

Sequence 3 : Risk in agricultural economics models

Unit 1 : Agriculture, a risky activity

Lesson 26 : Maximizing a utility function

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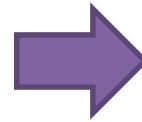
ModelEco

Maximizing expected utility

Maximize $Z = \sum_e [p_e \sum_j c_{je} x_j]$

Under the constraints $\sum_j a_{ij} x_j \leq b_i \quad \forall i, j$

$x_j \geq 0 \quad \forall j$



Maximize $\sum_e [p_e U(\sum_j c_{je} x_j)]$

Under the constraints $\sum_j a_{ij} x_j \leq b_i \quad \forall i, j$

$x_j \geq 0 \quad \forall j$

e states of nature

p_e probability of the state of nature e

c_{je} income of activity j in state of nature e

❖ Choice of the functional form for U

Problem : choice of the utility function

$U(Z) = Z^a$

$U(Z) = [1/(1-r)].Z^{1-r}$

...

Maximizing expected utility – Example

- The model Maximize $450x_1 + 1000x_2$
 under the constraints
 $x_1 + x_2 \leq 50$
 $25x_1 + 50x_2 \leq 2000$
 $x_1 \geq 0 ; x_2 \geq 0$

Pause the slideshow and add risk into the `risque_base.gms` model.
 Take your time !

- Becomes Maximize $0,2 [U(460x_1+2000x_2) + U(440x_1+500x_2) + U(450x_1+300x_2)$
 $+ U(430x_1+1400x_2) + U(470x_1+800x_2)]$
 Under the constraints
 $x_1 + x_2 \leq 50$
 $25x_1 + 50x_2 \leq 2000$
 $x_1 \geq 0 ; x_2 \geq 0$

Z^{1-r} in GAMS is written $z^{**} (1-r)$

And $U(460 x_1 + 2000x_2) = [1/(1-0,1)]. [460 x_1 + 2000x_2]^{1-0,1}$

If $U(Y) = [1/(1-r)]. Z^{1-r}$ with a 0,1 risk aversion coefficient