

### Problem 1 (20%)

Consider the following model: A worker chooses effort,  $e$ . By exerting effort, the worker produces a product in quantity  $y = e + a$ . The principal earns profit  $\pi = py - W$ , where  $p$  is the price on output, and  $W$  is the wage paid to workers. We first consider two cases. (i) The principal observes output and pays wages  $W = by + B$ , where  $b$  and  $B$  are chosen by the principal. The worker is maximizing  $u = W - c(e) = W - \frac{1}{2}e^2$ . (ii) The worker owns the firm and maximize  $\pi + u = py - W + W - \frac{1}{2}e^2$ .

- a) Show that in (i) the worker will choose effort  $e = b$ . What would be the worker's optimal effort in case (ii)?

*This is the simplest model we have discussed and student should know that they should maximize  $W - \frac{1}{2}e^2 = b(e + a) + B - \frac{1}{2}e^2$  to derive the first order condition  $b - e = 0$ .*

*The problem practically states that they should maximize  $p(e + a) - \frac{1}{2}e^2$  with FOB  $e = p$*

The worker has an outside option which gives utility  $u_0$ . Take for granted that to ensure that the worker get this utility, the principal must, for a given  $b$ , choose  $B = u_0 - \frac{1}{2}b^2 - b(b + a)$ .

- b) Show that the profit maximizing choice for the principal is to choose  $b = p$ .

*The profit now becomes:*

$$\pi = p(b + a) - b(b + a) - \left( u_0 + \frac{1}{2}b^2 - p(b + a) \right) = p(b + a) - \frac{1}{2}b^2 - u_0$$

*With FOB:  $p - b = 0$  thus  $b = p$*

- c) Wage contracts of the form above, with a piece rate such as the  $by$  term, are rather uncommon. The model above is simple. Discuss elements that would make the model more realistic, and that can explain why firms don't use more piece rates. You are not asked to solve any formal model.

We have discussed two extensions.

Adding uncertainty in a piece rate scheme makes final wages depend on uncertain factors. The piece rate will force the worker to bear all uncertainty, and if the firm is risk neutral and the worker risk averse, this is unfortunate.

Perhaps more important is that effort is usually multidimensional, and a piece rate would have to pay the things that are easy to observe and verify, which typically is not the things that matters. The Prendergast paper often use sports as an example. Writing a contract that pay e.g. goals and passes, will move incentives away from all the other efforts that are essential to the team's performance.

### Problem 2. (60%; a:20% + b:40%) (Note: There is no need to write a full essay.)

The enclosed paper is from the curriculum. Note: You can refer to tables and figures from the papers without copying them into you own text. Enclosed paper: Andreas Born, Eva Ranehill, Anna Sandberg, 2018, "A man's world? – The impact of a male dominated environment on female leadership"

- a) Explain briefly the basic experimental designed and main results of the experiment.

*The design is nicely outlined in a figure of the paper, but they should be able to highlight the key element of male and female dominated groups and the question about becoming a leader and votes on leader. The main results is that*

- b) In the introduction the authors motivate their study by pointing out that “A large literature shows that women are persistently underrepresented in leading positions.” Discuss the extent to which you think the study contribute to explaining this observation. Discuss also to what extent other papers in the curriculum can provide alternative explanations.

*The paper find that in the particular setting of the experiment, women are less likely to aspire to become leader than men are. Women also receive less votes from other, including other women. If these factors also are at play in corporate organizations, this would contribute to explain that women are underrepresented. It is natural to discuss how the particular experimental setting differ from many real world settings, e.g. that the participants have very limited knowledge of other participants skill, the task is something they have never faced before and related to these points that it takes place over a very short time period.*

*In the literature it is natural to point to Niederle and Vesterlund’s study that women shy away from competition. Both these studies are related to self-confidence, so there are some communalities in the studies. Finally it could also be pointed to studies where women are treated differently, like Golding and Rose’s study on blind audition in orchestras. Again there are communalities as women Born et al also find women are treated differently, as they receive less votes.*

### **Problem 3. (20%)**

One paper in the curriculum studies the effect of offering an award for best effort. The paper look at the case when the award is announced before the work start (Kosfeld, M., & Neckermann, S. (2011). Getting more work for nothing? Symbolic awards and worker performance. American Economic Journal: Microeconomics, 3(3), 86-99. **The paper is not enclosed.**) The paper concludes that “The contribution of this paper is to show that status and social recognition alone can be strong motivators for agents to increase their effort in the presence of awards.”

- a) Describe short the basic design of their experiment, and the main results.
- b) To what extent do you think that the study supports the conclusion stated above?

*In this study, the participants in one treatment was told that “the organization told the students that they would like to reward the two people who put in most effort with an award, and that the database software would indicate these names at the end of the session.” (Exact wording is not essential, but they should know that the reward was only symbolic, as also stated in the title.) The control treatment got no such announcement and no reward. The participants are working on collecting data about Swiss communities. They work in an environment where they are not observed, so they may browse the internet, hence there is a cost of effort. The result is that productivity is higher in the reward treatment, they also find higher variance in productivity with symbolic rewards.*

*The stated treatment explain the finding as evidence of preference for status and social recognition. This is one possible explanation, but participants motivated only by knowing for themselves that they were the best, would also be more productive in the reward treatment. So while status and social recognition is one possible explanation, it may not be the only one. It is not required that students point at a particular alternative interpretation, but preferably recognize that there is a leap in the*

*argument from observing a response to a symbolig award and the claim that this is status and social recognition.*