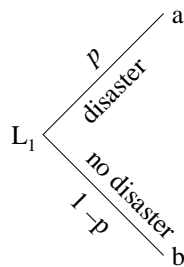


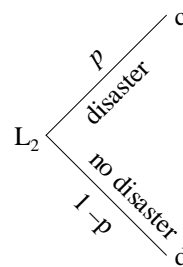
1. Individual's Decision to Insure. A risk-averse individual will insure himself up to the point wherein he is exactly *indifferent* between the expected outcomes of (L1) not insuring himself and (L2) insuring himself. Similarly, an individual offering to insure another individual will offer an insurance premium price wherein he is exactly indifferent between offering and not offering insurance.

no insurance



$$E \cdot U(L_1) = p \cdot U(a) + (1-p) \cdot U(b)$$

with insurance



$$E \cdot U(L_2) = p \cdot U(c) + (1-p) \cdot U(d)$$

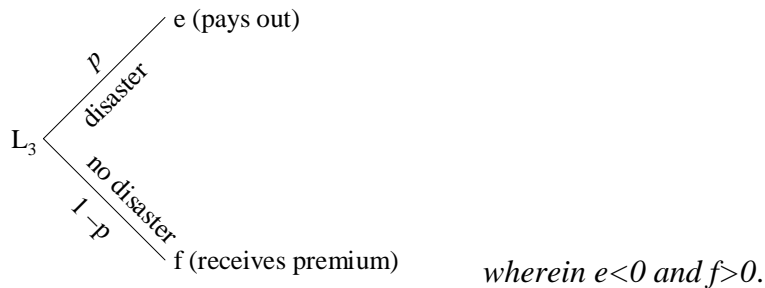
There are three main types of problems:

- (a) Given an insurance premium α and disaster likelihood p , will the individual insure himself? The decision rule is:
 - if $E \cdot U(L_1) < E \cdot U(L_2)$ then he will insure.
 - if $E \cdot U(L_1) = E \cdot U(L_2)$ then he is indifferent.
 - if $E \cdot U(L_1) > E \cdot U(L_2)$ then he will not insure.

- (b) Given an insurance premium α , what is the smallest likelihood of disaster p that will cause the individual to insure himself? Intuitively, we want to find know under what circumstances the individual is exactly indifferent between insuring and not insuring. Mathematically, we want to calculate the likelihood of disaster p such that the

- (c) Given the likelihood of disaster p , what is the maximum insurance premium α that he is willing to pay? Intuitively, we want to find know under what circumstances the individual is exactly indifferent between insuring and not insuring. Mathematically, we want to calculate the insurance premium, α (hidden in terms d and often c) such that $E \cdot U(L_1) = E \cdot U(L_2)$.

2. Actuarially Fair Premium. A risk-neutral and perfectly competitive insurance firm will offer an actuarially fair premium to consumers such that it expects to receive as much insurance premiums as it pays out.



There are two main types of problems:

(a) Given a likelihood of disaster p and payout e when a disaster occurs, what actuarially fair premium will the risk-neutral insurance firm charge? Intuitively, the firm will charge a premium f such that it expects to exactly break even. Mathematically, we want to calculate f such that $p \cdot e = (1-p) \cdot f$.

(b) Given an insurance plan with payout e and premium f , what is the maximum likelihood of disaster p that the firm will sell this plan under? Intuitively, the firm will only sell to clients whose expected claims do not exceed premium payments. Mathematically, we want to calculate p such that $p \cdot e = (1-p) \cdot f$.

3. Separating Equilibrium. One problem of asymmetric information is hidden information. That is to say, some agents know their own type (low or high) and this information is hidden from everyone else they transact with. In a separating equilibrium, we induce different types of agents to take different actions so that we can infer their types from their actions.

Given two types of agents (low and high) and two different actions (low and high), the four elements of a complete separating equilibrium are:

- High types desire to take high actions (instead of doing nothing at all).
- Low types desire to take low actions (instead of doing nothing at all).
- High types prefer to take high actions to low actions.
- Low types prefer to take low actions to high actions.

In the case of insurance plans, we want to offer different insurance plans to different types of clients, depending on their individual risks. And we want to price the insurance plan such that (1) the less risky individuals will want to buy insurance, and will prefer buying the low premium plan to the high premium plan, and (2) the more risky individuals will want to buy insurance, and will prefer buying the high premium plan to the low premium plan.