

## ECON4240 - Spring semester 2015

### Problem 1

Consider the setup in the Akerlof “lemons” model. There are two groups of traders: B and S.

Group B has the following utility function:

$$U_B = M + \sum_{i=1}^n 2x_i$$

Similarly,  $U_S = M + \sum_{i=1}^n x_i$  applies to group S.

Assume that group S has  $N$  cars with quality  $x$  where  $x$  is either 0 with probability  $\frac{1}{2}$  or 2 with probability  $\frac{1}{2}$ . Group B has 0 cars to begin with.

Normalize the price of  $M$  to 1.

Now calculate the equilibrium price and corresponding quantity of cars traded. How is this different from the full information first-best outcome?

### Problem 2

Consider a sharecropping arrangement between a landlord (the principal) and a tenant (the agent). The tenant chooses between two effort levels, namely 0 and 1. Output  $q$  is stochastic and can either be  $q^H$  (high) or  $q^L$  (low). Let  $\pi_i$  denote the probability that the output is high for effort level  $e_i$  where  $i=0,1$ . Assume that  $\pi_1 > \pi_0$ . The landlord cares about maximizing the expected value of the output net of transfers to the tenant (standard case!). Further, the tenant is risk-neutral and cares about the transfers and the disutility of effort (if he undertakes any).

Suppose there is limited liability in that transfers to the tenant cannot be negative.

Set up the landlord’s problem and characterize the optimal contract.

Now suppose that there is a *linear sharing rule* between the landlord and the tenant, with the landlord offering the tenant a share  $\alpha$  of the realized output. So now the landlord’s problem essentially boils down to the choice of the optimal share  $\alpha$ .

Now characterize the optimal contract. Does the limited liability constraint bind in equilibrium?

Calculate the expected utilities to the landlord and the tenant under the two different scenarios: the original problem and the one with the linear sharing rule.

Which one would the tenant prefer and which one would the landlord prefer?