

# Moral Hazard

Vani K Borooah  
University of Ulster

# Principal and Agent

- A principal engages an agent to act on his behalf and agrees to make a certain payment for this service
- The fact that the action of the agent cannot be observed by the principal creates the possibility of *moral hazard* for the agent
- Moral Hazard means that the agent will be tempted to act “without due care and attention” to the interest of the principal
- Moral Hazard underpins the relation between principal and agent

# Contract Design

- Faced with the possibility that the agent will face “moral hazard” the principal has to design the payment contract so as to avoid this
- A contract needs to satisfy two constraints
  - A *participation constraint*: the agent must be willing to work for the principal
  - An *incentive constraint*: the agent must be willing to work in the best interests of the principal

# Moral Hazard in Production

- A land owner produces rice using labour and land and his objective is to maximise rice production
- He employs a worker whose *effort* will influence the output of rice,  $y$
- In addition to effort, output will be affected by rainfall (good or poor)
- A worker's effort (low or high) is entirely within his control and hidden from the employer

# Payoffs from rice example

	Poor rainfall ( $p=0.5$ )	Good rainfall ( $p=0.5$ )
Low effort ( $e=0$ )	\$10,000	\$20,000
High effort ( $e=1$ )	\$20,000	\$40,000

# Fixed wage payment

- The cost of effort is  $c_0$  when effort is low and  $c_1$  when effort is high:  $c_0 < c_1$
- Owners offer a fixed wage:
  - $w^* > c_0$  ← participation constraint
- Then the net wage to the worker is:
  - $w^* - c_0$  with low effort
  - $w^* - c_1$  with high effort
- So, the effort supplied is low and the expected rice output is:  $\$15000 = \$10000 \times 0.5 + \$20000 \times 0.5$
- Participation constraint is satisfied ( $w^* > c_0$ ) but incentive constraint is not ( $e=0$ )

# Flexible wage payment

- The wage paid now depends upon output produced
  - $w = w_0$  if  $y = \$10,000$  or  $y = \$20,000$
  - $w = w_1$  if  $y = \$40,000$
  - $w_1 > w_0$
- If the worker puts in low effort his expected payment is:  $w_0 - c_0$
- If the worker puts in high effort his expected payment is:  $(w_1 - c_1) \times 0.5 + (w_0 - c_1) \times 0.5$

# Incentives

- The worker has an incentive to put in high effort if:
  - $(w_0 + w_1)/2 - c_1 > w_0 - c_0$
  - $w_1 - w_0 > 2(c_1 - c_0)$  ← Incentive constraint
- If the participation and incentive constraints are satisfied the worker will work supplying high effort
- Owner is better off since expected output \$30,000

# A Risk Aversion Interpretation

- Putting in high effort is to accept a gamble
  - $x_G = w_1 - c_1$  with probability 0.5
  - $x_B = w_0 - c_1$  with probability 0.5
- Putting in low effort ensures the certain wage  $w_0 - c_0$
- Suppose the utility function of the worker is  $u(x)$  for a net wage of \$x

# Risk Aversion

- The worker will accept the gamble (high effort) if:  
$$EU = u(w_1 - c_1) \times 0.5 + u(w_0 - c_1) \times 0.5 > u(w_0 - c_0)$$
- Alternatively, for fixed costs, calculate the certainty equivalent of the gamble:  
$$u(w_1 - c_1) \times 0.5 + u(w - c_1) \times 0.5 = u(w - c_0)$$
- If  $w^E$  is the certainty equivalent of the gamble, then he will accept the gamble if:  
$$\triangleright ER = (w_1 - c_1) \times 0.5 + (w^E - c_1) \times 0.5 > w^E - c_0$$
- So, the condition for accepting the gamble is:  
$$w_1 - w^E > 2(c_1 - c_0)$$

# Risk Neutrality and Aversion

■ In the first case, we assumed the worker was risk neutral. The incentive constraint was

➤  $w_1 - w_0 > 2(c_1 - c_0)$

■ In the second case, we assumed the worker was risk averse. The incentive constraint was

➤  $w_1 - w^E > 2(c_1 - c_0)$

■ Since  $w^E > w_0$ , compared to risk neutral worker, a risk averse worker will require a higher payment  $w_1$  to supply high effort

# Getting Teachers to Come to School

[http://econ-www.mit.edu/faculty/download\\_pdf.php?id=1238](http://econ-www.mit.edu/faculty/download_pdf.php?id=1238)

In the rural areas of developing countries, teacher absence is a widespread problem. This paper tests whether a simple incentive program based on teacher presence can reduce teacher absence, and whether it has the potential to lead to more teaching activities and better learning. In 60 informal one-teacher schools in rural India, randomly chosen out of 120 (the treatment schools), a financial incentive program was initiated to reduce absenteeism. Teachers were given a camera with a tamper-proof date and time function, along with instructions to have one of the children photograph the teacher and other students at the beginning and end of the school day. The time and date stamps on the photographs were used to track teacher attendance. A teacher's salary was a direct function of his attendance. The remaining 60 schools served as comparison schools. The introduction of the program resulted in an immediate decline in teacher absence. The absence rate (measured using unannounced visits both in treatment and comparison schools) changed from an average of 42 percent in the comparison schools to 22 percent in the treatment schools. When the schools were open, teachers were as likely to be teaching in both types of schools, and the number of students present was roughly the same. The program positively affected child achievement levels: a year after the start of the program, test scores in program schools were 0.17 standard deviations higher than in the comparison schools and children were 40 percent more likely to be admitted into regular schools.

# Moral Hazard and Corporate Management

- Shareholders, who own companies, wish to maximise share value
- They employ managers and pay them a high, but fixed, salary
- Managers are not interested in maximising share value but in management perks, subject to satisfactory share performance
- So, shareholders (as principals) lose out
- Solution: pay managers in share options

# Moral Hazard and Insurance

- The probability of an adverse event can often be influenced by the person insured (the “agent”) taking “due care”
- Consequently, the insurance company (the “principal”) will never offer full insurance because then the person insured has no incentive to take “due care”