**CHAPTER 3: Documentation of Data and Analysis**

The directory D:\Cap3\ contains all the files with the essential variables. The variable names are largely self-explanatory. The data sources are described in the chapter. Most of the results in Chapter 3 are now generated in the “CAP3\_sectMTPI” and “CAP3\_MTPI” command (GMS) files. Their generation and construction can thus be directly inspected.

The GMS files bring in the data and generates the sectoral and overall MTPI. The rest of the file is divided in 6 parts. Parts A and B are common in the two GMS files; part C and D refer to the GMS file “CAP3\_sectMTPI” which generates the sectoral MTPIs, while part E and F refer to program in GMS file “CAP3\_MTPI” which generates the overall MTPI.

**A. Set declarations and definitions**

(a) First we set some program options:

option solprint=on, decimals=3;

option limrow=1000;

option limcol=1000;

option nlp=conopt;

$ OFFUPPER

$ OFFDIGIT

(b) Price of domestic goods is set to 1:

pd Price of domestic goods /1/;

(c) We declare the dimension of the dataset, sector code and concordances

SETS

K obs /1\*187544/

s sector /1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42/

corr(s,K) matching\_of\_observations\_nb\_and\_chapter\_code

/1.( 1 \* 64 )

2 .( 65 \* 106) ……….

41 .( 136500 \* 177738)

42 .( 177739 \* 187544)

/ ;

**B. Parameter and variable declaration**

(a) We need to import the data to be used in the model:

parameter rave(k)/

$include D:\Cap3\rave.inc

/;

parameter rtmax(k)/

$include D:\ Cap3\rtmax.inc

/;

parameter trade(k)/

$include D:\ Cap3\trade.inc

/;

(b) we declare the parameters:

PARAMETER elas(s)

/1 10.1…… /;

PARAMETER domimprat(s)

\* Ratio domestic/import = VDM/VIM

/1 1.140693624 …… /;

PARAMETERS

pwld(k) World price of each good

dimp(s) Total imports by groups at domestic prices (equal to quantities)

wimp(s) Total imports by groups at world prices

totexp(s) Total expenditure in each group (equals base utility)

BETAd(s) Domestic value share (base period)

BETA(k,s) Import value shares at domestic prices (base period)

domest(s) consumption of domestic good by group;

pwld(k) = 1/(1+rave(k));

**C. Model for the MTPI rate by sectors:**

(a) Variable declaration

We declare all positive and free variables in the model:

POSITIVE VARIABLES

pi1rr(s) Inverse of price index

wmtri1(s) Imports in period

MTRIsurc (s) Uniform tariff preference equivalent (by sector) ;

FREE VARIABLES

ZMTRIsurc Objective function ;

(b) Execution statement

LOOP(s,

dimp(s) = sum(k$corr(s,k),trade(k)\*(1+rave(k)));

wimp(s) = sum(k$corr(s,k),trade(k));

domest(s)= dimp(s)\*domimprat(s);

totexp(s) = dimp(s) + domest(s);

BETAd(s) = domest(s)/totexp(s)$(totexp(s) gt 0);

BETA(k,s)= ((trade(k)\*(1+rave(k)))/totexp(s))$corr(s,k);

);

(c) We run the model to obtain the sectoral MTPI rates:

EQUATIONS

WIMP1mtri(s) Imports at world price

PIND1rr(s) Inverse price index

REV1rr(s) Equality between import expenditures at world prices

ZEROrr(s) Sets MTRIsurc equal to zero if there is no imports or tariffs

OBJECTrr;

PIND1rr(s).. pi1rr(s) =E= 1/(

BETAd(s)\*pd\*\*(1-elas(s)) +

sum(k$corr(s,k),BETA(k,s)

\*(pwld(k)\*(1+rtmax(k)\*MTRIsurc(s)))

\*\*(1-elas(s))))$(dimp(s) gt 0) ;

WIMP1mtri(s).. wmtri1(s) =E= (totexp(s)\*

sum(k$corr(s,k),BETA(k,s)\*pwld(k)\*

pi1rr(s)\*(pwld(k)\*(1+rtmax(k)\*MTRIsurc(s))

)\*\*(-elas(s))))$(dimp(s) gt 0);

ZEROrr(s).. MTRIsurc(s)$(dimp(s) eq 0) =E= 0;

REV1rr(s).. wmtri1(s) =E= wimp(s);

OBJECTrr.. ZMTRIsurc =E= sum(s,MTRIsurc(s));

MODEL MTRIrMOD /WIMP1mtri, PIND1rr, REV1rr, ZEROrr, OBJECTrr /;

SOLVE MTRIrMOD USING NLP MINIMIZING ZMTRIsurc;

DISPLAY MTRIsurc.L ;

**D. Weighted average**

PARAMETERS

wavrate(s) Normal weigthed average rate(world prices)

wavduty(s) Normal weigthed average duty (world prices)

wave(s) Normal weigthed average base rates (world prices)

weight(k) weights ;

LOOP(s,

weight(k)=(trade(k)/wimp(s)) $(dimp(s) gt 0) ;

wavrate(s) = (sum(k$corr(s,k),weight(k)\*rave(k)));

wavduty(s) = (sum(k$corr(s,k),weight(k)\*rtmax(k)));

wave(s)= wavrate(s)/wavduty(s);

);

DISPLAY wave;

End of the program “CAP3\_sectMTPI”.

**E. Model for the overall MTPI rate:**

(a) Variable declaration

We declare all positive and free variables in the model:

POSITIVE VARIABLES

pi1rr(s) Inverse of price index

wmtri1(s) Imports in period

MTRIsurc Uniform tariff preference equivalent ;

FREE VARIABLES

ZMTRIsurc Objective function ;

(b) Execution statement

LOOP(s,

dimp(s) = sum(k$corr(s,k),trade(k)\*(1+rave(k)));

wimp(s) = sum(k$corr(s,k),trade(k));

domest(s)=dimp(s)\*domimprat(s);

totexp(s) = dimp(s) + domest(s);

BETAd(s) = domest(s)/totexp(s)$(totexp(s) gt 0);

BETA(k,s)= ((trade(k)\*(1+rave(k)))/totexp(s))$corr(s,k)

);

(c) We run the model to obtain the overall MTPI rate:

EQUATIONS

WIMP1mtri(s) Imports at world price

PIND1rr(s) Inverse price index

REV1rr Equality between import expenditures at world prices

ZEROrr(s) Sets MTRIsurc equal to zero if there is no imports or tariffs

OBJECTrr;

PIND1rr(s).. pi1rr(s) =E= 1/(

BETAd(s)\*pd\*\*(1-elas(s)) +

sum(k$corr(s,k),BETA(k,s)

\*(pwld(k)\*(1+rtmax(k)\*MTRIsurc))

\*\*(1-elas(s))))$(dimp(s) gt 0) ;

WIMP1mtri(s).. wmtri1(s) =E= (totexp(s)\*

sum(k$corr(s,k),BETA(k,s)\*pwld(k)\*

pi1rr(s)\*(pwld(k)\*(1+rtmax(k)\*MTRIsurc)

)\*\*(-elas(s))))$(dimp(s) gt 0);

ZEROrr(s).. MTRIsurc$(dimp(s) eq 0) =E= 0;

REV1rr.. sum(s,wmtri1(s)) =E= sum(s,wimp(s));

OBJECTrr.. ZMTRIsurc =E= MTRIsurc;

MODEL MTRIrMOD /WIMP1mtri, PIND1rr, REV1rr, ZEROrr, OBJECTrr /;

SOLVE MTRIrMOD USING NLP MINIMIZING ZMTRIsurc;

DISPLAY MTRIsurc.L ;

**F. Weighted average**

PARAMETERS

wavrate Normal weigthed average rate(world prices)

wavduty Normal weigthed average duty (world prices)

wave Normal weigthed average base rates (world prices)

weight(k) weights ;

LOOP(s,

weight(k)=(trade(k)/wimp(s)) $(dimp(s) gt 0) ;

wavrate = (sum(k,weight(k)\*rave(k))));

wavduty = (sum(k,weight(k)\*rtmax(k)));

wave= wavrate/wavduty;

DISPLAY wave;

End of the program “CAP3\_MTPI”