

ECO 370
Economics of Organization
Test 2
Friday, March 4, 2015
3:10 AM to 5:00 PM – CCIT 2130

Students may use a non-programmable calculator. All work should be in pen written on the lined portions of the test booklets. Full marks will only be awarded to fully explained answers and derivations that show each step. Please read all questions carefully before answering them.

(30 marks) **Question 1** Agent A works for two (2) firms, P₁ and P₂. The cost of effort function for A is $C(e_1, e_2) = k_1e_1^2 + k_2e_2^2$. A enters a contract with P₁ where $W_1 = \alpha_1 + \beta_1X_1$ and $X_1 = e_1 + \varepsilon_1$, $E(\varepsilon_1) = 0$ and $\text{Var}(\varepsilon_1) = \sigma_1^2$. A enters a contract with P₂ where $W_2 = \alpha_2 + \beta_2X_2$ and $X_2 = e_2 + \varepsilon_2$, $E(\varepsilon_2) = 0$ and $\text{Var}(\varepsilon_2) = \sigma_2^2$. Covariance σ_{12} may not be 0.

(5 marks) (a) Derive and explain the Risk Premium (RP) of A. Derive A's RP.

The key thing to recognize in this problem is $\sigma_1^2 \neq \sigma_2^2$ and $\sigma_{12} \neq 0$. The risk premium is cost an agent is prepared to bear in order to accept lower risk. It is the amount that the Agent would be prepared to pay to switch from receiving a random income to receiving a certain income. The risk premium is $RP = (1/2)\rho\text{Var}(W_1 + W_2)$ where ρ = is the coefficient of absolute risk aversion (CARA) and $\text{Var}(W_1 + W_2)$ = a measure of wage variation

$$\text{Risk Premium} = (1/2)\rho\text{var}(W_1 + W_2)$$

$$\text{Risk Premium} = (1/2)\rho(\text{var } W_1 + 2\text{cov}(W_1, W_2) + \text{var } W_2)$$

$$\text{Risk Premium} = (1/2)\rho(\text{var}(\alpha_1 + \beta_1X_1) + 2\text{cov}(\alpha_1 + \beta_1X_1, \alpha_2 + \beta_2X_2) + \text{var}(\alpha_2 + \beta_2X_2))$$

$$\text{Risk Premium} = (1/2)\rho(\text{var}(\beta_1X_1) + 2\text{cov}(\beta_1X_1, \beta_2X_2) + \text{var}(\beta_2X_2))$$

$$\text{Risk Premium} = (1/2)\rho\beta_1^2(\text{var}(X_1) + 2\beta_1\beta_2\text{cov}(X_1, X_2) + \beta_2^2\text{var}(X_2))$$

$$\text{Risk Premium} = (1/2)\rho\beta_1^2(\text{var}(\theta_1e_1 + \varepsilon_1) + 2\beta_1\beta_2\text{cov}(\theta_1e_1 + \varepsilon_1, \theta_2e_2 + \varepsilon_2) + \beta_2^2\text{var}(\theta_2e_2 + \varepsilon_2))$$

$$\text{Risk Premium} = (1/2)\rho\beta_1^2(\text{var}(\varepsilon_1) + 2\beta_1\beta_2\text{cov}(\varepsilon_1, \varepsilon_2) + \beta_2^2\text{var}(\varepsilon_2))$$

$$\text{Risk Premium} = (1/2)\rho(\beta_1^2\sigma_1^2 + 2\beta_1\beta_2\sigma_{12} + \beta_2^2\sigma_2^2)$$

(5 marks) (b) Derive and explain the Net Benefit (NB) of A. Derive A's NB.

The agent's net benefit (NB) is what this party maximizes its portion of total value. It is subject to the participation constraint, usually $NB = 0$, that requires the benefit to be at a certain level in order to entice the agent from some alternative activity. The employee will not sign the contract if this condition is not met.

$$\text{Net Benefit} = E(W_1) + E(W_2) - C - RP$$

$$\text{Net Benefit} = E(\alpha_1 + \beta_1 X_1) + E(\alpha_2 + \beta_2 X_2) - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Net Benefit} = \alpha_1 + \beta_1 E(X_1) + \alpha_2 + \beta_2 E(X_2) - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Net Benefit} = \alpha_1 + \beta_1 E(e_1 + \varepsilon_1) + \alpha_2 + \beta_2 E(e_2 + \varepsilon_2) - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Net Benefit} = \alpha_1 + \beta_1 e_1 + \alpha_2 + \beta_2 e_2 - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

(5 marks) (c) Derive and explain the incentive compatibility constraints of A. Derive A's incentive compatibility constraints.

The Principals are bound by an Agent's incentive compatibility constraints when the Principals recognize the agent's minimum condition for performing the contracts. When the constraints are binding, the agent will select his or her efforts in such a way that the marginal gain from one additional unit of effort will equal one additional unit of personal cost. The employee-agent (but not the employer-principals) "knows" the actual value of e – his or her effort – which is hidden from the principals

So the first step of the "game" is for the principals to determine the Agent's incentive compatibility constraints thereby solving the "agent's problem" in order to ensure that the agent or employee performs the contract. The employee-agent will not perform the contracts if the constraint is not met.

$$d(\text{Net Benefit})/de_1 = 0$$

$$d(\text{Net Benefit})/de_2 = 0$$

$$d(\text{Net Benefit})/de_1 = d(\alpha_1 + \beta_1 e_1 + \alpha_2 + \beta_2 e_2 - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2))/de_1 = 0$$

$$d(\text{Net Benefit})/de_1 = 0 + \beta_1 + 0 + 0 - 2k_1 e_1 - 0 - 0 = 0$$

$$e_1 = \beta_1 / 2k_1$$

$$e_2 = \beta_2 / 2k_2$$

By Symmetry

(5 marks) (d) Derive the optimal β_1 and β_2 .

$$\text{Total Value} = E(\pi_1) + E(\pi_2) + NB$$

$$\text{Total Value} = p_1 E(X_1) - E(W_1) + p_2 E(X_2) - E(W_2) + E(W_1) + E(W_2) - C - RP$$

$$\text{Total Value} = p_1 E(X_1) + p_2 E(X_2) - C - RP \quad \text{because } p_2 > p_1 > 0$$

$$\text{Total Value} = p_1 E(e_1 + \varepsilon_1) + p_2 E(e_2 + \varepsilon_2) - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Total Value} = p_1 e_1 + p_2 e_2 - k_1 e_1^2 - k_2 e_2^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Total Value} = p_1(\beta_1 / 2k_1) + p_2(\beta_2 / 2k_2) - k_1(\beta_1 / 2k_1)^2 - k_2(\beta_2 / 2k_2)^2 - (1/2)\rho(\beta_1^2 \sigma_1^2 + 2\beta_1 \beta_2 \sigma_{12} + \beta_2^2 \sigma_2^2)$$

$$\text{Total Value} = p_1\beta_1/2k_1 + p_2\beta_2/2k_2 - \beta_1^2/4k_1 - \beta_2^2/4k_2 - (1/2)\rho(\beta_1^2\sigma_1^2 + 2\beta_1\beta_2\sigma_{12} + \beta_2^2\sigma_2^2)$$

$$d(\text{Total Value})/d\beta_1 = d[p_1\beta_1/2k_1 + p_2\beta_2/2k_2 - \beta_1^2/4k_1 - \beta_2^2/4k_2 - (1/2)\rho(\beta_1^2\sigma_1^2 + 2\beta_1\beta_2\sigma_{12} + \beta_2^2\sigma_2^2)]/d\beta_1 = 0$$

$$d(\text{Total Value})/d\beta_1 = p_1/2k_1 + 0 - \beta_1/2k_1 - 0 - \rho(\beta_1\sigma_1^2 + \beta_2\sigma_{12}) = 0$$

$$p_1 - \beta_1 - 2\rho k_1(\beta_1\sigma_1^2 + \beta_2\sigma_{12}) = 0$$

$$[1 + 2\rho k_1\sigma_1^2]\beta_1 = [p_1 + 2\rho k_1\beta_2\sigma_{12}]$$

Response (or Reaction) Functions between P₁ and P₂:

$$\beta_1 = [p_1 + 2\rho k_1\beta_2\sigma_{12}]/[1 + 2\rho k_1\sigma_1^2]$$

$$\beta_2 = [p_2 + 2\rho k_2\beta_1\sigma_{12}]/[1 + 2\rho k_2\sigma_2^2] \quad \text{By Symmetry}$$

$$\beta_1 = [p_1 + 2\rho k_1[[p_2 + 2\rho k_2\beta_1\sigma_{12}]/[1 + 2\rho k_2\sigma_2^2]]\sigma_{12}]/[1 + 2\rho k_1\sigma_1^2]$$

$$[1 + 2\rho k_1\sigma_1^2]\beta_1 = [p_1 + 2\rho k_1[[p_2 + 2\rho k_2\beta_1\sigma_{12}]/[1 + 2\rho k_2\sigma_2^2]]\sigma_{12}]$$

$$[1 + 2\rho k_1\sigma_1^2][1 + 2\rho k_2\sigma_2^2]\beta_1 = p_1[1 + 2\rho k_2\sigma_2^2] + 2\rho k_1[p_2 + 2\rho k_2\beta_1\sigma_{12}]\sigma_{12}$$

$$[1 + 2\rho k_1\sigma_1^2][1 + 2\rho k_2\sigma_2^2]\beta_1 = p_1 + 2\rho p_1 k_2 \sigma_2^2 + 2\rho k_1 p_2 + 4\rho^2 k_1 k_2 \beta_1 \sigma_{12}^2$$

$$([1 + 2\rho k_1\sigma_1^2][1 + 2\rho k_2\sigma_2^2] - k_1 k_2 [2\rho\sigma_{12}]^2)\beta_1 = (1 + 2\rho k_2\sigma_2^2) p_1 + (2\rho k_1) p_2$$

Nash equilibrium between P₁ and P₂:

$$\beta_1 = (1 + 2\rho k_2\sigma_2^2)p_1 + (2\rho k_1)p_2 / ([1 + 2\rho k_1\sigma_1^2][1 + 2\rho k_2\sigma_2^2] - k_1 k_2 [2\rho\sigma_{12}]^2)$$

$$\beta_2 = (1 + 2\rho k_1\sigma_1^2)p_2 + (2\rho k_2)p_1 / ([1 + 2\rho k_1\sigma_1^2][1 + 2\rho k_2\sigma_2^2] - k_1 k_2 [2\rho\sigma_{12}]^2) \quad \text{By Symmetry}$$

(5 marks) (e) What is the key design question for the Firm P₁ in this problem? Explain what the informativeness principle is and what role it plays in your answer?

The key design question for P₁ is to offer a contract to A that A can accept (participation constraint) and perform (incentive compatibility constraint) to take in account the possibility that A might moonlight (work for P₂ on the side.). So P₁ has to optimize the net benefit W₁ that A would obtain by performing the contract

The informativeness principle implies that any measure of performance (in this problem, outputs X₁ and X₂) eventually reveals information to the Principals on the effort levels that are chosen by the Agent, effort levels that are not immediately observable any other way. These measures form the basis of the compensation contract. [Text, p. 219]

(5 marks) (f) Should P₁ prevent A from working with P₂? Why or why not?

Looking at the Response (or Reaction) Functions between P₁ and P₂:

$$\beta_1 = [p_1 + 2\rho k_1 \beta_2 \sigma_{12}] / [1 + 2\rho k_1 \sigma_1^2]$$

$$\beta_2 = [p_2 + 2\rho k_2 \beta_1 \sigma_{12}] / [1 + 2\rho k_2 \sigma_2^2]$$

the existence of the “second job” will force Firm P_1 to offer even greater incentives to maximize its profits.

Looking at Nash equilibrium between P_1 and P_2 :

$$\beta_1 = (1 + 2\rho k_2 \sigma_2^2) p_1 + (2\rho k_1) p_2 / ([1 + 2\rho k_1 \sigma_1^2][1 + 2\rho k_2 \sigma_2^2] - k_1 k_2 [2\rho \sigma_{12}]^2)$$

$$\beta_2 = (1 + 2\rho k_1 \sigma_1^2) p_2 + (2\rho k_2) p_1 / ([1 + 2\rho k_1 \sigma_1^2][1 + 2\rho k_2 \sigma_2^2] - k_1 k_2 [2\rho \sigma_{12}]^2)$$

Preventing A from working for P_2 may not only reduce total value of the organizations but may reduce the profits for P_1 if the tasks are complements.

- (10 marks) **Question 2** Discuss the significance of a complete linear contract? In your answer discuss how a complete contract impacts issues like commitment to the contract, the possibility of breach of contract, and “skimming” by executives?

The student should touch upon the following points:

The only reason the contract is complete is that the Principal P can directly observe the inputs or effort levels of the Agent A.

The Agent A, knowing this, will optimize its cost of effort or inputs by increasing the levels to what is optimal.

This reinforces the idea of commitment to a longer term contract.

The belief of the parties in the performance or outcome of the contract, will increase the possibility of performance of the contract.

Skimming is where executives take compensation bearing little or no relationship to performance – its elimination may reflect contracts that are complete by perfect alignment of incentives.

- (10 marks) **Question 3** Define and explain pension benefits in linear contracts. What are they? What are the advantages of pension benefits in compensation to the agent? To the principal? What moral hazards arise in these benefits and why are they serious?

The student should touch upon the following points:

Pension benefits are a form of deferred compensation that rewards future productivity.

For the Agent – Pension benefits offer a match between future compensation and labour effort.

For the Principal – Pension benefits offer a match between future compensation and current output.

When compensation to an individual is less than the contribution made in the early cycle of the contract, then the compensation that exceeds contribution in the late cycle of the contract is referred to as deferred compensation.

Where an objective low cost performance measure exists, such as commissions for a sales force, is readily available, then deferred compensation is unlikely. Where an objective low cost performance measure does not exist, such as salaries for office workers, then deferred compensation is more likely.

(5 marks) Question 4 Identify and explain the intensity principle.

In linear contracts between an Agent A and Principal P the intensity principle refers to the role β plays in $W = \alpha + \beta X$, by aligning the Agent's motivations to the overall success of the organization. The higher β is in relationship to α , the more intense the need for this alignment. The importance of this alignment depends on the responsiveness of profit to the Agent's inputs, the precision of the performance measure, the Agent's risk tolerance and external volatility.

$$\beta = \theta^2 / [\theta^2 + \rho\sigma^2] \quad (\text{Text – pp. 216, 221})$$

(25 marks) Question 5 Suppose there are two (2) employees A_1 and A_2 working for Firm P. These employees provide two (2) unobservable inputs e_1 and e_2 to produce outputs $X_1 = \theta_1 e_1 + \varepsilon_1$ and $X_2 = \theta_2 e_2 + \varepsilon_2$. The cost of effort for A_1 is $C(e_1) = k_1 e_1^2 + c_1$. The cost of effort for A_2 is $C(e_2) = k_2 e_2^2 + c_2$, where k_1, k_2, c_1 and c_2 are constants. Random variables ε_1 and ε_2 represent external shocks to Firm P. The shocks are normally distributed such that $E(\varepsilon_1) = E(\varepsilon_2) = 0$, $\text{var}(\varepsilon_1) = \text{var}(\varepsilon_2) = \sigma^2$ and $\text{cov}(\varepsilon_1, \varepsilon_2) = \sigma_{12}$. The employees have identical and constant absolute risk aversions (CARA) $\rho_1 = \rho_2 = \rho$. Output X_1 is sold at price $p_1 = 1$ and output X_2 is sold at price $p_2 = 1$. Employee A_1 is compensated by a linear contract of the form of $W_1 = \alpha_1 + \beta_1 X_1 + \gamma_1 X_2$. Employee A_2 is compensated by a linear contract of the form of $W_2 = \alpha_2 + \beta_2 X_2 + \gamma_2 X_1$.

(5 marks) (a) Derive A_1 's and A_2 's Risk Premiums (RP). You do not need to explain it.

The key thing to recognize in this problem is $\sigma_1^2 = \sigma_2^2 = \sigma^2$ and $\sigma_{12} \neq 0$.

Risk Premium = $RP_1 = (1/2)\rho \text{var}W_1$

$$\begin{aligned}
RP_1 &= (1/2)\rho(\text{var}(\alpha_1 + \beta_1 X_1 + \gamma_1 X_2)) \\
RP_1 &= (1/2)\rho(\text{var}(\beta_1 X_1 + \gamma_1 X_2)) \\
RP_1 &= (1/2)\rho(\beta_1^2 \text{var}(X_1) + 2\beta_1 \gamma_1 \text{cov}(X_1, X_2) + \gamma_1^2 \text{var}(X_2)) \\
RP_1 &= (1/2)\rho(\beta_1^2 \text{var}(\theta_1 e_1 + \varepsilon_1) + 2\beta_1 \gamma_1 \text{cov}(\theta_1 e_1 + \varepsilon_1, \theta_2 e_2 + \varepsilon_2) + \gamma_1^2 \text{var}(\theta_2 e_2 + \varepsilon_2)) \\
RP_1 &= (1/2)\rho(\beta_1^2 \sigma^2 + 2\beta_1 \gamma_1 \sigma_{12} + \gamma_1^2 \sigma^2) \\
RP_1 &= (1/2)\rho(\beta_1^2 \sigma^2 + 2\beta_1 [-\beta_1 r_{12}] \sigma_{12} + [-\beta_1 r_{12}]^2 \sigma^2) \quad \text{See Part 5(d) Below} \\
RP_1 &= (1/2)\rho(\beta_1^2 \sigma^2 - 2\beta_1^2 r_{12} \sigma_{12} + \beta_1^2 r_{12}^2 \sigma^2) \\
RP_1 &= (1/2)\rho(\beta_1^2 \sigma^2 - 2\beta_1^2 r_{12} [r_{12} \sigma^2] + \beta_1^2 r_{12}^2 \sigma^2) \quad \text{Using } \sigma_{12} = r_{12} \sigma^2 \\
RP_1 &= (1/2)\rho(\beta_1^2 \sigma^2 - 2\beta_1^2 r_{12}^2 \sigma^2 + \beta_1^2 r_{12}^2 \sigma^2) \\
RP_1 &= (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2
\end{aligned}$$

$$RP_2 = (1/2)\rho(1 - r_{12}^2) \beta_2^2 \sigma^2 \quad \text{By symmetry}$$

(5 marks) (b) Derive A_1 's and A_2 's incentive compatibility constraints. You do not need to explain them.

$$\begin{aligned}
\text{Net Benefit} &= NB_1 = E(W_1) - C_1 - RP_1 \\
NB_1 &= E(\alpha_1 + \beta_1 X_1 + \gamma_1 X_2) - k_1 e_1^2 - c_1 - (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2 \\
NB_1 &= \alpha_1 + \beta_1 E(X_1) + \gamma_1 E(X_2) - k_1 e_1^2 - c_1 - (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2 \\
NB_1 &= \alpha_1 + \beta_1 E(\theta_1 e_1 + \varepsilon_1) + \gamma_1 E(\theta_2 e_2 + \varepsilon_2) - k_1 e_1^2 - c_1 - (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2 \\
NB_1 &= \alpha_1 + \beta_1 \theta_1 e_1 + \gamma_1 \theta_2 e_2 - k_1 e_1^2 - c_1 - (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2
\end{aligned}$$

$$d(\text{Net Benefit})/de_1 = 0$$

$$d(\alpha_1 + \beta_1 \theta_1 e_1 + \gamma_1 \theta_2 e_2 - k_1 e_1^2 - c_1 - (1/2)\rho(1 - r_{12}^2) \beta_1^2 \sigma^2)/de_1 = 0$$

$$0 + \beta_1 \theta_1 + 0 - 2k_1 e_1 - 0 - 0 = 0$$

$$\beta_1 \theta_1 = 2k_1 e_1$$

$$e_1 = \beta_1 \theta_1 / 2k_1$$

$$e_2 = \beta_2 \theta_2 / 2k_2 \quad \text{By symmetry}$$

(5 marks) (c) Derive β_1 and β_2

$$\begin{aligned}
\text{Total Value} &= E(\pi) + NB_1 + NB_2 \\
\text{Total Value} &= p_1 E(X_1) + p_2 E(X_2) - E(W_1) - E(W_2) + E(W_1) + E(W_2) - C_1 - RP_1 - C_2 - RP_2 \\
\text{Total Value} &= E(X_1) + E(X_2) - C_1 - RP_1 - C_2 - RP_2 \quad p_1 = p_2 = 1 \\
\text{Total Value} &= \theta_1 e_1 + \theta_2 e_2 - k_1 e_1^2 - c_1 - k_2 e_2^2 - c_2 - (1/2)\rho(1 - r_{12}^2) (\beta_1^2 + \beta_2^2) \sigma^2 \\
\text{Total Value} &= [\beta_1 \theta_1^2 / 2k_1] + [\beta_2 \theta_2^2 / 2k_2] - k_1 [\beta_1 \theta_1 / 2k_1]^2 - c_1 - k_2 [\beta_2 \theta_2 / 2k_2]^2 - c_2 - (1/2)\rho(1 - r_{12}^2) (\beta_1^2 + \beta_2^2) \sigma^2
\end{aligned}$$

$$d(\text{Total Value})/d\beta_1 = d[[\beta_1 \theta_1^2 / 2k_1] + [\beta_2 \theta_2^2 / 2k_2] - k_1 [\beta_1 \theta_1 / 2k_1]^2 - c_1 - k_2 [\beta_2 \theta_2 / 2k_2]^2 - c_2 - (1/2)\rho(1 - r_{12}^2) (\beta_1^2 + \beta_2^2) \sigma^2] / d\beta_1 = 0$$

$$\theta_1^2 / 2k_1 + 0 - \beta_1 \theta_1^2 / 2k_1 - 0 - 0 - 0 - \rho(1 - r_{12}^2) (\beta_1 + 0) \sigma^2 = 0$$

$$\theta_1^2 - \beta_1\theta_1^2 - 2\rho k_1(1 - r_{12}^2)\beta_1\sigma^2 = 0$$

$$\beta_1 = \theta_1^2 / [\theta_1^2 + 2\rho k_1(1 - r_{12}^2)\sigma^2]$$

$$\beta_2 = \theta_2^2 / [\theta_2^2 + 2\rho k_2(1 - r_{12}^2)\sigma^2]$$

By symmetry

- (5 marks) (d) Explain how Subjective Performance Evaluation might be involved in this organization.

$$d(\text{var}W_1)/d\gamma_1 = -0$$

Application of the Informativeness

Principle

$$d(\beta_1^2\sigma^2 + 2\beta_1\gamma_1\sigma_{12} + \gamma_1^2\sigma^2)/d\gamma_1 = 0$$

$$0 + 2\beta_1\sigma_{12} + 2\gamma_1\sigma^2 = 0$$

$$0 + \beta_1\sigma_{12} + \gamma_1\sigma^2 = 0$$

$$\gamma_1 = -\beta_1\sigma_{12} / \sigma^2$$

$$\gamma_1 = -\beta_1 r_{12}$$

The parameter γ_1 may be construed as a type of subjective performance evaluation adjustment to link individual performance with group performance. See Lecture 15 slides.

- (5 marks) (e) Explain how Relative Performance Evaluation might be involved in this organization.

The object of the form of subjective performance evaluation identified in part (d) is to filter out of individual compensation any reward for withholding information helpful to coworkers or rewards for interfering with the success of others in the same organization. This is an application of Relative Performance Evaluation.

- (10 marks) Question 6 Explain the role of luck in executive compensation? In your answer explore and explain the effect of strong anti-takeover laws governing the executives' firm and the effect of a major shareholder on luck in results.

The student should touch upon the following points:

The role of "luck" bears on the σ^2 measure in the optimization of β

Studies, such as those conducted by Bertrand or Mullainathan in the 1990's found that executive pay responded less to luck in the better-governed firms.

Also the presence of a large shareholder reduced the amount of pay for luck.

Bertrand and Mullainathan found that the variance of performance affecting the sensitivity of pay to performance appears in the better-governed firms

(10 marks) Question 7 Write a brief answer on how linear contracts might apply to any company case you have studied so far in the course?

Given the case or company the student chooses, the answer should touch on whether or not there is:

Objective Performance Evaluation

Subjective Performance Evaluation

Relative Performance Evaluation

The roles of α , β , σ , and θ in the case or company chosen by the student.

TOTAL MARKS = 100 Marks