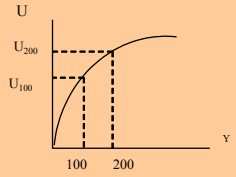
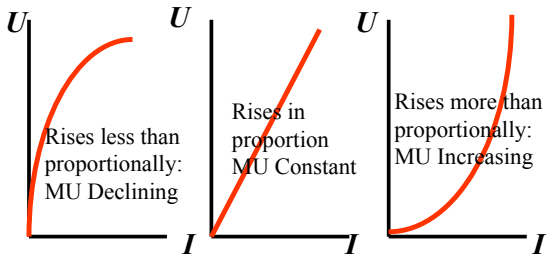
Uncertainty and Risky Behavior



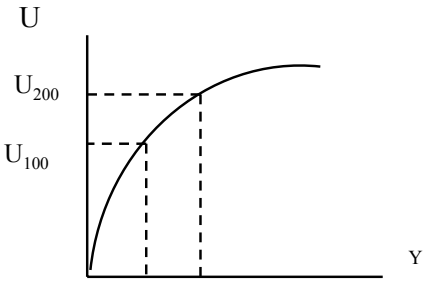
The Economics of Uncertainty

- Utility is a function of income.
- The higher the level of income, the higher the level of utility.
- Decisions are based on ***expected*** utility, not expected income.

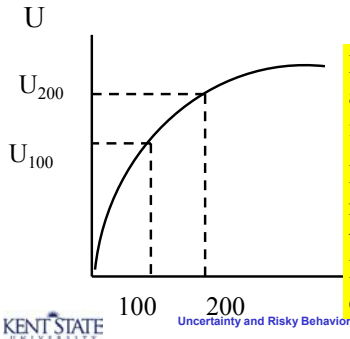
Income and Utility



Risk Averter



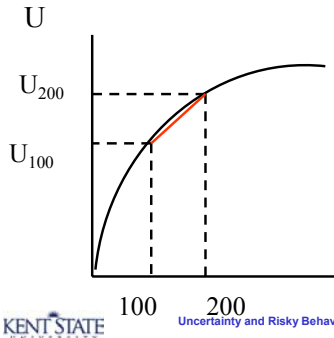
Risk Averter



Here, utility is a function of income.

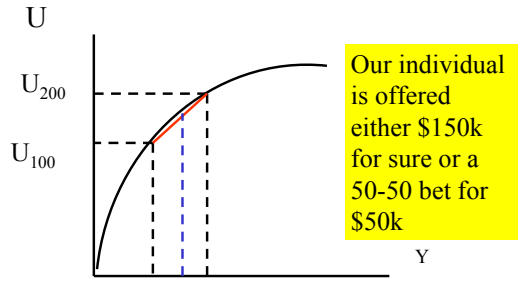
But utility rises slower than income: MU is declining

Risk Averter



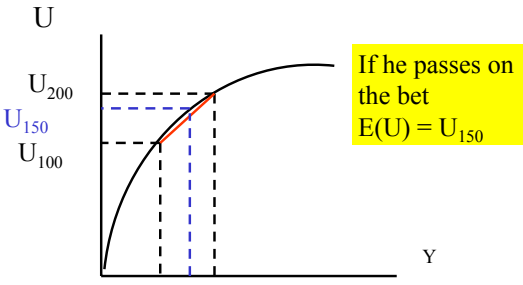
Why do I draw this red line? Patience

Risk Averter



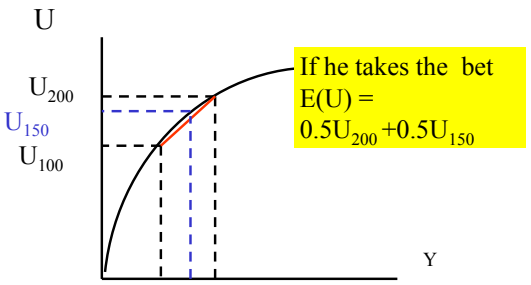
Our individual is offered either \$150k for sure or a 50-50 bet for \$50k

Risk Averter



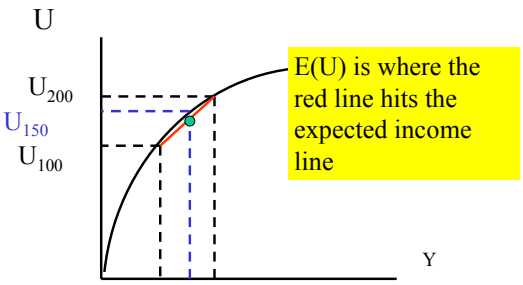
If he passes on the bet $E(U) = U_{150}$

Risk Averter



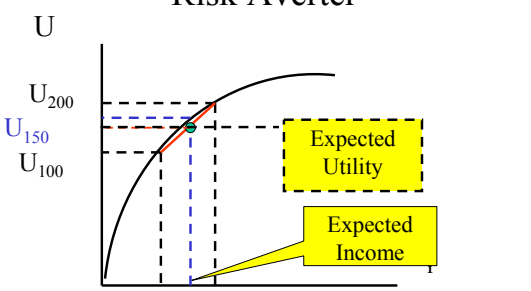
If he takes the bet $E(U) = 0.5U_{200} + 0.5U_{150}$

Risk Averter

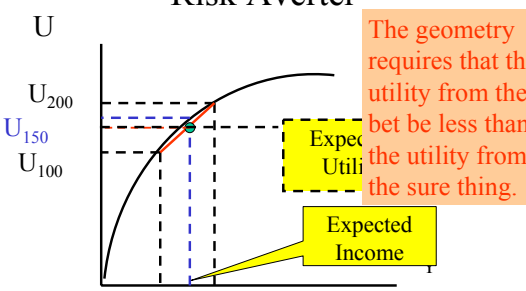


E(U) is where the red line hits the expected income line

Risk Averter

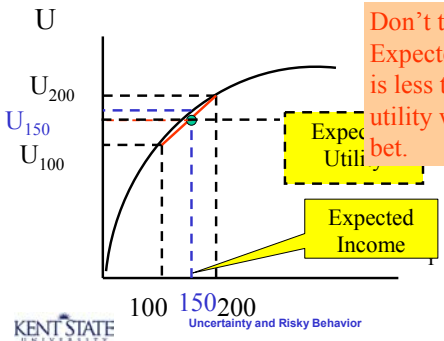


Risk Averter



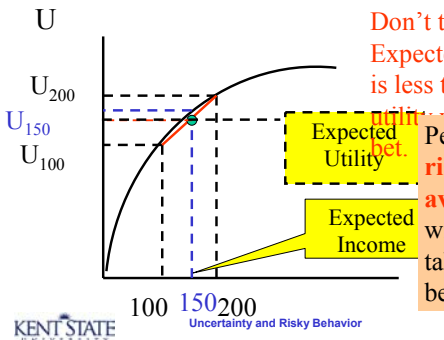
The geometry requires that the utility from the bet be less than the utility from the sure thing.

Risk Averter



Don't take bet. Expected utility is less than utility without bet.

Risk Averter



Don't take bet. Expected utility is less than utility without bet.

Person is **risk averter**; will not take fair bet.

A Digression

- An individual is offered a bet.
  - If he loses, he gets income of I_L.
  - If he wins, he gets income of I_W.
  - The probability of winning is p
- His expected income is

$$(1\text{-}p)I_L + pI_W$$

A Digression

- An
  - I
  - I
  - T
- His expected income is

$$U((1\text{-}p)I_L + pI_W)) \quad \textit{or} \quad (1\text{-}p)U(I_L) + pU(I_W) \quad ?$$

$$(1\text{-}p)I_L + pI_W$$

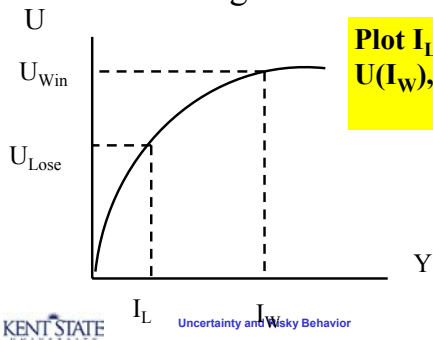
A Digression

- An
  - I
  - I
  - T
- His expected income is

If he is offered his choice between the bet or his expected income, which should he take?

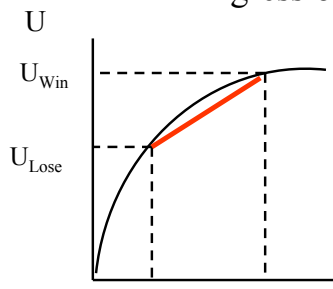
$$(1\text{-}p)I_L + pI_W$$

A Digression



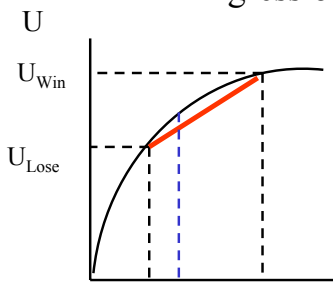
Plot I_L, I_W, $U(I_W)$, $U(I_L)$

A Digression



Draw the red line; connect the dots.

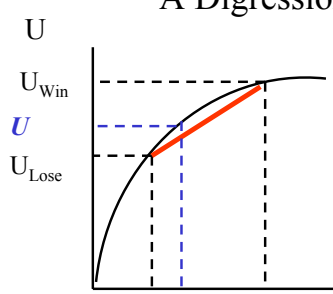
A Digression



Find

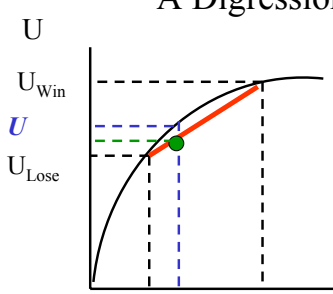
$(1-p)I_L + pI_L$

A Digression



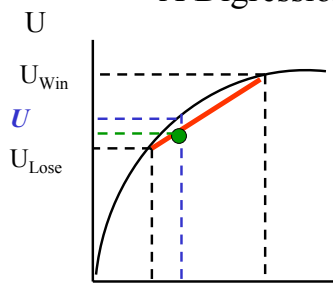
Find the Utility with the expected income

A Digression



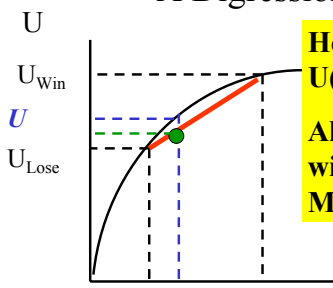
Find the point where the blue income line hits the red line.

A Digression



Draw a line to the utility axis. This gives us Expected Utility

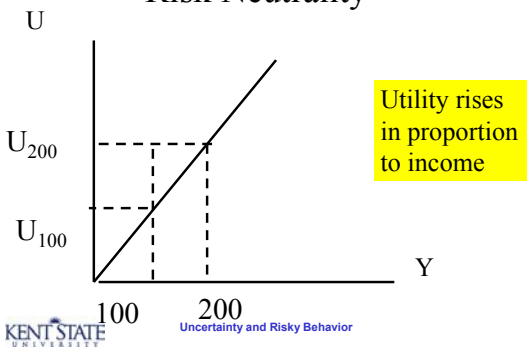
A Digression



Here, E(U) < U(Sure).

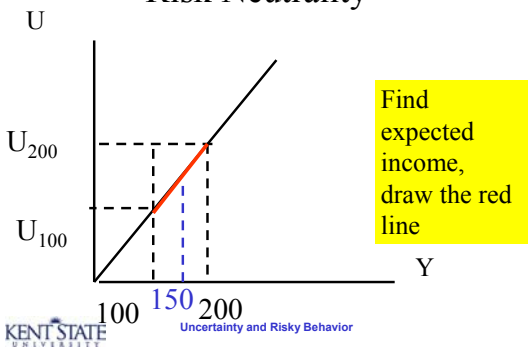
Always true with diminishing MU

Risk Neutrality



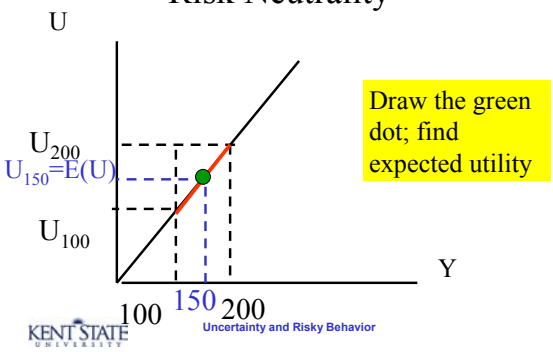
Utility rises in proportion to income

Risk Neutrality



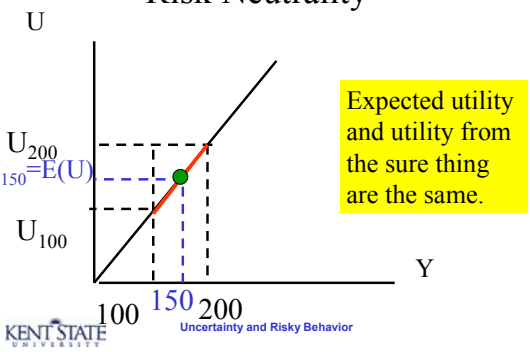
Find expected income, draw the red line

Risk Neutrality



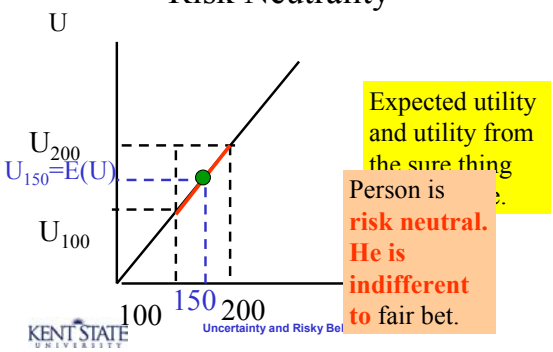
Draw the green dot; find expected utility

Risk Neutrality



Expected utility and utility from the sure thing are the same.

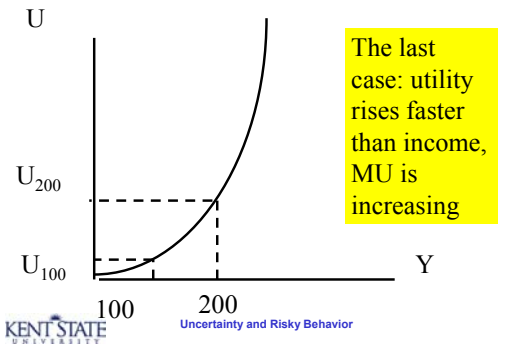
Risk Neutrality



Expected utility and utility from the sure thing .

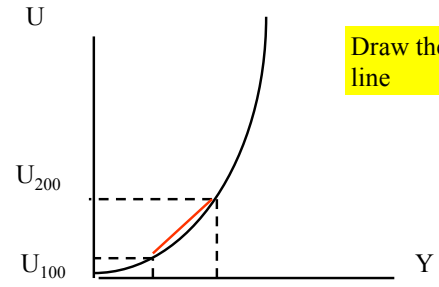
Person is **risk neutral. He is indifferent to** fair bet.

Risk Taker



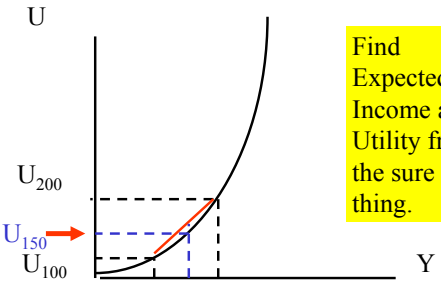
The last case: utility rises faster than income, MU is increasing

Risk Taker



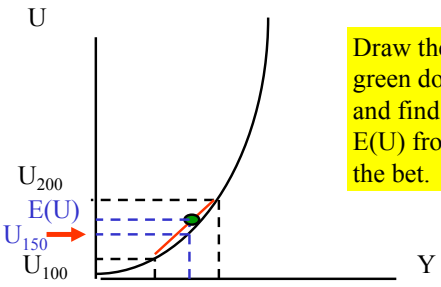
Draw the red line

Risk Taker



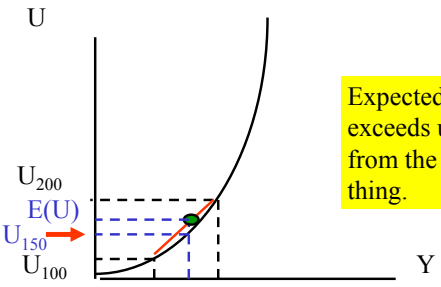
Find Expected Income and Utility from the sure thing.

Risk Taker



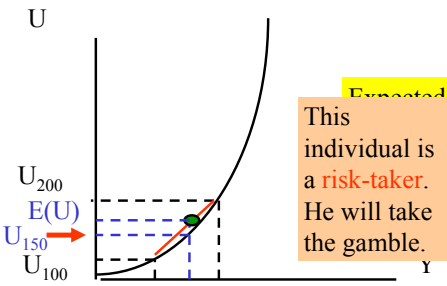
Draw the green dot and find E(U) from the bet.

Risk Taker



Expected utility exceeds utility from the sure thing.

Risk Taker



This individual is a risk-taker. He will take the gamble.

The Three Cases

- When utility rises less than income, we say the individual is a risk averter.
  - That is, he will avoid fair bets

The Three Cases

- When utility rises less than income, we say the individual is a risk averter.
- When utility rises faster than income, the individual is a risk-taker.
  - He will take fair bets

The Three Cases

- When utility rises less than income, we say the individual is a risk averter.
- When utility rises faster than income, the individual is a risk-taker.
- When utility is proportional to income, the individual is risk-neutral
  - He is indifferent to fair bets

The Three Cases

- Which one is most likely?

The Three Cases

- Which one is most likely?
- Some are risk takers, some are risk averters, and some are risk neutral.

The Three Cases

- Which one is most likely?
- Some are risk takers, some are risk averters, and some are risk neutral.
- **But *most*** people are risk averters.

End