$TITLE: M7-2.GMS:  Monopoly with fixed costs

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<td>-100</td>
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<td>PY</td>
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<td>MK</td>
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PARAMETERS

SIGMA: elasticity of substitution among varieties
SIGMA = 9;

FC: parameter setting the level of fixed costs
FC = 20;

ENDOWL: endowment of labor
ENDOWL = 200;

INCOMEM: monopoly profit share (markup revenues - fixed costs)
INCOME_M = 20;

INCOMEC: income share of the "the people"
INCOME_C = 200;

MODELSTAT: statistic indicating model solved: 0 = solved;
MODELSTAT = 0;
POSITIVE VARIABLES

X Activity level for X (output per firm)
Y Activity level of Y output
W Activity level for welfare

PX Price of X
PY Price of Y
PW Price index for utility (consumer price index)
PL Price of labor

CONS Income of the representative consumer
SHAREX Share of X in consumption (value share)
MARKUP Markup;

EQUATIONS

PRICEX MR = MC in X (associated with X output per firm)
PRICEY Zero profit condition for Y (PY = MC)
PRICEW Zero profit condition for W (PW = MC of utility)

MKT_X Supply-demand balance for X (individual variety)
MKT_Y Supply-demand balance for Y
MKT_W Supply-demand balance for utility W (welfare)
MKT_L Supply-demand balance for labor
INCOME  National income
SHX  Share of X in expenditure
MK  Markup equation;

PRICEX..  80*PL =G= 100*PX*(1-MARKUP);

PRICEY..  100*PL =G= 100*PY;

PRICEW..  (0.5*PX** (1-SIGMA) + 0.5*PY** (1-SIGMA))**((1/(1-SIGMA)))
           =G= PW;

MKT_X..  X*100 =G= PX**(-SIGMA)*(PW**(SIGMA-1))*CONS/2;

MKT_Y..  Y*100 =G= PY**(-SIGMA)*(PW**(SIGMA-1))*CONS/2;

MKT_W..  200*W =G= CONS/PW;

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

INCOME..  CONS =E= PL*ENDOWL + (100*PX*X*MARKUP - PL*FC);

SHX..  SHAREX =E= 100*PX*X / (100*PX*X + 100*PY*Y);

MK..  MARKUP =E= 1/(SIGMA - (SIGMA-1)*SHAREX);
MODEL MONOPOLY /PRICEX.X, PRICEY.Y, PRICEW.W, MKT_X.PX, MKT_Y.PY, MKT_W.PW, MKT_L.PL, INCOME.CONS, SHX.SHAREX, MK.MARKUP/;

OPTION MCP=PATH;

* set benchmark values:
X.L = 1;
Y.L = 1;
W.L = 1;
PX.L = 1;
PY.L = 1;
PL.L = 1;
PW.L = 1;
CONS.L = 200;
SHAREX.L = 0.5;
MARKUP.L = 0.20;

* choose the price of good Y as numeraire
PY.FX = 1;

* check for calibration and starting-value errors
MONOPOLY.ITERLIM = 0;
SOLVE MONOPOLY USING MCP;
MONOPOLY.ITERLIM = 1000;
SOLVE MONOPOLY USING MCP;

MODELSTAT = MONOPOLY.MODELSTAT - 1.;
DISPLAY MODELSTAT;

INCOMEM = (MARKUP.L*PX.L*X.L*100 - PL.L*FC)/CONS.L;
INCOME = (PL.L*ENDOWL)/CONS.L;

DISPLAY INCOMEM, INCOME;

* Counterfactual: contract the size of the economy

ENDOWL = 100;

SOLVE MONOPOLY USING MCP;

INCOMEM = (MARKUP.L*PX.L*X.L*100 - PL.L*FC)/CONS.L;
INCOME = (PL.L*ENDOWL)/CONS.L;

DISPLAY INCOMEM, INCOME;

* Counterfactual: expand the size of the economy

ENDOWL = 400;
SOLVE MONOPOLY USING MCP;

INCOMEM = (MARKUP.L*PX.L*X.L*100 - PL.L*FC)/CONS.L;
INCOME = (PL.L*ENDOWL)/CONS.L;

DISPLAY INCOMEM, INCOME;