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Are MIT Students Rational?

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ARE M.I.T. STUDENTS RATIONAL?

Report on a Survey

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This paper reports the results of a survey conducted in the Massachusetts Institute of Technology campus dining halls. The aim of the survey was to delineate students' perceptions of marginal costs in a very specific, but not uncommon, situation. A majority of the respondents' answers suggest a complete misunderstanding of the relevant marginal costs.

This study attempts to find out how individuals perceive their opportunity sets in a specific choice situation. The individuals studied are students who have meal plans at the M.I.T. dining halls. Each term students pay a high price for the meals until a certain number of meals have been purchased. Thereafter there is a substantial discount of 42 percent. For a student who knows he will pass the limit, the marginal cost of an additional meal is the discounted price.

A survey conducted in the Fall of 1982 and Spring of 1983 was designed to find out how students respond to this scheme. We asked how they would choose between a meal at their regular dining hall and one at an alternative dining hall with a fixed price above the discounted price. More than half of the respondents gave answers inconsistent with a rational choice based on correctly perceived marginal costs. These results indicate that price, tax, or subsidy schemes may often be misunderstood by those who are subject to them and that choices will often not be those predicted by economic theory.

Two types of meals can be purchased at the M.I.T. dining halls: commons and a la carte. Commons meals are priced on the basis of points: breakfast is one point, lunch two, and dinner three. A student who eats a la carte, on the other hand, pays for each item purchased separately. A typical meal includes

*We thank Garth Saloner and Andrei Shleifer for comments and retain responsibility for errors.

several different offerings, each of which may be purchased a la carte. A designated subset of these offerings may be purchased on commons. Students may use their accounts to pay for both commons and a la carte meals.¹ The important difference between the two types of meal plans is that the price of a commons meal is reduced by 42 percent after the student has used 160 commons points. There is no discount for a la carte purchases. After 160 points have been exhausted the price of a point goes down from \$2.09 to \$1.17. The dinner price, for example, drops from \$6.09 to \$3.51.²

The large discount for commons meals is the most interesting aspect of the meal plan. For a student who is certain of using 160 points, the marginal cost of a meal is the discounted price, not the price reported by the register earlier in the term.

The aim of our survey was to delineate students' perceptions of the marginal cost of a commons meal. The key question ran as follows:

Imagine that a temporary restaurant will open near your dining hall selling meals equivalent to the commons meals in the dining halls at the following prices:

		Seconds
Breakfast	\$1.30	\$1.60
Lunch	\$2.50	\$3.00
Dinner	\$3.70	\$4.40

The restaurant will be open for only two weeks. You may use your meal card there, but purchases at the restaurant do not count toward your commons meal discount. Some of your friends will go to the restaurant and some will stay in the dining halls.

Would you go to the restaurant? yes no

The prices listed lie between the reported and the discounted price for each meal. Any student certain of using 160 points faces a marginal cost for each meal which is lower than the restaurant prices above.

We then asked why the respondent answered yes or no to the above question, presenting several possible answers.

- (a) If yes
- (i) To save money
 - (ii) It's a nice change
 - (iii) I prefer the atmosphere of a restaurant

¹The numbering of the meal plans - 360, 310, 260 - reflects the number of commons points available under the plan.

²The lunch price drops from \$4.06 to \$2.34, and the breakfast price from \$2.34 to \$1.17. A student with a meal plan that allows for seconds receives the following discounts on dinner, lunch, and breakfast: \$6.84 to \$4.29, 4.56 to 2.86, 2.28 to 1.43.

- (b) If no
- (i) I prefer dining halls
 - (ii) It's too expensive

Before discussing the results two points should be noted. First, someone who answers 'yes' and 'to save money' is surely comparing and using costs as a reason for his choice. Second, this is not a purely academic exercise for the respondents. Of course, the example with the restaurant is hypothetical, but these students make similar decisions in real life when they face the choice of going to the dining hall, eating in their rooms, or going to a nearby sandwich shop. They have real incentives to know and understand the dining hall cost schedule.

It is difficult to determine which respondents correctly perceived marginal costs. We therefore settled for identifying the group that had the wrong idea. Any respondent certain of using 160 points who answered 'yes' and 'to save money' (YTSM) was wrong about the effect of his choice on total cost, and certainly misunderstood the relevant marginal costs.

A total of 118 answers remained when we had discarded those subject to disturbing influences. See table 1. In this group 80 students gave the answer 'yes' and 'to save money'. Thus, 68 percent of our final sample apparently were unaware of the marginal cost of a commons meal.

That two thirds of the respondents thought they would save money by going to the restaurant leads us to wonder (1) whether this perception is in fact correct, and if not (2) what might explain the large fraction of wrong answers?

Concerning the first question, we can suggest reasons why the relevant marginal cost for a commons meal at the dining hall could be higher than the discounted price. The most obvious is uncertainty. The reported planned number of meals per week is subject to some uncertainty. There may therefore be some probability that the respondent will not reach the discount

Table 1
Sample and results.

Total number of surveys given out	295
Non-respondents and discards	177
Of which: planned use less than 14 points per week	48
required use greater than planned	56
crazy answers	15
Valid surveys	118
Answers: Yes + to save money	80
Yes + other reason	27
No	11

limit (160 points). If this is true the expected marginal cost is a probability-weighted average of the discounted and the non-discounted prices. Such a weighted average could be higher than the restaurant price if the probability of not reaching 160 points is large enough.

The survey does not give any direct information about the degree of uncertainty attached to planned dining behavior. Our subjective experience of dining hall behavior, however, indicates that habits are rather stable within one semester. Therefore, as the survey was made five weeks into the semester, each respondent should have been able to make a fairly good prediction of his average number of meals per week. Still, uncertainty may explain a fraction of the YTSM answers among students who planned to use only a little more than 160 points. This hypothesis is consistent with the results reported in table 2, in which the respondents have been divided into groups according to planned number of meals. Note that the fraction of YTSM answers is higher among those who planned to use 14–23 points per week than among those who planned to use more. Still, in the three groups with planned point usage substantially above 14 points, more than 50 percent answered YTSM.

Table 2
Answers according to planned number of meals.

Answer	Planned number of points per week ^a					Total
	14–18	19–23	24–28	29–38	34–39	
Y+TSM	12 (80)	24 (80)	28 (66)	9 (50)	7 (54)	80
Y+other reason	2 (13)	5 (17)	10 (24)	7 (39)	3 (23)	27
No	1 (7)	1 (3)	4 (10)	2 (11)	3 (23)	11
Total	15 (100)	30 (100)	41 (100)	18 (100)	13 (100)	

^aPercentage in parentheses.

High subjective rates of discount may be another explanation for our results. One might argue that if rates of discount are very high, agents care only about what they are paying now and not about future savings. This does not seem relevant, however, as students buy meal plans at the beginning of the term and possible savings (by not using the meal plan) are only refunded at the end of the term. This implies that the marginal cost of a dining hall meal should be discounted more than a restaurant meal, which would tilt the comparison in favor of the dining hall meals.

Having dismissed discounting and having accepted uncertainty as an explanation for only a fraction of the answers, we must conclude that the

answer given by more than half of the respondents is inconsistent with the standard rationality theory of choice. The respondents who said that they would go to the restaurant to save money did not correctly perceive their opportunity sets.³

Respondents may be using the simple rule of thumb 'buy where the price is lowest'. Such a decision rule is optimal when the reported price is identical to marginal cost, so that the price completely characterizes the relevant aspects of the opportunity set. It seems that a large number of respondents did not perceive that the opportunity set in the present case is more complex, so they used the prices reported by the cash register in making their choice.

One might expect that increased experience with the meal plan would lead to a better understanding of the price system. Table 3 shows, however, that no clear relation exists between the number of terms that students have had a meal plan and the fraction that answered YTSM.

After seeing the results, we became worried that some features of the survey had seriously affected the outcome. We therefore decided to do a second survey where some questions were slightly changed. In this second survey the prices of the alternative eating place were set slightly higher, at 20 percent above the discounted prices. Also, the word 'restaurant' was replaced by 'temporary dining hall'. This survey was done in another dining hall where we received only 38 relevant answers. Fifty respondents did not return the survey. Of those who returned the survey 15 planned to use less than 14 points per week, 9 answers were incomplete, and 69 of the respondents were required to have meal accounts which they did not plan to exhaust. Of the 38 relevant answers, 20 (53 percent) answered 'yes' and 'to save money', 6 (16

Table 3
Answers according to experience.

	Experience in meal plan (terms) ^a		
	0-1	2-3	4-5
Y + TSM	33 (61)	15 (60)	32 (80)
Y + other reason	14 (26)	9 (36)	4 (10)
No	7 (13)	1 (4)	4 (10)
Total	54	25	40

^aPercentage in parentheses.

³Informal conversations with students after the survey also confirmed our impression that many simply had not considered the relevant marginal costs. One economics student commented that he thought he 'had six dollars to eat pizza with' whenever he abstained from a commons dinner.

percent) answered 'yes' and had another reason, and 12 (31 percent) answered 'no'. Although the fraction of wrong answers declined, it is still substantial, and supports the main point of this paper.

Appendix A

Survey

- (1) Do you have a meal plan? yes no seconds plan
 (2) Are you required to have a meal plan? yes no
 (3) If so, which size meal plan are you required to have
 360 310 240 210
 (4) How many commons meals per week do you expect have this Fall?

Number of commons meals per week

Breakfast _____

Lunch _____

Dinner _____

- (5) How many semesters have you had a meal plan?
 0 1 2 3 4 5 or more

- (6) What is your status at MIT?

Undergraduate _____

Graduate _____

Faculty _____

Other (describe) _____

- (7) What is your major field of study or course number?

- (8) Imagine that a temporary restaurant will open near your dining hall selling meals equivalent to the commons meals in the dining halls at the following prices:

		Seconds
Breakfast	\$1.30	\$1.60
Lunch	\$2.50	\$3.00
Dinner	\$3.70	\$4.40

The restaurant will be open for only two weeks. You may use your meal card there, but purchases at the restaurant do not count toward your commons meal discount. Some of your friends will go to the restaurant and some will stay in the dining halls.

Would you go to the restaurant? yes no

- (9) If yes, why? (Cross all relevant reasons.)

- To save money It's a nice change
 I prefer the atmosphere of a restaurant

- (10) If no, why?

- I prefer dining halls It's too expensive

Appendix B

Notes on survey

- (1) Students participate in the meal plan at M.I.T. by signing contracts at the beginning of each term. The meal contract offers nine plans. The choice between plans is based on expected number of meals per week. Upon signing a contract for a specific plan the student puts money into an account – the amount depending on the size of the plan – which is drawn upon to pay for meals throughout the term. For example, a student expecting to eat 14 meals per week in the campus dining halls would sign up for a 360 meal plan and put \$559 into his account. A card is also issued, which the student uses to charge meals. Most students living in campus dormitories are required to have meal plans.
- (2) An important question asked in the survey was the expected number of meals per week. There are 14 weeks in the Fall term in which a student may eat in the dining halls. Any student who plans to exhaust 160 points even if he goes to the restaurant for two weeks, must use on average a minimum of 14 commons points per week. Since our test aimed at those who would receive a discount, we discarded responses from students whose expected number of points per week was less than 14.
- (3) Problems might also arise in using responses from students who were either unlikely or just likely to use up their *required* semester accounts. It is possible that many of these respondents would be reluctant to go to a restaurant simply because eating outside of the dining hall would leave more money in their accounts that would not be used over the term. If the student has a required meal plan, money not used over the term is lost. A student with a 360 plan must use a minimum average of 30 points per week if he plans to exhaust his account. A student with a 310 should use 26, a 260 plan holder should use 22, and a 210 plan holder should use 18. We discarded responses from students who were required to have meal plans and whose expected number of meals per week, evaluated in terms of commons points, were less than or just enough to exhaust their required semester accounts.
- (4) The statement that the restaurant will remain open for only two weeks (see survey) was made to ensure that the respondent makes a marginal comparison. If our hypothetical restaurant were to remain open for the entire term, students might consider going either to the restaurant or to the dining hall for the rest of the term. For such a choice the relevant comparison would be the total (or average) cost of meals for the rest of the term. Restricting the life of the restaurant makes a marginal cost approach valid for this exercise.
- (5) An important non-pecuniary factor that might influence the respondent is the cost, in time and shoe leather, of carrying enough money to go to a restaurant daily. We tried to remove this influence by allowing our restau-

rant to accept charges on meal cards as payment. It was obviously necessary to state that the restaurant meal purchases would not count toward the commons meal discount. Recognizing that the presence of friends is another important factor in the decision to eat in the dining halls, we added the assurance that some of the respondents' friends would go to the restaurant also.