The Arkansas State University Parking Garage

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ABSTRACT

This paper presents a case study based on a regional university's decision to resolve a longstanding parking problem by constructing a parking garage. Although the garage was expected to generate an annual profit, usage of the garage and, accordingly, its revenues, fell well below expectations. The case analysis incorporates discussions of sunk costs, consumer choice theory, relevant revenues and costs, price elasticity of demand, market entry, and the use of the pricing mechanism to allocate scarce supply.

Keywords: supply and demand, price elasticity of demand, sunk costs, market entry, relevant revenues and costs

INTRODUCTION

tudents, faculty, and staff at Arkansas State University had long complained about inadequate parking on campus. Finding a parking space could be difficult, particularly between the hours of 9:00 AM and noon. The problem was especially acute during the first few weeks of the fall semester, when finding *any* parking space seemed nearly impossible. Beyond this initial period, the parking spaces nearest the classroom buildings were typically filled by 9:00 AM, but drivers could usually find a space in the rear half of parking lots.

To address the problem, the university planned to build a three-tiered parking garage. Funded by a bond issue, the $5.5 million project was not only expected to alleviate the longstanding parking problem, but also to turn an annual profit of $60,000. By all accounts, the investment proved to be a disaster. While parking continued to be tight across campus, the parking garage was ¾ empty most of the time. Accordingly, the revenues collected from daily users of the garage were only 28-36% of the original projections. Instead of eliminating the parking problem and generating positive net income for the university, the garage was underutilized and a money-loser.

BACKGROUND

Arkansas State University is a mid-sized regional university in northeast Arkansas. Over the previous ten years, its enrollments ranged from 9,000 to 9,500 students. Altogether, students, faculty, and staff totaled over 12,000. The university calendar includes two regular semesters that last 15 weeks plus two five-week summer semesters that meet four days per week. Although the campus had its own residence halls, 80% of the undergraduate population commuted to campus. Students who commuted to campus could obtain a parking decal for $20. This would allow them to park in any of the 8,350 parking spaces on campus, except for the handicapped spaces and the 458 "green" spaces that were reserved for faculty. Faculty could purchase decals for $40, allowing them to park anywhere except for the handicapped spaces.

The only other parking restrictions came from the 369 reserved parking spaces and the 60 metered spaces. The reserved spaces were very convenient to classroom buildings and required not only a parking decal, but an additional $200 annual fee. The 60 metered spaces were positioned next to classroom buildings, and were usually the closest parking spaces to the classrooms. Drivers could park in a metered space at a cost of $.05 for three minutes, $.10 for six minutes, or $.25 for 15 minutes.

With its large number of commuting students, the university had a problem accommodating all of its drivers. Individuals who arrived by 8:00AM had little problem finding a place to park, but by 9:00AM, the spaces convenient to the classroom buildings were invariably filled. Persistent drivers would eventually find a parking space, but only in the rear lots that were a longer walk to the classrooms. The university also maintained a large parking lot near its Convocation Center, but the lot was relatively far from any of the classrooms and consequently, sat empty most of the time.

To address the continued flood of complaints, the university made plans to build a $5.5 million three-tiered parking garage that would be funded by a bond issue. Although the garage would not be as close to most classroom buildings as some of the existing lots, it would sit near one of the largest lots on campus and would be significantly closer to classes than the Convocation Center lot. Moreover, the garage would sit next to a new student union that was under construction.

The garage would consist of 613 parking spaces. However, to accommodate the garage and the new student union, 200 existing spaces would have to be eliminated. Consequently, the garage would result in a net addition of 413 parking spaces. Between 40 and 50 of these spaces would be reserved spaces, available at an annual cost of $400. The remaining spaces would be available on a "pay-as-you-go" basis to anyone holding a parking decal. Anyone seeking to park in the garage would pay $1, allowing him/her to park for a period of up to four hours.

In addition to alleviating the parking problem, the garage was expected to generate an annual profit. Vice President of Student Affairs, Robert Sampson, revealed the projected net income for the parking garage. Exhibit I illustrates the projected expenses and revenues from the garage.

To pay for the debt service on the bond issue, the price of a decal would be increased by $20. In addition, the university projected revenues of $17,000/year from the reserved parking spaces in the garage and $160,800/year from drivers who paid the modest parking fee to use the garage. Coupled with the revenues from the parking meters, parking fines, other reserved lots, and money diverted from a food service provider, the facility was expected to generate an annual profit of $60,315.

EXHIBIT I
Estimated Annual Budget for New Parking Garage

Revenues		Expenses	
Parking Meters:	$36,540	Full-time Labor:	$33,901.40
Parking Decals: ($20/decal)	$171,530	Part-time Labor:	$14,214
Traffic Fines:	$75,000	Utilities:	$14,000
Parking Garage Patrons:	$160,800	Maintenance:	$25,000
Parking Garage Reserved Spaces:	$17,000	Debt Service:	$424,900
Reserved Lot Fees:	$73,800		
Food Service Commitment:	$37,700		
Total Revenues:	**$572,370**	**Total Expenses:**	**$512,055.40**

Projected Annual Net Income from Parking Garage: $60,314.60

Once it was finally completed on February 18, 2002, the parking garage fell well short of expectations, both in terms of usage and financially. "Just judging by when I patrol, I'm only seeing about 50 cars there," said Captain Mark Freeman of the University Police Department, "Going by the parking decals, about 18-20 are student

cars." (The Herald, March 25, 2002). Sampson suggested that the $1 daily charge had no effect on the low utilization of the parking garage, noting that fee is the same the one would pay to park at one of the metered spaces on campus. He also stated that the underutilization of the facility in its early days was fully anticipated and that the university did not expect full use of the garage until the summer of 2003, when the student union was expected to be completed. "When the [student union] is complete, that's when we'll see the fullness of the use of the parking garage." (The Herald, March 25, 2002).

Exhibit II shows the revenues and expenses from all oncampus parking for the years 2003-2005. By 2005, the garage had 55 reserved spaces; the covered spaces on the first two decks were available at an annual cost of $400 whereas the uncovered reserved spaces on the top deck could be rented for $300/year. In addition to the reserved spaces in the garage, 490 reserved spaces were available across campus at the rate of $200/year. Finally, by 2005, 65 parking meters were in service.

As Exhibit II clearly shows, usage of the garage increased from the low utilization level witnessed in 2002, but still fell significantly below the initial expectations even after the student union was completed. Instead of generating $160,800/year in daily usage, the garage pulled in only $58,943 in 2004 and $45,156 in 2005. Some of the dropoff in 2005 might have been attributed to a new parking lot constructed at a cost of $16 million (The Herald, April 5, 2004). The new lot provided spaces that were closer to the classroom buildings than the parking garage. Some of the new spaces were relegated to faculty and some of the spaces in a nearby lot were converted into reserved spaces. Even without the new parking lot, however, usage of the garage was significantly below expectations.

EXHIBIT II

REVENUES	*2003*	*2004*	*2005*
Parking Decals:	$410,616	$418,331	$498,387
Reserved Lot Fees:	$101,068	$83,973	$75,722
Fees:			
Parking Garage	$46,681	$58,494	$45,156
Parking Meters	$55,366	$50,895	$37,672
Reserved Lot Fees	$256	$20	----
Fines:	$298,150	$264,468	$316,608
Other Income:			
Parking Garage:	----	----	$37,700
Total Revenue:	**$912,137**	**$876,182**	**$1,010,245**
EXPENSES	*2003*	*2004*	*2005*
Salaries:	$26,992	$28,829	$46,680
Part-time Labor:	$709	$45,333	$43,030
Fringe Benefits:	$9,540	$11,376	$13,880
Supplies and Services:	$45,353	$50,242	$81,201
Capital Outlay:	$2,600	-----	-----
Debt Service:	$424,964	$424,777	$471,093
Total Expenses:	**$510,158**	**$560,558**	**$655,885**

Figure 1
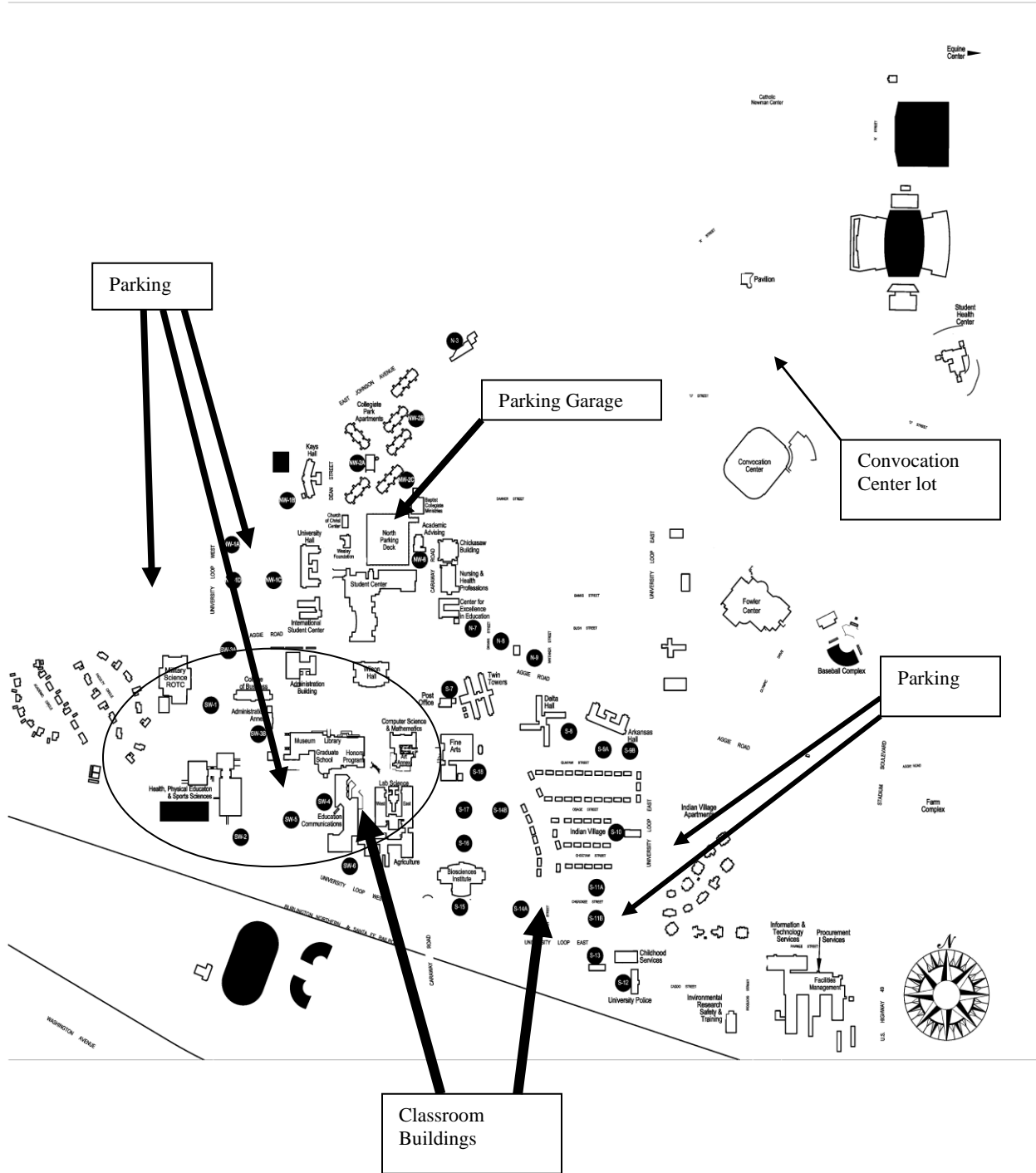
THE ARKANSAS STATE UNIVERSITY PARKING GARAGE

INSTRUCTOR'S MANUAL

CASE OVERVIEW

In response to years of complaints from faculty, students, and staff about inadequate parking spaces on campus, Arkansas State University issued a $5.5 million bond to construct a three-tiered parking garage. In addition to alleviating the parking problems on campus, the garage was expected to generate an annual profit of $60,000. Instead, garage usage fell significantly below expectations, with daily usage generating only about a third of its anticipated revenues.

The case requires students to apply basic microeconomic theory to determine why the garage failed to live up to expectations. It incorporates the concepts of sunk costs, relevant costs and revenues, consumer choice theory, the price elasticity of demand, and market entry. The case would be suitable for an undergraduate principles of microeconomics or intermediate microeconomics class. It would also be a useful case at the MBA level.

LEARNING OBJECTIVES

1.   To discern relevant costs and revenues in evaluating decisions.
2.   To utilize the basic tools of supply and demand to solve a rationing problem.
3.   To understand the concept of sunk costs and the role they play in decision-making.
4.   To understand basic microeconomic foundations in consumer decision-making.
5.   To utilize existing data to determine if a market is ripe for entry.

QUESTIONS

1.   In deciding whether to undertake a project, a firm must identify its relevant costs and revenues. By examining Exhibit I, what revenues and expenses are relevant to the construction of the parking garage?

On the expense side, the debt service on the garage is clearly a relevant cost. Beyond that, the maintenance costs, and the utilities expenses may also be indigenous to the garage. It's unclear as to what percentage of the labor costs are indigenous to the garage or parking in general. At the very least, relevant costs total $425,000.

On the revenue side, several of the funding sources are irrelevant to the decision. Clearly, the revenues from daily garage usage and the reserved lots in the parking garage are relevant. The increase in parking decal revenues is also relevant because raising the price of parking decals is tied to the construction of the garage. The parking meters are not located in the garage; consequently, these revenues will be generated with or without the construction. (Some of the more astute students may note that the revenues generated from the reserved parking spaces and metered spaces may be relevant if drivers choose the garage over meters and reserved spaces elsewhere on campus. However, these are revenue sources that, if relevant, are likely to *fall* after the garage is completed). Revenues from the contract with the food service provider are the same with or without the garage. Consequently, contributions from the food service provider are not relevant revenues. Finally, only those traffic fines collected from violators in the parking garage are relevant. It is unclear as to whether this item includes all parking violations on campus or only those projected to come from the garage. At the very minimum, therefore, at least $148,000 of the projected revenue stream of $572,000 is not relevant to the decision.

2.   Did the university suffer from a shortage of parking spaces before the garage was built?

The university never suffered from inadequate parking spaces. This is clear by virtue of the fact that the parking lot at the Convocation Center sat empty and that aside from the first couple of weeks in the fall semester, drivers eventually found parking spaces. Although your students will likely assert the university had a shortage of spaces close to classroom buildings, the alleged "shortage" was actually a product of charging a single price for

access to virtually any space on campus. Prime parking spaces were allocated on a first-come, first-served basis. Consequently, these spaces were filled fairly quickly. Drivers who arrived at 9:00 or later sought these spaces but eventually settled for more distant lots.
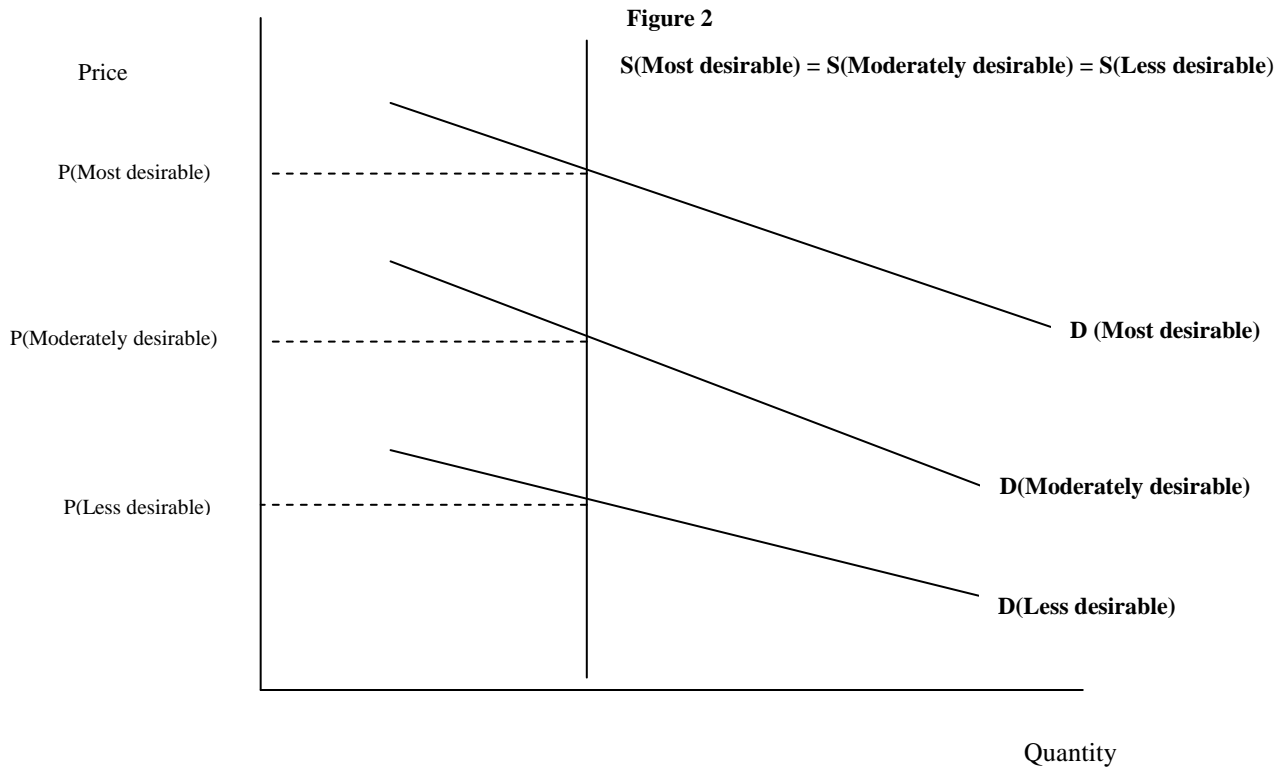
This phenomenon can be viewed by looking at a supply/demand diagram (Figure 1). If we were to designate parking spaces as "most desirable", "moderately desirable" and "less desirable", the demand for the "most desirable" spaces will exceed the demand for the "moderately desirable" spaces, which will exceed the demand for the least desirable spaces. For simplicity's sake, we will assume the same supply of "most desirable", "moderately desirable", and "less desirable" spaces are available to drivers and are fixed in number (i.e. independent of the price of a parking decal). Because a single decal price allows the driver to park in any of these lots, we can see a surplus of spaces in the "less desirable" lot (the Convocation Center) and a shortage of spaces in the "most desirable" lots (i.e. those closest to the classrooms).

Figure 1
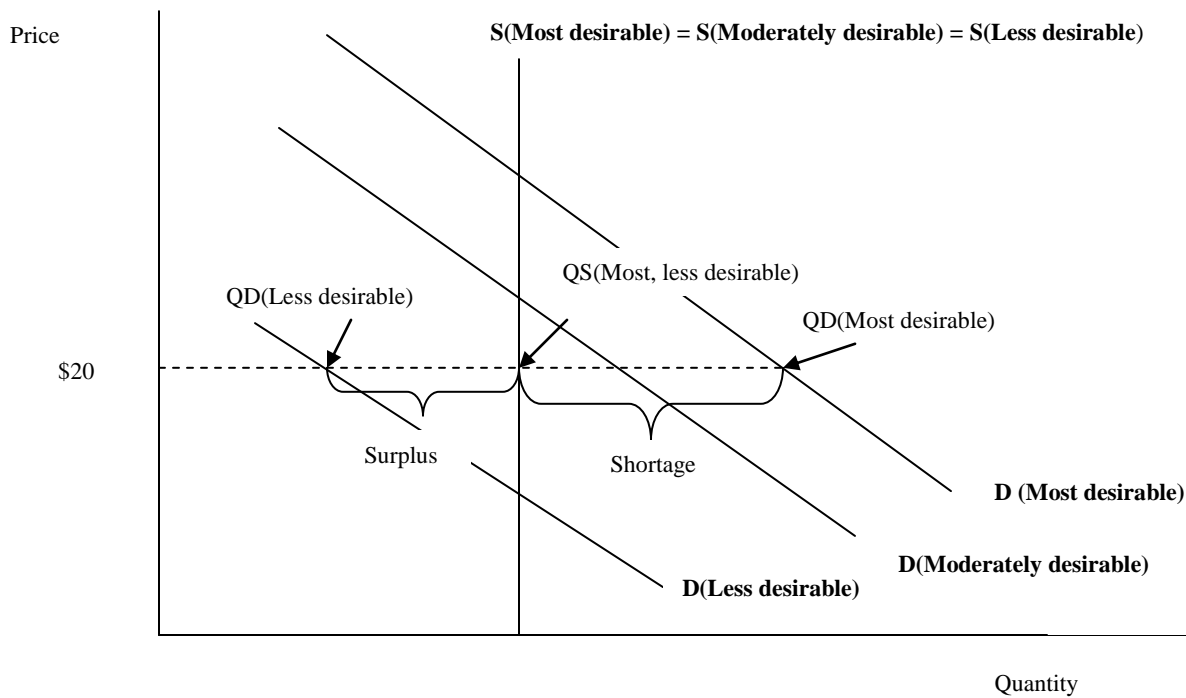
3.   Could the parking problem have been resolved without building a garage?

Figure 1 clearly revealed that university parking suffered from a pricing problem, not a problem of inadequate space. Figure 2 shows how the problem could have easily been resolved. The university's "one-price-fits-all" scheme caused drivers to eschew the more distant lots in the hope of parking close to their classes. If the university charged different prices based on the relative desirability of the parking lots, the market would have cleared because students would select the decal price that best suited their preferences.

Figure 2

S(Most desirable) = S(Moderately desirable) = S(Less desirable)

Price

P(Most desirable)

P(Moderately desirable)

P(Less desirable)

D (Most desirable)

D(Moderately desirable)

D(Less desirable)

Quantity

Sometimes students greet the notion that the parking "problem" would be eliminated with a different pricing structure with a bit of cynicism. As far as they're concerned, the university simply needs more parking spaces close to classrooms. To help drive down the point, ask them what would happen if the price of decals for the most desirable lots was set at $1,000 whereas the price for the less desirable lots were set at $.10. Figure 3 shows the likely result. With prices this extreme, few drivers would opt for the most desirable lots and the majority would pay for the cheap less desirable spaces. Note that by changing the prices, the shortage of "most desirable" spaces turns into a surplus while the surplus of "less desirable" spaces turns into a shortage.
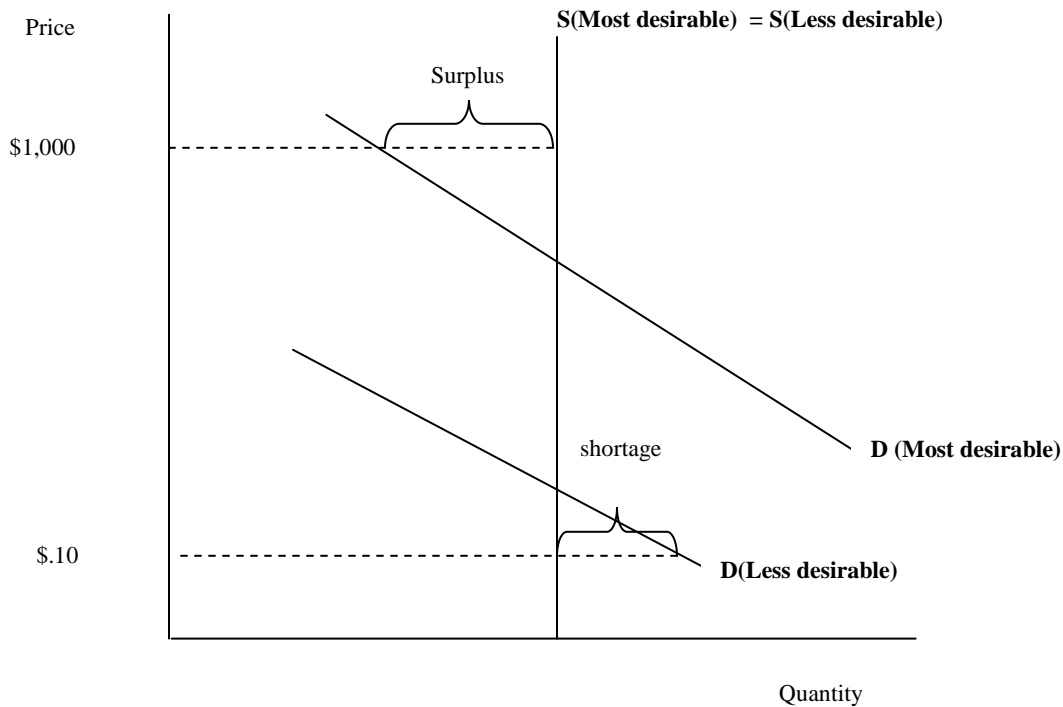
4.   What implications does microeconomic consumer choice theory have on driver's reluctance to use the parking garage?

Consumers typically say they want the good that gives them "the most for their money". Consumer theory states that in evaluating alternatives X and Y, consumers weigh the MU_x/P_x against the MU_y/P_y (the marginal utility per dollar spent) and choose the alternative with the higher ratio (i.e. the alternative that gives them the most for their money). In choosing between a parking space in the garage (G) and a non-garage space (N), the student must weigh MU_G/P_G against MU_N/P_N. The driver must pay $1 to park in the garage ($P_G = 1) whereas he/she can park in a non-garage space at no extra charge ($P_N = 0). This unambiguously suggests that $MU_N/P_N > MU_G/P_G$ because $MU_N/P_N = \infty$. In other words, drivers would never choose to pay for something they can get for free.

However, the cost of parking is not simply a money cost, but also a time cost. Drivers have an imputed money value on the cost of their time. When parking is tight, drivers have to search for an available parking space. They also consider the time cost of commuting between their parking space and their classroom building. If we designate the search costs as (S) and the commuting costs as (C), drivers determine whether to park in the garage by evaluating:

$MU_G/(P_G + S_G + C_G)$ versus $MU_N/(P_N + S_N + C_N)$.

Figure 3

Price   S(Most desirable) = S(Less desirable)

Surplus

$1,000

shortage   D (Most desirable)

$.10   D(Less desirable)

Quantity

Because most of the garage spaces are empty, the driver's search cost (S) can be reduced by parking in the garage. Hence, $S_G < S_N$. Drivers also wish to reduce the commute (C) between the parking space and their classroom building. However, the garage is farther from classes than most parking spaces. Therefore, for the most part, $C_G > C_N$. If, aside from money and time costs, a driver is indifferent between parking in the garage versus elsewhere, he/she will choose the garage only if the marginal reduction in search costs from parking in the garage exceeds the dollar fee plus the marginal value of the increase in commuting time, or

$$(S_N - S_G) > P_G + (C_G - C_N).$$

To illustrate an example, suppose the garage adds five minutes to the driver's commute to class (or 10 minutes roundtrip). If the driver believes he/she can find a parking space 10 minutes faster by choosing the garage over searching the other lots, he/she will still not park in the garage because of the dollar fee. In other words, the reduction in search costs by parking in the garage must more than offset the increase in commuting costs.

The above example assumes $MU_G = MU_N$, or that the driver is indifferent between the garage and the non-garage spaces except for the money and time costs. Because the first two tiers of the garage spaces are covered, some drivers may prefer the garage spaces over the non-garage spaces, particularly on hot days or on rainy days (although drivers will have to brave the elements by commuting to their classroom buildings). All else held constant, this increases the likelihood that the driver will choose to park in the garage.

5.   Did the university have any data that could provide any clues as to the drivers' preferences?

Interestingly, prior to constructing the garage, the university had ample evidence to suggest the garage would be underutilized. The 60 parking meters around campus were situated at the most desirable parking spaces on campus. As mentioned by the Vice President of Student Affairs, the cost of parking in the garage was commensurate with parking at a meter for the length of a one-hour class. According to Exhibit I, the meters

generated $36,540, or an average of $609 per meter per year. The meters are not policed on weekends or between semesters. The university's regular semesters last 15 weeks each. In addition, the university supports two five-week summer sessions that meet four days/week. If we add one week to each semester to accommodate students arriving early to register for classes and pay their fees, the meters are likely to be used 200 days per year. This implies an average revenue per meter per school day of $609/200, or $3.05. At a cost of $1/hour, the average meter is occupied three hours per school day. With classes meeting from 8:00AM until 5:00PM (not including evening classes), the meters are only occupied 1/3 of the time. Clearly, if existing evidence showed no excess demand of drivers indicating a willingness to pay $1 to park right next to their classroom buildings, a garage that is not convenient to most classroom buildings is not likely to attract many drivers.

After the fact, the pre-existing evidence supported this notion. At a cost of $1 to park in the garage, the university's initial estimates of $160,800/year implied revenues of $804/day ($160,800/200 days), or an average of 804 persons paying $1 to use the garage. The garage only holds 560-570 non-reserved spaces, so the projection implies a steady stream of drivers moving in and out of the facility. In contrast, 2004 and 2005 figures demonstrated that the total number of users averaged between 225 and 295 drivers per day.

6.   Could the university change its pricing policy to increase both usage and revenue?

Although the precise level of relevant costs is difficult to ascertain from Exhibit II, we know the garage must generate at least $425,000 to cover its debt service. With 55 reserved spaces being rented in the garage at rates of $300 and $400, we can infer these spaces generate revenues between $16,500 and $22,000. Although Exhibit II also indicates garage revenues of at least $37,700, this clearly refers to the contributions from the food service provider (budgeted at $37,700/year in Exhibit I) and is not a relevant revenue source.

The remaining relevant costs and revenues are difficult to infer from the exhibits. Undoubtedly, much of the increase in parking expenditures in 2005 reflects the cost of building the new lot. The total salaries expenses in 2003 and 2004 are similar to the costs budgeted in Exhibit I. This implies that at least some (and possibly all) of the salaries listed in Exhibit I is not relevant to the parking garage. If we treat the debt service as the only relevant cost, the garage to break even if university parking can increase its revenues by an additional $400,000 (the debt service less revenues from the garage reserved spaces).

The cost of a parking decal is a sunk cost. Once the driver pays for a decal, he/she can park virtually anywhere on campus at no additional cost. In contrast, the $1 garage fee is incurred only if the driver chooses to park in the garage. For this reason, drivers are steered away from the garage. Not surprisingly, therefore, actual revenues from daily usage ($45,000-$58,000 per year) fell well below the projected figure of $160,000----a shortfall of $100,000-$115,000 per year.

Exhibit I shows estimates the university expected to sell roughly 8,575 decals ($171,530/$20 = 8,576.5). If the needed $400,000 is divided by 8,576, the university could eliminate the $1 parking garage fee and pay off the debt service by adding roughly $47 to the cost of a parking decal. In doing so, the $47 surcharge becomes a sunk cost and drivers are not penalized for using the garage on any given day. Consequently, garage usage is likely to increase beyond its present level. Of course, the university must consider the impact of the decal price increase on the number of decals purchased. Overall, the demand for on-campus parking is fairly inelastic. On-campus parking is a necessity for faculty, staff, and off-campus students. Some drivers may opt to carpool to avoid the surcharge and some of the closest off-campus residents may choose to walk or ride bikes to class. However, because the $47 surcharge is not substantial, and the alternatives for getting to campus are fairly distant substitutes, the decline in decal sales should be fairly small.

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BASIS FOR RESEARCH

The original budget for the garage was distributed to the Faculty Senate by the Vice President of Student Affairs. Portions of the budget were reprinted in the *Jonesboro Sun* newspaper. The financial data for the years 2003-2005 and additional information regarding parking was provided by Dave McKinney, ASU Associate Director of Parking Services and Russ Hannah, ASU Assistant Vice Chancellor for Finance/Controller. The names of the persons mentioned in the case have been disguised.

<u>NOTES</u>