MICROECONOMICS I

Practice sheet. 2011-2012

P. Rey

1 Consumer Choice

3.1. A consumer with income $m = 100$ has preferences represented by the following utility function

$$u(x_1,\, x_2) = x_1 x_2 + x_1.$$

At which prices would this consumer be willing to buy the following conssumption bundle $(x_1,\, x_2)$ =(6, 2).?

3.2. An individual has income $m = 10$ and gaces prices $(p_1,\, p_2) = (2, 3)$. Her preferences are represented by the following utility function:

$$u(x_1,\, x_2) = x_1 + x_2.$$

1. Write and draw the budget constraint and budget set.
2. Justify why the optimal choice will be (5, 0). WHy can´t (5, 3) nor (2, 2) be optimal?
3. If prices were $(p_1,\, p_2)$ =(5, 5), what would be the optimal choice?

3.3. A telephone company offers two tariffs. The first one is using a card at a price of 80 cents pes minute. Under the second one, the consumer pays 200 euro per month and 40 cents per minute. A consumer spends his 5000 wage per month in telephone (x_1) and other goods (x_2). Assume $p_2 = 1$.

1. Find and draw the budget set in only the card tariff is available. Draw possible indifference curve maps such as a consumer would a) not use the telephone a t all b) use some telephone.
2. Repeeat the exercise for the second tariff.
3. Assume the utility function of the individual is

   $$u\left(x_1, x_2\right) = x_2 + \alpha x_1$$

   , with α a positive constant. Assuming the student can buy either one of the two tariffs (or none), determine the optimal conssumption (depending on values of α).

3.4. An electricity company has offers two tariffs for its supply of electricity (x_1):

Plan A: 20 cents per kilowatt per hour (kwh), for the first 200 kwh and 10 cents per adittional kwh above 200 kwh.

Plan B: Paying 600 euro and being allowed to consume any desired amount of kilowatts.

A consumer with $m = 8000$ euros faces the following prices for goods which are not electricity (x_2): $p_2 = 200$.

1. Draws the budget sets for each of the plans.
2. Which plan would the consumer choose if she had the following preferences?
$$u(x_1, x_2) = x_1 x_2$$
3. A for these preferences?
$$u(x_1, x_2) = \min\left\{x_1, \frac{1}{2}x_2\right\}$$

3.5. An individual with 40.000 euros to spend in food (good 1) and books (good 2), has preferences represented by $u(x_1, x_2) = x_1^{1/4} x_2^{3/4}$. Assuem prices are $p_1 = 100$ and $p_2 = 2500$.

1. What is the optimal conssumption? Draw it.
2. Assume there is a book club, such that you pay 100 euros, you can get books at a 10% discount. Draw the new budget set of the consumer. Now assume the consumer becomes a member of the club. What is his optimal choice?
3. Will the consumer become a member of the club?

3.6. An important assumption of consumer theory is that a consumer will spend all her income. Assume $m = 40$ and $(p_1, p_2) = (2, 5)$.

1. Check whether if
$$u(x_1, x_2) = 8x_1 + 3x_2$$
the consumer will spend her whole income.

2. Check whether if
$$u(x_1,\, x_2) = \sqrt{x_1 x_2}$$
the optimal solution is on the budget constraint.

3. Check whether if
$$u(x_1,\, x_2) = min\{x_1,\, 3x_2\}$$
the optimal solution is on the budget constraint.

   This hypothesis can be expressed by saying that preferences are *strictly monotonic*. A preference relationship is *strictly monotonic* when if $z_i > x_i$ and for some i and $z \geq x$ then $z \succ x$. However, strict monotonicity is not needed to make sure hte consumer will spend all her income. Preferences such as Leontieff (complements, part 3) are not strictly monotonic and still the solution is on the budget set.

4. Give an example of preferences that do not even satisfy weak monotonicity, i.e., such that "if $z \geq x$ then $z \succsim x$" is not satisfied.

5. Give a graphical example of a consumer not satisfying weak monotonicity and still consuming all her income.

2 Demand function, Engel curve and Slutsky equation

4.1. AN individual has preferences represented by
$$u(x_1,\, x_2) = min\{2x_1,\, x_2\}.$$
prices are strictly positive $(p_1,\, p_2) \gg 0$ and so is income $m > 0$.

1. Find the demand function for both goods.

2. Find and draw the Engel curve for good 2.

4.2. Assume
$$u(x_1,\, x_2) = x_1^{\alpha} x_2^{1-\alpha},$$
with $0 < \alpha < 1$,$(p_1,\, p_2) \gg 0$ and $m > 0$.

1. Find the demand functions

2. Find and draw the Engel curve for good 2.

3. What is the role of parameter α?

4.3. An indifference map is called "vertically parallel" if the MRS is constant for a given value of x_1, i.e., if for any value of x_1, the MRS does not depend on x_2.

1. What is the general shape of a utility function representing these preferences? Give some examples.

2. Represent both goods' Engel curves

3. Show that the Law of demand is satisfied (using income and substitution effect).

4.4. AN indifference map is homothetic if any straight line from the origin cuts the indifference curve in points with the same slope.

1. What is the general shape of a utility function representing these preferences? Give some examples.

2. Represent both goods' Engel curves and show they are straight lines.

3. Show that none of the goods are Giffen.

4.5. Assume Cobb-Douglas utility functions

$$u(x_1, x_2) = x_1 x_2$$

prices are equal to 1 and income equals 10 euros.

1. Find the optimal conssumptiom.

2. Calculate the Slutsky substitution effect when the price of x_1 is now equal to 2.

3. Calculate the Hicks substitution effect when the price of x_1 is now equal to 2.

4. Do the graph for both cases.

4.6. Assume

$$u(x_1, x_2) = \min\left\{x_1, \frac{x_2}{2}\right\}$$

$m = 12$, $p_1 = 1$, $p_2 = 2$.

1. Represent indifference maps
2. Draw the budget set.
3. Determine the optimal conssumption
4. Find the demand for good x_1. Draw it for $p_2 = 2$ and $m = 12$.
5. Decompose, using Hicks, the effect on the demand of x_1 if $\Delta p_1 = 3$. How much should m increase in order to compensate the consumer for the increase in the price of good? Draw your answer.

4.7. Assume

$$u(x_1,\, x_2) = \alpha x_1 + \beta x_2,$$

prices are p_1 and p_2 and income is m

1. Represent indifference maps
2. Draw the budget set.
3. Determine the optimal conssumption
4. Find the demand for x_1. Draw it for $p_2 = 1$, $m = 10$ and $\alpha = \beta = 1$.

4.8. Assume good 1 is bread and good 2 is wine and that

$$u(x_1, x_2) = x_1 x_2.$$

The government thinks wine conssumption should be reduced and decides to charge a tax f 25% on the price of wine. Prices before the tax of both goods equal 1and a consumer has income of $m = 10$.

1. Calculate the total effect of the tax on the demand of both goods.
2. Calculathe the Slutsky decomposition for both goods.

3. Calculathe the Hicks decomposition for both goods.

4. For both cases, calculate the additional income which would compensate the loss of real income (because of changes in prices)

5. How much money does the government get with the tax?

6. Assume the government gives the revenue back to the consumer...would this achieve a reduction in wine conssumption over the original situation?

7. Is the previous measure neutral from the point of view of public expending? is it neutral from the point of view of consumer's welfare?

8. Assume the government, instead of giving back the revenue collected they decide to give it back in the form of a subsidy to bread. Calculate the subsidy which is neutral from the point of view of public expending. Is it neutral from the point of view of individual consumer welfare?

9. Using what you learned from the exercise, debate what are the welfare efefcts of taxes and subsidies which do not create deficits.