MODULE 3

Introduction to the concepts of risk and insurance

Duration: 1 hour

Prerequisites: None

Key questions:

1. What is risk?
2. What are the different types of risk?
3. What are the sources and consequences of risk?
4. How is risk managed?
5. Why do we need insurance?
6. How does insurance work?
7. What are the law of large numbers and the J curve in insurance?
8. How is probability used in calculating health insurance premiums?
9. What is asymmetric information?

Objectives:

This module is designed to introduce participants to the concepts of probability, microeconomics of insurance, risk aversion, asymmetric information (adverse selection and moral hazard), and the J curve. The module presents the basic theory of risk and the elements of social risk management. It explains why insurance is required when traditional risk management mechanisms fail and briefly describes how insurance works. It also explains the role of probability in the calculation of insurance premiums. Finally, the module elucidates the challenges faced by insurance providers, such as adverse selection and moral hazard.

Overview:

What is risk?

Risk may be defined as an uncertain event which leads to some monetary loss. However, it is not the same as uncertainty. We know the various possible outcomes of the uncertain event, but we do not know which one of the outcomes will actually take place. This may be explained further with the help of an example about two brothers, Max and Chris. The brothers may either fall sick or remain healthy with equal probability. This leads to four possible outcomes:

- Max is sick, Chris is sick
- Max is sick, Chris is healthy
- Max is healthy, Chris is sick
- Max is healthy, Chris is healthy

Thus, we know what the four possible outcomes are, but we do not know which one will actually take place. In this way, it is equivalent to the rolling of a die. Any of these four outcomes has a 25 per cent probability of occurrence.

Further, in the case of social risks such as sickness, death, or maternity, we may or may not know whether they would take place, when they would take place if at all, and how much it would cost should the risk occur. In the case of sickness, we do not know if we will fall sick, when we will fall sick, and what would be the medical and other costs if we fall sick. In the case of maternity, we do know if the event will take place and when, but we do not know the exact cost for medical and other expenses. For the event of death, we know with certainty that we will die someday and how much the funeral cost would be, but we do not know when it will happen.

Although it is uncertain whether or not an individual will be sick, we can estimate the probability of sickness for a group of people using actuarial techniques. Similarly, we can also estimate the probability of other risks.

What are the different types of risk?

Risks can be classified in many ways. Some classifications include:

- Covariant and idiosyncratic – Covariant risks affect large numbers of people at the same time, such as an epidemic. Idiosyncratic risks affect only a small group of people.
- Minor and major – Minor risks have a high probability of occurrence and entail small costs. For instance, the common cold and fever are considered minor risks. Major risks have a low probability of occurrence and entail higher costs. For instance, hospitalization and surgery are considered major risks.
- Catastrophic – Catastrophic risks are low probability, high-cost risks that affect large numbers of people at the same time. They are sometimes uncovered by insurance policies as they would lead to many people claiming benefits at the same time, making it difficult to manage the risk.

What are the sources and consequences of risk?

There are many sources of risk, including:

- natural disasters;
- environment risks;
- health and life-cycle risks such as birth, old age, and death;
- social and political risks such as war and riots;
- economic risks and others.

Note that social security only aims at covering health and life-cycle risks as well as some economic risks (such as unemployment). These contingencies are defined in ILO's Convention No. 102.

Risks, when they occur, can have various consequences, such as financial loss, temporary or permanent disability, and so on. The consequences could be diverse, affecting not just the person but also the family members. This makes it important to have risk management to deal with the unpleasant effects of risks.

How is risk managed?

There are four main types of responses to risks or risk management strategies: prevention, precaution, mitigation, and coping:[7]

Strategies for protection (*ex ante*) involve:

- mechanisms aiming at reducing the risk, i.e. its chances of occurrence and its seriousness (preventive actions);
- mechanisms aiming at reducing exposure to risk, i.e. avoiding risky situations (precautionary measures);
- mechanisms aiming at mitigating the risk, i.e. reducing, in advance, the potential impact of the adverse event.

Strategies of repairing (*ex post*) involve:

- mechanisms aiming at relieving the impact of the adverse event.

Generally, one single arrangement is not sufficient to protect oneself against risk. It is necessary to combine several mechanisms corresponding with different strategies complementing each other.

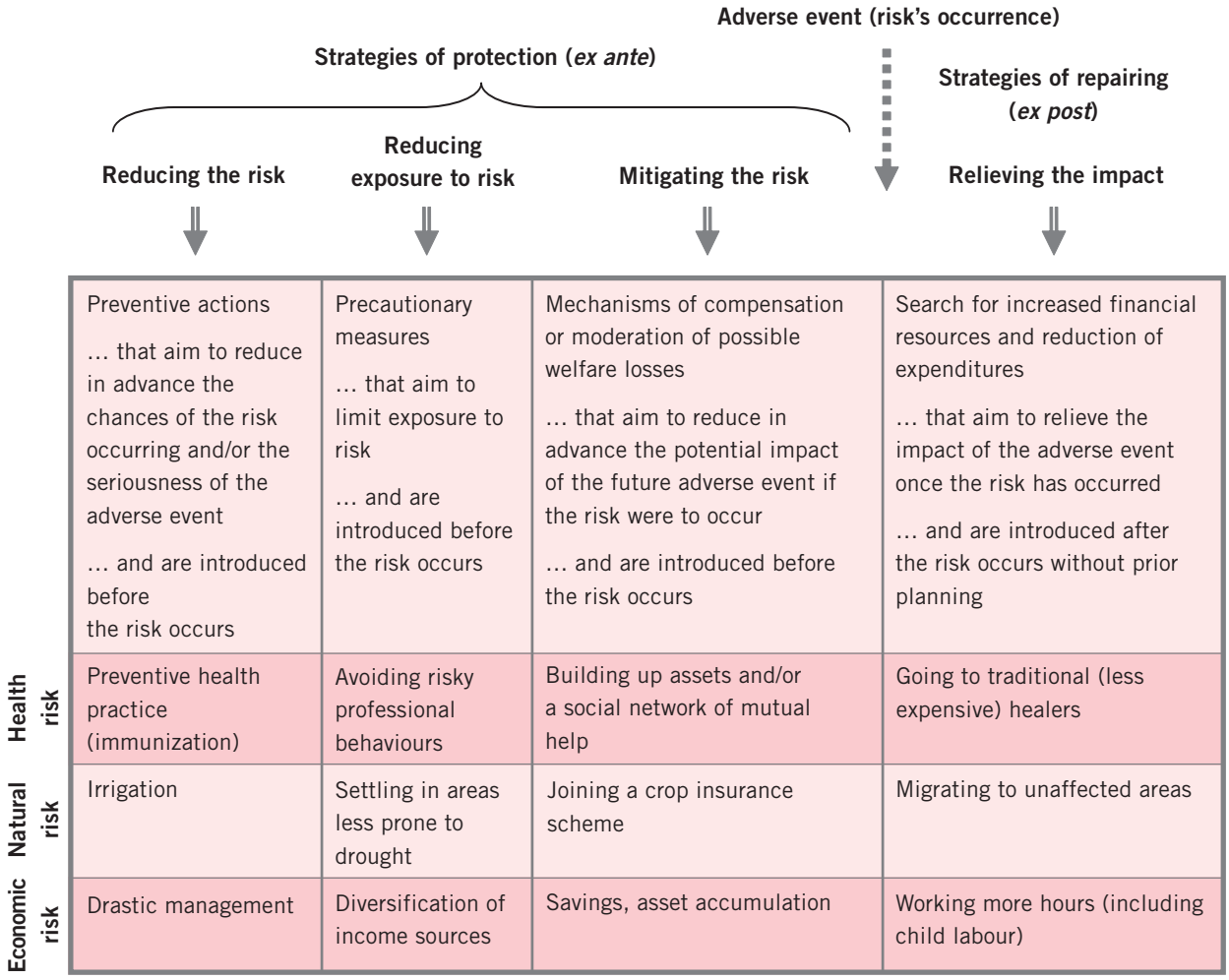
Some of these strategies and arrangements may be implemented at the household's instigation; some others call for the intervention of public, private, or a combination of public and private actors: central and local governments, employers, private firms, local organizations, among others.

The choice of the most appropriate strategies and related mechanisms depends on past exposure to risks, actors' capacity for action in terms of resources and knowledge, and existing financial incentives. Other factors may also play an important role in the choice of strategies and related mechanisms of protection such as:

- the cost-effectiveness of the mechanism, which means that mechanisms with the lowest cost and highest impact should be favoured;
- the characteristics of the risk (some risks may be prevented such as communicable diseases through immunization; others may be mitigated through mutual help networks; major covariant risks may require social insurance); and
- the context and the characteristics of the target population (economic status, size, geographic distribution, among others).

[7] Adapted from R. Holzmann and S. Jørgensen: "Social risk management: A new conceptual framework for social protection and beyond", in *International Tax and Public Finance* (2001, Vol. 8, No. 4, Aug.), pp. 529–556.

Figure 4. Examples of mechanisms to manage risks



	Reducing the risk	Reducing exposure to risk	Mitigating the risk	Relieving the impact
	Preventive actions … that aim to reduce in advance the chances of the risk occurring and/or the seriousness of the adverse event … and are introduced before the risk occurs	Precautionary measures … that aim to limit exposure to risk … and are introduced before the risk occurs	Mechanisms of compensation or moderation of possible welfare losses … that aim to reduce in advance the potential impact of the future adverse event if the risk were to occur … and are introduced before the risk occurs	Search for increased financial resources and reduction of expenditures … that aim to relieve the impact of the adverse event once the risk has occurred … and are introduced after the risk occurs without prior planning
Health risk	Preventive health practice (immunization)	Avoiding risky professional behaviours	Building up assets and/or a social network of mutual help	Going to traditional (less expensive) healers
Natural risk	Irrigation	Settling in areas less prone to drought	Joining a crop insurance scheme	Migrating to unaffected areas
Economic risk	Drastic management	Diversification of income sources	Savings, asset accumulation	Working more hours (including child labour)

When choosing strategies and mechanisms of protection, it is important to favour *ex ante* arrangements since they are more cost-effective and, unlike *ex post* arrangements, they reduce households' insecurity and vulnerability. *Ex post* strategies and mechanisms are often less efficient in terms of resource allocation. Moreover, when households rely mainly on *ex post* strategies, they incur greater stress when a risk occurs and their coping strategy often contributes to increasing their vulnerability towards future adverse events.

If households do not benefit from sufficient or adequate protection against risks (*ex ante* mechanisms), they may try to offset the consequences of an adverse event once the risk has occurred by searching for additional financial resources or by cutting spending. They may borrow money from extended family, friends, neighbours, a financial institution, or even moneylenders often at usurious rates of interest. They may take money out of the family business. They may use credit not for its original purpose. They may increase their labour supply, working more hours or involving more household members, including children. They may migrate to unaffected areas, especially when the shock is covariant and the local labour market has collapsed. They may also cut spending, withdraw children from school, and reduce food intake. They may enrol in public emergency programmes (e.g. free distribution of food and clothing), particularly in cases of covariant shocks.

The search for additional financial resources will certainly raise ready cash in the short-term, although it might take some time to find one or more lenders. However, this borrowing may result in heavy indebtedness which may jeopardize a family's financial position, ultimately leading to poverty. In cutting spending, households incur high long-term costs by jeopardizing their economic and human development prospects. *Ex post* arrangements often lead to child labour and malnourishment, with lasting damage to children. Also, such arrangements often impose an inordinate burden on women whose workload increases with stress, yet their duties at home are not lessened.

Why do we need insurance?

Idiosyncratic and minor risks which affect a small number of people at a time or entail small costs can be handled by approaching friends and family and falling back on informal risk management methods. However, when major, covariant, or catastrophic risks occur affecting a large number of people at the same time or entailing high costs, it is not possible to approach social networks or relatives for help as many would be facing the impacts of the risk. At such times, insurance becomes important.

For the poor or people living just above the poverty line, even minor risks can have catastrophic consequences. They may need protection for all types of risks.

How does insurance work?

In return for a regular payment called a premium, the insurance provider takes on the financial risk of the insured person. In case the insured person faces a risk such as hospitalization, theft, and so on, the insurance provider pays for the financial losses.

By compiling historical information on the occurrence of the risks among a large pool of insured people, insurance providers are able to predict the probability of a risk and thereby estimate the average cost of the risk. This average cost serves as the basis for the calculation of the premium.

Insurance is based on the assumption that not all insured will claim for benefits at the same time. The contributions paid by all insured members are used to compensate for the financial consequences of those few who are experiencing the risk.

What is the law of large numbers?

As they work with a large database of insured people, the insurance providers can sum up all individual risks into an insurance pool. Through this risk pooling, each insured person can share the financial burden of the risks. This is based on the law of large numbers.

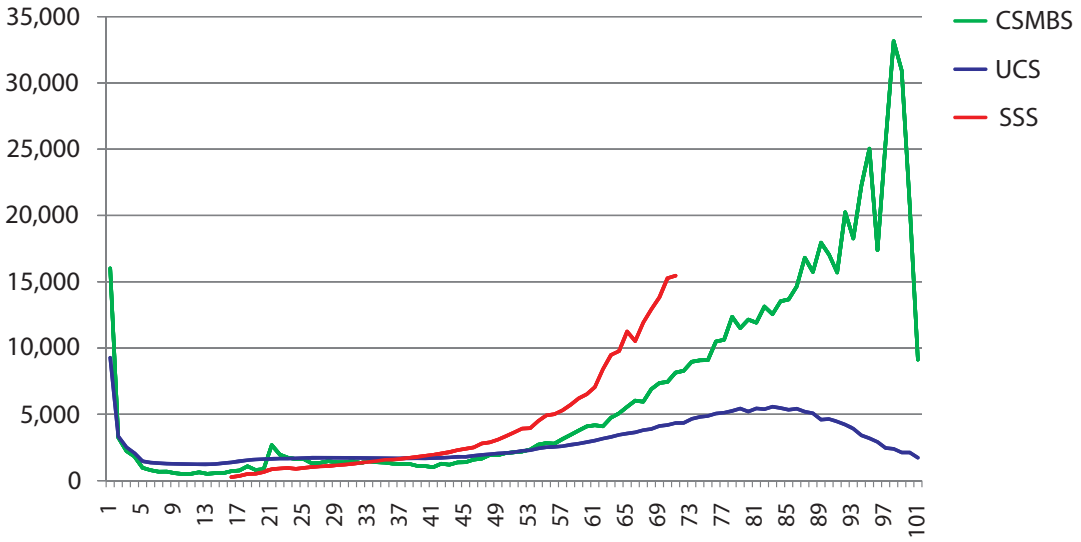
In probability theory, the law of large numbers is a theorem that describes the result of performing the same experiment a large number of times. According to the law, the average of the results obtained from a large number of trials should be close to the expected value, and will tend to become closer to the expected value as more trials are performed.

The law of large numbers is important because it "guarantees" stable long-term results for the averages of random events. While individuals may experience different exposure to risks, the law of large numbers states that for a very large group of people (theoretically infinite), the expected risk faced by each person is almost the same as the average of all the risks faced by the group.

What is the J curve in insurance?

The expected financial losses for health risks or health care expenditures of each age group are different. It is high in newborns and elderly people, which can be depicted as a J-shaped curve. One example of a J curve for the per capita health care expenditure in Thailand is given below.

Figure 5. Per capita health expenditure among the three social health insurance schemes in Thailand, 2010: Civil Servants Medical Benefit Scheme (CSMBS), Universal Coverage Scheme (UCS), and Social Security Scheme (SSS)



Source: Estimates based on the database of the CSMBS, the SSS, and the UCS (Bangkok, Health Insurance System Research Office (HISRO), 2011).

How is probability used in calculating insurance premiums?

The calculation of insurance premiums is based on the probability of a risk taking place. At a very simplistic level, it is based on probability of the risk multiplied by the financial consequence of the risk.

Therefore, the premium for health insurance is calculated as follows:

Premium = (probability of illness in a year) × (average number of utilizations of health care services per year) × (unit cost of each utilization)

For example, suppose a person has a 40 per cent chance (probability equal to 0.4) of falling ill in a year. In the case the person falls ill at least once per year, suppose they will visit the health care facility four times during the course of the year. Finally, assume the cost of consultation and medicines is US$30 per visit. In this case, the premium is calculated as:

Premium = 0.4 × 4 × 30 = US$48

Similarly, the premium for unemployment insurance is calculated as follows:

Premium = (unemployment rate) × (proportion of insured unemployed persons who meet the eligibility criteria) x (average duration of claims in a year expressed in weeks) × (average weekly benefits)

What is asymmetric information?

A challenge faced by insurance providers includes asymmetric information, i.e. when all people do not have the same information. It may be in the interest of the insured person to conceal information that would place the person in a higher risk bracket. For instance, a person may become a member of an insurance scheme just before they are scheduled to undergo a surgery or due to unhealthy habits. If they conceal this information, the average risk of the insured group is raised. In such cases, the premium would not be enough for the insurance scheme to pay for the actual risks. If more and more people conceal such information and become members of the insurance scheme, the insurance premium would go higher and higher. This would lead to a situation where the low-risk people would be willing to leave the risk pool. The group would be left with mostly high-risk people, causing an undesirable situation for the insurance provider. This is called adverse selection.

Another problem arising from asymmetric information is moral hazard. Moral hazard occurs when the insured person is more likely to take risks and is careless about safeguarding oneself from risky situations. This is because the person knows that they will be covered from financial losses by the insurance provider.

To minimize the occurrence of adverse selection, the most effective method is to establish mandatory insurance where all members of a group (for instance all car drivers or all workers under the labour law) have the obligation to join the scheme. In the case of a voluntary scheme, some private insurers may be inclined to select risks by recruiting only insured people with "good" health records, for instance, which is contrary to the principles of solidarity and social inclusion promoted by the ILO. Another method is to exclude predictable events from the benefit package such as planned surgeries.

To minimize the impacts of adverse selection and moral hazard, the careful design of the benefit package is required with the implementation of:

- co-payments and limitations, such as a maximum number of days of hospitalization and reimbursing surgical operations or specialist consultations subject to a maximum benefit level;
- long waiting periods before insured members can be entitled to certain benefits, such as a waiting period of nine months for deliveries;
- control mechanisms such as pre-authorization of high-cost planned surgeries.

To enable participants to understand the theoretical concepts better, the presentation is made in an interactive manner with questions and practical examples. Participants are encouraged to draw from their own experiences on when these challenges are encountered and ways to deal with them. For instance, a discussion may be initiated on the effectiveness of a co-payment mechanism as one way to reduce moral hazard.

Takeaway message:

Risk is not the same as uncertainty, yet it is important to insure a person from different kinds of risks. We may or may not know whether a particular risk will take place, when it will take place, and how much it will cost. Management of risk can be done by taking steps for its prevention, mitigating the effects of risk, and coping with the risk after it has occurred. People may fall back on family and social networks to deal with the financial consequences of risk or they may approach formal risk management methods such as public authorities and membership institutions. It is difficult for informal channels to assist in cases of covariant risk. Insurance providers have a large pool of insured people, thereby reducing individual risks to an average of all risks. Thus, the financial consequence of the expected risk for each person can be predicted. Insurance mechanisms include several challenges due to asymmetric information between the insurance provider and the insured. To minimize the occurrence of adverse selection, the most effective method is to establish mandatory insurance where all members of a group have the obligation to join the scheme.

Resources:

		textbook	*e-box*
	Master module 3 – Introduction to the concepts of risk and insurance	✓	✓
	Presentation – Introduction to the concepts of risk and insurance		✓
	Risk and Insurance		
	Part 1 – An overview and risk management		✓
	Part 2 – Insurance and its challenges		✓
	Part 3 – Thoughts from participants		✓

e-box available at: http://www.social-protection.org/gimi/pages/abnd/