Risk and Imperfect Information

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Reading: Chapter 18

This topic deals with market failures that may occur when individuals don’t have perfect information. One source of not having information is the problem of knowing about future outcomes. We discuss the implications of this by examining the concept of risk and how insurance and diversification can help to overcome problems arising from it. We also examine situations in which the problems are not so easily overcome, due to uncertainty and asymmetric information.

Risk and Imperfect Information

1. Risk and risk aversion
2. Market for risk
3. Diversification
4. Uncertainty
5. Asymmetric information and market failures

Risk and Risk Aversion

Risk, random variables and expected values

We do not know exactly what will happen in the future. The absence of perfect foresight about the future is one type of imperfect information. Economists often examine this type of situation using the concept of risk. Risk can be understood in terms of a random variable, a variable the value of which is not known with certainty, but which can have a number of possible outcomes (called states of the world), each with an associated probability of occurrence, the sum of these probabilities being one. A risky situation exists when the outcome of an event is random variable.

The expected value of a random variable is the weighted average of all its possible values, where the weights on each possible value correspond to the probability of that value occurring. With \( S_i \) being the value of the random variable in state \( i \) of \( N \) possible states, and \( P_i \) the probability of its occurrence, it is

\[
EV = (P_1 \times S_1) + (P_2 \times S_2) + ... + (P_N \times S_N)
\]

Utility, \( U(Y) \)

Utility of expected value of income (UE) = \( U(P_1 Y_1 + P_2 Y_2) \).

Risk aversion is shown by the fact that \( UE > EU \), that is, utility obtained by getting the expected value with certainty exceeds expected utility.

Risk averse individual is willing to purchase a fair insurance policy for which the premium is equal to the expected value of the claims.

Risk aversion and utility

Typically, people do not like risk – they are risk averse – and are willing to pay to avoid risks, for instance, by buying insurance.

Can be shown using the total utility curve.

Expected utility \( (EU) \), the expected value of an individual’s utility = \( U(P_1 Y_1 + P_2 Y_2) \).

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Purchase of fair insurance policy increases expected utility due to diminishing marginal utility which implies that a dollar gained when income is low adds more to utility than a dollar lost when income is high.

Risk and Risk Aversion

Differences in Risk Aversion

Differences in preferences. How “curved” is the utility curve, that is, how quickly marginal utility declines. More implies greater risk aversion. Straight line utility curve implies no risk aversion at all.

Differences in initial income or wealth. Generally, people who are richer will be less risk averse. Poorer people, especially those near poverty will be more risk averse – a loss of $1000 more important to a poor person than to a rich person.

Kenneth Arrow (b. 1921) American economist, an Nobel Prize winner in Economics, is a pioneers in the area of risk and markets for risk.

Market for Risk

In the presence of risk many beneficial trades would not take place. Examples: people would not buy things which might have a possibility of breaking down. Merchants would not trade if their sinks have a high chance of sinking. These could imply market failures.

However, the problems could be avoided if there is a market for risk. There are buyers of insurance and sellers of insurance. Less risk averse investors supply insurance. More risk averse people demand insurance. Each policy states that the seller will pay a certain amount to the buyer in case some event (like an accident) occurs. The price is insurance premium.

The equilibrium premium and number of policies is determined where supply and demand intersect. In the absence of private information, the market generates an efficient allocation of risk.
Diversification
Risk can be reduced through diversification. Not putting all your eggs in one basket: reduce the probability that all their eggs would be lost in case of an accident. Taking on risks of different kinds.

Diversification can reduce risk considerably when events are independent, that is, if each of them is neither more nor less likely to happen if the other one happens.

Diversification is made easier by the existence of institutions like the stock market, in which people trade shares or stocks—partial ownership of a company. Insurance companies are able to sell insurance because they can diversify their risks. Wealthy can be self-insured.

However, there are limits of diversification. Some events are positively correlated in the sense that one is more likely to occur when the other occurs. Positive correlation may be due to (1) severe weather conditions; (2) political events like wars; (3) business cycles: many companies can suffer decline in profits and many can lose their jobs.

Asymmetric information and market failures
Markets may fail when different people (buyers and sellers) do not have the same information. This is called asymmetric information. An example is: some people know things that other people don't know. This is a situation of private information.

Such situations of imperfect information can arise when buyers do not understand what the seller is claiming, or when they cannot ensure that the seller is actually providing what he or she is claiming to provide. Often occurs in the case of medicines, like false cures for fatal diseases, food which may cause illness, or toys which can injure kids. Government can provide correct information and have inspectors, to reduce market failure.

Two special problems have been discussed by economists: adverse selection and moral hazard.

Asymmetric information and market failures
Moral Hazard
Moral hazard occurs when an individual knows more about his or her own actions than other people do. This leads to a distortion of incentives to take care or to expend effort, especially when the individual is insured.

In the case of insurance, it leads individuals to exert too little effort to prevent losses. In the case of borrowing, it provides individuals to default by goofing off and claiming that there were accidental problems. This makes insurers and lenders unwilling to insure or lend, resulting in a market failure.

Insurance companies deal with moral hazard by requiring a deductible. A deductible in an insurance policy is a sum that the insured individual must pay before being compensated for a claim.

Banks and other lenders deal with the problem by requiring collateral. A collateral is an asset that the borrower agrees to transfer to the lender if he or she defaults. This doesn't solve the problem entirely: poor may not be able to provide collateral. Market failures result because efficient trades will not occur. There is also an equity problem. Some methods have been devised to deal with the problem: micro group lending, pioneered by Grameen Bank and Muhammad Yunus; now in many parts of the world.

Uncertainty
Several economists have distinguished between the concepts of risk and uncertainty. Risk exists when events have objectively-determined probabilities. Relate to events which can be thought of as repeated experiments—like toss of a coin, roulette wheel. Uncertainty exists when, as Keynes put it, we simply do not know the outcome. He discusses this in the context of investment decisions by firms, and stock markets.

Still, we may form subjective probabilities of outcomes. The problem is that we may have little confidence in the probability distribution. We may rely on more information from personal experience or from people we know. Perception of probabilities may change drastically—sudden changes. We may follow conventions of following others—herd behavior.

The presence of uncertainty can lead to market failures: (1) macroeconomic problems; firms buying goods for investment if they feel future is uncertain, even in cost of capital falls. Can lead to unemployment; (2) sudden movements of supply and demand, often out of equilibrium; (3) unstable markets—price goes up, people think it will go up more in future, demand more; real information is not being transmitted in markets.

Asymmetric information and market failures
Adverse selection
Adverse selection occurs when an individual knows more about the way things are than other people do. Private information leads buyers to expect hidden problems in products, leading to low average prices. They will want to pay low prices for high problem goods, etc., but because they don't know which has high problems, will only pay the average price. The best items being kept off the market, and the market may disappear: market failure. Ex. Lemons in used car market.

Adverse selection can be reduced by:
1. screening: using observable information about people to make inferences about their private information.
2. signaling: a way of revealing private information, such as warranties
3. cultivating a long-term reputation: allows an individual to reassure others that he or she isn't concealing private information.

These may not work very well. May require government intervention, for instance, lemon laws.