Sequence 2 : The farm model

Unit 2.1 : Enriching the base model

# Lesson 13 : Market access and overcoming constraints

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ModelEco

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| Knowing how to model | Knowing how to use GAMS |
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| What happens if all constraints are loosened ? | Exporting GAMS results to Excel<br><br>Displaying the model status |

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## Loosening a constraint

Maximize $Z = 450X_1 + 1000X_2$

With $X_1 + X_2 \leq 50$

$25X_1 + 50X_2 \leq 2000$

$X_1, X_2 \geq 0$

$X_3$ : number of hours of hired labour

Hired worker : 10€/hour

What would happen if all constraints were loosened ?

|  | LOWER | LEVEL | UPPER | MARGINAL |
|---|---|---|---|---|
| ---- EQU OBJECTIF | . | . | . | -1.000 |
| ---- EQU TERRE | -INF | 50.000 | 50.000 | 500.000 |
| ---- EQU TRAVAIL | -INF | 2000.000 | 2000.000 | 10.000 |

OBJECTIF  fonction objectif
TERRE   contrainte de terre
TRAVAIL   contrainte de travail

|  | LOWER | LEVEL | UPPER | MARGINAL |
|---|---|---|---|---|
| ---- VAR Z | -INF | 45000.000 | +INF | . |

Z   revenu total de l exploitation (euros)

---- VAR X   superficie par culture (hectares)

|  | LOWER | LEVEL | UPPER | MARGINAL |
|---|---|---|---|---|
| ble | . | . | +INF | -300.000 |
| mais | . | 50.000 | +INF | . |

|  | LOWER | LEVEL | UPPER | MARGINAL |
|---|---|---|---|---|
| ---- VAR MOS | . | 500.000 | +INF | . |

MOS  main d oeuvre salariee (heures)

Output file extract
Model with loosened labour constraint

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# Loosening all constraints in the model

Maximize $\quad\quad Z = 450X_1 + 1000X_2 - 10X_3 - 150X_4$

With $\quad\quad\quad X_1 + X_2 \leq 50 + X_4$

$\quad\quad\quad\quad\quad 25X_1 + 50X_2 \leq 2000 + X_3$

$\quad\quad\quad\quad\quad X_1, X_2 \geq 0 \; X_3 \geq 0 \; X_4 \geq 0$

$X_3$ : number of hours of hired labour
$X_4$ : rented land area
$X_{3 \text{ and}} X_4$ lower than their dual values

Dual value of labour : 20€
Hired worker : 10€/hour

Dual value of land : 250€
Land rental : 150€/ha

No solution to the model :
unbounded feasible region

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# Desserrer toutes les contraintes dans la réalité

➢ Desserrer toutes les contraintes ->  Agriculteur à accès aux marchés pour les différents facteurs de production

➢ Mais agrandissement limité, pas de reproduction correcte de la réalité car :

1.
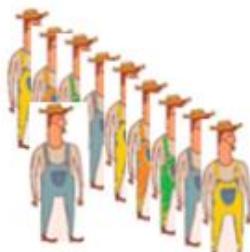
Confrontation demande de terre en grande quantité et offre
=> Hausse du prix de la terre

Confrontation demande en main d'oeuvre et offre

Limite modèle individuel :prix exogènes

2.

Agrandissement -> besoins de financement -> risque

Capacité d'emprunter limitée

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# Displaying the model status

In GAMS : Model Status = Unbounded

```
****  SOLVER STATUS      1 Normal Completion
****  MODEL STATUS       3 Unbounded
****  OBJECTIVE VALUE              48500.0000
```

But GAMS is showing results...

Always check the status of the model!

Status display :

**display** nameModel.ModelStat

When displaying a result table, make sure to include ALL variables of interest

Status display in a results table :

**parameter** RESULT ;
RESULT(c)=X.L(C);
RESULT('model_status')=nameModel.ModelStat;
**display** RESULT ;

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