CHAPTER 5

THE HIGH COST OF MINIMUM PARKING REQUIREMENTS

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ABSTRACT

Purpose – *This chapter estimates how minimum parking requirements increase the cost of constructing housing, office buildings, and shopping centers. It also explains proposed legislation to limit how much parking cities can require in transit-rich districts.*

Methodology – *I assembled data on the cost of constructing office buildings, shopping centers, and parking spaces in eight American cities, and data on the minimum parking requirements in these cities. I then combined the parking construction costs with the number of required parking spaces for each land use to estimate how the minimum parking requirements increase development costs for office buildings and shopping centers.*

Findings – *Minimum parking requirements increase the cost of constructing a shopping center by up to 67 percent if the parking is in an aboveground structure and by up to 93 percent if the parking is underground.*

In suburban Seattle, parking requirements force developers to spend between $10,000 and $14,000 per dwelling to provide unused parking spaces.

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On a typical construction site in Los Angeles, parking requirements reduce the number of units in an apartment building by 13 percent.

Practical implications – *To mitigate the high costs imposed by minimum parking requirements, California is considering legislation to set an upper limit on how much parking cities can require in transit-rich districts: no more than one space per dwelling unit or two spaces per 1,000 square feet (93 square meters) of commercial space. This legislation would limit parking requirements, but it would not limit the parking supply because developers can always provide more than the required number of spaces if they think demand justifies the added cost.*

Value of paper – *This chapter measures how minimum parking requirements increase the cost of housing, office buildings, and shopping centers in order to subsidize parking. Urban historians often say that cars have changed the city, but urban planning has also changed the city to favor cars.*

Keywords: Parking; parking requirements; real estate; infill development; housing

A city can be friendly to people or it can be friendly to cars, but it can't be both.

– Enrique Peñalosa

City planners are put in a difficult position when asked to set the minimum parking requirements in zoning ordinances, largely because they must rely on guesswork. Planners do not know the parking demand at every site, or how much the required parking spaces cost, or how the requirements increase the cost of urban development. Nevertheless, planners have managed to set parking requirements for hundreds of land uses in thousands of cities – the Ten Thousand Commandments for off-street parking.

Critics of minimum parking requirements argue that these regulations subsidize cars, increase traffic congestion and carbon emissions, pollute the air and water, encourage sprawl, raise housing costs, damage the economy, degrade urban design, reduce walkability, and exclude poor people. To my knowledge, no city planner has argued that parking requirements do *not* have these harmful effects.

In *Parking Reform Made Easy*, Richard Willson (2013a) recommends analytical and practical ways for planners to justify reducing or eliminating parking requirements. As Willson says, "All the land-use plans, design

reviews, and streetscape renderings in the world will not produce desired outcomes if we do not reform parking requirements" (Willson, 2013b, p. 30). But planners must first *want* to reform before anything will happen.

To show the need for reform, this chapter examines how parking requirements can dramatically increase the cost of constructing new buildings. After all, if planners do not know how much required parking spaces cost, they cannot know how much the parking requirements increase the cost of development. So how much do the required spaces cost, and how much do they increase the cost of urban development? I will answer these questions, and will then use the answers to make the case for reducing or removing off-street parking requirements.

THE COST OF REQUIRED PARKING SPACES

Because construction costs vary by location, there is no single measure of how much a parking space costs. But we can estimate the price tag in different locations by using published estimates of local construction costs. Rider Levett Bucknall (RLB), an international consulting firm that specializes in estimating real estate construction costs, publishes quarterly cost estimates for several real estate categories in cities around the world, including 12 cities in the United States.[1] Table 1 presents RLB's estimates of the average cost of parking spaces in these 12 American cities in 2012. Even within the same city, the cost can vary according to the soil conditions, the height of the water table, the shape of the site, and many other factors. RLB therefore reports both a low and a high construction cost; for simplicity; I have used the average of these two costs for each city.

Columns 1 and 2 show the average cost per square foot to build underground and aboveground parking structures. The average parking space, including the access aisles, occupies about 330 square feet (31 square meters). Given this size, Column 3 shows the cost per parking space for an underground garage. For example, the average cost of constructing an underground garage in Boston is $95 per square foot, and the average space occupies 330 square feet, so the average cost of a parking space is $31,000 ($95 × 330). Across the 12 cities, the average cost per space ranges from a low of $26,000 in Phoenix to a high of $48,000 in Honolulu, with an overall average of $34,000 per space. For an aboveground garage, the cost per space ranges from $17,000 in Phoenix to $29,000 in Chicago and San Francisco, with an average of $24,000.

Table 1. The Construction Cost of a Parking Space.

City	Construction Cost per Sq Ft		Construction Cost per Space	
	Underground $/sq ft (1)	Aboveground $/sq ft (2)	Underground $/space (3) = (1) × 330	Aboveground $/space (4) = (2) × 330
Boston	95	75	31,000	25,000
Chicago	110	88	36,000	29,000
Denver	78	55	26,000	18,000
Honolulu	145	75	48,000	25,000
Las Vegas	105	68	35,000	22,000
Los Angeles	108	83	35,000	27,000
New York	105	85	35,000	28,000
Phoenix	80	53	26,000	17,000
Portland	105	78	35,000	26,000
San Francisco	115	88	38,000	29,000
Seattle	105	75	35,000	25,000
Washington, DC	88	68	29,000	22,000
Average	103	74	34,000	24,000

Source: Rider Levett Bucknall, *Quarterly Construction Cost Report, Third Quarter* (2012).

These estimates refer to the cost of *constructing* a parking space. For an aboveground garage, the land beneath the garage is another cost. Underground garages also occupy space that could be used for other purposes, such as storage and mechanical equipment, and the opportunity cost of this space has been called the underground land value.[2] Because numbers in Table 1 do not include the cost of land, they underestimate the total cost of parking spaces.[3]

To put the cost of parking spaces in perspective, we can compare this cost with the value of the vehicles parked in them. In 2009, the U.S. Department of Commerce estimated that the total value of the nation's 246 million motor vehicles was $1.3 trillion. The average value of a motor vehicle was therefore only $5,200.[4] (This average value seems low because the median age of the fleet was 10.3 years in 2009.) Because the average cost of an underground parking space is $34,000, the average vehicle is therefore worth about 15 percent of this cost ($5,200 ÷ $34,000). And because the average cost of an aboveground garage space is $24,000, the average vehicle is worth about 22 percent of this cost ($5,200 ÷ $24,000).

A parking space can cost much more than the value of the car parked in it, and there are also several parking spaces for every car. Using aerial

photographs of all the off-street parking lots in Illinois, Indiana, Michigan, and Wisconsin, Davis et al. (2010) found between 2.5 and 3 off-street surface parking spaces per vehicle registered in these states. In addition, Zhan Guo and Luis Schloeter (2013) estimated that suburban streets alone contain more than enough on-street parking spaces to park all the passenger cars in the United States.

Parking spaces outnumber cars, and each space can cost much more than a car parked in it, but planners continue to set parking requirements without considering this cost. If I buy the average American car for $5,200, cities require someone else to pay many times more than that to ensure that parking spaces will be waiting for me whenever and wherever I drive. Minimum parking requirements amount to an Affordable Parking Act. They make parking more affordable by raising the costs for everything else. So who does pay for all these required parking spaces?

THE COST OF PARKING REQUIREMENTS FOR OFFICE BUILDINGS

Most cities require parking in proportion to the size of a building, such as 4 spaces per 1,000 square feet of building area. We can use the RLB data on the cost of parking spaces to show how parking requirements increase construction costs. Eight of the 12 cities in Table 1 require parking in direct proportion to the size of an office building.[5] We can calculate the cost of required parking per 1,000 square feet of building area in these eight cities by combining the parking requirements with the cost of constructing a parking space.

Table 2 shows how the cost of satisfying the parking requirement increases the total cost of constructing an office building. Column 1 shows the minimum parking requirement in each city, although certain areas of the city may have higher or lower requirements according to their specific area plans. Las Vegas, for example, requires 3.3 spaces per 1,000 square feet. Because the average size of a parking space is 330 square feet, this translates to 1,100 square feet of parking per 1,000 square feet of office building (Column 3). Thus, Las Vegas requires parking structures that are bigger than the buildings they serve.

Columns 4 and 5 show the RLB data on the cost per square foot for an office building and an underground garage.[6] Column 6 shows the cost of constructing 1,000 square feet of an office building, and Column 7 shows

Table 2. The Cost of Parking Requirements for Office Buildings – Underground Parking Structure.

City	Parking Requirement	Building Area	Parking Area	Construction Cost		Building Cost	Parking Cost	Cost Increase
				Building	Parking			
	Spaces/1,000 sq ft	Sq ft	Sq ft	$/sq ft	$/sq ft	$	$	%
	(1)	(2)	(3) = (1) × (2) × 0.33	(4)	(5)	(6) = (2) × (4)	(7) = (3) × (5)	(8) = (7)/(6)
Las Vegas	3.3	1,000	1,100	148	105	148,000	116,000	78
Phoenix	3.3	1,000	1,100	128	80	128,000	88,000	69
Honolulu	2.5	1,000	825	233	145	233,000	120,000	52
Portland	2.0	1,000	660	138	105	138,000	69,000	50
Los Angeles	2.0	1,000	660	158	108	158,000	71,000	45
Denver	2.0	1,000	660	125	78	125,000	51,000	41
Seattle	1.0	1,000	330	138	105	138,000	35,000	25
New York	1.0	1,000	330	225	105	225,000	35,000	16
Average	2.1	1,000	708	161	104	161,625	73,125	47

Source: Rider Levett Bucknall, *Quarterly Construction Cost Report, Third Quarter* (2012).

the cost of constructing the required parking. Finally, Column 8 shows that the required parking increases the cost of an office building in Las Vegas by 78 percent. Because most developers will provide some parking even if the city does not require it, the parking requirements are not responsible for all the money spent on parking. Nevertheless, Columns 7 and 8 show the minimum cost of the required parking for buildings with underground garages.

The high cost of structured parking gives developers a strong incentive to build in low density areas where cheaper land allows surface parking, thus encouraging sprawl. Surface lots cost developers less money but they cost the city more land that could have better and more profitable uses.

Table 2 ranks cities by how much the required parking increases the cost of office buildings (Column 8), which turns out to be the same ranking as by the size of the parking requirement (Column 1). Las Vegas and Phoenix have the highest parking requirements (3.3 spaces per 1,000 square feet) and the highest cost increases (78 percent and 69 percent). Seattle and New York have the lowest parking requirements (1 space per 1,000 square feet) and the lowest cost increases (25 percent and 16 percent). The last row shows that the required parking increases the average cost of an office building by 47 percent.

Table 2 shows the results for underground parking. Table 3 shows the same calculations for an aboveground garage. On average, the cost of providing the required parking in an aboveground structure adds 30 percent to the cost of an office building. Fig. 1 compares these results from Tables 2 and 3. The higher the parking requirement, the more it costs to construct an office building.

The average parking requirement for office buildings in these eight cities is only 2.1 spaces per 1,000 square feet, which is lower than in most American cities. One survey of 117 cities, for example, found that the median parking requirement for office buildings was 4 spaces per 1,000 square feet, which is almost double the average requirement in Tables 2 and 3. Some planners call this requirement of 4 parking spaces per 1,000 square feet for office buildings the "golden rule" or "magic number" (Shoup, 2011, pp. 612–613).

All this required parking takes up a lot of space. Fig. 2 compares the area of parking required for a 100,000-square-foot office building with the area of the buildings themselves in 45 American cities. While the parking lots look large in proportion to the buildings, most of these cities have atypically low parking requirements. Only one city in Fig. 2

Table 3. The Cost of Parking Requirements for Office Buildings – Aboveground Parking Structure.

City	Parking Requirement	Building Area	Parking Area	Construction Cost		Building Cost	Parking Cost	Cost Increase
				Building	Parking			
	Space/1,000 sq ft	Sq ft	Sq ft	$/sq ft	$/sq ft	$	$	%
	(1)	(2)	(3) = (1) × (2) × 0.33	(4)	(5)	(6) = (2) × (4)	(7) = (3) × (5)	(8) = (7)/(6)
Las Vegas	3.3	1,000	1,100	148	68	148,000	74,000	50
Phoenix	3.3	1,000	1,100	128	53	128,000	58,000	45
Portland	2.0	1,000	660	138	75	138,000	50,000	36
Los Angeles	2.0	1,000	660	158	78	158,000	51,000	32
Honolulu	2.5	1,000	825	233	83	233,000	68,000	29
Denver	2.0	1,000	660	125	55	125,000	36,000	29
Seattle	1.0	1,000	330	138	75	138,000	25,000	18
New York	1.0	1,000	330	225	85	225,000	28,000	12
Average	2.1	1,000	708	161	71	161,625	48,750	30

Source: Rider Levett Bucknall, *Quarterly Construction Cost Report Third Quarter* (2012).

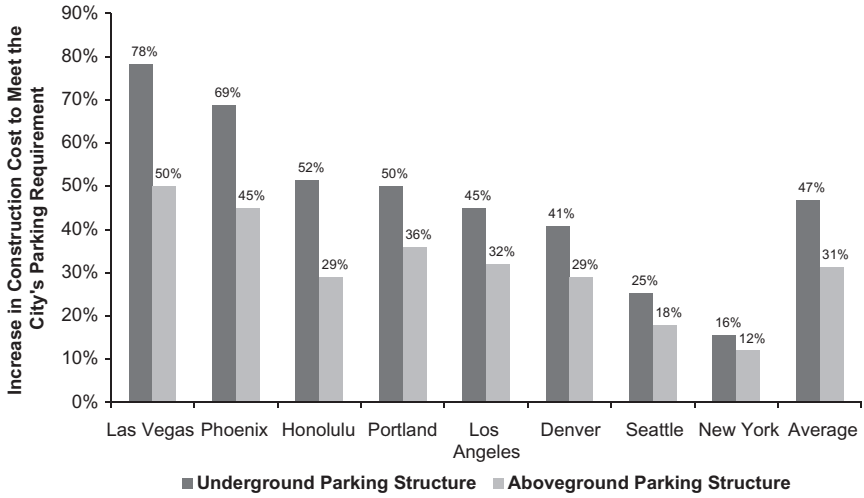

Fig. 1. How Parking Requirements Increase the Cost of Constructing Office Buildings.

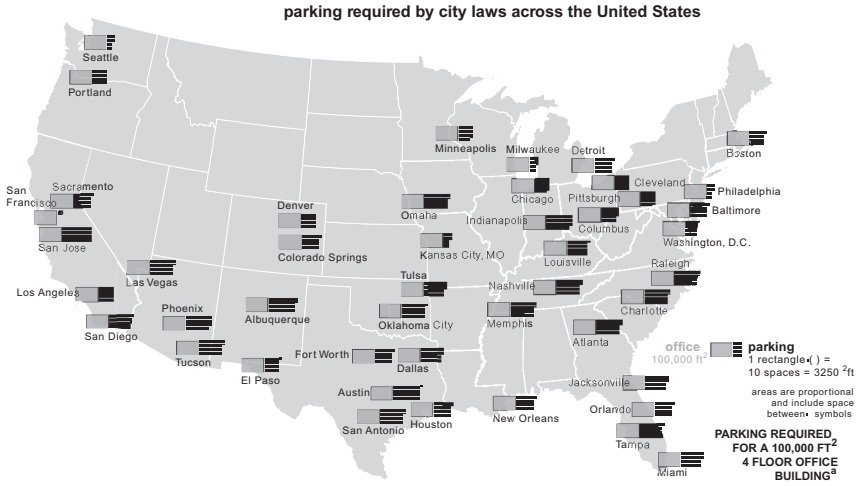

Fig. 2. Graphing the Parking Requirements for Office Buildings in 45 American Cities. *Source*: Reproduced from *Graphing Parking*, with permission from Seth Goodman (2013).

(San Jose) requires the common number of 4 spaces per 1,000 square feet of an office building.

THE COST OF PARKING REQUIREMENTS FOR SHOPPING CENTERS

Because RLB also provides data on the cost of shopping centers, we can use the method described above to estimate how parking requirements increase the cost of building a shopping center. Tables 4 and 5 and Fig. 3 show these estimates for underground and aboveground parking structures.

Cities usually require more parking for shopping centers than for office buildings. Los Angeles's requirement of 4 spaces per 1,000 square feet, for example, leads to parking lots that are 32 percent larger than the shopping centers they serve. For underground parking, this requirement increases the cost of building a shopping center by 93 percent; for an aboveground garage the cost increase is 67 percent. In contrast, New York City's requirement of 1 space per 1,000 square feet increases the cost of a shopping center by only 18 percent for underground parking and 14 percent for an aboveground garage. On average, the required off-street parking increases construction costs by 53 percent if underground and by 37 percent if aboveground.

The average parking requirement for shopping centers in these eight cities is only 2.8 spaces per 1,000 square feet, which is lower than in most American cities. The Urban Land Institute recommends at least 4 spaces per 1,000 square feet for small shopping centers, and 5 spaces per 1,000 square feet for large shopping centers (Shoup, 2011, pp. 84–87). Five parking spaces per 1,000 square feet would increase the average cost of constructing a large shopping center by 95 percent if underground, and by 66 percent if aboveground.

Parking requirements would do no harm, of course, if they did not force developers to provide more parking than they would supply voluntarily. But research has repeatedly found that developers usually provide only the required number of parking spaces, which strongly suggests that the requirements drive the parking supply. Most recently, using data on 9,279 properties in Los Angeles County, Cutter and Franco (2012, Table 8) found that developers provided almost exactly the number of parking spaces that cities require for office buildings. In their study, the average parking requirement was 3.02 spaces per 1,000 square feet, and the average parking supply was 3.03 spaces per 1,000 square feet.

Table 4. The Cost of Parking Requirements for Shopping Centers – Underground Parking Structure.

City	Parking Requirement	Building Area	Parking Area	Construction Cost		Building Cost	Parking Cost	Cost Increase
				Building	Parking			
	Space/1,000 sq ft	Sq ft	Sq ft	$/sq ft	$/sq ft	$	$	%
	(1)	(2)	(3) = (1) × (2) × 0.33	(4)	(5)	(6) = (2) × (4)	(7) = (3) × (5)	(8) = (7)/(6)
Los Angeles	4.0	1,000	1,320	153	108	153,000	142,000	93
Phoenix	3.3	1,000	1,100	135	80	135,000	88,000	65
Honolulu	3.3	1,000	1,100	255	145	255,000	160,000	63
Denver	2.5	1,000	825	105	78	105,000	64,000	61
Las Vegas	4.0	1,000	1,320	298	105	298,000	139,000	47
Portland	2.0	1,000	660	153	105	153,000	69,000	45
Seattle	2.0	1,000	660	158	105	158,000	69,000	44
New York	1.0	1,000	330	195	105	195,000	35,000	18
Average	2.8	1,000	914	181	104	181,500	95,750	53

Source: Rider Levett Bucknall, *Quarterly Construction Cost Report, Third Quarter* (2012).

Table 5. The Cost of Parking Requirements for Shopping Centers – Aboveground Parking Structure.

City	Parking Requirement	Building Area	Parking Area	Construction Cost		Building Cost	Parking Cost	Cost Increase
				Building	Parking			
	Space/1,000 sq ft	Sq ft	Sq ft	$/sq ft	$/sq ft	$	$	%
	(1)	(2)	(3) = (1) × (2) × 0.33	(4)	(5)	(6) = (2) × (4)	(7) = (3) × (5)	(8) = (7)/(6)
Los Angeles	4	1,000	1,320	153	78	1,53,000	1,02,000	67
Phoenix	3.3	1,000	1,100	135	53	1,35,000	58,000	43
Denver	2.5	1,000	825	105	55	1,05,000	45,000	43
Honolulu	3.3	1,000	1,100	255	83	2,55,000	91,000	36
Portland	2.0	1,000	660	153	75	1,53,000	50,000	33
Seattle	2.0	1,000	660	158	75	1,58,000	50,000	32
Las Vegas	4.0	1,000	1,320	298	68	2,98,000	89,000	30
New York	1.0	1,000	330	195	85	1,95,000	28,000	14
Average	2.8	1,000	914	181	71	1,81,500	64,125	37

Source: Rider Levett Bucknall, *Quarterly Construction Cost Report, Third Quarter* (2012).

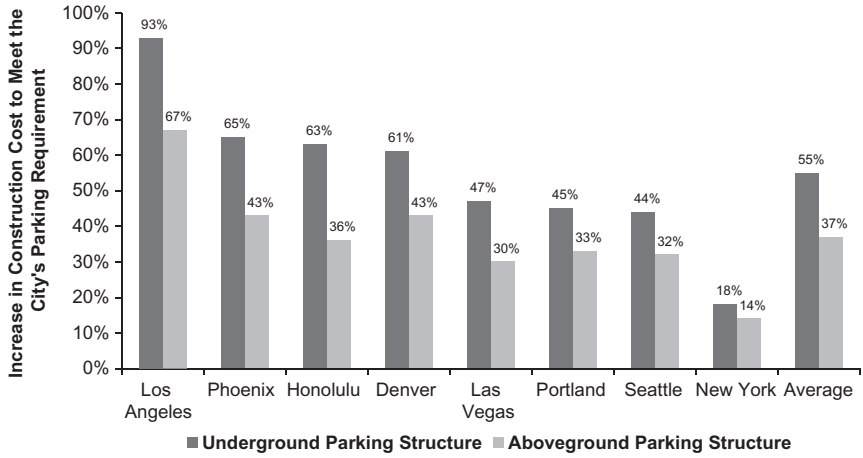

Fig. 3. How Parking Requirements Increase the Cost of Constructing Shopping Centers.

Cutter and Franco (Table 10) also estimated how much an additional parking space adds to a building's value. For retail service buildings with high parking requirements such as restaurants, the last parking space cost $14,700 more than it added to the building's value.[7] High parking requirements thus force developers to provide parking spaces that lose money. In effect, parking requirements tax buildings to subsidize parking. Cutter and Franco (2012, p. 919) conclude, "minimum parking requirements lower site density, increase land consumption, oversupply parking and reduce profits per unit of covered land."

THE COST OF PARKING REQUIREMENTS FOR APARTMENT BUILDINGS

City planners cannot predict how many parking spaces an apartment needs any more than they can predict how many cars a family needs. But the parking requirements for apartments help to predict how many cars a family will own. Even when planners try to measure the "need" for parking by observing the number of cars parked at existing buildings, they often require too much. Seattle's Right Size Parking Project, for instance, surveyed occupancy at over 200 apartment buildings in the region in 2012. The parking requirements in suburban Seattle were, on average, 0.4 spaces

per dwelling unit greater than the observed parking occupancy (King County Metro, 2013, p. 11). Table 1 shows that underground parking costs $35,000 per space in Seattle, and aboveground parking costs $25,000 per space. These figures suggest that the parking requirements in suburban Seattle require developers to spend between $10,000 (0.4 × $25,000) and $14,000 (0.4 × $35,000) per apartment to provide unused parking spaces.

The typical requirement of two spaces per apartment forces developers to spend at least $70,000 per dwelling unit for parking if the spaces are underground, or $50,000 per dwelling unit if the spaces are in an aboveground structure. These estimates refer to the *average* cost of building a parking space. The *marginal* cost of a parking space, however, can be far higher due to natural break points in the cost of building a parking structure. For example, a dramatic break point occurs with the construction of a second level of underground parking because it requires removing several spaces on the first level to provide a ramp to the lower level. Therefore, the marginal cost of the first space on the second level can be far higher than the average cost of the spaces on the first level. This high marginal cost of excavating a second parking level severely limits what developers can build on a site.

To demonstrate how break points in the cost of building a garage affect development decisions, Fig. 4 shows a four-story apartment building in Los Angeles on a typical lot that is 50 feet (15 meters) wide and 130 feet

Fig. 4. Seven-Unit Apartment Building on a 50 × 130 Foot Lot (47 Units per Acre).

Fig. 5. Tandem Compact Parking Space in Underground Garage.

(40 meters) deep. The city's R3 zoning allows eight apartments on the site, and the city's parking requirement is 2.25 spaces per unit. Eight apartments would therefore require 18 parking spaces (8×2.25), but only 16 spaces could be squeezed onto one level of underground parking (Fig. 5 shows how tightly the spaces are packed).[8] In response, the developer built only seven apartments on the site, rather than excavate a second level of parking to provide two additional spaces for the eighth apartment.

In this case, the parking requirement, not the density allowed by zoning, constrained the number of apartments. If the city had allowed the developer to provide only two parking spaces per apartment, the developer could have built eight apartments and 16 parking spaces. The prohibitively high *marginal* cost of two more spaces on a second underground level, however, reduced the feasible number of dwellings from eight to seven, or by 13 percent.

Repealing or reducing a city's parking requirement does *not* mean that developers won't provide parking. Even without parking requirements, the developer in the example above would probably have built a garage with 16 spaces, because the site told the developer that 16 spaces were feasible. With parking requirements, however, the garage told the developer that

only seven apartments were feasible. More parking for cars means less housing for people.

By increasing the cost of development, parking requirements can reduce the supply and increase the price of real estate in two ways. First, parking requirements can reduce the density of what gets built, as in the 13 percent reduction in apartments in the example above. Parking requirements increase the density of cars but reduce the density of people (Manville, Beata, & Shoup, 2013). Because parking requirements reduce the supply of apartments, they increase the price of housing. On some days, planners think about housing affordability, but on most days they think about parking and forget about housing affordability.

Second, parking requirements not only reduce the density on sites that are developed, but also reduce the number of sites that are developed. If the required parking spaces increase the cost of constructing a building by more than they increase the market value of the building, they will reduce the residual value of land. Residual land value is defined as the market value of the most profitable development that could be constructed on a site minus the cost of constructing it.[9] For example, if the best choice for development on a site would cost $750,000 to construct and would have a market value of $1 million, the residual value for the land is $250,000. If $250,000 is not enough to pay for buying and demolishing an existing building on the site, redevelopment won't happen. The residual land value of a site for redevelopment must be greater than the value of the existing building on the site before a developer can buy the building, clear the site, and make a profit on a new development. Therefore, if minimum parking requirements reduce residual land values, they make redevelopment less likely.

In their analysis of parking requirements for retail services, Cutter and Franco (2012) found that the last parking space adds $14,700 more to a building's cost than it adds to the building's value. Requiring one more parking space at a proposed restaurant thus reduces the residual land value of the site by $14,700. Where parking requirements reduce residual land values, they will reduce infill redevelopment. This reduction in the supply of real estate drives up the price of everything except parking and shifts the cost of parking from drivers onto all economic activity in the city.

THE COST OF PARKING REQUIREMENTS FOR HISTORIC BUILDINGS

Cornell professor Michael Manville (2013) showed how parking requirements can reduce the supply of housing by preventing the reuse of historic

buildings. He examined what happened after Los Angeles adopted its Adaptive Reuse Ordinance (ARO), which allows developers to convert economically distressed or historically significant office buildings into new residential units – with no new parking spaces required.

Parking requirements often make reusing historic buildings difficult or impossible, because old buildings rarely have all the parking spaces cities require for new uses. Downtown Los Angeles is a prime example. It has the nation's largest collection of intact office buildings built between 1900 and 1930. Starting in the 1960s, the city's urban renewal program created a new office district on Bunker Hill and left many splendid Art Deco and Beaux Arts buildings in the old office district on Spring Street (once known as the Wall Street of the West) vacant except for retail uses on the ground floor.

Before Los Angeles adopted the ARO in 1999, the city required at least two parking spaces per condominium unit in downtown. In the 30 years between 1970 and 2000, only 4,300 housing units were added in downtown. In the nine years after the ARO was adopted, developers created 7,300 new housing units in 56 historic office buildings. All these office buildings had been vacant for at least five years, and many had been vacant much longer.

Developers provided, on average, only 1.3 spaces per apartment, with 0.9 spaces on-site and 0.4 off-site, often by renting spaces in nearby lots or garages. If the city had not adopted the ARO, it would have required at least two *on-site* spaces for every condo unit, or more than twice as many as developers provided. Deregulating the quantity and the location of parking for the new housing was a key factor in restoring and converting the office buildings.

Removing the parking requirements also produced other benefits. It allowed the restoration and conversion of many historic buildings that had been vacant for years and might have been demolished if parking requirements had been maintained. Historic buildings are a scarce resource in a city, and the evidence shows that parking requirements stood in the way of preservation. Not only did removing the parking requirements preserve individual buildings, it also helped revitalize an entire historic district. The ARO applied only to downtown when it was adopted in 1999, but its benefits were so quickly apparent that the city council extended the ARO to several other historic parts of the city in 2003.

Parking requirements prevent many good things from happening in cities, but usually we cannot see the good things that parking requirements are preventing. Nevertheless, the beautifully restored buildings on Spring Street unveil what parking requirements had been holding back. Many wonderful buildings were restored and reinhabited only after the city removed the minimum parking requirements for these buildings (Fig. 6).

Fig. 6. Office Building Converted to Housing with No New Parking.

Cities also discourage historic preservation if they require additional parking when a rental apartment building is converted to condominium ownership. Los Angeles requires at least 1.5 spaces per unit before an apartment building can be converted to owner-occupancy (Shoup, 2011, p. 157). Because most old buildings do not have 1.5 parking spaces per apartment, the solution is often to reduce the number of apartments to match the number of parking spaces available, either by combining small apartments to create fewer but larger and more expensive ones, or by demolishing some apartments and converting the land to parking. More commonly, developers demolish the rental apartment house and build a new condominium with all the required parking (see Fig. 4). Many residents of historic buildings would prefer to own rather than to rent

their apartments, but parking requirements preclude this opportunity. In practice, the law discriminates against tenants who would like to own their housing but have only one car.

CIRCULAR PARKING REQUIREMENTS

Off-street parking requirements are a strong planning intervention based on scant, unreliable evidence. Because planners do not know how many cars every family needs, they cannot know how many parking spaces every residence needs. And because the number of available parking spaces affects the number of cars a family will own, the number of cars a family owns cannot predict the number of parking spaces to require. Minimum parking requirements increase the demand for cars, and then the number of cars increases the minimum parking requirements. It's like requiring closet space in every residence based on how much stuff planners think people will want to store, and then using the amount of stuff stored in the required closets to set the minimum closet requirements.

Because city planners and elected officials don't know how much it costs to construct a parking space, they can't take this cost into consideration when deciding how many spaces to require. Instead, they often use the occupancy of parking spaces at existing buildings to estimate the "need" for parking spaces at new buildings, as though the cost of a space was irrelevant. Since most drivers park free at existing buildings, parking requirements based on existing occupancy at sites with free parking will therefore reflect the demand for *free* parking, no matter how much the required spaces cost. To use a familiar analogy, if pizza were free, would there ever be enough pizza? Charging drivers a price for parking that is high enough to cover the cost of constructing and operating a garage would reduce the occupancy rates that planners use to estimate parking requirements.

PUTTING A CAP ON PARKING REQUIREMENTS

I thought the time to reform parking requirements had finally arrived when Assembly Bill 904 (The Sustainable Minimum Parking Requirements Act of 2012) was introduced in the California Legislature. AB 904 would set an upper limit on how much parking cities can require in transit-rich

districts: no more than one space per dwelling unit or two spaces per 1,000 square feet of commercial space. The bill defined these districts as areas within a quarter-mile of transit lines that run every 15 minutes or better. AB 904 would limit how much parking cities can require, but it would not limit the parking supply because developers can always provide more than the required number of spaces if they think demand justifies the cost.

Minimum Parking Requirements in Transit-Rich Areas

Why would state officials want to limit parking requirements in areas with good transit service? The federal and state governments give cities billions of dollars every year to build and operate mass transit systems, yet most cities require ample parking based on the assumption that almost everyone will drive almost everywhere. Los Angeles, for example, is building its "subway to the sea" under Wilshire Boulevard, which already has the city's most frequent bus service. Nevertheless, along parts of Wilshire, the city requires at least 2.5 parking spaces for each dwelling unit, regardless of the number of habitable rooms.[10] If every one-bedroom apartment has 2.5 parking spaces, how many residents will ride public transit?

Los Angeles also requires *free* off-street parking along parts of Wilshire Boulevard: "For office and other commercial uses there shall be at least three parking spaces provided for each 1,000 square feet of gross floor area available at no charge to all patrons and employees of those uses."[11] If all commuters and shoppers can park free, fewer will leave their cars at home and ride the bus or subway to work or shop on Wilshire.

Close to Wilshire Boulevard in Westwood, 20 public transit lines serve the UCLA campus, with 119 buses per hour arriving during the morning peak (7–9 am). Nevertheless, across the street from campus, Los Angeles requires 3.5 parking spaces for every apartment that contains more than four habitable rooms, and even a kitchen counts as a habitable room.

On another stretch of Wilshire, Beverly Hills requires 22 parking spaces per 1,000 square feet for restaurants, which means the parking lot is seven times larger than the restaurant. Public transit in this parking environment is as superfluous as a Gideon Bible at the Ritz.

The Rationale for a Statewide Limit on Minimum Parking Requirements

Cities get money from states and the federal government to build transit systems, and then require developers to provide parking spaces that undermine

these transit systems. We would own fewer cars, and use them more sparingly, if drivers instead paid prices for parking that covered the cost of constructing the parking spaces. Parking requirements are policy choices, and choices have consequences.

The rationale for a statewide limit on parking requirements in transit-rich districts is the same as the rationale for most city planning: the uncoordinated actions of many individuals can add up to a collective result that most people don't like. In this case, the uncoordinated parking requirements of many cities can add up to an asphalt wasteland that blights the environment and compels people to drive. Reducing the parking requirements in transit-rich neighborhoods can reduce this blight by making redevelopment at higher density more feasible near transit stations.

The United Kingdom's guidance on parking policy provides a precedent for national action to manage local parking requirements. In 2001, the U.K. Department for Communities and Local Government (2001, pp. 51–52) published a guidance document stating that cities should "not require developers to provide more spaces than they themselves wish. … There should be no minimum [parking] standards for development, other than parking for disabled people." Following this guidance, the Greater London Authority (2004) required its 33 boroughs to set a maximum number of parking spaces allowed, with no minimum number required. For apartment buildings that are near public transit or are within a ten-minute walk of a town center, for example, the maximum number of parking spaces allowed is now one space per dwelling unit.

Zhan Guo and Shuai Ren at New York University studied the results of London's shift from minimum parking requirements with no maximum, to maximum parking limits with no minimum. Using a sample of developments completed before and after the reform, they found that the supply of parking after the reform was only 68 percent of the maximum allowed, and only 52 percent of the previous minimum required. If, after the reform, developers provided only 52 percent of the parking spaces previously required, and rarely provided as many parking spaces as allowed, the result implies that the previous minimum parking requirement almost *doubled* the number of parking spaces that developers would have voluntarily provided on their own. Summarizing their results, Guo and Ren (2013, p. 1193) say,

> It is clear that, with the minimum standard but no maximum, most developments do not provide more than the minimum required. With the maximum standard but no minimum, most developments provide less than the maximum allowed.

They concluded that removing the minimum parking requirement caused 98 percent of the reduction in parking spaces, while imposing the maximum standard caused only 2 percent.

London's *maximum* of one parking space per unit everywhere is the same as California's proposed cap on *minimum* parking requirements in transit-rich districts. And even if California does limit how much parking cities can require, developers could always provide more.

National and regional governments guide local parking policies in the United Kingdom, but planning for parking is solely a local responsibility in the United States. As a result, American parking policies are parochial. Because sales taxes are an important source of local public revenue in California, cities are under terrific pressure to attract retail sales. Fierce competition for sales tax revenue puts cities in a race to offer ample free parking for all potential customers. This battle is an expensive negative-sum game within a region because more parking everywhere consumes valuable land and capital, without increasing total regional sales.

Beyond competing for sales tax revenue, cities have another incentive to set high parking requirements. Everyone wants to park free, and parking requirements allow elected officials to provide free parking at someone else's expense. The required parking spaces cost a lot, but the cost is hidden in higher prices for everything else.

Opposition from the California Chapter of the American Planning Association

To my dismay, the California Chapter of the American Planning Association lobbied against the proposed legislation. The California APA (2012, p. 1) argued that AB 904 "would restrict local agencies' ability to require parking in excess of statewide ratios for transit intensive areas unless the local agency makes certain findings and adopts an ordinance to opt out of the requirement."

According to the California APA, all cities should have the right to require abundant parking in transit-rich districts without presenting any findings to show that a high parking requirement is justified. That is, cities can tell property owners what to do, but the state cannot tell cities what to do. The California APA wants cities to require parking without being subject to any statewide planning.

City planners must, of course, take direction from local elected officials, but the American Planning Association represents the planning profession,

not cities. AB 904 gave the planning profession an opportunity to recommend a reform that would coordinate parking requirements with public transportation, but instead the California APA insisted on retaining local control over parking requirements regardless of any wider concerns.[12]

Planning for parking is an ad hoc skill learned on the job, and it is more a political than a professional or technical activity. Most city planning textbooks do not even mention minimum parking requirements. Despite their lack of professional training, planners in every city must set parking requirements for every land use, and they have adopted a veneer of professional language to justify the requirements. Simply put, planners are winging it when it comes to parking requirements, which are, at best, the outcome of simple tinkering. City planners do not have the omniscience to predict the need for parking at every restaurant, apartment house, church, and nail salon. Instead of reasoning about parking requirements, planners usually rationalize them. Minimum parking requirements result from complicated political and economic forces, but city planners enable these requirements and even oppose efforts to reform them. The public bears the high cost of this pseudoscience.

Suppose the automobile and oil industries have asked you to devise planning policies that will increase the demand for cars and fuel. Consider three promising policies that will make cars essential for most trips. First, segregating land uses (housing here, jobs there, and shopping somewhere else) will increase travel demand. Second, limiting development density will spread the city and further increase travel demand. Third, minimum parking requirements will ensure that drivers can park free at the beginning and end of almost every automobile trip. American cities have unwisely embraced each of these three planning policies.[13] Zoning ordinances that segregate land uses, limit density, and require parking will create sprawled, drivable cities and prohibit compact, walkable neighborhoods. Urban historians often say that cars have changed the city, but urban planning has also changed the city to favor cars.

MINIMAL PARKING REQUIREMENTS

Many people believe that America freely chose its love affair with the car, but I think there was an arranged marriage. By recommending minimum parking requirements in zoning ordinances, the planning profession was both a matchmaker and a leading member of the wedding party.

Unfortunately, however, planners failed to provide a good prenuptial agreement. Now, city planners should become marriage counselors or divorce lawyers. By working to reform minimum parking requirements, planners can help to secure a fair and friendly settlement between people and cars where the relationship no longer works well.

Minimum parking requirements limit urban development. They often force developers to provide more parking than necessary, or to construct smaller buildings than the zoning allows. Parking requirements promote an unsustainable city. If cities require ample off-street parking everywhere, most people will continue to drive everywhere, even if Santa Claus delivers a great transit system. Cities get the traffic they plan for and the behavior they subsidize.

The California Legislature has delayed action on the bill to cap parking requirements in transit-rich areas. Nevertheless, the proposal has already fomented debate within the planning profession. Should cities have minimum parking requirements with no maximums, like Los Angeles? Or should they have maximum parking limits with no minimums, like London? Or neither? And should state or national governments limit how much parking cities can require? Parking is an important policy issue and not merely a regulatory detail.

City planners should begin to consider minimal, not minimum, parking requirements. "Minimal" means barely adequate, or the smallest possible number, depending on the context. A minimal parking requirement would thus require planners to estimate an adequate number of parking spaces, after taking all the costs into account. For example, can the adjacent roads handle all the additional traffic caused by the cars that will park in the required spaces? Can the city's air safely absorb all the additional vehicle emissions? Can the earth's atmosphere safely absorb all the additional carbon emissions? How will the required parking spaces increase the cost of housing and all other real estate? And who will pay for all the required parking spaces?

If they are faced with the impossible task of calculating the costs and benefits of parking spaces required for every building in every location, planners may appreciate the idea of going Dutch on parking: Each driver can pay for his or her own parking, and planners should abandon the idea of parking requirements. If you pay for your parking and I pay for mine, someone who does not own a car will not pay for parking.

Most cities will not want to abandon parking requirements altogether, but perhaps they can start by reducing the minimum number of spaces required until they reach a minimal number that seems reasonable.

Eventually, they might reinterpret this to mean the maximum number of spaces allowed, not the minimum number required. With only a slight change in terminology, cities can require developers to provide no more than an adequate number of parking spaces. But as Guo and Ren found in London, simply removing the minimum parking requirements will greatly reduce the supply of new parking spaces, even without imposing any maximum parking limit. Removing a minimum parking requirement can be far more important than imposing a maximum parking limit, and politically easier. If cities do impose maximum parking limits, however, they can offer developers the option to pay per-space fees if they want to exceed the maximum number of spaces allowed, just as cities already offer developers the option to pay in-lieu fees if they want to provide fewer than the minimum number of parking spaces required.

CONCLUSION

I hope the information I have provided about the high cost of minimum parking requirements will encourage transportation and land use planners to examine how these requirements affect cities, the economy, and the environment. The politics that produce minimum parking requirements are understandable, but their high costs are indefensible. Irrefutable evidence on the health cost of smoking eventually led many people to kick their addiction to tobacco. I hope evidence about the high cost of required parking spaces will eventually lead cities to kick their addiction to minimum parking requirements.

NOTES

1. Rider Levett Bucknall, *Quarterly Construction Report, Third Quarter* (2012).
2. Pasqual and Riera (2005) explain the theory of underground land values.
3. These estimates probably come from building a garage with several hundred spaces, taking advantage of economies of scale in construction. Where parking requirements mandate only 10 or 20 spaces, there will be no economies of scale and the spaces will be much more expensive.
4. See Tables 723 and 1096 in the 2012 Statistical Abstract of the United States.
5. The other four cities exempt small buildings from parking requirements. Washington, DC, for example, exempts the first 3,000 square feet of building area from parking requirements; Chicago exempts the first 4,000 square feet; and San Francisco exempts the first 5,000 square feet.

6. RLB provides cost estimates for two categories of office buildings, Prime (the most expensive) and Grade A or Secondary. I have used the cost estimates for Grade A office buildings.

7. Shoup (2011, pp. 698–699) uses the data in Cutter and Franco's Table 10 to calculate the marginal value and marginal cost of the required parking spaces.

8. Shoup (2008) explains this example in greater detail.

9. Adams (1994, pp. 26–27) explains residual land values. Shoup (1970) explains the optimal timing of redevelopment.

10. City of Los Angeles, Park Mile Specific Plan (Ordinance No. 162530), Section 6.B.1.

11. City of Los Angeles, Park Mile Specific Plan (Ordinance No. 162530), Section 6.B.2.

12. Letters about AB 904 from mayors, planning academics, planning practitioners, and the California Chapter of the American Planning Association are available at http://shoup.bol.ucla.edu/LettersAboutAssemblyBill904.pdf

13. Cities have also adopted other policies that increase the demand for cars and fuel, such as free on-street parking and street-width requirements. For example, Section 1805 of the California Streets and Highways Code states, "The width of all city streets, except state highways, bridges, alleys, and trails, shall be at least 40 feet." On a 40-foot wide residential street, with two 12-foot-wide travel lanes and two 8-foot-wide parking lanes, curb parking takes up 40 percent of the roadspace. The U.S. Department of Commerce estimates that the value of roads is 36 percent of the value of all state and local public infrastructure, which also includes schools, sewers, water supply, residential buildings, equipment, hospitals, and parks (Shoup, 2011, p. 206). Because curb parking occupies a large share of road space, it is a substantial share of all state and local public infrastructure. Free curb parking may be the most costly subsidy that American cities provide for most of their citizens. Guo and Schloeter (2013) explain how minimum street-width requirements are a de facto on-street free parking policy.

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