Do Land Use, Transit, and Walk Access Affect Residential Parking Demand?

Detailed research into numerous factors correlated to parking utilization reveal clear relationships useful in site planning and parking policy development.

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Introduction

Parking policies of the past five decades have focused extensively on the provision of parking in a uniform manner to avoid conflicts between land owners. Policies were directed to avoid undersupplying parking in order to ensure adequate parking for all uses. The intent was to reduce risks resulting from those who did not sufficiently invest in parking and who then encroached, poached, or spilled over onto other property owners' parking supply. This approach to problem solving has led to the overprovision of parking as a ubiquitous answer to the parking problem.

Although oversupplied parking reduces perceived risk for individual land owners, it has negative impacts at the parcel, city, and regional levels. It has been hypothesized that overbuilding of parking results in increased auto ownership and vehicle miles traveled, unnecessary congestion of the motor vehicle network, and increased housing costs.[1,2] These problems were assumed to be most significant in urban areas where each of these factors is more pronounced.

Recent trends in the United States have shown decreases in auto ownership, licensed drivers, and vehicle miles traveled, especially among young people.[3] More important, many U.S. metropolitan areas are experiencing lowering levels of household vehicle access. The design of multifamily housing for low rates of vehicle ownership is equally as important as design for suburban conditions where higher rates of vehicle access are found. For example in the Seattle, WA, USA, region, 9.2 percent of King County, occupied households do not have access to a vehicle, and in the city of Seattle this number rises to nearly 15.7 percent.[4] Historically, there has been a market for housing where tenants do not have automobiles, and that share is growing.

Assuming that parking conditions for this market sector are the same as suburban areas leads to overprovision of parking and increased cost to users that have no need for these facilities. Assuming that all new residential tenants must have parking wastes an excellent opportunity to match land use development with appropriate transportation services and travel patterns. In addition, this assumption increases the costs of housing in urban areas, which can have a large economic impact. Acknowledging and accepting that not every household or group of households will own a vehicle(s) can facilitate the success of smart growth land use development. The key to this success is to understand which factors play a role in influencing the utilization of parking in multifamily developments.

One-size-fits-all parking policies are simple but, as our cities become more complex, they have resulted in onerous ordinances that do not take into account context-sensitive site characteristics and demographics. Key to future planning will be finding opportunities where low- or zero-auto-ownership households can be matched with high-quality public transportation services. Clearly simple "one-number-fits-all" codes, ordinances, or regulations make any attempt to right-size parking supplies very difficult.

The collection of data to develop a fact-based understanding of variations in residential parking supply and demand was a key goal of research undertaken by King County Metro in the Seattle region. A key objective of this study was to provide better data and context for decisions to vary parking supplies for multifamily residential uses.

Factors

A review of existing literature revealed a lack of consensus on the factors that drive parking use and account for the variation in auto ownership. Although sociodemo-

graphic, housing, and built environment variables have all been shown to have an impact on residential parking and vehicle availability, their relative influence is a source of debate. Experience from research on commuter parking pricing suggests a strong influence on mode choice, but the impact of pricing on residential parking demand and associated travel impacts has not been thoroughly studied.[5]

King County undertook an expansive research effort to better understand the factors that contribute to increases and decreases in parking utilization for multifamily housing. More than 100 factors were developed for data collection and analysis that could be grouped in five areas:

- Parking supply and price;
- Property/development characteristics;
- Neighborhood household characteristics;
- Accessibility; and
- Built form/development patterns.

The factors were developed based on data availability and possible influences on parking utilization. These included independent variables such as supply, average monthly parking cost to tenant, average rent, density, household income, household size, bedroom count, presence of children, age, distance to nearest transit stop, job density, proximity to schools, walkscore, block size, and block density. A full description of methodology and findings can be found on the project website (http://metro.kingcounty.gov/up/projects/right-size-parking/).

The Study

An initial set of 20 multifamily residential sites were identified to test the feasibility of field survey methodology on private multifamily property, a process identified by past researchers as a limitation to this type of research.[6] The survey methodology was successful and benefited from close relationships with property managers. Following the initial testing, a total of 208 sites were assembled, representing various types of multifamily development around urbanized King County. Parking utilization was observed from Tuesdays through Thursdays between midnight and 5 a.m. The parking utilization data was correlated with the 100 factors. Using linear regression methods, independent variable relationships were assessed for their predictive powers.

Parking utilization data were collected for all residential parking identified by the property manager at each multifamily development. Parking was provided mostly in off-street garages or lots on the multifamily parcel, but sometimes was in dedicated on-street stalls or satellite garages. Each property manager was interviewed and asked to identify all available parking for residents, which was included in the study. Furthermore, sites selected for the study were screened for building age and available parking supply to control for potential undersupplied parking where spillover could occur. The end result identified sites where the predominant parking could be measured through parking counts and not select sites where undefined off-site, on-street parking would have resulted in underrepresentation of parking use.

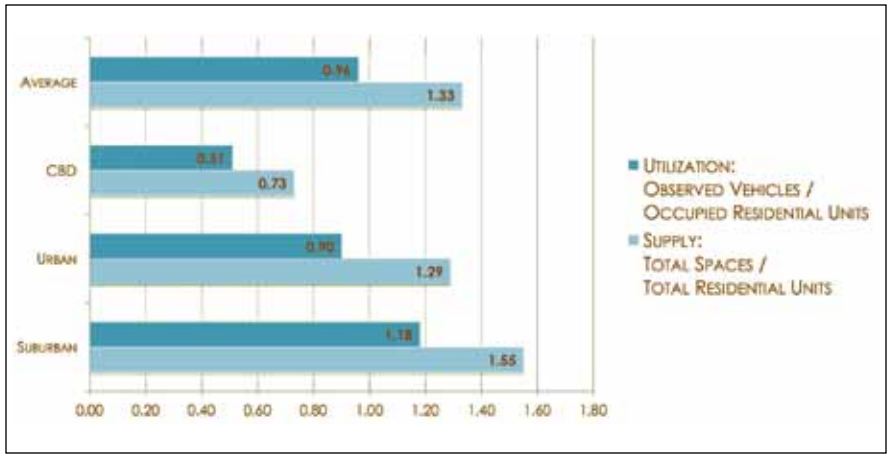


Figure 1. Field Data Summary Statistics by Urban Form.

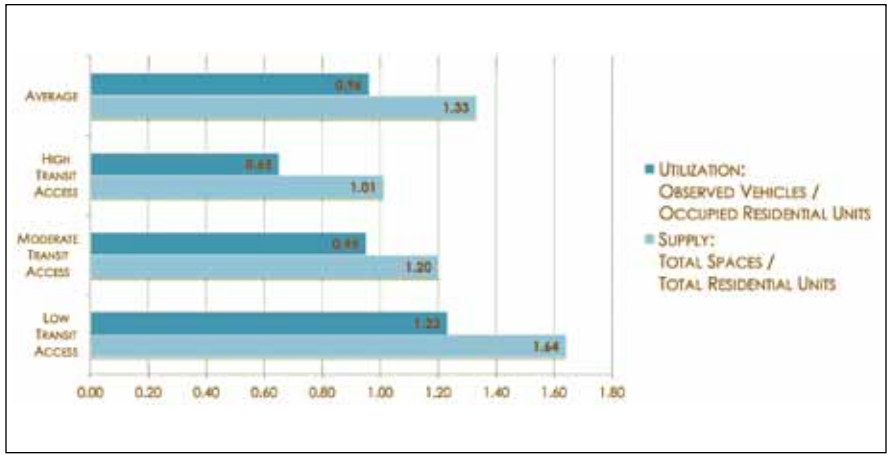


Figure 2. Field Data Summary Statistics by Transit Access.

The Results

The variation in land use to multifamily residential parking utilization was clearly evident and statistically relevant. Figure 1 highlights the variations in both utilization and supply of parking for CBD, urban, and suburban conditions. This suggests that lower auto ownership households often self-select locations that can support their transportation needs without a private vehicle. As a corollary, providing corridors or centers with access to jobs and services in addition to frequent, reliable, and safe transportation options can provide an opportunity for multifamily development with a lower parking supply.

A similar relationship existed between multifamily residential parking utilization and transit access. Figure 2 highlights the variations for high, moderate, and low transit access. Transit access was defined using the transit connectivity index (TCI), which explains the number of bus

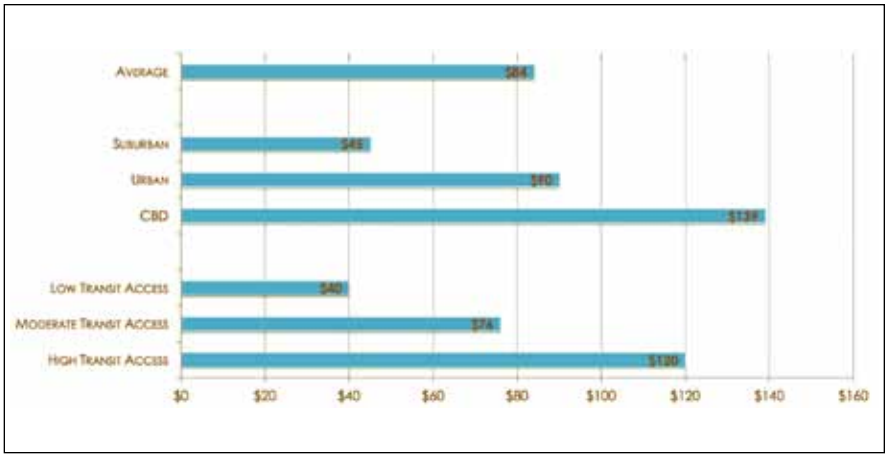


Figure 3. Average Monthly Price per Space at Paid Sites.

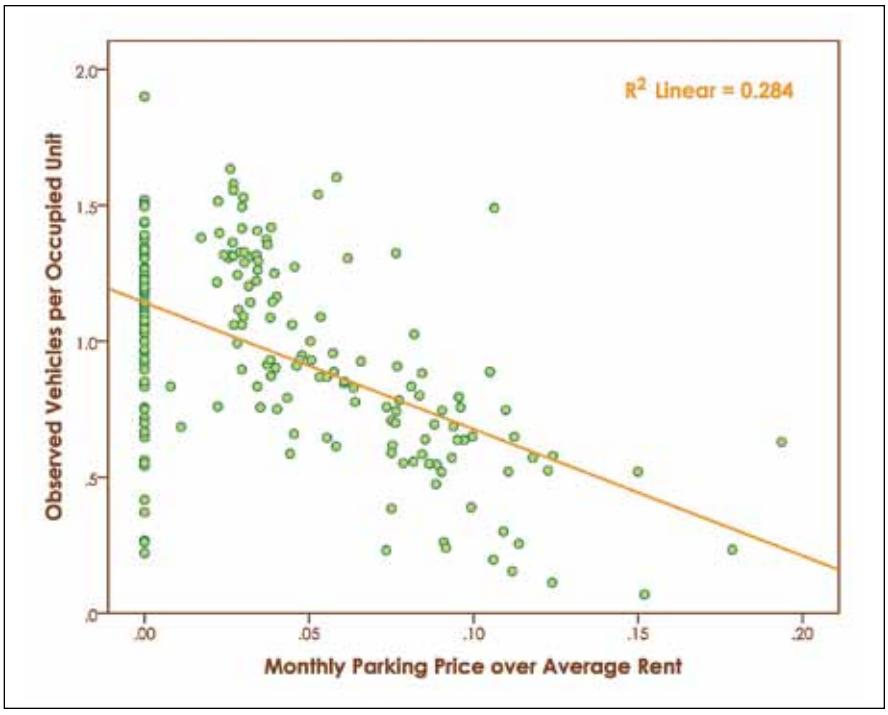


Figure 4. Relationship Between Price of Parking and Parking Utilization.

routes and train stations within walking distance for households in a given area scaled by the frequency of the service. (Low TCI is reported as < 9; moderate TCI is reported as ≥ 9 and < 15; and high TCI is reported as ≥15.)

Of the 208 sites studied, 81 had free parking and the remainder (127) had some form of pay-to-park spaces. Figure 3 summarizes the average monthly price per space charged to the tenant at those sites with paid parking. The price was reported by each property manager. The relationship between the price of parking and parking utilization showed utilization declining as the percentage of parking cost to rent increased (Figure 4). However, the correlation between pricing and utilization was somewhat weak ($R^2 < 0.3$).

Urban areas are complex environments for parking where various factors affect demand. Factors with higher correlations to parking utilization included the supply of parking, transit access, walkscore,[a] concentrations of people and jobs, and block size (Figure 5). Each of these are land use design characteristics. For example, a multifamily complex in a place with no transit, a large supply of parking, and poor walk conditions can expect few if any zero-auto households. However, a site with a high level of transit service, good walk access, and shorter block spacing has a reasonable potential to provide lower parking supply for a multifamily residential project. Developments with less parking are sensitive to these factors; a plan to best service (and potentially grow) this market sector requires sensitivity in identifying factors that lead to its successful implementation. Although each of these factors individually did not exhibit strong correlation ($R^2 > 0.7$), the next phase of research will be assessing multiple factor regression to identify groupings with stronger correlations.

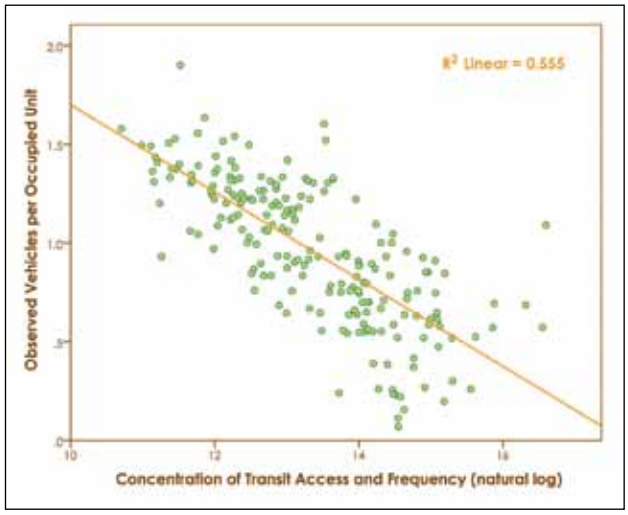
[a] According to walkscore.com, "Walk Score uses a patent-pending system to measure the walkability of an address. The Walk Score algorithm awards points based on the distance to amenities in each category. Amenities within .25 miles receive maximum points and no points are awarded for amenities further than one mile."

Conclusions

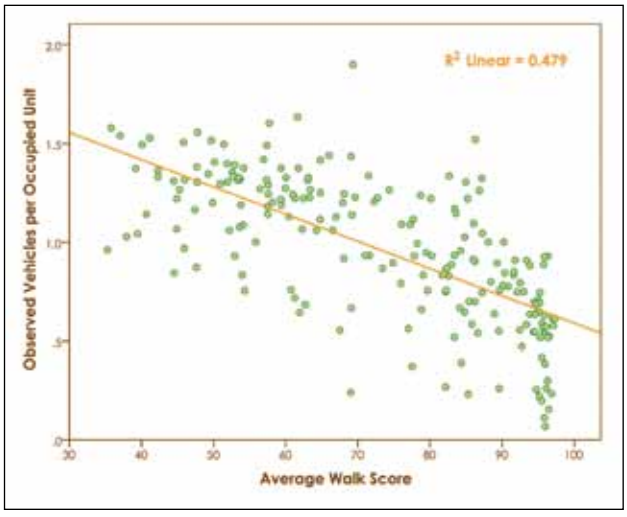
The Right Size Parking project in King County provides analysts with new tools to consider the proper provision of parking, given several land use, transit and walk factors. Block size, population and job density, and walk and transit access to trip destinations influence parking utilization, in some cases by as much as 50 percent. They provide clear indication of where parking for low auto ownership characteristics can be applied. CBD multifamily parking utilization of 0.51 vehicles per occupied dwelling unit in the sites studied, compared with suburban 1.18 vehicles per occupied dwelling unit, indicates that better accommodations/environment for low- and zero-auto-ownership households correlates with reduced need for parking. Most important, the research demonstrates that higher supply of parking appears to consistently correlate with greater parking demand. Most of these findings may be intuitive, but this study has taken the perceptions and verified them with data and fact. The next phase of this research will be assessing multiple factor regression to assess where stronger correlations can be identified.

The Right Size Parking project is developing algorithms for estimating parking needs more accurately for the various factors (such as land use, transit, and walk access) as a final part of this research effort. There is substantially greater detail

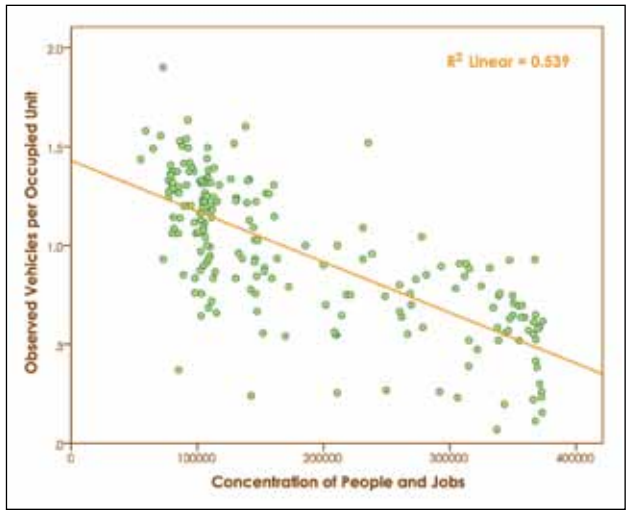
(a) Supply of parking



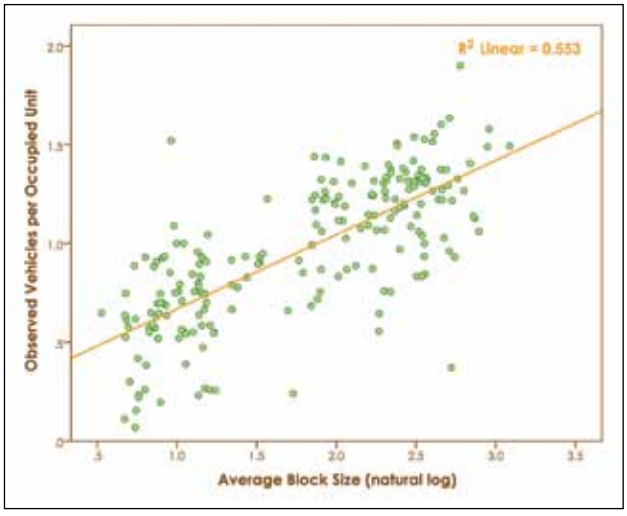
(b) Transit access



(c) Walkscore



(d) Concentration of people and jobs



(e) Block size

Figure 5. Supply of Parking.

on the project website, and analysts are encouraged to utilize the prediction models that are being developed. ■

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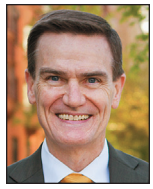

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