$TITLE: M8-3: Small open economy with a benchmark tariff

$ONTEXT

In this example, units are chosen such that all DOMESTIC prices equal one initially. Implied world price of import good X2: \( P_2 = \frac{1}{1.2} \)

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$OFFTEXT

$PARAMETERS

PE2 Export price of good 2
PM1 Import price of good 1
PE1 Export price of good 1
PM2 Import price of good 2
TM2     Import tariff for good 2;

PE1     = 1;
PM2     = 1 / (1.2);
PE2     = PM2 * 0.99;
PM1     = 1.01;
TM2     = 0.2;

**POSITIVE 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 (Hicksian welfare index)
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 (expenditure function)
PFX    Read 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 (Hicksian welfare index)

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 L
MKT_W   Supply-demand balance for aggregate demand

I_CONS  Income definition for CONS;

*  Zero profit conditions

PRF_X1..  150 * PL**(2/3) * PK**(1/3) =G= 150 * P1;

PRF_X2..  40 * PL**(0.5) * PK**(0.5) =G= 40 * P2;

PRF_E1..  50 * P1 =G= 50 * PFX * PE1;
PRF_E2..  60 * P2 =G= 60 * PFX * PE2;
PRF_M1..  50 * PFX * PM1 =G= 50 * P1;
PRF_M2..  60 * PFX * PM2 *(1+TM2) =G= 60 * P2;
PRF_W..  200 * P1**0.5 * P2**0.5 =G= 200 * PW;

* Market clearance conditions

MKT_X1..  150 * X1 + 50 * M1 =G= 50 * E1 + 100 * W *PW/P1;
MKT_X2..  40 * X2 + 60 * M2 =G= 60 * E2 + 100 *W *PW/P2 ;
MKT_PFX.. 60 * E2 * PE2 + 50 * E1 * PE1 =G=
            60 * M2 * PM2 + 50 * PM1 * M1;
MKT_W..  200 * W =G= CONS / PW;
MKT_L..  120 =G= 100 * X1 * P1/PL + 20 * X2 * P2/PL;
MKT_K..  70 =G= 50 * X1 * P1/PK + 20 * X2 * P2/PK;

* Income balance

I_CONS..  CONS =E= 120*PL + 70*PK + 60 * PFX * PM2 * M2 * TM2;
MODEL SOETARIFF /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 /;

* Check the benchmark (again):

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;
PW.FX =1;
PL.L =1;

CONS.L =200;

SOETARIFF.ITERLIM = 0;
SOLVE  SOETARIFF USING MCP;

SOETARIFF.ITERLIM = 2000;
SOLVE  SOETARIFF USING MCP;

* ccounterfactual experiment: free trade

TM2   = 0 ;
SOLVE  SOETARIFF USING MCP;