Walking the Walk

How Walkability Raises Home Values in U.S. Cities

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Summary

More than just a pleasant amenity, the walkability of cities translates directly into increases in home values. Homes located in more walkable neighborhoods—those with a mix of common daily shopping and social destinations within a short distance—command a price premium over otherwise similar homes in less walkable areas. Houses with the above-average levels of walkability command a premium of about $4,000 to $34,000 over houses with just average levels of walkability in the typical metropolitan areas studied.

This paper explores the connection between home values and walkability, as measured by the Walk Score algorithm. Walk Score measures the number of typical consumer destinations within walking distance of a house, with scores ranging from 0 (car dependent) to 100 (most walkable). By the Walk Score measure, walkability is a direct function of how many destinations are located within a short distance (generally between one-quarter mile and one mile of a home). Our measure of walkability reflects the convenience and proximity of having shopping and cultural activities close at hand, as well as the value households attach to mixed-use neighborhoods.

Using an economic technique called hedonic regression, we estimate how much market value homebuyers implicitly attach to houses with higher Walk Scores. We looked at data for more than 90,000 recent home sales in 15 different markets around the nation. Our statistical approach controlled for key characteristics of individual housing units (their size, number of bedrooms and bathrooms, age and other factors), as well as for the neighborhoods in which they were located (including the neighborhood's income level, proximity to the urban center and relative accessibility to employment opportunities).

After controlling for all of these other factors that are known to influence housing value, our study showed a positive correlation between walkability and housing prices in 13 of the 15 housing markets we studied. In the typical market, an additional one point increase in Walk Score was associated with between a $700 and $3,000 increase in home values. In one market (Las Vegas) there was a negative correlation—housing prices decreased with higher Walk Scores, and in one market (Bakersfield) there was no statistically significant correlation between prices and walkability after controlling for other factors.

These results show that consumers and housing markets attach a

positive value to living within easy walking distance of shopping, services, schools and parks. The property value premium for walkability seems to be higher in more populous urban areas and those with extensive transit, suggesting that the value gains associated with walkability are greatest when people have real alternatives to living without an automobile.

It should be stressed that our measure of walkability captures not just the benefits associated with walking but with greater accessibility generally. Even households that don't walk to every destination have shorter trips (and more nearby choices) than households with lower Walk Scores. And because places with higher walk scores tend to have more mixed uses and better transit services, some of the value measured here may be attributable to those assets.

This research makes it clear that walkability is strongly associated with higher housing values in nearly all metropolitan areas. The choice, convenience and variety of walkable neighborhoods are reflected in housing markets and are the product of consumer demand for these attributes. The nation's urban leaders should pay close attention to walkability as a key measure of urban vitality and as impetus for public policy that will increase overall property values – a key source of individual wealth and of revenues for cash-strapped governments in a tough economy.

Introduction

Walking and cities go hand in hand. Sidewalks, streetscapes and destinations all define urban space. The resurgent interest in downtowns and in promoting mixed-use developments throughout metropolitan areas is, in part, driven by a recognition of the value of walkability.

For a long time, walking has received little respect as a means of transportation or as an essential part of vibrant urban spaces. This report reconsiders the value of walkability using a new web-based assessment tool—Walk Score—to look at how walkability influences housing values in selected U.S. metropolitan areas.

Our analysis of walkability and its connection to urban housing values unfolds in five parts. First, we explore the concept of walkability, what it is and how it is measured. We describe the Walk Score measure developed by Front Seat and how it provides a tool for measuring the relative accessibility of common destinations to housing units. Part two discusses the tool of hedonic analysis developed by economists to decompose the contribution

of different attributes to the value consumers place on complex products. Part three outlines the data we use to analyze home values and neighborhood characteristics. Part four lays out the results of our hedonic modeling and the relative contribution of walkability to housing prices. Part five discusses the economic and policy implications of our findings and suggests next steps for further research.

This work was commissioned by CEOs for Cities to build on its growing body of work to help urban leaders understand how cities build and hold on to value and to uncover more evidence that demonstrates why cities and urbanism matter to the success of our nation as a whole.

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I. Walkability

A key asset of cities is the relative ease with which people can access a wide range of jobs, goods, services and opportunities for social interaction. People and businesses value city locations for the accessibility they provide. Places that are walkable—that have a variety of services and destinations in close proximity to one another—are more convenient and more lively.

Walking is a largely unmeasured and grossly under appreciated component of the urban transportation system. Transportation data often focus exclusively on car and transit trips, ignoring pedestrian travel, even when it is an important component, i.e., walking to a transit stop or from a parking area (Litman, 2007). Consequently, walkability has been under emphasized or ignored as a vital form of urban transportation.

Walking is both important in and of itself and as a marker of vibrant urban spaces. Urban spaces are, almost by definition, places where it is more convenient and common for people to walk between destinations than to take other modes of transportation. Places that are conducive to walking frequently have a host of other related characteristics: they are generally denser, better served by transit, more central, and have more of a mix of different land uses. As Jane Jacobs has observed, walkability is at the heart of urban vibrancy, short blocks, population density and diversity and a mix of uses, building types and ages that all play out in a "sidewalk ballet" (Jacobs, 1961).

Economists have paid increasing attention to Jacob's views. Two decades ago, Robert Lucas –subsequently awarded Nobel laureate in economics – asked rhetorically what forces held a city together:

> "If we postulate only the usual list of economic forces, cities should fly apart. The theory of production contains nothing to hold a city together. A city is simply a collection of factors of production: capital, people and land -- and land is always far cheaper outside cities than inside. Why don't capital and people move outside, combining themselves with cheaper land and increasing profits?" (Lucas, 1988)

The answer to this puzzle, Lucas suggested, was that people paid high rents in places like Manhattan or downtown Chicago for the opportunity to be near other people. Our study shines some additional light on that phenomenon, illustrating the value that homeowners attach to locations that enable them to easily access a variety of urban destinations by walking and other means.

Consumers and businesses attach value to the closeness and choice of things found in cities. The intrinsic advantages of cities revolve around the variety of consumption choices and experiences they provide, the relative ease of accessing those choices, and the opportunity to discover new goods, services and experiences (Cortright, 2007). Walking provides a range of benefits including mobility, consumer cost savings, fitness and health and social interaction (Litman, 2007).

Walking has important social benefits as well. More people walking on the streets is a signal that an area is safe and interesting. A prominent characteristic of vital urban neighborhoods is their vibrant pedestrian street life (Jacobs, 1961).

Land use policies prevalent during much of the twentieth century had the effect of greatly reducing walkability. Local governments adopted land use planning that intentionally separated different types of land uses. Many zoning codes not only outlawed the corner grocery store and the corner bar, but winding suburban streets and cul de sacs effectively outlawed corners as well. In addition, the scale of commercial development and public facilities increased rapidly—fewer and larger schools and stores, which are, by definition, farther from the average student or shopper and less walkable.

Part of the value associated with walkability may reflect the relative

scarcity of walkable, mixed-use neighborhoods in many U.S. metropolitan areas. There is some evidence that there are fewer pedestrian-friendly, transit-oriented residential neighborhoods in most metropolitan areas that consumers would prefer, given a choice between these and more sprawling, auto-oriented developments (Levine, Inam, & Torng, 2005).

Concerns about urban sprawl, global warming and the health and social effects of an automobile-dominated transportation system have rekindled interest in walkability in the United States, especially over the past 15 years. Walkability is a central feature of efforts to revitalize urban centers, promote transit-oriented development and in new urbanist planning (Leinberger, 2007).

As a result of the emphasis on automobiles in most metropolitan transportation planning, walking has been less studied and is less well understood than other forms of transportation. Many transportation surveys either ignore or discount walking trips (or the portion of travel spent walking) and good data on walking is rare (Litman, 2007). In an effort to shed greater light on the urban characteristics that facilitate walkability, Front Seat has developed Walk Score, a web-based algorithm for computing the relative walkability of different residential locations. The idea for counting close-by destinations as means of assessing walkability was suggested by Alan Durning of the Sightline Institute. The Walk Score index is freely available on the Internet and is increasingly being used in the real estate market. Launched in 2007, Walk Score has been integrated into many online real estate listing services. In fact, ZipRealty.com, which provided the data for this inquiry, was the first large real estate website to add Walk Score to all their listings. Today more than 2 million Walk Scores are shown each day by all Walk Score partners.

Walk Score uses Google maps to compute the distance between residential addresses and nearby destinations. The Walk Score algorithm looks at destinations in 13 categories and awards points for each destination that is between one-quarter mile and one mile of the subject residential property:

- grocery store
- coffee shop
- movie theater
- park
- bookstore
- drug store
- clothing and music store
- restaurant
- bar
- school
- library
- fitness
- hardware store

Destinations get maximum points if they are one quarter mile or less from the residence and no points if they are more than one-mile away. Only the closest destination in each category is evaluated (additional destinations in a category within one mile have no additional effect on Walk Score). Each destination category is weighted equally, and scores are normalized from zero to 100.

Walk Score has both conceptual and technical limitations. Whether people weight all destinations equally or are indifferent to the number of additional destinations in a category is unknown. The Walk Score depends on the accuracy of the database of destinations used by Google Maps. It appears that this database has been compiled from the Dun and Bradstreet database, although Google allows users to add additional destinations (subject to verification and quality control) (Drake, 2009). In addition, Walk Score simply measures the straight-line distance to each of these locations and makes no adjustments for the ease of walking, the width or connectivity of streets, and traffic or other obstacles to walking.

In essence, Walk Score is a measure of the proximity of a range of typical goods, services and activities to a particular household. As a result, locations with high Walk Scores are not only more conducive to walking, they are also similarly more conducive to cycling and are more likely to be well-served by transit. In addition, because a wide range of activities are available close at hand, locations with high Walk Scores enable households to drive shorter distances when they do choose to travel by car.

It's also worth noting that Walk Score is a measure of opportunity and not necessarily a measure of activity. Households with high Walk Scores may choose not to walk for all of their trips, but places with higher Walk Scores are more convenient for walking, generally speaking, than places with lower Walk Scores.

II. Hedonic Analysis: Estimating Values of Housing and Neighborhood Attributes

Over the past several decades, economists have developed a statistical technique, called hedonic regression, to break out the contribution of each of a house's attributes to its market price. The pioneering application of hedonic analysis to real estate was developed by Sherwin Rosen three decades ago (Rosen, 1974).

By looking at hundreds (or thousands) of different transactions over time and examining the relationship between variations in price and variations in house characteristics, it is possible to estimate statistically the separate or marginal contribution of each attribute to a house's selling price. Hedonic analysis is a more rigorous, quantitative way of measuring our intuition that larger houses or those located in nicer neighborhoods command higher prices than otherwise similar houses.

To some readers, it may seem counterintuitive to use higher housing prices as an indicator of improvements in livability. But price variations among houses, particularly within a metropolitan market, reflect the value that consumers derive from the characteristics of those houses (and the neighborhoods in which they are located).

We know that the reverse is certainly true. Low and declining prices are the hallmark of troubled and declining neighborhoods. Declining prices prompt disinvestment and a lack of maintenance, perpetuating a cycle of decline, leading in extreme cases to housing abandonment that mars many troubled urban neighborhoods. Rising prices are a key leading indicator of neighborhood revitalization (Weissbourd, 2008).

Economists say that the positive attributes of particular properties are capitalized into the price of land. For decades, urban economists have talked about an urban rent gradient—property closer to the center of an urban area commands higher prices because it is more accessible to jobs and shopping and customers and workers than more peripheral locations. The rent gradient visualizes rents as being highest in the center of the region and then declining as one moves outward (McMillen, 2002).

Hedonic regression is used to decompose the values that consumers attach to different attributes of complex products. Because houses differ widely in terms of size, location and amenities, simply comparing sales prices reflects differences in quality as much as differences in costs. From the view of hedonic analysis, complex, highly varied products like houses can be thought of as consisting of a bundle of more fundamental attributes that

consumers value. Hedonic analysis statistically unbundles these different attributes and estimates their separate value. Economists have used hedonic price estimation in a variety of ways. For example, the Bureau of Labor Statistics uses hedonic methods to control for quality changes in cars and computers in calculating the rate of price increases over time.

Hedonic models of housing prices estimate the values consumers attach to a variety of characteristics including some characteristics of the building and others of the site or neighborhood in which it is located.

Hedonic analysis rests on a number of key assumptions about markets, pricing and consumer behavior, the details of which are beyond the scope of this paper. For an excellent review of these issues, the reader may wish to consult one of several academic reviews of hedonic analysis (Gibbons & Machin, 2008).

Many different characteristics contribute to the value of a house. After controlling for other factors like home and lot size, location and number of bedrooms and bathrooms, one study found positive and significant values for fireplaces, decks, basements, pools, porches, central air conditioning and brick construction (Yinger, 2009).

Neighborhood and environmental factors also play a role in shaping housing prices. Academic research has identified school quality, employment accessibility and crime rates as important influences on housing prices within cities (Gibbons & Machin, 2008). One study attributes a portion of the appreciation of housing values in New York to the decline in crime rates over the past two decades. High crime rates held down housing prices, and when crime subsided, housing values increased (Schwartz, Susin, & Voicu, 2003).

Poor environmental quality also has a negative effect on housing values. Households are willing to pay more for an otherwise similar house in a neighborhood with low levels of air pollution than a neighborhood with high levels of pollution. This revealed willingness to pay is one way economists estimate the economic costs associated with air pollution (Kahn, 2004).

Most hedonic pricing models address location using a variety of measures. A study of housing values in Seattle in the late 1990s found that accessibility (by car) to commercial and university uses had a positive effect on housing values, while accessibility to K-12 schools and industrial land uses was associated with a negative affect on housing prices (Franklin & Waddell, 2002).

Bina, et al studied 900 housing sales in Austin, Texas, and reported that accessibility shapes residential values. Home prices rise with proximity to the Central Business District (by $8,000 per mile) and shorter average commute times ($4,700 per minute saved in daily travel time), everything else constant. Most studies focus on home sales, but the hedonic pricing technique has also been used to study variations in apartment rents. A study of Portland, Oregon, confirmed the classic negative rent gradient—rents declined with increased distance from the central business district (Wilson & Frew, 2007).

Few studies deal directly with walkability as a factor in shaping home prices. A recent analysis of home price trends in Portland, Oregon, found that houses in pre-war (i.e. those built prior to 1940) neighborhoods had appreciated more than housing in more contemporary neighborhoods (Hohndel, Conder, & Cser, 2008). One of the key distinctions between these two eras was the preponderance of grid-street systems in pre-war neighborhoods compared to cul-de-sacs in post-war neighborhoods.

Two studies have looked at the effects of "new urbanism" on property values, i.e. how connected streets, higher density, mixed uses—all attributes connected to walkability—are statistically related to housing prices. One study developed hedonic regressions for housing prices in metropolitan areas that had identified "traditional neighborhood developments" marked by connected street systems, higher densities, mixed uses and other characteristics. The study found that after controlling for other observable characteristics of housing including size, age and quality, buyers paid premiums of 4 percent to 15 percent for otherwise similar houses located in new urbanist developments (Tu & Eppli, 2001).

A second study looked at neighborhood level characteristics in the suburbs of Portland, Oregon, constructing measures for census block groups of median distance of each single family home to the nearest commercial land use. This study found a positive effect of proximity to commercial land uses but a negative effect for proximity to bus stops (Song & Knaap, 2003).

While these two studies considered the effects of neighborhood level variations in walkability, they don't account for variations in walkability at the level of an individual household, nor do they reflect a wide range of destinations. Using Walk Score measures – which are based on 13 different destinations – and examining variations for individual properties may provide us with added insight into the value placed on walkability.

III. The Data

ZipRealty and Front Seat provided us with data on 93,725 housing transactions in 15 housing markets around the United States. These data included the street address of the property as well as key variables on each property. We excluded from this database incomplete and anomalous records, for example, properties with sales prices of less than $25,000, properties built prior to 1800, and properties missing data for any of the listed variables used in our analysis.

Table 1: Metropolitan Areas Included in the Study

	Population	Rank	Median Home Value, 2007
Austin-Round Rock, TX	**1,652,602**	**36**	**177,500**
Bakersfield, CA	**800,458**	**63**	**256,800**
Charlotte-Gastonia-Concord, NC-SC	**1,701,799**	**34**	**167,000**
Chicago-Naperville-Joliet, IL-IN-WI	**9,569,624**	**3**	**261,100**
Dallas-Fort Worth-Arlington, TX	**6,300,006**	**4**	**145,400**
Fresno, CA	**909,153**	**54**	**296,300**
Jacksonville, FL	**1,313,228**	**40**	**201,400**
Las Vegas-Paradise, NV	**1,865,746**	**30**	**315,300**
Phoenix-Mesa-Scottsdale, AZ	**4,281,899**	**12**	**260,300**
Sacramento--Arden-Arcade--Roseville, CA	**2,109,832**	**25**	**400,800**
San Francisco-Oakland-Fremont, CA	**4,274,531**	**13**	**706,100**
Seattle-Tacoma-Bellevue, WA	**3,344,813**	**15**	**379,100**
Stockton, CA	**672,388**	**78**	**399,500**
Tucson, AZ	**1,012,018**	**52**	**210,700**
Washington-Arlington-Alexandria, DC-VA-MD-WV	**5,358,130**	**9**	**458,500**

Source: U.S. Census Bureau, Population Estimates, 2008
American Community Survey, 2007.
Rank is rank among U.S. metropolitan areas in population.

Market coverage varied substantially across metropolitan areas. In most cases, our sample was drawn from all parts of the metropolitan area. In several cases, however the sample was drawn from certain jurisdictions (cities, counties or sub-markets within a metropolitan area). Our data for Chicago, for example, include only selected neighborhoods on the near north side and south side; our data for the San Francisco Bay include suburban

jurisdictions but not the cities of San Francisco or Oakland.

Our sample included high priced housing markets (San Francisco) as well as markets with lower prices, such as Tucson, as shown in Table 2. The number of properties included in our sample also varied considerably from city to city.

Table 2: Summary of Data for Cities

	Observations	Sales Price (N)	Home Size (SF)
Arlington	**1,226**	**393,136**	**1,319**
Austin	**3,333**	**249,706**	**1,446**
Bakersfield	**2,566**	**224,233**	**1,812**
Charlotte	**5,313**	**279,727**	**1,508**
Chicago	**1,525**	**386,785**	**1,638**
Dallas	**13,959**	**231,236**	**2,075**
Fresno	**2,651**	**217,805**	**1,689**
Jacksonville	**4,719**	**179,873**	**1,660**
Las Vegas	**5,227**	**313,903**	**2,021**
Phoenix	**13,801**	**311,480**	**1,862**
Sacramento	**5,754**	**284,076**	**1,415**
San Francisco	**15,246**	**728,101**	**1,619**
Seattle	**9,600**	**487,404**	**1,738**
Stockton	**4,890**	**248,513**	**1,702**
Tucson	**2,466**	**190,194**	**1,462**

For each property, we identified a set of variables describing its important characteristics in two categories: housing variables (characteristics of the individual residence) and neighborhood characteristics (attributes related to location).

Housing Variables

The real estate transaction data provided by ZipRealty identified several basic characteristics of each home sale, including the price of the transaction, size of the home, the number of bedrooms and bathrooms, the year the house was built, and whether the residence was a condominium or single-family home.

These variables are commonly used in the real estate community in describing and categorizing homes. Table 3 contains data on the mean and standard deviation of selected variables in the study for each of these cities.

ZipRealty also provided us with the street address of each property. From this information, Front Seat used its Walk Score algorithm to generate a Walk Score for each property.

Table 3: Mean and Standard Deviation Selected Variables
(Standard Deviation in Parentheses)

	Price	SF	Age	MHI	CBD	Jobs	Walk
Arlington	**393,136** (227,357)	**1,319** (652)	**33** (24)	**67,023** (23,449)	**6** (1)	**180,711** (19,374)	**70** (15)
Austin	**249,706** (165,689)	**1,446** (1,293)	**37** (22)	**44,081** (21,013)	**4** (3)	**118,877** (34,217)	**58** (20)
Bakersfield	**224,233** (227,357)	**1,812** (652)	**21** (24)	**52,376** (18,231)	**11** (1)	**51,099** (19,374)	**34** (15)
Charlotte	**279,727** (306,854)	**1,508** (904)	**36** (30)	**44,299** (25,201)	**3** (2)	**152,816** (21,875)	**55** (21)
Chicago	**386,785** (413,046)	**1,638** (1,006)	**51** (37)	**54,058** (22,163)	**6** (4)	**283,233** (212,572)	**79** (17)
Dallas	**231,236** (298,829)	**2,075** (1,029)	**30** (22)	**67,088** (32,542)	**13** (7)	**148,744** (94,122)	**47** (19)
Fresno	**217,805** (377,707)	**1,689** (590)	**32** (23)	**45,570** (18,587)	**6** (3)	**76,162** (16,870)	**47** (18)
Jacksonville	**179,873** (163,357)	**1,660** (661)	**28** (25)	**46,125** (19,084)	**8** (4)	**79,079** (36,157)	**36** (20)
Las Vegas	**313,903** (298,090)	**2,021** (984)	**11** (8)	**63,379** (18,037)	**12** (4)	**75,354** (56,196)	**42** (18)
Phoenix	**311,480** (353,160)	**1,862** (837)	**24** (18)	**57,326** (24,701)	**12** (7)	**122,307** (65,333)	**44** (20)
Sacramento	**284,076** (196,847)	**1,415** (512)	**42** (25)	**41,198** (16,700)	**5** (3)	**104,381** (50,916)	**49** (19)
San Francisco	**728,101** (620,428)	**1,619** (834)	**43** (22)	**77,590** (31,261)	**11** (5)	**107,343** (47,887)	**55** (20)
Seattle	**487,404** (369,853)	**1,738** (923)	**41** (34)	**53,867** (21,149)	**9** (8)	**162,594** (81,669)	**65** (20)
Stockton	**248,513** (135,144)	**1,702** (626)	**26** (25)	**47,256** (18,744)	**5** (2)	**62,244** (16,007)	**39** (18)
Tucson	**190,194** (99,339)	**1,462** (500)	**34** (21)	**37,999** (13,630)	**7** (5)	**82,223** (35,863)	**49** (19)

Neighborhood Characteristics

We used the location information provided by ZipRealty to identify the zip code and census tract in which each property was located. Using GIS software, we looked up or computed several key variables describing the larger neighborhood in which each property was located.

Centrality (distance to CBD). Using the Census Bureau's definition of central business districts and the Maptitude GIS system, we computed the distance from the center of the central business district to the centroid of each zip code in the metropolitan area. Common central place models of urban form hold that property values are higher closer to the center of a region, reflecting accessibility to the rich and dense work and consumption opportunities that tend to be located in the center.

Job Access (Jobs within 3 miles). Using data drawn from the Census Bureau's Zip Code Business Patterns database and the Maptitude GIS system, we computed the number of jobs within 3 miles of the centroid of each zip code in the metropolitan area. Our measure of job accessibility aims at capturing the value that households attach to locations that are relatively proximate to employment opportunities.

Neighborhood Income. Using the Maptitude GIS system, we determined the Census 2000's reported values for median household income for the census block group in which each house was located. We use income levels as a proxy for perceived differences in neighborhood quality and to reflect the external effects associated with the income level of one's neighbors. Neighborhood income levels are frequently associated with crime rates and school quality, two factors which we have not modeled directly. (High-income neighborhoods tend to have better local schools, neighborhoods with lower incomes tend to have higher crime rates.)

IV. Regression Results

We conducted separate regressions for each of the 15 metropolitan areas included in our sample. Table 4 outlines the results of these regressions.

Functional Form. Hedonic models estimate the statistical relationship between housing characteristics and home prices. Some models assume these relationships are linear (each additional square foot of a house is worth a certain number of dollars), while other models assume a proportional, or log-linear relationship—each 10 percent improvement in size results in a 10 percent im-

provement in price. We tested both linear and log-linear specifications of the hedonic model for our 15 cities. In general, the log-linear version of the model better fit the data than did the linear version, so we used this for our estimates.

Each of the variables entered in our equations were statistically significant for the majority of cities evaluated. A summary of the results of our analysis are shown in Table 4.

Table 4: Regression Results: Log Linear Model Coefficient

(t-statistics in parentheses)

	R2	Constant	SF	BRs	BA	Age	Type	MHI	CBD	Jobs	Walk
Arlington	**.77**	**12.6816**	**0.0003**	**0.0419**	**0.1398**	**-0.0009**	**-0.0162**	**0.0052**	**-0.1266**	**-0.0264**	**0.0044**
		(115.31)	(12.47)	(2.98)	(8.19)	(-2.51)	(-0.56)	(15.81)	(-17.64)	(-6.93)	(8.83)
Austin	**.56**	**10.8255**	**0.0001**	**-0.018**	**0.3478**	**0.0002**	**-0.3049**	**0.0105**	**-0.0626**	**0.0105**	**0.0083**
		(198.36)	(15.07)	(-1.54)	(26.15)	(0.58)	(-13.8)	(29)	(-18.76)	(4.48)	(17.04)
Bakersfield	**.75**	**11.1423**	**0.0004**	**0.0051**	**0.0267**	**-0.0043**	**-0.2366**	**0.0065**	**0.0003**	**-0.0075**	**-0.0005**
		(233.1)	(30.9)	(0.52)	(1.86)	(-11.14)	(-5.46)	(17.91)	(0.26)	(-2.28)	(-1.43)
Charlotte	**.71**	**11.0902**	**0.0005**	**-0.0513**	**0.2047**	**0.0008**	**0.0967**	**0.0063**	**-0.1112**	**-0.0214**	**0.0071**
		(142.99)	(33.35)	(-4.19)	(14.33)	(3)	(4.6)	(20.68)	(-20.35)	(-6.56)	(15.54)
Chicago	**.75**	**9.8439**	**0.0003**	**-0.0141**	**0.1927**	**-0.0045**	**0.4383**	**0.0088**	**0.0068**	**0.002**	**0.0136**
		(57.91)	(11.3)	(-0.65)	(6.36)	(-10.47)	(8.3)	(10.29)	(0.91)	(1.86)	(8.08)
Dallas	**.75**	**10.2171**	**0.0004**	**-0.1074**	**0.0594**	**-0.0052**	**-0.1444**	**0.0058**	**0.0091**	**0.0373**	**0.0037**
		(370.56)	(53)	(-14.82)	(6.57)	(-23.02)	(-9.33)	(37.4)	(10.78)	(57.78)	(14.96)
Fresno	**.68**	**10.6887**	**0.0005**	**0.0129**	**-0.0174**	**-0.0039**	**-0.0319**	**0.0096**	**0.0026**	**0.0248**	**0.0031**
		(204.67)	(26.14)	(1.13)	(-1.02)	(-9.05)	(-1.06)	(21.06)	(0.74)	(6.81)	(7.91)
Jacksonville	**.62**	**10.3225**	**0.0006**	**-0.0711**	**0.1045**	**-0.0071**	**0.0085**	**0.0077**	**0.0229**	**0.0073**	**0.0045**
		(196.29)	(30.74)	(-5.41)	(5.97)	(-19.21)	(-1.06)	(16.91)	(7.74)	(3.13)	(10.41)
Las Vegas	**.76**	**11.4812**	**0.0004**	**-0.063**	**-0.036**	**-0.0065**	**-0.1961**	**0.0032**	**0.0193**	**0.0175**	**-0.0019**
		(381.5)	(66.37)	(-10.54)	(-3.96)	(-12.81)	(-16.84)	(14.4)	(16.72)	(20.63)	(-8.04)
Phoenix	**.73**	**10.415**	**0.0005**	**-0.1005**	**0.0586**	**-0.004**	**-0.0479**	**0.0104**	**0.0194**	**0.0244**	**0.005**
		(419.55)	(66.05)	(-18.48)	(7.43)	(-17.58)	(-4.55)	(63.17)	(26.71)	(33.95)	(25.34)
Sacramento	**.51**	**10.6764**	**0.0006**	**-0.1046**	**0.0363**	**0.0006**	**-0.1576**	**0.0159**	**0.0054**	**-0.0143**	**0.0093**
		(188.74)	(29.95)	(-8.7)	(2.13)	(1.56)	(-5.13)	(38.12)	(1.59)	(-6.65)	(21.19)
Seattle	**.77**	**11.9592**	**0.0004**	**-0.0102**	**0.0754**	**-0.0009**	**0.0103**	**0.0054**	**-0.0252**	**-0.0004**	**0.0029**
		(501.64)	(65.96)	(-2.26)	(13.37)	(-8.44)	(1.22)	(32.3)	(-52.38)	(-0.76)	(15.1)
Stockton	**.35**	**11.5287**	**0.0004**	**-0.0147**	**-0.0009**	**-0.0031**	**-0.179**	**0.007**	**-0.0126**	**-0.02**	**0.0032**
		(181.11)	(19.95)	(-1.18)	(-0.05)	(-7.39)	(-5.42)	(16.84)	(-3.02)	(-4.11)	(6.08)
Tucson	**.60**	**10.878**	**0.0005**	**-0.0645**	**0.1125**	**-0.0036**	**-0.1836**	**0.0089**	**-0.0146**	**0.0159**	**0.0038**
		(165.69)	(27.56)	(-5.94)	(6.74)	(-9.46)	(-9.64)	(15.42)	(-5.25)	(3.89)	(9.29)

Key to variables: R^2 = adjusted R^2 for Equation, SF = Square Feet of Interior Floor Area, BR = Number of Bedrooms, BA = Number of Bathrooms, Age = Age (Years), Type = Housing Type Dummy (Condo = 1), MHI = Median Household Income of Census Tract (Divided by 1000), CBD = Distance to Central Business District, Jobs = Number of Jobs within 3 miles (divided by 10,000), Walk = Walk Score

Housing Variables

House Size. House size, or the number of square feet in a housing unit, was positively correlated with housing prices. Each additional hundred square feet of space in a house increases that home's selling price by about 4 percent. House size was statistically significant in each city examined.

Bedrooms. The number of bedrooms in a house generally had a negative correlation with housing value. Although this seems counterintuitive, much of the effect of house size is accounted for by the number of square feet, rather than the number of bedrooms. All things being equal, for example, a 1,200 square foot, three-bedroom house commands a higher price than a 1,200 square foot, four-bedroom house. (The additional bedroom implies that there is less space for other uses in this house, either smaller bedrooms or less space in other common rooms.) The coefficient of the number of bedrooms was significant and negative in eight cities. It was insignificant in six cities. Arlington, Virginia, was an anomaly: housing prices were significantly and positively correlated with the number of bedrooms, even controlling for other factors.

Bathrooms. True to the belief of home remodelers everywhere, additional bathrooms are associated with additional value. In 12 of our cities, the number of bathrooms had a positive and significant association with increased home value. In two cities—Bakersfield and Fresno—the relationship was statistically insignificant. Las Vegas was an outlier—the number of bathrooms had a negative and significant relationship with house prices.

House Type. Except in Charlotte and Chicago, single family residences commanded a price premium over otherwise similar condominiums. In four cities, there was no statistically significant relationship between housing type and sales prices.

House Age. The effect of housing age on house prices varied across markets. In 11 cities, older houses had somewhat lower prices, all other things equal. In two markets—San Francisco and Charlotte, older homes commanded a premium over similar newer homes, on average. In two cities—Sacramento and Austin—there was no statistically significant relationship between housing age and prices. (However, see box on page 18 for an alternative analysis of the effect of house age on housing prices in Austin.)

Table 5: Estimated Effects of 1 Point Change in Walk Score by Metropolitan Area
Log-Linear Model

	Effect of Walk Score	t-statistic for Walk Score	R^2 for equation
Arlington	**1730**	**8.83**	**0.77**
Austin	**2073**	**17.04**	**0.56**
Bakersfield	**-112**	**-1.43**	**0.75**
Charlotte	**1986**	**15.54**	**0.71**
Chicago	**5260**	**8.08**	**0.75**
Dallas	**856**	**14.96**	**0.75**
Fresno	**675**	**7.91**	**0.68**
Jacksonville	**809**	**10.41**	**0.62**
Las Vegas	**-596**	**-8.04**	**0.76**
Phoenix	**1557**	**25.34**	**0.73**
Sacramento	**2642**	**21.19**	**0.51**
San Francisco	**2985**	**22.46**	**0.66**
Seattle	**1413**	**15.10**	**0.77**
Stockton	**795**	**6.08**	**0.35**
Tucson	**723**	**9.29**	**0.60**

Note: Except for Bakersfield, all result significant at the .01 level. Effect of Walk Score calculated based on a one-point Walk Score improvement for the mean-priced house in each metropolitan area, holding all other factors constant.

Neighborhood Characteristics

Distance to Central Business District. Proximity to the center of a region's commercial core had very different effects in different cities. Six cities—Austin, Stockton, Charlotte, Seattle, Tucson and Arlington—had higher values closer to the center, all other things equal. Five cities—Dallas, Jacksonville, Las Vegas, Phoenix and San Francisco—had higher values farther from the central business district. The relationship between proximity to the core and housing values was statistically insignificant in the remaining four cities.

Proximity to Employment Opportunities. In eight cities, proximity to employment was associated with higher housing values. The number of jobs

within 3 miles of a household was negatively correlated with housing prices in four metropolitan areas—Sacramento, Arlington, Stockton and Bakersfield. Negative correlations may reflect the disamenities associated with proximity to non-residential uses (too near a manufacturing zone, for example), or may reflect the absence of other amenities (if an area has a high concentration of jobs, it may have relatively few parks or open spaces).

Neighborhood Average Income. We measured average neighborhood income by determining the median household income for the census tract in which the subject property was located. Income levels are a proxy for neighborhood quality and are likely to overlap with neighborhood schools and, in some cases, environmental amenities. The coefficient for median household income was positive and significantly correlated with housing values in each of the metropolitan areas examined.

Walk Score. Walk Score was positively and significantly correlated with housing values in 13 of the 15 metropolitan areas included in our study. Only in Las Vegas was the relationship between Walk Score and housing prices significant and negative. In Bakersfield, the coefficient of the Walk Score variable was not significant.

Comparing our model with another

In one city—Austin, Texas—we had access to a reasonably similar hedonic price study that had been carried out recently (Bina, Kockelman, & Suescun, 2006). To evaluate the robustness of our estimates, we developed a version of our hedonic model that approximately followed the same approach. Bina, et al used a linear specification for their model and added quadratic terms for bedrooms, baths and the age of the structure to account for scale effects in each of these variables. (The squared terms account for the fact that while a 20-year-old house may be worth less than a new one, all things equal, an otherwise similar house that was 100 years old might be worth more).

The results of the two models are shown in Table 6. In some cases the two models use different variables. Where a variable present in one model was not included in the other, this is indicated as "na". The table shows the estimated linear coefficients associated with each variable as well as the standardized beta coefficient (the linear coefficient divided by each variable's standard deviation).

While there are some differences—the Bina et al model better fits the data—the sign and size of each of the variables is strikingly similar between the two models. Both models imply, for example, that an additional square foot of housing space is worth about $40 and that home values deteriorate up to about age 35 and appreciate thereafter. Condominiums are worth about $30,000 to $40,000 less than comparable single family homes. The effect of a neighborhood's median home price (Bina, et al) is the same as the measured effect of a neighborhood's median household income in our model, as measured by standardized coefficients. The Bina et al model has somewhat different estimates for the effects of bedrooms and bathrooms: our model suggests that variations in these attributes have a larger effect on house prices than the Bina et al model.

The Bina et al model does not include a measure of Walk Score. The most similar variable is likely to be number of bus stops per square mile, which may be correlated with Walk Score, because bus stops tend to be more common on major arterials and near the kinds of destinations included in Walk Score calculation (schools, stores, parks and libraries).

The fact that, despite the differences, these two models, based on different data sets produce similar results for common variables gives us increased confidence in the reliability of our model, even though it is constructed with fewer variables than other hedonic equations.

Table 6: Comparison of Hedonic House Price Models for Austin

Variable	Bina, et al Coefficient	Std. Beta	Walk Value Coefficient	Std. Beta
Attached Housing	**(32,066.0)**	**-0.06**	**(39,035.6)**	**-0.11**
Bedrooms	**41,834.0**	**0.24**	**50,916.6**	**0.28**
Bedrooms Squared	**(6,979.0)**	**-0.24**	**(10,117.0)**	**-0.31**
Bathrooms	**(46,359.0)**	**-0.23**	**(123,355.3)**	**-0.50**
Bathrooms Squared	**19,691.0**	**0.40**	**53,360.0**	**0.93**
Number of Living Areas	**10,846.0**	**0.07**	**na**	
Age of Dwelling	**(1,402.0)**	**-0.24**	**(4,236.6)**	**-0.56**
Age Squared	**20.7**	**0.29**	**60.6**	**0.65**
Interior Square Footage	**39.9**	**0.31**	**36.3**	**0.28**
Lot Size	**52,762.0**	**0.09**	**na**	
Rural	**12,584.0**	**0.03**		
Distance to CBD	**(8,001.0)**	**-0.26**	**(11,750.8)**	**-0.19**
Bus Stops	**44.3**	**0.08**	**na**	
Mean Travel Time	**(4,666.0)**	**-0.18**	**na**	
Median Home Value	**0.3**	**0.30**	**na**	
Logsum for Work Trips	**(26.9)**	**-0.20**	**na**	
Mean SAT Score	**149.8**	**0.13**	**na**	
Walk Score	**na**		**1,460.2**	**0.18**
Median HH Income	**na**		**2.4**	**0.30**
Jobs within 3 miles	**na**		**0.6**	**0.13**
Adjusted R2	**0.823**		**0.660**	
N	**729**		**3332**	

Source: Bina, et al, Table 4
Note: na: variable not estimated in this model.

Analysis

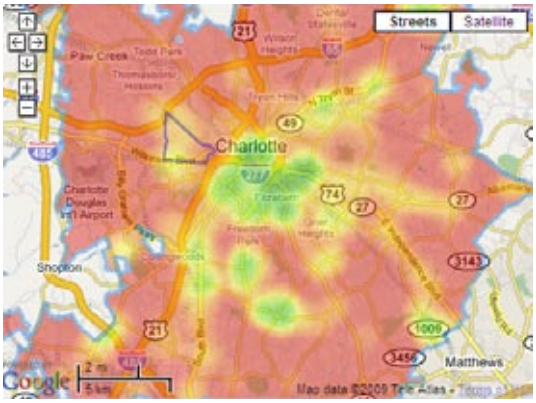
Our study shows that walkability improves housing values. Housing values are positively and significantly correlated with walkability in almost all metropolitan markets.

Walkability was correlated with high housing values in metropolitan areas of different sizes and in different regions of the country. Walkability was correlated with housing prices both in older, denser markets (Chicago) and in faster growing Sunbelt markets (Phoenix, Jacksonville). Only two very fast-growing metropolitan areas (Las Vegas and Bakersfield) did not exhibit the positive relationship between walkability and home prices.

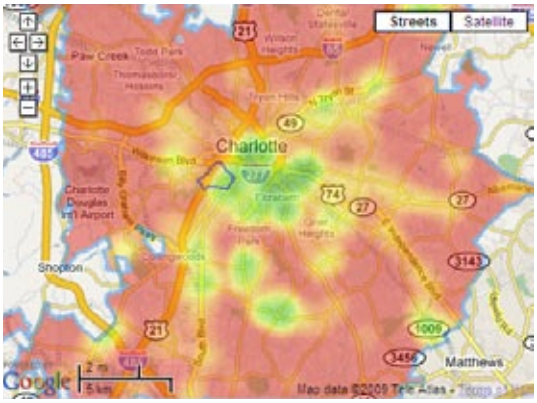
Interestingly, walkability was positively correlated with prices both in metropolitan areas with relatively high levels of walkability and those with relatively low levels of walkability. For example, Walk Scores had a positive impact on values in Jacksonville and Dallas (median Walk Scores for the metro area of 35 and 46 respectively) and also in Seattle and Austin (median Walk Scores 68 and 62). Walkability has a larger impact on housing values in more populous, denser metropolitan areas and those with larger transit systems.

To give some idea of the impact of Walk Score on actual housing values, consider the median house in Charlotte with a typical Walk Score. It would be worth about $280,000 (the median sales price of all house units in our sample). If that house's Walk Score were increased from a Walk Score of 54 (the average for our sample of houses in Charlotte) to a Walk Score of 71, it would add about $34,000 (or about 12 percent) to its value, holding all other features of the house constant. For comparison, that would be the equivalent of moving the house from the Ashley Park neighborhood to the Wilmore neighborhood.

Figure 1: Walk Scores in Charlotte, NC, by Neighborhood



Ashley Park (Average Walkscore 54)



Wilmore (Average Walkscore 71)

The impact of walkability on home values varies across metropolitan areas. An additional one point improvement in average Walk Scores adds between $700 and $3,000 to the value of a typical house, holding all other factors constant. Since the distribution of Walk Scores varies considerably across metropolitan areas, it's useful to consider each metropolitan area separately.

For each metropolitan area in our study, we estimate the gain in value that a typical house would gain from going from an average level of walkability (for that metropolitan area) to an above average level of walkability. To establish these averages, we look at the distribution of Walk Scores in the sample of homes in each metropolitan area. We define as "average" the median Walk Score for the sample, i.e. the Walk Score that half of the houses in the sample exceed and that half fall below. For the "above average" Walk Score, we use the 75th percentile Walk Score, i.e. the Walk Score that 75 percent of all households fall below and that 25 percent of all houses exceed. Values for the 25th percentile, median, and 75th percentile Walk Score are shown in Table 7.

Table 7: Distribution of Walk Scores within Metropolitan Areas

	25% Percentile	Median	75% Percentile
Arlington	**60**	**71**	**82**
Austin	**45**	**62**	**74**
Bakersfield	**15**	**3**	**51**
Charlotte	**40**	**54**	**71**
Chicago	**63**	**86**	**92**
Dallas	**34**	**46**	**51**
Fresno	**35**	**49**	**60**
Jacksonville	**20**	**35**	**51**
Las Vegas	**29**	**43**	**55**
Phoenix	**31**	**46**	**58**
Sacramento	**35**	**49**	**62**
San Francisco	**43**	**57**	**68**
Seattle	**52**	**68**	**82**
Stockton	**23**	**38**	**51**
Tucson	**34**	**51**	**66**

Source: Computed from sample data. Note: Arlington reflects data for the District of Columbia. Neighborhood average estimates not available for the City of Arlington.

In most metropolitan areas, improving from median to the 75th percentile requires a Walk Score improvement of about 12 points, with a range of from a five point gain (Dallas) to a 20 point gain (Bakersfield). Table 8 shows how much a typical home would gain in value if it were located in neighborhood with above average walkability, compared to an otherwise identical home with an average level of walkability, for that metropolitan area. The premium for a house with an above average Walk Score ranges from $4,200 in Dallas to more than $30,000 in Chicago, Charlotte, San Francisco and Sacramento. (Las Vegas is the exception: a house with above average walkability is valued about $7,200 less than a house with just average walkability).

Table 8: Contribution of Walk Score to Housing Values

	Walk Score Median	75% Percentile	Estimated Housing Gain from Moving to 75% Percentile
Arlington	**71**	**82**	**19,028**
Austin	**62**	**74**	**24,871**
Bakersfield	**31**	**51**	**(2,242)***
Charlotte	**54**	**71**	**33,763**
Chicago	**86**	**92**	**31,562**
Dallas	**46**	**51**	**4,278**
Fresno	**49**	**60**	**7,427**
Jacksonville	**35**	**51**	**12,951**
Las Vegas	**43**	**55**	**(7,157)**
Phoenix	**46**	**58**	**18,689**
Sacramento	**49**	**62**	**34,345**
San Francisco	**57**	**68**	**32,837**
Seattle	**68**	**82**	**19,789**
Stockton	**38**	**51**	**10,338**
Tucson	**51**	**66**	**10,841**

Note: Value for Bakersfield not statistically significant at the 90% level.

Front Seat has computed the average Walk Scores of different neighborhoods in most of the major cities in our study. From this data, it is possible to identify particular neighborhoods that, on average, have levels of walkability that are equal to the median and the 75th percentile for each metropolitan area. Table 9 shows neighborhoods which have average Walk Scores approximately equal to these values. Not every house in each neighborhood has the same Walk Score, but the differences between these neighborhoods illustrate the relative change in Walk Score associated with the value differences identified in Table 8.

Table 9: Selected Neighborhoods with Walk Scores at the Metro Median and 75th Percentile

	Median	75% Percentile
Arlington	**Takoma Park 71**	**Woodley Park 82**
Austin	**Rosewood 62**	**Zilker 75**
Bakersfield	**31**	**51**
Charlotte	**Ashley Park 54**	**Willmore 71**
Chicago	**Logan Square 86**	**Uptown 92**
Dallas	**Urbandale 47**	**Northeast Dallas 54**
Fresno	**Bullard 53**	**Hoover 62**
Jacksonville	**Deerwood 35**	**University Park 51**
Las Vegas	**Centennial Hills 42**	**Twin Lakes 56**
Phoenix	**Maryvale 47**	**Camelback East 61**
Sacramento	**Del Pas Heights 49**	**Land Park 62**
San Francisco	**57**	**68**
Seattle	**South Delridge 68**	**Greenwood 82**
Stockton	**38**	**51**
Tucson	**North Dodge 51**	**Mitman 66**

Source: Front Seat. Note: Front Seat has not computed average Walk Scores for neighborhoods in Bakersfield, Stockton, or the suburbs of the San Francisco Bay Area. For comparison to Arlington, neighborhoods in the District of Columbia are shown.

On average, home buyers attach greater value to walkable homes relative to other housing units in the same metropolitan area, controlling for other observable characteristics. These results provide a strong basis for concluding that improved walkability produces real economic value for city residents.

The apparent value that consumers attach to walkability likely stems from many sources. Consumers in more walkable neighborhoods may save money on driving (and transit) by virtue of the closer proximity of many destinations. It seems likely that many consumers value the time savings associated with walkable neighborhoods – even for trips taken by other modes. The variety of uses close by and the implied opportunities for serendipitous interaction may also make a neighborhood more interesting.

V. Implications

Our research confirms the intuition of Jane Jacobs that walkability has an important connection to the function of urban economies. The data presented here show that home buyers attach a significant economic value to the attributes captured by Walk Score.

Neighborhood walkability is the product of both public and private decisions. The public sector dictates the land use framework, regulating the location and composition of commercial land uses and the types and density of housing units. The public sector is also responsible for streets and sidewalks and choosing the number, size and location of important destinations (i.e., schools and parks).

If we're looking to shore up value in local housing markets, it appears that promoting more walkable neighborhoods is one way to do so.

The implicit price attached to improved walkability shows that there is a market value for this kind of neighborhood. This is true both in markets with relatively high levels of walkability and lower levels of walkability. The fact that, on average, the impact of walkability on value is higher in metropolitan areas with higher average Walk Scores suggests that there may be some increasing returns to improving walkability: having more walkable housing region wide is associated with a larger value gain from improved walkability for all housing in the region.

And improved walkability may assist fiscally strapped local governments. Because most local governments depend heavily on property taxes to finance local services, improved walkability may mean higher property values and higher tax revenues than for less walkable development.

These are turbulent times for the nation, particularly in the two sectors of the economy most closely tied to the built landscape: transportation and housing. General Motors and Chrysler have entered bankruptcy, held together with infusions of tens of billions of dollars of federal money. And over the past three years, housing values—which many imagined could only go up—have plummeted as the housing bubble has imploded.

Many Americans are re-examining their communities and lifestyles, and asking whether their might be some alternatives that are more sustainable, both economically and environmentally. From new urbanists comes an interest in recasting our communities along traditional lines, with a closer mixing of commercial and residential uses, better transit and connected, complete streets.

One of the key challenges of the next few years will be to revisit the pattern of land uses in U.S. communities, particularly in traditional suburbs. Already, there are pioneering examples of adaptation of now obsolete land use patterns into more diverse, mixed and walkable communities (Dunham-Jones & Williamson, 2008).

There may be opportunities to rebuild malls as mixed-use centers. In Denver, the aging Villa Italia Mall in suburban Lakewood was demolished and replaced with a commercial and residential district with 1,300 apartments, 200 condominiums and single family homes, offices, and a neo-traditional main street (Davis, 2008). The current decline in shopping malls nationally creates abundant opportunities to re-think the distribution of land uses in metropolitan areas. By one recent count, 84 malls nationally are either dead or on the verge of closing (Hudson & O'Connell, 2009).

A 2007 survey commissioned by the National Association of Realtors showed that 57 percent of Americans agreed with the statement that "business and homes should be built closer together, so that stores and shops are within walking distance and don't require the use of an automobiles" (Ulm, 2007).

The upheaval in financing markets, the dramatic decline in housing prices, retrenchment in the retail sector and the ongoing restructuring of the automobile industry are all harbingers of change for the nation's cities. Continued uncertainty about future energy prices and the need to deal aggressively with climate change will demand new strategies in the years ahead. Our research suggests that walkability is already an important component of the value proposition of the nation's cities, and that improving walkability can be an important key to their future as well.

Next Steps

Our research highlights a strong connection between walkability, as measured by Walk Score, and variations in home values. The relationship holds across most metropolitan markets we've studied, and our hedonic modeling produces results that are consistent with other investigations of housing prices. Still, there is much more to be learned about how walkability contributes to home values. We think there are several important questions that should be high on the research agenda.

What parts of Walk Score contribute most to home values? Walk Score is a composite measure. Walk Score is computed based on the proximity of

a housing unit to 13 different destinations. We've made no attempt in our analysis to evaluate the separate contributions of different destinations to the value associated with accessibility. It may well be that one or a few destinations are the most highly valued, and that a more precise scoring formula would attach different weights to the different categories of destinations (Walk Score weights them equally).

Part of what Walk Score is capturing is the value consumers attach to mixed-use development—living in an area with a range of different uses in close proximity. Houses located in exclusively residential neighborhoods will tend to have lower Walk Scores because a majority of Walk Score points are awarded for proximity to commercial uses that would generally be prohibited in most residential zones.

How do other aspects of walkability influence home values? The Walk Score measure is based on straight line distances between housing units and various destinations and doesn't account for many of the physical factors—sidewalks, street connectivity, urban design, traffic, slopes and vegetation—that are known to influence walkability. Additional research is needed to know how these factors—in addition to proximity—affect home values.

How does transit accessibility relate to Walk Score? We have good reason to suspect that Walk Scores, in part, reflect transit accessibility. Other studies have shown that home values are influenced by proximity to transit, particularly high-capacity transit with frequent service, like light rail. Because transit stops are often located in commercial areas, it seems likely that high Walk Scores are associated with high levels of transit service. In this case, some of the effect we attribute to walkability may reflect the value consumers attach to transit. Our study lacked data to investigate this effect, and it would be a logical next step for further research.

How has the collapse of the housing bubble affected the market value attached to walkability (and other factors)? Our data were gathered from sales that took place in 2006 through 2008. During this time, housing prices peaked and then declined. We have not investigated the extent to which house price declines influenced the impact of different attributes. Our earlier analysis of housing price trends at the metropolitan level suggests that price declines have been more severe in more outlying neighborhoods within metropolitan areas, which suggests consumers may be putting an even higher premium on accessibility, including walkability (Cortright, 2008).

Further research could also address some of the limitations of the dataset used in this study. Our data did not include many detailed housing attributes known to influence home values, and so we were unable to model them. For example, research has shown that other variables are important in explaining home values, including lot size, environmental amenities, building improvements (fireplaces, swimming pools, garages), and the quality of local schools. We are presently working with other researchers to include Walk Score data in a hedonic model that includes a much wider array of variables, including those listed.

References

Bina, M., Kockelman, K. M., & Suescun, D. (2006). Location Choice vis-à-vis Transportation: The Case of Recent Homebuyers. Austin: University of Texas.

Cortright, J. (2007). City Advantage (No. 1-7276-1308-7). Chicago: CEOs for Cities.

Cortright, J. (2008). Driven to the Brink: How the gas price spike popped the housing bubble and devalued the suburbs. Chicago: CEOs for Cities.

Davis, L. S. (2008, November/December). Malls, the Future of Housing? HousingWire.

Drake, N. (2009). Review of the Literature ((Mimeographed)). Portland: Reed College.

Dunham-Jones, E., & Williamson, J. (2008). Retrofitting Suburbia: Urban Design Solutions for Redesigning Suburbs: Wiley.

Franklin, J. P., & Waddell, P. (2002). A Hedonic Regression of Home Prices in King County, Washington, using Activity-Specific Accessibility Measures. Seattle: University of Washington.

Gibbons, S., & Machin, S. (2008). Valuing school quality, better transport, and lower crime: evidence from house prices. Oxf Rev Econ Policy, 24(1), 99-119.

Hohndel, K., Conder, S., & Cser, J. (2008). Housing Price Study - SFR Sales in the 3 County Area 2000 – 2006 Part 1: Descriptive Statistics. Portland, OR: Metro Data Resource Center.

Hudson, K., & O'Connell, V. (2009, May 22). Recession Turns Malls Into Ghost Towns. The Wall Street Journal.

Jacobs, J. (1961). The Death and LIfe of Great American Cities. New York: Random House.

Kahn, M. (2004). Environmental Valuation Using Cross City Hedonic Methods. 37.

Leinberger, C. (2007). Footloose and Fancy Free:

A Field Survey of Walkable Urban Places in the Top 30 U.S. Metropolitan Areas. Washington: Brookings Institution.

Levine, J., Inam, A., & Torng, G.-W. (2005). A Choice-Based Rationale for Land Use and Transportation Alternatives. The Journal of Planning and Education and Research, 34(1), 317-330.

Litman, T. (2007). The Economic Value of Walkability. Victoria, BC: Victoria Transport Policy Institute.

Lucas, R. E. (1988). On the Mechanics of Economic Development. Journal of Monetary Economics, 22, 3.

McMillen, D. P. (2002). The center restored: Chicago's residential price gradient reemerges. Economic Perspectives(Q II), 11.

Rosen, S. (1974). Hedonic prices and implicit markets: product differentiation in pure competition. Journal of political economy, 82(1), 34-34.

Schwartz, A. E., Susin, S., & Voicu, I. (2003). Has Falling Crime Driven New York City's Real Estate Boom? Journal of Housing Research, 14(1), 101-132.

Song, Y., & Knaap, G.-J. (2003). New urbanism and housing values: a disaggregate assessment. Journal of Urban Economics, 54(2), 218-218.

Tu, C. C., & Eppli, M. J. (2001). An Empirical Examination of Traditional Neighborhood Development. Real Estate Economics, 29(3), 485-501.

Ulm, G. (2007). The key findings from a national survey of 1,000 adults conducted October 5, 7, 9-10, 2007. Washington: National Association of Realtors.

Weissbourd, R. (2008). Analyzing Regional Economies. Chicago: RW Ventures.

Wilson, B., & Frew, J. (2007). Apartment rents and locations in Portland, Oregon: 1992-2002. Journal of Real Estate Research, 29(2).

Yinger, J. (2009). Hedonic Markets and Explicit Demands: Bid-Function Envelopes for Public Services, Neighborhood Amenities and Commuting Costs (Working Paper No. 114). Syracuse, NY: Maxwell School of Citizenship and Public Affairs.