

**UNIVERSITY OF TORONTO**  
**Faculty of Arts and Science**  
**AUGUST 2009 EXAMINATIONS**  
**ECO381H1S – Personnel Economics**  
**Duration 2 hours**  
(Instructor: J. Kantarevic)

**Instructions**

Non-programmable calculators are allowed. The test consists of seven questions, each worth 5 points. Show all your work. Good luck!

1. Consider a one-period employment relationship with the following sequence of events. First, the employer pays  $w$  to the worker. Second, the worker supplies effort  $e$ . Third, the employer monitors the worker's effort. Fourth, the employer offers a retirement bonus  $b$  to workers who are not caught shirking during their period of employment. Effort  $e$  can take two values, 0 or 1, and imposes cost  $0.25e$  on the worker. The monitoring technology allows the employer to detect shirking (when  $e=0$ ) with probability  $p=0.5$ . Each unit of effort produces one unit of output. The worker's outside option  $R$  is 0.85 and the employer's outside option is 0. Explain what contract  $[w, b]$  will induce the efficient outcome in this relationship.

2. The probability that a military unit of  $N$  soldiers wins a battle is given by  $Q=q_1+\dots+q_N$ . The value of winning the battle, normalized to one, is shared equally by all soldiers. The contribution of each soldier is  $q_i=e_i+u_i$ , where  $e$  denotes soldier's effort and  $u$  is a random variable with a mean of zero. The cost of effort is identical for all soldiers and equals  $0.5e_i^2$ . Due to intensive military training, soldiers feel guilt if they don't give their best in the combat. Specifically, the guilt function is  $k(1-e_i)/V$ , where  $k$  is a parameter that the military can influence and  $V$  is a measure of social diversity. Suppose that the Military wants to increase the size of each unit by recruiting new soldiers. Show that optimal  $k$  must be set higher if the new recruits come from a different social background than the old soldiers.

3. The aim of the Equal Opportunity Law is to prevent unfair tournaments between identical contestants (e.g. promotion in firms based on gender). Specifically, the aim of the law is to change the tournament rule where  $i$  wins over  $j$  if  $q_i>q_j-k$  to the rule that  $i$  wins only if  $q_i>q_j$ , where  $k>0$ . Using the tournament model, explain what impact this law will have on the effort and welfare of contestants. Use the appropriate optimality conditions and constraints to support your answer. Assume that the difference in random components of  $q_i$  and  $q_j$  is distributed uniformly on  $[-1, 1]$ .

4. Explain the following two puzzles:

(a) Promotion in some firms is based on seniority rather than on productivity.

(b) Rather than promote within the firm, firms sometimes hire outsiders, even though the firm is uncertain about the productivity of these outsiders.

5. The Ministry of Health and Long-Term Care wishes to provide incentives to the Toronto General Hospital and the Princess Margaret Hospital to reduce waiting time for the cardiac surgeries. One option is to pay a bonus to each hospital for each cardiac surgery performed. The other option is to pay a large bonus for the hospital that performs more surgeries. Both hospitals have the same number and type of physicians and other resources to perform the surgeries. Discuss factors that the Ministry should consider when choosing which of the two options to implement. Briefly review evidence from the course readings on the effectiveness of each option in improving productivity.

6. Employee's output in Coca Cola is given by  $q=e+u$ , where  $e$  is effort and  $u$  is a random variable with a mean of zero. Each Coca Cola employee is paid individually according to  $w=q$ . Employees in Pepsi work in teams of 2. Each employee's output is  $q=e+n+u$ , where  $n$  is employee's ability. Pepsi employees get equal share of their total output  $Q=q_1+q_2$ . The cost of effort function is  $0.5e^2$  for employees in both Coca Cola and Pepsi. All employees are risk neutral and don't exert peer pressure on each other. All employees in the economy are of two ability types:  $n=0$  or  $n=1$ . What is the predicted observed difference in productivity per employee between Coca Cola and Pepsi?

7. Prior to 2000, all Canadian firms used a salary contract to pay their workers. In 2000, firms in Ontario switched to a piece rate contract, while firms in the rest of Canada (ROC) did not. To estimate the impact of this change, a researcher has estimated the following model:

$$\text{Productivity} = a + b \times \text{Ontario} + c \times \text{Post2000} + d \times \text{Ontario} \times \text{Post2000}$$

where Ontario is 1 if the firm is in Ontario and 0 otherwise, and Post2000 is 1 for the period after 2000 and 0 otherwise. The results were as follows.

Variable	Coefficient	Standard Error
Ontario	-1.05	0.90
Post2000	1.50	0.30
Ontario × Post2000	2.15	1.45

Interpret the reported coefficients and discuss the identification assumptions for this empirical strategy. Could these results be explained by the multi-tasking problem?

THE END