

\$TITLE M8-1.GMS: Small open economy 2x2

\* strips out trade costs and tariffs for simplicity of exposition

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*CALIBRATION: country exports X1, imports X2  
in free-trade SOE*

	Production Sectors					Consumer
Markets	X1	X2	E1	M2	W	CONS
P1	150		-50		-100	
P2		50		50	-100	
PL	-135	-5				140
PK	-15	-45				60
PW					200	-200
PFX			50	-50		

\$OFFTEXT

\* the first four parameters allow changes in (exogenous) world prices

### PARAMETERS

PE2	Export price of good 2	/0.999/
PM1	Import price of good 1	/1.001/

PE1	Export price of good 1	/1/
PM2	Import price of good 2	/1/;

### NONNEGATIVE VARIABLES

X1	Activity level for sector X1
X2	Activity level for sector X2
E1	Activity level for sector E1
E2	Activity level for sector E2
M1	Activity level for sector M1
M2	Activity level for sector M2
W	Activity level for sector W
P1	Price index for commodity X
P2	Price index for commodity Y
PL	Price index for primary factor L
PK	Price index for primary factor K
PW	Price index for welfare (consumer price index)
PFX	Real exchange rate index
CONS	Income definition for CONS;

### EQUATIONS

PRF_X1	Zero profit for sector X1
PRF_X2	Zero profit for sector X2
PRF_E1	Zero profit for sector E1
PRF_E2	Zero profit for sector E2

PRF\_M1 Zero profit for sector M1  
 PRF\_M2 Zero profit for sector M2  
 PRF\_W Zero profit for sector W

MKT\_X1 Supply-demand balance for commodity X1  
 MKT\_X2 Supply-demand balance for commodity X2  
 MKT\_PFX Supply-demand balance for commodity PFX  
 MKT\_L Supply-demand balance for primary factor L  
 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\_X1.. 150\*PL\*\*(0.9) \* PK\*\*(0.1) =G= 150\*P1;

PRF\_X2.. 50\*PL\*\*(0.1) \* PK\*\*(0.9) =G= 50\*P2;

PRF\_E1.. 50\*P1 =G= 50\*PFX\*PE1;

PRF\_E2.. 50\*P2 =G= 50\*PFX\*PE2;

PRF\_M1.. 50\*PFX\*PM1 =G= 50\*P1;

PRF\_M2.. 50\*PFX\*PM2 =G= 50\*P2;

PRF\_W..         $100 * P1^{**0.5} * P2^{**0.5} =G= 100 * PW;$

\*        *Market clearance conditions*

MKT\_X1..         $150 * X1 + 50 * M1 =G= 50 * E1 + 100 * W * PW / P1;$

MKT\_X2..         $50 * X2 + 50 * M2 =G= 50 * E2 + 100 * W * PW / P2 ;$

MKT\_PFX..         $50 * E2 * PE2 + 50 * E1 * PE1 =G= 50 * PM2 * M2 + 50 * PM1 * M1;$

MKT\_W..         $200 * W =G= CONS / PW;$

MKT\_L..         $140 =G= 135 * X1 * P1 / PL + 5 * X2 * P2 / PL;$

MKT\_K..         $60 =G= 15 * X1 * P1 / PK + 45 * X2 * P2 / PK;$

\*        *Income balance*

I\_CONS..         $CONS =E= 140 * PL + 60 * PK;$

**MODEL** SOE1 /PRF\_X1.X1, PRF\_X2.X2, PRF\_E1.E1, PRF\_E2.E2,  
                   PRF\_M1.M1, PRF\_M2.M2, PRF\_W.W,  
                   MKT\_X1.P1, MKT\_X2.P2, MKT\_PFX.PFX, MKT\_L.PL,  
                   MKT\_K.PK, MKT\_W.PW, I\_CONS.CONS /;

\* *set SOE values:*

X1.L =1;

X2.L =1;

E2.L =0;

M1.L =0;

E1.L =1;

M2.L =1;

W.L =1;

P1.L =1;

P2.L =1;

PFX.L =1;

PK.L =1;

PL.L =1;

CONS.L =200;

\* *choose the real consumer price index as numeraire*

PW.FX =1;

\* *check for calibration and starting-value errors*

SOE1.ITERLIM = 0;

**SOLVE** SOE1 USING MCP;

SOE1.ITERLIM = 2000;

**SOLVE** SOE1 USING MCP;

*\* counterfactual: a terms-of-trade improvement*

PE1 = 1.2;

PM1 = 1.21;

SOE1.ITERLIM = 2000;

**SOLVE** SOE1 USING MCP;