Modeling Supply

Short Course on CGE Modeling, United Nations ESCAP

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Introduction

- Now that we have modeled the firm's production decision, we will complete a basic model of supply.
- We will consider two cases. In the first we will assume that all factors of production are mobile between economic activities.
- Next we will show how exception handling can be used to introduce specific factors.

Session Outline

1. The long-run production problem
2. Building the model in GAMS
3. Extending to allow specific factors

GDP Maximization

- Consider the problem of maximizing the value of total output (GDP), at given prices, subject to the constraints imposed by resource limitations.
- This sounds like a social planning problem and may in fact be viewed as such, it is not necessary to do so. When there are no factor market distortions, factor endowments are fixed, and competition prevails, the market maximizes the value of output at given output prices.
- We will start with the two factor, two good case.
- Both factors are assumed to be mobile.

The Solution

- At a competitive equilibrium, each factor price is equal to the value of the marginal product of that factor in each industry.
- Also at an optimum, resources are fully utilized.

GAMS Program - Sets

To build the model in GAMS, we can modify the firm's problem:

We'll create two sets which will index the goods and factors:

```
SET I Goods /1,2/;
SET J Factors /K,L/ ;
ALIAS (J, JJ);
```

GAMS Program - Parameters

Now we'll define the parameters, extending the dimensions over the goods and adding in new holders for endowments and GDP:

```
PARAMETERS
GAMMA(I)    Shift parameter in production
DELTA(J,I)  Share parameters in production
RHO(I)      Elasticity parameter in production
QO(I)       Output level
RO(J)       Factor prices
FO(J,I)     Initial factor use levels
FBAR(J)     Initial endowments
P(I)        Prices
GDPO        Gross domestic product;
```

GAMS Program - Variables

Our next task is to assign names for the variables:

```
VARIABLES
Q(I)        Output levels
R(J)        Factor prices
F(J,I)      Factor use levels
GDP         Gross domestic product;
```

Notice that `Q` and `R` are now endogenous not exogenous.