

# UC Berkeley

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# SMART PARKING ON CAMPUS

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## *Abstract*

Universities have tried almost every possible way of dealing with the shortage of campus parking: lotteries, hunting licenses, first-come-first-served, waiting lists, seniority, and need-based systems. As another way to eliminate parking shortages, this paper proposes using variable prices to balance supply and demand. We can call this the Goldilocks Principle of parking prices: the price at any location is too high if many spaces are vacant, and too low if no spaces are vacant. When a few vacant spaces are available everywhere, the prices are just right and drivers can always find a place to park. The paper concludes by proposing a pilot program to test drivers' responses to performance-based prices for campus parking.

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# SMART PARKING ON CAMPUS

Donald Shoup

*Few institutions are so conservative as universities are about their own affairs while their members are so liberal about the affairs of others.* CLARK KERR

Big universities resemble small cities. They have athletic facilities, concert halls, housing, hospitals, libraries, museums, offices, restaurants, stores, theaters, and—of course—parking. Big universities also have big transportation problems, and to solve these problems a few universities have reformed their pricing policies for parking and public transportation. The promising results of these reforms suggest that many other universities can adopt similar policies to reduce congestion, clean the air, and conserve energy. This paper will focus first on the experiences with parking and public transportation at UCLA, and will then apply the findings to other universities.

Universities have adopted two main approaches to campus parking policy—political and economic. The political approach relies on administrative rules to manage parking, while the economic approach relies on flexible prices. Most universities rely on rules rather than prices to allocate parking among drivers, and these rules always create problems.

What is the campus parking problem? Berkeley professors Horst Rittel and Melvin Webber once wrote, “The information needed to *understand* the problem depends upon one’s idea for *solving* it. . . . The problem can’t be defined until the solution has been found.”<sup>1</sup> In the spirit of this intriguing statement, I suggest that flexible prices are a solution that can help us understand the campus parking problem. I will first examine how the dominant administrative approach to campus parking creates serious problems, and will then explain how better pricing can solve these problems.

## ADMINISTERED PARKING

University of California president Clark Kerr wrote, “I have sometimes thought of the modern university as a series of individual faculty entrepreneurs held together by a common grievance over parking.”<sup>2</sup> Earlier, as chancellor of the Berkeley campus, he remarked, “The chancellor’s job has come to be defined as providing parking for the faculty, sex for the students, and athletics for the alumni.” More recently, UCLA Chancellor Albert Carnesale said, “At UCLA, parking is the most important issue for everyone.” UCLA has more parking spaces than all but one other university in the United States—Texas A&M.<sup>3</sup> How did parking become more important than

sex and athletics when parking is so abundant? Campus parking problems, I will argue, stem from mispricing, not scarcity.

### Feudal Hierarchy

In academia, you are not so much what you drive as where you park. At Berkeley, for example, only Nobel Laureates are eligible for the highest status symbol on campus—a reserved parking space. After Charles Townes won the Nobel Prize for physics in 1964, for example, and Berkeley put his name on a space, Townes commented, “It saves me a whole lot of time. The cost is not the big thing—it’s the convenience.”<sup>4</sup> Shortly after Daniel McFadden won the Nobel Prize for economics in 2000, he received a standing ovation during halftime at a Cal football game. When asked which was better, the adulation of 50,000 people or the lifetime reserved parking space, he replied, “Well, the parking space goes on and on. It’s considered slightly more important than the prize itself.”<sup>5</sup> The California Institute of Technology also reserves spaces for Nobel Laureates. After Rudolph Marcus won the Nobel Prize for chemistry in 1992, and a colleague saw his name on the reserved space outside his office, Marcus remarked, “Well, the Nobel Prize has to be worth something.”<sup>6</sup>



Universities often lead society in advocating social and economic equality, but their complex parking hierarchies make the *Titanic* look like a one-class ship. UCLA, for example, has 175 different types of parking permits, carefully graded according to the status of each administrator, faculty member, staff member, and student. Major donors also receive campus parking permits based on the size of their donations. Parking privileges are cumulative, which means that holders of higher-ranking permits can park in the spaces reserved for their own rank *and* in the spaces available to all permits of a lower rank. Blue-permit holders can always “park down” in the spaces reserved for the lower-ranking Yellow permits, for example but Yellow-permit holders can park in the spaces reserved for the Blue permits only after 4:30 p.m when demand is lower. The best parking spaces on campus are reserved for the coveted “X” permit, which allows holders to park in the premium spaces reserved exclusively for X permits *and* in the spaces reserved for all the other permits. The X permit is the ultimate status symbol on campus, and is UCLA’s equivalent to a knighthood.<sup>7</sup>

University administrators also co-opt students into the hierarchy by giving special parking privileges to officers in the student government and editors of the student newspaper. These students buy into the status-based system because they have been bought off with choice parking spaces.

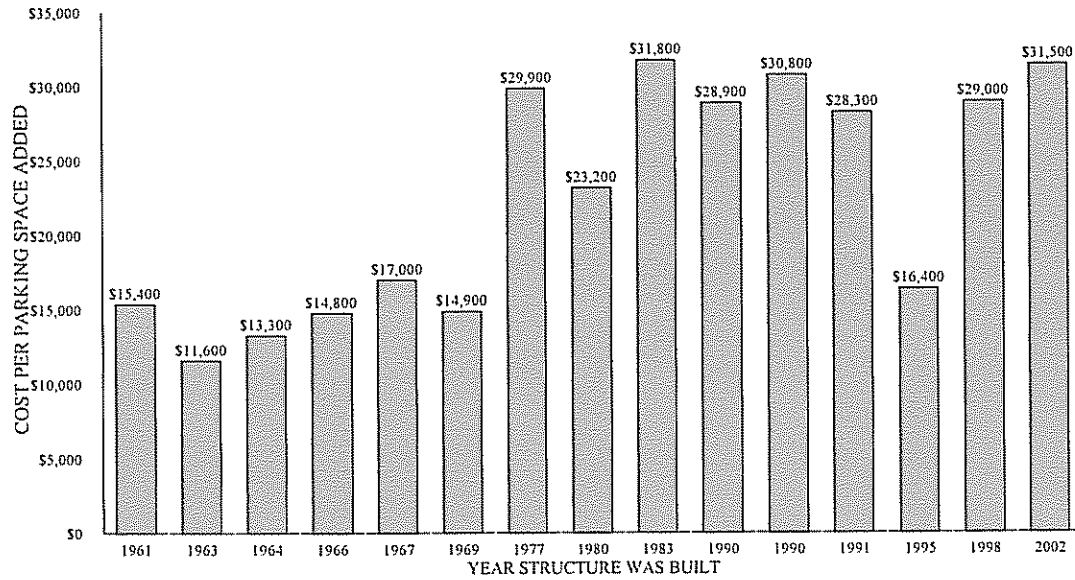
### **Average Cost Pricing**

Because permit prices are not set to match demand with supply, parking shortages are to be expected. Students who cannot obtain a permit are put on a wait list, which the UCLA Transportation Service views as a measure of “unmet need.” Building new parking structures to meet this need is extremely expensive. After adjusting for inflation, the average cost of the spaces added since 1977 has been \$27,800 apiece (see Figure 1).<sup>8</sup> Seven of the nine structures built since 1977 have some or all spaces underground, which helps explain this high cost: underground parking requires expensive excavation, shoring, waterproofing, fireproofing, ventilation, and lighting.

Figure 1

Since the price of a parking permit is far below the cost of a new parking space, drivers who park in a new structure pay only a small fraction of the marginal cost of their parking. For example, UCLA opened a \$47-million, 1,500-space parking structure in 2003. The capital and operating expenses were \$223 per space per month, but the price of a parking permit was only \$55 a month.<sup>9</sup> Because the capital and operating costs are so high and the permit price is so low, new parking structures have a long payback period (the number of years before the accumulated cash inflow from operations will repay the initial capital cost). One UCLA parking structure opened in 2004 will have a payback period of 30 years.<sup>10</sup> How does this compare with the payback periods for other campus investments? UCLA’s criterion for investing in energy conservation is that the payback period must not exceed three years (the money saved by reducing energy use must repay the capital cost in three years or less).<sup>11</sup> Because the estimated payback period for solar panels is about nine years, for example, UCLA does not invest in these panels. For a sustainable campus, it seems unwise to reject a solar investment that will take only nine years to repay its capital cost but build a parking structure that will take 30 years to repay its capital cost and will also—by attracting more cars to campus—increase energy consumption, traffic congestion, and air pollution. When it comes to promoting sustainability, UCLA seems to focus first on the sustainability of the Parking Service.

FIGURE 1  
COST PER PARKING SPACE ADDED (\$2002)



COST PER PARKING SPACE ADDED BY FIFTEEN PARKING STRUCTURES

Year built (1)	Parking structure (2)	Spaces in structure (3)	Surface spaces lost (4)	Spaces added by structure (5)=(3)-(4)	Structure cost		Cost per space added	
					Current \$ (6)	2002 \$ (7)	Current \$ (8)=(6)/(5)	2002 \$ (9)=(7)/(5)
1961	5	765	219	546	\$1,091,000	\$8,421,000	\$2,000	\$15,400
1963	14	1,428	355	1,073	\$1,745,000	\$12,662,000	\$1,600	\$11,600
1964	3	1,168	213	955	\$1,859,000	\$12,985,000	\$1,900	\$13,300
1966	9	1,800	298	1,502	\$3,490,000	\$22,392,000	\$2,300	\$14,800
1967	8	2,839	666	2,173	\$6,061,000	\$36,896,000	\$2,800	\$17,000
1969	2	2,253	323	1,930	\$5,610,000	\$28,903,000	\$2,900	\$14,900
1977	CHS	921	319	602	\$7,084,000	\$17,980,000	\$11,800	\$29,900
1980	6	750	200	550	\$6,326,000	\$12,777,000	\$11,500	\$23,200
1983	4	448	0	448	\$8,849,000	\$14,229,000	\$19,800	\$31,800
1990	1	2,851	346	2,505	\$52,243,000	\$72,182,000	\$20,900	\$28,900
1990	RC	144	53	91	\$2,040,000	\$2,819,000	\$22,300	\$30,800
1991	SV	716	0	716	\$14,945,000	\$20,209,000	\$20,900	\$28,300
1995	3 Addition	840	118	722	\$9,900,000	\$11,831,000	\$13,700	\$16,400
1998	4 Addition	1,263	0	1,263	\$33,217,000	\$36,685,000	\$26,300	\$29,000
2002	7	1,500	0	1,500	\$47,300,000	\$47,300,000	\$31,500	\$31,500
Total		19,686	3,110	16,576	\$201,760,000	\$358,271,000	—	—
Average 1961-1969		1,709	346	1,363	\$3,300,000	\$20,400,000	\$2,300	\$14,500
Average 1977-2002		1,048	115	933	\$20,200,000	\$26,200,000	\$19,900	\$27,800
Average 1961-2002		1,312	207	1,105	\$13,500,000	\$23,900,000	\$12,800	\$22,500

Note: The ENR Construction Cost Index is used to convert current dollars to 2002 dollars.

The difference between the high cost of a new structure and the low price charged for parking in it creates a substantial deficit for the structure. UCLA finances this deficit by raising the prices charged for all the other parking spaces on campus. Because the marginal cost (the cost of adding another space to the parking supply) is so far above the average cost (the total cost of the system divided by the total number of parking spaces), each addition to the parking supply drives up this average cost. Permit prices increase every time a new parking structure is built (see Figure 2), yet the shortage of parking persists.<sup>12</sup> Even after spending \$358 million (in 2002 dollars) to construct 19,700 parking spaces since 1961, UCLA cannot provide a parking space for every student who is willing to pay the system's average cost for a permit.<sup>13</sup>

Figure 2

UCLA gives priority to administrators, faculty, and staff for permits in the locations they choose, and allocates the remaining permits (about 10,000) to students. As a result, all new permits made available by a new parking structure are allocated to students.<sup>14</sup> UCLA then increases the fees for all permit holders—primarily faculty and staff—to cover the cost of the new structure. UCLA's Faculty Welfare Committee wrote to a Vice Chancellor to ask about the economics of a new parking structure built in 1998:

*Do you think that it is either fair or efficient for UCLA to build new parking spaces that cost \$170 a month, offer all the new parking permits made available by these parking spaces to students at a price of \$43 a month, and finance the subsidy by raising faculty and staff parking fees?*

The Vice Chancellor responded:

*In our view, this planned approach is fair, efficient and appropriate.*<sup>15</sup>

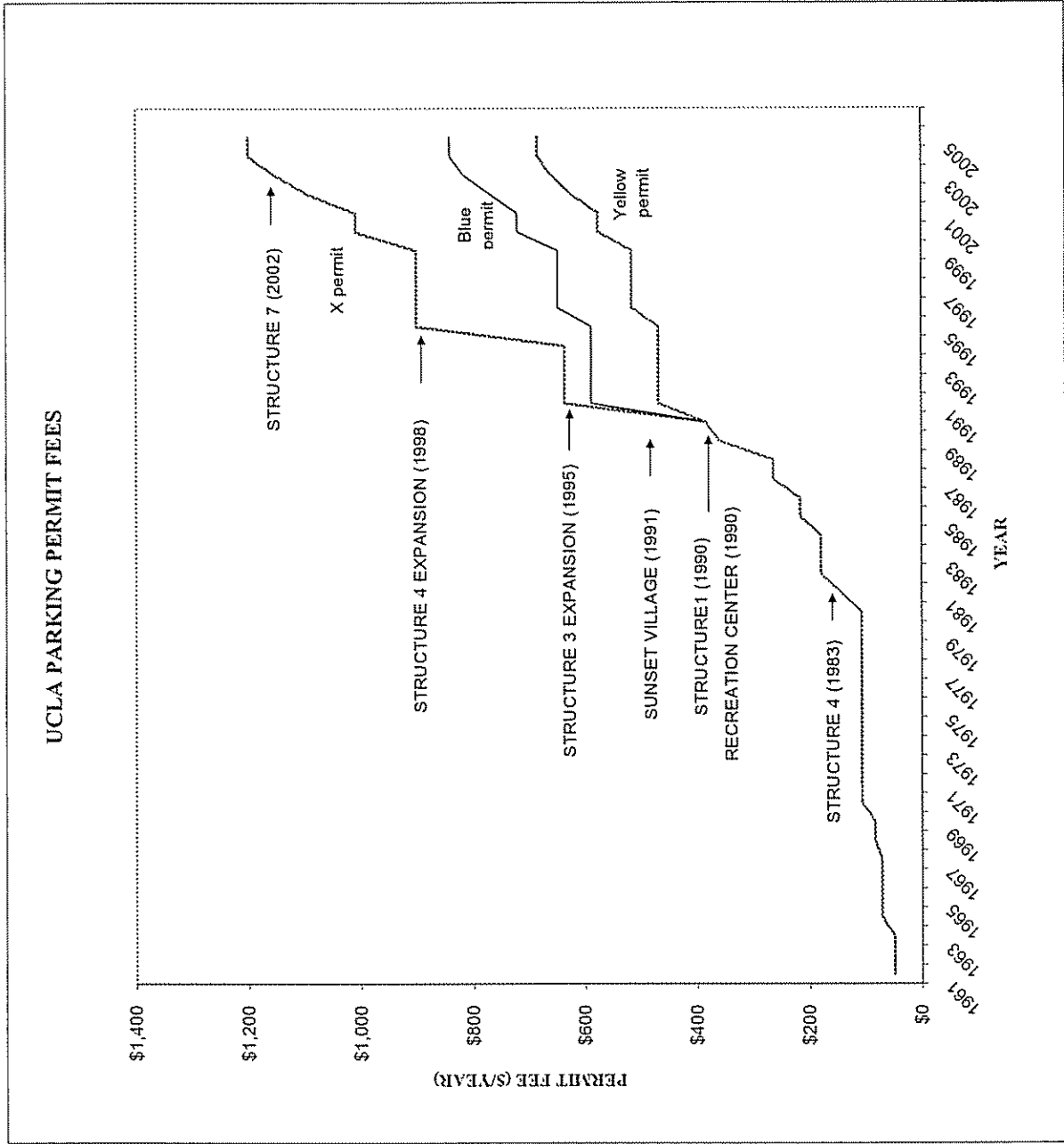
Most universities follow this average-cost pricing approach. A professor at the University of Illinois, for example, told me that after he recommended charging the users of new parking structures a price that would cover the cost of building them, an astonished administrator responded, "Why, if we did that, we wouldn't build any parking structures!"<sup>16</sup> This objection is unfounded, of course, because parking structures can always be built where drivers are willing to pay the cost-recovery price of parking in them.



# UCLA PARKING PERMIT FEES (\$/YEAR)

PERMIT TYPE

YEAR	X	BLUE	YELLOW
1961	\$50	\$50	\$50
1962	\$50	\$50	\$50
1963	\$50	\$50	\$50
1964	\$72	\$72	\$72
1965	\$72	\$72	\$72
1966	\$72	\$72	\$72
1967	\$72	\$72	\$72
1968	\$84	\$84	\$84
1969	\$84	\$84	\$84
1970	\$108	\$108	\$108
1971	\$108	\$108	\$108
1972	\$108	\$108	\$108
1973	\$108	\$108	\$108
1974	\$108	\$108	\$108
1975	\$108	\$108	\$108
1976	\$108	\$108	\$108
1977	\$108	\$108	\$108
1978	\$108	\$108	\$108
1979	\$108	\$108	\$108
1980	\$108	\$108	\$108
1981	\$144	\$144	\$144
1982	\$180	\$180	\$180
1983	\$180	\$180	\$180
1984	\$180	\$180	\$180
1985	\$216	\$216	\$216
1986	\$216	\$216	\$216
1987	\$264	\$264	\$264
1988	\$264	\$264	\$264
1989	\$360	\$360	\$360
1990	\$384	\$384	\$384
1991	\$636	\$588	\$468
1992	\$636	\$588	\$468
1993	\$636	\$588	\$468
1994	\$636	\$588	\$468
1995	\$900	\$588	\$468
1996	\$900	\$648	\$516
1997	\$900	\$648	\$516
1998	\$900	\$648	\$516
1999	\$900	\$648	\$516
2000	\$1,008	\$720	\$576
2001	\$1,008	\$720	\$576
2002	\$1,092	\$768	\$624
2003	\$1,152	\$816	\$660
2004	\$1,200	\$840	\$684
2005	\$1,200	\$840	\$684



## Parking Anxiety

Because parking without a permit is often difficult, students apply for a permit even if they don't intend to park on campus every day. And because demand exceeds the supply for parking spaces that are priced far below their cost, UCLA administrators have devised a "point system" that ranks students' priority for campus permits.<sup>17</sup> A student's chance of receiving a permit is based on a jumble of factors that supposedly measure the "need" for parking, and the distance from home to campus is the chief measure of need. Each factor is assigned a point value, and the points are totaled to decide a student's priority for parking. Yet students' anxiety about the point system extends far beyond the simple issue of *whether* they get a parking permit; point totals also determine *where* they park. As Bob Hope joked, "It takes four years to get through UCLA, or five if you park in Lot 32." Because a permit to park in remote Lot 32 costs the same as a permit to park at the center of campus, students whose point totals put them in Lot 32 will never be satisfied if other students pay the same price to park in more central locations.<sup>18</sup>

To see the effects of the point system, consider the results of a 1983 survey to learn the major problems experienced by UCLA students. The Student Affairs Information and Research Office sent questionnaires to a stratified sample of 8,852 students selected to represent the entire student body, and 4,400 students responded—almost one of every seven students. Seventy percent of all students reported that parking was a problem, while only 12 percent were on the waiting list for a parking permit. In a subsequent survey of 2,681 students in 1989, 69 percent of students reported that parking was a major problem, while only 9 percent were on the waiting list. In both surveys, most students who identified parking as a problem either have a permit or never applied for one (and thus are not on the waiting list). Even the students who have permits think parking is a problem, but the problem is caused by faulty *pricing*, not by an insufficient *quantity* of parking. Yet the point system that makes it seem as though the parking problem has only one long-term solution—build more parking structures, no matter how much they cost.<sup>19</sup>

Parking may seem trivial but it is a serious problem in the minds of many students. In the 1983 survey, 70 percent of students reported parking as a problem, more than any other problem they experienced at UCLA. Only 28 percent of students felt their writing skills were a problem, and only 24 percent felt their math skills were a problem. If students see parking as a bigger problem than

writing and math, the parking problem must be serious. The 1989 survey found almost identical results. Sixty-nine percent of students reported that parking was a major problem, while only 12 percent reported “too much school work” as a major problem. Perhaps because of these depressing findings, UCLA has not conducted any similar studies in recent years.

### **Cheating for Parking**

Underpricing anything creates a shortage, and parking is no exception. UCLA’s point system is intended to deal with the self-inflicted parking shortage by distributing permits according to “need.” The chief measure of a student’s need for parking—distance from home to campus—is based on the idea that students who live far from campus have a greater need for parking than students who live near campus. This sounds sensible, but since most UCLA undergraduates come from Southern California, they have a parent, grandparent, or other relative whose address they can use as a home address. Even students who live in apartments a few blocks from campus can get more points by reporting as their residence a relative’s home that is far from campus. Many students who live near campus freely admit they have used a false address on their permit applications to get a better parking space. As the Chair of UCLA’s Parking Review Board said in the *Daily Bruin*, “From what you hear on campus, everyone is lying.”<sup>20</sup>

In 1997, UCLA’s Academic Senate appointed members to a review committee to examine whether the point system encourages students to misrepresent their circumstances when applying for parking permits. Students on the committee were frank about the problems with the point system. One student member of the committee said, “students are driven to dishonesty by a need-based student point system.”<sup>21</sup> Another student said, “A lot of students use their [parents’] home addresses if they live in this area,” making their commutes seem longer and therefore earning more points for a parking permit. “I’m from up north, so I can’t do that.”<sup>22</sup> That is, the student’s complaint was that she herself couldn’t falsify her parking application. Confirming these views, the President of the Graduate Students Association wrote to the Chancellor:

Almost all students, as well as many faculty and staff, know about the need to lie on parking permit applications. Resident Assistants in the dormitories, who must give an educational lecture once a quarter, even offer sessions about cheating to maximize points awarded when filling out their applications.<sup>23</sup>

Defending the point system, however, the Director of the UCLA Transportation Services argued, “cheating is rampant throughout society and the point system is not itself the cause of the cheating.”<sup>24</sup>

After complaints about the ethical problems caused by the point system, in 1998 UCLA engaged a consultant to survey the administrators responsible for student advising. These advisors expressed serious concerns about the almost compulsory dishonesty engendered by the system:

*One of the biggest concerns interview participants have is that students frequently lie or falsify data in order to get a parking permit. Most believe that cheating is rampant and that students routinely lie and coach others to lie to get enough points for a permit. Some say that the current system encourages dishonesty and unethical behavior, rewarding those who “play the system” most effectively.*<sup>25</sup>

The consultant also interviewed focus groups composed of student government representatives and randomly selected students who applied for parking permits. These students expressed similar concerns about the point system:

*Each focus group talked about the ease with which students are able to falsify information on the parking application, indicating that commuting address and employment status are easiest to lie about. A fair amount of discussion centered on how students cheat on commuting address—how they quickly learn not to list a local address, how they use the address of parents or relatives, how they share with friends and new students the best zip codes to use.*<sup>26</sup>

A student who lives in an apartment in West Los Angeles (– 4 points), for example, may report living at his or her parents’ home in Long Beach (+16 points). The ease of claiming to live at home with one’s family makes it almost impossible for the Parking Service to audit thousands of permit applications for false addresses. Appendix B presents an exchange of memos about the audits of student permit applications, while Appendix C shows the results of an audit of faculty and staff permits. Both raise doubts about whether anyone at UCLA is telling the truth.

In 2006, focus groups of students and of the administrators responsible for advising students were surveyed again about ethical problems created by the point system. UCLA administrators reported that, “Falsification of application information [is] seen as a given, part of the UCLA culture.” Students did not express a great deal of concern about providing false information on applications for permits, and a majority agreed that, “Falsification will always exist because people will figure out how to game the system.”<sup>27</sup>

While the consultant's findings about cheating did not surprise anyone, the administration's complacency about the problem did dismay some. A student member of UCLA's Transportation Services Advisory Board wrote to the Vice Chancellor who supervises the parking system:

As a member of the Board, I am disturbed that Parking Services does not believe that cheating on parking permit applications is considered by many students to be rampant, and is unwilling to seriously consider strategies for dealing with the problem.<sup>28</sup>

Similar views are expressed frequently in the *Daily Bruin*. In 1999, for example, one student wrote, "Lie, cheat, and steal. These are the fundamental traits Transportation Services wants you to learn here at UCLA."<sup>29</sup> Students sometimes criticize the point system at embarrassing times. During the Law School's graduation ceremony in 2000, the president of the graduating class said in her speech, "I learned to get good grades, you had to work, work, work, but to get parking at UCLA you had to lie, lie, lie."<sup>30</sup>

The point system encourages students to lie on their permit applications even if they expect they would receive a permit without lying. Why? All spaces on campus are the same price, but some are remote and inconvenient. If students need more points to get a space in a better location, and they suspect most of their peers are lying, many students are tempted to lie even they don't need to in order to get a permit. Cheating to get a better parking space on campus resembles doping to improve athletic performance. If athletes believe their competitors use performance-enhancing drugs and that detection is difficult, they too will be tempted to use drugs. When two-time Tour de France champion Fausto Coppi was asked if he had ever used drugs, for example, he replied, "Only when necessary." When was that? "Almost always."<sup>31</sup>

Even the University's own official publications causally refer to campus parking scams. *UCLA Arts*, for example, commented on the "notorious parking permit black market, allowing students to finance an entire college education with one Blue 5 permit."<sup>32</sup> Parking on campus is an ethics-free zone, and students do whatever it takes to get a permit. Although the point system fails to allocate parking spaces fairly, efficiently, or ethically, it may have one educational value: it trains students to prepare an income tax return.

Campus parking scandals occasionally break into the national news, as when 22 UCLA football players were found using disabled placards to park on campus (see box). The athletes got their bogus placards by forging doctors' signatures for such conditions as asthma and palsy.<sup>33</sup>

(Headlines about disabled parking placards)

As a result of many serious accusations about the point system, the Undergraduate Council of the UCLA Academic Senate conducted an inquiry, and unanimously requested an investigation:

The Chancellor should appoint an Ad Hoc Committee of faculty and students to examine UCLA's method of allocating parking permits. The task group should recommend to the Chancellor ways to improve fairness and economic efficiency in allocating student parking permits, with particular attention to remedying the ethical problems apparent in the current system.<sup>34</sup>

The Academic Senate's Executive Board unanimously endorsed the request for a study and forwarded it to the Chancellor, who declined the request because, he said, "The allocation of parking permits is delegated to an organizational level well below that of chancellor, and I consider that to be appropriate."<sup>35</sup>

Parking does have a low status in the university hierarchy. The Director of UCLA Transportation Services reports to the Assistant Vice Chancellor for General Services, who reports to the Associate Administrative Vice Chancellor, who reports to the Administrative Vice Chancellor, who reports to the Executive Vice Chancellor, who reports to the Chancellor. Transportation is thus five organizational levels below the Chancellor.

These many levels of bureaucracy help explain how a faulty parking allocation system can persist. Top administrators, busy with other matters, look at parking as a sideshow, and everything looks fine from their privileged "X-permit" view of the world. Lower-level parking administrators control big budgets, undertake big construction projects, employ a big staff, and have their own agenda; they present themselves as experts who know how to handle the sideshow and its \$40 million annual budget. Yet not until 2004 did the UCLA Transportation Services have a single staff member with any academic training in transportation or with any professional experience in transportation other than at UCLA.<sup>36</sup> Because the parking system is self-supporting—funded mainly from parking fees paid by faculty, staff, and students—it appears to take care of itself without taxing

HEADLINES FROM THE *LOS ANGELES TIMES* ABOUT UCLA  
FOOTBALL PLAYERS' ABUSE OF DISABLED PARKING PLACARDS

14 Bruins Charged With Getting Passes for Handicap Spots	July 9, 1999
There's No Spot for These Crimes; If Charges are True, Then UCLA Football Players Should Have the Wheelchair Thrown at Them.	July 9, 1999
Bruin Tailgate Party Will Be Easy to Find	July 10, 1999
It's Fitting That These Guys Find Themselves in a Spot	July 10, 1999
UCLA Football Players' New Opponent: the Disabled	July 10, 1999
The Danger of Treating Athletes Like Gods	July 11, 1999
Severe Punishment Unlikely by UCLA; Dean of Students Says Students in Past Have Not Been Suspended or Expelled for 'Parking Violations.'	July 13, 1999
Parking Scam Angers UCLA Athletic Director	July 14, 1999
This Isn't Good Sign for Bruins	July 24, 1999
14 to Plead Guilty in Parking Scam	July 28, 1999
A Sorry Day for Bruins	July 29, 1999
UCLA Is Sentenced in Court of Public Opinion	July 31, 1999
9 Enter Pleas in UCLA Parking Case	August 3, 1999
Parking Scandal Flares Anew	August 12, 1999
Handicapped Parking Scandal Will Return to the Spotlight This Week	August 23, 1999
Nothing Little About UCLA Predicament	September 11, 1999
Five More Charged in Parking Scandal	September 14, 1999
They're Parked in the UCLA Lineup	September 16, 1999
Fans Legally Park the Blame on Bruins	September 18, 1999

the Chancellor's general budget and thus escapes the careful, thoughtful, and exacting scrutiny given to all the academic departments on campus.

Cheating for parking is not unique to UCLA, of course. For example, the University of New Hampshire requires first-year students to submit documentation of need with their applications for campus parking permits. Marc Laliberte of the university's Transportation Services wrote:

It's very clear that many of these letters are pure baloney, but you can't call them liars without getting their parents (often equally eager to join in the ruse) in your face. I'm considering eliminating the documentation-of-need procedure since it was enacted when we had far fewer parking spaces on campus and since it takes forever to read them all, and since I'm sick of feeling like I'm getting lied to 100 times a day. We feel that commuter students who live within one mile of campus (who are not eligible for a permit) often just give us their home address instead of their apartment address. One can walk through a local off-campus apartment complex within a mile of campus and see many commuter permits. Of course at the time they are out of our jurisdiction, and there's really no hard evidence that they live at this complex, just a strong suspicion and circumstantial evidence. We don't really know what to do with these people.<sup>37</sup>

Need-based parking systems engender distrust on campus. A staff member of the UCLA Parking Service once used an intriguing analogy that helps to explain this distrust. The Parking Service awards permits like a professor who grades exams on a curve, she said. The point total necessary for a permit in a good location is determined only after all the applications have been received, just as the score needed for an A is determined only after all exams have been graded. The point system does resemble grading on a curve, and that creates ethical problems. Suppose you were a student in a class where your entire grade depended on the final exam. You have heard that cheating is easy, difficult to detect, and almost never punished. You have also heard that most students cheat on their exams, which are graded on a curve. What would you do, and what lessons for life would you draw from the experience? Students learn they can get by without their scruples, but not without their cars.

### **Problems with Faculty and Staff**

Students aren't the only ones who lie and cheat to get underpriced campus parking. Consider the experiences at universities that offer faculty and staff who own two vehicles the option to receive a parking decal for each vehicle. This option avoids the inconvenience of moving a single decal between two vehicles, and the two-decal permit holders must agree to park only one vehicle on



campus at a time unless they pay a daily fee to park the second one. Abuse of this two-decal privilege has led many universities to begin offering faculty and staff only one hangtag decal for whichever car is driven to campus.

When the University of Texas restricted users to a single hangtag per permit, faculty/staff permit sales increased by 40 percent; the university's manager of parking explained:

Many of the folks who previously had received two permits were in fact "gifting" one of the permits to someone special to them. I actually booted some of those who had both permits on campus at the same time. . . . we found them parked side by side."<sup>38</sup>

When the University of Wisconsin switched from multiple decals to one hangtag per permit, it sold 1,600 more permits and eliminated the faculty/staff wait list for permits.<sup>39</sup> Pennsylvania State University experienced a large reduction in the number of cars coming to campus when it shifted to hangtag permits:

Even our President is limited to one permit. . . . If you go to a system where you allow only one permit per employee you are going to get a bunch of screaming people. The loudest screamers are the ones that were sending more than one vehicle to campus in a given day.<sup>40</sup>

Beyond the loss of revenue when two cars are parked with one permit, there are also ethical problems. The manager of parking at the University of Oregon explained what happened when it was discovered that a Dean had given his second permit to his daughter:

A citation was issued to the second vehicle on campus at the same time and the situation was turned over to the Vice President for Academic Affairs to address with the Dean. . . . We have always felt that a student should not have the advantage of access to faculty/staff parking merely because they are fortunate enough to have a parent, sibling, aunt, uncle, grandparent, etc. on staff. We would be creating a class structure for parking with reference to students—some more equal than others.<sup>41</sup>

Second-decal abuse reduces campus parking revenue, creates unfair privileges for some drivers, and is also dishonest. Appendix C presents an unusually well documented study of this dishonesty and its consequences at UCLA.

### **Inflated Parking Demand**

UCLA's point system is meant to measure the "need" for parking. Students whose need is judged to be lower than that of the approximately 10,000 students who receive a permit are put on a waiting list. To reduce the waiting list for student permits, UCLA builds extremely expensive

parking structures (\$31,500 per space in the most recent structure) to provide parking for students who have been judged to need it least—primarily solo drivers and those who live near campus.<sup>42</sup>

Among all the factors intended to measure the “need” for parking, what is verifiable (such as being an athlete) seems arbitrary, and what is not arbitrary (how far from campus one lives) is not verifiable. The ease of claiming to live with one’s parents in Orange County, for example, means that the students who are most willing to lie tend to get the best parking spaces. Defending the point system, the Director of UCLA Transportation Services wrote, “As flawed as the point system is, we feel it is better than a lottery, for example, where need is not taken into account at all.”<sup>43</sup> To say that something is better than a lottery is not a strong argument, but many universities are drawn to lotteries to replace a failed system for distributing permits. Duke University, for example, is considering a lottery to replace its first-come-first-served system for allocating student parking permits: “With the first-come-first-served method, we find a feeding frenzy results, with thousands of people waiting to hit the online registration site the minute we turn it on. This creates a heavy load on the system and ‘registration rage’ if there are any technical glitches.”<sup>44</sup>

Lotteries and waiting lists are an attractive alternative because they appear to give everyone an equal chance of getting a permit, and the appearance of equality is a prominent feature of parking systems at many universities. Consider how *The Chronicle of Higher Education* described a new system to distribute parking permits at the University of Iowa:

A strong current of “Midwestern egalitarianism” at the university made it difficult to suggest favoring professors over staff members on the waiting lists. The new system, a Solomonic marvel, was devised by parking services and the university’s staff council. It created two seniority-based waiting lists for every faculty and staff lot—one for professors and the other for staff members. As spaces become available, they are offered to the top person on each list by turns—faculty, staff, faculty, staff. Over time, popular lots will end up 50-percent faculty, 50-percent staff, even though staff members outnumber faculty members by more than five to one. . . . For deans trying to hire star professors, the system has additional flexibility. A dean can ask that a faculty member be put at the top of the faculty list.<sup>45</sup>

When prices are the same in all lots on campus, everyone wants the most convenient spaces, and most people will put their names on the waiting list for a better space. As proved by the long waiting lists for the choice lots, the seemingly high “demand” for convenient parking justifies new parking

structures, but the users' parking fees pay only a small share of the cost. Inept distribution of underpriced permits thus leads to a bloated and highly subsidized parking supply.

UCLA allocates most new parking spaces to students who were on the waiting list for permits rather than to drivers who pay by the day. The marginal cost of parking is zero for all permit holders, and other drivers cannot park no matter how great their need. Relatively few spaces are available to drivers without permits, and UCLA typically puts out the "full sign" for daily parking by 10 a.m. To see the problem, consider this e-mail message from a professor of engineering at UC Irvine, who drove up to UCLA for a meeting:

Sorry that I was not at your meeting with Gary Hart at UCLA. I did try; I arrived at the parking kiosk before 2 p.m. and was told by the attendant that all the campus lots are full and I may be able to park in a public lot several blocks away. After finding the lot, it was also full. So, I gave up and drove back to my office, partly because it was 100 degrees outside and my presence was not essential. I will try to communicate my thoughts to you some other time. I trust you had a good meeting.<sup>46</sup>

The round-trip from Irvine to UCLA is 110 miles! The professor's trip was fruitless because most campus parking spaces were occupied by students, staff, and faculty who can park free once they get their permit. If UCLA is an ivory tower, the Parking Service is its moat.

### **Increased Vehicle Travel**

As the saying goes, if you build it, they will come. After the \$47-million Structure 7 opened in 2003, the *Daily Bruin* interviewed several users and found that some of them formerly walked: "Alicia de Anda used to park her car on the corner of Beverly Glen and Sunset Boulevard every morning for a 25-minute walk to campus. Now one of the 545 proud owners of a Lot 7 parking permit, de Anda is thankful the new structure opened early. 'There are quite a few students who park on Sunset,' de Anda, a fourth-year art history student, said. 'It's a pain walking when it's hot or when it's raining.'"<sup>47</sup>

The new parking structure also attracted former vanpoolers. One new student driver happily reported, "I didn't have a permit before so I had to vanpool. For me, having a permit is awesome."<sup>48</sup> Paying only \$55 a month to park in a space that costs UCLA \$223 a month *is* awesome. That's quite a subsidy, and there's probably no better deal on campus.

Underpricing creates the demand for more parking spaces on campus, and the added spaces increase other costs in the transportation system. After all, universities provide new parking spaces

so drivers can use them. We should therefore ask: do the additional parking spaces increase vehicle travel? If so, how will this added vehicle travel increase the external costs of traffic congestion and air pollution?

Parking spaces do not create vehicle travel, but they clearly enable it. The phenomenon of vehicle travel induced by new parking spaces (added vehicle-*storing* capacity) is similar to vehicle travel induced by new roads (added vehicle-*carrying*) capacity. The environmental impact report (EIR) for UCLA's newest parking structure provides an example of how new parking spaces increase vehicle travel, traffic congestion, and air pollution. The EIR was conducted for the 1,500-space Parking Structure 7, completed in 2003.<sup>49</sup> The EIR provides full documentation for nearly every aspect of the structure, including an estimate of how it will increase the number of vehicle trips to campus and vehicle-miles traveled (VMT).

The EIR reports that the 1,500 new parking spaces will generate 5,630 one-way vehicle trips per weekday, or 3.8 trips a day per space, implying a parking turnover rate in the structure of 1.9 vehicles a day per space.<sup>50</sup> If we assume that the structure is used only 22 weekdays a month, each space will generate 82.6 vehicle trips a month (which underestimates total trips because no trips are calculated for the weekends).<sup>51</sup> The EIR reports that the average distance for vehicle trips to campus is 8.8 miles, so each space will generate 727 VMT a month per space ( $82.6 \times 8.8$ ), and the structure will generate 1.1 million VMT a month ( $727 \times 1,500$ ).<sup>52</sup>

This added vehicle travel is not a problem for UCLA, but it is for Los Angeles, which has the worst traffic congestion in the nation; in 2002, the cost of wasted time and added fuel consumption caused by traffic congestion in Los Angeles was estimated at \$11.2 billion.<sup>53</sup> To put this congestion cost in perspective, in 2002 the total general revenue of all cities in California was \$13.7 billion.<sup>54</sup> That is, the cost of traffic congestion in Los Angeles alone may be almost as high as the total general revenue of all cities in California combined. In this congested environment, added vehicle travel to UCLA makes a bad situation for the region even worse.

Beyond the impacts of *using* the new 1,500-space parking structure, *constructing* it required excavating the 10-acre site to a depth of 31 feet. Removing 222,000 cubic yards of earth required 26,000 truck trips (sometimes more than one every minute) through the campus and Westwood Village on a their route for disposal.

## **Other Problems with Administered Parking**

Because UCLA's point system is so opaque, no one knows how many points it takes to get a permit. The Parking Service does not inform students whether they'll get a permit until just before classes begin in the Fall, and the resulting uncertainty increases the difficulty of planning where to live and how to commute. These difficulties increase the incentive to report a false address, and the incorrect addresses then create problems for the Registrar. An official from the Registrar's Office pointed out that because students misreport their addresses to obtain additional points for parking, official mail sent to these addresses often fails to reach students, causing unnecessary delays and sometimes severe complications for both the students and the university.

The point system for allocating permits sometimes creates personal hardships. Students are told where to park for the quarter or year, without regard to their changing circumstances on different days. A student with a permit in a central spot—near the Library, for example—can park there all day every day at a zero marginal cost per hour, while other students with permits in distant lots who want to visit the Library for a few minutes must spend a long time walking a great distance to reach their destination. In a more efficient system, students who want to park all day would park in the more distant lots, while those who want to park for a short time in a higher-priced central lot would pay only for the few minutes they use. Those who split the cost of parking because they carpool could also afford to park in the center of campus. Students should be allowed to make different choices on different days, depending on the circumstances of their trip, but the rigid point system denies this option. As a result, the system poorly serves occasional drivers, short-term parkers, and students who carpool for specific trips.

UCLA's point system for student parking is much closer to communism than to capitalism but it manages to combine the worst features of both systems. The point system distributes parking according to purported "need" but it gives no preference to low-income students. Providing cheap parking on expensive land is inefficient and does nothing to help the poorest students who cannot afford a car. As an alternative to the point system, let's consider a market solution to the problem.

### **PERFORMANCE-BASED PARKING PRICES**

With all the intellect on campus, one would expect universities to teem with creative ideas about how to solve the parking problem. Nevertheless, most universities price parking at average

cost and distribute permits according to status or assumed need. Research in economics, political science, and urban planning seem to have little impact on administrators. Naturally, professors should not expect to decide how to allocate campus parking. Universities hire faculty to think and they hire administrators to make decisions. Problems can arise when the faculty try to make decisions and administrators try to think. Nevertheless, administrators should not totally ignore academic research in making university policy.

A few universities do charge higher prices for the more convenient parking spaces in high demand. Washington State University, for example, uses a zone system of parking prices. The price in each zone is set according to three criteria: proximity (location with respect to major destinations on campus), quality of the facility (garage, paved surface, or gravel surface), and demand (competition for the zone). WSU sets fees that allow drivers to choose the parking spaces they are willing to pay for.<sup>55</sup> Taking the zone system to its logical economic conclusion, prices for parking can be set to balance demand and supply at each location and time.

Flexible prices for parking can balance demand—which varies over time—with the fixed supply of spaces. We can call this balance the Goldilocks Principle of performance-based parking prices: the price is too high if many spaces are vacant, and too low if no spaces are vacant. When a few spaces are vacant everywhere, the price is just right. If a parking shortage or surplus regularly occurs at any time in any location, the price can be raised or reduced. If prices keep a few spaces vacant at every location, drivers can always find an available space near their destination.<sup>56</sup>

### **Performance-Based Prices**

If the goal of pricing is to create a few vacancies everywhere, what is the appropriate vacancy rate? Traffic engineers usually recommend that about 15 percent of spaces should remain vacant to ensure easy access. This cushion of vacant spaces eliminates searching for a place to park, which can be a major source of frustration for students and faculty with time-sensitive schedules. If we accept this recommendation, the performance-based price for parking should vary by time and location to balance a variable demand with the fixed supply and produce a stable vacancy rate of about 15 percent. When the price is *not* right, either too many spaces will be empty (the price is too high), or shortages will appear (the price is too low).

Figure 3 illustrates this performance-based price for parking (the price at which demand equals the supply of spaces available with a 15-percent vacancy rate). The number of spaces at any site is fixed, so a vertical line positioned at the 85-percent occupancy rate represents the supply curve. The demand curve for parking slopes downward, and the point where this demand curve intersects the vertical supply curve shows the price that will clear the market for spaces. For example, when demand is high (demand curve  $D_1$ ), a price of \$1 an hour produces a 15-percent vacancy rate (point  $P_1$ ). When demand is moderate (demand curve  $D_2$ ), a price of 50¢ an hour produces a 15-percent vacancy rate (point  $P_2$ ). When demand is low (demand curve  $D_3$ ), the vacancy rate is 70 percent even with free parking, so the right price of parking is zero (point  $P_3$ ).

Figure 3

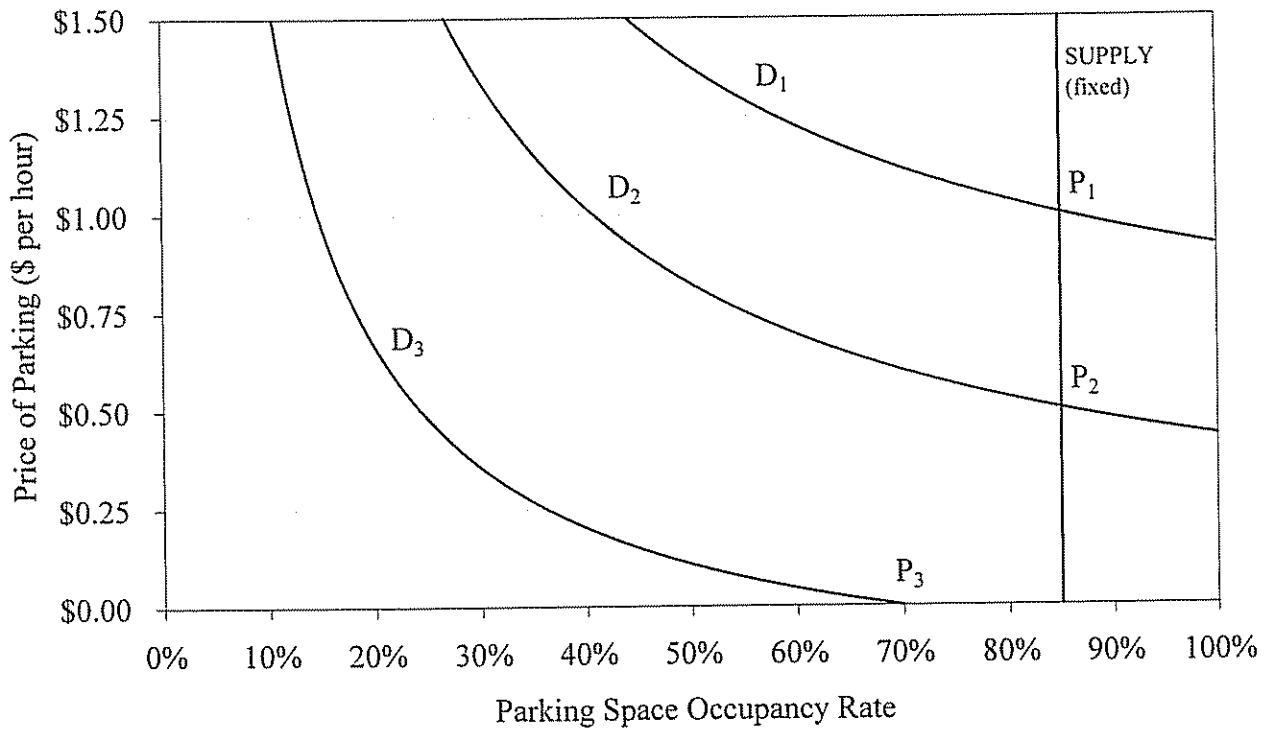
Prices that produce about 85 percent occupancy can be called performance-based for two reasons. First, these prices allow the parking system to perform efficiently. Most spaces are occupied, but drivers can always find a vacant space. Second, these prices allow the whole transportation system to perform efficiently. Drivers who are searching for parking will not congest traffic, waste fuel, and pollute the air. For both parking and transportation efficiency, what pricing policy is better than setting prices to yield about an 85 percent occupancy rate?

We can rely on prices alone to maintain a few vacancies and create turnover. The parking supply is fixed, but demand rises and falls during the day, so demand-responsive parking prices will necessarily rise and fall to maintain the desired vacancy rate. Obviously, prices cannot constantly fluctuate to maintain a vacancy rate of *exactly* 15 percent, but they can vary sufficiently to avoid chronic overcrowding or underuse.

How will drivers know what to pay if the parking prices vary throughout the day? Electronic parking meters can charge variable prices, and the basic idea is simple.<sup>57</sup> Suppose experience shows the right price to achieve a few vacancies in a lot at the center of campus is zero from midnight to 6 a.m.; 25¢ an hour from 6 a.m. to 8 a.m.; \$1 an hour from 8 a.m. to 6 p.m.; and 50¢ an hour from 6 p.m. until midnight. Suppose also that you arrive at 7 a.m. and want to stay three hours. How much money should you put in the meter? The first

Time of day	Price per hour	Minutes per 25¢
Midnight-6 a.m.	Free	
6 a.m.-8 a.m.	\$0.25	60
8 a.m.-6 p.m.	\$1.00	15
6 p.m.-midnight	\$0.50	30

FIGURE 3  
THE MARKET PRICE OF PARKING





quarter you insert will give you one hour (until 8 a.m.) Each additional quarter will give you another 15 minutes. So you will have to pay \$2.25 for three hours (25¢ for the first hour, and \$1 an hour for the next two). The meter shows the price of parking during each hour, and you simply get less time for your money at the peak hours. Prices would be lower in lots farther from the center of campus, but they would still vary throughout the day.

Parking occupancy can be reviewed periodically to see whether prices are producing the target occupancy rate. If a parking surplus or shortage regularly occurs at any time in any location, the price can be adjusted. With newer electronic meters, the parking authority can monitor occupancy rates, remotely reconfigure the price schedules, and send the new rates wirelessly to all the meters on campus. These pricing adjustments will preserve a few vacancies during peak hours, and fill spaces that would otherwise be vacant during off-peak hours. This arrangement differs only slightly from existing meters that have a uniform rate during the daytime and are free at night.

The familiar image of pushing quarters into a parking meter is used only to suggest how much time you get for your money. Electronic pay stations accept payment by credit cards, debit cards, and cell phones. The transactions are cashless so drivers don't have to carry a pocketful of change to pay for parking. Multispace meters can also display information on an interactive screen, including the variable price schedule. The information can be multilingual, include graphics, and guide the user through transactions. New York City, for example, uses multispace meters in Manhattan to charge variable prices of \$2 for the first hour, \$3 for the second hour, and \$4 for the third hour during the daytime, and \$2 an hour during the evenings and on weekends.

A variable price for parking may seem impractical at first, but the price of most commercial parking already varies by time of day and day of the week. Parking lot operators instinctively raise prices when their occupancy rates approach 100 percent, and some operators claim they don't own a "full" sign because they never need one. To set the prices for campus parking, universities can use the traditional four-step process that commercial operators use to set prices for off-street parking:

1. Look to see if your lot is full or empty.
2. Then check your competition.
3. If you are full and they are empty, raise your price.
4. If you are empty and they are full, lower your price.

Campus parking should *not* be priced like a private parking lot, however, because commercial operators aim to maximize private profits, not social benefits. Nevertheless, this example does show that the price of parking can be adjusted to create a few vacancies everywhere. The purpose of “right-priced” parking is *not* to gouge drivers or to maximize revenue. Instead, *the right price of parking is the lowest price that will avoid shortages.*

Some cities have adopted this pricing policy for their curb parking. The municipal code of Redwood City, California, for example, succinctly states the goal of parking management:

A. To accomplish the goal of managing the supply of parking and to make it reasonably available when and where needed, a target occupancy rate of eighty-five percent (85%) is hereby established.

B. At least annually and not more frequently than quarterly, the Parking Manager shall survey the average occupancy for each parking area in the Downtown Meter Zone that has parking meters. Based on the survey results, the Parking Manager shall adjust the rates up or down in twenty-five cent (\$0.25) intervals to seek to achieve the target occupancy rate.<sup>58</sup>

Similarly, universities can vary the price of parking to match the quantity of parking demanded with the available supply, at each location and time. Prices will be lower in less convenient locations and at off-peak hours, and it can be free whenever and wherever there is excess capacity, such as on weekends and during vacations. Free parking at off-peak hours will encourage students to come to campus during uncrowded times to use the library and athletic facilities, attend plays and concerts, or to take advantage of the many other resources of the university. Why charge students anything to park when the spaces would otherwise remain empty? Free parking at off-peak hours will help to make the campus a livelier and thus safer place at night and on weekends.

Performance-based parking prices will also reveal where expanding the parking supply is justified. If high prices in some locations produce parking revenues that would recover the cost of building a new structure, investment in more parking may be warranted. Similarly, low prices in other locations will reveal where new construction is unwarranted.

### **Parking Prices Turned Upside Down**

UCLA now allocates parking permits to students either for the quarter or the year. Drivers thus pay an up-front cost for the permit and nothing extra for parking on each trip. The zero marginal cost of parking invites permit holders to drive to campus alone, encourages overuse of scarce spaces during peak hours, and leads to shortages that generate demands for even more campus parking. The

permit system works well for conventional commuters who come to campus five days a week and stay on campus all day. The system does *not* work well for students who come to campus only on certain days, who do not remain all day, or who drive to campus only occasionally.

Some universities charge everyone for parking, even those who don't drive to campus. Florida State University and Florida Atlantic University, for example, bundle the cost of a parking permit with every student's tuition payment.<sup>59</sup> Parking is free for everyone on every day, and because the cost is hidden, no one knows that they pay for parking. Even those who are too poor to own a car pay for parking.

Universities that do charge for parking usually give a big discount for monthly permits. At UCLA, for example, the price of parking is \$8 a day or \$57 a month for a permit in 2005-2006. Anyone who wants to drive to campus more than 7 days a month thus finds it cheaper to buy a permit, and the marginal cost of parking on campus then becomes zero. For a month with 21 working days, the cost of buying a permit is only 34 percent of the cost of paying per day. Permits are also much more convenient because the users can drive straight into their parking lots, while those without permits must line up at a kiosk to pay every day, and spaces are often not available. Convenient, heavily discounted monthly permits are an invitation to drive to campus alone.

In contrast to selling discounted monthly permits, or bundling the cost of parking with tuition, some universities offer convenient ways to pay for parking on a daily basis. In their survey of university parking policies, Elizabeth Isler, Lester Hoel and Michael Fontaine (2005) found some campuses that accommodate the occasional parker without requiring the purchase of a permit:

The University of Michigan has scratch-off cards that cost \$35 for a 10-pack. Each scratch unit is valid for 1 day of parking, and the user scratches the card to reveal the appropriate date and displays the card in the vehicle's windshield. Other schools such as Utah State University have similar daily permits in the form of punch cards. Day-to-day permits such as this help prevent the "all you can eat" syndrome that is often enabled by long term permits. If a driver has already paid for a full parking permit, he or she has no incentive not to drive and park every day rather than occasionally using alternative modes. . . . Short-term options such as hourly or daily permits, and a guaranteed ride home program have also been used to fill a niche for the campus user who needs to drive to school occasionally but ends up driving every day because he or she paid for a semester or annual permit or may need a vehicle in the event of an emergency.<sup>60</sup>

The University of Texas has also devised a convenient and cheap Share Pass system to serve alternative transportation users who occasionally want to drive to campus. Customers purchase debit cards and swipe them through a card reader when entering a garage. The Share Passes give users up to a 75 percent discount from the normal daily rate, but this still exceeds the price for conventional permit holders.<sup>61</sup> A few universities charge a marginal cost for parking, with no fixed cost. The University of Massachusetts and the University of Wisconsin use in-vehicle parking meters (which resemble debit cards) to pay for parking. The basic idea is simple: the longer you park, the more you pay (see Appendix A). Drivers use these in-vehicle meters to pay for parking on every trip, and they pay only for the exact time they use—no more, no less. This system encourages commuters to consider alternatives to solo driving for each trip because they can save money by carpooling, riding transit, bicycling, or walking. In addition, many universities offer fare-free public transit programs for students, staff, and faculty.<sup>62</sup> If the bus is free and you have to pay for parking on each trip, why not try riding the bus to campus?

The structure of parking prices at airports provides an example of what performance-based prices on campus could look like. Everyone expects not only to pay for parking at airports, but also to pay higher prices for parking closer to the terminals. The expensive central spaces encourage short-term parking and carpooling, while the cheaper remote spaces attract long-term parkers and solo drivers. Many passengers use public transportation or shared-ride vehicles to get to and from the airports specifically to avoid paying for parking (which, incidentally, has become a major source of income for airports). Similarly, once people have become accustomed to performance-based prices for campus parking, the idea of going back to administered parking will seem as absurd as expecting free parking at airports (desired, perhaps, but understood to be neither realistic nor ultimately beneficial).

### **Low Cost of Administration**

Letting prices manage parking will take a heavy burden off university administrators who now devote endless hours debating how to micromanage parking for faculty, staff, and students. Even higher political bodies, all the way up to the President's Cabinet in Washington, waste time talking about parking, as suggested by this description of a cabinet meeting in which Daniel Patrick Moynihan participated: "a cabinet meeting which was mainly bitching about parking in federal

buildings—all right, it was supposed to be about office space, but it was also about parking, it always is.”<sup>63</sup> What Joseph Schumpeter said about politics in general applies perfectly to the politics of parking in particular: “The typical citizen drops down to a lower level of mental performance as soon as he enters the political field. He argues and analyzes in a way which he would readily recognize as infantile within the sphere of his real interests.”<sup>64</sup> If universities let prices allocate parking, everyone will be able to spend more time dealing with academic issues.

### **Parking Cash Out**

Parking cash out is another way to reduce the demand for campus parking. Faculty members at many universities pay nothing for parking, and it may be politically impossible to begin charging them for it. In this case, a program of parking cash out—offering employees the option to choose the cash value of any parking subsidy offered, in lieu of that parking itself—can achieve almost the same results as charging for parking, but without the political pain. Consider the cash-out program run by the Pfizer Corporation at its laboratories in Kent, England. Pfizer estimates that the capital and operating cost of providing parking for its employees is more than £1 million a year, and that the average cost per space is £2 (approximately \$3.75) a day.<sup>65</sup> Under the program, employees can park free at work on any day, but any commuter who works on site without bringing a car receives a credit worth £2. Commuters can either park free or take the cash value of the parking, and they can make different choices on different days. Although everyone can park free, commuters who drive to work alone forfeit £2 a day. The daily cash option therefore encourages every commuter to consider the alternatives to solo driving whenever possible.

The program is simple. Employees automatically earn a credit of £2 each day they use their company identification cards to enter their office building. If they have driven to work, they use the same identification cards to access the company parking lot, and £2 is deducted from their account.<sup>66</sup> A solo driver thus receives both a credit and a debit of £2 for the day (so the net value is zero), but a commuter who has walked, biked, or taken the bus to work receives a net credit of £2 for the day (because there is no debit for parking). These accumulated credits are forwarded to the payroll office at the end of the month, and the cash value is included in each employee’s salary one month in arrears. This arrangement automatically enrolls all employees in the program even if they usually drive to work alone.

Daily parking cash out is fair and flexible for both the firm and its employees. Giving a credit for arriving and then deducting it for parking informs every commuter, every day, that parking has a cost. Commuters can earn a cash bonus on any day simply by showing up at work without a car. Rather than charge commuters to park, the firm pays them not to park. This policy levels the playing field among all modes of travel because all commuters receive the same subsidy, regardless of their mode choice. Parking cash out does not favor the alternatives to solo driving, but instead offers the same subsidy to drivers and nondrivers alike—a parking subsidy for drivers and a cash subsidy for nondrivers. This seems generous to nondrivers only because most employers offer nondrivers nothing.

The daily parking cash-out arrangement is particularly well suited to universities. Some professors argue that charging for parking discourages coming to campus, while free parking encourages the faculty to make themselves available to meet with students, attend committee meetings, and participate fully in the life of the university. In this situation, daily parking cash out serves everyone's interest. Professors who drive to campus can park free, while those who come to campus without a car receive the cash value of the parking they do not use. Even economics professors can have a free lunch if they forgo a free parking space, and professors who stay at home receive nothing. What could be fairer or more efficient?

### **Parking Fee Level versus Parking Fee Structure**

The daily cash-out option illustrates a key distinction between the *level* and the *structure* of parking fees. The level of the fee refers to the amount, while the structure refers to the way drivers pay it (per hour, day, or month). A fee of \$2.50 a day and \$50 a month both amount to the same charge for 20 working days month, but drivers react differently to a daily fee than to a monthly one. In many cases, drivers will respond more to a change in a parking fee's structure than to a change in its level. Imagine, for example, that the price of a parking permit is \$50 a month, with no daily option. If a commuter wants to drive to work a couple of times a week (for example, to run errands at lunch or after work), then the rational decision may be to buy a parking permit. And with a permit, the marginal cost to park at work on any given day is zero. Once you have bought your car, paid for your insurance, and have a parking permit, why not drive? As a result, commuters are more likely to drive to work *every* day, even on occasions when there are no errands to run. If the permit price

increases to \$60 a month, most commuters will continue to buy one and continue driving to work, so the higher price will do little to reduce vehicle trips.

Now suppose the fee level remains \$50 a month, but the structure is changed to include the option of paying \$2.50 per day (the collection can be automated with electronic fare cards to avoid any inconvenience for the drivers). In this case, commuters need not buy a permit for an entire month. Instead, they can pay only for the days when they drive to work. On other days, they can ride transit, carpool, walk, or bicycle to work and save the \$2.50 daily fee. Offering the option of a daily fee will increase the number of commuters who drive only a few days each month, and reduce the number who drive every day. In this way, restructuring the fee without increasing its level can reduce the number of vehicle trips by giving commuters new options.

Another benefit of offering the daily fee option is that employees won't oppose it. Raising a parking fee from \$50 to \$60 a month, for example, can arouse strong opposition but only slightly reduce solo driving. In contrast, adding the option to pay \$2.50 a day can reduce solo driving but arouse no opposition because it does not increase the monthly cost for someone who drives every day. Pfizer's daily cash-out program does not increase the price of parking, is popular with employees, treats full-time and part-time drivers equally, and provides a financial incentive for everyone to rideshare, every day.

### **Efficient Location Choices**

With performance-based prices, drivers who choose parking locations to reduce their individual costs will park in a pattern that also reduces social costs. Why? Because these prices will efficiently allocate the central spaces to carpools, short-term parkers, and those who place a high value on saving time.<sup>67</sup> First, because carpools split the cost of parking among two or more people, they are less sensitive to parking prices and will therefore use the more central spaces. Second, because short-term parkers pay for only a few minutes, they are also less sensitive to parking prices and will also use the more central spaces. Third, those who place a high value on saving time will use the more central spaces because the time they save outweighs the higher cost.

Drivers may have different destinations on campus on different days, and they can park in different locations on different days. Those who want to spend only a short time on campus—such as for a quick trip to the library—will not have to spend a long time walking from their assigned

parking spaces to their final destinations. The faster turnover of the central parking spaces will make them available to more people.

These results confirm what common sense suggests. A high price per hour is no problem if you park for only a short time or split the cost of parking among several people in the car. A high price per hour *is* a problem if you drive by yourself and park for a long time. These results also show that there is no single, sensible estimate of how far drivers are willing to walk from parking spaces to their final destinations. Willingness to walk depends on the parking duration, the number of people in the car, their walking speed, and their value of time. Someone who parks all day, for example, is probably willing to walk much farther than someone who parks only ten minutes.

If the price of parking increases toward the center of campus, will rich drivers who place a high value on their time monopolize the central parking spaces? All else equal, a higher value of time does lead to shorter walks, but time value is only one of several factors that determine the optimal parking location. Because parking duration and the number of people in a car also affect location choice, performance-based prices will not automatically allocate the best parking spaces to drivers who place a high value on time. Many other factors other than income also affect how much drivers are willing to pay to save walking time on any particular trip: whether they are late or tired, the weather, the scenery, safety, heavy packages they are carrying, whether they want the exercise, their health, a disability that makes walking difficult, and other circumstances that are unique to each trip. The value of saving time can vary greatly from one place to another, from one person to another, and from one trip to another. An old Ford may park in an expensive space at the center of campus if its driver is in a hurry, while a new Bentley may park in a cheap space at the periphery if its driver has plenty of time and enjoys walking. To allay any equity concerns, any extra revenue that results from higher prices for the central spaces can be used to pay for alternative forms of transportation, such as fare-free public transit rides for all students, staff, and faculty.<sup>68</sup>

#### CONCLUSION: LET PRICES DO THE PLANNING

Policy analysts often complain that public services aren't working for poor people because the rich, the powerful, and the dishonest often seem to capture the lion's share of the benefits. So too with campus parking, which reproduces in miniature the inefficiency and inequity of more important public services.



Is there a better way to manage the campus parking supply—a lower cost alternative that is fair, efficient, and does not encourage rampant cheating? A system that relies on incentives rather than on penalties to encourage honest behavior? There is, and some universities already use it: they charge higher prices for the more desirable parking spaces, and they charge by the hour rather than by the month or year. In short, they rely more on the market and less on bureaucracy. They manage space, not human behavior, and they focus on parking cars, not people.

### **Pilot Program**

Universities can use a pilot program to test in-vehicle meters and parking prices that vary by time and location. Offering a pilot program for a sample of a few hundred students, staff, and faculty will show how drivers respond to the new option, and how much revenue it produces. If performance-based prices provide better service and produce more revenue than conventional permits for the spaces used by the pilot project, the pay-as-you-park option can be expanded incrementally. The results of the pilot project can be carefully evaluated before proceeding to more widespread adoption. So long as the new revenue from performance-priced spaces replaces the lost revenue from conventional permits, the university will lose nothing from the shift. A pilot program could be used to test whether performance-based parking prices produce these 13 benefits:

1. Students will not need to lie on permit applications.
2. The system will be transparent and will treat everyone equally.
3. All students will be eligible to park on campus, while fewer than one out of three students now obtain a permit under the point system.
4. The administration will not need to judge whether a student “needs” parking.
5. By encouraging faster turnover and higher vehicle occupancy for the better-located parking spaces, the existing parking supply will serve more people.
6. If performance-based parking prices increase total revenue, the extra money can pay for new transportation services, such as fare-free public transit, that benefit the poorest students.
7. Drivers will pay only for the parking time they use—no more and no less.

8. Charging drivers for the time they park will encourage everyone to consider alternatives to solo driving for every trip to campus. Anyone can always save money by carpooling, riding public transit, bicycling, or walking.
9. Drivers will have more flexibility. They can pay a higher price to park in the more central spaces when they are in a hurry, when they want to park for a short time, or when they carpool. They can save money by parking in the cheaper, peripheral spaces when they are willing to walk farther, want to park all day, or drive solo. Students, staff, and faculty can park free on campus at off-peak times when demand is low.
10. Areas where high parking demand leads to high parking prices will signal where new parking structures should be built. Similarly, areas where low demand leads to low prices will signal where parking structures should *not* be built. Performance-based prices will create a dynamic, self-correcting parking system and will help to guide the allocation of scarce land and capital.
11. Lower off-peak prices will draw students to campus during the summer, in the evenings, and on weekends when the university has empty parking spaces waiting to be used. Populating the campus at off-peak times will make it livelier and safer for everyone.
12. Drivers with disabilities can be offered transportation allowances to park in the best-located spaces, enhancing their access to the campus and their overall mobility.
13. Highly-recruited students can be offered transportation allowances to be used for parking on campus or for any other purpose. By rewarding academic or athletic excellence, for example, the transportation allowances can further the academic and other missions of the university.

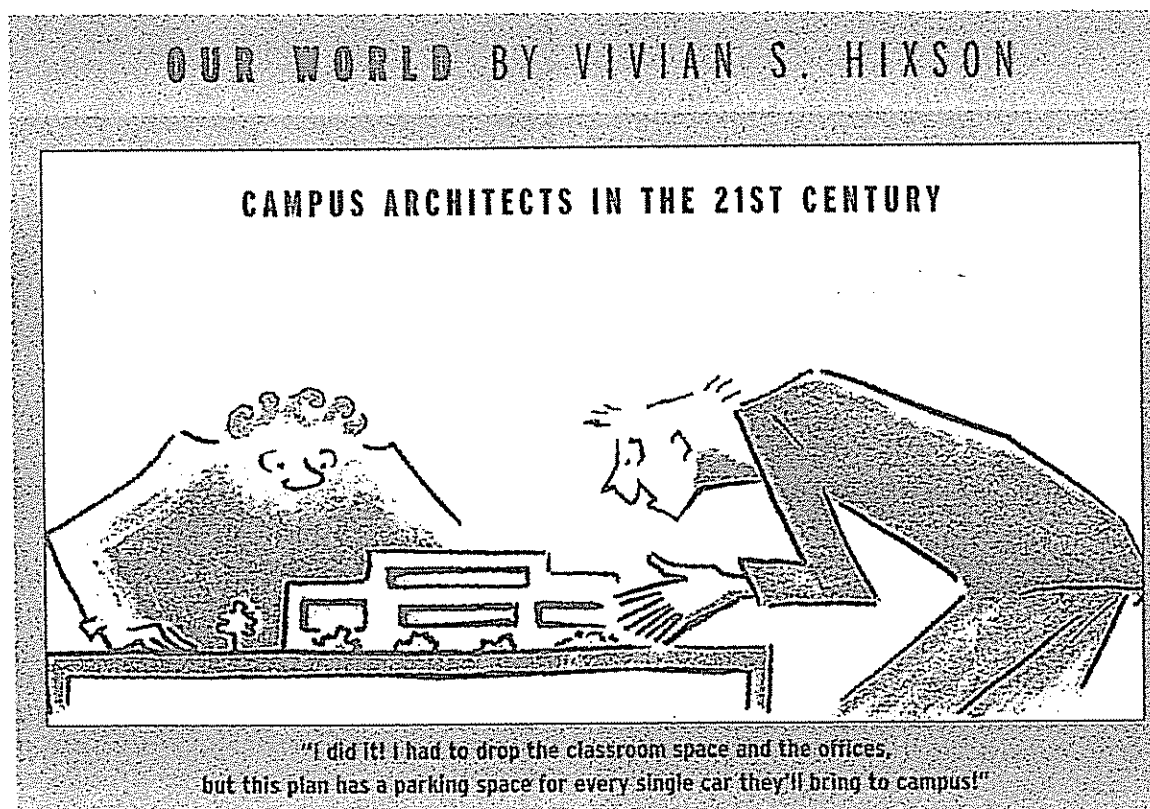
This experiment could have a downside that might cause parking administrators to oppose a pilot program. The Campus Parking Service may lose revenue from faculty, staff, and students who now buy monthly permits but drive to campus only occasionally. These people would be likely to jump at the chance to pay only for the parking they use, rather than to pay for a whole month. In effect, the permit holders who drive occasionally would no longer subsidize the permit holders who drive every day. Parking administrators may therefore be reluctant to offer convenient access to daily parking because they fear that occasional drivers would give up their permits and pay only for the parking they use. This possible effect should be examined, but it should not preclude a pilot program.

### **Honest Parking**

Performance-based parking prices are a practical and theoretically appealing alternative to the current point system for allocating parking spaces to students. UCLA Chancellor Carnesale has

reminded us that “our budget should reflect our strategy.” What does UCLA’s \$40 million annual transportation budget reveal about its current transportation strategy? The policy of building new parking structures that lose money suggests that the goal is to encourage commuting by car. And complacency about the rampant cheating to get campus parking through the point system suggests that UCLA is unconcerned about ethical abuses.

Performance-based parking prices are fair, efficient, and transparent. These prices will favor high-occupancy vehicles and short-term parkers, accommodate occasional users, and create more opportunities for individual choice. Perhaps most important for a university, performance-based parking prices will not drive students to dishonesty.



## APPENDIX A: IN-VEHICLE PARKING METERS

In-vehicle parking meters look like small pocket calculators, and motorists use them in combination with a stored-value smart card to pay for parking.<sup>69</sup> The system works on a university campus as follows. The university marks the zones where parking is priced by the hour, assigns a number to each zone, and posts the zone numbers and meter rates. To pay for parking, the driver keys the zone number into the meter, inserts the smart card, switches the meter on, and hangs it inside the car's windshield with the liquid crystal display (LCD) visible. A timer in the meter deducts money from the smart card for the parking time elapsed until the driver returns and switches it off.<sup>70</sup> Enforcement personnel can easily determine whether a parked car's meter is running because they can see the zone code and elapsed time flashing in the LCD window. The meter shows the card's remaining prepaid value at both the beginning and the end of each use, and thus reminds motorists when they need to add value to their cards.

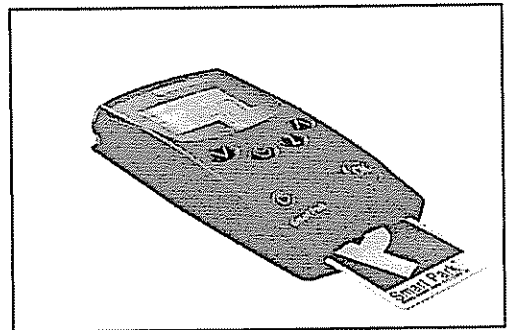
### In-Vehicle Meters

Europeans refer to the in-vehicle meter as an “electronic purse” because of its convenience. Paying for parking with an in-vehicle meter is like paying for a long-distance telephone call with a prepaid calling card. Callers pay for long-distance telephone calls according to where they call, when they call, and how long they talk. With in-vehicle meters, drivers pay for parking according to where they park, when they park, and how long they park.

In 1989, Arlington, Virginia, became the first local government to introduce in-vehicle parking meters in the U.S., and subsequent surveys have shown an overwhelmingly positive response from motorists.<sup>71</sup> When the city of Aspen, Colorado, began to offer the in-vehicle meters, drivers bought 300 meters in the first three

days of the program, and by 1998 had bought more meters (which cost about \$40) than the number of residents in the city.<sup>72</sup> Cities and campuses that use the in-vehicle meter system report the following advantages:

1. **No need for cash.** Drivers don't need coins, tokens, or exact change when parking because the in-vehicle meters operate like debit cards.
2. **Accurate payments for parking.** Drivers pay for the exact parking time they use—no more, no less. Drivers don't pay for any leftover time they don't use.
3. **No meter anxiety.** Drivers don't need to guess how long they will want to park and don't need to return to their cars by a specific time.
4. **Safety.** Where personal safety is an issue, drivers feel more secure because they pay for parking while still inside their cars. Drivers are also protected from bad weather while paying for parking.
5. **Receipt for parking fees.** The electronic memory of the in-vehicle meter can provide receipts for parking fees to use for expense accounts or tax purposes.
6. **Mobility.** The same in-vehicle meter can be used all over campus.



7. **Faster turnover.** In-vehicle meters encourage faster parking turnover because drivers pay for parking by the minute. Drivers don't use up excess time simply because they have already paid for it.
8. **Low cost.** The in-vehicle meters reduce the need to buy, install, and maintain conventional post-mounted meters, and the need to collect, transfer, and count coins.
9. **Revenue in advance.** The university collects the parking revenue in advance and earns interest on the unused balances.
10. **Adjustable prices.** In-vehicle meters can charge different rates in different areas, at different times of the day and days of the week, and for different parking durations.
11. **Compatibility with conventional meters.** Drivers can use their in-vehicle meters to pay for parking at conventional meters. Cash customers who don't have in-vehicle meters can pay by putting coins in the conventional meters.
12. **No theft or vandalism.** Users activate the meter by inserting a smart card when they key in the zone where they park, and remove the smart card before leaving the car. The debit for parking is deducted from the card when the driver inserts it in the meter for the next use. No one has any incentive to steal the meter because it has no monetary content and it cannot be activated without the smart card that stores the monetary value. In-vehicle meters also eliminate the risk of vandalism that is commonly directed at conventional meters.
13. **Ease of enforcement.** The parking-zone code flashes in the LCD window of a meter that is running, and enforcement personnel can easily see whether a car is paying for parking.
14. **Fewer parking violations.** Drivers with in-vehicle meters usually pay for parking rather than risk getting a ticket. If the expected cost of illegal parking (the fine multiplied by the probability of citation) exceeds the price of legal parking, people pay for parking to save themselves money.
15. **Statistical analysis.** The times parked in each zone are stored in the smart card's memory and can be retrieved for statistical analysis when value is added to the cards. Anyone who is concerned about keeping this information private can always pay cash, or buy a new smart card rather than add value to an old one.
16. **Better urban design.** For on-street campus parking, the in-vehicle technology saves valuable space on the sidewalk and removes unsightly meter clutter.

These advantages come at low cost to both drivers and the university. For example, the University of Wisconsin-Milwaukee charges a one-time deposit of \$25 per in-vehicle meter, which is refunded when a user leaves the program. The University of Massachusetts-Amherst offers the meters without charge, but requires a \$50 replacement fee if the meters are not returned. The main disadvantage of the in-vehicle meters seems to be that most people have never heard of them.

## APPENDIX B: EXCERPTS OF CORRESPONDENCE ABOUT THE POINT SYSTEM

### **Chair of Faculty Welfare Committee to Director of Parking Services, July 17, 1996:**

[Please explain] how the point system operates—including what happens after a student submits an application. For example,

- How do you check the information on the permit applications?
- What percent of permit applications are found to contain misrepresentations?
- How do you deal with instances of misrepresentation on permit applications?

### **Director of Parking Services to Chair of Faculty Welfare Committee, August 14, 1996:**

In past audits, 10-15% of students were found to have provided falsified information.

### **Chair of Faculty Welfare Committee to Director of Parking Services, September 18, 1996:**

You mention that in past audits, 10 to 15 percent of students were found to have provided falsified information. Can you please tell me the *absolute number* of students who provided falsified information, per year? Also, can you tell me what happens to these students?

### **Director of Parking Services to Chair of Faculty Welfare Committee, October 7, 1996:**

In regard to the consequences students face for falsifying information on their parking applications, students who are unable to provide the documentation required by the auditor may lose their parking assignments and/or have their parking privileges revoked for an extended period of time.

### **Chair of Faculty Welfare Committee to Director of Parking Services, October 24, 1996:**

You mention that in past audits, 10 to 15 percent of students were found to have provided falsified information. If only for the past year, can you please tell me the *absolute number* of students who provided false information and the *absolute number* of students who had their parking privileges revoked for an extended period of time?

### **Director of Parking Services to Chair of Faculty Welfare Committee, December 10, 1996:**

Due to systems problems with our parking permit database, we did not conduct an audit last year. Therefore, we are unable to provide you with last year's number of students who provided falsified information on their parking applications. We will search for the files over the holiday period when our staff can devote the time necessary to do so.

**Chair of Faculty Welfare Committee to Director of Parking Services, January 9, 1997:**

You mentioned in your memo of December 10 that you would try to find the past years' records for the number of students who have had their parking privileges revoked because of misinformation on their parking permit applications. If this information is available, I would appreciate receiving it.

**Director of Parking Services to Chair of Faculty Welfare Committee, January 30, 1997:**

Unfortunately, a number of Parking and Commuter Services staff were out ill during the holiday period, so we were unable to conduct a file search of our off-site files for information related to earlier years' student audits. We plan to do so as soon as possible.

**Chair of Faculty Welfare Committee to Director of Parking Services, September 3, 1997:**

I am attaching a memo I wrote on October 24, 1996, regarding the results of previous parking audits. I would still appreciate receiving the two pieces of information requested.

**Director of Parking Services to Chair of Faculty Welfare Committee, September 25, 1997:**

We have again searched our off-site storage locations and, unfortunately, it appears that the results of earlier years' student audits were among the boxes of files completely destroyed by flooding in the lower level of Parking Structure 4 a couple of years ago.

**Chair of Faculty Welfare Committee to Director of Parking Services, October 1, 1997:**

I am disappointed to learn that no records are available, not even on computer files, but I understand that accidents happen. Are disciplinary actions for false information on permit application violations forwarded to the Dean of Students? If so, perhaps I could contact their office to get the records. Please tell me whom to call in the Dean's Office if you think I can get the information there.

**Director of Parking Services to Chair of Faculty Welfare Committee, November 6, 1997:**

The Dean of Students Office says they do not have such records.

END

## APPENDIX C: ABUSE OF PARKING DECALS BY FACULTY AND STAFF

Each UCLA parking permit holder receives one permit decal that must be displayed in the windshield when a car is parked on campus. To avoid the inconvenience of moving a single decal between two vehicles owned by one permit holder, UCLA formerly offered faculty and staff who own two registered vehicles the option to receive a decal for each vehicle. Two-decal permit holders were required to sign a statement that only one vehicle would be parked on campus at a time unless a per-entry parking fee was paid to park the second vehicle. The suspicion that some faculty and staff were using one permit to park two cars on campus at the same time led the Parking Service to request an audit of the problem.

### Audits

In 1989 UCLA's Internal Audit Department conducted a special review to estimate how many two-decal holders parked two vehicles on campus at the same time without paying for the second vehicle.<sup>73</sup> The audit had two phases. In Phase 1, auditors examined the records for a sample of 600 two-decal permit holders (8 percent of the 7,437 two-decal permit holders). Auditors obtained the permit holders' vehicle license numbers from their parking applications, obtained DMV reports for these license numbers, and compared the two data sets. The auditors discovered serious problems:

- Information on 42 percent of all two-decal permit holders' UCLA parking applications differed from the corresponding DMV reports.
- Of all two-decal permit holders, 31 percent had only one vehicle registered in their name.
- The second vehicle of 24 percent of all two-decal permit holders was registered to a person who neither appeared to be a relative nor resided at the employee's address.
- For 11 percent of all two-decal permit holders, neither vehicle was registered in the employee's name, no license number could be located by the DMV, or the Parking Service could not find the permit application.

In Phase 2, auditors recorded the license numbers and permit information for all the vehicles parked in Structure 2 on December 14 and Structure 8 on December 6, 1989. The goal was to estimate how many cars were parked using two decals for the same permit at the same time. The auditors discovered even more problems:

- Five percent of the cars in both Structures 2 and 8 were using two decals issued for the same permit. Because auditors performed sweeps of only one parking structure at a time, the auditors could not detect instances where they parked vehicles with the same permit in other parking structures or lots at the same time. The audits therefore seriously underestimated the frequency of parking two vehicles on campus without paying for the second vehicle.



- Forty-three decals that had been reported lost or stolen were found in use.
- Sixteen of these 43 lost-or-stolen decals were being used in the same structure at the same time with the replacement decals.
- In two cases, *three* decals for the same permit were being used in the same structure at the same time. In both cases the permit holders had been issued a replacement decal when one of their two original decals had been reported lost or stolen.

Because of these abuses, UCLA increased the price of a second decal to \$72 a year to compensate for the revenue lost from their abuse. The higher price did not stop abuse, of course, but instead made the purchase of second decals a sensible choice mainly for those who intended to abuse them. The Parking Service estimated that at least 23 percent of those who purchased a second decal parked two cars on campus at the same time, and in 1999 it eliminated the option of second parking decals for faculty and staff.

### **Ethics**

Why did UCLA end the second-decal privileges for faculty and staff but continue to use the corrupted and corrupting point system for students? The answer is simple. When faculty and staff abused their second decals, they reduced the Parking Service's revenue. When students abuse the point system, they merely jump the queue for parking permits without costing the Parking Service anything. Abuse of second decals is apparently more important than abuse of the point system because money is more important than ethics. For a commercial enterprise, the priority of revenue over ethics might make sense. For a university, however, ethical considerations require reforms beyond simply eliminating second parking decals for faculty and staff.

*What kind of liar are you?  
 People lie because they don't remember clear what they saw.  
 People lie because they can't help making a story better than it  
 was the way it happened.  
 People tell "white lies" so as to be decent to others.  
 People lie in a pinch, hating to do it, but lying on because it  
 might be worse.  
 And people lie just to be liars for a crooked personal gain.  
 What sort of liar are you?  
 Which of these liars are you?*

CARL SANDBURG

## ENDNOTES

1. Rittel and Webber (1973, 161).
2. Kerr (1966, 20). An earlier President of the University of California, Robert Gordon Sproul, defined the faculty even more succinctly: "The faculty is a group of people who think otherwise."
3. When the two new parking structures being built on campus are completed in 2006, UCLA will have 25,169 parking spaces. Texas A&M has 34,000 spaces, Ohio State University has 25,000 spaces, the University of Florida has 24,000 spaces, and the University of Michigan has 23,000 spaces. All four of these other universities are large campuses in small towns, while UCLA is a much smaller campus in a big city with high land values.
4. *Chronicle of Higher Education* (August 11, 1993). Professor Townes also told the *Contra Costa Times*, "My parking space makes a very big difference to me" (May 31, 2002). Professor Townes's work in the field of quantum electronics led to the widespread use of lasers.
5. "Severe Parking Crunch Plagues Universities," *Los Angeles Times* (February 25, 2001). Professor McFadden's work on the theory and methods for analyzing discrete choice has been especially influential in transportation economics.
6. "Life among the Nobility; For Southland's Laureates, the Thrill of Winning Comes in Small Ways," *Los Angeles Times* (October 14, 1994). Marcus continued to walk to work on most days, and kept his 1978 Oldsmobile for days he needed to drive.
7. The UCLA Parking Services issues a 24-page booklet ("UCLA Parking Permit Privileges") to every permit holder to explain the complicated hierarchal system. At the top, the privileges of the X-permit holder are akin to the feudal *droit de seigneur*.
8. See Shoup (2005) for the cost of UCLA parking structures.
9. Brown, Hess, and Shoup (2003, 77).
10. Message from the Assistant Vice Chancellor for General Services on November 16, 2005. This payback calculation assumes steady increases in the price of parking permits during the next 30 years. The ratio between initial capital cost and the first year's cash flow is more than 50 years.
11. Message from the Assistant Vice Chancellor for General Services on November 14, 2005.
12. Toor and Havlick (2004) explain that when most parking on a campus is in surface lots, building the first structure does not greatly increase the average cost of parking because the high cost of a new structure is averaged with the low cost of the many surface spaces. But as surface lots disappear and more structures are built, the average cost rises rapidly. This phenomenon helps explain why the price of parking at UCLA increased slowly when the first structures were built in the 1960s, but increased rapidly after 1980 when few surface spaces remained. Until 1990, the three

main types of permits (X, Blue, and Yellow) were priced the same; when four new parking structures were built in the early 1990s, the prices of X and Blue permits were increased above the price of Yellow permits to generate more revenue.

13. Parking spaces are even more expensive at Harvard, where the cost of building, financing, and maintaining the campus parking system will amount to more than \$500 million during the next 25 years (Harvard University Operations Services 2001, 4). Most parking will be built underground at an estimated cost of \$60,000 per space.

14. All the new permits made available by a new parking structure are allocated to students, but not all of the new students permits will be in the new structure because some administrators, faculty, and staff may shift into the new structure and release their previous spaces.

15. Memorandum from the Associate Administrative Vice Chancellor to the Faculty Welfare Committee on September 17, 1998.

16. Message from Professor Bruce Hannon, July 9, 2004.

17. The point system is described on the website of the UCLA Parking Services at <<http://www.transportation.ucla.edu/parking/Studpts.htm>>.

18. To get students from Lot 32 to the main campus, UCLA provides a shuttle bus system; originally intended only for Lot 32 parkers, it has grown over the years, and now stops at other parking structures on campus, so that drivers can park and ride the shuttle to and from their final destinations on campus. UCLA spends almost \$3 million a year on the shuttle buses; UCLA's average cost is \$2 per ride on the shuttle, which is free to the users.

19. Setting parking fees below marginal cost has long created a seemingly insatiable demand for new parking spaces on campus. Writing on the campus parking problem in *Traffic Quarterly* in 1956, the Dean of the University of Michigan's College of Architecture and Design, Wells Bennett, concluded, "The only solution of the campus parking problem is *more parking*" (Bennett 1956, 105, italics in the original).

20. *UCLA Daily Bruin* (September 23, 1980).

21. Minutes of the April 30, 1997 meeting of the Ad Hoc Review Committee for the Point System.

22. *UCLA Daily Bruin* (May 1, 1997, p. 12).

23. Letter from Andrew Westall to Chancellor Carnesale, May 26, 1998.

24. Minutes of the February 12, 1997 meeting of the Ad Hoc Review Committee for the Point System.

25. Sundstrom and Associates (1998, 9, emphasis in the original). This information did not surprise the administration. As the Dean of Students Robert Naples wrote, “mostly everything I’m hearing from students supports your statements” (e-mail message from Dean Naples on October 12, 1999).
26. Sundstrom and Associates (1998, 32, emphasis in the original). To gain additional information about these perverse incentives for dishonesty, the consultant then conducted a survey of 1,074 students. One question in the survey was: “How significant is the problem of students falsifying information on their parking application?” In response, 76 percent of students reported that the problem of falsifying information of parking applications is either “very significant” or “somewhat significant.” Only 8 percent of students reported that the problem is “not significant” (Sundstrom and Associates 1999).
27. Sundstrom and Associates (2006, 11 and 19).
28. Letter to Associate Administrative Vice Chancellor Sam Morabito, May 11, 1999.
29. *UCLA Daily Bruin* (October 5, 1999, p. 16).
30. *UCLA Daily Bruin* (May 22, 2000, p. 14).
31. Wheatcroft (2003, 207). A big difference between doping and lying is that doping can damage your health; Fausto Coppi died at age 40.
32. “Parking Nightmares and other Horror Stories,” *UCLA Arts*, Spring 1999, p. 14. A Blue 5 permit is a permit to park in the better spaces in Parking Structure 5.
33. The Academic Senate’s request for a committee to examine student parking allocation was rejected only two months after the football players’ scandal. UCLA seems to be unusual only in the large number of football players who were caught misusing disabled parking placards. Similar scandals have erupted on many campuses. In 2003, the quarterback at Florida State University earned national attention for parking his SUV in spaces reserved for the disabled (“More Car Trouble for FSU’s Rix,” *Tallahassee Democrat*, September 24, 2003). Also at FSU, when a student refused to pull out of a faculty parking space, a business professor rammed his Pontiac Grand Am into the student’s Nissan twice, which is more violent than the shouting matches and occasional fistfights that are more typical (“A Strain on Civility?” *Chronicle of Higher Education*, August 11, 1993).
34. Memo from the Chair of Undergraduate Council to the Chair of the Academic Senate on February 18, 1998.
35. Memo from the Chancellor to the Chair of the Academic Senate, November 22, 1999.
36. One former Director of Parking Service left UCLA to become a masseur in Palm Springs, for example, and a new Director of the UCLA Transportation Services moved into the job from his previous position as Director of the UCLA Child Care Center.

37. Personal communication from Marc Laliberte on September 30, 1999.
38. Message from the University of Texas, Austin, to the Campus Parking System listserv, September 7, 2005.
39. Message from the University of Wisconsin, Madison, to the Campus Parking System listserv, September 8, 2005. Clearly, cheating increased the demand for campus parking.
40. Message from Pennsylvania State University to the Campus Parking System listserv, September 7, 2005.
41. Message from the University of Oregon to the Campus Parking System listserv, September 7, 2005.
42. The goal of the Parking Service is to reduce the Fall Quarter waiting list to zero, although the Spring Quarter waiting list is already zero in most years: "By Spring Quarter we do not have a wait list as student demand is lower at this time of year. One reason is fewer students are in school. We get a quarterly list from the registrar of those withdrawn and know several hundred withdraw by Spring" (Memo from Director of UCLA Transportation Services to the Faculty Welfare Committee on May 10, 1996). The goal is thus to build enough parking spaces to meet the peak demand at a price much lower than the cost of providing the new parking spaces, even if these spaces are used only in the Fall Quarter by students who live close to campus and drive to campus alone.
43. Memo from the Director of Transportation Services to the Faculty Welfare Committee on May 10, 1996.
44. E-mail message from George Oberlander at Duke University, November 16, 2004.
45. "Notes from Academe," *Chronicle of Higher Education*, October 5, 2001. Even the old system, which was based on the date a staff or faculty member put their name on the waiting list for a particular lot, gave faculty requests a boost by automatically backdating them a year.
46. E-mail message on October 14, 1997. Some professors might not have been so even-tempered about the incident, but the mismanagement of campus parking is so common the incident did not seem extraordinary to the frustrated visitor.
47. *Daily Bruin*, April 9, 2003.
48. *Daily Bruin*, April 9, 2003.
49. Intramural Field Parking Structure Final Environmental Impact Report, State Clearinghouse Number 1999091001, University of California, Los Angeles, May 2001. Because UCLA commissioned the EIR, the structure's environmental impacts are unlikely to be overestimated.

50.  $5,630 \text{ trips} \div 1,500 \text{ spaces} = 3.753 \text{ one-way trips or } 1.9 \text{ round-trips a day per space.}$
51.  $3.753 \times 22 = 82.6 \text{ one-way trips a month.}$  This calculation assumes that the parking spaces are used on 22 weekdays a month and not on weekends. This neglect of weekend traffic produces a conservative estimate of vehicle trips and VMT per month.
52. This estimate may sound high, but it is based on uniformly conservative assumptions because the VMT are estimated only for weekday trips, and the average one-way trip distance is only 8.8 miles, while the average one-way automobile commute to work in Southern California is 15 miles. Annual surveys conducted between 1989 and 1996 found that average one-way vehicle commute distances ranged from 14.8 to 16.9 miles (Southern California Association of Governments 1996).
53. Texas Transportation Institute (2004, Tables 1 and 2). The Texas Transportation Institute (TTI) annually surveys traffic data in American cities, and calculates the Roadway Congestion Index to rank them by the severity of their traffic congestion. Los Angeles has ranked highest on the TTI Roadway Congestion Index in every year since 1983.
54. California State Controller (2004, Figure 1). General revenues are defined as revenues that cannot be associated with any particular expenditure; examples include property taxes, sales taxes, and business license fees. General revenues do not include fees and charges for direct services, such as the revenue from municipally owned electric utilities.
55. Shaheen and Khisty (1990). John Shaheen is the Director of WSU's Parking, Transportation and Visitor Center.
56. The purpose of charging the right price for parking is to ration a scarce resource, *not* to finance the cost of constructing it. Public agencies often price facilities at their cost of provision, regardless of the market, but parking spaces should be priced at their market value, regardless of their construction cost.
57. Appendix A explains in-vehicle parking meters, and Chapter 15 in Shoup (2005) explains multispace meters.
58. Section 20.120 of the Redwood City Municipal Code.
59. Isler, Hoel, and Fontaine (2005, 6).
60. Isler, Hoel, and Fontaine (2005, 8-10).
61. Stone (2005, 26).
62. Brown, Hess, and Shoup (2001 and 2003) evaluate fare-free transit programs at universities.
63. Takesuye (2001, 36.).
64. Schumpeter (1942, 262).

65. Pfizer is the world's largest pharmaceutical company. Sandwich is a coastal town on the English Channel, 70 miles east of London. The consulting firm of John Whitelegg and Associates designed the cash-out program for Pfizer. The cash value of a parking space is based on the capital cost and on operating costs for security, maintenance, planting, and lighting. The cash-out program began in June 2001, and it is described in the brochure, "Check-In, Cash-Out," available from Pfizer Global Research and Development in Sandwich, Kent, England. The program is also described in UK Department of Transport (2002).

66. Pfizer keeps a record of each commuter's credits and debits; the charge for parking is deducted when a card activates the exit barrier as a driver leaves the company parking lot. Charges are deducted only when a car passes through the exit barrier for the first time during the workday; subsequent exits from the car park using the same identification card do not register any further deductions, so drivers can leave and return during the day without charge. An alternative policy is to offer each employee a monthly transportation allowance, and to deduct a payment for parking on each day a commuter uses an access card to enter the firm's parking facility; the money that is not used for parking can be taken in cash at the end of the month.

67. In linear-programming terms, the user-optimizing solution is the same as the system-optimizing solution. Shoup (1999) analyzes how market-clearing prices will allocate parking spaces efficiently.

68. See Brown, Hess, and Shoup (2001 and 2003).

69. Several manufacturers's websites demonstrate how the in-vehicle meters work. For example, see [www.ing.co.il/ganis/html/virtualdemo.html](http://www.ing.co.il/ganis/html/virtualdemo.html). The in-vehicle meters are a hi-tech version of the simple voucher parking systems used in some cities, such as New Haven, Connecticut. Motorists buy a booklet of permits and use them by scratching off the appropriate panels indicating the date and the time they have parked and placing the vouchers on the inside of the car window.

70. In spaces with a time limit, the time display becomes negative if a driver overstays the limit; traffic enforcement officers can then issue a ticket just as they do when a conventional parking meter shows a violation. Alternatively, the city can set the in-vehicle meters to charge for parking at an accelerated rate for those who overstay the time limit.

71. *Public Technology*, November/December 1990, p. 4.

72. Ready (1998, 9). In 1996 Aspen received the International Parking Institute's Award of Excellence for its transportation and parking plan. Aspen charges a one-time deposit of \$40 for the meters, and this is refunded when users leave the program.

73. UCLA Internal Audit Department, *Parking Service Special Review 90-201507*.

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