2 Discussion problem: Student Choices
(for possible assignment with chapters 3 or 15)

(This example is covered in some detail in chapters 14 and 15, but we pose the issue here for use in those courses that will not cover the last two chapters. Professors might pose the problem during the first day of class just to find out how students divide on the two choice (for reference when the problem is taken up late in the course).

Suppose you and your classmates are asked to choose one of these two options:

Option A. Students choosing this option will receive a certain payoff of $800.

Option B: Students choosing this option have one opportunity to pull one "ticket" from a barrel of tickets (which they cannot see). In the barrel 85 percent of the tickets are worth $1,000; 15 percent are worth $0. The tickets are thoroughly mixed in the barrel.

1. **First step in the discussion:** Which option would you take? (Which option did other members of your group pick, if you have a group? What is the percentage distribution of the group in the choices taken?)

   To be determined by students and their groups. There is no right or wrong answer, or right or wrong division of choices.

2. **Second step in the discussion:** Suppose that 80 percent of the hundred students choose Option A and 20 percent choose Option B.

   (These two choice options have been given students in experiments classroom settings, with the percentage of students taking Option A varying between 75 and 85 percent.)

   a. Are the choices of either group "irrational" (or "not rational")? Why or why not?

      No, neither choice is *necessarily* "irrational." Some students (a likely majority in this case) can be "risk averse" and will prefer the sure-thing outcome ($800) to the gamble, which does have a higher expected value ($850 = [85% x $1,000] + [15% x $0]). Moreover, people's rational choices can be a function of the variance of outcome, and the outcome of the gamble 1/0, or $0 or $1,000, which suggests a high variance and, thereby some loss of utility for Option B not associated with Option A.

   b. Is there "money being left on the table" by the choices either group of students made? Which group? If so, are their choices irrational? Why or why not?

From the answer to 2a, it is obvious that there is "money being left on the table," in a sense. The eighty students who choose Option A receive a total of $64,000 (80 x $800). If all of these students had chosen Option B, their total payoff would have likely been $68,000 (85% x 80 x $1,000), which means that $4,000 is, in a sense, being left on the table. However, choosing individually, the value of the certain payoff of $800 for each student is greater than the cost (or "disutility") of their individually running the risk of getting nothing.

c. If "money is being left on the table," how might the money be picked up by you (and your teammates)? Develop at least two ways.

There are at least three possible ways student "entrepreneurs" can collect the "money being left on the table":

- The students who chose Option A (for example, 80 students) could collectively decide to choose Option B. They can then divide the *expected* total received ($68,000) equally, with each of the eighty students receiving $850.

- Some smart student could sell each student inclined to choose Option A an insurance policy (for, say, $25, or whatever it takes (below $50) to get all of them to choose Option B) that provides protection against getting nothing.

- Some smart student (an "entrepreneur") could offer the students inclined to choose Option A a fixed payment of more than $800 (and less than $850), say, $810 to choose Option B and hand over the "ticket" value (whether $1,000 or $0). If the smart student gets all (or just a sizable percentage) of the students inclined to choose Option A to pick Option B, then the smart student can be expected to receive a "profit" of as much as $40 on each student persuaded to take the deal.

- If one smart student figures out how to make money off of students inclined to choose Option A, then other students can be expected to try to do the same. The competition among the student-entrepreneurs that ensues can be expected to drive up the payments received by the students inclined to take Option A and drive down the profits of those student-entrepreneurs making the buyouts.

3. Third step in the discussion:

a. Suppose that Option A were changed to $600, while Option B remained the same?

   i. How might the distribution of the choices of the hundred students be expected to change? Why or why not?

      In any large group, members (the students) can be expected to vary in how they assess risk (which is to say that their "risk aversion" will vary). As the Option A payoff falls from $800 toward $600, more and more students will see the growing difference in the *expected* values of the two options and will be inclined to take Option B, the value of which has remained at $850. This suggests that the percentage of students taking Option A can be expected to fall, while the percentage of students taking Option B can be expected to rise.

   ii. What applicable economic principle will be at work in making your prediction of the change in the distribution of choices?

      The major applicable economic principle: the "law of demand" (or the expected inverse relationship between price and quantity, assuming all other relevant forces on relevant choices remain constant). With the decline in the value of Option A, the cost (or price) of choosing Option B goes down, which suggests more students will choose Option B.

      (Some students might reasonable argue that the relevant economic principle is that choosers will equate at the margin. As the difference in in the expected values of two options narrows, students can be expected to adjust at the margin, moving toward the relative option with the rising relatively higher expected value (which *can* come from rational behavior.)

b. Suppose that Option A remains the same (a sure-thing of $800), but Option B is changed to the following conditions: Eighty-five percent of the tickets in the barrel are worth $10 each; 15 percent of the tickets are worth $0 each. However, students are each given a hundred draws from the barrel.

   i. How might the distribution of the choices of the students between A and B be expected to change? Why?

Variance of outcomes is importance in choices (because variance can affect outcomes and the utility of given choices). The variance in the problem as initially set up above (one draw with an outcome of either $1,000 or $0) is quite high and stark. In this new specification of the problem, students have a chance of receiving either $10 or $0 on each draw, but they each have a hundred draws. The total value of all hundred draws can go all the way between $0 (they draw all $0 tickets) to $1,000 (they draw all $10 tickets). They can also be expected to draw different combinations of $10 and $0 tickets. Their individual totals can, for example, be $400 or $600 or $950. The expected value of their hundred draws is $850. Since the variance is lower in this specification of the problem, more (potentially risk-averse) students would be expected to choose Option B.

ii. What applicable economic principle will be at work in making your prediction of the change in the distribution of choices?

Again, the applicable economic principle: the "law of demand." With lower variance for Option B, the cost (price) of choosing Option B falls. The "quantity" of Option B chosen can be expected to rise. (Also, see the suggested answer for 3.a.ii.)