

maintain accessibility to the core by automobile.

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Employer-Subsidized Parking and Work-Trip Mode Choice

DON H. PICKRELL AND DONALD C. SHOUP

The widespread practice of employer-subsidized parking is a significant but often overlooked determinant of mode choice for the journey to work. Experiences in several major cities are examined, and estimates are made as to how many of those who are offered employer-paid parking decide to drive alone to work rather than commute by other modes. It appears that approximately 20 percent of those who now drive alone and receive free parking would form carpools or begin using public transit if they were required to pay for parking at the workplace. This estimate is derived from comparisons of the behavior of commuters of similar characteristics who park free and who pay to park and from the results of the imposition of parking charges for parking formerly provided free. The major incentive for employers to provide free parking appears to be the fact that, as a fringe benefit, free parking escapes income taxation. Enforcing the reporting and taxation of its cash value, however, is a difficult and predictably unpopular task. Two policies intended to extend employer parking subsidies to work travel by modes other than the single-occupant automobile are recommended: tax-exempt travel allowances and carpool parking subsidies. Both policies could lead to significant increases in carpooling and transit use at very low or no public expense.

In metropolitan areas throughout the United States, offering employees either free or partly paid parking is a common practice of both private and government employers. Nationwide, as many as 85 percent of all those who commute by automobile in urban areas park free of charge (1), and most of those who park at their employers' expense work in downtown areas, where parking is most costly to provide. In the Los Angeles central business district (CBD), for example, almost one-third of the 100 000 employees who arrive daily by automobile report that they pay nothing to park, and another quarter pay only the nominal cost of participating in an employee permit system. Advertised parking rates in the Los Angeles downtown area average almost \$35/month. This suggests that parking subsidies offered by private and government employers in the area total almost \$30 million annually (2).

In a 1977 memorandum to the Secretary of Transportation, acting administrator Charles F. Bingman of the Urban Mass Transportation Administration reported that in Washington, D.C., the federal government alone provides free parking for about 30 000 of the 140 000 automobiles that enter the central em-

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ployment district daily as well as partly paid parking (at \$5-\$20/month) for another 10 000 cars. In an area where posted rates average almost \$50/month (3), this amounts to a continuing federal subsidy for automobile travel of well over \$20 million/year, half the combined capital outlay for building the Shirley Highway Busway and for acquiring nearly 100 specially equipped buses intended to attract commuters out of their automobiles (4).

The federal government may be the most generous provider of parking subsidies in the Washington, D.C., area, but it is by no means the only one: When subsidies offered by private employers are included, almost 40 percent of all parking facilities (some 65 000 spaces) in the metropolitan area are made available at no charge to their users (3). This brings the total cash value of employer-provided subsidies for automobile travel to almost \$40 million/year.

Employer-subsidized parking also appears to be commonplace in Canadian urban areas. Transport Canada (5) reports that 85 percent of all Canadian automobile commuters working in urban areas are provided with free parking at their places of employment. In Ottawa, for example, the federal government provided free parking for almost 40 000 employees until 1975, when fees equal to 70 percent of downtown commercial rates were imposed in federal parking facilities.

FREE PARKING AND WORK-TRIP MODE CHOICE

The surprisingly widespread practice of subsidized parking is a significant but generally overlooked influence on commuters' choices among travel modes. In both downtown and suburban employment centers, the cost of parking can be a substantial component of the total cost of the trip to work by automobile. Daily parking rates as high as \$3.50 are common in some areas of downtown Los Angeles, for example, and rates as high as twice this figure prevail in other urban areas such as Washington, D.C., and New York City. When such charges are paid

by the motorist, they represent a significant fraction of the total cost of already expensive and time-consuming trips. By offering free or partly subsidized parking, employers thus substantially reduce the price their employees pay to travel to work by automobile. Because those employees generally are not offered an equivalent price reduction for travel to work by carpool or public transit, they are more likely to drive alone to work than they would be if forced to bear the full cost of parking.

U.S. Department of Transportation (DOT) data for 1976 (6) show that the cost of operating a medium-sized automobile in a typical urban area averages \$0.074/mile, of which \$0.036 represents fuel costs. For a representative 10-mile suburb-to-downtown commuting trip (the national average), even a nominal \$2.00 charge at the destination represents more than half of the total dollar cost incurred over the round trip. If, as Quarmby (7), Landing (8), and others argue, commuters perceive the cost of automobile mileage to include only fuel expenses, parking fees may represent as much as three-quarters of the combined dollar outlays on the basis of which driving alone is compared with other modes available for the journey to work. For those who work in downtown areas, the cost of parking can be far higher than in this modest example, as the price of almost \$50.00/month in downtown Washington suggests. Because the price of off-street parking is highest in the most congested areas, free parking perversely gives the greatest cost reduction to drivers headed for areas where congestion is already worst and where public transit often provides its best service.

To recipients of subsidized parking, its cost is comparable to the other, more notorious external costs motorists impose on one another and on the transportation system. Like the time delays drivers impose on one another on congested facilities and the health and property damages that result from their contributions to air pollution, it becomes a cost that is borne by persons other than those responsible for it. The value of the subsidy inherent in free parking can be even larger than the more frequently cited subsidies implicit in allowing motorists to congest urban streets and pollute the air. Again, using Los Angeles as an example, Elliott (9) estimates that congestion and pollution costs imposed by an automobile driver over the course of a typical round trip to work may be as high as \$2.50, yet an employer's offer of free parking at the trip's destination can represent a subsidy of up to \$4.00/day (1).

The cost of parking does differ in one important respect from the costs of congestion and pollution: Unlike these other external costs, parking cost seems comparatively easy to transfer to those who impose it through policy measures. Accurate estimation of the costs of congestion and pollution has proved extremely difficult, and the various proposals for charging them to their perpetrators all involve substantial outlays for metering and collecting charges. Such "transaction costs" can significantly reduce the benefits these policies promise, since they must be accounted among the costs of their implementation. Because transferring the full cost of providing parking to commuters involves no such outlays, it is likely to be far simpler and cheaper to accomplish than other measures designed to bring the price of peak-hour automobile travel into closer conformity with the total cost it imposes on society.

Still, in deciding whether an ambitious policy to change employer subsidy practices is warranted, it is important to assess how extensively current offers of free parking encourage employees who would

otherwise carpool or use public transit to drive to work instead. By estimating the effect of employer-paid parking on the travel mode decision, the contribution of subsidized parking to problems stemming from the underpricing of automobile use can be separated from those stemming from the failure to tax exhaust emissions, price road capacity, or deregulate crude oil price. Only if removing parking subsidies promises a significant reduction in peak-hour automobile travel are the public policy changes necessary to foster their withdrawal likely to prove worthwhile. Because parking subsidies appear to be offered more frequently to employees than to shoppers, travelers conducting personal business, or recreational travelers, it is particularly important to examine their effect on travel mode choice for the trip to work.

EVIDENCE OF THE EFFECTS OF FREE PARKING

Two direct ways to estimate the effects of employer parking subsidies are (a) to observe changes in the travel modes used by commuters whose free parking is withdrawn and (b) to compare differences between the travel modes chosen by commuters who are eligible for free parking and those chosen by otherwise identical commuters who are not eligible for free parking. The following discussion reviews a variety of evidence of the effects of both changes and differences in parking prices on commuting behavior. Although adequate controls for fully isolating the effect of parking price from effects of other variables are in some cases lacking, studies conducted in Los Angeles, Ottawa, and Washington, D.C., consistently show that free parking markedly increases the proportion of employees who drive alone to work. Taken together, they suggest that 20 percent of automobile drivers who now park at their employers' expense would be induced to join carpools or begin using transit for the trip to work if they were charged for the parking they now receive free.

Discontinuance of Free Parking for Canadian Government Employees

On April 1, 1975, the government of Canada discontinued the provision of free parking to its employees and began charging a price equal to 70 percent of commercial rates for comparable parking (5). The proportions of survey respondents in Ottawa who commuted by various modes before and after the removal of parking privileges for government employees are given below (other includes bicycle, walk, taxi, and ice skate; sample size = 3782):

Mode	Commuters (%)		Change
	Before Parking Charges	After Parking Charges	
Drive alone	34.9	27.5	-21
Carpool	10.5	10.4	-1
Transit	42.3	49.0	+16
Other	12.3	13.1	+7

As the table indicates, the number of persons driving alone decreased by more than 20 percent, bus ridership increased substantially, and commuting by various other modes (including ice skating!) increased slightly. Although the fraction of employees who carpooled remained almost constant, this reflected the finding that the number of carpools who switched to other modes--predominantly transit--was almost exactly offset by the number of

former drivers and bus users who switched to car-pooling.

Table 1 examines an unusual feature of the data collected in the Transport Canada study: the fraction of former automobile drivers who cited various reasons for switching to a new travel mode. By far the most common reason for changing commuting behavior--and the reason cited by two-thirds of all automobile drivers who changed to other modes--was the substantial reduction in the parking subsidy drivers formerly enjoyed. Table 1 confirms the indication in the preceding text table that the primary effect of the parking-price change has been the shift to bus travel among former automobile drivers.

Another important aspect of the Ottawa case is the fact that, among a group of highly paid employees, the imposition of seemingly modest parking charges led to a pronounced shift from driving alone to other modes. The average annual income reported by survey respondents was almost \$17 000 (in 1975 currency, \$1.00 Canadian = U.S. \$1.0172); yet, even in the presence of the strong, positive influence of income on the probability that a commuter will choose to drive alone to work, parking price appears to play a pivotal role in determining which mode is selected.

Further evidence to this effect drawn from the Transport Canada survey (6, Exhibits 4.16 and 4.32, Table 5) is given below (sample size = 3782):

Annual Income (1975 Canadian \$)	Employees Driving Alone (%)			Change (%)
	Before Parking Charges	After Parking Charges		
<10 000	27	25	-7	
10 000-15 000	37	31	-16	
15 000-20 000	33	25	-24	
20 000-25 000	40	28	-30	
25 000-30 000	50	36	-28	
>30 000	49	31	-37	

Although a positive correlation of income with the likelihood that an individual will drive to work persists even after the imposition of parking charges, the fraction of high-income drivers shifting to other modes actually exceeds that among lower-income drivers.

Although it is certainly an implausible result, the finding that a higher proportion of upper-income drivers switched to other travel modes may be partly explained by the fact that more of this group initially received free parking. Since demand for parking facilities among federal employees exceeded supply when spaces were offered free, access to spaces was rationed on the basis of seniority in government employment. Because of the association

Table 1. Reasons cited by Ottawa drivers for switching to other travel modes after withdrawal of free parking in 1975.

Mode to Which Drivers Switched	Reason Cited for Switching (%)			
	Imposition of Parking Charges	Improved Bus Service	Change in Automobile Availability	Other ^a
Carpool	70	0	10	20
Transit	68	18	4	10
Other ^b	55	0	9	36
All	67	14	5	14

^aIncluding weather and various other reasons.

^bIncluding bicycle, walk, taxi, and ice skate.

of higher salaries with seniority, permits for free access to parking spaces were more commonly held by higher-income employees, as the following table indicates (6, Exhibits 4.16 and 4.36):

Annual Income (1975 Canadian \$)	Survey Respondents in Income Class (%)	Total Permits Held by Class (%)
<10 000	29	11
10 000-15 000	21	18
15 000-20 000	24	26
20 000-25 000	14	21
25 000-30 000	7	14
>30 000	5	10

Since those who did not hold permits were required to pay market rates for parking if they chose to drive, only permit holders were confronted with a parking-price increase when government-provided free parking was eliminated.

The table above indicates that roughly the same number of permits--about 10 percent of the total issued--was initially distributed among each of the lowest and highest income groups, the latter of which was only about one-sixth as large as the former. Thus, a higher-income driver was far more likely to be confronted with a significant parking-price increase (about \$1/day) than a driver of relatively low income, which makes much less surprising the observation that the fraction of drivers switching modes increases with income.

Public Employee Parking in the Los Angeles Civic Center Area

Francis and Groninga (10) investigated the effect of parking subsidies on mode choice for the journey to work by using a sample of 275 government employees who work in the Civic Center area of downtown Los Angeles. Of the sample, 135 were employees of Los Angeles County who received free parking if they chose to drive to work. The remaining 140 were federal employees who paid for their own parking if they commuted by automobile. Those federal employees who did park paid an average of about \$16/month at the time of the study.

The distribution of employees in the two groups by travel mode for the work trip is given below (10):

Mode	Employees (%)		
	County (free parking)	Federal (unsubsidized parking)	Difference (%)
Drive alone	72	40	-44
Carpool	16	27	+69
Transit	12	33	+175

This table indicates a startling difference in the behavior of the two groups. The share of federal employees who drive to work alone is 44 percent lower than the share of county employees who do so, and the share of federal employees who commute by carpool or public transit is more than twice that of county employees.

Examination of the differences in commuting behavior for selected subgroups of the samples of county and federal employees suggests that variables other than parking price account for only a small portion of the dramatic differences in travel behavior between the two groups. Data given in Table 2 show that, among men, women, and three different income classes, the drive-alone share among employees who pay to park was from 29 to 45 percent less than the drive-alone share among similar employees who have free parking available.

Table 2. Travel mode for selected subgroups of Los Angeles Civic Center employees with and without free parking.

Subgroup	Mode	Modal Share (%)		Difference (%)
		County Employees (free parking)	Federal Employees (unsubsidized parking)	
Sex				
Males	Drive alone	82	52	-37
	Carpool or transit	18	48	+167
Females	Drive alone	66	36	-45
	Carpool or transit	34	64	+88
Income ^a (\$)				
<6000	Drive alone	57	35	-39
	Carpool or transit	43	65	+51
6000-8500	Drive alone	80	39	-51
	Carpool or transit	20	61	+205
>8500	Drive alone	80	57	-29
	Carpool or transit	20	43	+115
Total sample	Drive alone	72	40	-44
	Carpool or transit	28	60	+114

^aAnnual income in 1968 U.S. dollars.

Table 3. Travel mode for employees in Century City (Los Angeles).

Mode	Modal Share (%)			Difference Between Free and Pay (%)
	Employees Parking Free	Employees Partly Paid for Parking	Employees Who Pay to Park	
Drive alone	92	85	75	-18
Carpool	4	9	12	+200
All other ^a	4	6	13	+225

^aIncluding public transit, walk, and bicycle.

Although the available controls do not completely account for the effect of factors other than parking price on commuters' travel-mode decisions, the consistent differences in commuting behavior within each subgroup clearly show that parking subsidies exert a strong influence on how employees commute to work.

County employees who drove estimated the cost to their employer of supplying their parking to average about \$0.55/day, about 20 percent below the average price paid by the unsubsidized federal employees. When asked what they would do if the parking subsidy they estimated they received were added to their paychecks and they were required to pay the market price to park, 19 percent of these county employees stated that they would continue to drive but would park at a more distant (and presumably cheaper) space and 17 percent stated that they would find another means of travel to work. The remaining 64 percent responded that they would continue to drive and pay their estimate of the cost of providing the space they now receive free of charge.

Although the data reported by Francis and Groninga (10) are not entirely conclusive, they do make it difficult to argue that parking subsidies to employees do not induce a substantial number of employees to drive to work alone. In fact, the data suggest that, if parking subsidies were removed, there would be extensive switching to carpooling and mass transit. One other point suggested by this

evidence is particularly important to note: The difference in commuting behavior between subsidized and unsubsidized drivers implies that a significant number of those who now drive alone would form carpools for the trip to work if their parking subsidies were rescinded. Because carpooling is a particularly important strategy for more effective use of existing transportation investments, in that accommodating additional carpool travel requires no new capital investments and no operating subsidy to be met at public expense, this is a significant finding. Furthermore, it suggests that eliminating employer-paid parking could be a valuable means of increasing the effectiveness of carpool promotion efforts.

Employer-Subsidized Parking in Century City, California

A 1976 survey of more than 3500 employees working in a new office, retail, and entertainment subcenter in the Century City area of Los Angeles also shows that commuting behavior is strongly influenced by the availability of parking subsidies. More than half of the survey respondents reported that they could park for free if they chose to drive to work, another 16 percent were offered partially subsidized parking, and the remainder paid the full cost of parking if they chose to drive. At the time of the survey, parking prices in the Century City area averaged about \$40/month at indoor garages and approximately half the garage rate at outdoor lots.

Table 3 gives the modal distribution of travel to work among those who are offered full, partial, or no parking subsidies. The drive-alone share among employees who pay for their parking is 19 percent less than that among those who can park free at their employer's expense. Although none of the three groups displays a high rate of use of carpools, transit, or other nondriver modes, the nondriver share among commuters who pay for parking is more than three times as high as that among commuters who can park free.

The data in Table 3 clearly suggest that parking subsidies discourage carpooling and use of mass transit. These data must be interpreted cautiously, however, since there are no controls for the effects of variables other than parking price on mode choice. In particular, higher-income employees, who are more likely to drive to work anyway, are probably more frequent recipients of employer-subsidized parking. Other factors that influence mode choice may also be correlated with the availability of parking subsidies. Nevertheless, such factors would have to exert a strong influence on mode choice to produce these pronounced differences in travel behavior among such a large sample of commuters.

Subsidized Parking at the University of California, Los Angeles

The faculty, staff, and students of the University of California, Los Angeles (UCLA), together account for about 40 000 daily trips to the campus, approximately two-thirds of which are by single-occupant automobile. Almost all of those who do commute to campus by automobile park in spaces provided by the university at various locations on and off campus. The university charges \$9/month for a parking permit, and the demand at that low price exceeds the available supply. Monthly parking rates in adjacent Westwood average about \$35/month.

Faculty and staff members are given priority in the distribution of permits, and the remaining permits are rationed among student applicants on the basis of a complex formula that involves distance

from residence to campus, access to the campus via freeway and transit routes, and university seniority as well as employment status, location, and schedule. About 2400 faculty and 11 000 administrative staff members receive annual parking permits; about 8500 students also receive them during each of three academic terms each year.

To obtain information about the travel patterns of students who apply for and are denied parking permits, the UCLA campus parking service surveyed 500 students selected randomly from among those who were denied a parking permit in the fall of 1977. These data can be used to estimate the effects that an increased supply of campus parking spaces would have on the travel behavior of those who now apply for but are denied a parking permit.

The table below gives the distribution of travel modes eventually chosen by 402 off-campus residents who were on the waiting list for campus parking permits during October 1977 (other includes motorcycle, bicycle, and walk):

<u>Mode</u>	<u>Percentage</u>
Drive alone	60.2
Carpool (with permit holder)	3.7
Transit	20.1
Other	15.9

As the table indicates, approximately 40 percent of those applicants who were denied a parking permit subsequently chose to commute to UCLA without driving their cars. In the past, this choice of another travel mode by those on the waiting list for a parking permit has been largely responsible for the annual disappearance of the waiting list over the course of the academic year. The survey results also demonstrate that comparatively few of those who chose other modes for campus-bound travel experienced a hardship as a result. Almost 75 percent of those who chose to drive even without a parking permit reported dissatisfaction with their current travel arrangements, whereas less than half of those who chose other modes reported similar dissatisfaction. In fact, some 40 percent of the group who chose a mode other than driving indicated that they were satisfied to some degree with their commuting arrangements.

If all students on the waiting list had been offered parking permits, those now not driving would presumably have chosen instead to drive to the campus. This assumption is confirmed by the results of a second questionnaire administered later to many of those on the waiting list, which indicated that 20 percent of those on the initial waiting list had accepted permits offered them after the start of the fall academic term. Another 60 percent of those responding had already reapplied for a permit for the following term by the time of the initial survey, demonstrating their continuing desire for access to campus parking facilities at less than the market price.

These findings suggest that, if more campus parking spaces are provided, 40 percent of the recipients of new parking permits would be new drivers diverted from buses, carpools, or other modes. In fact, the number of those seeking parking permits who now carpool or use modes other than the automobile is by itself sufficient to more than fill a new and very expensive expansion of the campus parking supply. A \$4.28 million parking structure now under construction on the UCLA campus will provide 355 additional spaces (at a cost of more than \$12 000/space) to be offered at \$9/month to those who now travel to the campus without driving their automobiles.

Shirley Highway Experiment

Another source of direct evidence of the effects of parking subsidization is the extensive set of survey data assembled in connection with the evaluation of commuters' responses to express bus service on exclusive lanes of the Shirley Highway in Virginia (11). The survey procedure included interviews with automobile commuters who tried riding the bus but switched back to driving after a trial period. They constituted about one-quarter of all automobile users who responded to the survey.

The survey results show that one of the responses most commonly cited by those who tried the bus service but switched back to driving was that the bus was too expensive. Among this group, 19 percent cited the expense of the bus service as their reason for driving. The only response cited as frequently (also cited by 19 percent of the group) was the "inconvenience" of the bus. Round-trip fares for the express service averaged about \$1.25, and the average annual income of automobile users was almost \$20 000. Half of those who responded that the bus was too expensive reported having free parking available at their places of employment. The average price paid by automobile drivers who did not receive free parking was \$1.20/day at the time of the survey (12). This implies that a parking subsidy was high enough to be pivotal in the mode-choice decisions of many Shirley Highway commuters.

SUMMARY

The studies cited in this paper indicate that for many commuters the price of parking is a key variable in the mode-choice decision for work trips; moreover, they consistently demonstrate that the offer of free parking at work increases the number of commuters who drive to work alone. Because this evidence is drawn from case studies, it may appear that the results are particular to each case and may not apply to other circumstances. However, the consistency of the findings despite the diversity of the settings strongly suggests that free parking at work does indeed draw a large number of commuters to travel by single-occupant automobile. When all of this evidence is considered together, the best estimate is that 20 percent of commuters who now drive alone and park free would choose another travel mode if they were required to pay for the parking they now receive at no charge.

The nation will obviously never meet its proclaimed goals of energy conservation, environmental protection, and transportation efficiency if so much parking remains free of charge. The harm caused by parking subsidies is not so much the overuse of parking itself but the increased driving it causes. This distorted incentive to drive increases not only traffic congestion but also air pollution and energy consumption, so that the harmful effects of free parking extend well beyond the transportation sector.

EQUITY OF FREE PARKING

The widespread provision of parking subsidies also raises two important questions of equity. First is the question of fairness between those who do park at their employer's expense and those who (whether because they are not offered prepaid parking or choose not to drive to work despite its availability) do not. Second is a more subtle question of the distribution of benefits among those who do take advantage of employer parking subsidies.

Employer parking policies in the aggregate are inequitable insofar as they arbitrarily subsidize the travel of a limited group of automobile users

without extending commensurate benefits to either unsubsidized automobile users or those who commute by other modes. The policies of individual employers who offer subsidized parking are also unfair in themselves insofar as they fail to reimburse employees who commute by public transit for even the nominal fares they incur. Nor do they offer two employees who agree to carpool together a subsidy as large as the combined total of what each would receive if they drove separately. These generous fringe-benefit payments by employers to automobile drivers are partly underwritten by reduced salary payments to nondrivers, an income-transfer scheme that, while probably unintended, is nevertheless unfair, for several reasons.

The nondriver group contains a disproportionate share of low-income earners, minorities, and women. For example, in 1970 the median annual income of transit riders in the Washington, D.C., urban area was \$6200, whereas that of automobile drivers, many of whom receive another \$600/year in after-tax income in the form of employer-subsidized parking, was \$9600/year (3). Transit riders are, of course, subsidized heavily through public financing of the capital outlays and operating deficits of the transit system, but it is also true that automobile commuters are generously subsidized at public expense in a variety of less obvious ways (8). Thus, the combined effect of public and private transportation subsidies may well be weighted in favor of higher-income commuters by employer parking policies.

Other research shows that more than three times as many nonwhites as whites travel to work by public transit in U.S. urban areas (13). Finally, the survey of commuters in downtown Los Angeles reported in this paper showed a much smaller proportion of females among those receiving subsidized parking than among those required to pay for their parking (10). The inescapable conclusion is that the considerable benefits of employer-paid parking accrue predominantly to persons not usually identified as being among the nation's disadvantaged.

Employer subsidy practices also pose a similar question of equity within the group of commuters who do take advantage of them. Among the recipients of such benefits, the value of the subsidy inherent in free parking might appear to be uniformly distributed among employees of varying income, since everyone receives the same privilege. But, because free parking is a fringe benefit that typically escapes income taxation, its after-tax value increases with employee salary and the correspondingly increasing marginal tax rate on earned income.

As an illustration of how rapidly the value of free parking increases with income, the following table gives the increase in taxable income that would be equivalent to a tax-exempt parking subsidy of \$50/month:

<u>Taxable Income of Married Couple Filing Jointly (\$)</u>	<u>Marginal Federal Income Tax Rate (%)</u>	<u>Annual Taxable Income Equivalent of \$50 Monthly Parking Subsidy (\$)</u>
4 200	15	706
15 200	25	800
31 200	40	1000
47 200	50	1200
91 200	60	1500

As the table indicates, much larger taxable salary equivalents for free parking go to the highest-income employees. At the other extreme, an employee whose income is too low to be subject to income taxation would value a free parking subsidy no more

than an equivalent increase in taxable income. In addition, employees who would choose not to drive their automobiles when required to pay the full cost of parking evidently value the free-parking privilege at less than the cost to the employer of providing it. Such employees--who would prefer to receive the value of the subsidy in cash--are not an insignificant fraction of current parking-subsidy recipients, according to the evidence reviewed above.

Yet the table above also shows an important reason why free parking is so popular among those who do take advantage of it. For those who drive to work, the tax-exempt status of free parking can make it worth far more than a salary increase equal to the cost of parking, and employees who now park free understandably want to keep this privilege. An obvious but unpromising way to eliminate this tax incentive for employers to provide free parking would be to treat the value of parking provided to employees as taxable income, just as the value of housing and other benefits provided to employees is now treated. In fact, the Commissioner of Internal Revenue, in a July 1977 interview in U.S. News and World Report, suggested that the value of free parking provided to employees must be considered taxable income.

Taxation of parking fringe benefits is a predictably unpopular approach, however, and even determining the value of free parking for tax purposes would hardly be simple. A case can even be made that travel to work is a cost incurred in earning a living and should therefore legitimately remain untaxed. Furthermore, any policy changes intended to encourage employers to remove the parking subsidies they now offer must recognize the understandable, if presumptuous, interest of drivers in continuing to have low-priced parking available.

RECOMMENDATIONS

Two courses of action are worth considering as alternatives to the policy of taxing the value of parking fringe benefits as income to employees. The first can be implemented only by the federal government, but the second can be implemented by any employer, public or private. Either policy would lead to a substantial reduction in commuting by single-occupant automobile, and neither would impose any cost on employers or employees.

Tax-Free Travel Allowance

The first alternative is to amend the Internal Revenue Code to permit employers to pay employees a tax-exempt travel allowance in lieu of free or subsidized parking. In order to pay employees this tax-free travel allowance, the employer would certify to the Internal Revenue Service (IRS) that employees are provided no further parking subsidies of any kind. Both employers who now offer their employees subsidized parking and those who do not could be allowed to pay the tax-exempt travel allowance (employers who do not subsidize their employees' transportation could provide the travel allowance by classifying part of each employee's wages as tax exempt). They could thus make their employees better off without increasing total wage payments, so that employers who are not part of the free-parking problem would receive some reward.

In order to be allowed to begin paying their employees the tax-free travel allowance, employers who now provide subsidized parking would be required to certify to the IRS that they had discontinued the practice. The employer's certification could be subject to audit, if necessary, in order to verify that any parking spaces controlled by the employer

are provided to employees--or, for that matter, to anyone who is willing to pay--only at the market price for parking in the immediate vicinity, with no waiting list for spaces at the price charged. Thus, an employer who now offers free parking could either begin offering employees a tax-free travel allowance or continue to offer free parking, but not both.

If employees "cashed out" their current parking privileges in exchange for a tax-free travel allowance of equivalent value, they could not later win back their free-parking privilege without having to give up the tax-free allowance because the employer would be prohibited from giving both. If the permitted size of the tax-exempt travel allowance is equal to the price of free parking, employees could then choose freely among competing travel modes on the basis of service quality and cost. Any automobile commuter could continue driving alone by using the allowance to pay for parking, but those who decide to carpool could split the cost of parking and use some of the travel allowance for other purposes. Others will choose not to commute by automobile at all once the travel subsidy is offered separately from the use of free parking. Again, judging from the evidence presented here, this latter group could include as many as 20 percent of drivers whose parking privileges were converted to a tax-exempt travel allowance.

The main advantage of a tax-exempt travel allowance is that it would eliminate the employer's federal income tax incentive to give employees free parking. The tax exemption would recognize that commuting is a cost of earning income and at the same time remedy the distortion in the relative prices of travel by different modes that results from employer-subsidized parking.

If this simple reform were adopted, employer-paid parking would tend to disappear with little or no opposition from either employers or employees. Employees would, however, begin to face the full market price of parking in their work-trip decisions. According to the research findings presented here, the resulting reduction in the number of automobile work trips would be large enough to produce a noticeable reduction in energy consumption, air pollution, and traffic congestion.

A tax-exempt travel allowance would also be much more fairly distributed than is free parking because it would benefit the entire working population, not just those who drive to work. Those who now park free would simply be exchanging a tax-free fringe benefit in the form of a free parking space for a tax-free travel allowance. Whereas each would benefit only if the allowance exceeded the market value of their free parking space, those who did not already have the free-parking privilege would benefit by the full amount of the new travel allowance. Thus, the new tax exemption would mainly aid low-paid workers, who are now the least likely to park free. In effect, the federal government could "buy" the elimination of employer-paid parking by reducing income taxes for the working poor.

When this research was done, it was felt that the proposal could be tested during the implementation of President Carter's executive order imposing parking charges on all employees of the Executive Branch of the federal government. If the "windfall" increase in federal parking revenues were returned to federal employees in the form of a travel allowance, all employees would be treated equally, regardless of how they got to work, and the artificial incentive to drive provided by subsidy practices would be eliminated.

Carpool Parking Subsidies

The second proposal is best explained by an example. Take the case of an employer who pays \$50/month for off-street parking spaces that are in turn offered to employees for only \$25/month. This common sort of arrangement has the advantage of giving a tax-exempt fringe benefit of \$25/month to employees who drive to work.

Suppose that this employer decides to allow carpoolers to park free. Those continuing to drive alone would pay the same \$25 parking price as before, but two drivers who each pay \$25/month for parking could now park free by carpooling and save a bit more by splitting the driving costs. The cost to the employer would not rise because the employer would simply be paying one subsidy of \$50/month for one parking space instead of two subsidies of \$25 for two parking spaces. Indeed, a carpool of three employees can be granted a free \$50/month parking space plus a cash subsidy of \$25/month at no more cost to the employer than the parking subsidy for three employees who each drive alone to work and pay \$25/month to park. The general principle is that a two-person carpool can be given a parking subsidy twice as large as that given to an employee who drives alone, a three-person carpool can be given a subsidy three times as large, and so on, at no additional cost to the employer.

As an example, recall that one quarter of the almost 100 000 persons who drive to downtown Los Angeles park free and another quarter pay \$5.00/month or less for parking while the market price for parking is \$35.00/month. Those employers who now offer free parking to employees could also offer free parking and a cash bonus of \$35.00/month to any two drivers who form a new carpool without increasing the total subsidy cost. Each new carpooler would receive free parking and an extra \$17.50/month in cash as the reward for sharing a ride. Likewise, each member of a newly formed three-person carpool could be given free parking and almost \$25.00/month at no increase in the employer's total outlay. And those driving alone would still park free.

A few employers already give some preference to carpoolers, but no one seems to have argued that this practice can be vastly expanded without costing employers, or anyone else, anything. Carpool parking discounts would complement other strategies--such as exclusive freeway lanes for buses and carpools, ramp metering, and mass transit subsidies--to reduce the social costs of excessive automobile use. But offering cheaper parking, or even payments, to carpoolers is the only one of these transportation strategies that is free.

ACKNOWLEDGMENT

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Discussion

Donald A. Morin

Pickrell and Shoup have done an excellent job of describing the extent to which free or greatly subsidized parking for employees does bias mode choice in favor of commuting by automobile. The only part of the paper with which I disagree is, unfortunately, the last section, in which the authors describe two alternative solutions.

Their first alternative is to amend the Internal Revenue Code to permit employers to pay employees a tax-exempt travel allowance in lieu of free or subsidized parking. Although this certainly has merit from the standpoint of equity, it is an action that employers can take now, even without the additional benefit of having the travel allowance provided tax free. One employer, the American Hospital Supply Corporation (AHSC) in Evanston, Illinois, has done just this. As of the beginning of 1978, AHSC converted the total amount of money that they were spending to lease parking spaces in order to provide free parking to their employees who commuted by automobile into a cash transportation allowance that was then distributed equally among all employees.

A solution to the disparity between the value of employer-subsidized parking being nontaxable income to the employee while an equivalent cash transportation allowance is taxable income is not essential. Suffice it to note that the accepted practice it not to declare the fair market value of

employer-provided parking as "income in kind" and therefore part of an employee's taxable income. The IRS has never made any ruling that concurs with this "accepted practice". Neither has the IRS issued any guidelines that specify that it is the accepted practice. It would seem that rather than try to change the Internal Revenue Code to include another tax-exempt category--that of the "cash travel allowance in lieu of subsidized parking"--to resolve the disparity, an equally strong case could be made for determining that the fair market value of employer-provided parking be treated as taxable "income in kind".

The authors' second alternative solution is for employers to provide reduced parking charges for carpool parking. This approach to reducing the amount of automobile commuting involves very serious problems in the areas of cost-effectiveness, impact on other transportation modes, administrative control, and equity.

In relation to cost-effectiveness, this approach could only be implemented at no additional cost to the employer (as stated by the authors) if all of the employees who were commuting by automobile were doing so as solo drivers and if no employees who use a nonautomobile mode (e.g., transit, walk, bicycle, or taxi) decided to carpool instead--a very unlikely situation. Table 4, which is based on the authors' example of \$25/month employee carpool subsidy, shows that it would cost the employer an additional \$25/month for each space used by those carpooling before the plan was implemented. If the average vehicle occupancy of employees commuting by automobile were 2 persons/automobile before the plan started, the cost to the employer would double under the new plan even if no employee changed commuting mode.

As for the impact on other transportation modes, it can be shown by the same example that it would also be negative. Each employee who formerly commuted by transit, walked, or rode a bicycle would be offered \$25/month as an incentive not to do so but to carpool instead. This is borne out by the Seattle project on reduced carpool parking rates, which was evaluated by Olsson and Miller (14). Of those who took part in this program, about 40 percent of the new carpoolers formerly used transit, another 38 percent were carpoolers who now got reduced parking charges, and only 22 percent were new carpoolers coming from the 1 person/automobile mode.

Defining what is a legitimate carpool, in order for the carpooler to receive the \$25/month benefit, would create administrative control problems. If it is on the basis of the employees saying that they are in carpools, then the employer would be put in the position of having to check up on the honesty of each carpooling employee to ensure that the number of "phantom" carpools is minimized. If it is on the basis of the employees being in the automobile as it arrives at the parking facility, is a daily check to be made of every car and its occupants? If an otherwise legitimate carpooling employee is not going to be in the automobile for a certain day because he or she is on vacation, sick, or traveling on company business, does the employee lose the entire \$25 monthly carpool payment or just the one-day proportional share?

As for the equity issue, it would seem that an employer would have a difficult time explaining the new plan in the name of reducing automobile use to those employees who walk, use transit, or bicycle to work, since these employees would not get the \$25 monthly payment while employees who carpool would.

All of the above concerns with the authors' solution to the problem of subsidized parking can be

Table 4. Net parking cost to employer for 100 employees before and after implementation of carpool parking subsidy.

Commuting Condition	No. of Spaces Needed	Cost Category	Before Subsidy ^a	After Subsidy ^b
All at 1 person/car	100	Employer	100 × \$50 = \$5000	100 × \$50 = \$5000
		Employee	100 × \$25 = \$2500	100 × \$25 = \$2500
		Net cost to employer	\$2500	\$2500
Ten percent by other than car, 40 percent at 1 person/car, 50 percent at 2 persons/car	65	Employer	65 × \$50 = \$3250	65 × \$50 = \$3250
		Employee	65 × \$25 = \$1625	40 × \$25 = \$1000
		Net cost to employer	\$1625	\$2250
All at 2 persons/car	50	Employer	50 × \$50 = \$2500	50 × \$50 = \$2500
		Employee	50 × \$25 = \$1250	50 × \$0 = \$ 0
		Net cost to employer	\$1250	\$2500
Fifty-five percent at 1 person/car, 22 percent at 2 persons/car, 15 percent at 3 persons/car, 8 percent at 4 persons/car ^c	73	Employer	73 × \$50 = \$3650	73 × \$50 = \$3650
		Employee	73 × \$25 = \$1825	55 × \$25 = \$1375
				11 × \$0 = \$ 0
				5 × \$25 = \$ 125
				2 × \$50 = \$ 100
Net cost to employer			\$1825	\$2500

^aEmployer pays \$50 to lease each parking space; employee pays employer \$25 for space.

^bEmployer pays \$50 to lease each parking space; employees driving alone pay employer \$25 for space, and employees who commute 2

^cpersons/car pay employer nothing for space.
Average automobile occupancy = 1.4 persons.

overcome by taking the direct approach of stopping the employer-provided subsidy to employee automobile parking. If this were viewed as just the employer benefiting by taking away a fringe benefit (even though the fringe benefit was given only to employees who commuted by automobile and was more valuable to employees who did not carpool), the employer could take the same amount that was being spent on subsidizing parking and distribute it equally to all employees as AHSC has done. In addition, should the employer wish to devote more effort in the form of personnel time and/or money to encourage less automobile commuting, as more and more are doing, then there are a host of actions that can be taken. These include actions such as brokering vanpooling, subscription bus service, assigning the choice parking spaces to vehicles with the largest number of occupants, permitting flexitime so that employees who wish to rideshare with others do not have a time constraint, and many others, ranging from actively assisting employees to find other ridesharers and establishing a company policy of not holding employees past the normal quitting time to prizes for lucky winners of a company-sponsored ridesharers' lottery. All of these are being done in varying degrees by some employers. More and more are joining in as top management recognizes the need to do so.

My closing observation has to do with the final sentence in the authors' paper: "But offering cheaper parking, or even payments, to carpools is the only one of these transportation strategies that is free". To repeat the economist's often-used phrase, "There is no such thing as a free lunch!"

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Authors' Closure

We appreciate Morin's detailed comments on the two policy proposals contained in our paper. However, we completely disagree with both his assessment of them and his counterproposal to enforce the taxation of the market value of employer-provided parking as

earned income. We would like to respond to each of the points offered in Morin's discussion in the order in which they were raised.

TRAVEL ALLOWANCE VERSUS SUBSIDIZED PARKING

Regarding the proposal to permit employers to pay a tax-exempt travel allowance in lieu of subsidizing their employees' parking, it is of course true that any employer can now convert the value of parking subsidies it offers to a travel allowance that would be distributed among all employees. The problem is that there is no incentive, except perhaps recognition by a few employees of the U.S. DOT, for employers to do this. Because the value of free parking escapes income taxation while a cash travel allowance would not and, according to the 1969 Nationwide Personal Transportation Survey, more than 75 percent of those who drive to work use employer-provided free parking, employers are deterred from "cashing out" the parking subsidies they now offer by the fact that doing so would make the vast majority of their employees worse off. In fact, they face exactly the opposite incentive: to make parking available to all of their employees who want it at the subsidized price.

Probably the strongest evidence that employers will not end their current offers of subsidized parking unless they are offered some incentive is the fact that only one employer in the United States is known to have voluntarily done so. Even more convincing may be the refusal of DOT itself to stop providing free parking to its own employees until directed to do so by executive order of the President, despite insistence from within its own ranks that this policy was hypocritical and unfair to its own employees. On at least one recent occasion, the IRS has clarified its position that the value of free parking must be considered taxable income, but it is apparently unprepared to follow this declaration with the substantial commitment of resources that would be required to annually assess the market value of employer-provided parking and enforce its reporting by recipients.

REDUCED PARKING CHARGES FOR CARPOOLS

Morin's Table 4 exaggerates the likely cost to employers of offering reduced parking charges for carpools because it assumes that none of those who now drive alone would begin carpooling if they were

offered a parking discount as an incentive to do so. For example, in the fourth commuting condition in the table, which comes closest to the actual current situation, if as few as one in five of those initially driving alone joined carpools, the cost to the employer would decrease.

Furthermore, if such an offer did draw some current transit riders into carpools for work trips, this would not necessarily be an undesirable result. Most analyses of the deteriorating financial situation of public transit operations have concluded that among the most important causes is the peaking of transit demand during morning and evening commuting hours (15,16). In addition, because carpool travel entails a level of fuel consumption per passenger mile that is among the lowest of all travel modes, diverting some transit commuters to carpools might well reduce energy consumption as well as operating losses incurred by public transit authorities (17,18). The "administrative control" problems of such a scheme are now at least as severe with employee parking-permit schemes. The problem of "phantom" carpools evidently was nowhere more severe than in DOT's own parking garage when no such carpool discount scheme was in effect.

The objection to carpool discounts on equity grounds now applies even more strongly to employer parking-subsidy plans that do not offer carpool discounts, since carpoolers receive a smaller subsidy than those who drive alone. Although the proposal would not correct the inequity between automobile commuters and those who use transit,

bicycle, or walk, it would at least correct the inequity between the different classes of automobile users, carpoolers, and those who drive alone. Finally, all of the ridesharing promotion activities Morin applauds are not only subject to exactly the same objections that he raises to the carpool discount proposal but are also likely to prove no more effective in encouraging carpooling while consuming considerably more of employers' time and resources.

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Abridgment

Maintenance of Park-and-Ride Facilities in New Jersey

ROBERT A. INNOCENZI

An overview of the maintenance and cost experiences of park-and-ride facilities now owned by the New Jersey Department of Transportation is presented. A brief description is given of how the department became involved in the operation of park-and-ride facilities—initially subsidizing the maintenance of privately owned facilities and eventually constructing its own rail park-and-ride facility at MetroPark Station on the present Northeast Corridor Line. Department-maintained and municipally maintained park-and-ride facilities are compared in terms of costs and effectiveness. The state of New Jersey is in the process of finalizing the acquisition of more than 130 rail stations with associated parking, and the New Jersey Department of Transportation is developing a plan to effectively deal with the maintenance and service needs of these facilities. The proposed policy, which calls for local operation and management of state-owned rail stations and park-and-ride facilities, is outlined.

The New Jersey Department of Transportation (DOT), like most state DOTs, evolved from a typical highway department. The New Jersey DOT became involved in public transportation with the creation in 1966 of the Commuter Operating Agency (COA). This has led to the expanding state program of financial support of privately owned rail and bus companies. Until the beginning of the 1970s, park-and-ride facilities in the state were constructed and operated by the private transit companies. The COA supported the maintenance of these facilities, no matter how minimally, through the financial assistance program. However, there was no major direct involvement by staff of the state DOT or COA.

After a few demonstration projects, the department, using federal highway funding, initiated its first regional rail park-and-ride project: construction of the first phase of the MetroPark facility.

PRESENT PRACTICE

Currently, the state of New Jersey is the owner of five rail park-and-ride facilities. Of these five facilities, four (Princeton Junction, Little Silver, Middletown, and Waldwick) are locally operated and maintained through lease agreements between the state and the local municipality. The MetroPark Station park-and-ride lot is maintained by the state DOT.

In 1971, the New Jersey DOT constructed the initial parking lot at the MetroPark Station on what is now known as the Northeast Corridor Line. The original lot had a capacity of 818 parking spaces. On-site parking was expanded in 1974 to 1334 spaces. Because of congestion problems, department maintenance crews undertook minor expansion and restriping of the lot in the summer of 1979 to accommodate compact cars and provide an additional 178 spaces, for a total of 1512 spaces. All parking at MetroPark is currently on a paved lot directly in front of the station. Parking is free, and the lot is filled beyond capacity every day.

With its excellent vehicle access via the Garden