsite benefits the green space provides. Numerous studies have shown appraised property values typically 8%–20% higher when adjacent to public green space (Wolf, 2004b). Additionally, Morancho (2003) found proximity to green space, rather than size, affected property values the most, reasserting the value of many parks scattered throughout cities rather than large parks located outside of the cities. One study conducted by More, Stevens, and Allen (1988) looked at the complex relationship between parks and property values. Most researchers found evidence of property declining in value as distance from a park increased; however, there is also evidence that properties directly adjacent to parks can also be affected negatively. In Columbus, Ohio Weicher and Zerbst (1973) found parks developed for intense active recreation affected adjacent to property values negatively, whereas passive open parks affected property values nearly equal amounts yet positively. More, Stevens, and Allen concluded through their analysis of four parks and proximate properties within 2,000 feet of the parks all properties were positively affected. Although each park had different levels of effect, the combined economic value measured for the parks' effects was nearly \$350,000, significantly more than the annual operation and maintenance costs of \$125,000. Unfortunately, they also concluded their sample was too small to definitively support previous findings regarding the negative effects of different characteristics of the individual parks, although the

results did appear to be in agreement with Weicher and Zerbst (1973). As a result, researchers argued for careful design and planning of neighborhood parks, especially along the interior borders of intensely recreational parks as to mitigate the negative effects of the high-use areas and to enhance the experience of the park visitor (More, Stevens, & Allen, 1988).

Urban Greening

Benefits of green infrastructure are not only seen in large-scale conservation lands or city parks. Researchers also report the many economic benefits of urban trees. In multiple studies, Kathleen Wolf (2003, 2004a, 2004b, 2005a, 2005b, 2006, 2008) analyzed the effects of nature within retail areas. In these replicated studies, Wolf showed participants images of differing retail settings and then asked them preference and projected behavior questions. The retail settings showed included: well-kept sidewalks and buildings without trees, similar buildings and a sidewalk enclosed by smaller trees, and similar buildings and sidewalks containing large mature trees, some of which blocked aspects of the buildings. These studies were replicated with respondents and sample retail settings from throughout the United States, including small towns and large cities. Across these studies, results were consistent. Wolf found the retail area with the large mature trees received the highest visual preference rating—a rating proportional to visual quality ratings of larger open green spaces (Wolf, 2005b). Additionally, these studies reported consumers were willing to travel further distances, shop longer, and return more often to retail settings with trees compared to those without. These responses potentially affect the revenue of these greener urban retailers significantly, especially given Wolf found consumers reported being willing to pay more for items when shopping in these settings as compared to treeless areas.

Within cities of 250,000 people or more, consumers were willing to pay an average of 12% more for items and an additional 9% in smaller cities (Joye, Willems, Brengman & Wolf, 2010; Wolf 2003, 2004a, 2004b, 2005a, 2005b).

Through examining the economic valuation of environmental benefits, it was estimated that the trees of the Chicago region removed 5,500 tons of pollutants out of the air, the equivalent of providing the city with more than \$9 million of air filtration services during one year. Also in Chicago, it was shown that increasing the tree cover by 10%, an average of about 3 trees per building lot, could reduce the total energy used for heating and cooling by \$50–\$90 per dwelling unit per year (Bolund & Hunhammar, 1999). Although the savings doesn't seem substantial, microclimate regulation in urban areas is important because of the heat island effect. It has been shown that temperatures in cities are about 0.7°C warmer than in the surrounding areas. This increase in temperature, in turn, raises energy consumption in the summer, which illustrates the importance of lowering the costs through the addition of trees (Bolund & Hunhammar, 1999). The benefits from trees in Chicago were found to be twice the value of the costs. In another measure of the environmental benefits green spaces can provide, the Puget Sound Basin tree cover was shown to have reduced stormwater storage costs by \$910 million and to have generated annual air quality savings of \$19.5 million (Wolf, 2004). These savings were all produced solely through urban ecosystems, as the Chicago tree cover was in the city limits and the Puget Sound basin study was based on the tree cover within the urban growth boundary.

Inequity

When discussing urban greening and urban parks, it is necessary to not ignore the current inequity within these programs. In a study conducted by Pincetl and Gearin (2005), residents of an urban Los Angeles neighborhood voiced their elation for scenarios of increased greenery and parks within their economically distressed neighborhood. However, these residents were also cognizant of the likelihood, or lack thereof, of receiving such programs, given their status as mostly lower-income immigrants, with little political influence. Equity within urban parks is an important factor, as with many other environmental concerns. Lower socioeconomic groups are more likely to suffer a low quality of life due to these injustices. (Pincetl & Gearin, 2005)

This inequity among the distribution of parks and thus benefits associated with parks can even affect residents throughout their lives in surprising ways. Strohbach, Hasse, and Kabisch (2009) addressed the problem that up to 82% of people live in areas with below average biodiversity, described throughout his report as neighborhood diversity (ND). This is significant because a lack of daily encounters of biodiversity was found by the study to cause a disconnection with nature, leading to a lack of conservation support, evident from observed behaviors and voting activity. Stronhbach et al. (2009) also addressed the problem of biodiversity varying across urban regions and whether this trend follows socioeconomic and demographic patterns. Researchers claimed the need for more emphasis placed on enhancing urban biodiversity, especially in more economically distressed neighborhoods. Backed by correlations between high unemployment and high low-income housing prevalence with high percentage of people living with low ND, Stronhback et al. (2009) suggested lower social status correlated to low ND. Additionally, the study suggested urban green did not automatically equate to

urban biodiversity. They found the age and maturity of green spaces affects ND, and that ND was a good indicator for where urban green infrastructure needs improvements. These studies showed the inequity present within park programs, and demonstrated the importance of equity within urban greening and park expansions.

Summary

Since green space does not work within the typical economic supply and demand curves, and because much of the urban greening and park creation depends on government funding, there must be additional methods for presenting the demand for parks. By showing stress levels, health-related quality of life scores, general quality of life scores, and economic investment—all benefits from urban green spaces—these articles provide an overview of what type of research has been done related to the positive effects of green spaces and present established evidence in green space justification.

Ultimately, the value of urban green infrastructure has been shown through the economic benefits of a variety of ecosystem services provided, such as the \$9 million in air filtration in Chicago and the \$910 million in stormwater storage in the Puget Sound Basin. Also shown were the hedonic pricing effect of green space on property appraisal and the human health benefits. Although these benefits do not pass through the money economy as market goods, their benefits are still able to be valued and thus can create justification for increased green space preservation as a key component of an economically prosperous future.

As shown, the effects of green infrastructure are public goods and, as a result, are harder to quantify in the money economy. However, the economic benefits of green infrastructure—most importantly the ecosystem services such as air filtration,

stormwater drainage, and microclimate regulation—and the human health benefits are proven to be imperative factors to demand its increased protection. Green space is not a typical market good in that its supply cannot be increased or decreased depending on market demand and actions of the economic system. Additionally, by preserving green space and developing a comprehensive framework of planning to manage the green space, the economic benefits go beyond ecosystem service and human health to local governments that will see an increase in property values and an increase in the demand for people and companies to locate within these municipalities.

With the continued demand for land within urban municipalities, cities focus on land uses that create tangible economic benefits instead of green spaces. However, by examining green spaces in terms of their overall contributions to a city's potential ability to attract new residents and jobs will further quantify the overall value of green spaces to cities, leading to more funding and functional systems.

Hypothesis

Green space is an important element in economic development through its attraction of both firms and people to a community. I predict firms will concentrate in cities with a high amount of and a high quality green space, represented by the total number of firms in the city and new firm births in a city and shown through the expected strong positive correlations between the amount of green space and the number of firms located within a city. Additionally, it is hypothesized cities with a high amount and a high quality green space will have a higher percentage of the population with college degrees, bachelors, graduate or higher.

CHAPTER 3 METHODOLOGY

Past studies looking at the effects of green space on economic factors have used diverse methodology, much of which was mentioned earlier in the literature review. Often used, hedonic pricing methods measure the value of green space on housing. Researchers have also used surveys, extensively measuring the effects of both quality of life and green space on location decisions of firms looking to start-up, relocate, or expand. The survey method is very useful in gaining location decision data. By asking the respondents to rank the different factors that affected the final location decision, factors they find important, and can give a detailed look at the “must-want” list. Although through surveys, researchers can create a more detailed assessment of the factors and strength of each factor on the location decisions from company representatives, surveys also present several negative aspects and have been criticized accordingly. Many times these surveys look at the potential of a relocation, expansion, or hypothetical new company creation. This generates problems since there tends to be a disconnect between factors that are reported as would be important decision variables and the resulting evidence (Crompton, 1999). To combat these problems, researchers have also surveyed key decision makers from companies that have relocated, expanded, or started a company in an area within a time period, such as five years as in the Love and Crompton (1999) study. There are criticisms of this approach as well. Specifically, it is hard to guarantee the company representative taking part in the survey was actually a key decision maker in the location decision of the firm, and surveys tend to only provide anecdotal evidence for the amenity effects (Salvesen & Renski, 2003).

For this study, green space data needed to be analyzed against economic data, in addition to traditional economic factors, to determine the significance of green space on economic development. The demographic and economic city data compiled is from the Census Bureau, whereas national green space data is not well documented nor compiled. The most comprehensive data regarding urban parks is from the Trust for Public Land. Thus, all park data for this report is from the *2011 City Park Facts* report published by the Trust for Public Land (2011). The Trust for Public Land (2011, p. 7) explained their definition of parks and what the data covered with the report,

When we say “park” we are referring to publicly owned and operated parks...[counting] every kind of park within the municipal boundary of the city, including national, state, county, regional, and municipal parks. We do not count private golf, tennis, swimming, or other clubs, nor do we count parks in gated communities.

Initially data for the 100 most populated cities, measured by highest population within the individual city’s jurisdictional boundary, in the United States was compiled. There was incomplete economic data for the city of Honolulu, Hawaii, and Anchorage, Alaska was a significant outlier in park data due to having the largest urban park within the city limits. Chugach State Park covers 490,125 acres (nearly 465,000 acres larger than any other urban park) and alone makes up for 39% of the total acreage of Anchorage. Thus, this study analyzed the 98 remaining cities within the contiguous United States for more accurate results.

In order to have a more comprehensive examination of the interaction between green space and economic development, an analysis of Metropolitan Statistical Areas (MSA) was completed. There was data regarding new firm births on a MSA level that was not available on a municipal city level from the US Small Business agency. Thus, in order to analyze the effect of parks within the principle city of a MSA, data for 70

MSAs was compiled. Again, the Trust for Public Land has the most comprehensive data available on urban green space; however, this data is gathered at the municipal city level. The park data from each municipality that was part of a larger metropolitan statistical area was combined together to form park data from the most populated cities within the MSA. This presents a significant limitation to these analyses because the park data is skewed toward the MSAs that included more than one municipality from the Trust for Public Land data set. This is expected to skew the results in favor of these MSAs, including New York, Washington D.C., and Los Angeles. However, given time and data constraints, this was the best way to measure how urban parks affect firm births within an area.

Once all data was compiled, multiple statistical analyses using IBM SPSS Statistics software were run. Correlation analyses were completed to determine what type of associations existed between variables, and regressions, controlled for population and city size, were run to determine the ability of the independent variables to predict the dependent variable. For this study, the total number of firms per 1,000 residents in a municipality was the indicator used to measure economic development, thus the independent variable in the regression analysis. When completing the metropolitan statistical area analysis, the dependent variable, indicating economic development, was the total number of firm births per 10,000 residents in the MSA over the period of one year.

From the research completed, economic development, especially business location theory, is multi-faceted with many influencing variables. Therefore, the study needed to include as many traditional location factor variables from the literature within

the regression analysis that time and data constraints allowed. The independent variables included for the city analysis were: total park acres, parks as a percent of city land, park expenditures, percent of population with a college degree, income per capita, and median home value. The percent of population with a college degree and per capita income data captured the more traditional business location variables of the skill and cost of labor. The cost of living attempted to be captured by the median home value. More comprehensive tax data was available on the MSA level. When analyzing the new establishment births within MSAs, the dependent variables were: park acres, park expenditures, corporate tax burden, median real estate taxes, number of establishments, and percent of population with a college degree or higher. To control for population, the study analyzed total park acres and number of establishments per 1,000 residents, and park expenditures per capita, based on the Census Bureau MSA population statistics. Refer to Tables 3-1 and 3-2 for the expected results of the correlation analyses.

Table 3-1. Expected City Data Correlation Results

| Independent Variable | Number of firms per 1,000 residents | Percent of population age 65+ | Percent of Population with at least a Bachelor's degree |
|---|-------------------------------------|-------------------------------|---|
| Total Park Acres | Positive | Positive | Positive |
| Park Acres Per 1,000 residents | Positive | Positive | Positive |
| Total Park Expenditure (\$) | Positive | Positive | Positive |
| Park Expenditure per capita | Positive | Positive | Positive |
| Park Acres as Percent of Land Area | Positive | Positive | Positive |
| Median value of owner-occupied housing units | Positive | Negative | Positive |
| Per capita money income | Negative | Negative | Positive |
| Percent of Population with at least a Bachelor's degree | Positive | Negative | -- |
| Number of firms per 1,000 residents | -- | Negative | -- |

Table 3-2. Expected Metropolitan Area Correlation Results

| Independent Variable | Establishment births per 10,000 residents | Percent of population age 65+ | Percent of Population with at least a Bachelor's degree |
|---|---|-------------------------------|---|
| Total Park Acres | Positive | Positive | Positive |
| Park Acres Per 1,000 residents | Positive | Positive | Positive |
| Total Park Expenditure (\$) | Positive | Positive | Positive |
| Park Expenditure per capita | Positive | Positive | Positive |
| Median real estate taxes paid for units with a mortgage | Negative | Negative | Negative |
| Total business establishments | Positive | Positive | Positive |
| Total establishments per 1,000 residents | Positive | Positive | Positive |
| Average corporate income tax burden by MSA household | Negative | Positive | Negative |
| Percent of Population with at least a Bachelor's degree | Positive | Negative | -- |
| Establishment births per 10,000 residents | -- | Negative | -- |

CHAPTER 4 RESULTS

The variables analyzed for this study are listed with their respective descriptive statistics in Table 4-1 for the city data and Table 4-2 for the Metropolitan Statistical Area data sets. The first analysis performed was the Pearson's Correlation Coefficient measuring the strength and direction of the linear relationship between variables. The first correlation measured significant, significance level less than or equal to .05, relationships between green space and economic variables. The strongest relationship measured in the correlation analysis was between total number of firms and total park expenditure, strength of 0.931, and total number of firms and population, strength 0.990. Other significant relationships measured included the median value of owner occupied housing units and park expenditure per resident with a strength of 0.348; and total number of firms and total number of park acres with a strength of 0.419, see Tables 4-3, 4-4 and 4-5 for a summary of the correlation results. There were no significant relationships measured between the percent of population of retirement age and any of the green space variables.

The first regression analysis tested each of the variables, controlled for population, associated with the number of firms, also controlled for population. Table 4-6 show the summary of this regression. The R value (0.392) is the Pearson's Correlation, showing the strength and the direction of the relationship between the independent variables (park expenditure per resident, percent of population with at least a college degree, and income per capita) and the dependent variable, the number of firms per 1,000 residents. The R Square Value represents the amount of variation that can be explained in the dependent variable given the independent variables. The R Square value is .154, thus

the listed independent variables can explain 15% of the variation of the number of firms per 1,000 people. The Adjusted R Square value explains how well the model would apply to a population rather than just a sample. The significant F change is 0.004, which allows the rejection of the null hypothesis. Thus, to deduce there is a difference in the number of firms given the measured factors. The B coefficient explains for every unit the independent variable increases, the amount the dependent variable is expected to change. Thus, for every percent higher the population of college graduates is, it can be expected that the number of firms will increase by 0.44 per 1,000 residents. However, the t-statistics and significance measure if the coefficients are statistically different than zero, which includes none of the measured factors.

After seeing the strong correlation between the percent of the adult population with at least a bachelor's degree and both total number of firms and green space variables, an additional regression analysis was completed. The effects of the dependent variables—park expenditure per resident, median value of owner occupied homes, per capita income, park acres as a percent of city acres, and the total number of firms per 1,000 residents—were measured in terms of the independent variable—the percent of the population 25 years old and above with at least a bachelor's degree. The results of this regression are summarized in Table 4-6. The R square value is 0.811; thus, the independent variables explain 81% of the variation of the percent of the population with at least a bachelor's degree. Also seen in Table 4-6, per capita income and the percent of parkland are each shown to be significant predictors of the percent of the population with at least a bachelor's degree. Median house value is also statistically

different from zero in predictive ability, but it is a surprisingly negative direction with a coefficient value of $-1.06E-05$.

In the metropolitan statistical area analysis, the independent variables analyzed in the regression were park expenditure per capita, park acres per 1,000 residents, median real estate taxes paid for units with a mortgage, average corporate tax burden per household, total firm establishments per 1,000 residents, and the percent of the population over 25 with at least a bachelor's degree. The dependent variable was the number of firm births per 10,000 residents. The R square value is 0.318; thus, the measured factors can explain 31% of the variation in the number of firm births. Table 4-6 shows of the independent variables analyzed, only the total number of existing establishments is significantly different from zero in predicting the number of births, suggesting for every increase of 1 establishment per 1,000 people, it is expected the number of firm births per 10,000 residents will increase by 0.76.

Table 4-1. Variable Descriptive Statistics for City Data

| Variable | Mean | Standard Deviation | Median | N |
|--|--------------|-----------------------|--------------|----|
| Population | 603,281 | 929,967 | 373,903 | 98 |
| Total park expenditure (\$) | \$62,867,933 | \$141,379,173 | \$34,812,737 | 98 |
| Park expenditure per resident (\$) | \$93 | \$64 | \$77 | 98 |
| Total Park Acres | 10,109 | 12,238 | 5,095 | 98 |
| Park Acres as Percent of Land Area | 9% | 6% | 8% | 98 |
| Park Acres per 1,000 Residents | 19 | 28 | 12 | 98 |
| Persons 65 years and over (%) | 11% | 2% | 11% | 98 |
| Bachelor's degree or higher of persons age 25+ (%) | 31% | 11% | 29% | 98 |
| Median value of owner-occupied housing units | 237,309 | 148,488 | 200,150 | 98 |
| Per capita money income in past 12 months | 26,465 | 7,108 | 25,187 | 98 |
| Median household income | 48,655 | 12,893 | 46,925 | 98 |
| Total number of firms | 57,080 | 106,312 | 32,076 | 98 |
| Number of Firms per 1,000 Residents | 90 | 26 | 82 | 98 |

Table 4-2. Variable Descriptive Statistics for Metropolitan Statistical Area Data

| Variable | Mean | Standard Deviation | Median | N |
|---|-----------|--------------------|-----------|----|
| Population of MSA | 2,432,673 | 2,926,871 | 1,624,353 | 71 |
| Percent of Population with at least a Bachelor's degree | 27% | 6% | 26% | 71 |
| Percent of population age 65+ | 12% | 2% | 11% | 71 |
| Population of MSA | 2,432,673 | 2,926,871 | 1,624,353 | 71 |
| Total Park Acres | 13,094 | 14,368 | 7,336 | 71 |
| Park Acres Per 1,000 | 8 | 9 | 6 | 71 |
| Total Park Expenditure (in millions) | \$84.31 | \$172.88 | \$35.83 | 71 |
| Park Expenditure per capita | \$32 | \$19 | \$31 | 71 |
| Average corporate income tax burden by MSA household | \$2,894 | \$778 | \$2,816 | 71 |
| Median real estate taxes paid for units with a mortgage | \$2,316 | \$1,095 | \$1,969 | 71 |
| Total business establishments | 54,198 | 69,933 | 32,963 | 71 |
| Total establishments per 1,000 residents | 22 | 3 | 22 | 71 |
| Establishment births per 10,000 residents | 28 | 6 | 27 | 71 |
| Total establishment births | 7,150 | 9,241 | 4,455 | 71 |

Table 4-3. Significant Correlations with Total Number of Firms

| Variable | Strength and Direction of Correlation |
|----------------------------------|---------------------------------------|
| Total Expenditure | Strong Positive |
| Total Acres | Moderate Positive |
| Parks as a percent of city acres | Moderate Positive |
| Median value of homes | Moderate Positive |
| Population | Strong Positive |

Table 4-4. Significant Correlations with Firms per 1,000 Residents

| Variable | Strength and Direction of Correlation |
|--|---------------------------------------|
| Percent of population with Bachelor's degree or higher | Moderate Positive |
| Per capita income | Moderate Positive |
| Total number of firms | Moderate Positive |
| Median value of homes | Moderate Positive |

Table 4-5. Significant Correlations with Percent of Population with a Bachelor's degree or higher

| Variable | Strength and Direction of Correlation |
|----------------------------------|---------------------------------------|
| Park Expenditure per resident | Moderate Positive |
| Parks as a percent of city acres | Moderate Positive |
| Per capita income | Strong Positive |
| Median value of homes | Moderate Positive |
| Total number of firms | Moderate Positive |

Table 4-6. Regression Model Summaries

| Dependent Variable | Independent Variables | R | R Square | Sig. F Change | Significant Coefficients? |
|---|--|-------|----------|---------------|--|
| Firms per 1,000 residents | Park acres, park expenditure, parks as percent, median home value, per capita income, percent of population with at least a bachelors degree | 0.409 | 0.167 | 0.009 | None |
| Firms per 1,000 residents | Park expenditure, median home value, per capita income, percent of population with at least a bachelors degree | 0.392 | 0.154 | 0.004 | None |
| Percent of population with at least a Bachelor's degree | Park expenditure, parks as percent of city, median home value, per capita income, firms per 1,000 residents | 0.901 | 0.811 | 0.001 | Per capita income, Median value of homes, parks as a percent of city acres |

CHAPTER 5 DISCUSSION

As the literature suggests, there are many different factors that influence business location decisions and, in effect, the economic development of localities. The regression analysis proved this even further. The regression analysis run for the city data was only able to account for 15% of the variance of the number of firms per 1,000 residents. Even more evident regarding the multiple factors affecting location decisions was that none of the coefficients were statistically different from zero in affecting the predictability of firm existence. Although these may seem like inconclusive or even unsuccessful results, they do, in fact, indicate important findings. The correlation results provided evidence for the relationship between green space and factors of economic development.

Expenditure

The strong positive correlation between park expenditures and number of firms shows this important association. Although this association cannot be looked at as a causal relationship, it at least confirms, through data, a strong association between green space expenditures and existence of firms. From this association, there is not sufficient evidence to state greater park expenditure creates more firms within a city; however, there is evidence to conclude all other things being equal, greater park expenditures do not cause firms to avoid locating in a municipality. Additionally, it is assumed greater park expenditure creates better parks. Having parks alone is not sufficient; the parks must be places people want to live. Higher park expenditure is a result of more maintenance, landscaping, and programming, creating more enjoyable environments within the parks and thus a higher quality of life of the citizens within the

municipality. This is why the analysis and the results of the association between park expenditure and number of firms was key to this study.

College Degree

Another important aspect of the park expenditure correlation results was the relationship between park expenditure per resident and the percent of residents with a Bachelor's Degree or higher. There was a strong, statistically significant relationship found between these two variables, indicating support for the theories of human capital and Florida's creative capital. Both of these theories present evidence of a highly educated workforce being an attractive draw for business. Asserting high quality social and recreational amenities attract this highly educated class to certain jurisdictions. Also supporting this relationship was the statistically significant, strong positive correlation between the percentage of the city being parkland and the percent of the population with at least a college degree. This correlation suggested a relationship of attracting college graduates to cities beyond park spending. Perhaps the dedication of a higher percentage of a city's land area suggests more recreational and social opportunities available for residents, a healthier environment, or a cultural or political atmosphere that is attractive to college graduates.

The correlation between park expenditure and parks as a percent of land area and percent of population with a college degree was not the only significant result from the statistical analysis. The regression analysis results presented the predictive ability of green space in relationship to the percent of the population with a college degree or above. These results are the most significant in terms of economically justifying an investment in green space initiatives. Of the variables analyzed, the percent of the population with at least a college degree was the strongest predictor of the number of

firms. In turn, the percent of a city's acreage dedicated to parkland is a statistically significant predictor of the percent of the city populations with at least a college degree. Given these results, it can be suggested college graduates tend to locate within cities with a higher percentage of parkland and firms tend to locate in cities with a high percentage of college graduates. Although not able to model firm location based directly on green space within cities, there does seem to be a strong relationship evident given the college graduates factor.

Retirees

The most surprising results were the lack of correlation between the percent of the population retirement age and the existence of green space. Research suggested the migration of retirees to areas with high quality of life amenities, especially in regard to recreational amenities. There are a number of possible explanations for this lack of relationship, including lack of sufficient data analyzed. The park data analyzed did not include private green spaces and parks, such as golf courses. This factor alone could account for the surprising results, since many retirees are moving to areas with extensive private green spaces such as golf course communities. Another possible explanation for these results is looking at the overall percent of the population above retirement age, rather than the migration rates and patterns of retirees with regard to cities' green space. Regardless of the exact reasoning for no associations found between the percentage of retirement-age citizens and green space, this is still a very interesting research matter and ever growing matter, given the high number of upcoming retiring baby boomers. As the literature suggests, this population presents strong economic development potential for cities and provides an excellent matter for further research.

Metropolitan Statistical Areas

Although the results for the metropolitan statistical areas analysis seemed unable to support the hypothesis, some important patterns emerged. The strong correlation between firm births and existing establishments, further supported through the regression results, support the economies of agglomeration theory as a factor of business location. Although this seems of little value since agglomeration economies are well researched and documented, these results provide additional significance to the total number of firms when analyzing economic development. The regression results showed the most significant factor predicting firm births was the total number of existing establishments. The percent of the population with a college degree was also strongly correlated with firm births showing an important relationship between college graduates and firm births, although no statistically significantly different from zero in predicting firm births through the regression. The analysis showed taxes correlated with the number of firm births, but is a surprisingly positive direction. However, due to limited corporate tax burden data analyzed, I made neither assumptions nor generalizations regarding taxes, outside of them not being major factors in this study. The results showed limited correlations of green space to any of the economic development variables and no predictive ability, thus the hypothesis was not supported through the metropolitan statistical areas analysis. Yet, the results supported the importance of the number of firms per capita in a city and the percent of college graduates living in a city.

CHAPTER 6 CONCLUSIONS

As seen in the literature, there are many variables affecting firm location within and among cities. This analysis tried to account for as many of these variables as data and time limitations allowed. However, the large number of additional variables such as incentive packages, land and transportation costs, proximity to a university, and 'positive business environments' could not be accounted for in this analysis. Through the literature, each of these is an important factor of business location and ensuing economic development and could have affected the overall results. However, the results produced by this study support the existing literature by providing statistical evidence of the multi-catalyst nature of business location decisions and economic development. Through the regression analysis, none of the variables were significantly different from zero in their ability to predict the total number of firms located in a city, yet all of the variables analyzed together within the regression produced a statistically significant 15% variation explanation of the total number of firms, showing the variables are important factors in business location. These results provide a starting point for continued research using more comprehensive data, such as incentives, transportation costs, proximity to a university, and the business environment, in addition to running analysis based on different industry sectors, as the research points to significant variation of location decisions based on industry sector.

Thus, there are major limitations of this study. The data analyzed does not account for all of the possible independent variables affecting business location. Additionally, the variables analyzed correlated with each other, such as total park acres strongly correlated with parks as a percent of land area, and per capita income is

correlated with percent of population with at least a bachelor's degree and the median home value. This correlation between variables may have affected the power of the models and again, presents a limitation to the study. As mentioned, the study would have benefited from additional economic variables, but the economic data analyzed was significantly limited by the park data available. Also, as seen by the metropolitan statistical areas analysis results, the municipality park data is not a successful variable when taken beyond the city level. This study attempted to use this extension of municipality data to show city parks as a catalyst for metropolitan statistical area economic development. Given the results, the data wasn't insufficient to support this claim.

Despite the study's limitations, it was able to add to existing literature by beginning to statistically show urban green space as a catalyst of economic development through its relationship to attracting college graduates and, in effect, firms to cities. The study supports what was seen in recent literature and provides evidence for urging municipalities to shift the focus of attracting business by large incentive packages and tax breaks, to a method focusing on the quality of the community. By focusing on the quality of the current and future resident's experience in the city, through increased and more comprehensive green space planning, the city can attract both highly educated and skilled workers and business investment.

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BIOGRAPHICAL SKETCH

Allison Schutes graduated from the University of Florida in May 2012, with a Master of Arts in Urban and Regional Planning. Before coming to the University of Florida, Allison earned her Bachelor's degree in psychology from Rollins College in Winter Park, Florida. After graduating from Rollins, Allison spent 5 years at SeaWorld Orlando overseeing education and camp programs. Allison's main planning interests are in the interaction between economic development and environmental concerns.