

\$TITLE M3-6.GMS: Introduces a labor supply or labor/leisure activity

\$ONTEXT

Activity T transforms leisure into labor supply

Initially, the consumer has 200 units of leisure and supplies 100 to the market, retaining 100 as leisure

X, Y and Leisure are all Cobb-Douglas substitutes

Markets	Production Sectors				Consumers	
	A	B	W	T	CONS	
PX	100		-100			
PY		100	-100			
PW			300			-300
PLS	-40	-60		100		
PL			-100	-100		200
PK	-60	-40				100

PL will denote the CONSUMER (HOUSEHOLD) price of labor

PLS will denote the PRODUCER price or COST of labor to the firms

\$OFFTEXT

PARAMETERS

TL ad-valorem tax rate on labor

WELFARE true welfare - including the value of leisure
REALCONS observed market value of consumption of X and Y;

TL = 0;

POSITIVE VARIABLES

X Activity level for sector X
Y Activity level for sector Y
T Labor supply (transforms leisure to labor)
W Activity level for sector W
PX Price index for commodity X
PY Price index for commodity Y
PL Price index for primary factor L (household price)
PLS Price index for labor supply (producer cost)
PK Price index for primary factor K
PW Price index for welfare (expenditure function)
CONS Income definition for CONS;

EQUATIONS

PRF_X Zero profit for sector X
PRF_Y Zero profit for sector Y
PRF_T Zero profit for sector T
PRF_W Zero profit for sector W

MKT_X Supply-demand balance for commodity X
MKT_Y Supply-demand balance for commodity Y

MKT_L Supply-demand balance for primary factor L
MKT_LS Supply-demand balance for Leisure
MKT_K Supply-demand balance for primary factor K
MKT_W Supply-demand balance for aggregate demand

I_CONS Income definition for CONS;

* *Zero profit conditions:*

PRF_X.. 100*(PLS**0.4 * PK**0.6) =G= 100*PX;

PRF_Y.. 100*(PLS**0.6 * PK**0.4) =G= 100*PY;

PRF_T.. 100*(PL *(1+TL)) =G= 100 * PLS;

PRF_W.. 300*(PY**(1/3) * PX**(1/3)) * PL**(1/3)
 =G= 300 * PW;

* *Market clearing conditions:*

MKT_X.. 100*X =G= 300*W*(1/3)*PW /PX;

MKT_Y.. 100*Y =G= 300*W*(1/3)*PW /PY;

MKT_W.. 300*W =G= CONS/PW;

MKT_L.. 200 =G= 100*T + 300*W*(1/3)*PW/PL;

MKT_LS.. 100*T =G= 40*X*PX/PLS + 60*Y*PY/PLS;

MKT_K.. 100 =G= 60*X*PX/PK + 40*Y*PY/PK;

* *Income constraints:*

I_CONS.. CONS =E= 200*PL + 100*PK + TL*100*T*PL;

MODEL LABELS /PRF_X.X, PRF_Y.Y, PRF_T.T, PRF_W.W,
MKT_X.PX, MKT_Y.PY, MKT_L.PL,
MKT_LS.PLS, MKT_K.PK, MKT_W.PW, I_CONS.CONS /;

X.L =1;

Y.L =1;

W.L =1;

T.L =1;

PL.L =1;

PLS.L =1;

PX.L =1;

PY.L =1;

PK.L =1;

PW.FX =1;

```
CONS.L = 300;
```

```
TL = 0;
```

```
LABLEIS.ITERLIM = 0;
```

```
SOLVE LABLEIS USING MCP;
```

```
LABLEIS.ITERLIM = 1000;
```

```
SOLVE LABLEIS USING MCP;
```

```
WELFARE = W.L;
```

```
REALCONS = (PX.L*X.L*100 + PY.L*Y.L*100)/  
            (PX.L**0.5*PY.L**0.5*200);
```

```
DISPLAY WELFARE, REALCONS;
```

```
TL = 0.5;
```

```
SOLVE LABLEIS USING MCP;
```

```
WELFARE = W.L;
```

```
REALCONS = (PX.L*X.L*100 + PY.L*Y.L*100)/  
            (PX.L**0.5*PY.L**0.5*200);
```

```
DISPLAY WELFARE, REALCONS;
```