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**Parking Requirements and Housing Affordability:
A Case Study of San Francisco**

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Abstract

Residential parking requirements specify the number of parking spaces that must be provided when new residential units are built. This paper examines the way such parking requirements influence housing affordability. The provision of parking spaces requires land, building materials and equipment which increase the price of housing. On the other hand, off-street parking requirements are said to be needed to prevent streets overcrowded with parked cars. In a case study of six neighborhoods in the City of San Francisco, this study investigated the influence on housing affordability of code-required parking. A hedonic model was fit to data describing housing and neighborhood characteristics in order to statistically explain the sales price of housing units that changed hands in those neighborhoods in 1996. The analysis revealed that single family houses and condominiums were more than ten percent more costly if they included off-street parking than if they did not. Based on the selling prices and the distribution of incomes of San Francisco residents, it was estimated that tens of thousands of additional households could qualify for home mortgages for units without off-street parking if those units could legally be provided under zoning and subdivision ordinances. The policy implications of this finding include the possible consideration of alternative forms of regulation regarding the provision of off-street parking in residential projects.

Housing affordability and parking availability are two of the most vexing problems in the nation's largest cities. In San Francisco, internationally known for its ambience, most working people find it almost impossible to find a house, condo, or apartment at an affordable price. Finding a parking space is nearly as difficult. Many houses are situated on narrow lots, and frequent curb cuts for their driveways reduce on-street parking. Cars circle the block looking for rare empty spaces. Residents say parking problems are a major bane of urban life. In many other urban centers as well—New York, Chicago, Boston, and Seattle—housing costs and parking availability are twin public-policy problems that become enormous when combined.

Although Americans rarely connect housing affordability with parking availability, the two problems are actually intimately linked, presenting planners with something of a conundrum. To ease parking shortages, cities write zoning ordinances and subdivision regulations requiring that new dwelling units provide off-street parking spaces. But parking spaces add significantly to the cost of building houses, requiring more land, more materials and more labor. This, of course, raises their sales prices or monthly rents. Todd Litman estimated that one parking space per unit increases the cost by 12.5% and that two spaces increases cost by 25% in comparison with no off-street parking(1). Donald Shoup, based on interviews with housing developers, has argued that the cost of providing parking also acts as a ratchet that increases housing prices by more than the direct cost of the parking spaces(2). Because developers must bear the costs of parking and that raises the basic cost of the housing unit, they believe that the higher priced units are not as marketable unless they increase the number of luxury features included in the units. Thus, because parking places are required, more up-scale features are typically included in the unit and this causes their prices to rise even further. So it seems that reducing the parking problem also reduces housing affordability. If municipalities allowed new housing units to be built without parking spaces, housing prices would be lower but streets could eventually overflow with parked cars.

By requiring the provision of parking spaces as a condition of approval for new housing, urban zoning and subdivision regulations may be inviting more cars into the city. Planners often favor “transit oriented development” to increase public transit use and lessen residents’ reliance on automobiles. It would seem logical to *decrease* the number of parking spaces in neighborhoods

that have good transit access, as many in San Francisco do. Neighborhoods with fewer parking spaces and efficient transit service may attract families who avoid or limit car trips. But even neighborhoods with few car owners can suffer parking shortages. The double and triple parking common on Manhattan's residential streets occurs in densely populated communities where car ownership rates are comparatively low.

Previous Research

Parking has been widely recognized to be an important transportation policy issue in the broad context of the transportation-land use relationship. The most studied aspect of parking policy is employee parking at work sites and its effects on commuting behavior. Shoup finds that employer-provided subsidized parking encourages commuting by automobile and discourages transit use. He advocates reducing current parking requirements and eliminating free parking(3) by "cashing out" employee parking benefits. If employees were given the cash value of their parking subsidy instead of the space, they might choose to walk, cycle, carpool, or use public transit for commuting between home and work.

Commercial parking is also a focus of some research. In a study of parking pricing in the busiest commercial district of Vancouver, B.C., Parson and Lambe proposed higher parking prices in order to induce greater reliance on public transport(4). European countries have explored "car-free" downtowns, by reducing or eliminating commercial parking space requirements and prohibiting auto access to downtown commercial centers(5). The thrust of the argument is that using incentives, such as the cashing-out policy, or disincentives, like increasing parking prices and reducing parking supply, reduces auto usage at many activity centers and encourages transit use.

While research on employment-related and commercial parking have provided useful insights for transportation policy makers, there have been relatively few studies of residential off-street parking. One important study was done by Todd Litman, who used typical values of construction costs to estimate the impact of parking requirements on housing costs, and studied the relationships between density and parking requirements(1). He argued that by requiring a substantial amount of space devoted to the parking of automobiles, parking requirements lower

housing densities in the inner city and also and push development to fringe locations where the land required to comply with parking requirements is available at lower prices. Litman concludes that parking requirements are a clumsy and inadequate mechanism for matching parking supply with parking demand because the number of automobiles needed per housing unit varies significantly between households and even within households over time. He points out the irony that parking requirements, intended to improve the efficiency and aesthetic appearance of neighborhoods, actually result in substantial indirect environmental and social costs by encouraging automobile ownership, discouraging public transit use, and contributing to an overall lowering of urban densities. Parking requirements also discourage inner city urban residents from increasing existing densities by adding second units to the property they already own.

Should urban policies require that builders provide *more* parking—to alleviate parking shortages? Or should they require *less* parking—to promote cheaper housing and more transit use? Choosing the former may result in higher residential prices, more cars, and less transit use. Choosing the latter may lead to streets congested by parked cars.

San Francisco requires one parking space per new dwelling unit(6). If the housing is specifically intended for the elderly, fewer parking spaces are required, presuming the tenants will own fewer cars than younger residents. Many other cities require larger numbers of parking spaces per dwelling unit, often one parking space per bedroom(7). In one widely-cited volume on parking, for example, Robert Weant and Herbert Levinson suggest that single family dwellings and three-bedroom apartments should be required to provide two spaces per unit, one to two bedroom units should provide 1.5 spaces per unit, efficiency apartments should be required to provide one space per unit, and condominiums ought to offer 1.4 spaces per unit(8). Even though it appears to be less demanding than many others, San Francisco's parking requirement may be influencing housing affordability in a city in which housing affordability is a topic of everyday conversation and frequent newspaper headlines.

Research Design

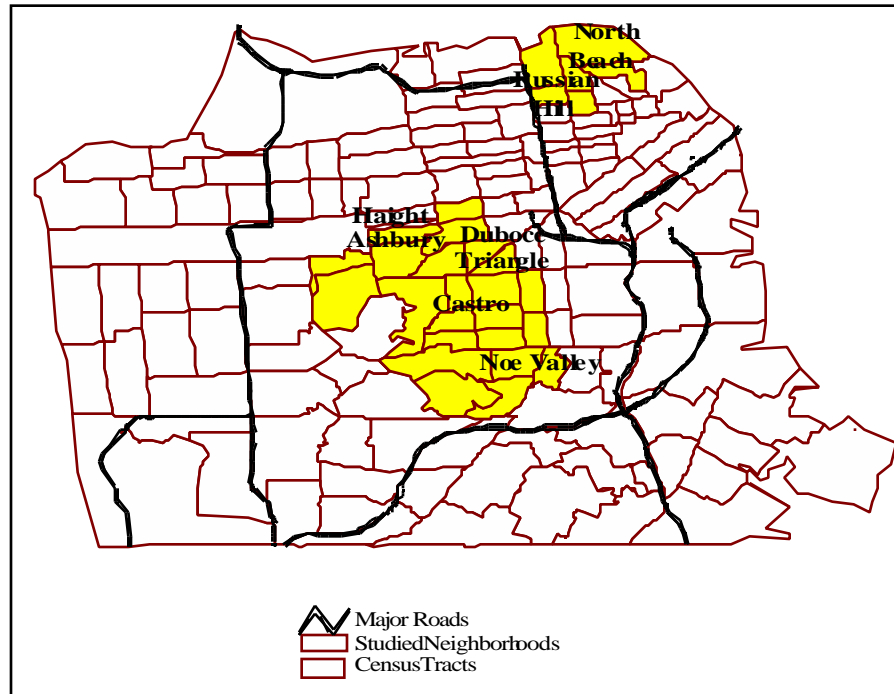
Because many dwelling units were built before current parking requirements were enacted, we were able to study the relationship between parking and housing by comparing the

sales of units that included parking spaces with those that did not. But, of course new and old housing units differ in many ways other than the extent of their parking, and statistical methods are needed which isolate the effects of parking spaces from other differences. We looked at six San Francisco neighborhoods with fairly typical demographics (including income, household size, and racial composition): North Beach, Haight-Ashbury, Duboce Triangle, Russian Hill, Noe Valley, and the Castro District. Table 1 summarizes the demographic characteristics of the communities included in the study and compares them with city-wide demographic data. Figure 1 is a map that shows the locations of the study neighborhoods within the city.

Table 1: Demographic and housing characteristics of the Study Area

	Study area	Citywide	Housing	Study area	Citywide
Population	120334	723959	Median Value	\$ 381,950	\$ 294,800
White	74.1%	53.6%	<\$300,000	29.1%	52.0%
Black	5.1%	10.9%	\$300,000-\$399,999	29.0%	26.0%
Asian	15.9%	29.1%	\$400,000-\$499,999	21.6%	10.0%
Hispanic	11.8%	13.3%	\$500,000+	20.3%	12.0%
Other	4.9%	6.3%			
Household size	60490	305984	Unit Type	64337	328471
1 person	42.9%	39.2%	Condo	5.6%	4.7%
2 person	35.1%	30.0%	Own unit	29.6%	34.5%
3 person	11.4%	12.5%	Rent unit	70.4%	65.5%
4+ person	10.6%	18.3%			
Median income	\$ 39,139	\$ 33,414			

Figure 1: a map that shows the locations of the study neighborhoods within the city



We also employed San Francisco real estate transaction data on the units sold in 1996: address, initial asking price, selling price, number of days until sold, date sold, size in square feet, number of bedrooms and bathrooms, unit's age, architectural style, off-street parking availability, and neighborhood description. The study used the Geographic Information System application software Arc-View to link the real estate sales data with San Francisco census data, by geocoding each individual unit's address with San Francisco street network coverage. Thus we could identify the census tracts in which these units were located. Data from the 1990 census were used to identify neighborhood and demographic factors that might also affect the sales prices of dwellings.

To understand the impact of residential off-street parking on housing affordability and the housing market, we used a hedonic model. In the model, the value of a housing unit results from a combination of factors representing unit size, type of structure, age, architectural style, quality of neighborhood, and social and economic characteristics. The hedonic model allowed us to assess the effects of off-street parking on the sales prices of the housing units, while holding constant effects of other variables. The 1990 real estate sales database provided the primary data source for this analysis. In total we had data describing 232 dwelling units listed for sale in 1996, distributed among 28 census tracts in the selected neighborhoods.

The model is specified as:

Home value = f(Unit size, Unit structure, Unit age, Architectural style, Off-street parking availability, Neighborhood median income level, and Neighborhood racial composition).

Two separate hedonic models were developed to estimate residential off-street parking values for single-family units and condominium units.

Findings: The Effects on Off-Street Parking on Housing Costs

The results of the model are shown in Table 2. They indicate that the inclusion of parking spaces in dwelling units significantly influences the selling price of the units. As indicated by the coefficients and their T scores, only the size of the unit in square feet and the number of bathrooms included in the unit have a greater effect on sales price than the presence of an off-street parking space.

Table 2: Results of Hedonic Model

Housing Unit Attributes	Single Family Units		Condominium	
	Coefficients	T_score	Coefficients	T_score
Unit Size (SQFT)	96.3	5.6	135.	8.1
Bathroom Number	65604.5	4.1	25972.3	2.1
Parking Availability	46390.8	1.9	38803.5	2.1
Unit Age (YEAR)	-1217.1	-1.9	-1065.7	-1.3
Architectural				
Contemporary	-61689.6	-1.5	-99728.5	-1.5
Cottage	-133409.3	-2.6		
Custom	-30532.3	-0.4		
Edwardia	-32835.0	-1.4	-21814.3	-1.2
Spanis	6092.6	0.1	11387.8	0.3
Rusti	298414.9	3.5		
Traditio	-4778.0	-0.1	-67762.0	-1.7
Neighborhood				
Median Household	-3.5	-1.3	2.7	2.0
Ethnicity				
Asian	1479.7	0.4	1959.4	3.6
Black	-5016.8	-1.9	-517.1	-0.4
Hispanic	-751.6	-0.6	-2615.3	-2.3
Constant	397274.9	0.0	51266.4	0.6
R_square	0.8		0.8	
Observations	102		130	

In 1996 single-family dwelling units with off-street parking sold for an average of \$394,779, while units without parking sold for an average of \$348,388. This price differential of 11.8 percent is statistically significant. Similarly, the average selling price of condominiums with garages was \$303,856 in comparison with a price of \$265,053 without parking. This difference of \$38,804 amounts to 13 percent. These differences directly affect housing affordability. Most people seeking housing in San Francisco apply for mortgages. Assuming a prevailing rate of 7.5 percent for a thirty-year mortgage with a 10 percent down payment, an annual family income of \$76,000 is required to qualify for a mortgage on the average single-family home in San Francisco neighborhoods with off-street parking. Obviously, most lower- and middle-income families are

excluded from these communities by this requirement. The average annual household income needed to qualify for a mortgage on a unit without parking was \$67,000. Thus, many more households could afford to live in these neighborhoods if building codes did not require parking.

Condominiums at the median sales value in these communities showed similar results. A condominium loan on a median-priced unit with off-street parking required an annual family income of \$59,000. A household income of only \$51,000 would support a loan on the average condo without parking. Again, the parking requirement significantly affects housing accessibility in San Francisco.

We estimated that based upon their current incomes, in the 1996 market 68,700 San Francisco households could qualify for mortgages on typical single-family units with parking, while *16,600 additional* households could afford an equivalent home without parking. Thus, 24 percent more households could afford houses if they did not include parking. Similarly, if the parking ordinance did not exist, *26,800 additional* households could afford condominiums. The number of households that could qualify for loans on condos without parking was 20 percent greater than the number that could qualify for those with off-street parking. Further, condominiums with parking took an average of forty-one days longer to sell than those without, though the difference in time to sale for single family homes was not found to be statistically associated with the number of parking spaces.

Interpretations and Policy Implications

The results are statistically significant, robust and dramatic. Housing affordability in San Francisco is directly affected by the requirement that parking spaces be provided along with housing units. Why is the requirement for a parking space bundled with housing? Why should each dwelling unit be required to have a fixed number of parking spaces regardless of the number of cars in the household? Would the public interest be better served if parking and housing were unbundled, creating separate markets for each? Vehicles could be parked off the street in parking garages independent of dwelling units. In Tokyo, families cannot register automobiles until they

have off-street spaces for them, but families that do not own cars need not pay for parking spaces attached to their houses. Would it not be more logical to link the requirement for a parking space with car ownership rather than with housing ownership?

Imagine American cities in which housing developers provide dwelling units and parking spaces separately. If there were separate markets for housing and parking, a buyer could opt for a housing unit with zero, one, or two parking spaces depending on need. Long-time neighborhood residents who have cars but no garages in their older dwellings would be able to purchase or lease parking spaces associated with newly constructed housing, while new residents who do not need parking would not be required to pay for a unit that includes parking.

If parking and housing were marketed separately in inner-city urban neighborhoods, wouldn't *everyone* choose not to pay for parking and instead park free on local streets? Not necessarily, especially if parking restrictions and time limits are strictly enforced by the local police or traffic department. Rather than searching endlessly for an on-street space, moving a car frequently to comply with parking time limits, or paying frequent fines for parking violations, car owners with sufficient income would probably choose to purchase or lease parking spaces. Others, wishing to save money, would give up cars they rarely use to forego a garage and pay less for housing. This would, of course, contribute to reductions in air pollution and urban congestion, and it would encourage greater reliance upon public transit. If the simple realities of everyday life are not sufficient to induce the provision of off-street parking spaces for the cars that are actually owned in the city, couldn't regulations link the off-street parking requirement to the possession of an automobile rather than to the ownership of a dwelling?

A greater understanding of the relationship between housing affordability and parking requirements would inform discussion and policy making on both issues. But, even with further studies, there will be no simple or obvious policy recommendations on the right course for each and every neighborhood. We must balance the need for affordable housing with the problem of congested streets—and different approaches may be best for different communities.

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