

SAMGator: An Introduction

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Abstract

This note provides a brief overview of the operation of the SAMGator interface for aggregating Social Accounting Matrices. It is assumed the user is familiar with the GAMS programming language, is using GAMSIDE as the text editor, GDY as the source of transactions data and destination of the model results, and MS Excel – in conjunction with GDXXRW. This note refers first to the single country model version and then to the global model version

This is a draft that is undergoing continuing development. It is provided on that basis. Comments on the current content are encouraged.

1. Using SAMgator for a Single Region SAM

The dimensions of a SAM may be such as to require, for practical purposes, that the database is aggregated before being used to calibrate a CGE model. There are two main reasons for this:

1. If the database is not aggregated the resultant model would be too large to
 - a. solve within realistic limits of computer capacity,¹ OR
 - b. yield results that would be susceptible to practical analyses and interpretation.
2. It is argued that models should be focused upon specific issues rather than being general and that part of the process of focus depends upon the identification of an appropriate aggregation for the purposes at hand.

An aggregation of a SAM requires that the database is (simultaneously) aggregated in two dimensions, i.e., the income and expenditure accounts are simultaneously aggregated to reduce the number commodities/activities, factors, trade partners and associated transactions. GAMS is an extremely efficient medium for implementing the calculations required to aggregate a large SAM, but setting up the sets and (set) mappings to control the aggregation is potentially time consuming and subject to errors. One method for reducing the time costs involved in setting up a new aggregation, and simultaneously reducing the time required to configure the sets and other data needed to implement a version² of GLOBE or STAGE with a new aggregation, is to use the SAMgator software (PROVIDE, 2004).

SAMgator is a Visual Basic for Applications (VBA) programme implemented using Microsoft (MS) Excel. The user declares, describes and defines the new (aggregated) sectors (commodities and activities), factors and regions in an Excel template, identifies the source and destination data files and then runs GAMS remotely from within the Excel programme³.

¹ Developments in solver technologies have allowed solutions to be derived for ever larger models so this reason is increasingly not relevant.

² The term “version of GLOBE or STAGE” is used to refer to an implementation of the GLOBE or STAGE model with a specific aggregation of the database. A “version of GLOBE or STAGE” is used to refer to an implementation of a version of the STAGE model that contains either ‘limited’ or no variations in the behavioural relationships of the STAGE model. More substantial changes in a model are identified by ‘extending’ the name, e.g., GLOBE-AGR.

³ The GAMS code at the heart of SAMgator is report in the Appendices.

The SAMgator programme generates the set and mapping files, checks to ensure that all the mappings are ‘legal’ and then generates the GAMS programme file.

1.1 The Mechanics of SAMgator

At the heart of SAMgator is a single (GAMS) equation that aggregates the SAM database in two dimensions (see below).

$$\begin{aligned} \text{NEWSAM}(sp, spp) &= \text{SUM}((ss, ssp) \\ &\quad \$(\text{MAPSAMAG}(sp, ss) \\ &\quad \quad \$\text{MAPSAMAG}(spp, ssp)), \\ &\quad \text{SAM}(ss, ssp)) ; \end{aligned}$$

The parameter $SAM(ss, spp)$ contains the disaggregated database where ss^4 is the set that defines the row and columns labels for the SAM. The parameter $NEWSAM(sp, spp)$ contains the aggregated database where s is the set that defines the row and columns labels for the aggregated (NEW)SAM. The set $MAPSAMAG(sp, ss)$ defines the members of ss that aggregated into sp by the rows of $SAM(ss, spp)$, while the set $MAPSAMAG(spp, ssp)$ defines the members of ssp that aggregated into spp by the columns of $SAM(ss, spp)$. (Note that there is only one mapping set $MAPSAMAG$ with its implementation being solely driven by the sets ss and s and their aliases.).

1.2 SAMGatorM

The user interface to SAMgator consists of three worksheets ‘Control’, ‘MappingConfig’ and ‘Sets’. A user only needs to access these three worksheets; although more experienced users may wish to use other features of SAMgator the discussion here is limited to these three worksheets.

1.2.1 Control

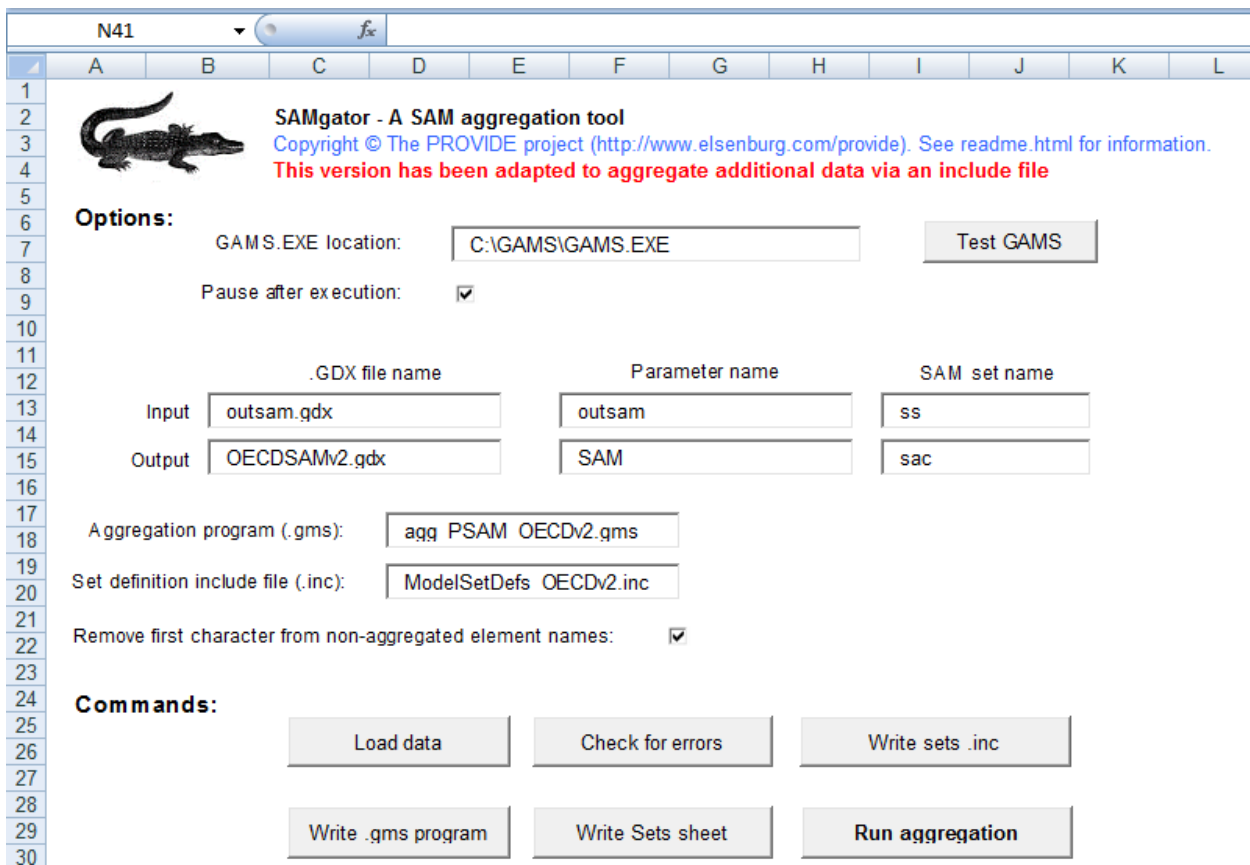
The ‘Control’ worksheet is used to identify the location of GAMS.EXE, input and output file names, check for errors, write output and to run the aggregation programme. A screen shot of the worksheet is given in Figure 2.1.

In order to run GAMS from within MS Excel it is necessary for Excel to know the location of the GAMS.EXE file; this information is provided in the ‘GAMS.EXE location’

⁴ The set spp is an alias for ss .

box.⁵ In order to test that Excel can implement a GAMS programme first click on the ‘Pause after execution’ box – so it has a tick in the box as in Figure 2.1 – and then click on the ‘Test GAMS’ button. A DOS window will appear (Figure 2.2); if this indicates a normal completion this is confirmation that Excel can trigger GAMS correctly and the user can press any key to continue.

Figure 2.1 Control Worksheet for SAMgator



The user should now define the input file, which is required to be a GAMS Data Exchange (GDX) file; in this illustration the file is called ‘outsam.gdx’.⁶ Then name the output file; in this illustration ‘OECD SAMv2 .gdx’. In both instances it is necessary for the

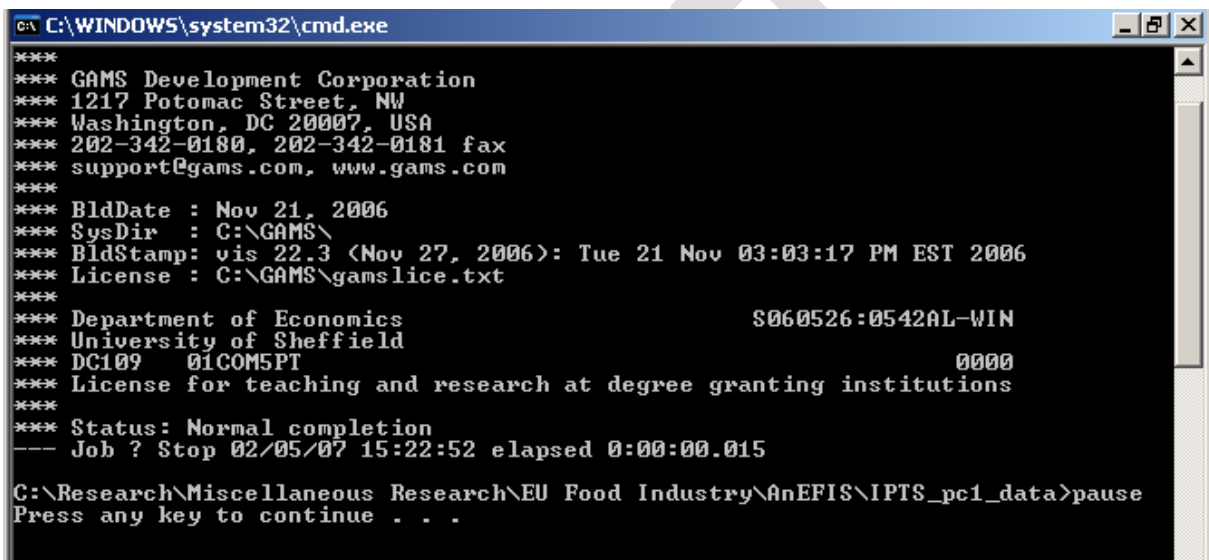
⁵ With some versions of GAMS spaces in the paths can lead to problems. Note how the screen shot indicates that GAMS.exe is stored in a GAMS directory on the C drive and not in the ‘Program Files’ directory that is the default destination when installing GAMS.

⁶ GAMS has changed the formatting of GDX files over recent years. The changes are backward compatible but not forward compatible. This can lead to problem if the user wishes to access a more recent version of a GDX file that is not consistent with the version of GAMS being used; this should be rare. If it does happen there are two most obvious solutions; (1) recompile the input database using the more recent version of GAMS or (2) recompile the input database using the options in GAMS to write out GDX files in the earlier formats.

user to identify the parameter within the GDX file that is the source of the data and the destination and the set labels used in the source and destination parameters. And finally the user should provide a name for the GAMS programme file; in this illustration 'agg_PSAM_OECDv2.gms' and the name for the include file that will be generated to contain the set definitions.

Then select each of the Command buttons in turn – do so for each row in turn starting each time with the lefthand button.

Figure 2.2 Test GAMS



```

C:\WINDOWS\system32\cmd.exe
***
*** GAMS Development Corporation
*** 1217 Potomac Street, NW
*** Washington, DC 20007, USA
*** 202-342-0180, 202-342-0181 fax
*** support@gams.com, www.gams.com
***
*** BldDate : Nov 21, 2006
*** SysDir : C:\GAMS\
*** BldStamp: vis 22.3 (Nov 27, 2006): Tue 21 Nov 03:03:17 PM EST 2006
*** License : C:\GAMS\gamslice.txt
***
*** Department of Economics                S060526:0542AL-WIN
*** University of Sheffield
*** DC109 01COM5PT                          0000
*** License for teaching and research at degree granting institutions
***
*** Status: Normal completion
--- Job ? Stop 02/05/07 15:22:52 elapsed 0:00:00.015

C:\Research\Miscellaneous Research\EU Food Industry\AnEFIS\IPTS_pc1_data>pause
Press any key to continue . . .

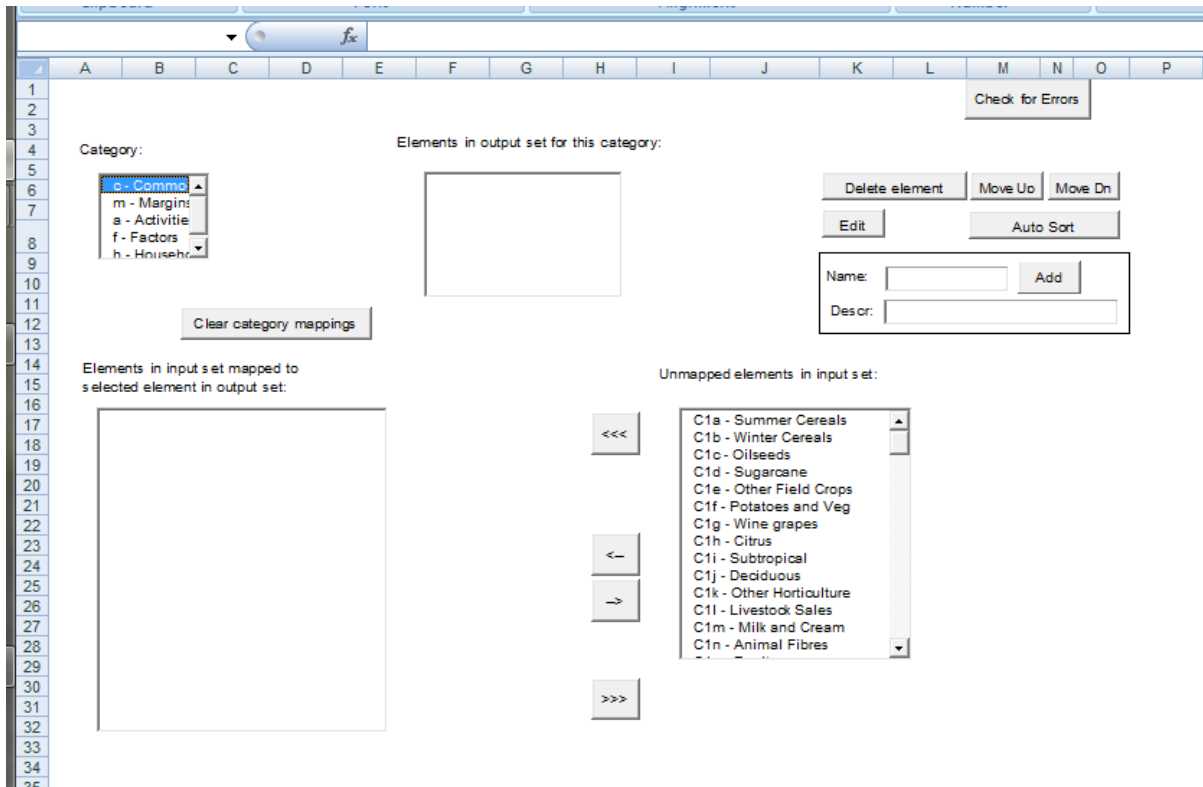
```

2.2 MappingConfig

The role of the 'MappingConfig' worksheet is to generate the sets for the aggregated SAM and set up the mappings, which will control the aggregation. The process has a number of safeguards built in to ensure there the mappings are legitimate and that there are no errors. Although users may choose to adapt a previous aggregation the description given here assumes that the user starts with a version of SAMgator that contains no aggregation specific set or mapping data.

Figure 2.3 illustrates how the 'MappingConfig' worksheet might look when there is no aggregation specific set or mapping data. The user needs to create sets and mappings for the commodities/activities, factors and households.

Figure 2.3 Mapping and Configuration Worksheet 1



The steps undertaken to declare and define aggregate sets and to generate the mapping file are as follows.

1. Select a category: choose commodities/activities, factors or households in the ‘Category’ box (top left).
2. Declare (and describe) an aggregate set element: type the name in the ‘Name’ box and below it a description in the ‘Descr’ box and then click the ‘Add’ button. This element will be a member of an output set for which each element will appear with its description in the ‘Elements in output set for this category’ box.
3. Select elements in the input set that are to be mapped to the selected member of the output set: select an element in the ‘Elements in output set for this category’ box and then select those elements that are to be mapped to that output set element from the ‘Unmapped elements of input set’ box (bottom right) by clicking on each in turn (NB the SHIFT and Ctrl click options do not operate). Click on the <- button to define the mapping. Note how the selected element of

the input set are moved to the ‘Elements in input set mapped to selected element in output set’ box (bottom left).

- The <- button moves selected elements in the unmapped element box to the mapped elements box; the -> button moves selected elements in the mapped element box to the unmapped elements box; the <<< button moves all elements in the unmapped element box to the mapped elements box; >>> button moves all elements in the mapped element box to the unmapped elements box.
 - Figure 2.3 illustrates that for the category ‘c – Commodities’.
4. Continue adding elements to the output set in each category until all the elements in the input set are mapped to elements in the output set. Note how each element in the input set can only be mapped to one element in the output set – thereby avoiding ‘double counting’. The error checking also checks to avoid duplicates in the output set.
 5. Ordering of the output set: as each new element of an output set is declared it is added to the end of the list of members of the output set for that category and this defines the set ordering that will be used by GAMS. The order of elements within an output set can be altered by selecting elements in the ‘Elements in output set for this category’ box and using the ‘Move Up’ and/or ‘Move Down’ buttons.⁷
 6. Deleting an output set element: select the element to delete in ‘Elements in output set for this category’ box and click on the ‘Delete element’ button.
 7. Select another category and complete steps 2 to 7 as appropriate until output sets and mapping sets for all three categories have been generated.

⁷ Note that GAMS lists set members in the order that they were declared in the programme. If the same name, say ‘abc’, is used in 2 different sets this can create ordering problems for the user: assume that the order wanted for reports is the order of members in the second set declared, but because ‘abc’ is in the first set declared it will be the first member of the second set. Use names for members of sets that are unique to the sets to which they belong.

2.3 Sets

The worksheet sets provides a full listing of the set names and descriptions required by the STAGE model. These can be copied and pasted into the worksheet that contains set information for STAGE.

2.4 Aggregation Guidelines

Some general guidelines for aggregations are given below. In the main these are common sense.

The aggregation of accounts in a SAM is overwhelmingly a matter of the context for which the aggregation is being compiled; consequently the notes below are general and are not a replacement for economic reasoning and/or common sense.

- Aggregations across the categories (commodities, activities, factors, regions) of accounts are NOT economically appropriate even though they are mathematically possible. SAMgator prohibits such aggregations, and where the aggregation is conducted using a different method the checks in the STAGE model code will often identify such inappropriate aggregations⁸.
- Aggregations within categories should typically avoid mappings that are difficult to rationalise, e.g., aggregating unskilled labor with capital and keeping skilled labour separate, aggregating an agricultural commodity with a heavy manufacturing commodity.

2.4 GAMS Data Exchange (GDX) Database

The GDX file produced by the SAMgator programme contains an aggregated SAM. The user can then choose that the model accesses the SAM data directly from GDX or the user can extract the SAM from GDX, the easiest option being to use the CUBE and EXPORT facilities in GDXViewer, and add the SAM data to the model Excel workbook (see below).

⁸ The checks in the model code are not designed to identify such errors but they do identify entries in cells that are inappropriate and in such circumstances will cause the model to abort. However the error messages are not geared to the identification of problems associated with inappropriate aggregations.

3. Aggregating the GTAP SAMs

The dimensions of the GTAP database require that for practical purposes the database must be aggregated before being used to calibrate a global CGE model. There are two main reasons for this:

3. If the database is not aggregated the resultant model would be too large to
 - a. solve within realistic limits of computer capacity, OR
 - b. yield results that would be susceptible to practical analyses and interpretation.
4. It is argued that models should be focused upon specific issues rather than being general and that part of the process of focus depends upon the identification of an appropriate aggregation for the purposes at hand.

An aggregation of the GLOBE SAM requires that the database is (simultaneously) aggregated in three dimensions, i.e., the intra-regional accounts for all regions are aggregated to reduce the number commodities/activities, factors, trade partners and associated transaction, and inter regional transactions are aggregated so as to accord with the aggregation of the trade accounts for each region. GAMS is an extremely efficient medium for implementing the calculations required to aggregate the GLOBE SAM,⁹ but setting up the sets and (set) mappings to control the aggregation is potentially time consuming. One method for reducing the time costs involved in setting up a new aggregation, and simultaneously reducing the time required to configure the sets and other data needed to implement a version¹⁰ of GLOBE with a new aggregation, is to use the SAMgator software (PROVIDE, 2004).

SAMgator is a Visual Basic for Applications (VBA) programme implemented using Microsoft (MS) Excel. The user declares, describes and defines the new (aggregated) sectors (commodities and activities), factors and regions in an Excel template, identifies the source

⁹ If the programme is run without the elements that provide weighted aggregates of the GTAP elasticities it runs very quickly, however the elements that aggregate the elasticities slows the programme down appreciably.

¹⁰ The term “version of GLOBE” is used to refer to an implementation of the GLOBE model with a specific aggregation of the database. A “version of GLOBE” is used to refer to an implementation of a version of the GLOBE model that contains either ‘limited’ or no variations in the behavioural relationships of the GLOBE model. More substantial changes in the GLOBE model are identified by ‘extending’ the GLOBE name, e.g., GLOBE-IC (McDonald, 2007b) is a version of GLOBE with imperfect competition and GLOBE-EN (McDonald and Thierfelder, 2007c) is a version of GLOBE to model energy use.

and destination data files and then runs GAMS remotely from within the Excel programme¹¹. The SAMgator programme generates the set and mapping files, checks to ensure that all the mappings are ‘legal’ and then generates the GAMS programme file.

Moreover the same mapping sets can be used to aggregate other components of the GTAP database so that they are consistent with the transactions (SAM) data, e.g., the elasticities that are part of the GTAP database.

3.1 The Mechanics of SAMgator

At the heart of SAMgator is a single (GAMS) equation that aggregates the GTAP database in three dimensions (see below).

$$\begin{aligned} \text{NEWSAM}(sp, spp, k) &= \text{SUM}((ss, spp, kk) \\ &\quad \$(\text{MAPSAMAG}(sp, ss) \\ &\quad \$\text{MAPSAMAG}(spp, spp) \\ &\quad \$\text{MAPREGAG}(k, kk)), \\ &\quad \text{SAMG}(ss, spp, kk)) ; \end{aligned}$$

The parameter $\text{SAMG}(ss, spp, kk)$ contains the GTAP database where ss ¹² is the set that defines the row and columns labels for the SAM for each of the kk regions. The parameter $\text{NEWSAM}(sp, spp, k)$ contains the GTAP database where s is the set that defines the row and columns labels for the aggregated (NEW)SAM for each of the k regions. The set $\text{MAPSAMAG}(sp, ss)$ defines the members of ss that aggregated into sp by the rows of $\text{SAMG}(ss, spp, kk)$, while the set $\text{MAPSAMAG}(spp, spp)$ defines the members of spp that aggregated into spp by the columns of $\text{SAMG}(ss, spp, kk)$. (Note that there is only one mapping set MAPSAMAG with its implementation being solely driven by the sets ss and s and their aliases.) The set $\text{MAPREGAG}(k, kk)$ defines the aggregation of regions kk into k for the aggregated (NEW)SAM for each of the k regions.

3.2 Using SAMgator

The user interface to SAMgator consists of three worksheets ‘Control’, ‘MappingConfig’ and ‘Sets’. A user only needs to access these three worksheets; although more experienced users

¹¹ The GAMS code at the heart of SAMgator is report in the Appendices.

¹² The set spp is an alias for ss .

may wish to use other features of SAMgator the discussion here is limited to these three worksheets.

3.2.1 *Control*

The 'Control' worksheet is used to identify the location of GAMS.EXE, input and output file names, check for errors, write output and to run the aggregation programme. A screen shot of the worksheet is given in Figure 3. 1.

In order to run GAMS from within MS Excel it is necessary for Excel to know the location of the GAMS.EXE file; this information is provided in the 'GAMS.EXE location' box.¹³ In order to test that Excel can implement a GAMS programme first click on the 'Pause after execution' box – so it has a tick in the box as in Figure 3.1 – and then click on the 'Test GAMS' button. A DOS window will appear (Figure 3.2); if this indicates a normal completion this is confirmation that Excel can trigger GAMS correctly and the user can press any key to continue.

¹³ With some versions of GAMS spaces in the paths can lead to problems. Note how the screen shot indicates that GAMS.exe is stored in a GAMS directory on the C drive and not in the 'Program Files' directory that is the default destination when installing GAMS.

Figure 3.1 Control Worksheet for SAMgator

		fx										
		A	B	C	D	E	F	G	H	I	J	K

Aggregation program for global SAM from GTAP data
This version also generates weighted averages of the GTAP elasticities ESUBD, ESUBM and ESUBVA. A correctly formulated input database is required.

Options:

GAMS.EXE location:

Pause after execution:

.GDX file name

Input

Output

Aggregation program (.gms):

The user should now define the input file, which is required to be a GAMS Data Exchange (GDX) file; in this case the file is called 'worsam60_v3g.gdx'.¹⁴ Then name the output file; in this case 'samg23_5_18_ipts.gdx', where the convention adopted is 'samgC_F_R**.gdx' where *C* is the number of commodities and activities, *F* the number of factors and *R* the number of regions. And finally the user should provide a name for the GAMS programme file; in this case 'globaggr_ipts1.gms'. The programme is not sensitive to the choice of naming conventions.

¹⁴ GAMS has changed the formatting of GDX files over recent years. The changes are backward compatible but not forward compatible. This can lead to problem if the user wishes to access a more recent version of a GDX file that is not consistent with the version of GAMS being used; this should be rare. If it does happen there are two most obvious solutions; (1) recompile the input database using the more recent version of GAMS or (2) recompile the input database using the options in GAMS to write out GDX files in the earlier formats.

Figure 3.2 Test GAMS

```

C:\WINDOWS\system32\cmd.exe
***
*** GAMS Development Corporation
*** 1217 Potomac Street, NW
*** Washington, DC 20007, USA
*** 202-342-0180, 202-342-0181 fax
*** support@gams.com, www.gams.com
***
*** BldDate : Nov 21, 2006
*** SysDir : C:\GAMS\
*** BldStamp: vis 22.3 (Nov 27, 2006): Tue 21 Nov 03:03:17 PM EST 2006
*** License : C:\GAMS\gamslice.txt
***
*** Department of Economics                S060526:0542AL-WIN
*** University of Sheffield
*** DC109 01COM5PT                        0000
*** License for teaching and research at degree granting institutions
***
*** Status: Normal completion
--- Job ? Stop 02/05/07 15:22:52 elapsed 0:00:00.015

C:\Research\Miscellaneous Research\EU Food Industry\AnEFIS\IPTS_pc1_data>pause
Press any key to continue . . .

```

3.2.2 MappingConfig

The role of the ‘MappingConfig’ worksheet is to generate the sets for the aggregated SAM and set up the mappings, which will control the aggregation. The process has a number of safeguards built in to ensure there the mappings are legitimate and that there are no errors. Although users may choose to adapt a previous aggregation the description given here assumes that the user starts with a version of SAMgator that contains no aggregation specific set or mapping data.

Figure 3.3 illustrates how the ‘MappingConfig’ worksheet might look when there is no aggregation specific set or mapping data; the only difference between this image and the one seen when opening SAMgator is that the ‘int_k – Regions’ line in the ‘Category’ box (top left) has been highlighted. The user needs to create sets and mappings for the commodities/activities, factors and regions.

Figure 3.3 Mapping and Configuration Worksheet 1

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
													Check for Errors	
Category:			Elements in output set for this category:											
<div style="border: 1px solid black; padding: 2px;"> int_c - Commodities-Activiti int_f - Factors int_k - Regions vstmarg - export margin acc </div>												Delete element Move Up Move Dn Edit Auto Sort		
			Name: <input type="text"/> Add Descr: <input type="text"/>											
Elements in input set mapped to selected element in output set:				Unmapped elements in input set:										
				<div style="display: flex; align-items: center;"> <div style="margin-right: 5px;"><<<</div> <div style="margin-right: 5px;"><<</div> <div style="margin-right: 5px;"><</div> <div style="margin-right: 5px;">></div> <div style="margin-right: 5px;">>></div> <div style="margin-right: 5px;">>>></div> <div style="border: 1px solid black; padding: 2px; flex-grow: 1;"> <div style="font-size: 8px; margin-bottom: 5px;"> aus - Australia nzl - New Zealand xoc - Rest of Oceania chn - China hkg - Hong Kong jpn - Japan kor - Korea twn - Taiwan xea - Rest of East Asia idn - Indonesia mys - Malaysia phl - Philippines sgp - Singapore tha - Thailand vnm - Vietnam xse - Rest of Southeast Asia </div> </div> </div>										

The steps undertaken to declare and define aggregate sets and to generate the mapping file are as follows.

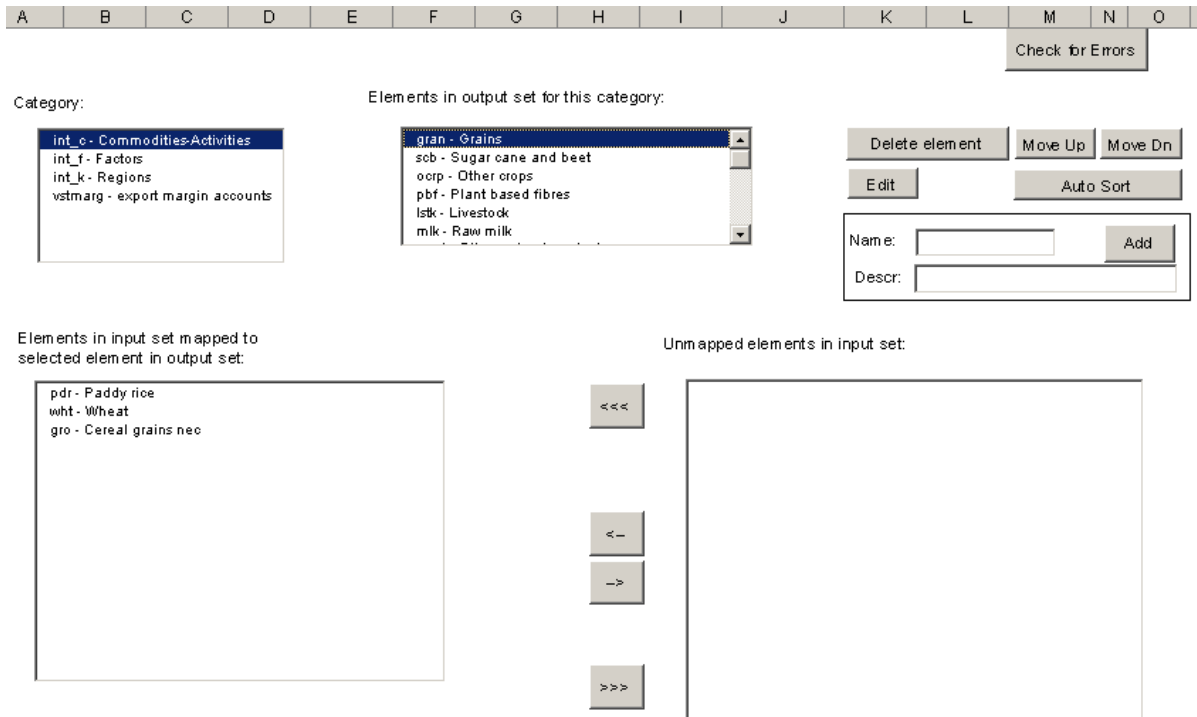
8. Select a category: choose commodities/activities, factors or regions in the 'Category' box (top left).
9. Declare (and describe) an aggregate set element: type the name in the 'Name' box and below it a description in the 'Descr' box and then click the 'Add' button. This element will be a member of an output set for which each element will appear with its description in the 'Elements in output set for this category' box.
 - Note that SAMgator will use the sets and mappings to generate automatically multiple sets by PREFIXING letters (between 1 and 5 characters) to each element of the output set.
10. Select elements in the input set that are to be mapped to the selected member of the output set: select an element in the 'Elements in output set for this category' box and then select those elements that are to be mapped to that output set element from the 'Unmapped elements of input set' box (bottom right) by clicking on each in turn (NB the SHIFT and Ctrl click options do not operate).

Click on the <- button to define the mapping. Note how the selected element of the input set are moved to the ‘Elements in input set mapped to selected element in output set’ box (bottom left).

- The <- button moves selected elements in the unmapped element box to the mapped elements box; the -> button moves selected elements in the mapped element box to the unmapped elements box; the <<< button moves all elements in the unmapped element box to the mapped elements box; >>> button moves all elements in the mapped element box to the unmapped elements box.
 - Figure 3.4 illustrates that for the category ‘int_c – Commodities-Activities’ the elements ‘pdr – paddy rice’, ‘wht – wheat’ and ‘gro – cereal grains nec’ of the input set are mapped to the element ‘gran – grains’ of the output set.
11. Continue adding elements to the output set in each category until all the elements in the input set are mapped to elements in the output set. Note how each element in the input set can only be mapped to one element in the output set – thereby avoiding ‘double counting’. The error checking also checks to avoid duplicates in the output set.
 12. Ordering of the output set: as each new element of an output set is declared it is added to the end of the list of members if the output set for that category and this defines the set ordering that will be used by GAMS. The order of elements within an output set can be altered by selecting elements in the ‘Elements in output set for this category’ box and using the ‘Move Up’ and/or ‘Move Down’ buttons.¹⁵
 13. Deleting an output set element: select the element to delete in ‘Elements in output set for this category’ box and click on the ‘Delete element’ button.
 14. Select another category and complete steps 2 to 7 as appropriate until output sets and mapping sets for all three categories have been generated.

¹⁵ Note that GAMS lists set members in the order that they were declared in the programme. If the same name, say ‘abc’, is used in 2 different sets this can create ordering problems for the user: assume that the order wanted for reports is the order of members in the second set declared, but because ‘abc’ is in the first set declared it will be the first member of the second set. Use names for members of sets that are unique to the sets to which they belong.

Figure 3.4 Mapping and Configuration Worksheet 2



3.2.3 Sets

The worksheet sets provides a full listing of the set names and descriptions required by the GLOBE v1 model. These can be copied and pasted into the worksheet that contains set information for GLOBE v1.

3.3 Aggregation Guidelines

Some general guidelines for aggregations are given below. In the main these are common sense, but the note about the treatment of the Globe region (*glo*) is critical.

3.3.1 Account Aggregation

The aggregation of accounts in the global SAM is overwhelmingly a matter of the context for which the aggregation is being compiled; consequently the notes below are general and are not a replacement for economic reasoning and/or common sense.

- Aggregations across the categories (commodities-activities, factors, regions) of accounts are NOT economically appropriate even though they are mathematically possible. SAMgator prohibits such aggregations, and where the

aggregation is conducted using a different method the checks in the GLOBE model code will often identify such inappropriate aggregations¹⁶.

- Aggregations within categories should typically avoid mappings that are difficult to rationalise, e.g., aggregating unskilled labor with capital and keeping skilled labour separate, aggregating an agricultural commodity with a heavy manufacturing commodity.

3.3.2 Treatment of the Globe region when aggregating

The Globe region serves a special purpose in the GLOBE model since it handles all transactions for which full bi lateral data are absent. Consequently Globe must never be part of an aggregate region and MUST be retained as a separate region in ALL implementations of the GLOBE model.

3.4 GAMS Data Exchange (GDX) Database

The GDX file produced by the SAMgator programme contains an aggregated global SAM in a format consistent with the GLOBE model and three series of elasticities that are aggregates of the elasticities reported in the GTAP database. The parameters in the GDX database are:

- NEWSAM – the aggregated global SAM in GLOBE format;
- ESUBD2 – Armington (CES) elasticities for level 1 domestic/(aggregate) import substitution, using domestic supply shares by value as weights;
- ESUBM2 – Armington (CES) elasticities for level 2 import substitution, using import supply shares by region as weights;
- ESUBM3 – Armington (CES) elasticities for level 2 import substitution, using domestic supply shares by value as weights;
- ESUBVA2 – elasticities of substitution between primary inputs, using factor shares by value as weights.

¹⁶ The checks in the model code are not designed to identify such errors but they do identify entries in cells that are inappropriate and in such circumstances will cause the model to abort. However the error messages are not geared to the identification of problems associated with inappropriate aggregations.