10 Book Notes

Saturday, March 6, 2021 1:44 PM

Uncertainty w/ Risk Aversion

Expected Utility Theorem

W_i = Wealth for outcome i
f_i = Probability of i^{th} outcome

Expected Utility Theorem $E(U) = f_1 U(W_1) + f_2 U(W_2) + \ldots$
↳ $= EU = \Sigma_i f_i U(W_i)$

five assumptions:
1) completeness
2) more is better
3) transitivity
4) preference for variety
5) Independence Axiom:
If A > B, compound lottery A w/ prob f and C w/ prob (1-f) > compound lottery B w/ probability f and C with prob (1-f)

Example:
$U = 10\sqrt{W}$
option A: $f = \frac{1}{2}$ $W = 0$ and $f = \frac{1}{2}$ $W = 100$
B: $f = 1$ $W = 36$

$EV_A = .5(0) + .5(100) = 50$
$EV_B = 1(36) = 36$ → Utility

$EV_A = .5(10\sqrt{0}) + .5(10\sqrt{100}) = 0 + 50 = 50$
$EV_B = 1(10\sqrt{36}) = 10(6) = 60$ → Gamble

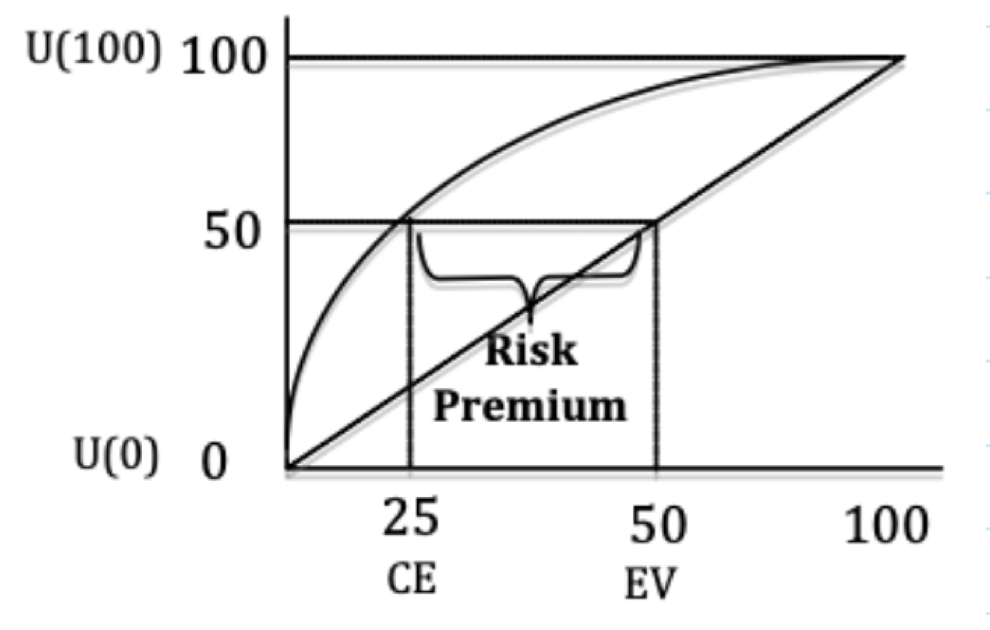
Certainty Equivalent: amount of wealth where utility = gamble
↳ $U(CE) = \Sigma f_i U(W_i)$

Using previous example: $U(CE) = .5(10\sqrt{100}) + .5(10\sqrt{0})$
$10\sqrt{CE} = 50$
$\sqrt{CE} = 5$
$CE = 25$

Constructing a Utility Function for Certain Outcomes

CE only exists for a gamble, not overall

Risk Premium: amount willing to pay to get rid of risk



Uniqueness and Scale of the Expected Utility Function

The Value of Insurance

Value added = Number Insured * (EV - CE - Admin Costs Per)

Policy Price = expected losses + Admin costs per

Consumer Surplus = Initial Wealth - Policy Price - CE

↳ CS = EV - CE - Admin Costs Per

Value gambles at EV because people have CE less than Wealth

Limitations of the Expected Utility Model and Rational Man Models

trade gains must exceed transaction costs