Optimal contract for sale agents

1. Assignment Description

Sale agents in the Green State are risk averse. Thus, according to the principal-agent theory, in order to motivate them to maximize their efforts in their work, their compensation should be based upon a fix payment with bonus based upon performance. Details about the theory behind this fact can be found in the references of the next section.

The current assignment's aim is to build an optimal contract for these agents. The contract should be based upon a fixed quarterly payment and payment based upon the total amount of sales in the region. Note that according to the rules of the Green State, the bonus is paid with a delay of a quarter.

Note that the Sale Agents compare their payment to that of engineers.

2. Background Theory

The principle - agent theory suggests several ways for modeling the sale agent's problem. The following is an example.

Denoted by W the utility an agent receives. This utility is based on a fixed payment denoted by a and a payment denoted by g which depends on his/her efforts denoted by h.

The agent chooses a level of h in order to maximize

$$W(h) = a + g*V(h*e) - D(h)$$

Where D(h) denotes his disutility from work, and e denotes unexpected events which affects his performance. Note that e is distributed with mean equal to 1 and standard deviation that can be estimated based on historical events.

The principle on the other hand maximizes the following:

$$R(a,g) = V(h*e)-a-g*V(h*e)$$

Where V(h) denotes the results of the agent's efforts (i.e. sales !). Note that h is not observed by the principle, but it is given as a result of the agent's maximization of their behavior.

3. Data Source

- Log into the assignment domain as firm Number 1.
- Make sure the firm is producing enough quantity of both products.
- Select the number of agents (N) you would like to hire. This number should vary between zero and 30.
- Set the fixed salary (a) and bonus rate in percentages (g).
- Run a set of simulations in which the values of N, a and g vary along a logical range that covers the possible payment policy.
- For each simulation record the sales, the net benefit to the firm and the payment(s) to the agents. Organize the results in a table.

4. Analysis Required

Assume that each line in the table obtained in Section 3 describes an equilibrium which results from the agent's optimized behavior.

Suggest a possible functional form for V() and D().
Calibrate the parameters of both functions based upon the data table. Based on the results of the calibration answer the following questions:

- What is the optimal parameters a and g for a sale agent contract.
- What is the optimal number of agents the firm should hire per region?
- How much effort (in terms of hours of work) are agents willing to invest in working per quarter.