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Gerard C. Mildner
Portland State University, mildnerg@pdx.edu

James G. Strathman
Portland State University

Martha J. Bianco
Portland State University

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GERARD C.S. MILDNER, JAMES G. STRATHMAN,
and MARTHA J. BIANCO

ABSTRACT

This paper looks at the connection between the regulation of parking by cities, transit service levels, and travel and parking behavior in the United States. Travel behavior information comes from the 1990 Nationwide Personal Transportation Survey (NPTS) and the Federal Urban Mass Transportation Administration's 1990 Section 15 Report. Data on the current state of parking programs in place in central business districts of the U.S. is identifed through telephone interviews of local officials responsible for parking policies from the twenty cities identified in the NPTS. The travel behavior analyses and the data from the parking officials interviews were combined with data from the Federal Highway Administration's Journey-to-Work data to group cities according to their parking policies, transit service, and ridership levels on a continuum of "Transit-Accommodating Cities" and "Auto-Accomodating Cities". A key finding is that cities with interventionist parking policies, high parking prices and limited supply, frequent transit service, and a high probability that travelers will pay to park are the most likely to have high transit ridership figures.

ANALYSIS OF COMMUTING BEHAVIOR AND PARKING

Introduction

Transportation economists have long noted the connection between high levels of automobile usage and the failure to charge auto users the appropriate cost for driving. A particular concern has been the subsidy received by drivers whose cost of parking is paid by their employer or by local retailers (1). This paper look at new local policies implemented to restrict the

availability of parking and to boost the use of transit facilities. These policies are assessed in terms of their effect on reducing transit ridership.

Two studies were conducted to assess the current state of worktrip travel behavior, transit service, parking policies, and other factors across the U.S. The first of these used data from the 1990 Nationwide Personal Transportation Survey (2) augmented by the Federal Urban Mass Transportation Administration's (UMTA) Section 15 data (3) and congestion estimates calculated by the Texas Transportation Institute (4) The second study surveyed officials across the U.S. regarding the parking policies currently in place. Results from these two studies were combined, along with data from the Federal Highway Administration's Journey-to-Work trends in order to group cities and compare their parking policies, based on transit ridership and transit service (5).

The Nationwide Personal Transportation Survey (NPTS)

Twenty metropolitan areas were examined using data from the 1990 Nationwide Personal Transportation Survey (NPTS). The NPTS is the only source of information on travel for all purposes in the U.S. The 1990 survey recovered information on personal trip-making over a 24-hour period for a sample of approximately 22,000 households and 50,000 individuals. The NPTS data on individual behavior was supplemented with areawide transit service data from the UMTA's Section 15 Report.

Some of the salient characteristics of this data are shown in Table 1, which lists worktrip characteristics for the twenty metropolitan areas. The first data column in the table reports the number of observations for each Consolidated Metropolitan Statistical Area (CMSA). More than half of the CMSAs have fewer than 100 observations, indicating that the NPTS data does not likely portray conditions in any given metropolitan area very precisely. Overall, however, the NPTS should be representative of U.S. metropolitan commuting activity.

The mode chosen for 75 percent of commutes in the NPTS sample is single occupant vehicle (SOV), while carpools and transit account for 13 and 8 percent, respectively, and other modes (mainly walking) make up the remainder. Over 40 percent of the sample respondents

reported that they lived within 1/4 mile of transit service. Only 5 percent of auto commuters reported that they paid for parking at work.

There is an average of 1.7 hours of revenue-producing transit service per year for each resident. Service in older, more densely developed eastern metropolitan areas (the "rustbelt") is higher, while service in the more recently developing southern and western metropolitan areas (the "sunbelt") is generally lower. But there are exceptions to this pattern. For example, San Francisco and Portland offer high levels of transit service in relation to other western metropolises, while Detroit and Providence provide comparatively less than their regional counterparts. Even ignoring the polar cases of New York and Providence, the range of transit service provided in these CMSAs is noteworthy. San Francisco's 2.13 revenue hours per capita is more than three times the .67 hours provided in Detroit.

SURVEY OF PARKING POLICIES

The primary cities of the twenty metropolitan were also surveyed about their parking policies. Telephone interviews were conducted of city, county, regional, and state officials, in the planning, transportation, and public facilities departments. The typical respondent was a city planner or a manager of a municipal parking authority.

The survey focused on the Central Business District (CBD) of these central cities. The geographic definition of each city's CBD was largely adopted as suggested by the local officials. Interviews were adapted to the circumstance, but the interview focused on four key areas: one, parking regulation, especially zoning requirements and parking taxation; two, publicly owned CBD parking facilities; three, parking meters; and four, neighborhood parking permit programs.

Parking Regulations

Zoning. Some cities use zoning to regulate parking by mandating a minimum number of parking spaces for a given floor area for each possible use of the property. These requirements are usually expressed as the number of parking spaces required per 1,000 feet of floor area. The most

striking finding is that minimum parking requirements for office development, which are so prevalent in suburban areas of the U.S., are uncommon in large U.S. downtowns. Instead, the amount of parking being developed appears to be determined primarily by the need of tenants and their clients and not by minimum parking regulations. And in several examples, the city is rationing the amount of space that can be allocated for parking by using maximum ratios or caps on the total amount of downtown parking (e.g., Portland).

Stand-Alone Parking. The survey also examined whether cities are restricting private-sector parking garages in the downtown area. Eleven of the twenty cities have some sort of restriction on the development of surface parking lots or stand-alone parking garages, whether in the form of locational restrictions, design restrictions, or review processes.

Taxes. A third way cities regulate parking is through taxation. Taxes are imposed on parking revenue in ten of the twenty surveyed cities. For about half of those ten, the parking tax is merely an application of the ordinary county or state sales tax that is applied to consumer goods. None of these taxes is levied on drivers in instances where the parking is provided free by the landowner, and no city attempts to tax the portion of office lease payments that secures parking spaces for tenants. As long as the office lease and the parking lease are bundled, as they often are, the parking tax does not apply.

Publicly Owned CBD Parking Facilities

Information on the amount of municipally held spaces was usually obtained from the department managing those facilities. The category of publicly owned parking does not include spaces held by state or federal agencies, many of which rent privately owned office space that contains accessory parking.

Most cities own a minimal share of the downtown off-street parking supply. Provision of parking is seen by most city officials, especially in large cities, as a role of the private real estate sector. The cities in the ten larger metropolitan areas had smaller percentages of publicly owned parking supplies than the cities in smaller metro areas (10.4 percent versus 17.9 percent). Cities

with large public parking supplies often have established a public parking authority that has some independence of city hall to manage their supplies (Pittsburgh, Buffalo, Cincinnati, Miami). Often these authorities also manage on-street parking and earn surpluses for the city's general fund.

Officials in five of the seven cities where a large portion of downtown parking is publicly held identified downtown commuters as the primary market served by the parking facilities. All cities were found to own at least one parking facility, usually located adjacent to their city hall, municipal building, or convention center, and invariably used by city employees and/or for event parking. The rates charged for city employees are often highly discounted, while the management of those facilities is often done on a contract basis by a private firm.

Parking Meters

All cities have parking meters in their CBD, although in two cases (Portland, Houston) the CBD was the only place they had any metered spaces. Very few of the cities have any free parking in their downtown areas, and some are aggressively expanding the areas where metering reigns.

In most cities hourly meter rates vary by location. Only two cities—Boston and Buffalo—have a uniform hourly rate. In general, cities in large metropolitan areas have higher meter rates. In the ten largest metro areas, meter rates have an average range of $0.45 to $1.40, while cities in the ten smallest metro areas have meter rates in the $0.38-to-$0.97 range.

Neighborhood Parking Permit Programs

The problem of spillover parking in residential neighborhoods is often created when parking prices in the CBD rise. Thirteen of the twenty cities surveyed had at least one neighborhood parking permit program to address spillover parking. Of the remaining seven, two cities had been interested in neighborhood permit programs but faced a state constitutional prohibition (New York, Buffalo), and two were in the smallest metro areas in the survey (Providence, Hartford) and perhaps faced only minor spillover parking problems.

Cities typically apply parking permit programs in five types of areas: residential neighborhoods on the fringe of the CBD, streets surrounding transit stations, neighborhoods surrounding stadiums and arenas, neighborhoods near hospitals and universities, and historic or tourist-destination neighborhoods. No city reported applying this technique in the CBD itself, where pricing via meters and time limits governs supply, and downtown residents who own a car are assumed to have their own off-street space.

Most cities with parking permit programs consider a new parking management zone only following a neighborhood request, often with explicit rules about the percentage of residents who must sign a petition. A parking survey is usually done by the city's traffic engineer. The neighborhood is determined to be adversely impacted if the available on-street parking supply has a low average vacancy rate (typically daytime use) and if a high percentage of the automobiles parked in the neighborhood are licensed to owners who lived outside the neighborhood.

Most of the permit districts are large and allow the permit holder to park anywhere within the district; permit prices do not exceed $35 per year. City officials often expressed a desire to keep the districts sufficiently large so that excess resident demand for parking on certain streets can spill over into other parts of the same district. Two exceptions to this pattern are Denver and Chicago.

None of the districts faces the condition in which the number of permit holders exceeds the number of available spaces. Therefore, permits are not rationed among residents but are available for any registered automobile owner. Indeed, officials in cities that have areas with insufficient parking supply for all potential car owners have decided to avoid instituting permit zones for this very reason. Most of the permit zones allow visitors to park in these districts, either on a short-term basis for shoppers or on an extended basis for out-of-town guests.

METROPOLITAN CLASSIFICATION

BASED ON TRAVEL DATA AND PARKING POLICIES

Introduction

Information from the NPTS and the telephone survey was supplemented with data from the Federal Highway Administration's Journey-to-Work Trends publication. The twenty metropolitan areas were then categorized according to the three transit-related variables: transit share (Journey-to-Work data), percentage of the respondents living within 1/4 mile of transit service (NPTS data), and annual per capita transit revenue hours, as a proxy for transit frequency (UMTA Section 15 data). The cities were ranked based on these variables and grouped into three main categories: transit-accommodating, transitional, and auto-accommodating (6).

Data for the categories is displayed in Tables 2 and 3. Note that while Table 2 presents metropolitan area data, Table 3 consists primarily of central city data. Table 4 summarizes whether the metropolitan areas, grouped according to transit service, implement the following five parking programs:

. parking maximums are imposed in the CBD

. a parking tax of 10 percent or more is levied

. the maximum meter rate is equal to or greater than the overall mean of $1.18

. stand-along garages are not unconditionally allowed in the CBD

. residential permit programs are in place

A discussion follows, with an emphasis on the parking policies that prevail in each category. A relationship between extent of public intervention in parking, transit service, and transit ridership does appear to exist. For example, cities with interventionist parking policies, high parking prices and limited supply, frequent transit service, and a high probability that travelers will pay to park are the most likely to have high transit ridership figures.

Transit-Accommodating Cities

Transit-accommodating central cities tend to have large and growing populations. All but two of the eight cities in this category—Portland and Seattle—are rustbelt cities (7). With the exception of Seattle, which has a dedicated bus tunnel, all of these cities also have established rail transit systems.

Commute Characteristics of this Category. The percentage of SOV ridership—68.4 percent—is less for this group than for the entire sample (74 percent), with the percentage of transit ridership (10.3) being greater than that of the rest of the twenty-city sample (6.3 percent). The percentage of carpooling is slightly less than for the entire sample. A larger percentage of respondents in this group are within 1/4 mile of transit access, and similarly, transit per capita revenue hours are higher than the average for the sample. The average annual congestion costs for travelers in these cities are higher than any other group and higher than for the sample on average. This relatively high congestion cost may explain the higher-than-average transit-ridership figures.

Parking Characteristics of this Category. Only 25 percent of the central cities in this category impose parking minimums, less than in the other two categories. Half, however, impose maximums, whereas none of the cities in the other two categories do. Five of the eight cities impose a parking tax of 15 percent or more. None of the cities in this category allow parking structures to be built in the CBD without some sort of conditions.

Travelers in these cities are about as likely to pay to park as is the case with the sample overall or with the other two groups. The maximum hourly meter rate is, at $1.49, relatively high when compared with the overall average of $1.18. Finally, a lower share of the CBD off-street parking is publicly owned than average—11 percent compared with the overall average of 14 percent. The comparative stringency of CBD parking is accompanied not only by relatively high transit service and usage, but residential permit programs to control spillover.

Transitional Cities

Transitional cities have some characteristics of auto-accommodating cities and some of transit-accommodating cities. From the perspective of historic and economic development, these cities appear to be moving away from an auto-accommodating approach to parking policy, although not necessarily toward a deliberate transit-accommodating approach. Los Angeles, for instance, is historically the prototypical auto-accommodating city, yet in terms of emerging parking and transportation policy, the city is approaching the trends of the transit-accommodating cities: it imposes a parking tax, furnishes a relatively small percentage of publicly owned CBD parking, does not allow stand-alone garages in the CBD without some sort of conditions, and supports residential permit programs. On the other hand, the city does not yet impose parking maximums, but does require parking minimums. The most likely explanation for Los Angeles's transition toward transit-accommodation is its commitment to federal and state legislation requiring a decrease in SOV use.

Commute Characteristics of this Category. At 4.6 percent, transit share is lower than the overall average of 6.3 percent. Carpooling, however, is, at 12.5 percent, slightly higher than the overall average of 12.2 percent. Of the three groups, the percentage of trips that are complex is lowest for this group. The average congestion cost for these cities is $370, compared with an overall average of $399.

Parking Characteristics of this Category. These cities are unlikely to impose parking minimums or maximums, thus indicating little public intervention in terms of zoning requirements. Only one of the cities in this group—Los Angeles—imposes a parking tax of 10 percent or more. Half of the cities allow parking structures to be built in the CBD without some sort of conditions. Travelers in these regions are more likely than average to pay for parking (probability of 6.0 percent compared with 5.6 percent overall) A smaller percentage of cities in this category have residential permit programs than either the average overall or of the transit-accommodating cities.

Auto-Accommodating Cities

Two of these cities, Cincinnati and Detroit, have experienced population decline, while the remaining four have remained fairly stable or have experienced significant growth due to annexation.

Commute Characteristics of this Category. Transit share is very low in these cities—at an average of 2.7 percent, while SOV and carpooling is more frequent than for the other two groups. Although higher than the transitional cities, these cities have a smaller-than-average number of trips that are classified as complex. This fact seems to contradict the low levels of transit ridership until the very low levels of transit service are taken into consideration: only 27.6 percent of the respondents are within 1/4 mile of transit access, and there are only .90 per capita revenue hours.

Parking Characteristics of this Category. Half of the cities in this group impose parking minimums, but none impose maximums. Only two of the six cities have residential permit programs. None of the cities has a parking tax greater than 10 percent. All of these cities allow the construction of parking structures in the CBD without any sort of condition or review process. Travelers in these cities are the least likely to pay to park, and the maximum hourly rate for meters is very low—$0.83 compared with the overall average of $1.18.

Conclusions

Cities with both a relatively high degree of public intervention in parking policy and high transit service levels—particularly in terms of frequency—are more likely to have high transit ridership levels than cities with less public involvement in parking policy and a lower degree of transit service.

Parking policies in transit-accommodating cities appear to be part of a larger transportation policy that supports public transit. Such policies are more likely to be characterized by higher maximum parking rates, parking taxes of at least 15 percent, conditions imposed on the erection of parking structures in the CBD, zoning requirements, and residential permit programs. These cities are either larger, rustbelt cities or growing sunbelt cities on the Pacific coast. Rail or express bus service is a feature of all of these cities.

Transitional cities have some of the characteristics of auto-accommodating cities, but appear to be moving away from a transportation policy aimed primarily at accommodating the auto and more toward transit-supportive policies or policies that are the least burdensome to the city budget. Some of these cities impose conditions on the erection of parking structures in the CBD, zoning requirements, and residential permit programs. Travelers in these cities are the most likely to pay to park. These cities range from a small, declining rustbelt city such as Buffalo to a large, expanding sunbelt city such as Los Angeles.

Parking policies in auto-accommodating cities are the most likely to be characterized by low parking rates and little public involvement except, in half of the cases, to require parking minimums. Travelers in these cities are the least likely to pay to park. These cities are either expanding southern sunbelt cities or declining rustbelt cities or.

These findings indicate that transit ridership depends less on transit access than on transit frequency and that the probability that travelers pay to park is positively correlated with transit ridership, suggesting that public policies that support pricing of parking and improved transit service, particularly in terms of frequency, are likely to be correlated with high levels of transit ridership. In addition, the survey analysis reveals that such policies may work best in combination. However, the fact that these policies are most successfully imposed in cities with other important characteristics—population size, growth, age, etc.—should not be overlooked.

Table 1A:
Selected Worktrip Commute Characteristics
in the 1990 NPTS-Section 15-TTI Sample

		Travel Mode (%)			
CMSA	N	SOV	Carpool	Mass Transit	Other
Boston	97	72.2	11.3	6.2	10.3
Buffalo	24	75.0	25.0	0.0	0.0
Chicago	255	74.9	13.7	8.2	3.1
Cincinnati	81	86.4	11.1	0.0	2.5
Cleveland	91	81.3	12.1	3.3	3.3
Dallas	138	84.8	14.5	0.7	0.0
Denver	78	85.9	7.7	5.1	1.3
Detroit	151	89.4	9.3	0.7	0.7
Hartford	269	84.0	9.7	2.2	4.1
Houston	132	89.4	7.6	1.5	1.5
Los Angeles	447	77.9	16.3	2.7	3.1
Miami	74	71.6	25.7	2.7	0.0
Milwaukee	61	77.0	13.1	3.3	6.6
New York	1152	64.2	12.1	15.9	7.8
Philadelphia	194	72.7	13.4	7.7	6.2
Pittsburgh	79	67.1	22.8	5.1	5.1
Portland	44	81.8	15.9	2.3	0.0
Providence	27	74.1	11.1	7.4	7.4
San Francisco	153	80.4	9.2	5.9	4.6
Seattle	98	78.6	15.3	2.0	4.1
Overall	**3645**	**74.7**	**12.9**	**7.6**	**4.8**

Source: Mode share estimated from the 1990 National Personal Transportation Survey

Table 1B:
Selected Worktrip Commute Characteristics
in the 1990 NPTS-Section 15-TTI Sample

CMSA	N	% Pay to Park	% Within 1/4 Mile	Transit Service: Annual Revenue Hours Per Capita
Boston	97	6.6	46.4	1.45
Buffalo	24	4.5	58.3	.99
Chicago	255	4.1	47.1	1.81
Cincinnati	81	5.2	32.1	.82
Cleveland	91	7.2	30.8	1.10
Dallas	138	6.1	30.4	.73
Denver	78	5.8	53.8	1.07
Detroit	151	4.9	21.2	.67
Hartford	269	2.5	28.3	1.19
Houston	132	6.6	25.8	.84
Los Angeles	447	3.4	49.9	.92
Miami	74	1.4	43.2	1.31
Milwaukee	61	13.7	26.2	1.51
New York	1152	5.5	46.0	2.74
Philadelphia	194	4.4	39.7	1.40
Pittsburgh	79	7.6	36.7	1.96
Portland	44	7.7	50.0	1.35
Providence	27	4.8	37.0	.56
San Francisco	153	4.6	60.1	2.13
Seattle	98	5.7	53.1	1.31
Overall	**3645**	**5.0**	**42.3**	**1.71**

Source: Parking data and transit access data estimated from 1990 National Personal Transportation Survey; transit operation data from US Dept. of Transportation, 1990 UMTA Section 15 Report

TABLE 2A :
Travel Characteristics for Metro Areas Grouped by Mean Transit Rank

Metropolitan Area	Mean Transit Rank	Transit Share (%)	SOV Share (%)	Carpool Share (%)	% Within 1/4 Mile Transit	Annual Transit Revenue Hours Per Capita
Transit-Accommodating						
San Francisco	2.33	9.3	68.8	13.0	60.1	2.13
New York	3.67	27.8	52.3	10.3	46.0	2.74
Boston	5.33	10.6	70.2	10.3	46.4	1.45
Seattle	6.67	6.3	73.8	11.9	53.1	1.31
Portland	6.67	5.4	74.1	12.3	50.0	1.35
Chicago	6.67	4.8	67.5	12.0	47.1	1.81
Philadelphia	7.00	10.2	69.2	12.2	39.7	1.40
Pittsburgh	7.00	8.0	71.5	12.8	36.7	1.96
Mean	**5.67**	**10.3**	**68.4**	**11.8**	**47.4**	**1.77**
Transitional						
Buffalo	8.67	4.7	77.1	11.2	58.3	0.99
Denver	10.00	4.3	75.2	12.4	53.8	1.07
Milwaukee	10.33	4.9	77.3	10.9	26.2	1.51
Miami	10.67	4.4	75.5	14.5	43.2	1.31
Los Angeles	10.67	4.6	72.9	15.5	49.9	0.92
Cleveland	13.00	4.6	79.6	10.3	30.8	1.10
Mean	**10.56**	**4.6**	**76.3**	**12.5**	**43.7**	**1.15**
Auto-Accommodating						
Cincinnati	15.67	3.7	79.3	11.4	32.1	0.82
Hartford	16.00	1.6	78.5	13.3	28.3	1.19
Providence	16.33	2.6	78.6	12.3	37.0	0.56
Houston	16.67	3.8	76.3	14.6	25.8	0.84
Dallas	17.67	2.4	78.9	13.8	30.4	0.73
Detroit	19.00	2.4	82.7	10.1	21.2	0.67
Mean	**16.89**	**2.7**	**79.0**	**12.6**	**27.6**	**0.90**
Overall Mean		**6.3**	**74.0**	**12.2**	**40.8**	**1.29**

Sources: Mean transit rank is calculated from metropolitan area rankings for Transit Share, Percent within 1/4 Mile Transit Access, and Annual Transit Revenue Hours Per Capita; mode share data from U.S. Department of Transportation, Federal Highway Administration, Journey-to-Work Trends in the United States and Its Major Metropolitan Areas, 1960-1990; transit access estimated from Nationwide Personal Transportation Survey, 1990; and transit operation data from U.S. Dept. of Transportation, Urban Mass Transportation Admin., Transit Profiles: Agencies in Urbanized Areas Exceeding 200,000 Population. 1990 Section 15 Report (1990).

TABLE 2B:
Travel Characteristics for Metro Areas Grouped by Mean Transit Rank

Metropolitan Area	%Complex Trips	Annual Congestion Cost Per Traveler	1994 Central City Pop.	% Change in Central City Pop. 1980-90	Rustbelt versus Sunbelt
Transit-Accommodating					
San Francisco	41.8	$760	734,676	6.6	rustbelt
New York	64.2	$390	7,333,253	3.5	rustbelt
Boston	42.3	$495	547,725	2.0	rustbelt
Seattle	39.8	$660	520,947	4.5	sunbelt
Portland	31.8	$330	450,777	18.8	sunbelt
Chicago	38.4	$300	2,731,743	-7.4	rustbelt
Philadelphia	36.6	$270	1,524,249	-6.1	rustbelt
Pittsburgh	35.4	$270	358,883	-12.8	rustbelt
Mean	**41.3**	**$434**	**1,775,282**	**1.13**	**75% rustbelt**
Transitional					
Buffalo	41.7	$380	312,965	-8.3	rustbelt
Denver	33.3	$370	493,559	-5.1	sunbelt
Milwaukee	27.9	$160	6,174,044	-1.3	rustbelt
Miami	36.5	$520	373,024	3.4	sunbelt
Los Angeles	39.6	$670	3,448,613	17.4	sunbelt
Cleveland	30.8	$120	492,901	-11.9	rustbelt
Mean	**34.9**	**$370**	**956,351**	**-0.96**	**50% rustbelt**
Auto-Accommodating					
Cincinnati	24.0	$160	358,170	-5.5	rustbelt
Hartford	100.1	$220	124,196	2.5	rustbelt
Providence	10.0	$380	150,639	2.5	rustbelt
Houston	51.0	$570	1,702,086	2.2	sunbelt
Dallas	66.0	$570	1,022,830	11.3	sunbelt
Detroit	56.0	$380	992,038	-14.6	rustbelt
Mean	**38.5**	**$368**	**724,993**	**-.27**	**67% rustbelt**
Overall Mean	**42.3**	**$399**	**1,214,516**	**1.7**	**65% rustbelt**

Sources: The percent complex trip is estimated from the Nationwide Personal Transportation Survey, 1990; congestion cost data from Schrank, D.L., et al., Estimates of Urban Roadway Congestion - 1990. Research Report 1131-5, Texas Transportation Institute, Texas A&M University (1993), 61 pp; population data from US Bureau of Census; rustbelt/sunbelt categorization is based on date of founding, incorporation, extent of preautomobile development (pre-1920), and early 19th century economic base.

TABLE 3A:
Parking Characteristics for Cities Grouped by Mean Transit Rank

Central City	Pay-to-Park Probability	Parking Minimums Imposed in CBD	Parking Maximums Imposed in CBD	Parking Tax exceeds 10%
Transit-Accommodating Cities				
San Francisco	4.6	no	yes	yes
New York	5.5	no	yes	yes
Boston	6.6	no	no	no
Seattle	5.7	yes	yes	no
Portland	7.7	no	yes	no
Chicago	4.1	yes	no	**yes
Philadelphia	4.4	no	no	yes
Pittsburgh	7.6	no	no	yes
Mean	**5.7**	**25% yes**	**50% yes**	**63% yes**
Transitional Cities				
Buffalo	4.5	no	no	no
Denver	5.8	no	no	no
Milwaukee	13.7	no	no	no
Miami	1.4	yes	no	no
Los Angeles	3.4	yes	no	yes
Cleveland	7.2	no	no	no
Mean	**6.0**	**33% yes**	**0% yes**	**17% yes**
Auto-Accommodating Cities				
Cincinnati	5.2	yes	no	no
Hartford	2.5	yes	no	no
Providence	4.8	no	no	no
Houston	6.6	no	no	no
Dallas	6.1	yes	no	no
Detroit	4.9	no	no	no
Mean	**5.0**	**50% yes**	**0% yes**	**0% yes**
Overall Mean	**5.6**	**35% yes**	**20% yes**	**30% yes**

Sources: Pay-to-park probability is etimated for each metropolitan areas from the Nationwide Personal Transportation Survey, 1990; all other data from the twenty-city telephone survey.
** Chicago imposes a flat $25-per-space monthly parking tax

TABLE 3B
Parking Characteristics for Cities Grouped by Mean Transit Rank

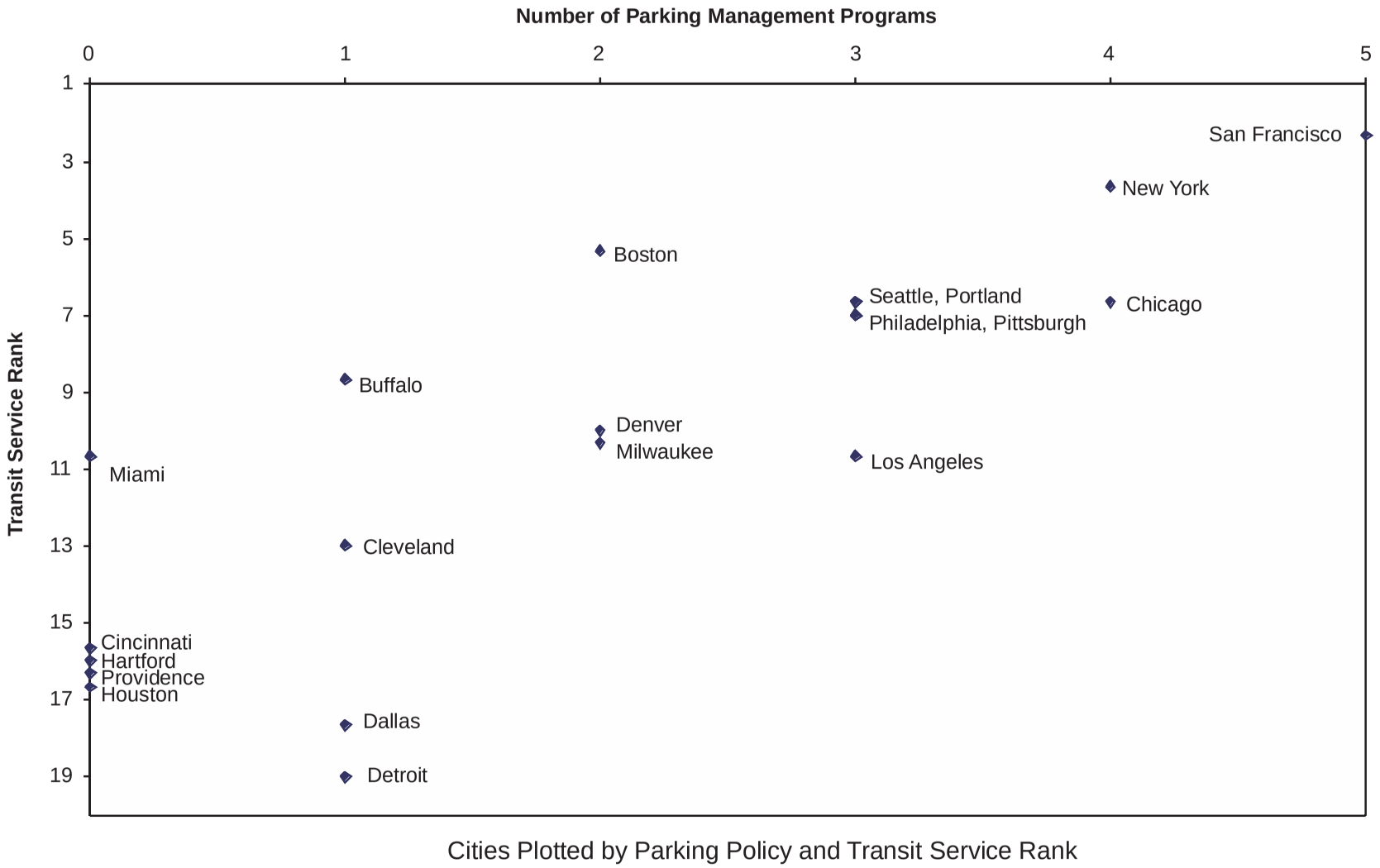
Central City	%of CBD Parking Public Owned	% of Meters Located in CBD	Maximum Meter Rate	Stand-Alone Parking Garages Unconditionally Allowed in CBD	Residential Permit Programs
Transit-Accommodating Cities					
San Francisco	15	34	$1.50	no	yes
New York	1	26	$1.50	no	no
Boston	7	85	$1.00	no	yes
Seattle	3	74	$1.00	no	yes
Portland	10	100	$0.90	no	yes
Chicago	1	26	$3.00	no	yes
Philadelphia	9	40	$1.00	no	yes
Pittsburgh	41	8	$2.00	no	yes
Mean	**11**	**49**	**$1.49**	**100% no**	**88% yes**
Transitional Cities					
Buffalo	52	48	$1.00	no	no
Denver	10	67	$1.00	no	yes
Milwaukee	12	45	$1.00	no	yes
Miami	28	12	$1.00	yes	no
Los Angeles	6	16	$2.00	yes	yes
Cleveland	7	95	$0.75	yes	yes
Mean	**19**	**47**	**$1.13**	**50% no**	**67% yes**
Auto-Accommodating Cities					
Cincinnati	24	33	$0.50		
Hartford	19	24	$0.75		
Providence	1	97	$0.75		
Houston	8	100	$1.00		
Dallas	8	58	$1.00		
Detroit	21	35	$1.00		
Mean	**14**	**58**	**$0.83**		
Overall Mean	**14**	**51**	**$1.18**		

Source: Twenty-city telephone survey.

TABLE 4
Transit Service Rank and Parking Policies

Metropolitan Area	Mean Transit Rank	Transit Share (%)
Transit-Accommodating		
San Francisco	2.33	5
New York	3.67	4
Boston	5.33	2
Seattle	6.67	3
Portland	6.67	3
Chicago	6.67	4
Philadelphia	7.00	3
Pittsburgh	7.00	3
Mean	**5.67**	**3.38**
Transitional		
Buffalo	8.67	1
Denver	10.00	2
Milwaukee	10.33	2
Miami	10.67	0
Los Angeles	10.67	3
Cleveland	13.00	1
Mean	**10.56**	**1.50**
Auto-Accommodating		
Cincinnati	15.67	0
Hartford	16.00	0
Providence	16.33	0
Houston	16.67	0
Dallas	17.67	1
Detroit	19.00	1
Mean	**16.89**	**0.33**

Source: See Table 2A and explanation in the text.



Cities Plotted by Parking Policy and Transit Service Rank

ENDNOTES

1. For example, see MacKenzie, J.J., et al., The Going Rate: What it Really Costs to Drive. World Resources Institute (1992), Willson, R.W., "Suburban Parking: Economics and Policy," DOT-T-93-05, US Department of Transportation (1993), or Zupan, J.M., "Transportation Demand Management: A Cautious Look: Transportation Research Record, No. 1346 (1992).
2. Vincent, M.J., Keyes, M.A., and Reed, M., NPTS Urban Travel Patterns: 1990 Nationwide Personal Transportation Survey. U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management (1994) pages vary.
3. U.S. Department of Transportation, Urban Mass Transportation Administration, Transit Profiles: Agencies in Urbanized Areas Exceeding 200,000 Population. 1990 Section 15 Report (1990) pages vary.
4. Schrank, D.L., Turner, S.M., and Lomax, T.J., Estimates of Urban Roadway Congestion - 1990. Research Report 1131-5, Texas Transportation Institute, Texas A&M University (1993), 61 pp.
5. U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management, Journey-to-Work Trends in the United States and its Major Metropolitan Areas, 1960-1990 (1993) pages vary.
6. These categories are consistent with the three categories in Weant, R. A., and H. S. Levinson, Parking, Eno Foundation for Transportation (1990). pp. 8-9.
7. Although geographically a sunbelt city, San Francisco is identified here as rustbelt due to its early date of founding (1776), compact development, significant growth during the preautomobile period prior to 1920, and early economic base (mining, rail, commerce, and banking).

Biographical Sketch

GERARD C.S. MILDNER is Assistant Professor of Urban Studies and Planning at Portland State University. Dr. Mildner received his Ph.D. in Economics from New York University.

JAMES G. STRATHMAN is Professor of Urban Studies and Planning and Associate Director of the Center for Urban Studies at Portland State University. Dr. Strathman received his Ph.D. in Geography from University of Iowa.

MARTHA J. BIANCO is Assistant Director of the Center for Urban Studies at Portland State University. Dr. Bianco received her Ph.D. in Urban Studies from Portland State University.