

\$TITLE M3-7.GMS: two households with different preferences
 * *and different endowments endowments*

\$ONTEXT

Two household: differ in preferences and in endowments

*Household A: well endowed with labor,
 preference for labor-int good Y*

*Household B: well endowed with capital,
 preference for capital-int good X*

Allows for tax to be redistributed unevenly between households

Markets	Production Sectors				Consumers	
	X	Y	WA	WB	A	B
PX	100		-40	-60		
PY		100	-60	-40		
PWA			100		-100	
PWB				100		-100
PL	-25	-75			90	10
PK	-75	-25			10	90

*The tax redistribution or sharing rule can also be interpreted
 as the relative number of households in each group, with all
 households getting an equal share of tax receipts*

\$OFFTEXT

PARAMETERS

TX Ad-valorem tax rate for X sector inputs
SHA Share of tax revenue given back to household A
SHB share of tax revenue given back to household B;

TX = 0;
SHA = 0.5;
SHB = 0.5;

NONNEGATIVE VARIABLES

X Activity level for sector X
Y Activity level for sector Y
WA Activity level for sector WA
WB Activity level for sector WB
PX Price index for commodity X
PY Price index for commodity Y
PK Price index for primary factor K
PL Price index for primary factor L
PWA Price index for welfare A(expenditure function)
PWB Price index for welfare B(expenditure function)

CONSA Income definition for CONSA
CONSB Income definition for CONSB;

EQUATIONS

PRF_X Zero profit for sector X
 PRF_Y Zero profit for sector Y
 PRF_WA Zero profit for sector WA
 PRF_WB Zero profit for sector WB

MKT_X Supply-demand balance for commodity X
 MKT_Y Supply-demand balance for commodity Y
 MKT_L Supply-demand balance for primary factor L
 MKT_K Supply-demand balance for primary factor K
 MKT_WA Supply-demand balance for consumer A
 MKT_WB Supply-demand balance for consumer B

I_CONSA Income definition for CONSA
 I_CONSB Income definition for CONSB;

* *Zero profit conditions:*

PRF_X.. $100 * (PL^{**0.25} * PK^{**0.75}) * (1+TX) =G= 100 * PX;$

PRF_Y.. $100 * (PL^{**0.75} * PK^{**0.25}) =G= 100 * PY;$

PRF_WA.. $100 * (PX^{**0.4} * PY^{**0.6}) =G= 100 * PWA;$

PRF_WB.. $100 * (PX^{**0.6} * PY^{**0.4}) =G= 100 * PWB;$

* *Market clearing conditions:*

MKT_X.. 100*X =G= 40*WA*PWA/PX + 60*WB*PWB/PX;

MKT_Y.. 100*Y =G= 60*WA*PWA/PY + 40*WB*PWB/PY;

MKT_WA.. 100*WA =G= CONSA/PWA;

MKT_WB.. 100*WB =G= CONSB/PWB;

MKT_L.. 90 + 10 =G= 25*X*(PX/(1+TX))/PL + 75*Y*PY/PL;

MKT_K.. 10 + 90 =G= 75*X*(PX/(1+TX))/PK + 25*Y*PY/PK;

* *Income constraints:*

I_CONSA.. CONSA =E= 90*PL + 10*PK + SHA*TX*100*X*PX/(1+TX);

I_CONSB.. CONSB =E= 10*PL + 90*PK + SHB*TX*100*X*PX/(1+TX);

MODEL TWOHOUSE /PRF_X.X, PRF_Y.Y, PRF_WA.WA, PRF_WB.WB,
 MKT_X.PX, MKT_Y.PY, MKT_L.PL,
 MKT_K.PK, MKT_WA.PWA, MKT_WB.PWB,
 I_CONSA.CONSA, I_CONSB.CONSB /;

* *Check the benchmark:*

X.L =1;

Y.L =1;

WA.L =1;

WB.L =1;

PL.FX =1;

PX.L =1;

PY.L =1;

PK.L =1;

PWA.L =1;

PWB.L =1;

CONSA.L =100;

CONSB.L =100;

TX =0;

TWOHOUSE.ITERLIM = 0;

SOLVE TWOHOUSE USING MCP;

TWOHOUSE.ITERLIM = 1000;

SOLVE TWOHOUSE USING MCP;

TX = 0.50;

SOLVE TWOHOUSE USING MCP;

** counterfactual: give a larger share of tax to household B*
** illustrates impossibility of making both types better off*

TX = 0.50;
SHA = 0.25;
SHB = 0.75;

SOLVE TWOHOUSE USING MCP;

** suppose that 80% of households are type A, 20% type B*
** and all individual households get an equal share*
** of tax receipts*

TX = 0.50;
SHA = 0.80;
SHB = 0.20;

SOLVE TWOHOUSE USING MCP;