Chapter 1

Review Questions

1. What is your opportunity cost of reading a novel this evening?

   The opportunity cost of reading a novel this evening is not being able to do whatever you would have done instead. If you would have watched TV, then your opportunity cost is not watching TV; if you would have studied economics, then your opportunity cost is not studying economics.

2. Your roommate is thinking of dropping out of university this semester. If his tuition payment for this semester is non-refundable, should he take it into account when making his decision?

   The tuition is a sunk cost and so your room-mate should consider only costs and benefits relevant now and in the future. If he will be better off in life by leaving university now, he should not let the tuition make the rest of life less meaningful.

3. Give three examples of activities accompanied by external costs or benefits.

   Driving an automobile (which pollutes the atmosphere) imposes an external cost on others. Building a house which others admire presents an external benefit. Inventing something which is new and useful but which cannot be patented presents another external benefit.

4. Why is the opportunity cost of attending university higher for a 50-year-old than for a 20-year-old?

   A 50-year-old presumably is in a higher pay bracket than a 20-year-old so the opportunity cost of leaving the job is greater for the older person.

5. Why should sunk costs be irrelevant for current decisions?

   By definition, a sunk cost is a cost that is incurred regardless of one's current decisions.

6. How can the cost-benefit model be useful for studying the behaviour of people who do not think explicitly in terms of costs and benefits?

Economists generally argue that people act in their own self-interest even if they do not consistently evaluate costs and benefits. The analogy most frequently used (from Milton Friedman) is that of a pool player who knows how to sink his shots without having studied physics.

Problems

1. Jamal has a flexible summer job. He can work every day but is allowed to take a day off anytime he wants. His friend Don suggests they go to the amusement park on Tuesday. The admission charge for the park is €15 per person, and it will cost them €5 each for gasoline and parking. Jamal loves amusement parks and a day at the park is worth €45 to him. However, Jamal also enjoys his job so much that he would actually be willing to pay €10 per day to do it.
   a. If Jamal earns €10 if he works, should he go to the amusement park?
   b. If Jamal earns €15 . . . ?
   c. If Jamal earns €20 . . . ?

   Let €X be the amount Jamal earns in a day on his job. The cost to Jamal of going to the park is then €15 (admission fee) + €5 (gas & parking) + €10 (the lost satisfaction from not working) + €X (lost salary) = €30 + €X. The benefit of going to the park is €45. He should go to the park if his salary is €10/day, and shouldn't go if his salary is €20/day. At a salary of €15/day, he is indifferent between going and not going.

2. Tom is a mushroom farmer. He invests all his spare cash in additional mushrooms, which grow on otherwise useless land behind his barn. The mushrooms double in size during their first year, after which time they are harvested and sold at a constant price per kilogram. Tom's friend Dick asks Tom for a loan of €200, which he promises to repay after 1 year. How much interest will Dick have to pay Tom in order for Tom to be no worse off than if he had not made the loan?

   If Tom kept the €200 and invested it in additional mushrooms, at the end of a year's time he would have an additional €400 worth of mushrooms to sell. Dick must therefore give Tom €200 of interest in order for Tom not to lose money on the loan.

3. The meal plan at University A lets students eat as much as they like for a fixed fee of €500 per semester. The average student there eats 250 kg of food per semester. University B charges students €500 for a book of meal tickets that entitles the student to eat 250 kg of food per semester. If the student eats more than 250 kg, he or she pays extra; if the student eats less, he or she gets a refund. If students are rational, at which university will average food consumption be higher?

It is reasonable to assume that everybody has decreasing satisfaction from each kilogram of food as consumption level increases. In University A, everybody will eat until the benefit from eating an extra kilogram of food is equal to €0, since this is the cost of each kilogram of food. In University B, people will eat until the benefit decreases to$€x$, where $€x$ is the cost of an extra kilogram of food (or the refund from eating a kilogram less of food). Thus, everybody will eat less if they are at University B. So, not just average consumption but also each individual's personal consumption will be lower. Note that to reach this conclusion we need the assumption that the students at both universities have the same appetites.

4. You are planning a 1000-mile trip to Lisbon. Except for cost, you are indifferent between driving and taking the train. Train fare is €260. The costs of operating your car during a typical 10,000-mile driving year are as follows:

Insurance	€1000
Interest	2000
Fuel & oil	1200
Tires	200
License & registration	50
Maintenance	1100
Total	€5550

Should you drive or take the train?

The only costs that vary with mileage are fuel, maintenance, and tires, which average €0.25/mile. The cost of driving will thus be €250, and since this is less than the cost of the train, you should drive.

5. Al and Jane have rented a banquet hall to celebrate their wedding anniversary. Fifty people have already accepted their invitation. The caterers will charge €5 per person for food and €2 per person for drinks. The band will cost €300 for the evening, and the hall costs €200. Now Al and Jane are considering inviting 10 more people. By how much will these extra guests increase the cost of their party?

The band and hall rental fees are fixed costs. The caterers charge at the rate of €7/guest (€5 catering bill/€2 drink). So an extra 10 guests will increase total costs by only €70.

6. You loan a friend €1000, and at the end of one year she writes you a check for €1000 to pay off this loan. If the annual interest rate on your savings account is 6 per cent, what was your opportunity cost of making this loan?

You gave up the €60 you would have earned if the money was in your savings account. This assumes that your tax rate on interest earned is zero.

7. Bill and Joe live in Dover, England. At 2 PM, Bill goes to the local Ticketmaster and buys a £30 ticket to a football game to be played that night in London (50 miles west). Joe plans to attend the same game, but doesn't purchase his ticket in advance because he knows from experience that it is always possible to buy just as good a seat at the stadium. At 4 PM, a heavy, unexpected snowstorm begins, making the prospect of the drive to London much less attractive than before. If both Bill and Joe have the same tastes and are rational, is one of them more likely to attend the game than the other? If so, say who and explain why. If not, explain why not.

Bill has already bought his ticket, so his cost-benefit calculation when it is time to go is as follows: benefit of seeing game vs. cost of the drive + time costs, etc. Joe, not having bought his ticket, faces a different calculation: benefit of seeing game vs. £30 + cost of the drive + time costs, etc. Since the benefits are the same in each case, but the costs are larger for Joe at the moment of decision, he is less likely to go.

8. Two types of radar weather-detection devices are available for commercial passenger aircraft:

the "state-of-the-art" machine and another that is significantly less costly, but also less effective. The European Aviation Safety Agency (EASA) has hired you for advice on whether all passenger planes should be required to use the state-of-the-art machine. After careful study, your recommendation is to require the more expensive machine only in passenger aircraft with more than 200 seats. How would you justify such a recommendation to an EASA member who complains that all passengers have a right to the best weather-detecting radar currently available?

A plane of either type - large or small - should use the state-of-the-art device if the extra benefits of that device exceed its extra costs. Because the device will save more lives in large planes than in small planes, its benefits are larger in large planes than in small ones. Your original recommendation was presumably based on the calculation that the benefits for the larger planes justified the extra cost, but did not do so in the case of the smaller planes. Airline passengers are like other people insofar as their willingness to invest in extra safety is constrained by other pressing uses for their scarce resources. Where extra safety is relatively cheap, as in large planes, they will rationally choose to purchase more than when it is relatively more expensive, as in small planes.

9. A group has chartered a bus to Paris. The driver costs €100, the bus costs €500, and tolls will cost €75. The driver's fee is non-refundable, but the bus may be cancelled a week in advance at a charge of only €50. At €18 per ticket, how many people must buy tickets so that the trip need not be cancelled?

With more than a week to go, the €100 driver's fee and the €50 bus cancellation fee are sunk costs. If the trip takes place, the additional costs will be the remaining €450 of the bus fee plus the €75 in tolls, for a total of €525 in additional costs. If at least 30 tickets will be sold, it makes sense to continue the trip, since total revenue (€540) will exceed the additional cost.

10. Residents of your city are charged a fixed weekly fee of €6 for refuse collection. They may put out as many refuse sacks as they wish. The average household puts out three sacks per week.

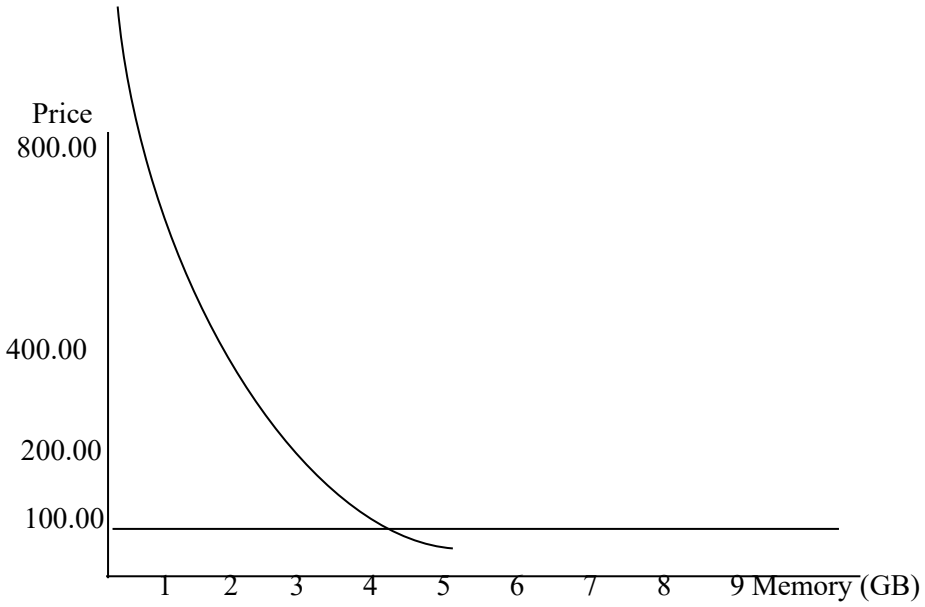
Now, suppose your city changes to a "tag" system. Each sack of refuse must have a tag affixed to it. The tags cost €2 each.

What effect will the introduction of the tag system have on the total quantity of refuse collected?

In the first case, the fixed cost of €6/week is a sunk cost. Therefore, for the residents, the cost of disposing an extra refuse sack is €0. In the tag system, the cost of disposing an extra refuse sack is €2, regardless of the number of sacks. Therefore, since the costs are higher and the benefit of putting out a refuse sack is assumed to be the same in both cases, you expect fewer sacks to be collected in the tag system.

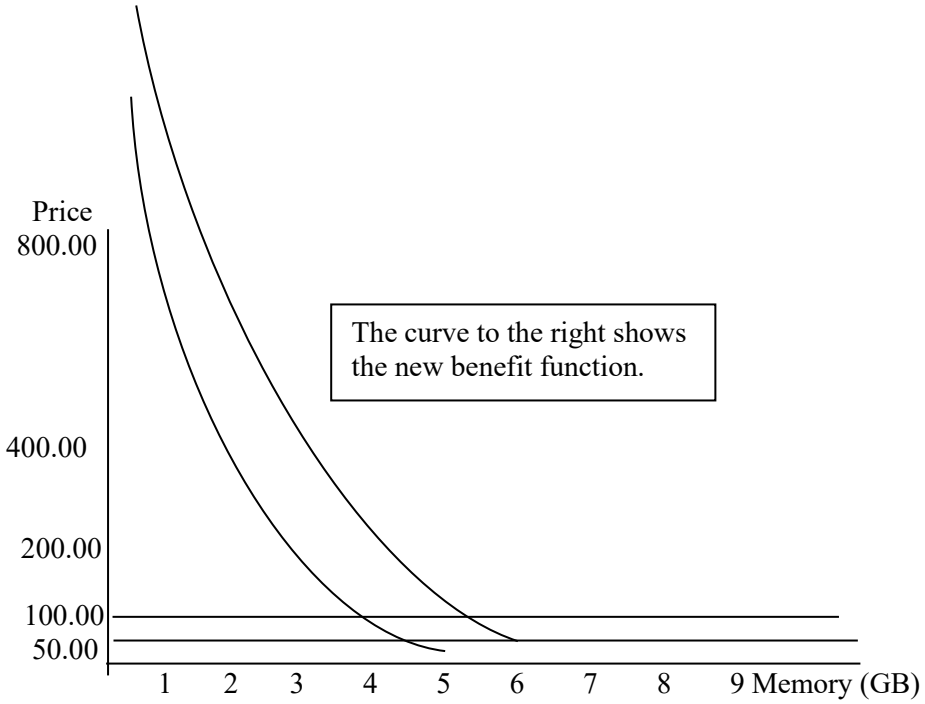
11. Suppose that random access memory (RAM) can be added to your computer at a cost of €100 per gigabyte. Suppose also that the value to you, measured in terms of your willingness to pay, of an additional gigabyte of memory is €800 for the first gigabyte, and then falls by one-half for each additional gigabyte. Draw a graph of marginal cost and marginal benefit. How many gigabytes of memory should you purchase?

The benefit of the 1st gigabyte is €800, the 2nd is €400, the 3rd is €200, the 4th is €100, the 5th is €50, the 6th is €25, the 7th is €12.50 and the 8th is €6.25. You should purchase 4 gigabytes. At higher levels of benefit, the benefit is less than the cost. At lower levels, benefit exceeds the cost.



12. Suppose in Problem 11 the cost of RAM falls to €50 per gigabyte. How many gigabytes of memory should you purchase now? Suppose additionally that your benefit for an additional gigabyte of memory rises to €1600 for the first gigabyte, also falling by one-half for each additional gigabyte. How many gigabytes of memory should you purchase now, with both the lower price and the larger benefit?

When the price falls to €50/GB, you consume 5 GB (rather than 4 GB at the higher price.) When your benefit rises also, you consume 6 GB of RAM.



*13. Dana has purchased a €40 ticket to a rock concert. On the day of the concert she is invited to a welcome-home party for a friend returning from abroad. She cannot attend both the concert and the party. If she had known about the party before buying the ticket, she would have chosen the party over the concert. *True or false:* It follows that if she is rational, she will go to the party anyway. Explain.

False. The fact that she would have chosen the party before she bought her ticket means that she prefers a party to an event that costs €40. Now her choice is between two events that she can attend with no further payment.

*14. Yesterday you were unexpectedly given a free ticket to a Muse concert scheduled for April 1. The market price of this ticket is €75, but the most you could sell it for is only €50. Today you discover that Lady Gaga will be giving a concert that same evening. Tickets for the Lady Gaga concert are still available at €75. Had you known before receiving your Muse ticket yesterday that Lady Gaga would be coming, you definitely would have bought a ticket to see her, not Muse. *True or false:* From what we are told of your preferences, it follows that if you are rational, you should attend the Lady Gaga concert. Explain.

We can summarize the benefits and costs of going to each concert.

	Lady Gaga	Muse
Benefit	Bp	B_r
Cost (initial)	€75	€75
Cost (final)	€75	€50

In the problem, we are given that

$$B_p - €75 > B_r - €75$$

or

$$B_p > B_r \qquad (*)$$

Now, we need to find out whether the following is true or not:

$$B_p - €75 > B_r - €50$$

which is the same as

$$B_p > B_r + €25 \qquad (**)$$

Notice that (*) does not necessarily imply (**). For example, if B_p=€80 and B_r=€60, then (*) holds while (**) does not. So we can conclude that you should not go to the Lady Gaga concert in the above scenario if you are a rational utility maximizer.

Your decision will depend on the relative values of B_p and B_r. The fact that you would have bought a Lady Gaga ticket means that the benefit of attending the Lady Gaga concert must be greater than €75. The fact that you would have chosen the Lady Gaga concert before receiving your free Muse concert ticket means that $B_p > B_r$. But this does not imply that you should go to the Lady Gaga concert. Suppose B_p = €80 and B_r = €60. When you now choose between the two concerts, the opportunity cost of attending the Muse concert is €50, so the net benefits of attending each concert are given by B_p - €75 =€5 and B_r - 50 = €10, which means you should go to the Muse concert. So false.

*15. Mr. Smith recently faced a choice between being (*a*) an economics professor, which pays €60,000/yr, or (*b*) a safari leader, which pays €50,000/yr. After careful deliberation, Smith took the safari job, but it was a close call. "For a euro more," he said, "I'd have gone the other way."

Now Smith's brother-in-law approaches him with a business proposition. The terms are as follows:

- Smith must resign his safari job to work full-time in his brother-in-law's business.

- Smith must give his brother-in-law an interest-free loan of €100,000, which will be repaid in full if and when Smith leaves the business. (Smith currently has much more than €100,000 in the bank.)
- The business will pay Smith a salary of €70,000/yr. He will receive no other payment from the business.

The interest rate is 10 per cent per year. Apart from salary considerations, Smith feels that working in the business would be just as enjoyable as being an economics professor. For simplicity, assume there is no uncertainty regarding either Smith's salary in the proposed business or the security of his monetary investment in it. Should Smith join his brother-in- law and, if so, how small would Smith's salary from the business have to be to make it NOT worthwhile for him to join? If not, how large would Smith's salary from the business have to be to make it worthwhile for him to join?

Safari provides €10,000+/yr more enjoyment than a business job. €70,000 = gross benefit of business job salary.

Costs of Business Job

10,000 opportunity cost of loan

50,000 lost salary as safari leader

10,000+ lost enjoyment from safari job

€70,000+ total cost of taking of business job > benefit, so don't take the job.

If business salary was €70,001/yr, he would have taken it.

*16. You have just purchased a new Ford Mondeo for €20,000, but the most you could get for it if you sold it privately is €15,000. Now you learn that Toyota is offering its Yaris, which normally sells for €25,000, at a special sale price of €20,000. If you had known before buying the Mondeo that you could buy a Yaris at the same price, you would have definitely chosen the Yaris. *True or false:* From what we are told of your preferences, it follows that if you are rational; you should definitely not sell the Mondeo and buy the Yaris. Explain.

True. That you originally bought the Mondeo means you are not willing to pay an extra €5,000 for the Yaris; you prefer the Yaris, but value the difference at less than €5,000. If you sell the Mondeo for €15,000 then you will need to pay an extra €5,000 in order to afford the Yaris. So, it will cost you €5,000 to change from a Mondeo to a Yaris. Given that you were not willing to pay an extra €5,000 initially, why would you spend that for it now?