STAGE_t: Model Setup and Configuration

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Outline

- SAM
- Data Loading
  - Excel database
  - Sets
  - Maps
  - Elasticities
  - Controls
- Model configuration
- Diagnostics

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SAM

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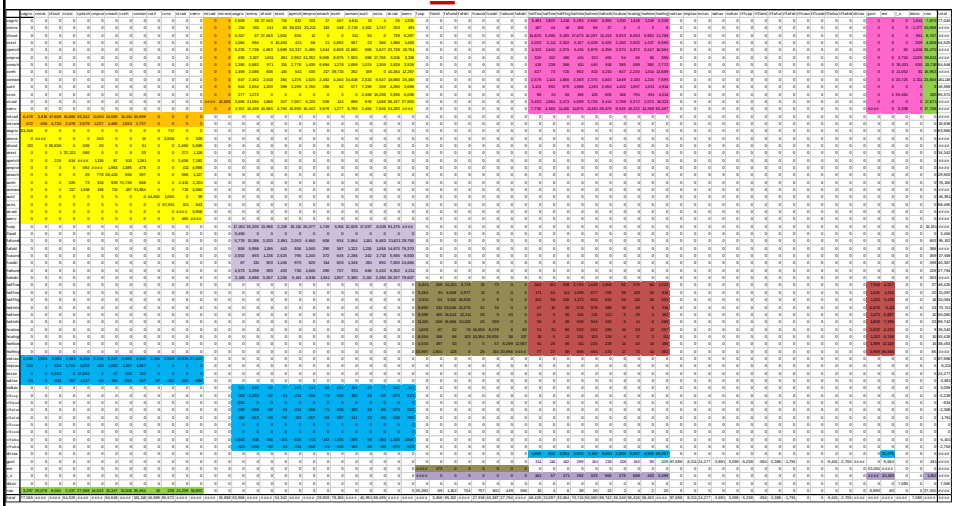
STAGE_t RSA SAM



YELLOW – intermediates & production
ORANGE – margin supply & demand
PURPLE – final demand
GREEN – exports and imports
BLUE – tax instruments
MAUVE – Values added & savings
TAN – Distribution of factor incomes
BROWN - transfers

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Data entry

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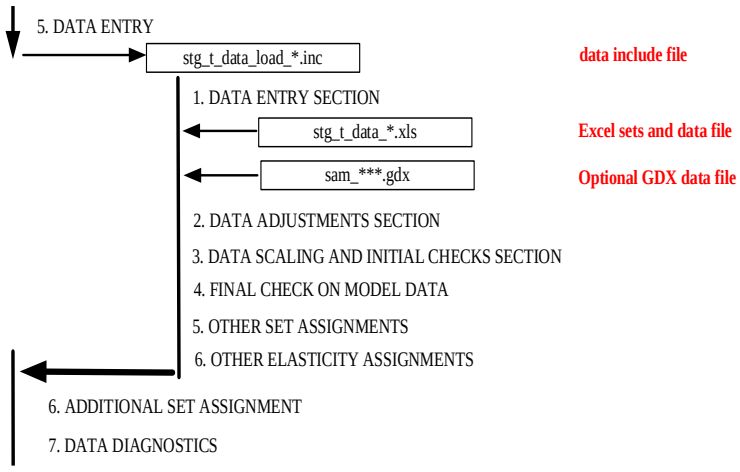
STAGE_t Code Structure



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Data Conversion

```
*---- 1a. Excel workbook sets and data converted to gdx here
$CALL "GDXXRW i=%mod_data%.xlsx o=data_in.gdx index=Layout!A4 trace=3 "
$if errorLevel 1 $abort problems with GDXXRW
*---- 1b. All data, elasticities and sets from excel are assigned here
```

%mod_data% - $SETGLOBAL VARNAME

data_in.gdx – FIXED name for gdx data file

trace=3 – option that provides information about GDXXRW

$if errorLevel 1 – text that GDXXRW fails

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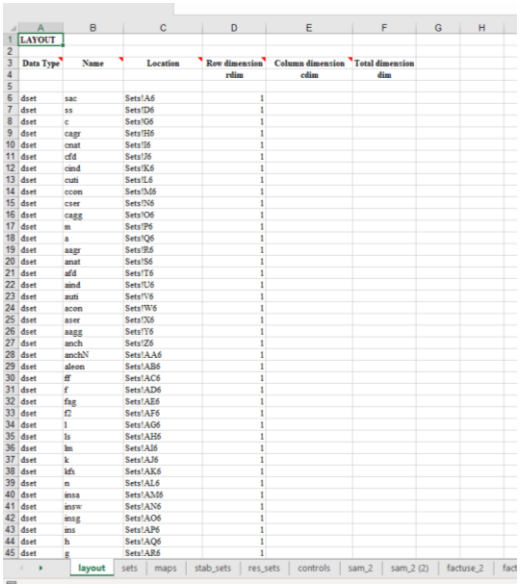
'LAYOUT' Worksheet



	A	B	C	D	E	F	G	H
1	LAYOUT							
2								
3	Data Type	Name	Location	Row dimension rdim	Column dimension cdim	Total dimension dim		
4								
5								
6	dset	sac	Sets!A6	1				
7	dset	ss	Sets!D6	1				
8	dset	c	Sets!G6	1				
9	dset	cagr	Sets!H6	1				
10	dset	cnat	Sets!I6	1				
11	dset	cfd	Sets!J6	1				
12	dset	cind	Sets!K6	1				
13	dset	cuti	Sets!L6	1				
14	dset	ccon	Sets!M6	1				
15	dset	cser	Sets!N6	1				
16	dset	cagg	Sets!O6	1				
17	dset	m	Sets!P6	1				
18	dset	a	Sets!Q6	1				
19	dset	aagr	Sets!R6	1				
20	dset	anat	Sets!S6	1				
21	dset	afd	Sets!T6	1				
22	dset	aind	Sets!U6	1				
23	dset	auti	Sets!V6	1				
24	dset	acon	Sets!W6	1				
25	dset	aser	Sets!X6	1				
26	dset	aagg	Sets!Y6	1				
27	dset	anch	Sets!Z6	1				
28	dset	anchN	Sets!AA6	1				
29	dset	aleon	Sets!AB6	1				
30	dset	ff	Sets!AC6	1				
31	dset	f	Sets!AD6	1				
32	dset	fag	Sets!AE6	1				
33	dset	fΩ	Sets!AF6	1				
34	dset	l	Sets!AG6	1				
35	dset	ls	Sets!AH6	1				
36	dset	ln	Sets!AI6	1				
37	dset	k	Sets!AJ6	1				
38	dset	kfx	Sets!AK6	1				
39	dset	n	Sets!AL6	1				
40	dset	nsa	Sets!AM6	1				
41	dset	nsw	Sets!AN6	1				
42	dset	nag	Sets!AO6	1				
43	dset	ns	Sets!AP6	1				
44	dset	h	Sets!AQ6	1				
45	dset	g	Sets!AR6	1				

layout | sets | maps | stab_sets | res_sets | controls | sam_2 | sam_2 (2) | factuse_2 | fact

'Layout' used by GDXXRW to convert data from Excel to GDX formats

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Data load: Sets

```
*---- 1b. All data, elasticities and sets from excel are assigned here
$GDXIN 1_1_Model_data/data_in.gdx
* Sets
$LOADdc sac
$LOADdc c cagr cnat cfd cind cuti ccon cser cagg
$LOADdc m
$LOADdc a aagr anat afd aind auti acon aser aagg anch anchN aleon
$LOADdc ff f fag l ls lm k kfx n
$LOADdc insa insw insg ins
$LOADdc h
$LOADdc g gt tff
$LOADdc e
$LOADdc i in
$LOADdc w
$LOADdc ss
$LOADdc ppn
$LOAD mcons
* Results sets
$LOADdc adjres scalres
* Mapping sets
$LOADdc map_va_ff map_fagg_ff
$GDXIN
```

'dc' – only ensures elements in a subset are in the parent set

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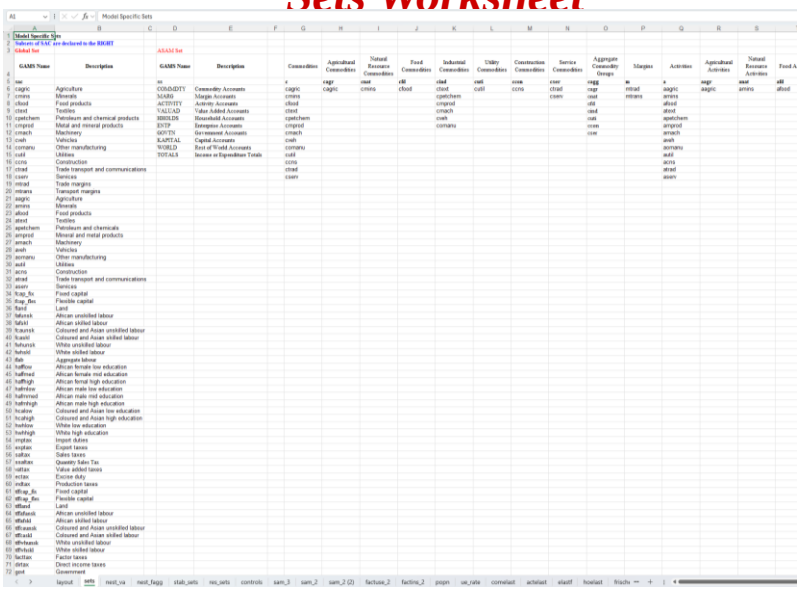
Sets Worksheet



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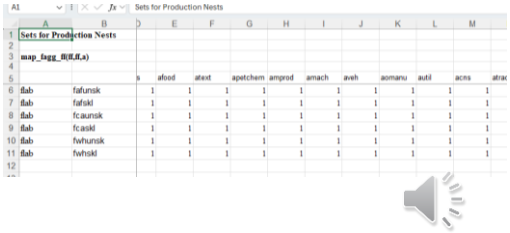
Maps Worksheets

A1 | Sets for Production Nests

	A	B	C	D	E	F	G	H	I	J	K
1	**Sets for Production Nests**										
2											
3	**map_va_ff(ff,a)**										
4											
5			aagric	amins	afood	atext	apetchem	amprod	amach	aveh	aomanu
6	Land	fland	1	1	1	1	1	1	1	1	1
7	Fixed capital	fcap_fix	1	1	1	1	1	1	1	1	1
8	Flexible capital	fcap_flex	1	1	1	1	1	1	1	1	1
9	Aggregate labour	flab	1	1	1	1	1	1	1	1	1
10											

Map for second level nest
map_va_ff(ff,a)

Map for third level nest
map_fag_ff(ff,ff,a)



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Data load: Parameters

```
* 1bi. Loading other data from Excel via GDX
$GDXIN data_in.gdx
* Transactions data
$LOADdc sam

* Elasticities data
$LOADdc elastc elastx elastf elasty elastmu

* Factor quantities
$LOADdc factuse
$LOADdc factins

* Population
$LOADdc popn

* Control data
$LOADdc mod_cont

$GDXIN
```


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Elasticities

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**Model Specific Household Elasticities**													
2	Elasticities													
3														
4	ELASTY	ELASTY	ELASTY	ELASTY	ELASTY									
5			haflow	haffmed	haffhigh	hafmlow	hafmmed	hafmhigh	hcalow	hcahigh	hwhlow	hwhhigh		
6	Agriculture	cagric	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4		
7	Minerals	cmins	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6		
8	Food products	cfood	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7		
9	Textiles	ctext	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2		
10	Petroleum and chemical products	cpetchem	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4		
11	Metal and mineral products	cmprod	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1		
12	Machinery	cmach	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8		
13	Vehicles	cveh	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6		
14	Other manufacturing	comanu	2	2	2	2	2	2	2	2	2	2		
15	Utilities	cutil	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2		
16	Construction	ccns	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8		
17	Trade transport and communications	ctrad	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5		
18	Services	cserv	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2		

sam_2 | sam_2 (2) | factuse_2 | factins_2 | factins_2 (OLD) | Factins Calc | popn | ue_rate | comelast | actelast | elastf | **hoelast**

example

Elasticity Worksheets

elastc
elastx
elastf
elasty
elastmu

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Model Controls

	A	B	C	D	E	F	G	H	I
1	**Control Parameters**								
2	These values are used to initialise various parameters that condition the model and control the operation of the model programme								
3									
4									
5	mod_control								
6									
7	**mcons**								
8	numerchk	1			IF 1 then default, if NOT 1 then check on numeraire				
9	minaqxsh	0.1			Minimum share of intermediates in cost for aqx				
10	samscal	0.001			SAM scaling factor and initial value for autoscaling				
11	scaltarg	100			target level for auto scaling				
12	scalprop	0.95			proportion of NON zero elements that must be below the target level				
13	setpop	2			If 1 then POP data used; if 2 then adult equivalent data used				
14	toldifsam	0.000001			Tolerance on differences in base and solution SAM entries				
15	micsam1	1			If 1 checks micro SAM at calibration; If 0 does not check micro SAM at calibration				
16	micsam2	1			If 1 checks micro SAM at solution; If 0 does not check micro SAM at solution				

stab_sets | res_sets | **controls** | sam_2 | sam_2 (2) | factuse_2 | factins_2 | factins_2 (OLD) | Factins Calc | popn | ue_rate | comelast

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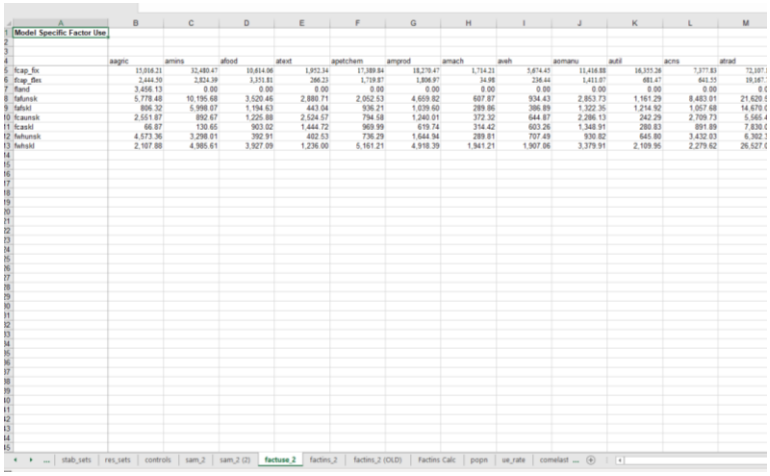
Satellite Data: FACTUSE



	aagric	amins	afood	atext	apetchem	amprod	amach	aveh	asmanu	autil	acns	atrad
fcap_fix	15,016.21	32,480.47	10,614.06	1,952.34	17,389.84	18,270.47	1,714.23	5,674.45	11,416.88	16,355.28	7,377.83	72,107.
fcap_flex	2,444.50	2,824.39	3,351.81	266.23	1,719.87	1,806.97	34.98	236.44	1,411.07	681.47	641.55	19,167.
fland	3,456.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.
fafunsk	5,778.48	10,195.68	3,520.46	2,880.71	2,052.53	4,659.82	687.87	934.43	2,853.73	1,161.29	8,483.01	21,620.
fafskl	806.32	5,998.07	1,194.63	443.04	936.21	1,039.60	289.86	386.89	1,322.35	1,214.92	1,057.68	14,670.
fcaunsk	2,551.87	892.67	1,225.88	2,524.57	794.58	1,240.01	372.32	644.87	2,286.13	242.29	2,709.73	5,565.
fcaskl	66.87	130.65	903.02	1,444.72	969.99	619.74	314.42	603.26	1,348.91	280.83	891.89	7,838.
fwhunsk	4,573.36	3,298.01	392.91	402.53	736.29	1,644.94	289.81	707.49	930.82	645.80	3,432.03	6,302.
fwhskl	2,107.88	4,985.61	3,927.09	1,236.00	5,161.21	4,918.39	1,941.21	1,907.06	3,379.91	2,109.96	2,279.62	26,527.

stab_sets | res_sets | controls | sam_2 | sam_2 (2) | factuse_2 | factins_2 | factins_2 (OLD) | Factins Calc | popn | ue_rate | comelast ...

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Model configuration

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'Standard' Configurations

```
*---- 1b. Data-specific SAM adjustments

*$INCLUDE stg_t_adjust.inc

*---- 1c. Defining SETS by exclusions from previously defined SETS
*---- 1d. Defining MAPPING SETS by using subset information

*---- 1e. Initial SAM check

ABORT$(TOTALSCHK GT 0.000005) "Totals Check failed for BASE SAM" ;

*#### 2. DATA ADJUSTMENTS SECTION ########

*---- 2a. Standard SAM adjustments
* Adjusting the SAM to avoid common problems that do not affect model
* Eliminating transactions between accounts and themselves
* Net transactions between domestic institutions and ROW
* Net transfers between domestic non-govt institutions and govt

*---- 2c Adjusting satellite accounts to ensure consistency
* Forcing FSI0 and FD0 to be consistent
```


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Automatic Scaling

```
*---- 3a. Automatic Scaling of SAM
* Assigning values to initialise scaling parameter

 samscal   = mod_cont("samscal") ;

WHILE{
 [(SUM((sacn,sacnp)${SAM(sacn,sacnp)
        AND (ABS(SAM(sacn,sacnp)/samscal) < mod_cont("scaltarg"))},1))
        /SUM((sacn,sacnp)$SAM(sacn,sacnp), 1)] < mod_cont("scalprop") ,

•  samscal is increased in multiples of 10 until condition is satisfied

      samscal = samscal * 10 ;

  } ;

* Scale the SAM data for algorithm performance
 SAM(sac,sacp)$samscal  = SAM(sac,sacp)/samscal ;
```


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Factor Data

```
*---- 3b. Entering and Scaling of FACTUSE

* Remove factuse where there is no corresponding SAM payment
 factuse(f,a)$(not sam(f,a)) = 0 ;

* Declare factuse from SAM if neccessary
 factuse(f,a)$((NOT factuse(f,a)) AND sam(f,a)) =   sam(f,a) ;

* By default set factor use scaling factor equal to SAM scaling factor
 factscal       = samscal ;

 FACTUSE(f,a)$factscal   = FACTUSE(f,a)/factscal ;

*---- 3c. Entering and Scaling of FACTINS
* Remove factins where there is no corresponding SAM payment
 factins(insw,f)$(not SAM(insw,f)) = 0 ;

* Declare factins from SAM if neccessary
 factins(insw,f)$((NOT factins(insw,f)) AND SAM(insw,f)) = SAM(insw,f) ;

* By default set factor use scaling factor equal to SAM scaling factor
 factins(insw,f)$factscal   = factins(insw,f)/factscal ;
```


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Population Data Entry

```
* By default set population scaling factor equal to SAM scaling
factor

 popn(h,ppn)$samscal     = popn(h,ppn)/samscal ;
```

Population data are used in the analyses files for providing extra information about the results from simulations

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Other Set Assignments

```
*#### 5. OTHER SET ASSIGNMENTS ########

*---- 5a. Assign set members for unskilled labour by exclusion

lu(l)         = (NOT ls(l)) AND (NOT lm(l));
```


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Production Set Assignments

```
*---- 5b. Defining sets to control production nesting structure
$ontext
  The set aqxn(a) - activities with Leontief at the top level is set as the complement to aqx(a,r)
Selecting aqx
 a) All activities WITH intermediate inputs where intermediates account
    for more than the value share set in Excel worksheet 'controls'
    are assigned to aqx.
 b) Selected members of a in aqx are cancelled - use the set aleon.
 c) Other members of a in aqx are cancelled manually.
Setting aqxn -  Defined as the complement to aqx.
$offtext

* Top level CES chosen by reference to intermediate input shares
 aqx(a)$((SUM(c,SAM(c,a))/SAM("total",a)) GT mod_cont("minaqxsh") ) = YES ;

* Top level CES cancelled for selected activities
aqx(aleon)       = NO ;

* Top level CES cancelled for selected activities manually
* aqx("amines")   = NO ;

* Top level Leontief set for all activities without top level CES
aqxn(a)         = not aqx(a) ;
```


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Other Elasticities

```
*#### 6. OTHER ELASTICITY ASSIGNMENTS ########

$ontext
 NB: If the values for elasticities of substitution and/or
     transformation are set here they OVERRIDE the values set
     in the Excel database.
$offtext

*---- 6a. Defining other elasticities

*Syntax example
* elastABC("cmines","exdem")     = 0.5 ;
```


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Other Set Assignments

*---- 5c. Defining sets to control aggregation commodities

* Linear aggregation of homogenous commodities

cxac(c) = YES ;
cxac(cagr) = NO ;

cxacn(c) = not cxac(c) ;

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Other Set Assignments

```
* Define mapping between CONSISTENTLY ORDERED sets
$ontext
  This method of declaration and assignment requires the two
set arguments are ordered so that the matching is correct.
  Check carefully
$offtext

Sets
map_f_tff(f,tff) Factor taxes to factors /
 #f:#tff
  /

map_tff_f(tff,f) Factor taxes to factors reverse  /
 #tff:#f
  /

map_i_k(in,k)   Mapping from investment type to capital type /
 #in:#k
  / ;
```


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Other Set Assignments

```
* Define sets on the basis of read in data
 ce(c)$(SAM(c,"row"))          = YES ;
 cen(c)                        = NOT ce(c) ;

 ELASTC(c,"exdem")$(NOT ELASTC(c,"exdem")) =   0.0 ;
 ced(c)$(ELASTC(c,"exdem"))    = YES ;
 cedn(c)                       = NOT ced(c) ;
..
..
 cxac(c)$ELASTC(c,"sigmaxc")   = YES ;
 cxacn(c)                      = not cxac(c) ;

* CET vs. non-CET activities
$ontext
CET if elasticity for CET non-zero; Fixed proportions if CET zero
$offtext

 ELASTX(a,"omegaout")$(NOT ELASTX(a,"omegaout")) =   0.0 ;
 acet(a)$(ELASTX(a,"omegaout"))  = YES ;
 acetn(a)                        = NOT acet(a) ;
```


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Diagnostics

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Diagnostics: Illegal Sub Matrix Entries

```
PARAMETERS

* Macro SAM for checking calibration and initial solve

 ASAM0(ss,ss)   Aggregate SAM for data entry check     ;

* Macro SAM to check data entry

 ASAM0("COMMDTY","COMMDTY")    = SUM((c,cp),SAM(c,cp)) ;
..
..
..
..
..
..
ABORT $(ASAM0("COMMDTY","COMMDTY") NE 0.0)
 "ASAM0(COMMDTY,COMMDTY) non zero" ;
```


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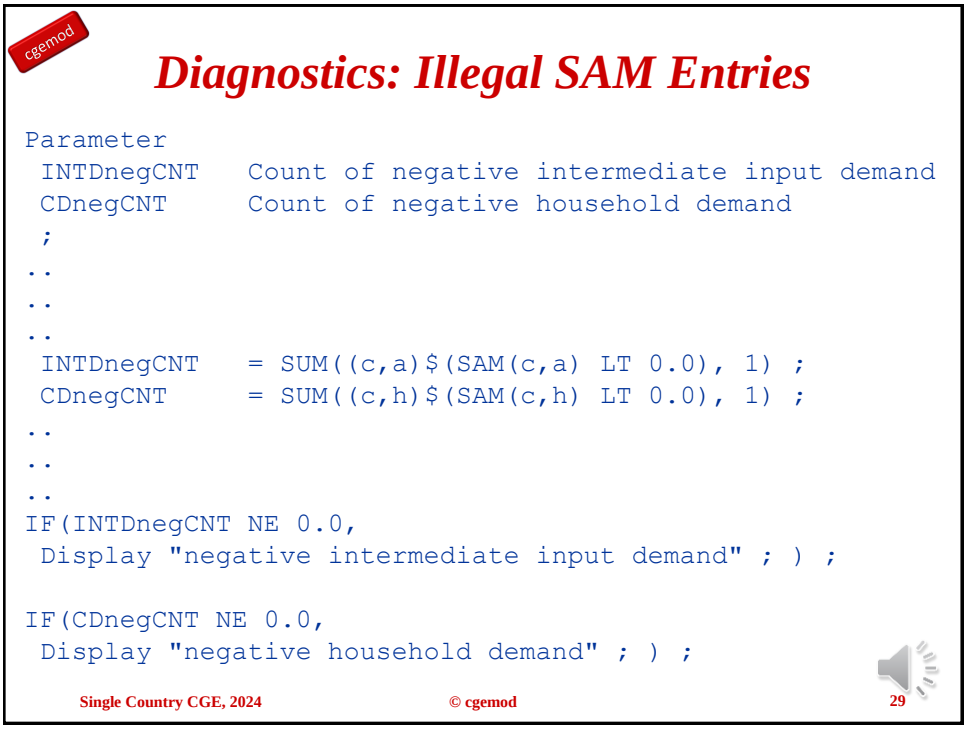
cgemod
Diagnostics: Illegal SAM Entries
Parameter
INTDnegCNT Count of negative intermediate input demand
CDnegCNT Count of negative household demand
;
..
..
..
INTDnegCNT = SUM((c,a)$(SAM(c,a) LT 0.0), 1) ;
CDnegCNT = SUM((c,h)$(SAM(c,h) LT 0.0), 1) ;
..
..
..
IF(INTDnegCNT NE 0.0,
Display "negative intermediate input demand" ;) ;
IF(CDnegCNT NE 0.0,
Display "negative household demand" ;) ;
Single Country CGE, 2024
© cgemod
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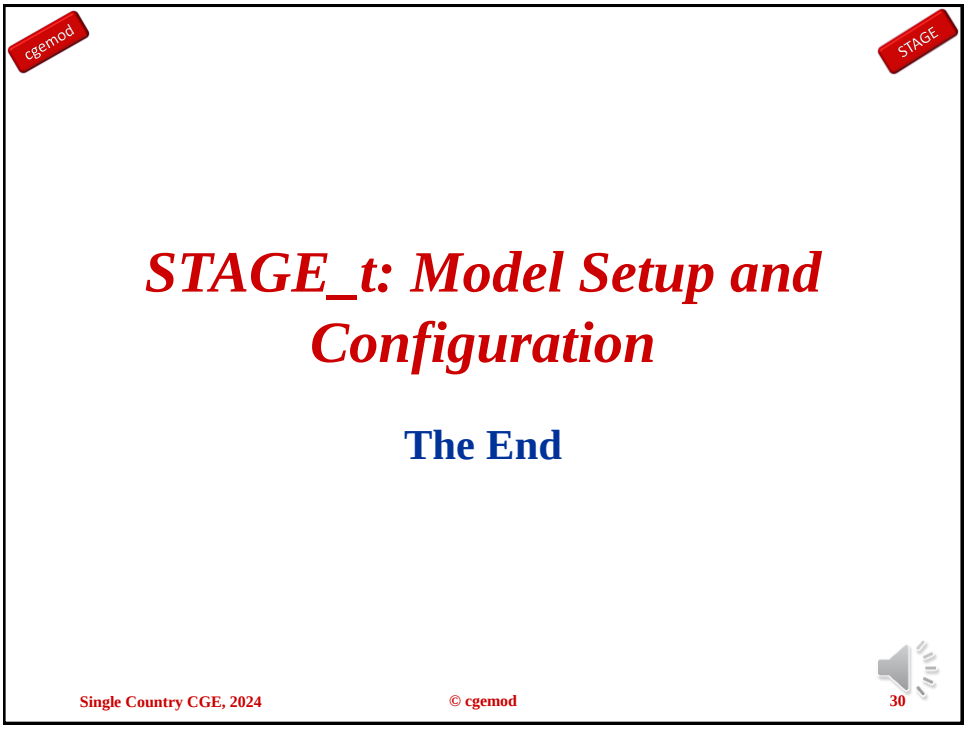
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