Principles of Economics I 2023
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Problem Set 2 (Due 22.9.2023 at 10:00)

1. Let's practice a bit more with indifference curves and budget sets.

   (a) A consumer that spends her income I on food and clothing. Let the price of food be $p_F = 20$ and the price of clothing $p_C = 30$. Draw the budget sets for the cases $I = 100, I = 200, I = 300$.

   (b) Suppose that her preferences are such that at the optimum she spends half her income on food and the other half on clothing. Find the optimal choices for the three budget sets in part a. and draw indifference curves that are consistent with this choice.

   (c) Redo part b. for prices $p_F = 50, p_C = 20$. Connect the optimal points to the origin with a ray. What do you observe?

2. The highest earning quintile in Finland in 2016 uses 28% of its disposable income on housing (including energy, electricity, and rental or mortgage payments), 8% on food and 64% on all other consumption. The poorest quintile uses 40% on housing, 12% on food and 48% on other consumption.

   (a) Consider the following estimates for increases across these three categories of consumption in the year following Russian invasion of Ukraine. Housing prices increased by 20%, food prices increased by 10% and the prices for all other consumption increased by 5%. Compute the CPI based on these categories for the highest earning quintile and the poorest quintile using the 2016 consumption shares and with the year before the war as the base period.

   (b) If all goods are normal and income does not change, how do the optimal choices of the different goods at the new prices compare to the old choices? Also list some concrete ways in which households can adjust their consumption in the different (categories of) goods in response to the relative price changes as above.

3. At current wages of EUR 15 per hour Ann chooses to work for 8h per day. To reward her for good performance, her boss gives her a raise to EUR 20 per hour. Ann is lucky enough to be in a job where she can pick her own working hours.

(a) Can you say with certainty what will happen to Ann's working hours as a result of this raise?

(b) Ann computes that at her old working hours, the boss ends up paying EUR 40 more per day. She is tempted to go to the boss and ask for a different wage contract. A flat payment of EUR 40 per day and the old wage of EUR 15 on top. Draw the budget constraint for the alternative wage contract and for the EUR 20 per hour wage (without flat payments).

(c) What can you say about Ann's intended working hours in the case where she is better off under her proposal and in the case where she is worse off with her proposal.

(d) Suppose that the boss wants to induce Ann to work more. Rather than raising the wage, the boss gives a bonus EUR 5 per hour for each extra hour of overtime work (i.e. if Ann works for $t > 8$ hours, then her pay is $120 + (t - 8)20$, for $t \leq 8$, the pay is unchanged). Draw Ann's budget set in this case. Will she work more with this wage structure?

4. When buying a product, it is often difficult for the customer to observe the quality before purchase. For example, the cook in a restaurant may choose between high and low quality ingredients and the customer does not know the result of this choice when buying. To fix ideas, suppose that a meal costs EUR 30 and the cook may use expensive high quality ingredients costing EUR 15 or low quality ones at EUR 10. A meal prepared from good ingredients is worth EUR 40 to the customer while a meal from inferior ingredients is worth only EUR 20. The buyer chooses whether to buy and the cook chooses the ingredients.

(a) Assume that the cook's payoff is given by the profit (i.e. price of meal net of cost of ingredients) and the customer's payoff is the value of her meal net of the cost of the meal if she buys the meal and zero otherwise. Draw the game matrix and determine any dominant strategies and Nash equilibria for the game.

(b) Can you find a reasonable specification of payoffs (i.e. subjective payoffs) that would result in a different prediction for equilibrium play.

(c) Restaurants have multiple customers and sometimes repeat customers. Discuss the role of ratings and repeat purchases for equilibrium play.

5. Here is a simple example of a classic bargaining situation. Ann and Bob must share a cake between them. Both like cake and prefer a larges slice to a smaller.

   (a) One possible way of doing this is to let Ann and Bob submit simultaneous demands: let x_A and x_B be the fraction (i.e. real number between zero and one) of the cake demanded by Ann and Bob respectively. If $x_A + x_B \leq 1$, then Ann and Bob get the share that they demanded. If $x_A + x_B > 1$, then the game ends in conflict and neither player gets anything. Does either of the players have a dominant strategy? What are the Nash-equilibria of the game? (Hint: since you cannot draw the matrix for this game, just think of best responses).

   (b) Cut and divide method works as follows: Ann divides the cake into two pieces and Bob chooses amongst the pieces. How will Bob choose? How should Ann cut the pieces?

   (c) Suppose that the cake has 100 raisins and 100 almonds (unevenly distributed in the cake) and Ann only cares about the almonds (i.e. her payoff is the number of almonds she gets) while Bob cares about raisins. Ann knows Bob's preferences and cuts the cake in two pieces. Bob chooses amongst the pieces. How should Ann now cut the cake?

   (d) If Ann does not know whether Bob likes almonds or raisins, how should she cut the cake?