Guide[1] to answers, Written Exam for the B.Sc. or M.Sc. in Economics

Microeconomics B, 2nd Year

June 2015

Problem 1

Consider a market for a good. There is perfect competition in the market which has a supply side characterized by the supply function S(p), and a demand side characterized by the demand function D(p), with both functions being continuously differentiable, with D'(p) always strictly negative and S'(p) always strictly positive.

The market is in equilibrium. The government then introduces a (very) small tax, on each unit of the good traded. In fact, the tax is so small, we may call it $dt > 0$.

- Please derive an expression for the tax incidence on the supply side and demand side, respectively, using as parameters:
  - the elasticity of demand with respect to price
  - the elasticity of supply with respect to price
  (Hint: Use the following equilibrium conditions:
  $D(p_d) = S(p_s)$
  $p_d = p_s + t$
  where the price paid by customers is p_d, while the price received by sellers is p_s)
- Comment on the expression

Answer: Differentiating the two equilibrium equations, we get $D'(p_d)\cdot(dp_s + dt) = S'(p_s)\cdot dp_s$, so $dp_s/dt = D'(p_d)/[S'(p_s) - D'(p_d)] = -|\varepsilon_d|/(|\varepsilon_s| + |\varepsilon_d|) < 0$ and $dp_d/dt = |\varepsilon_s|/(|\varepsilon_s| + |\varepsilon_d|) > 0$, obviously obtaining $|dp_s/dt| + dp_d/dt = 1$. The intuition is that the side of the market with the lowest absolute value of price elasticity bears the major part of the tax burden.

Problem 2

Consider a private-ownership economy. Two consumers, Arnold and Brian, are born "today" and will have to consume "tomorrow"; today, there is no consumption, but they will be able to trade in contingent goods, as we will soon see.

The economy may end up in two possible states tomorrow. State 1 will occur with probability $(1-\pi)$, while state 2 occurs with probability π.

In state 1, Arnie will own 6 units of the consumption good, while Brian will own 4 units. In state 2, Arnie owns 1 unit of the consumption good, and Brian owns 4 units.

There are opportunities today for the two agents to trade in contingent goods, in markets characterized by perfect competition. Both agents have the utility function $u(x_1, x_2) = (1-\pi)\cdot\ln(x_1) + \pi\cdot\ln(x_2)$, with indices describing the future state in which the good is consumed.

- Identify the Walrasian market equilibrium, assuming for simplicity that $\pi = ½$

[1] What is presented here is not a full, satisfactory answer to the problems, but indicates the correct results and important points to be made.

- Comment on how markets change the distribution of risk in the economy.

Answer: Note that agents are actually von Neumann-Morgenstern agents, the way the state probabilities affect utility. Equilibrium relative price is $p_1/p_2 = ½$ (both states are equally probable, but state 1 has twice as much of the good as state 2). In equilibrium, A consumes (4,2), whereas B consumes (6,3). Initially, B was bearing no risk, but there is aggregate risk in the economy (state 2 providing a total endowment which is only half of what materializes in state 1), and both agents are risk-averse, so none of them will be fully insured in equilibrium; needless to say, B is better off after trades, even if he has to bear some risk. In equilibrium, both agents have the same risk profile, consuming only half as much in state 2 as in state 1.

Problem 3

The bar "Time Out" is a monopoly serving beer to students who are relaxing on Friday afternoons. The marginal costs of selling and serving a cold beer are 10 DKK. The lower the price, the more beers students will buy. If the price is set at 10 DKK, the students buy 1000 beers. At this price, the absolute value of the elasticity of demand with respect to price is 2, i.e. if there is a marginal price increase of 1 %, the number of beers sold will fall by 2 %. For simplicity, we assume that fixed costs are zero.

- a) You are informed that the demand curve is linear. What price should the bar charge, how many beers are sold, and how much profit does the bar make?
- b) Suppose instead that you are informed that the demand side is characterized by constant elasticity of demand. What price should the bar charge, how many beers are sold, and how much profit does the bar make?
- c) Compare your answers in a) and b) and comment.

Answer: Obviously, the perfect competition outcome is a price of 10, selling 1000 beers, and zero profits. In a) $D'(p)$ has to be -200 to give an elasticity of -2, so the demand function must be $D(p) = 3000 - 200 \cdot p$, so $p(x) = 15 - x/200$, $MR(x) = 15 - x/100$, so, solving $MR = MC$, sales should be 500, the price 12½, and profits 1250. In b), there will be a constant mark-up due to constant elasticity of demand; the mark-up becomes 100 %, so the price is 20. The demand function must be $100000p^{-2}$, to fit 1000 beers sold at price 10, so 250 beers are sold at price 20, and profits are 2500. c) Clearly, b) is preferable to a), even if less beer is sold. The intuition is that in case a), the absolute value of the elasticity is increasing as the price increases, giving the bar a weaker position vis-á-vis its customers than in b).

Problem 4

Stiglitz and Weiss have argued that moral hazard may cause rationing in the credit market, i.e. that when there is an excess demand for credit, banks may prefer saying no to potential customers at the current interest rate rather than increasing the interest rate they charge. Please explain the idea behind their argument.

Answer: The point is explained in the paper by Birgitte Sloth, where a borrower goes bankrupt when the investment fails. In case of perfect information/full control, the bank designs a contract in which the borrower chooses the safer project A with returns G_A, and the bank makes sure to set the interest rate high enough so the borrower receives nothing in case of success, $R = G_A$. With moral hazard, however, the borrower will then be tempted to choose the riskier project B, leaving him with a positive after-interest-profit. To prevent this, the bank has to consider the incentive

constraint, allowing the borrower a strictly positive after-interest-profit when choosing project A. Increasing the interest rate beyond the level $[\pi_a \cdot G_a - \pi_b \cdot G_b]/[\pi_a - \pi_b]$ *would violate the IC, increasing the probability of bankruptcy and lowering expected profits for the bank.*

Problem 5

Consider a lake with a high number of residents living in the area around the lake. Many of them enjoy eating fish which can be purchased at the price of 1 $ (per fish) in the super-market. An alternative way of having fish for dinner is to go fishing in the lake (an activity which in itself provides neither utility nor disutility). To go fishing, however, requires the purchase of a fishing permit which costs 5 $. If n residents go fishing, the total catch of fish will be $100 \cdot n^{½}$. For simplicity, we assume that there is no element of chance, so every resident will catch the same number of fish; likewise, we simplify by allowing the number of residents, as well as the catch of fish, to be real numbers.

- How many residents will, in equilibrium, choose to buy a permit and go fishing?
- Is the outcome efficient; and if not, how might an efficient outcome be ensured?

Answer: AP will be $100 \cdot n^{-½}$*, MP is* $50 \cdot n^{-½}$*, so individual/private maximization, setting AP equal to the MC of 5, leads to n = 400, the total catch being 2000, the AP becoming (obviously) 5, and the MP 2½. Social optimization, MP = 5, entails n = 100, total catch of 1000, AP becoming 10, and the MP (obviously) 5. A Pigou tax of 5 on each fishing permit would implement the social optimum.*

Problem 6

Findings in Experimental Economics have, in some ways, questioned the predictions of traditional neoclassical economic theory. This has given rise to Behavioral Economics.

- Provide some examples of how Behavioral Economics contradict the traditional neoclassical view on how economic agents make decisions.

Answer:
- hyperbolic discounting/time inconsistency vs. constant discount rate and time consistency
-present-bias and lack of self-control vs. being a "constant self" always adhering to over-all life-span optimization
- anchoring/endowment effect/path-dependency vs. preferences depending only on end result
- framing vs. choice depending only on end result and objective facts
- malleable preferences/acquired taste vs. truly exogenous preferences
- prospect theory vs. maximizing expected utility
- fairness considerations vs. caring only about one's own outcome

ref.: mtn 9. juni 2015