

\$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

PL Price of labor
PW Price index for utility (consumer price index)

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.CONS/;

* *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'
```