

GAMS Rev 121 Windows NT/95/98

```

2
3 SETS
4 G Global set of SAM accounts
/
5 AGR agriculture
6 MAN manufacturing
7 LAB labor
8 CAP capital
9 HH-U urban household
10 HH-R rural household./

11
12 C(G) Commodities /AGR, MAN./
13 F(G) Factors /LAB, CAP./
14 H(G) Households /HH-U, HH-R:/

15
16 ALIAS (G,GG), (C,CC), (F,FF):(
17
18
19 PARAMETERS
20 beta(C,H) household consumption shares
21 fd0(F,C) benchmark factor demand
22 hd0(C,H) benchmark household consumption
23 fs0(F,H) benchmark factor endowments
24 q0(C) benchmark output levels
25 hw0(H) benchmark household expenditure
26 p0(C) initial commodity price
27 pf0(F) initial factor price
28 pw0(H) initial consumer price index
29 gd0(C) benchmark government purchases
30 gp0 government total provision
31 pg0 government expenditure price index
32 tf(F) factor income taxes
33 x0 benchmark exports of AGR
34 m0 benchmark imports of MAN
35 xch nominal exchange rate
36 tx export subsidy
37 tm import tariff:

38
39
* 40 SAM and parameter calibration:
41 Table SAM(*,*) Rectangular SAM with pre-existing taxes
42 AGR MAN GOV HH-U HH-R ROW
43 AGR 113 -10 -35 -58 -10
44 MAN 162 -25 -105 -42 10
45 LAB -70 -60 50 80
46 CAP -30 -80 90 20
47 LTX -713 6-
48 KTX -6 -16 22
49 EXCH:
50
51 p0(C)=1; pf0("LAB")=1.1; pf0("CAP")=1.2; pw0(H)=1:
52 q0(C) = sam(C,C)/p0(C):(
53 fd0(F,C) = -sam(F,C):(
54 hd0(C,H) = -sam(C,H)/p0(C):(
55 fs0(F,H) = sam(F,H):(

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56 hw0(H) = sum(C, hd0(C,H))/pw0(H);
57 beta(C,H) = hd0(C,H)*p0(C)/sum(CC, hd0(CC,H)*p0(CC);
58 gd0(C) = -sam(C,"gov");
59 gp0 = sum(C, gd0(C);
60 pg0 =1;
61 tf("LAB")=0.1;
62 tf("CAP")=0.2;
63 x0 = -sam("AGR","ROW");
64 m0 = SAM("MAN","ROW");
65 tx = 0;
66 tm = 0;
67 xch=1;
68
* 69 Model Block:
70
$ MODEL:TARIFF

$ SECTORS:
    Q(C)      ! commodity output level
    W(H)      ! welfare or aggregate consumption
    GV        !government activity level
    X         !exports of AGR
    M         !imports of MAN

$ COMMODITIES:
    P(C)      ! commodity price
    PW(H)     ! expenditure price index
    PF(F)     ! factor price
    PG        !government expenditure price index
    PFX       !real exchange rate

$ CONSUMERS:
    YH(H)     ! household income
    GOV       !government income

$ PROD:Q)C) S:1
    O:P(C)   Q:q0(C)
    I:PF(F)  Q:fd0(F,C) P:pf0(F) A:GOV T:tf(F)

$ PROD:X
    O:PFX      Q:(x0*XCH)
    I:P("AGR") Q:m0      A:GOV T:tx

$ PROD:M
    O:P("MAN") Q:m0
    I:PFX      Q:(m0*XCH) A:GOV T:tm

$ PROD:W(H) S:1
    O:PW(H)   Q:hw0(H)
    I:P(C)    Q:hd0(C,H)

$ PROD:GV S:1
    O:PG      Q:gp0
    I:P(C)    Q:gd0(C)

```

```
$ DEMAND:YH(H (
    D:PW(H) Q:hw0(H(
    E:PF(F) Q:fs0(F,H(

* For GOV there is no endowment but has tax income
$ DEMAND:GOV
    D:PG Q:gp0
```

120

```
SYSINCLUDE C:\PROGRAM FILES\GAMS20.0\MPSGESET
INCLUDE C:\CGE\225A\GAMSGEH.SCR
```

MPSGE PREPROCESSOR VERSION 12/95 VIS Windows

```
1
$ 2 SECTORS:
3 Q(C) ! commodity output level
4 W(H) ! welfare or aggregate consumption
5 GV !government activity level
6 X !exports of AGR
7 M !imports of MAN

8
$ 9 COMMODITIES:
10 P(C) ! commodity price
11 PW(H) ! expenditure price index
12 PF(F) ! factor price
13 PG !government expenditure price index
14 PFX !real exchange rate

15
$ 16 CONSUMERS:
17 YH(H) ! household income
18 GOV !government income

19
$ 20 PROD:Q(C) S:1
21 O:P(C) Q:q0(C(
22 I:PF(F) Q:fd0(F,C) P:pf0(F) A:GOV T:tf(F(

23
$ 24 PROD:X
25 O:PFX Q:(x0*XCH(
26 I:P("AGR") Q:m0 A:GOV T:tx

27
$ 28 PROD:M
29 O:P("MAN") Q:m0
30 I:PFX Q:(m0*XCH) A:GOV T:tm

$ 31 PROD:W(H) S:1
32 O:PW(H) Q:hw0(H(
33 I:P(C) Q:hd0(C,H(

34
$ 35 PROD:GV S:1
36 O:PG Q:gp0
37 I:P(C) Q:gd0(C(

38
$ 39 DEMAND:YH(H(
40 D:PW(H) Q:hw0(H(
41 E:PF(F) Q:fs0(F,H(
```

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```

42
* 43 For GOV there is no endowment but has tax income
$ 44 DEMAND:GOV
45 D:PG Q:gp0
46
$ 47 OFFTEXT
  
```

Symbol Listing

Note: Parameter and set references appearing within parentheses are not identified by the preprocessor.

Symbol	Type	References
" AGR"	SET	26
" MAN"	SET	29
C	SET	3 20 21 21 22 33 33 37 37
F	SET	12 22 22 22 22 41 41
FD0	PARAM	22
FS0	PARAM	41
GD0	PARAM	37
GOV	CONSU	18 22 26 30 44
GP0	PARAM	36 45
GV	ACTIV	5 35
H	SET	4 31 32 32 33 39 40 40 41
HD0	PARAM	33
HW0	PARAM	32 40
M	ACTIV	7 28
M0	PARAM	26 29
P	PRICE	10 21 26 29 33 37
PF	PRICE	12 22 41
PF0	PARAM	22
PFX	PRICE	14 25 30
PG	PRICE	13 36 45
PW	PRICE	11 32 40
Q	ACTIV	3 20
Q0	PARAM	21
TF	PARAM	22
TM	PARAM	30
TX	PARAM	26
W	ACTIV	4 31
X	ACTIV	6 24
YH	CONSU	17 39

```

295
298 TARIFF.INTEGER1=1;
299 option oldname;
EXIT C:\PROGRAM FILES\GAMS20.0\MPSGESET
INCLUDE C:\CGE\TARIFF.GEN
448
* 449 Replicate Benchmark:
450 TARIFF.ITERLIM=0;
451 SOLVE TARIFF USING MCP;
  
```

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```
452
* 453 Policy Simulations and Reports
454
* 455 Define policy scenario (25% import TARIFF:(
456 tm = 0.25:
457
* 458 Define report parameters:
459 PARAMETERS
460 w_ch(H) percentage welfare change
461 p_ch(C) percentage change in output
462 m_ch percentage change in imports:
463
* 464 Set numeraire to deflate prices in the model:
465 PW.FX("HH-R")=1:
466
* 467 Relax the interation limit:
468 TARIFF.ITERLIM=1000:
469
* 470 solve the model:
INCLUDE C:\CGE\TARIFF.GEN
618 solve TARIFF using mcp:
619
* 620 compute report parameters:
621 w_ch(H) = 100*(W.L(H)-1):(
622 p_ch(C) = 100*(Q.L(C)-1):(
623 m_ch = 100*(M.L-1):(
624
* 625 Display results:
626
627 DISPLAY w_ch,p_ch,m_ch:
```

TARIFF model in MPSGE format
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 Include File Summary
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SEQ	GLOBAL	TYPE	PARENT	LOCAL	FILENAME
1	1	INPUT	0	0	C:\CGE\TARIFF.GMS
121	2	SYSINCLUDE	1	121	.C:\PROGRAM FILES\GAMS20.0\MPSGESET
140	3	CALL	2	19	.gmsge_nx "C:\CGE\225A\gamsge.scr"
141	4	INCLUDE	2	20	..C:\CGE\225A\GAMSGEH.SCR
300	5	EXIT	2	22	.C:\PROGRAM FILES\GAMS20.0\MPSGESET
301	6	INCLUDE	1	122	.C:\CGE\TARIFF.GEN
447	7	EXIT	6	146	.C:\CGE\TARIFF.GEN
471	8	INCLUDE	1	146	.C:\CGE\TARIFF.GEN
617	9	EXIT	8	146	.C:\CGE\TARIFF.GEN

COMPILATION TIME = 0.090 SECONDS 0.7 Mb WIN200-121

TARIFF model in MPSGE format
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Model Statistics SOLVE TARIFF USING MCP FROM LINE 451
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MODEL STATISTICS

BLOCKS OF EQUATIONS	1	SINGLE EQUATIONS	1
BLOCKS OF VARIABLES	12	SINGLE VARIABLES	18
NON ZERO ELEMENTS	18	NON LINEAR N-Z	0
DERIVATIVE POOL	3	CONSTANT POOL	0
CODE LENGTH	1		

GENERATION TIME = 0.030 SECONDS 1.9 Mb WIN200-121

EXECUTION TIME = 0.040 SECONDS 1.9 Mb WIN200-121

GAMS Rev 121 Windows NT/95/98

S O L V E S U M M A R Y

MODEL TARIFF
 TYPE MCP
 SOLVER PATH FROM LINE 451

***SOLVER STATUS 1 NORMAL COMPLETION
 ***MODEL STATUS 1 OPTIMAL

RESOURCE USAGE, LIMIT 0.258 1000.000
 ITERATION COUNT, LIMIT 0 0
 EVALUATION ERRORS 0 0

Work space allocated -- 6.87 Mb

Default price normalization using income for YH.HH-U
 Path v4.4a: GAMS Link ver043, Wintel
 17row/cols, 100 non-zeros, 34.60% dense.

Path 4.4a (Mon Mar 19 17:44:21 2001)
 Written by Todd Munson, Steven Dirkse, and Michael Ferris

INITIAL POINT STATISTICS

Maximum of X. 1.0000e+002 var: (YH.HH-R(
 Maximum of F. 0.0000e+000 eqn: (Q.AGR(
 Maximum of Grad F 1.6200e+002 eqn: (P.MAN(
 var: (Q.MAN(

INITIAL JACOBIAN NORM STATISTICS

Maximum Row Norm. 4.5951e+002 eqn: (P.MAN(
 Minimum Row Norm. 2.0000e+001 eqn: (X(
 Maximum Column Norm 4.5951e+002 var: (P.MAN(
 Minimum Column Norm 2.0000e+000 var: (YH.HH-R(

FINAL STATISTICS

Inf-Norm of Complementarity . . 0.0000e+000 eqn: (Q.AGR(
 Inf-Norm of Normal Map. 0.0000e 000+eqn: (Q.AGR(
 Inf-Norm of Minimum Map 0.0000e+000 eqn: (Q.AGR(
 Inf-Norm of Fischer Function. . . 0.0000e+000 eqn: (Q.AGR(
 Inf-Norm of Grad Fischer Fcn. . . 0.0000e+000 eqn: (Q.AGR(
 var: (Q.AGR(

FINAL POINT STATISTICS

Maximum of X. 1.0000e+002 var: (YH.HH-R(
 Maximum of F. 0.0000e+000 eqn: (Q.AGR(
 Maximum of Grad F 1.6200e+002 eqn: (P.MAN(
 var: (Q.MAN(

LOWER LEVEL UPPER MARGINAL

----EQU DUMMY01 . 290.0000 . .

DUMMY01 Artificial equation for model: TARIFF

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----VAR Q commodity output level

	LOWER	LEVEL	UPPER	MARGINAL
AGR	.	1.0000	+INF	.
MAN	.	1.0000	+INF	.

----VAR W welfare or aggregate consumption

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	1.0000	+INF	.
HH-R	.	1.0000	+INF	.

----VAR GV government activity level

	LOWER	LEVEL	UPPER	MARGINAL
GV	.	1.0000	+INF	.
X	.	1.0000	+INF	.
M	.	1.0000	+INF	.

GV government activity level
 X exports of AGR
 M imports of MAN

----VAR P commodity price

	LOWER	LEVEL	UPPER	MARGINAL
AGR	.	1.0000	+INF	.
MAN	.	1.0000	+INF	.

----VAR PW expenditure price index

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	1.0000	+INF	.
HH-R	.	1.0000	+INF	.

----VAR PF factor price

	LOWER	LEVEL	UPPER	MARGINAL
LAB	.	1.0000	+INF	.
CAP	.	1.0000	+INF	.

TARIFF model in MPSGE format
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	LOWER	LEVEL	UPPER	MARGINAL
----VAR PG	.	1.0000	+INF	.
----VAR PFX	.	1.0000	+INF	.

PG government expenditure price index
 PFX real exchange rate

----VAR YH household income

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	140.0000	+INF	.
HH-R	.	100.0000	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
----VAR GOV	.	35.0000	+INF	.

GOV government income

****REPORT SUMMARY : 0 NONOPT
 0 INFEASIBLE
 0 UNBOUNDED
 0 REDEFINED
 0 ERRORS

TARIFF model in MPSGE format
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Model Statistics SOLVE TARIFF USING MCP FROM LINE 618
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MODEL STATISTICS

BLOCKS OF EQUATIONS	1	SINGLE EQUATIONS	1
BLOCKS OF VARIABLES	12	SINGLE VARIABLES	18
NON ZERO ELEMENTS	18	NON LINEAR N-Z	0
DERIVATIVE POOL	3	CONSTANT POOL	0
CODE LENGTH	1		

GENERATION TIME = 0.020 SECONDS 1.9 Mb WIN200-121

EXECUTION TIME = 0.040 SECONDS 1.9 Mb WIN200-121

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S O L V E S U M M A R Y

MODEL TARIFF
 TYPE MCP
 SOLVER PATH FROM LINE 618

***SOLVER STATUS 1 NORMAL COMPLETION
 ***MODEL STATUS 1 OPTIMAL

RESOURCE USAGE, LIMIT 0.273 1000.000
 ITERATION COUNT, LIMIT 4 1000
 EVALUATION ERRORS 0 0

Work space allocated -- 6.87 Mb

Path v4.4a: GAMS Link ver043, Wintel
 17row/cols, 102 non-zeros, 35.29% dense.

Path 4.4a (Mon Mar 19 17:44:21 2001)
 Written by Todd Munson, Steven Dirkse, and Michael Ferris

INITIAL POINT STATISTICS

Maximum of X. 1.4000e 002+var: (YH.HH-U(
 Maximum of F. 2.5000e+000 eqn: (M(
 Maximum of Grad F 1.6200e+002 eqn: (P.MAN(
 var: (Q.MAN(

INITIAL JACOBIAN NORM STATISTICS

Maximum Row Norm. 4.5951e+002 eqn: (P.MAN(
 Minimum Row Norm. 2.0000e+001 eqn: (X(
 Maximum Column Norm 4.5951e+002 var: (P.MAN(
 Minimum Column Norm 1.0000e+000 var: (YH.HH-R(

FINAL STATISTICS

Inf-Norm of Complementarity 3.0695 . . e-012 eqn: (PF.CAP(
 Inf-Norm of Normal Map. 3.0695e-012 eqn: (PF.CAP(
 Inf-Norm of Minimum Map 3.0695e-012 eqn: (PF.CAP(
 Inf-Norm of Fischer Function. . . 3.0695e-012 eqn: (PF.CAP(
 Inf-Norm of Grad Fischer Fcn. . . 4.1427e-010 eqn: (PF.CAP(

FINAL POINT STATISTICS

Maximum of X. 1.4125e+002 var: (YH.HH-U(
 Maximum of F. 1.8997e+000 eqn: (X(
 Maximum of Grad F 1.6200e+002 eqn: (P.MAN(
 var: (Q.MAN(

LOWER LEVEL UPPER MARGINAL

----EQU DUMMY01 . 288.3813 . .

DUMMY01 Artificial equation for model: TARIFF

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----VAR Q commodity output level

	LOWER	LEVEL	UPPER	MARGINAL
AGR	.	0.9145	+INF	.
MAN	.	1.0593	+INF	.

----VAR W welfare or aggregate consumption

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	1.0051	+INF	.
HH-R	.	0.9905	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
----VAR GV	.	1.0049	+INF	.
----VAR X	.	.	+INF	1.8997
----VAR M	.	.	+INF	EPS

GV government activity level
 X exports of AGR
 M imports of MAN

----VAR P commodity price

	LOWER	LEVEL	UPPER	MARGINAL
AGR	.	0.9952	+INF	.
MAN	.	1.0066	+INF	.

----VAR PW expenditure price index

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	1.0037	+INF	.
HH-R	1.0000	1.0000	1.0000	EPS

----VAR PF factor price

	LOWER	LEVEL	UPPER	MARGINAL
LAB	.	0.9822	+INF	.
CAP	.	1.0237	+INF	.

TARIFF model in MPSGE format
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	LOWER	LEVEL	UPPER	MARGINAL
----VAR PG	.	1.0033	+INF	.
----VAR PFX	.	0.8053	+INF	.

PG government expenditure price index
 PFX real exchange rate

----VAR YH household income

	LOWER	LEVEL	UPPER	MARGINAL
HH-U	.	141.2450	+INF	.
HH-R	.	99.0512	+INF	.

	LOWER	LEVEL	UPPER	MARGINAL
----VAR GOV	.	35.2905	+INF	.

GOV government income

****REPORT SUMMARY : 0 NONOPT
 0 INFEASIBLE
 0 UNBOUNDED
 0 REDEFINED
 0 ERRORS

