

# ECON3302

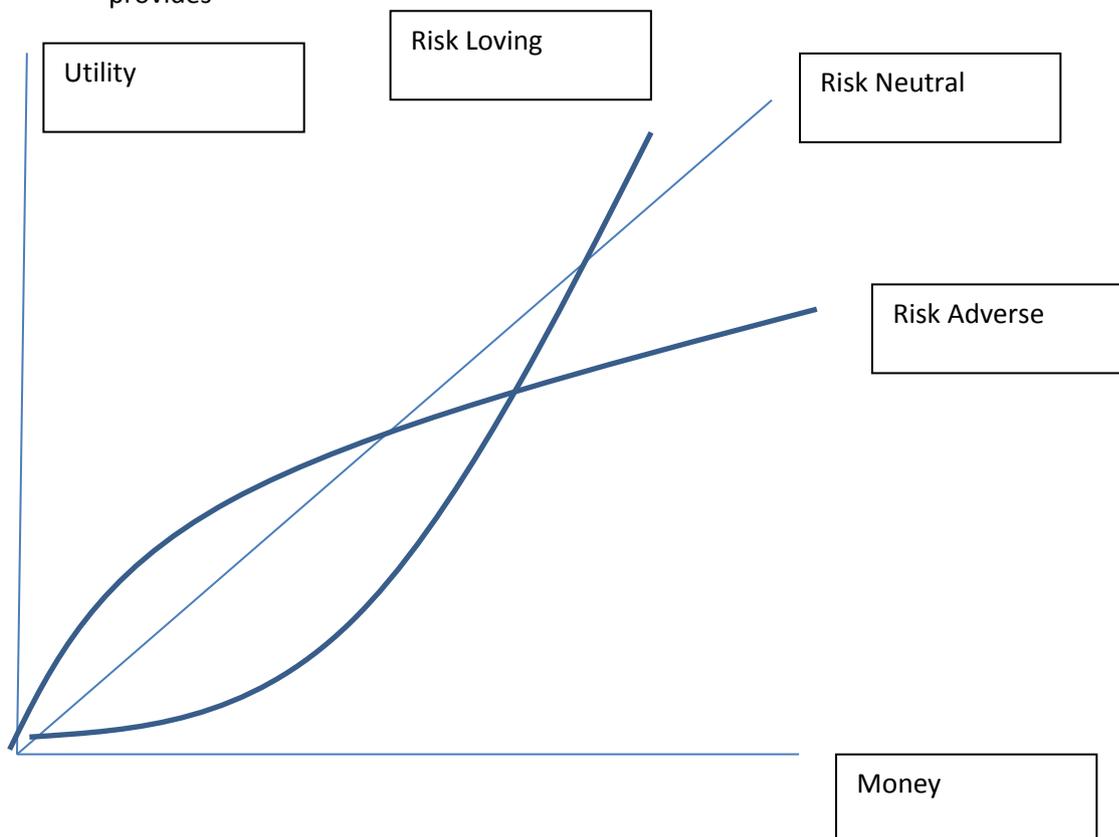
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## Economics of Uncertainty

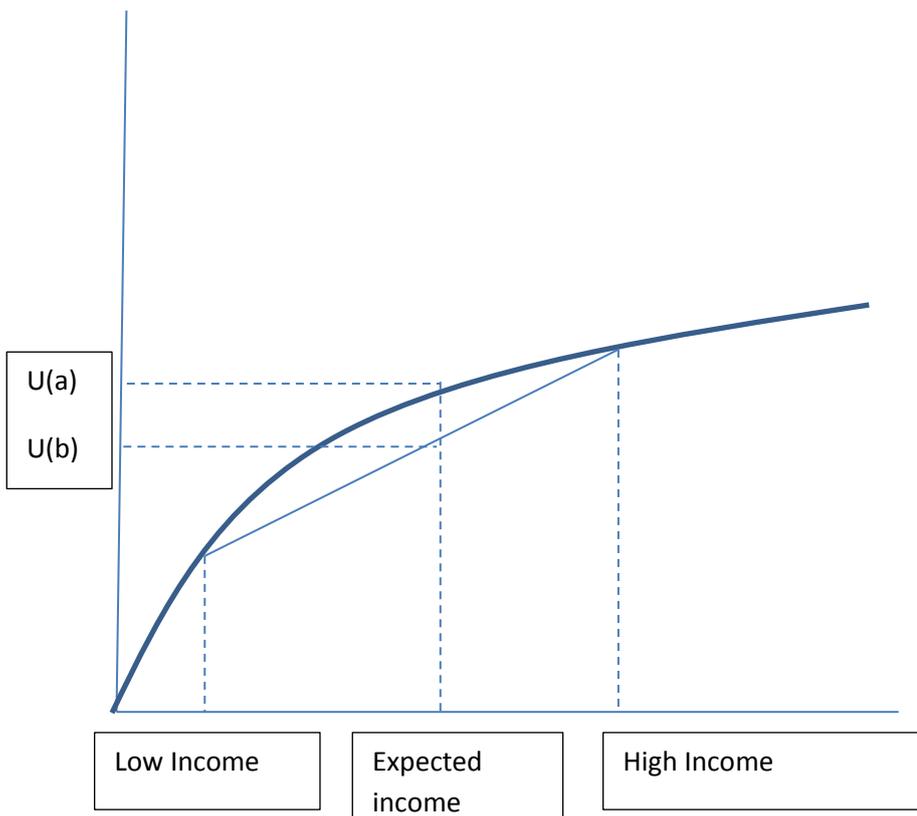
- Consumers maximise utility
  - Within the budget constraint of  $P_x X + P_y Y$
- Probability: we assume that it will be knowing with certainty
  - Objective probability
    - Based on fact
  - Subjective probability
    - Based on experience
- The expected value is the weighted sum of the payoffs
  - $E(X)$
- Variability
  - The extent to which possible outcomes differ
  - Difference between actual and expected payoff
  - Measured with standard deviation
- People do not care directly about the money they get, they care about the utility that it provides



- Risk adverse
  - Strictly concave
  - Diminishing marginal returns
  - The largest expected value does not always equal the largest utility as they don't like risk.
- Risk neutral

- Don't care about risk, neither like nor dislike
- Just wants the largest expected value, which will equal expected utility
- Insurance companies could be an example as they play the game so many times the risk of one individual does not matter
- Expected utility modifies expected income by an individual's attitude toward risk

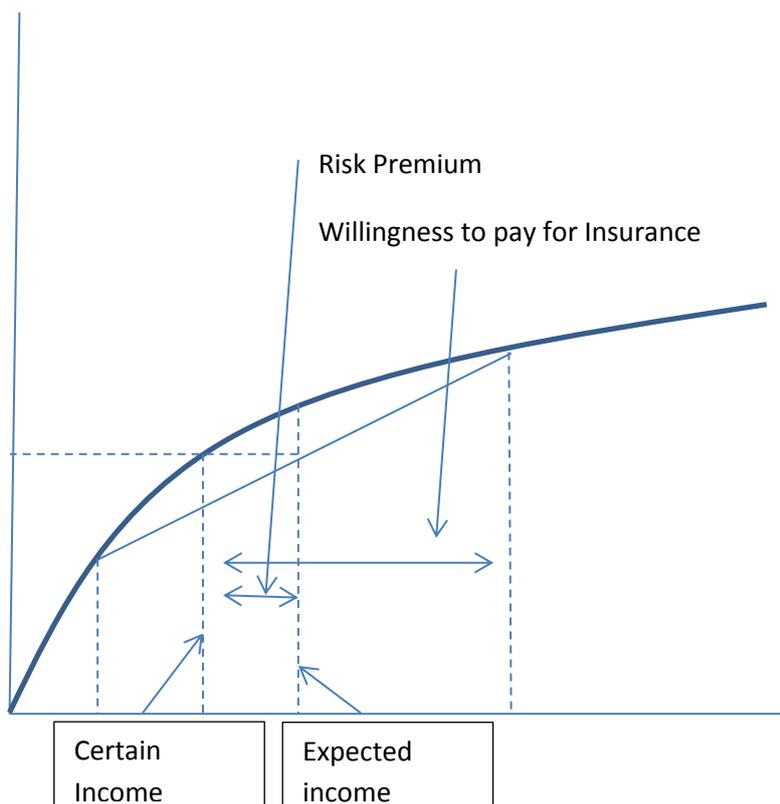
### Calculating Expected Utility



- Expected utility is lower than utility from income because they are risk averse
  - If probabilities are assigned to the different incomes, and an expected income can be calculated.
    - The utility from this level of income is  $U(a)$  where the utility is read of the utility curve
      - However, the utility is reduced because of the uncertainty, so it is lower than the regular utility curve which does not factor in the risk, simply how much they value each level of income.
      - The actual utility is  $U(b)$  where the expected income intersects with the replacement utility curve.

## Market for Insurance

- Diversification reduces risk
- The value of information
  - Is the difference in the expected value of the choice with incomplete information and the choice with complete information
- Why do people have insurance
  - They are risk adverse so they pay to avoid risk
  - The expected disutility of losing the insured items is greater than the disutility of paying an insurance premium
- Providing insurance
  - Is based on diversification
    - Not everyone will get sick at once in the health insurance market
    - The insurer receives money from the healthy and gives it to the unhealthy
- Example of willingness to pay for insurance
  - $U(X) = \ln(x)$  is the utility function for someone that has \$100,000 and a 25% chance of losing a car worth \$20,000
    - $E(U) = 0.75 * (U)100,000 + 0.25 * (U)80,000$
    - $E(U) = 0.75 \ln(100,000) + 0.25 \ln(80,000) = 11.46$ 
      - You can then work out what amount of income would give a utility of 11.46. This level of income is 100,000 less the premium  $y$
      - $E(U) = U(100,000 - y) = \ln(100,000 - y) = 11.46$
      - $100,000 - y = e^{11.46}$
      - $y = 5426$
      - This is a risk premium of \$426 as the expected value is 95,000 or an expected loss of 5000.



In the below diagram, the expected income that involves risk, provides the same utility as the certain income that does not have risk because the person is risk adverse. The difference between the expected income and the certain income is the amount that they would be willing to pay for insurance to make that expected income certain. The willingness to pay for insurance is the risk premium in addition to the expected loss.

- Expected utility is the **weighted average** of the different possibilities
- Actuarially fair premium
  - The insurance company expects no profits from it
    - Does not include marketing/admin
  - The difference between what the consumer pays and the actuarially fair premium is the loading fee
  - The firms are risk neutral so they just care about expected values
- Loading factors (**as opposed to loading fees**)
  - Things like administrative costs
- Why are actuarially fair premiums not charged
  - Loading factors
  - Market power
  - Information problems
  - Resource costs
- Why should you not insure small things
  - Because of loading costs people will underinsure
  - You are paying for more than just the reduced risk
- Deductibles
  - The consumer has to pay a fixed amount out of pocket
    - Like you have to pay the initial \$100 health cover
  - Lowers demand for inexpensive services
  - Has little effect on demand for expensive services
  - The sum of the premiums should exceed the medical expenses
- What determines health insurance demand
  - Price
  - How risk adverse you are
- Assumptions of these models
  - Consumers bear full cost of their own insurance
  - Insurance companies can appropriately price policies
  - Individuals can afford insurance/health care

