

Introduction: What Is a Parking Space Worth?

Parking can be a useful and user-friendly aspect of the land use and transportation system if it is treated as a valuable community asset. This book shows how to strategically manage parking resources and, in the process, make parking stakeholders happier and communities more sustainable and prosperous. In downtowns, the parking management agenda is to better use scarce and expensive parking resources with sophisticated shared parking arrangements, real-time parking guidance, and dynamic parking pricing. Parking management allows downtowns to reduce the total parking inventory while growing and prospering. In suburban areas, where parking is generously supplied, the parking management agenda is to introduce parking controls, parking pricing, and sharing arrangements so that current oversupplies of parking can be more fully used and also serve new development, slowing or stopping the growth of parking supply. Since the number of parking spaces in the United States exceeds the number of cars by a factor of more than three, strategic parking management can forestall building new parking for decades to come, saving the money and land for better uses, including parks, urban agriculture, child development centers, affordable housing, and tax-producing commercial spaces. Strategic parking management supports sustainable development.

On the surface (pun intended), the parking space is mundane. It sits passively, is often unsightly, and performs one function—storing a vehicle. Worse, it is empty much of the time. Residential parking is underused during the day when people are at work, and workplace parking is underused in the evening when people are at home. Yet parking is a central issue in community development and a big part of the daily lives of city administrators, residents, employers, employees, and retailers. Disparate stakeholders who agree on nothing else unite in their dissatisfaction with parking. For many, a free parking space is a right, and it should be available directly in front of their destination. So, while the parking *space* is passive, the opportunity and excitement lies in how it is *used*. Recognizing the importance of the “sharing” economy, in which technology facilitates frictionless sharing of resources rather than ownership, provides a model for parking management opportunities. Downtown curb parking

(on-street surface parking in the public right-of-way), for example, has always had qualities of the sharing economy—it is collectively owned, managed for efficient use, and used by many different people over the course of the day. The question is: how can sharing economy concepts make better use of existing parking?

The “worth” of a seemingly generic parking space varies. Some spaces serve dozens of parkers per day, whereas others are seldom or never used. A never-used parking space is worthless—in the sense of not serving any transportation purpose. At the same time, that parking space has onetime and ongoing costs for land, construction, administration, and maintenance. A recent estimate placed the annualized capital and operating cost of one space at \$854 for a suburban surface lot, \$2,522 for an urban three-level structure, and \$4,363 for an underground central business district (CBD) space (Nelson\Nygaard and Dyett & Bhatia 2012). Parking also has opportunity costs, such as other forgone uses for that land or building area, and negative externalities, including polluted storm water runoff, heat island effects, and negative design impacts. Strategic parking management reduces the number of worthless spaces so that less total parking can provide the desired land use and transportation benefits.

Parking spaces have standard size characteristics, but the worth of each space depends on how it is used. Table 1-1 shows a variety of parking conditions, ranging from a parking space that is almost never used to a parking space that is used many times per day, most days of the week, and most months of the year. It adopts a metric of destination person-trips per space per year, which accounts for the days used per year, the arrivals per day, and the number of persons in each vehicle. For example, a shared parking space in a mixed-use district serves office workers during weekdays, shoppers on weekday evenings and weekends, and residents overnight. Such a shared space provides more value than a parking space at a sports and entertainment venue, which is used only on event days. Figure 1-1 shows a parking lot at Angel Stadium of Anaheim, in Anaheim, California. The lot is used only during baseball games and other events, and the spaces in the foreground may be used only when the venue is full. The major league baseball season includes eighty-one regular home games, and given that not all of the games sell out, the spaces in the foreground of the picture are used on even fewer days per year. Even when they are used, they are used for less than one quarter of the day. The rest of the time, this valuable land, located in the heart of Orange County, provides no economic or social use.

The varying worth of a parking space is not well understood by policy makers and the public, and too seldom are efforts made to maximize its value. Figure 1-2 displays an illustrative estimate of the number of destination person-trips per year served by a parking space to nonhome destinations, such as retail outlets or offices. Parking spaces serving land uses that operate throughout the year, and with fast turnover, naturally serve the greatest number of trips. Parking for short-visit retail and

Table 1-1. The Differing Value of a Parking Space

<i>Daily Occupancy</i>	<i>Turnover</i>	<i>Typical Uses Served</i>	<i>Annual Destination Person-Trips per Space (illustrative)</i>	<i>Value</i>
Empty or seldom used	Low	Any land use where more parking was built than used	<100	No value; opportunity cost for other uses of the land; negative impacts
Well used but only on certain days	Low	Religious institutions, sports facilities	100-300	As above when not used; valuable to the specific use but not to the broader community
Well used on most days in certain seasons	High	Shopping mall parking (if built to supply holiday period peak occupancy)	Closest to entrance: ~2,500 Farthest from entrance (only used during peak season): ~200	Valuable if close to the entrance; value declines with distance
Well used most days, all year	Low	Single uses: office buildings, park-and-ride facilities, residential uses	~400	Valuable to the specific use but empty when the use is not active
	High	Downtown commercial parking with sharing between uses with short visits	1,500-30,000	Maximizes the value of the space for multiple uses; requires parking management

food uses and CBD curb parking score highly, and occasionally used spaces such as a baseball stadium or the least convenient spaces at a shopping mall (which are used only a few days a year) score poorly. Figure 1-3 arrays intensity of use by level of sharing, showing the desired combination of high-intensity of use and high sharing. The arrows indicate the goal of increasing sharing *and* increasing intensity of use. This perspective emphasizes use value rather than seeing each space as having uniform attributes. In addition, low-use spaces are prime opportunities for shared parking since they are available much of the time. Understanding parking in terms of its use value in connecting people to trip destinations opens the door to a wide range of parking management strategies that increase efficiency and support community goals.

A generous parking supply at every site can preclude the need to manage parking, as each development site is a self-sufficient parking “island.” If there is plenty of parking available at every site, everyone can find a space, when they want and where they want. These assumptions are embedded in zoning codes, where minimum parking



Figure 1-1. Wasted spaces at Angel Stadium of Anaheim, in Anaheim, California

Image source: Aiden Irish

requirements usually force developers to build more parking than they would if the market determined parking supply. This issue has been addressed by Shoup (2011b) and Willson (2013) but is not the focus of this book. Nonetheless, minimum parking requirements and parking management are inextricably linked. Excessive minimum parking requirements *preclude* the need for parking management. Conversely, minimum parking reform *requires* parking management to address such issues as spill-over parking. Better parking management is the key to making parking requirement reform possible.

The problems of overbuilt parking have been chronicled by researchers who identify negative impacts on land use, transportation systems, economic development, and social equity. Further, the land use and transportation impacts produce negative environmental outcomes, as described later in this chapter. In response, cities are reforming zoning code mandates for private developer parking by eliminating requirements (Shoup 2011b) or reforming them (Willson 2013).

In searching for a way to explain the transition from emphasizing parking *supply* to emphasizing parking *management*, I found a tagline from an early infomercial

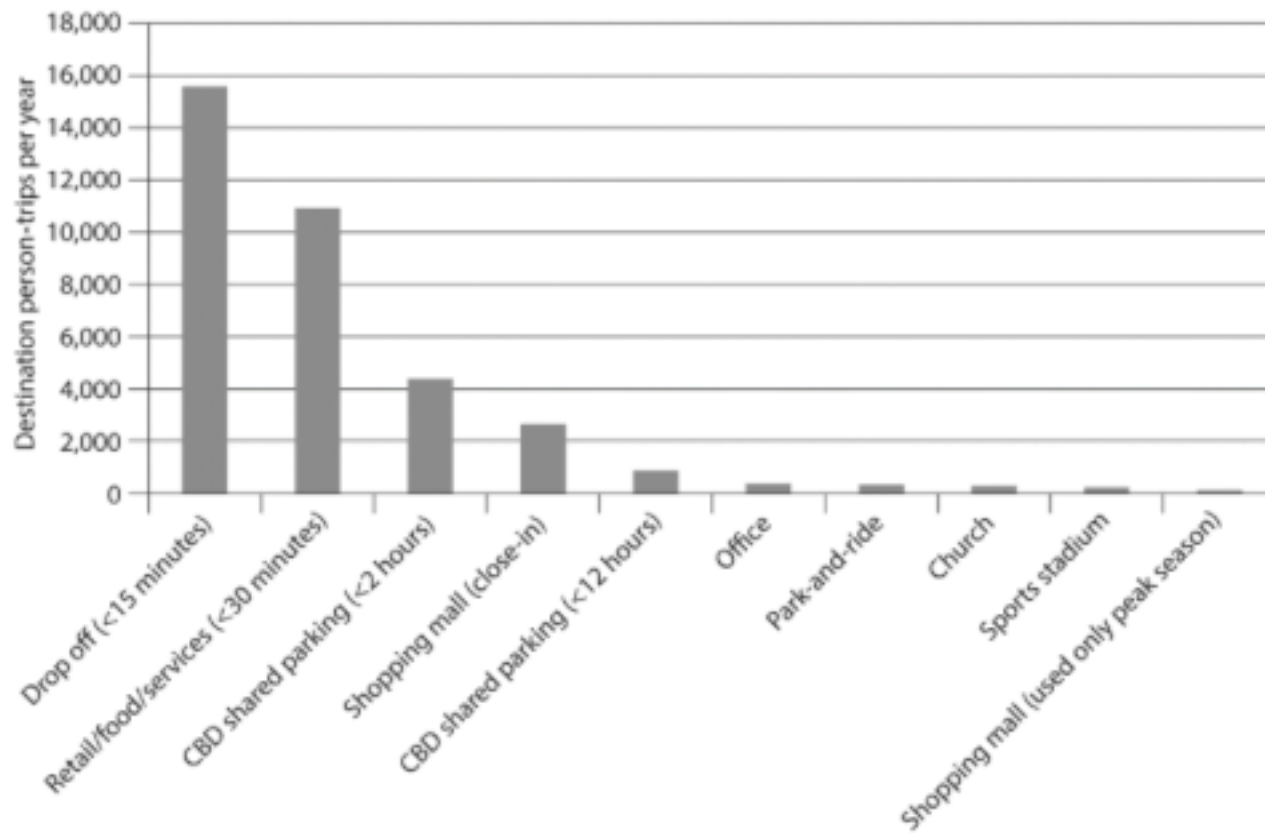


Figure 1-2. Person-trips per year, by type of parking space

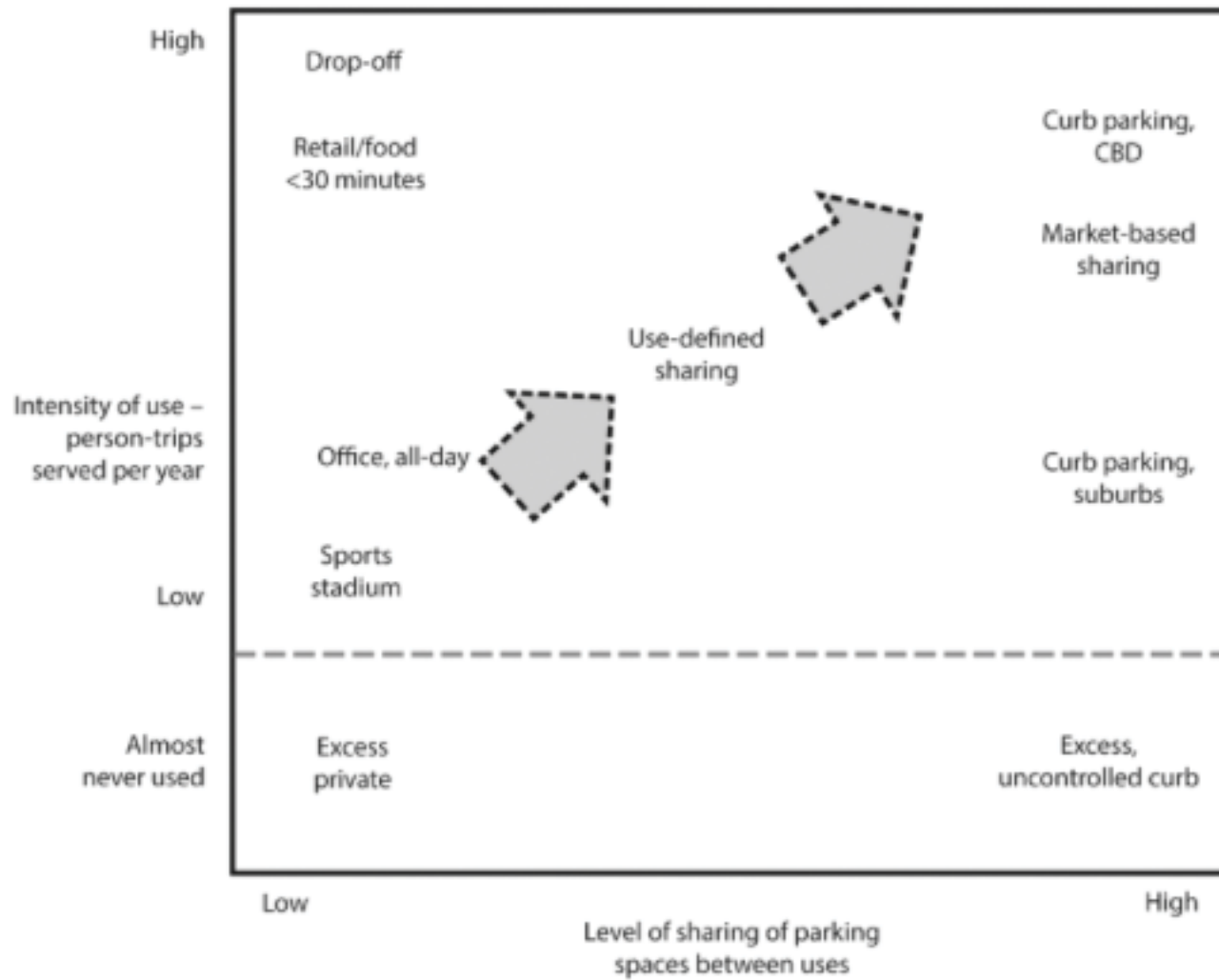


Figure 1-3. Relationship of use intensity and sharing

for a rotisserie cooker that says it best. The pitchman implored the audience to “Set it and forget it,” emphasizing ease of use in roasting a chicken. Frequently, public officials take a similar approach. They “set it” through high parking requirements or expensive public parking projects—and set it so high that there will never be a parking shortage—that way, they can “forget it” when it comes to parking management. “Set it and forget it” seems to have reached a new level in figure 1-4. Most cities do not leave parking signs so long that trees grow around them, but travel around your community and consider how long some parking regulations have been in effect with no change, despite the fact that land uses, demographics, travel patterns, and parking use change in a dynamic fashion. Programs to share parking, to coordinate between land uses, or to price parking are ignored. This impulse is understandable in both parking and cooking chicken—but this approach to parking lies at the center of livability problems in many communities. Seeking to “outsupply” parking use is a recipe for bad planning outcomes.



Figure 1-4. “Set it and forget it” parking management

Image source: Katherine Bautista

Strategic parking management would not matter if plenty of low-cost land was available for parking construction. However, this is no longer the case in suburban areas, where land costs are higher than before, or in urban areas, where vacant land is rare, parcels are expensive, and land assembly is costly and problematic. A better course is to ensure that existing parking spaces are well used. Parking management reduces the need to build parking for future development and allows parking supply to be reduced if better uses exist for the land or building area. The latter instance occurs when on-street curb spaces are converted to parklets, bicycle corrals, sidewalks, outdoor dining, or bus lanes, and more productive land uses replace off-street surface parking. Finally, parking management improves the prospects for the development and use of alternative travel modes. For example, higher parking charges induce some travelers to walk, bicycle, use transit, or be dropped off.

This book provides a path forward for strategic parking management in a new era in which parking requirements are lessened or eliminated, under-used parking is eliminated, and multimodal transportation is improved. This era of tighter parking supplies requires strategic parking management. The book offers a set of tools and a method for strategic parking management so that communities can better use parking resources and avoid overbuilding parking. It helps stakeholders manage public and private parking resources so that the greatest benefit is gained from every parking space. Table 1-2 provides examples of the community benefits of parking management.

The benefits of strategic parking management are meaningful and extend beyond parking itself. Figure 1-5 shows a parking management strategy in the city of Los Angeles that prohibits on-street parking during rush hours to create a dedicated bus lane in the curb parking lane. Consider how many person-trips per day are accommodated with this bus lane, which speeds peak-hour bus operations, makes buses more competitive with driving, reduces bus operating costs, increases fare revenue, and moderates traffic. Consistent with the goal of efficiently using resources, the lane reverts to curb parking during off-peak hours, when congestion is lower and the bus does not have a travel time advantage from using an exclusive lane.

Strategic parking management memorializes goals, implementation commitments, and phasing. It offers a managed implementation process as well as stakeholder and public agency accountability. As with any plan or strategy, however, benefits are not limited to the direct outcomes. Strategic parking management also has benefits as a process: it brings stakeholders together to share concerns, educates stakeholders about parking management and broader community development issues, and coordinates the many parties involved in parking. This can lead to new forms of coordination and collaboration, new institutional relationships, and heightened deliberative capacity concerning parking. Finally, strategic parking management bridges product

Table 1-2. Benefits of Strategic Parking Management

<i>Benefit</i>	<i>How It Occurs</i>
Efficiently use existing parking	Produces faster turnover in the most popular spaces and better use of less-popular spaces. Pricing schemes produce vacancies on each block face. Information systems guide parkers to available spaces.
Avoid excessive expenditures on parking	Reduces the need to build additional public or private parking, which saves money and land, facilitates compact development, and reduces land consumption.
Enhance economic development	Supports new business formation and business expansion by reducing the burden of providing parking. Districts with active parking management have a good image; access is easier. The parking experience is an integrated part of the experience in stores, restaurants, and businesses. Improve consumer parking and access options. Improve facility design and smart growth implementation.
Reduce traffic, safety, and environmental problems	Supports broad mobility management. Management tools reduce overall parking demand and cruising for parking—the process of circling for parking spaces. Reduced cruising lessens vehicle miles traveled, congestion, and instances of distracted drivers, which makes pedestrians and cyclists safer. Parking management supports transit use, walking, and bicycling and lowers energy use, pollution, and greenhouse gas emissions. Reduces total parking lessens stormwater runoff, water pollutions, and heat island effects.
Reduce conflicts between districts	Residential permit programs prevent intrusion by parkers destined for retail districts, medical centers, universities, and other activity centers. Alternatively, parking can be allowed with pricing mechanisms that return revenue to neighborhoods.
Generate revenue and improve social equity	Revenue from parking fees and fines is directed to parking, other forms of access, and district improvements. Revenue can be used as matching funds for grants, and reduces prevalence of cross subsidies from nondrivers to drivers.

and process in generating ongoing management of parking resources and systems with real-time information, adjustment procedures, and coordination protocols.

Parking as a Contested Space

Without parking management, parking is a free-for-all—a competitive sport—with arbitrary winners (those lucky enough to find a prime space) and losers (those who don't find one). In mixed-use districts, shoppers, employees, and residents compete for the same spaces. The classic case is on-street parking in front of a store. The store owner may arrive first thing in the morning and enjoy the convenience of parking



Figure 1-5. Peak-hour bus lanes as a better use of curb parking in Los Angeles, California

there, as may the store's employees. Over the course of the day, though, perhaps ten or fifteen customers could park in each of the spaces, or the space could be used by many more customers picking up bulky items or by trucks delivering inventory. Which of these is the better use? Without parking management, that question is not asked. Instead, parking is on a first-come, first-served basis, resulting in costly unintended impacts.

Parking is a contested space because many uses compete for the land or building area the parking occupies. An on-street parking space can be used for traffic lanes, bus lanes, bus stops, bicycle lanes, sidewalks, or sidewalk bulb outs. Tactical urbanists propose parklets, sidewalk cafés, performance spaces, and many other uses. Spurred by the "complete streets" movement, communities are considering the *opportunity cost* of devoting scarce public rights-of-way to parking. In the suburbs, urban designers, economic developers, investors, and real estate developers consider vast swaths of underused off-street parking and envisage other uses—parks and open space, bioswales, street-oriented infill development, mixed-use development, transit terminals, and the like.

Parking is also a contested space because it is an extension of the driver's personal domain. Unlike walking, bicycling, or transit—where people share public spaces—drivers experience their car as an extension of personal space, a part of their home. Improvements in vehicle technology have reinforced this feeling. Drivers view the world through windshields that have dimensions similar to their high-resolution televisions, with windows up, air-conditioning or heat on, audio entertainment provided, and perhaps their e-mails being read to them. Considering these features and the time spent in the car, it is easy to see how this space is an extension of the driver's home. Seen this way, a driver's perspective when looking for a parking space is that what is at stake is the driver's home, rather than finding storage for a "mobility machine." The heightened emotions brought to parking issues highlight this critical perception.

Parking conflicts are fodder for many forms of popular culture—stand-up comedians, episodes of the television comedy *Seinfeld*, and commentaries on the state of civility. The cable network Arts & Entertainment features a show called *Parking Wars*, which finds drama and entertainment in parking enforcement activities:

From the mean streets of the Bronx to the antics of outrageous characters on Staten Island to New Jersey's capital city of Trenton, these independent towing companies face off with illegal parkers who go to volatile extremes to keep their cars from being towed. (*Parking Wars* website 2013)

Presumably, parking enforcement relates to the "entertainment" rather than the "art" portion of the network's name.

Problems of Unmanaged Parking

Unmanaged parking leads to undesirable community outcomes. The negative impacts fall into four categories:

- *Land use.* Unmanaged parking is correlated with oversupplied parking, since the lack of management leads public officials and developers to require or provide large supplies of parking for each development. Figure 1-6 shows a suburban area located along Interstate 580 in the San Francisco Bay area served by the BART Dublin/Pleasanton rail station. Each site provides enough parking to respond to its peak occupancy level. This reduces the density that can be achieved on each site and citywide. Large office complexes are surrounded by parking (only partially occupied), smaller-scale residential uses have spaces in garages, and corridors of commercial uses have surface parking. The separation of different land uses, such as office, retail and residential, means that parking resources cannot be easily shared between uses. The overconsumption of land associated with low density and a lack of shared parking leads to negative environmental impacts, such as consumption of valuable habitat, higher pollution, greater energy use, and increased water consumption. This is the land use and urban design legacy of the “set it and forget it” approach to parking.
- *Transportation.* Unmanaged parking is underpriced parking, which incentivizes ownership and use of private vehicles. Underpriced parking also undermines the economics of alternative transportation, including transit, walking, cycling, and shared rides. High levels of vehicle use increase regional vehicle miles traveled (VMT). Unmanaged parking also creates excess local VMT in urban areas as distracted drivers drive around (called “cruising”) looking for available spaces. It increases pollution, energy use, and greenhouse gas (GHG) emissions, and has secondary impacts in such areas as groundwater pollution and ecosystem impacts.
- *Economic development.* Unmanaged parking is a drag on economic development. In suburban areas, the lack of shared parking lowers development potential by misallocating land to parking. In built-up areas, it is a restriction on reuse, infill development, and redevelopment. Business formation is slower since perceived parking problems affect city regulations. Built-up areas do not display a dominance of parking, but they have problems as well. Figure 1-7 shows a core district in the city of South Pasadena, California. In this incremental, fine-grained development pattern, parking does not dominate the streetscape. On-street parking is free, so it is difficult to find a parking space at times. The high occupancy of curb parking on popular streets makes



Figure 1-6. The wastefulness of exclusive parking in Pleasanton, California

Image source: Google Earth

it feel as if there is a parking shortage when in fact there is not. Retail employees may outsmart the simple two-hour time limit for on-street parking and use the most valuable on-street spaces, moving their cars every two hours or hoping that enforcement is lacking. It makes no sense for employees to park in the most convenient on-street spaces, since perhaps a dozen or more shoppers could use the same space over the course of the day. Better parking management produces more retail sales and tax revenues because the business district is offering more convenient, closer-in parking spaces to shoppers.

Unmanaged parking also produces artificial parking shortages, such as when banks' off-street parking is well used during the day but largely empty in the evenings and on weekends. If a resurgence of restaurants and bars occurs in historic structures that were built before parking requirements, the banks may notice that restaurant patrons are using their spaces in the evening. In response, they often put a chain across the lot entrance at night. Nighttime restaurant patrons find that on-street and public off-street spaces are full, so they park in surrounding residential neighborhoods, producing a community



Figure 1-7. Shared parking in South Pasadena, California

backlash. The lack of shared parking agreements produces an artificial parking shortage. Figure 1-8 shows a typical lost opportunity—an off-street lot closed off to daytime users with a gate and a no parking sign.

- *Social equity.* Unlike land use and transportation, the social impacts of unmanaged parking are less visible. Unpriced parking privileges those with cars, and creates a cross subsidy in wages, and the price of goods and housing from those without cars to those with them. This is because expenditures are made to provide parking for those with cars, but those expenditures are paid by all shoppers and are reflected in lower wages and higher housing prices. On-street parking in residential neighborhoods such as Huntington Park, California, is jammed because of large households (and multiple households) in each unit and because some of the existing off-street parking may not be used



Figure 1-8. Wasted shared parking opportunity

Image source: Aiden Irish

for parking. Instead, garages may be used for storage or may be illegally converted to housing. The anxiety about parking, as well as complaints to elected officials, produces such reactions as increasing minimum parking requirements for types of housing that might experience high household sizes. This has the intended effect of discouraging development because of the high cost of construction. On-street parking is not managed and priced as the valuable public asset that it is. Figure 1-9 shows a neighborhood in Huntington Park, California, that has a high population density (19,270 persons per square mile in the 2010 census) in neighborhoods that were originally designed for lower population densities. The community therefore experiences extreme pressure on parking resources that calls for innovative parking management.

Understanding Parking Behavior

Parking use is the aggregation of individual driver responses to the parking facilities, services, rules, and pricing structures offered by private and public entities. Parking