

\$TITLE: M7-4.GMS: Large-Group Monopolistic Competition
 * calibrated to an elasticity of substitution of 5

\$ONTEXT

| Markets | / | XC | Production Sectors | | | / | Consumers | |
|---------|---|-----|--------------------|------|------|---|-----------|------|
| | | | N | Y | W | | CONS | ENTR |
| PX | / | 100 | | | -100 | / | | |
| PY | / | | | 100 | -100 | / | | |
| PN | / | | 20 | | | / | | -20 |
| PW | / | | | | 200 | / | -200 | |
| PL | / | -80 | -20 | -100 | | / | 200 | |
| MK | / | -20 | | | | / | | 20 |

\$OFFTEXT

PARAMETERS

SI SIGMA: elasticity of substitution among varieties
 FC parameter setting the level of fixed costs
 ENDOWL endowment of labor
 MODELSTAT statistic indicating model solved: 0 = solved;

SI = 5;

FC = 20;

ENDOWL = 200;

POSITIVE VARIABLES

X Activity level for X (output per firm)
 XC Composite X (utility value of agg X sector output)
 N Number of X sector firms (variety measure)
 Y Activity level of Y output
 W Activity level for welfare

PX Price of an individual X variety
 PE Price index (unit expenditure function): cost of XC = 1
 PN Price of fixed costs (price of entering)
 PY Price of Y
 PW Price index for utility (consumer price index)

PL Price of labor

CONS Income of the representative consumer;

EQUATIONS

PRICEX MR = MC in X (associated with X output per firm)
 PINDEX Price index for X sector goods
 PRICEN Zero profits - free entry in X (associated with N)
 PRICEY Zero profit condition for Y (PY = MC)

PRICEW Zero profit condition for W ($PW = MC$ of utility)

 DX Supply-demand balance for X (individual variety)
 DXC Supply-demand balance for XC
 DN Supply-demand for firms N: markup rev = fixed cost
 DY Supply-demand balance for Y
 DW Supply-demand balance for utility W (welfare)

 LAB Supply-demand balance for labor

 INCOME National income;

PRICEX.. $PL = G = PX * (1 - 1/SI);$

 PINDEX.. $(N * PX^{**}(1 - SI))^{**}(1 / (1 - SI)) = G = PE;$

 PRICEN.. $PL = G = PN;$

 PRICEY.. $PL = G = PY;$

 PRICEW.. $(PE^{**}0.5) * (PY^{**}0.5) = G = PW;$

 DX.. $X * 80 = G = PX^{**}(-SI) * (PE^{**}(SI - 1)) * CONS / 2;$

```

DXC..      XC =G= N** (SI / (SI-1)) *X;

DN..      N*FC  =G= (PX/SI) *X*80*N/PN;

DY..      Y*100 =G= CONS / (2*PY);

DW..      200*W =G= (1.25**0.5) *CONS/PW;

LAB..     ENDOWL =E= Y*100 + N*X*80 + N*FC;

INCOME..  CONS =E= PL*ENDOWL;

```

```

MODEL M62 /PRICEX.X, PRICEY.Y, PRICEW.W, PRICEN.N, PINDEX.XC,
            DX.PX, DXC.PE, DN.PN, DY.PY, DW.PW,
            LAB.PL, INCOME.CONST/;

```

```

*      set benchmark values:

```

```

PE.L = 1.25;
CONS.L = 200;
X.L = 1;
XC.L = 1;
Y.L = 1;
N.L = 1;

```

W.L = 1;

PX.L = 1.25;

PN.L = 1;

PY.L = 1;

PL.L = 1;

PW.L = 1.25**0.5;

** choose the price of good Y as numeraire*

PY.FX = 1;

** check for calibration and starting-value errors*

M62.ITERLIM = 0;

SOLVE M62 USING MCP;

M62.ITERLIM = 1000;

SOLVE M62 USING MCP;

MODELSTAT = M62.MODELSTAT - 1.;

DISPLAY MODELSTAT;

** Counterfactual: expand the size of the economy*

```
ENDOWL = 400;
```

```
SOLVE M62 USING MCP;
```

```
* show welfare as a function of the economy's size
```

```
SETS I indexes 25 different size levels /I1*I25/;
```

PARAMETERS

```
SIZE(I)
```

```
WELFARE(I)
```

```
WELFCAP(I)
```

```
FIRMSIZE(I)
```

```
FIRMNUMB(I)
```

```
MARKUPM(I)
```

```
RESULTS(I, *);
```

```
LOOP(I,
```

```
SIZE(I) = 5.2 - 0.2*ORD(I);
```

```
ENDOWL = 200*SIZE(I);
```

```
SOLVE M62 USING MCP;
```

```
WELFARE(I) = W.L;  
WELFCAP(I) = WELFARE(I)/SIZE(I);  
FIRMSIZE(I) = X.L;  
FIRMNUMB(I) = N.L;  
MARKUPM(I) = 1/SI;  
  
);  
  
RESULTS(I, "SIZE") = SIZE(I);  
RESULTS(I, "WELFARE") = WELFARE(I);  
RESULTS(I, "WELFCAP") = WELFCAP(I);  
RESULTS(I, "FIRMSIZE") = FIRMSIZE(I);  
RESULTS(I, "FIRMNUMB") = FIRMNUMB(I);  
RESULTS(I, "MARKUP") = MARKUPM(I);
```

```
DISPLAY RESULTS;
```

```
* Write parameter RESULTS to an Excel file TRCOST.XLS,  
* starting in Sheet1,
```

```
$LIBINCLUDE XLDUMP RESULTS M7.XLS SHEET1!A31
```

```
Execute_Unload 'M7.gdx' RESULTS
```

```
execute 'gdxrw.exe M7.gdx par=RESULTS rng=SHEET2!A31'
```