TINYTurk, a Tiny model based on Turkish data

First steps to build an Inforum model

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TURKTiny is a "Tiny model" as Clopper Almon defines it in his book, "The Craft of Economic Modeling"[4]. Thus, TINYTurk is "a simple input-output model using only commands available in G"[5]. The main difference between TINY and TINYTurk obviously is that the data of the last are the data of the Turkish economy and not a special structure created from US statistics. Therefore, the structure of the last Turkish 2002 Input-Output table, which applies the ESA 95 recommendations, is different from Tiny's structure. From this point of view, we can consider TURKTiny like an application of Tiny concept to an ESA 95 Input-Output framework.

To build TURKTiny, we have only used the 2002 Input-Output Table, in Basic prices, Current Prices and a table containing the components of the GDP by expenditure for the period 1998-2007[6]. These two tables do not match very well. This is the consequence of a revision of the GDP in March 2008[7]. We have chosen several compromises to build our model. You find below all explanations on our choices.

For the rest, we have scrupulously followed the instructions of Clopper Almon's book with very few marginal adaptations especially in the building of the Vam file. These adaptations are necessary to take into account some problems of Turkish data and ESA 95.

The main difference between the two input-output tables is in the numbers of products and in the description of the economy. We have eight products in TINY and fifty-nine in TURKTiny. We have, indeed, more rows and columns in TURKTiny to describe intermediate consumption, more rows and columns to describe the components of final demand. The components of final demand are defined differently in the two files. Some cells of the Turkish Input-Output table could not be considered like observation of a vector but only like numbers. We discuss of this last point below.

If you are a reader of "the Craft of Economic Modeling, Part III", you have a good idea of our work. You will read this text only to see how we have solved several small problems using a more real set of data. Real, here, means more conform to reality of the economy

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[4] Almon Clopper (2008), The Craft of Economic Modeling
[5] Almon Clopper (2008), The Craft of Economic Modeling, Part III, Multisectoral models, p.15
[6] The data files are available on Turkstat.
[7] To get more information on the revised GDP estimates, consult:
http://www.turkstat.gov.tr/jsp/duyuru/upload/13032008gdpeng.pdf

of course but more for the reality of the structure of the input-output table than the data. As mentioned by Clopper Almon, you will see that TINY "gives a very nice idea, in very simple word, of what is an input-output model".

The reading of the paper can also teach to the reader some uses of G commands. It can also learn how to manage them differently. For example, we use a lot the "xl" command of G developed by Ron Horst, to read data from MS Excel files.

First, we present you a short description of the file containing the GDP by expenditure and the 2002 Input-Output table. We show you what the relations between the different matrices, vectors, and variables are. With these two structures in mind, we show how we have introduced data into G and Vam banks. This is done, we follow the step describe for the TINY model. The analysis of the result conducts us to small modifications in the computation of the "forecast" for three products. The last part presents briefly some results: graphics and tables.

In all the text, we assume that the reader knows the basic statements of G software.

National Accounts, data and identities

Turkey has a long history in collecting information. This history took place in the 14th century with the first land-population censuses in 1326-1360 and 1360-1389.

More recently, the Turkish Statistical Law published in the Official Gazette numbered 25997 on November,18th 2005 and entered into force the same day has more a direct impact for our work. The 2002 Input-Output table is the consequence of this law.

The new law has been adopted in accordance with the commitments of Turkey because of statistical system applied in EU countries.

So nowadays, Turkey stands in a particular situation, between a previous system based on SNA 68 and the new one following the Turkish Statistical Law and based on the ESA 95[8]. This is bad news and good news in the same time. Is to build a model with the data available in SNA 68 concepts a good project? It represent a lot of work and has nearly no future. In a near future, may be at least three years, we have all the information to build a very useful intersectoral model of Turkey?

In the following, we show you how to begin the building of this new Turkish model. What are the data available today in ESA 95 concepts?

Turkish input-output table and GDP by expenditure

When we first look for the available input-output tables for our work, we have seen that Turkey have a lot of them and from a long time. The first table has been built in 1959. Therefore, the 2002 Input-Output table is the tenth table.

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[8] To have more information on the history of statistics in Turkey, consult http://www.turkstat.gov.tr/UstMenu.do?metod=tarihce. To read the Turkish Statistical Law consult http://www.turkstat.gov.tr/UstMenu.do?metod=tuikKanun. To have information on the actual Strategic Plan, consult http://www.turkstat.gov.tr/stratejik_plan/str2007.pdf.

It seems at this time to be possible to create a nice series of tables. Do not dream. Classification problems, concepts use to build the table (SNA 1968 for all the tables except the last one ESA 95); access to previous data and the recent revised GDP estimate have destroyed our dream.

Date[9]	Type	SNA	Dim	Prices	Constant/Current	Dom./Imp.
1959	Input-output table					
1963	Input-output table					
1968	Input-output table		50			
1973	Input-output table	68	64	market prices	current prices	No
1979	Input-output table	68	64	market prices	current prices	No
1985	Input-output table	68	64	market prices	current prices	No
1990	Input-output table	68	64	producers prices	current prices	No
1996	Input-output table	68	97			
1998	Input-output table	93	97	basic prices	current prices	Yes
2002	Input-output table	93	59	basic prices	current prices	Yes

Table 1 : List of the Input-Output tables published by Turkish National Institute of statistics

We have found no equivalent table to NIPA or to the Integrated Economic Accounts table on the TurkStat website. We have not found disposable income time series. We have just found a "GDP by Expenditure table".

The main reason, we believe, for such a situation is supported by the fact Turkstat is at the beginning of its renewal process. Thus, not all tables are available.

The totals of final demand component in this last table are not equal to the column total of the final demand component of the input-output table. Only total of final consumption expenditure, total of gross capital formation, total of exports, and total of imports are comparable. The numbers are not exactly the same in the two tables.

Therefore, we consider our purpose to take into account the growth rate of the series even if the total is not exactly the one in the input-output table. When we write these lines, we have no idea of the reason of these differences.

Therefore, in a way, TurkStat, the Turkish Institute of Statistics, publishes many data, but only few of them are useful for our modeling purposes now.

We decide to use the 2002 Input-output table and the GDP by Expenditure because they are homogenous in concept, in the sense of ESA 95, even if the numbers are not exactly the same. It is possible to transform the GDP by Expenditure data to obtain comparable information between our two tables. G has all the tools to do it.

A quick presentation of the two tables

Many data on the Turkish economy is available on the website of TurkStat[10]. Among all data, an item concerns the National accounts. This item consists of six categories. We are concerned, of course, with Input-Output tables and after an analysis of the content of

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[9] Date is the date of the data contains in the table. 2002 means the Input-Output table contains the data of the year 2002.

[10] The address of the website is : http://www.turkstat.gov.tr/

the files of the other items; we see that only Gross Domestic Product by Expenditure files provides us the level of information we look for.
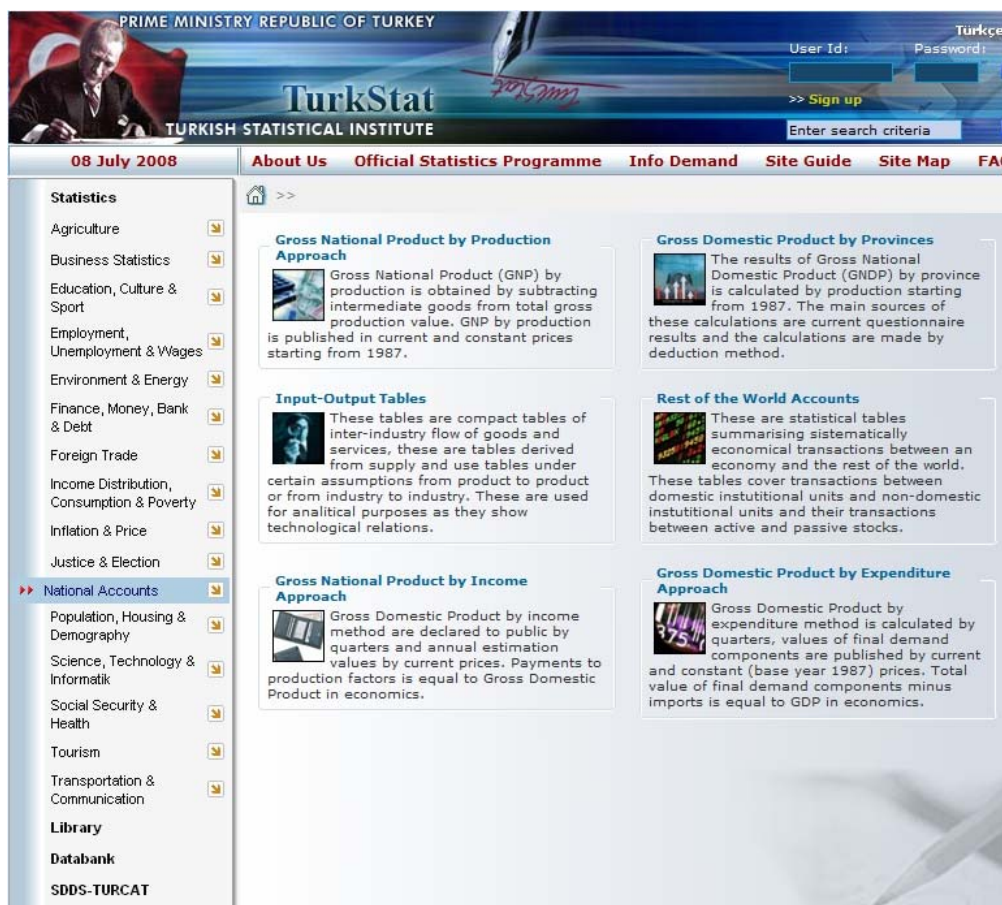

Figure 1 : The National Accounts Web page of TurkStat website

Among all tables available, we decide to select the ones, which verify the following conditions:

- The concepts inside the table must follow the ESA 95 recommendations,
- The data must follow the last reform of the Turkish National accounts.

Thus, we hold "Table 7. Expenditure on the Gross Domestic Product (at current prices), 1998-2007" and the "2002 Input-Output table, basic prices, current prices".

In the next sections, we have a look at the Gross Domestic Product by Expenditure files and then at the 2002 Input-output table. In each case, we show the relations or identities that link the different variables.

GDP by Expenditure

You see below a view of the content of the file ExpendituresGDP_Cur98.xls[11] as it appears in MS Excel.

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[11] ExpendituresGDP_Cur98.xls is the Excel file contains the data coming from TurkStat

Figure 2: A view of the structure and the number inside the MS Excel file.[12]

From this table, we have computed GDP by Expenditure Approach with the numbers for 2002.

Gross Domestic Product	gdpaea	=			350 476 089
Final Consumption Expenditure of Resident Households	fcerhh	+	=		238399083
Final Consumption Expenditure of Resident and Non Resident Households on the economic territory	fcernrhhet		+		259441149
Final Consumption Expenditure of Non Resident Households on the economic territory	fcenrhhet		-		23886509
Final Consumption Expenditure of Resident Households in the Rest of the World	fcerhhrow		+		2844442
Government Final Consumption Expenditure gfce)	gfce	+	=		44615308
Compensation of Employees	gfcece		+		26533445
Purchases in Goods and Services	gfcepigas		+		18081863
Gross Fixed Capital Formation	gfcf	+	=		58601768
Public Sector	pubs		+	=	15211265
Machinery-Equipment	pubsme			+	4353696
Construction	pubc			+	10857569
Private Sector	pris		+	=	43390442
Machinery-Equipment	prime			+	25745309
Construction	pric			+	17645133
Changes in stock	cis	+			3131331
Exports of Goods and Services	expgs	+			88380641
Imports of Goods and Services	impgs	-			82651981

Table 2 : Identities inside the file

From the Table 2, we can write:

gdp = fcerhh +gfce + gfcf + cis + expgs – impgs

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[12] To have a better view of the whole structure of the file and of its contents, open it in your favorite spreadsheet. The file is available in the TURKTiny directory. The name of the file is ExpendituresGDP_cur98.xls.

With   fcerhh = fcernrhhet – fcenrhhet + fcerhhrow

        gfce = gfcece +gfcepigas

        gfcf = pubs + pris

        With   pubs = pubsme + pubsc

            pris = prisme + prisc

The table contains annual and quarterly data for 1998 to 2007. In this paper, we take into account only the annual data. The next step is to import the data into a G banks.

2002 Input-Output table

In TurkStat website, we have not found information on the 2002 Input-Output table. Generally, for all other tables, we have files, which describe them. It is not the case for this one. A recently published book[13] on use and supply tables and input-output table 2002 would correct this lack of documentation.

Figure 3: An overview of the 2002 Input-Output table of Turkey[14]

It is impossible to read anything on Figure 3, but this figure gives us the possibility to have a view of a real input-output table. The Figure 4, below, is more readable, with the flow matrix FM reduced to two lines and two columns. All columns and rows colored in pale orange represents summation of columns or rows.

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[13] Turkish Statistical Institute (2008), "The use-supply and input-output tables 2002", Turkish Statistical Institute.

[1414] To have a better view of the table, open it in your preferred spreadsheet. You find the MS Excel file in the TURKTiny directory. The name of the file is IOT2002_bp.xls.

Figure 4 : An « abstract » representation of the above Input-Output table

To show you better the structure of the table, we have reproduced the table with different colors in Table 3.

The pink cells contain the value of intermediate consumption and the value of the components of value added. The orange cells represent the computation of rows or columns totals of intermediate consumption and the components of value added. The sky-blue cells contain the observation of each components of the final demand. The dark blue cells contain totals of column or intermediate totals of rows for the components of final demand. The red cells contain the total of the totr column plus fubp.

	FM	Totr	fcehh	fcenpish	fceg	fce	gfcf	civ	cii	ciiv	gcf	expfob	fubp	tubp
totc														
tlsop														
ticupp														
coe														
ontop														
otop														
osop														
cofc														
osn														
osg														
vaabp														
oabp														
impcif														
sabp														

Table 3 : A skeleton structure of our Input-output table

The two lines in green are important, because we need them to compute the GDP by Expenditure at purchaser's prices as describe in ESA 95. The olive-green cells represent taxes less subsidies on products. The most-green cells contain the sum of the dark-blue cell plus the olive-green cell. They represent the final demand components at purchaser's prices.

The cells with vertical lines are totals of row or column. The cells with a grid are totals of totals rows or totals columns.

Perhaps this distinction of colors does not seem very clear for you, but with it, we have an idea of all the identities we have in the table.

You have remarked that in this table, imports are under the output row. So the final demand could not be obtained to sum up the rows of final demand components.

How to create our Vam.cfg file ?

In this section, we give a list of all the identities or relations available from an Input-Output Table. We do this because we want to show how to use this information to build a vam configuration file. By the way, we also underline the importance of the availability of data in the definition of the structure the model. Of course, TURKTiny is not a very complex model, but we try to explain what must be done when a person want to build a model. A Vam configuration file is a text file. Therefore, it could be changed at every moment of the building process.

What are the matrices and vectors to put or to declare in a Vam.Cfg file? To answer to this question, we have to think of the computations to do in the model and of the data to show in graphics and tables. It is not necessary to introduce in a Vam.cfg file all the rows or all the columns, which constitute a published Input-Output table. However, we need for computation some matrices and vectors, which are not in the Input-Output table. Tables or graphics need also some specific vectors. Then our model will be in use, we can consider we have a completed Vam.cfg.

We have to create this configuration file at a moment, how to build it?

Three main steps define the building of this file:

- Research of the necessary information about the beginning and ending years of the data and for each vector and matrix
  - *"The name of the elements,*
  - *Its number of row,*
  - *Its number of columns,*
  - *The maximum of lags with which a vector occurs in the model or a p if the matrix is a "packed matrix",*
  - *The name of file containing the names of rows of a vector or matrix,*
  - *The name of file containing the names of columns of columns of a matrix,*
  - *A # followed by a brief description"*[15].
- Write the file with a text editor.
- Modify the Vam.cfg file, to adapt it to the need of the model.

When we look at an Input-Output table, we have no name for the different rows, columns, and cells. We have to create them. We give explanations on how to build them below. In the next section, we will use names without knowledge about their creation. We explain later how to build names.

To determine the number of rows and / or the numbers of columns, we have in general several indicators in the table to get them quite easily. In our case, we have 59 rows and 59 columns for the Flow matrix per example. In some model, we have the possibility to

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[15] The Craft of model building, Part III, pp.16-17

use more desegregated data for a component of the final demand, consumption per example. Thus, we have another number of rows for the consumption vector by function.

The maximum of lags could not be known at this step. The estimation of all specifications will give us the elements of response.

The files containing the names of rows or the names of columns are generally obtained by pasting the title of the classification used in the Input-Output table. Here also, we have to give name, which should be used in the form generated by show command. These files could also be used with the compare program.

With the contents of the previous paragraphs, we know how to obtain or to create the associated information with a vector or a matrix. But, we do not know the list od matrices and vectors.

A basic Vam.cfg

If to create a Vam.cfg file is quite easy with a text editor, to manage its contents is a process, which need some knowledge on how the different programs use it and on the structure of the model.

Per example to run the model with fixes on vectors and matrices, we have to run Fixer. Moreover, "to use Fixer program, *it is essential that the model's Vam.cfg file should have a vector call "fix"* with enough row to allow on for each fix"[16].

In this section, we want to list all vectors and matrices, which must be introduced in the Vam.cfg. We try to classify them.

The next section tries to give some advices to obtain a basic list.

Identities and other relations

An Input-Output table is not only a lot of cells where somebody find numbers. Each cell has a connection with the others. To in the same row or on the same column has an economic sense. In addition, relations, identities, link cells in rows and columns. In the next section, we want to list these relations. Input-Output is also defined by computations, Leontief Inverse per example; we try to define the vectors and matrices needed to realize such computation. Most of the reader of this paper knows these relations; the next lines are just a reminder.

We first define the relations of the intermediate consumption, and then the relations of the final demand, the relations for the value added. We finished with the rest.

In the following sections, i represents a row, and j represents a column. The range for i in our input-output table is from 1 to 59. The range for j is also from 1 to 59.

Some general remarks

In the following, we assume we are writing a Vam.cfg file for an Inforum model. This model uses Input-Output tables and Integrated Economic Accounts tables[17] under the

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[16] The Craft of economic modeling, Part III, pp. 83.

requirements of the ESA 95. For this reason, we have to use some matrices, vectors and time series, which are necessary in a traditional Input-Output model. The reader sees in this assumed case, how the contents on the Vam.Cfg file not only of the Input-Output table but also of the structure and the use of the model itself. The name of matrices, vectors and Time series are all defined in Appendix B. The general structure for an Inforum model is presented in the Figure 5.
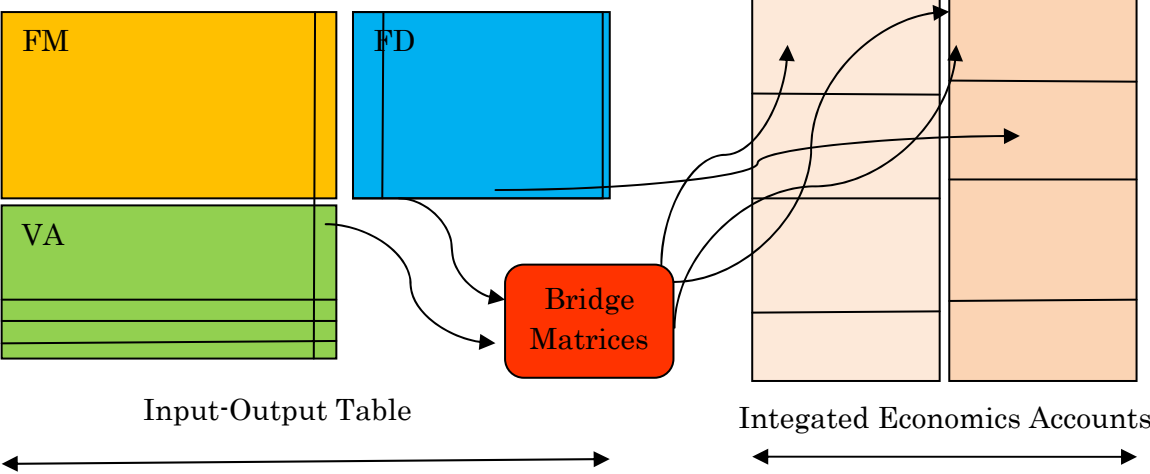
Figure 5 :

Identities and relations from Intermediate consumption matrix (FM)

Flow Matrix	1	2	...	j	...	n-1	n	Total of rows
1			...		...			
2			...		...			
...			...		...			
...			...		...			
i			...	ic_{ij}	...			$ictotr_i$
...			...		...			
...			...		...			
n-1			...		...			
n			...		...			
Total of columns			...	$ictotc_j$				$ictot$

Figure 6 : A presentation of the summation

Total of intermediate consumption by columns

$$ictotc_j = \sum_{i=1}^{89} FM_{ij} \qquad (1)$$

Total of intermediate consumption by rows

$$ictotr_i = \sum_{j=1}^{BP} FM_{ij} \tag{2}$$

Total of intermediate consumption

$$ictot = \sum_{j=1}^{BP} ictotc_j = \sum_{i=1}^{BP} ictotr_i \tag{3}$$

Technical coefficient

$$\alpha_{ij} = \frac{ic_{ij}}{oapb_j} \tag{4}$$

From the point of view of the matrix writing:

$$AM = \begin{bmatrix} a_{1,1} & \cdots & a_{1,BP} \\ \vdots & \ddots & \vdots \\ a_{BP,1} & \cdots & a_{BP,BP} \end{bmatrix} \tag{5}$$

For the Vam.cfg file, we need to describe FM, AM like matrix; we have also to describe ictotc like a vector. To compute AM we need also oapb vector.

Identities and relations obtained by summation of rows (Final demand (FD))

In this second quadrant, Final demand quadrant, all the elements with a subscript *i* are elements of vectors. They have to be introduced in VAM.cfg file. All the element must with another subscript are time series. Therefore, they go to the ws bank as an observation of the time series.

$$fcenpish_{tot} = \sum_{i=1}^{BP} fcenpish_i \tag{6}$$

$$fceg_{tot} = \sum_{i=1}^{BP} fceg_i \tag{7}$$

$$fce_i = fcehh_i + fcenpish_i + fceg_i \tag{8}$$

$$fce_{tot} = \sum_{i=1}^{BP} fce_i \tag{9}$$

$$gfcf_{tot} = \sum_{i=1}^{BP} gfcf_i \tag{10}$$

$$cii_{tot} = \sum_{i=1}^{BP} cii_i \tag{11}$$

$$civ_{tot} = \sum_{i=1}^{BP} civ_i \tag{12}$$

$$ciiv_i = cii_i + civ_i \tag{13}$$

$$cilv_{tot} = \sum_{i=1}^{59} cilv_i \tag{14}$$

$$gcf_i = gfcf_i + cilv_i \tag{15}$$

$$gcf_{tot} = \sum_{i=1}^{59} gcf_i \tag{16}$$

$$fuabp_i = fce_i + gfc_i + expfob_i \tag{17}$$

$$fuabp_{tot} = \sum_{i=1}^{59} fuabp_i \tag{18}$$

$$tuabp_i = tot_i + fuabp_i \tag{19}$$

$$\tag{20}$$
$$tuabp_{tot} = \sum_{i=1}^{59} tot_i + fuabp_i$$

$$fcehh_{totapp} = fcehh_{tot} + fcehh_{tisopfd} \tag{21}$$

$$fcenpish_{totapp} = fcenpish_{tot} + fcenpish_{tisopfd} \tag{22}$$

$$fceg_{totapp} = fceg_{tot} + fceg_{tisopfd} \tag{23}$$

$$fce_{totapp} = fce_{tot} + fce_{tisopfd} \tag{24}$$

$$gfcf_{totapp} = gfcf_{tot} + gfcf_{tisopfd} \tag{25}$$

$$cil_{totapp} = cil_{tot} + cil_{tisopfd} \tag{26}$$

$$civ_{totapp} = civ_{tot} + civ_{tisopfd} \tag{27}$$

$$cilv_{totapp} = cilv_{tot} + cilv_{tisopfd} \tag{28}$$

$$gcf_{totapp} = gcf_{tot} + gcf_{tisopfd} \tag{29}$$

$$expcob_{totapp} = expcob_{tot} + expcob_{tisopfd} \tag{30}$$

$$fuabp_{tisopfd} = fce_{tisopfd} + gcf_{tisopfd} + expcob\_tisopfd \tag{31}$$

$$tuabp_{tisopfd} = \tag{32}$$

$$fuabp_{totapp} = fuabp_{tot} + fuapp_{tisopfd} \tag{33}$$

$$tuabp_{totapp} = ticabp_{tot} + fuabp_{tisopfd} \tag{34}$$

Identities obtained by summation of the columns (summation on j)(VA)

We also apply here the rules we define above, except the "j" replaces the "i".

$$\tag{35}$$
$$tisopic_{tot} = \sum_{j=1}^{59} tisopic_j$$

$$ticapp_j = tot_j + tisopic_j \tag{36}$$

$$ticapp_{tot} = \sum_{j=1}^{59} ticapp_j \tag{37}$$

$$coe_{tot} = \sum_{j=1}^{59} coe_j \tag{38}$$

$$ontop_{tot} = \sum_{j=1}^{59} ontop \tag{39}$$

$$otop_{tot} = \sum_{j=1}^{59} otop_j \tag{40}$$

$$osop_{tot} = \sum_{j=1}^{59} osop_j \tag{41}$$

$$cofc_{tot} = \sum_{j=1}^{59} cofc_j \tag{42}$$

$$osn_{tot} = \sum_{j=1}^{59} osn_j \tag{43}$$

$$operating\ surplus\ gross \tag{44}$$

$$vaabp_j = coe_j + ontop_j + otop_j + osop_j + cofc_j + osn_j \tag{45}$$

$$vaabp_{tot} = \sum_{j=1}^{59} coe_j + ontop_j + otop_j + osop_j + cofc_j + osn_j \tag{46}$$

$$oabp_j = ticapp_j + vaabp_j \tag{47}$$

$$oabp_{tot} = \sum_{j=1}^{59} oabp_j \tag{48}$$

$$impcif_{tot} = \sum_{j=1}^{59} impcif_j \tag{49}$$

$$sabp_j = oabp_j + impcif_j \tag{50}$$

$$sabp_{tot} = \sum_{j=1}^{59} sabp_j \tag{51}$$

Other identities

In Input-Output table

$$sabp_j - tuabp_i = 0\ for\ j = i \tag{52}$$

GDP

In the SNA 93 or ESA 95, the GDP has three different expressions. For this reason, we have given to each definition a different name. Therefore, it could be possible to compare the results obtain for the three computations. Normally, they must be equal.

You have noticed that they all used results of our previous computations.

GDP By Product Approach

$$gdpbpa = vaabp_{tot} + tuabp_{tisop} \tag{53}$$

GDP By Expenditure Approach

$$gdpbea = fce_{tot} + gcf_{tot} + expcob_{tot} - impcif_{tot} \tag{54}$$

GDP By Income Approach

$$gdpbia = coe_{tot} + otop_{tot} + osop_{tot} + cofc_{tot} + osn_{tot} + tuabp_{tisop} \tag{55}$$

The identities and relations in G

It is easy to understand the mathematical writing above. It is also easy, if you have some knowledge in programming, to have an idea how to write a program to sum up all the elements of a vector or a matrix. However, in G, how do we transform the sum of all the elements of a vector in a time series, or all the elements of a matrix rows in a vector?

To do so, G has the functions @csum. To know all things about @csum, you have to look at the item "*23. Functions*" of the G help. In our case per example, to compute the total of the vector vaabp, vaabptot, we have to write:

```
f vaabptot = @csum(vaabp)
```

Do not make any confusion between the function @csum and the statement getsum. Getsum computes the sum of the rows or of the columns of a matrix. @csum computes the sum of the elements of a vector or of a subset of the elements of a vector.

The result of a getsum statement is a vector. The result of a @csum function is a time series.

Now, we have established all the necessary relations to make our input-output computation, we try to import the 2002 Input-output table into G. To do so, we have to prepare a vam.cfg file. This is the object of the next section.

Importation of data into G and Vam banks

In the next sections, we first describe how to prepare and create a Vam.cfg file and then how to import data from MS Excel files into G and Vam bank. The content of this section could be used for building other models.

Preparation and Creation of the Vam.cfg

Now, we know where our data are and how our data are organized. We have to import it in G and Vam banks. To do it, we have to determine, which matrices, vectors and time series to use in the model. However, we first have to give a name to all matrices, all vectors, and all time series. We explain how to make it in the next section.

Names of matrices, vectors, and time series

G needs a name for each matrix, vector, and time series. If you look at G help, you see there are rules to build these names. We give two examples of these rules, one for G bank, and the other one for Vam file.

In G Help file "*22. Forming variables*", you find the following rule for G bank:

"*Variable names must begin with a letter and may contain up to 32 letters, digits, or the '$' or '_'characters. Do not use a digit as the first character.*"

In G Help file "*45. The Vam Configuration File*", you find the following rule for Vam file:

"*Names of vectors may contain up to 16 letters or numbers and may contain the underscore mark, "_". They must not, however, end in a number. This restriction is necessary because it is sometimes necessary to use the sector number as a suffix to the vector name and to convert between the suffix and subscript forms of the name. For example, we have to be able to recognize that pce[23] and pce23 are the same series. If we had a vector named g2, then g2[3] would convert to g23, and g23 would convert back to g[23], which is wrong. So no numbers at the end of vector names, please!*

G is case sensitive; Q is not the same variable as q.

When using a Vam file, you may need a reminder of the names of the various vectors and matrices. You can use G's editor to look back to the VAM.CFG file or, if the names alone are sufficient reminder, you can use the "listvecs" command."

If G were able to manage time series names with 32 characters, it would be better to use up to 15 characters, if you want to read them with per example the "lis" command.

As mentioned in the G Help file "*45. Vam Configuration file*", the name of all types must be "sufficient reminder". When you read the name of a matrix, a vector, or a time series, you have to know at once, what this name represents. To chose for name, an acronym built on the title of the matrix, vector, or time series could be an easy practice. All model builders finish knowing all the title of the row and columns of an Input-Output table or the title of a time series of an Integrated Economic Accounts table. We have held the solution of acronym.

Per example, "Growth domestic product" becomes gdp, "Taxes less subsidies on products" tlsop, and so on. Generally, in G usage, matrix is in upper letter, another rule.

It is easy to define the acronyms of the time series in the ExpenditureGDP_Cur98.xls file. The title of the time series is in the header of each column, we chose the first letter of each word of the title. For the title, "Final Consumption Expenditure of Resident

Households", the acronym is fcerhh. You have remarked we use "hh" for "household". We have our own code. If you work with several models, you have to keep the same rules. If you work a research group, the group members have to define precisely their rules.

To create the name of Intermediate consumption matrix, we have the possibility to use the title "Flow matrix" and so the acronym is FM. For coefficient matrix, we call it AM, in relation with its theoretical naming. Of course, there is exception to the rules as we see. However, these exceptions find their origins in the Input Output theory or the usage of the profession.

To create the name of vectors used in the model, we used an Ms Excel worksheet. As we have ideas on how G use names (add files, groups, etc.), we make an effort to build the different acronyms to be easy to use with the software. We concatenate in each cell the contents of the line 1, and the column D and E.

Formula bar: F6 =C6&F$2

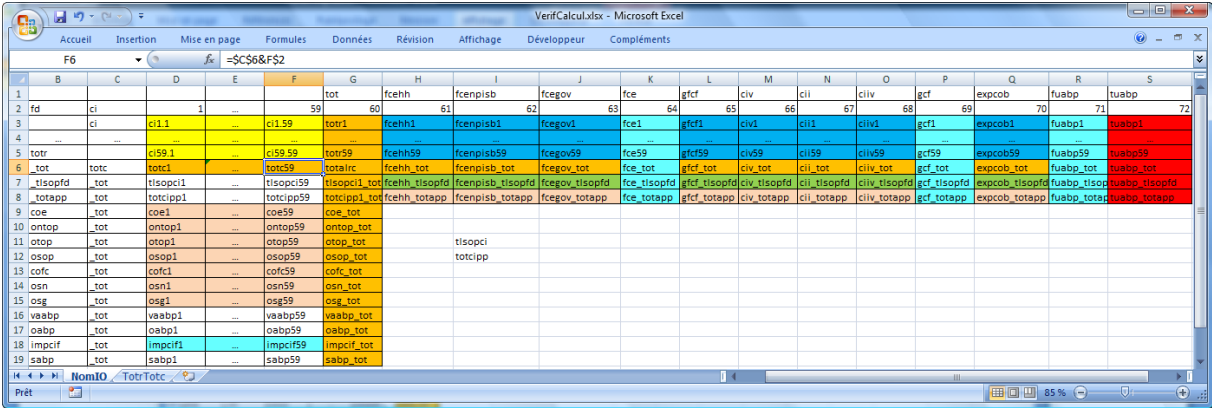|	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1							tot	fcehh	fcenpisb	fcegov	fce	gfcf	civ	cii	ciiv	gcf	expcob	fuabp	tuabp
2	fd	ci		1	59	60	61	62	63	64	65	66	67	68	69	70	71	72
3		ci	ci1.1	...	ci1.59	totr1	fcehh1	fcenpisb1	fcegov1	fce1	gfcf1	civ1	cii1	ciiv1	gcf1	expcob1	fuabp1	tuabp1
4	...	...	...		...	...	...	...	...	...	...	...	...	...	...	...	...	...
5	totr		ci59.1	...	ci59.59	totr59	fcehh59	fcenpisb59	fcegov59	fce59	gfcf59	civ59	cii59	ciiv59	gcf59	expcob59	fuabp59	tuabp59
6	_tot	totc	totc1	...	totc59	totairc	fcehh_tot	fcenpisb_tot	fcegov_tot	fce_tot	gfcf_tot	civ_tot	cii_tot	ciiv_tot	gcf_tot	expcob_tot	fuabp_tot	tuabp_tot
7	_tlsopfd	_tot	tlsopci1	...	tlsopci59	tlsopci1_tot	fcehh_tlsopfd	fcenpisb_tlsopfd	fcegov_tlsopfd	fce_tlsopfd	gfcf_tlsopfd	civ_tlsopfd	cii_tlsopfd	ciiv_tlsopfd	gcf_tlsopfd	expcob_tlsopfd	fuabp_tlsop	tuabp_tlsopfd
8	_totapp	_tot	totcipp1	...	totcipp59	totcipp1_tot	fcehh_totapp	fcenpisb_totapp	fcegov_totapp	fce_totapp	gfcf_totapp	civ_totapp	cii_totapp	ciiv_totapp	gcf_totapp	expcob_totapp	fuabp_totap	tuabp_totapp
9	coe	_tot	coe1	...	coe59	coe_tot												
10	ontop	_tot	ontop1	...	ontop59	ontop_tot												
11	otop	_tot	otop1	...	otop59	otop_tot		tlsopci										
12	osop	_tot	osop1	...	osop59	osop_tot		totcipp										
13	cofc	_tot	cofc1	...	cofc59	cofc_tot												
14	osn	_tot	osn1	...	osn59	osn_tot												
15	osg	_tot	osg1	...	osg59	osg_tot												
16	vaabp	_tot	vaabp1	...	vaabp59	vaabp_tot												
17	oabp	_tot	oabp1	...	oabp59	oabp_tot												
18	impcif	_tot	impcif1	...	impcif59	impcif_tot												
19	sabp	_tot	sabp1	...	sabp59	sabp_tot												

Sheets: NomIO, TotrTotc

Figure 7 : The MS Excel worksheet used to build the acronyms for the Input-Output table

The reader may consult the exhaustive list of all matrices, vectors, and time series, in Appendix B.

Preparation of Vam.cfg file.

The Vam.cfg file is a very important file in the process of model building with G and Interdyme. To understand its content and its use is one the basic knowledge to master in the use of G's family software. In the following two sections, we try to show to the reader how to understand its importance and how to build it.

Some ideas on the contents of a Vam.cfg file

We must distinguish three categories of vectors and matrices:

- The vectors and matrices, which contain the imported data from the National Institute files;
- The vectors and matrices, which represent the identities;
- The vectors and matrices, which will contain the results of computation inside the model.

In a Vam.cfg file, you have the possibilities to introduce the different categories, but the first is always compulsory. If you build a Vam file, just to have in it all the Input-Output for several years for a country per example, you just need the first category. If you also want to consult with G, the read or computed identities, you must add the second category of vectors and matrices in the Vam.cfg file.

Due to a feature of MS Excel, it will be better to compute all the identities in G and not to use the one available in the MS Excel file. These computations originate on a rounding problem. Some small differences can appear between the numbers of the MS Excel and the computations obtained with G. The number in the cell is an image (formatted number) of the stored number and not the stored number in Ms Excel. Therefore, it is better to compute all the identities.

The last category is directly connecting with your model. This situation depends also on your knowledge in model building. As Vam.cfg file is a simple text file, it is always possible to modify it according to the needs of the model.

The Vam.cfg file.
In G/Interdyme, matrices and vectors are stored in a Vam file[18]. To create a Vam file, we need a configuration file.

The Vam configuration file does not only contains information on the vectors and matrices we have to import but also information on vectors and matrices we want to use in the computation for the model.

Imagine you have introduced in your Vam file only the matrix FM. You want to compute the technical coefficients and to do so you need an output vector and a matrix in which you will store the computed technical coefficients. Thus, your configuration file for the Vam file must have a line for Fm, a line for an output vector and a line for AM, the matrix of technical coefficient. We compute the output vector like the total vector of the total intermediate consumption per line and the valued added at basic prices and place the result in output.

Of course, as a Vam configuration file is a text file, we have always the possibility to modify it following our needs in matrices and vectors. The alone constraint is to run again the file containing the G statements to create the Vam file of the model.

The structure of a Vam configuration file is quite simple. It begins with a line, which defines the first year and the last year of the range of the time series of matrices and vectors. The following line is the first line for TURKTiny Vam configuration file.

```
1998 2020
```

In TURKTiny, 1998 represents the first year of data. The choice of 1998 finds its origin in the beginning year of the time series available in the MS Excel file ExpendituresGDP_bp.xls. We have considered, we run TURKTiny from this date.

---

[18] To have more information, report to page 15 and following of the Part III of the Craft of Economic modeling or to G help, item "45. The Vam file configuration".

The ending date represents in general a date in distant future. The modeler could see the consequences on his choice over the period he need to forecast or simulate.

You can give the name you want to the configuration file. Usually, we call it Vam.cfg. In the next line, Vam.cfg will assign the Vam configuration file of TURKTiny.

To fill our Vam.cfg, we need information:

- The number of line and the number of columns of the intermediate consumption matrix;
- The name of the file, which contains the title of rows and of columns to display vectors or matrices.

When you create the first Vam.cfg, you do not know yet, the numbers of lags. Therefore, you have to modify this information later. In a Tiny model, the value is always zero.

In the Vam.cfg, below, keep in mind that the character "#" defines a comment. The lines in italic represent total of row or total of column. The line in bold and in italic represent the matrices or the vectors that the model need. The normal line is the minimum information imported from the MS Excel file IO2002_BP.xls. Thus, we give an illustration of the categories of matrices and vectors.

```
#
#-------------------------------------------------------------------------------
#
#   Vam.cfg file for the Input-Output Table 2002 - Basic Prices - Current
#
#-------------------------------------------------------------------------------
#
1998 2020
#
#   Matrices
#
FM      59 59 0 sectors02.ttl sectors02.ttl # Intermediate consumption matrix
AM      59 59 0 sectors02.ttl sectors02.ttl # Intermediate coefficient matrix
LINV    59 59 0 sectors02.ttl sectors02.ttl # Leontief Inverse
#
#   Vectors
#
#
#   Final Demand
#
totr     59  1 0 sectors02.ttl  # 60 Total Intermediate consumption row
fcehh    59  1 0 sectors02.ttl  # 61 Final consumption expend.  by households
fcenpish 59  1 0 sectors02.ttl  # 62 Final consumption expenditure by
                                # non-profit organizations serving households
fcegov   59  1 0 sectors02.ttl  # 63 Final consumption expenditure
                                #  by government
fce      59  1 0 sectors02.ttl  # 64 Final consumption expenditure
gfcf     59  1 0 sectors02.ttl  # 65 Gross fixed capital formation
civ      59  1 0 sectors02.ttl  # 66 Changes in valuables
cii      59  1 0 sectors02.ttl  # 67 Changes in inventories
ciiv     59  1 0 sectors02.ttl  # 68 Changes in inventories and valuables
gcf      59  1 0 sectors02.ttl  # 69 Gross capital formation
expfob   59  1 0 sectors02.ttl  # 70 Exports, fob
fuabp    59  1 0 sectors02.ttl  # 71 Final uses at basic prices
tuabp    59  1 0 sectors02.ttl  # 72 Total use at basic prices
#
#   Value Added Components
#
compemp  59  1 0 sectors02.ttl  # 63 Compensation of employees
ontop    59  1 0 sectors02.ttl  # 64 Other net taxes on production
otop     59  1 0 sectors02.ttl  # 65 Other taxes on production
osop     59  1 0 sectors02.ttl  # 66 Other subsidies on production
cofc     59  1 0 sectors02.ttl  # 67 Consumption of fixed capital
```

```
opn       59  1 0 sectors02.ttl  # 68 Operating surplus, net
opg       59  1 0 sectors02.ttl  # 69 Operating surplus, gross
vaabp     59  1 0 sectors02.ttl  # 70 Value added at basic prices
outputbp  59  1 0 sectors02.ttl  # 71 Output at basic prices
impcif    59  1 0 sectors02.ttl  # 72 Imports, cif
supplyabp 59  1 0 sectors02.ttl  # 73 Supply at basic prices
#
#
#
totc      59  1 0 sectors02.ttl  # 60 Total
tlsop     59  1 0 sectors02.ttl  # 61 Taxes less subsidies on products
totic     59  1 0 sectors02.ttl  # 62 Total intermediate consumption/
                  #  Final use at purchasers' prices
#
#
#
totcfd    13  1 0 sectors0213.ttl # 60 Total
tlsopfd   13  1 0 sectors0213.ttl # 61 Taxes less subsidies on products
toticfd   13  1 0 sectors0213.ttl # 62 Total intermediate consumption/
                  #  Final use at purchasers' prices
#
#  Final demand - This vector does not exist in the 2002 Input Output table.
#
fd        59  1 0 sectors.ttl    #  Final demand
#
#  Ratios
#
fcehhr    59  1 0 sectors02.ttl  # 61 Final consumption expenditure by households
fcenpishr 59  1 0 sectors02.ttl  # 62 Final consumption expenditure by non-profit
                  #  organizations serving households NPISH)
fcegovr   59  1 0 sectors02.ttl  # 63 Final consumption expenditure by government
fcer      59  1 0 sectors02.ttl  # 64 Final consumption expenditure
gfcfr     59  1 0 sectors02.ttl  # 65 Gross fixed capital formation
civr      59  1 0 sectors02.ttl  # 66 Changes in valuables
ciir      59  1 0 sectors02.ttl  # 67 Changes in inventories
ciivr     59  1 0 sectors02.ttl  # 68 Changes in inventories and valuables
gcfr      59  1 0 sectors02.ttl  # 69 Gross capital formation
exofobr   59  1 0 sectors02.ttl  # 70 Exports, fob
impcifr   59  1 0 sectors02.ttl  # 72 Imports, cif
#
#  Shares
#
compemps  59  1 0 sectors02.ttl  # 63 Compensation of employees / outputbp
ontops    59  1 0 sectors02.ttl  # 64 Other net taxes on production / outputbp
otops     59  1 0 sectors02.ttl  # 65 Other taxes on production / outputbp
osops     59  1 0 sectors02.ttl  # 66 Other subsidies on production / outputbp
cofcs     59  1 0 sectors02.ttl  # 67 Consumption of fixed capital / outputbp
opns      59  1 0 sectors02.ttl  # 68 Operating surplus, net / outputbp
opgs      59  1 0 sectors02.ttl  # 69 Operating surplus, gross / outputbp
#
#   Workspace
#
X         59  1 0 sectors02.ttl  #  Workspace
Y         59  1 0 sectors02.ttl  #  Workspace
```

Box 1 : Vam.cfg for the TURKTiny model following the structure of the one of the Tiny model

To create an empty Vam file for TURKTiny, you have to type into a text file or into G, the following statements.

```
Vamcreate vam.cfg hist
Vam hist b
Dvam b
```

The item "*46. Creating, Assigning, Defaulting, and Closing a Vam File*" of G Help gives you all the details you need to master these three lines.

The three lines run in G have created an empty Vam file. It is now necessary to fill the created Vam file with the data contains in the two files previously described above:

- GDP by Expenditure;

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- 2002 Input-Output Table.

These two files are in MS Excel format. How G does manage this kind of file? The next section would bring us the answer.

From MS Excel files into Vam and G banks

The best way to know everything about the management of MS Excel file in G is to look carefully to the item "*66. How To Read and Write in Excel Format with G7*" of the G help? Ron Horst has introduced the "xl" commands in G in 2006[19].

All G commands that are useful to work with MS Excel files begin by the word "xl". After "xl", you find another word that determines the action to do. Open, read, and write, close, workbook, worksheet, close, exit, and some others are these words.

After the previous word, you have to add some arguments which precise what to do. You want to read the content of a workbook. You have to tell the number of the worksheet. On the worksheet you have chosen, which cell or range do you want to read? Your selected data inside the worksheet are in row or in column.

If you are accustomed with spreadsheet, you will understand quickly what mean all the "xl" commands.

What is nice with xl commands is the possibility to use them with the do{ } statement with the "m" option[20].

How to read the GDP by expenditure file?

In this section, we show how to import data from an .xls file.

To facilitate our explanation, you find above a piece of the "GDP by Expenditure MS Excel file".

---

[19] Ron Horst Inforum world conference G New Features

[20] To have more information on the "m" option, read carefully the item "*24. Command Files, Groups and Do Loops*" of the G help. The information is at the end of the section "*Groups and Group Arguments in Add commands*".

Figure 8 : The top left corner of the worksheet

Which "xl" commands to use to read this MS Excel file?

The solution of our question seems to be in the second part of the first example and in the second example. We have solutions with and without the do statement.

Analysis of the structure of the file

We want to introduce in a G bank several time series. Each time series begins in 1998 and ends in 2007. The time series have their values in columns and every five lines. In fact, quarterly data and annual data are in the same file.

Figure 9

Blue arrows and blue circles show, which cells are concerned. Red rectangles show the values contain in the cells and red arrows give the direction of our time series, in our case, down. You have may seen that the data in columns must be read with a step of six. How do we manage this "jump" with G?

In the examples provided in the G Help, the second one can bring us a solution.

```
xl open BEA\section2all_xls.xls   # Start or attach to Excel

                   # server, open workbook.

xl missing "....."         # Replace missing values


do{

  xl open worksheet 2          # Open worksheet 2.

  xl read D %2 right a.inv_cst%1 1987 2004 # Read data.

                      # Store data in vam bank

  xl open worksheet 3          # Switch to worksheet 3.

  xl read D %2 right a.inv_qst%1 1987 2004

  }1-66)10 12 14 16-46 48 50 52 54-74 76 78-84 ) m

xl exit
```

Box 1： Code from G help file

We can write the following lines for our purpose.

```
xl open \modeles\turkey\data_g\ExpendituresGDP_cur98.xls

do {

xl open worksheet 1

xl read C %1 down fce %2 %2

  } (3 8 13 18 23 28 33 38 43 48) (1998-2007) m

type fce 1998 2007

```

Box 2： G code to read the content of the worksheet

In the Box 2, we write from the G Help examples some lines, which open the workbook, open the worksheet 1 in the collection of worksheet and read the C column in it. Not all the lines of C column are read, only the one in the first list of the Do loop 3, 8, 13, etc. The second list of arguments contains the date for the data of the selected lines of the C column. Therefore, C3 contains the observation for 1998; C8 contains the observation for

1999 and so on. This is the result of the "m" at the end of the do lists. Run this code into G.

You see in the above Figure that "%1" and "%2" have been changed by their value per example 3 and 1998 as shown in the green circles. The most important thing in this figure is the last line. The fce time series contains only a number, the one for 2007. All the others are missing value. Do you know why?

We note that only the value corresponding to the "xl read" statement is allocated to the time series. Each "xl read" statement seems to create a new empty series.

In G, it is possible to assign a value to a particular observation of the time series. Per example, we have in the workspace a time series, fce, defines for the period 1998-2007 and we want to assign the value 10 to the observation of the year 2002, the following statement[21] will do the job:

```
f fce{2002} = 10
```

---

[21] To have more information of th "{}" consult "*18. The 11 Basic G commands*" and "*22. Formating variables*".

23

If we transform our test.add file by introducing a series of line like the previous one, we must obtain all the read time series with all the available numbers.

Figure 11 : The results obtain with the corrected code

With the line "f fce{%2} = temp", we have found a solution to our problem. We have introduced a new time series "temp". Do not forget to delete it from the workspace by adding the statement:

```
del temp
```

at the end of your code.

In the following box, you find all the statements to read the information, we import from the ExpendituresGDP_Cur98.xls file to the workspace.

```
#

#----------------------------------------------------------

#   ExpGDP98_read_do_cur98.add

#----------------------------------------------------------

#

#   This file contains all the statements to read the
```

```
#   ExpendituresGDP_cur98.xls

#

#   In this version, the time series read is only the

#   Basic one.  We do not read total of row or of column.

#

#---------------------------------------------------------

#

#       Open the workbook

#

xl open c:\modeles\turkey\data_g\ExpendituresGDP_Cur98.xls

#

#     Select the worksheet to work on.

#

xl open worksheet 1

#

#   Do Loop

#

do {

  xl read D %1 down temp    %2 %2

    f fcernrhhet{%2} = temp

  xl read E %1 down temp    %2 %2

    f fcenrhhet{%2} = temp

  xl read F %1 down temp    %2 %2

    f fcerhhrow {%2} = temp

  xl read H %1 down temp    %2 %2

    f compemp{%2} = temp

  xl read I %1 down temp    %2 %2

    f pigas{%2} = temp

  xl read L %1 down temp    %2 %2

    f pubsme{%2} = temp

  xl read M %1 down temp    %2 %2
```

```
      f pubc{%2} = temp

  xl read O %1 down temp    %2 %2

    f prisme{%2} = temp

  xl read P %1 down temp    %2 %2

    f pric{%2} = temp

  xl read Q %1 down temp    %2 %2

    f cis{%2} = temp

  xl read R %1 down temp    %2 %2

    f expgs{%2} = temp

  xl read S %1 down temp    %2 %2

    f impgs{%2} = temp

  } 3 8 13 18 23 28 33 38 43 48) 1998-2007) m

#

#   Close the Workbook

#

xl close

#

#   Close MS Excel

#

xl exit

#

#   Display the time series in the workspace with temp

#

lis w

#

#   Delete the temporary time series

#

del temp

#

#   Display the time series in the workspace without temp

#
```

```
lis w

#

#  Display the data for checking.

#

tdates 1998 2007

type fcernrhhet

type fcenrhhet

type fcerhhrow

type compemp

type pigas

type pubsme

type pubc

type prisme

type pric

type cis

type expgs

type impgs

#

#------------------------------------------------------------

#   End of Expenditures_Cur98.add

#------------------------------------------------------------

#
```

To complete the time series in the workspace, we compute the identities. The G code to make all the computation is in the next box.

```
#

#------------------------------------------------------------

#   ExpGDP98_identities.add

#------------------------------------------------------------

#

#   This file contains the statement to compute the
```

```
#   identities of ExpendituresGDP_cur98.xls
#
#-------------------------------------------------------
#
#   Final Consumption of resident Households
#
f fcerhh = fcernrhhet - fcenrhhet + fcerhhrow
#
#   Government Final Consumption Expenditure
#
f gfce = gfcece + gfcepigas
#
#   Gross Fixed Capital Formation - Public Sector
#
f pubs = pubsme + pubsc
#
#   Gross Fixed Capital Formation - Private Sector
#
f pris = prisme + prisc
#
#   Gross Fixed Capital Formation
#
f gfcf = pubs + pris
#
#   Gross Domestic Product
#
f gdpexp = fcerhh + gfce + gfcf + cis + expgs - impgs
#
#-------------------------------------------------------
#   End of ExpGDP98_identities.add
#-------------------------------------------------------
```

```
#
```

Box 4 : Code to compute the identities

To finish this section, we present the result of the execution of the ExpGDP_all.add. This file contains all the statements from the reading of the Excel file to the creation of the G bank.

Now all the time series we need from GDP_Exp_BP.xls are in a G bank. We have to do something similar to read 2002 Input-out

How to read the 2002 Input-Output Table file?

To import the matrix, vectors and series in G from IOT2002_BP.xls, we use the same approach than the approach in the previous section. We have to import the matrix, vectors and time series definite in Table 4 and then compute all the identities we need.

Name	Type	Location in the worksheet
FM	Matrix	D11:BJ69
fcehh	Vector	BL11:BL69
fcenpish	Vector	BM11:BM69
fcegov	Vector	BN11:BN69
gfcf	Vector	BP11:BP69
civ	Vector	BQ11:BQ69
cii	Vector	BR11:BR69
expfob	Vector	BU11:BU69
tlsop	Vector	D71:BJ71
compemp	Vector	D73:BJ73
ontop	Vector	D74:BJ74
otop	Vector	D75:BJ75
osop	Vector	D76:BJ76
cofc	Vector	D77:BJ77
osn	Vector	D78:BJ78
impcif	Vector	D82:BJ82

Table 4 : List of Matrix and vectors contain in 2002 Input-Output table

The code in the below box realizes the transfer from MS Excel file into a Vam bank.

```
#

#-------------------------------------------------------------
-------

#  IOT2002_BP_READ.add

#-------------------------------------------------------------
-------

#

#  This file contains all statements to read Matrix, vectors

#  from IOT2002_BP.xls to G
```

```
#

#----------------------------------------------------------
-------

#

#  Creation of the Vam file and definition of default vam
bank

#

vamcreate vam_iot2002_bp.cfg hist2002

vam hist2002 b

dvam b

#

#  Opening the Excel file

#

xl open \modeles\turkey\data_G\IOT2002_BP.xls

xl open worksheet 1

xl replace 0.0

#

#  Reading the components of Value added

#

ic Read a full matrix for Excel, store in Vam Matrix

xl matread c(4-62) r(11-69) b.FM c(1-59) r(1-59) 2002

#

#   VAB

#

do{

   xl read BL %2 down b.fcehh%1   2002 2002

   xl read BM %2 down b.fcenpish%1 2002 2002

   xl read BN %2 down b.fcegov%1   2002 2002

   xl read BP %2 down b.gfcf%1    2002 2002

   xl read BQ %2 down b.civ%1    2002 2002

   xl read BR %2 down b.cii%1    2002 2002

   xl read BU %2 down b.expfob%1  2002 2002
```

```
  }(1-59)(11-69) m

#

#  Reading the components of Final Demand

#

#  Taxes less subsidies on products

#

xl read  D 71 right b.tlsop1    2002 2002

xl read  E 71 right b.tlsop2    2002 2002

…

xl read BI 71 right b.tlsop58   2002 2002

xl read BJ 71 right b.tlsop59   2002 2002

#

#  Compensation of employees

#

xl read  D 73 right b.compemp1   2002 2002

xl read  E 73 right b.compemp2   2002 2002

…

xl read BI 73 right b.compemp58  2002 2002

xl read BJ 73 right b.compemp59  2002 2002

#

#  Other net taxes on production

#

xl read  D 74 right b.ontop1    2002 2002

xl read  E 74 right b.ontop2    2002 2002

…

xl read BI 74 right b.ontop58   2002 2002

xl read BJ 74 right b.ontop59   2002 2002

#

#  Other taxes on production

#

xl read  D 75 right b.otop1    2002 2002
```

```
xl read  E 75 right b.otop2    2002 2002

…                             32

xl read BI 75 right b.otop58    2002 2002

xl read BJ 75 right b.otop59    2002 2002

#

#  Other subsidies on production

#

xl read  D 76 right b.osop1    2002 2002

xl read  E 76 right b.osop2    2002 2002

…

xl read BI 76 right b.osop58    2002 2002

xl read BJ 76 right b.osop59    2002 2002

#

#  Consumption of fixed capital

#

xl read  D 77 right b.cofc1    2002 2002

xl read  E 77 right b.cofc2    2002 2002

…

xl read BI 77 right b.cofc58    2002 2002

xl read BJ 77 right b.cofc59    2002 2002

#

#  Operating surplus, net

#

xl read  D 78 right b.opn1    2002 2002

xl read  E 78 right b.opn2    2002 2002

…

xl read BI 78 right b.opn58    2002 2002

xl read BJ 78 right b.opn59    2002 2002

#

#  Imports, cif

#
```

```
xl read  D 82 right b.impcif1   2002 2002

xl read  E 82 right b.impcif2   2002 2002

…

xl read BI 82 right b.impcif58   2002 2002

xl read BJ 82 right b.impcif59   2002 2002

#

#  Total Rows and Total Columns

#

#  Total (intermediate consumption by columns)

#

xl read  BK 70 right b.totcfd1    2002 2002

xl read  BL 70 right b.totcfd2    2002 2002

…

xl read  BV 70 right b.totcfd12    2002 2002

xl read  BW 70 right b.totcfd13    2002 2002

#

#  Total (intemediate consumption by columns)

#

xl read  BK 70 right b.tlsopfd1    2002 2002

xl read  BL 70 right b.tlsopfd2    2002 2002

...

xl read  BV 70 right b.tlsopfd12    2002 2002

xl read  BW 70 right b.tlsopfd13    2002 2002

#

#  Total (intermediate consumption by columns)

#

xl read  BK 70 right b.toticfd1     2002 2002

xl read  BL 70 right b.toticfd2     2002 2002

…

xl read  BV 70 right b.toticfd12    2002 2002

xl read  BW 70 right b.toticfd13    2002 2002
```

```
#

#  Close operations for the Excel file.

#

xl close

xl exit

#

#  Computations of identities

#

add iot2002_bp_identities.add

#

#-------------------------------------------------------------
--------

#  End of IOT2002_bp_read.add

#-------------------------------------------------------------
--------

#
```

Box 5 : Abstract of the file containing G commands to read the input-output table

To reduce the size of the box, we have kept the two first and the two last lines of the code to import a vector or a matrix.

To compute the identities, we transform in G code all the identities described above in the presentation of the Turkish input-output table. We obtain the following code.

```
#

#------------------------------------------------------

#   IOT2002_BP_identities

#------------------------------------------------------

#

#  Computation of all the identities of the IO table

#

#------------------------------------------------------
#  ROW

#

# Intermediate consumption (total rows)

#
```

34

```
getsum FM c totc

#

# Total intermediate consumption

#

vc totic = totc + tlsop

#

# Operating surplus, gross

#

vc opg = cofc + opn

#

# Value added at basic prices

#

vc vaabp = compemp + ontop + otop + osop + opg

#

# Output at basic prices

#

vc outputbp = totic + vaabp

#

# Supply at basic prices

#

vc supplyabp = outputbp + impcif

#

#   COLUMNS

#

# Intermediate consumption (total Columns)

#

getsum FM r totr

#

# Final Consumption Expenditure

#

vc fce = fcehh + fcenpish + fcegov
```

```
#

# Changes in inventories and valuables

#

vc ciiv = cii + civ

#

# Gross Formation capital

#

vc gcf = gfcf + ciiv

#

# Final uses at basic prices

#

vc fuabp = fce + gcf + expfob

#

# Total uses at basic prices

#

vc tuabp = totr + fuabp

#

#----------------------------------------------------

#   End of IOT2002_BP_Identities.add

#----------------------------------------------------

#
```

Box 6 : Computation of the identities of the Input-Output table

It is not necessary to add some comments here. We call attention to two G statements use in the file:

- getsum
- vc

Now, we have all the basic information that we need to build our Tiny model. We have enough information to fiddle with them to create something, which looks like a model but it is not exactly one.

We have to make some works on the data before to go further. If you look carefully at the description of the final demand in the Input-output table and at this of the ExpenditureGDP file, you observe the components are not exactly the same. Before

passing to the next section, we need to make some tummy to have something, which looks more like usual case.

A Tiny model for Turkey

In the next Box, we do not show all the G statements needed to create Vam and G banks. We have written TurkTiny_Data.add[22], which contains all files and statements to build the data banks. Except this line, all the rest follows the structure of the Tiny model.

```
#

#-------------------------------------------------------

#   TURKTINY - A TINY model for Turkey

#-------------------------------------------------------

#

#   Bring in data

#

add TurkTiny_Data.add

#

#   Year of the IOT

#

fdates 2002 2002

#

#   Compute the value of the row sum of FM and store

#   the result in the vector outputbp

#

getsum FM r outputbp

#

#   Add to outputbp the total of Final demand

#

vc outputbp = outputbp + fce + gcf + expfob - impcif

#

#   Copy the content of the Flow matrix to
```

---

[22] The contents of TurkTiny_Data.add is available in Appendix E.

```
#  the coefficient matrix
#
mcopy b.AM b.FM
#
#   Compute the technical coefficient
#
coef AM outputbp
#
#   Compute the share of the components of
#   VA by ouptputbp
#
vc compemps = compemp / outputbp
vc ontops  = ontop  / outputbp
vc otops   = otop   / outputbp
vc osops   = osop   / outputbp
vc cofcs   = cofc   / outputbp
vc opns    = opn    / outputbp
vc opgs    = opg    / outputbp
#
# Copy the 2002 AM matrix into 1998 2020
#
fdates 1998 2020
#
dfreq 1
#
f one = 1.
#
# Index all the AM for the years defined in fdates
#
index 2002 one AM
#
```

```
show b.AM c 1

#

#  Index the share of the components of VA by outputbp

#

index 2002 one compemps

index 2002 one ontops

index 2002 one otops

index 2002 one osops

index 2002 one cofcs

index 2002 one opns

index 2002 one opgs

#

#   Index Final demand components with the times

#   series coming from the file "GDP by the

#   expenditure"

#

fdates 1998 2007

#

index 2002 fceorhhu8 fcehh

index 2002 fceorhhu8 fcenpish

index 2002 gfceu8   fcegov

index 2002 gfcfu8   gfcf

index 2002 expgsu8   expfob

index 2002 impgsu8   impcif


f gfcf5 = 0.

#

#

#

index 2002 one civ

index 2002 one cii
```

```
#

#

#

vc fce = fcehh + fcenpish + fcegov

vc gcf = gfcf + civ + cii

#

#   Creation of series needed to forecast Final demand
components

#

fdates 1998 2020

#

#  Creation of a time trend and growth rate series

#

f time = @cum(time,one,0)

f g03  = @exp(.05*(time-10))

f waves = g03 + 0.3 * @sin(time-9)

#

#  "Forecasts" of the Final demand components

#

fdates 2007 2020

index 2007 g03  fcehh

index 2007 g03  fcenpish

index 2007 g03  fcegov

index 2007 waves gfcf

index 2007 one  gfcf5

index 2007 g03  gfcf24

index 2007 g03  gfcf27

index 2007 one  civ

index 2007 one  cii

index 2007 g03  expfob

index 2007 g03  impcif

#
```

```
#

#

vc fce = fcehh + fcenpish + fcegov

vc gcf = gfcf + civ + cii

#

#   Preparation of LINV and Leontief inverse computation

#

fdates 1998 2020

mcopy b.LINV b.AM

linv LINV

#

#   Computation of the final demand

#

vc fd = fcehh + fcenpish +fcegov + gfcf + civ + cii +
expfob - impcif

#

#   Input-output computation

#

vc outputbp = LINV * fd

#

#   Computation of the components of the Value added

#

vc compemp = compemps *    outputbp

vc ontop  = ontops  *      outputbp

vc otop   = otops   * outputbp

vc osop   = osops   * outputbp

vc cofc   = cofcs   * outputbp

vc opn    = opns    * outputbp

vc opg    = opgs    * outputbp

#

#

#
```

```
vc vaabp  = compemp + ontop + otop + osop + cofc + opn

#

#------------------------------------------------------
#     End of Turkmodel.pre

#------------------------------------------------------

#
```

In the next sections, we examine and comment the result of a TURKTiny run.

Tools to analyze results

In G family's software, we have the possibilities to look at the results of the model by drawing graphics or by creating tables. You have the possibility to look at them on the screen or to build documents with your preferred text processor or you preferred presentation software. We give you the code of the files we use with TURKTiny.

We give first examples of graphics and then examples of tables.

Graphs

G7 contains many graphics commands. To have good descriptions of G graphics statement, you can consult the G help file "*29. Drawing Graphs*"

```
vr 0

ti %3 - %5

subti Final Consumption Expenditure

gname fce%3

gr fcehh%3 b.fcenpish%3 fcegov%3 fce%3

subti Gross Capital Formation

gname gcf%3

gr gcf%3 gfcf%3 cii%3 civ%3

subti Exports and Imports

gname expimp%3

gr expfob%3 impcif%3
```

Box 8 : Code to graph the final demand components

```
vr 0

ti %3 - %5
```

```
subti Output and Final demand

gname outputbp%3

gr b.outputbp%3 b.fd%3

subti Components of Value Added

gname coe%3

gr compemp%3 ontop%3 otop%3 osop%3 cofc%3 opn%3
```

Box 9 : Code to graph Output, Final demand and Value added components

```
#

#------------------------------------------------------

#   TURKTiny_Graphs.add

#------------------------------------------------------

#

#   This file contains the statement to run graphs.

#

#------------------------------------------------------

#

#

#

zip off

gdates 1998 2007 2020

#

#   Components of value added

#

fadd graphs.add sectors02.ttl

#

#   Components of final demand

#

fadd fdgraphs.add sectors02.ttl

#

#------------------------------------------------------

#   End of TURKTiny_Graphs.add
```

43

```
#----------------------------------------------------

#
```

<div align="center">Box 10: TURKTiny graphs</div>

Tables

In this section, we do not explain how to create all the files to generate the tables of time series, vectors, and matrices. To obtain more information, the reader will report to the Tiny model for a short description, to the G help as usual and to the Compare.pdf file in the doc directory of the pdg directory.

```
\dates 1998 2000 2002 2005 2010 2015 2020 1998-2002 2002-2005 2005-2010 2010-2015
2015-2020

\pages off

\noformat

\12 1 80 3 9 50

\gw 6

\title TURKTiny G-ONLY MODEL, Illustrative forecast


\add TurkTiny.tab outputbp Output of Industries

;

\add TurkTiny.tab compemp Compensation of employees

;

# The next page forces a new page.

*

\matcfg matlist.cfg

\center Matrix Listing

\row

\cutoff 0.001

\matlist 1-59
```

<div align="center">Box 11 : TurkTiny.stb</div>

```
; %1 %2

&

%11 ; 1 Agriculture, hunting and related services

%12 ; 2 Forestry, logging and related services
```

```
%13  ; 3 Fish and other fishing products; services incidental of fishing

%14  ; 4 Coal and lignite; peat

%15  ; 5 Crude petroleum and natural gas; services incidental to oil and gas
extraction excluding surveying

%16  ; 6 Uranium and thorium ores

%17  ; 7 Metal ores

%18  ; 8 Other mining and quarrying products

%19  ; 9 Food products and beverages

%110 ;10 Tobacco products

%111 ;11 Textiles

%112 ;12 Wearing apparel; furs

%113 ;13 Leather and leather products

%114 ;14 Wood and products of wood and cork (except furniture); articles of straw
and plaiting materials

%115 ;15 Pulp, paper and paper products

%116 ;16 Printed matter and recorded media

%117 ;17 Coke, refined petroleum products and nuclear fuels

%118 ;18 Chemicals, chemical products and man-made fibers

%119 ;19 Rubber and plastic products

%120 ;20 Other non-metallic mineral products

%121 ;21 Basic metals

%122 ;22 Fabricated metal products, except machinery and equipment

%123 ;23 Machinery and equipment n.e.c.

%124 ;24 Office machinery and computers

%125 ;25 Electrical machinery and apparatus n.e.c.

%126 ;26 Radio, television and communication equipment and apparatus

%127 ;27 Medical, precision and optical instruments, watches and clocks

%128 ;28 Motor vehicles, trailers and semi-trailers

%129 ;29 Other transport equipment

%130 ;30 Furniture; other manufactured goods n.e.c.

%131 ;31 Secondary raw materials

%132 ;32 Electrical energy, gas, steam and hot water
```

```
%133 ;33 Collected and purified water, distribution services of water

%134 ;34 Construction work

%135 ;35 Trade, maintenance and repair services of motor vehicles and motorcycles;
retail sale of automotive fuel

%136 ;36 Wholesale trade and commission trade services, except of motor vehicles
and motorcycles

%137 ;37 Retail trade services, except of motor vehicles and motorcycles; repair
services of personal and household goods

%138 ;38 Hotel and restaurant services

%139 ;39 Land transport; transport via pipeline services

%140 ;40 Water transport services

%141 ;41 Air transport services

%142 ;42 Supporting and auxiliary transport services; travel agency services

%143 ;43 Post and telecommunication services

%144 ;44 Financial intermediation services, except insurance and pension funding
services

%145 ;45 Insurance and pension funding services, except compulsory social security
services

%146 ;46 Services auxiliary to financial intermediation

%147 ;47 Real estate services

%148 ;48 Renting services of machinery and equipment without operator and of
personal and household goods

%149 ;49 Computer and related services

%150 ;50 Research and development services

%151 ;51 Other business services

%152 ;52 Public administration and defense services; compulsory social security
services

%153 ;53 Education services

%154 ;54 Health and social work services

%155 ;55 Sewage and refuse disposal services, sanitation and similar services

%156 ;56 Membership organization services n.e.c.

%157 ;57 Recreational, cultural and sporting services

%158 ;58 Other services

%159 ;59 Private households with employed persons
```

Box 12 : TurkTiny.tab

```
1
v
hist2002
turktiny.stb
turktiny.out
```

Box 13 : TurkTiny.inp

TURKTiny G-ONLY MODEL, Illustrative forecast

outputbp Output

	1998	2000	2002	2005	2010	2015	2020	98-02	02-05	05-10	10-15	15-20
1 Agriculture, hunting and related services	12324121.0	25737942.0	49988560.0	92324752.0	136279200.0	174658848.0	223558256.0	35.0	20.5	7.8	5.0	4.9
2 Forestry, logging and related services	274607.3	574811.9	1112617.8	2095960.8	2823632.5	3815814.0	4954040.0	35.0	21.1	6.0	6.0	5.2
3 Fish and other fishing products; services inci	175608.0	415340.6	845745.4	1607460.1	2417023.2	3104226.5	3983366.0	39.3	21.4	8.2	5.0	5.0
4 Coal and lignite; peat	338265.2	872071.9	1823094.5	3508578.0	4634197.0	6321768.5	8256005.5	42.1	21.8	5.6	6.2	5.3
5 Crude petroleum and natural gas; services inci	1230734.8	1007707.4	775467.3	-292369.2	-6384011.0	-6423737.0	-7816410.5	-11.5	-0.0	61.7	0.1	3.9
6 Uranium and thorium ores	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.0	-0.0	-0.0	-0.0	-0.0
7 Metal ores	111027.0	225985.3	511403.7	968010.2	484975.8	1271903.1	1861508.0	38.2	21.3	-13.8	19.3	7.6
8 Other mining and quarrying products	-604615.8	368213.4	2232196.0	5620166.0	6864124.5	10898352.0	14965788.0	-0.0	30.8	4.0	9.2	6.3
9 Food products and beverages	11711028.0	24192210.0	46447632.0	85923712.0	127256016.0	162790304.0	208200112.0	34.4	20.5	7.9	4.9	4.9
10 Tobacco products	876134.6	1447903.4	2457428.2	4277003.5	6196501.5	7816842.0	9897087.0	25.8	18.5	7.4	4.6	4.7
11 Textiles	9826903.0	17438870.0	34726108.0	57887648.0	83044360.0	106748344.0	136346352.0	31.6	17.0	7.2	5.0	4.9
12 Wearing apparel; furs	4151918.0	9137414.0	20011310.0	35341464.0	53041824.0	68267736.0	87605824.0	39.3	19.0	8.1	5.0	5.0
13 Leather and leather products	1087083.2	1792221.8	3192889.0	5354822.5	7580272.0	9634071.0	12228239.0	26.9	17.2	7.0	4.8	4.8
14 Wood and products of wood and cork (except fur	810193.9	1472825.6	2651016.8	5011955.5	6125226.0	8807414.0	11572875.0	29.6	21.2	4.0	7.3	5.5

15	Pulp, paper and paper products	268515.2	2004096.1	5331600.5	10836589.0	14636454.0	20428220.0	26986326.0	74.7	23.6	6.0	6.7	5.6
16	Printed matter and recorded media	290486.0	1253339.6	3019185.2	6093412.0	8835537.0	11872386.0	15496162.0	58.5	23.4	7.4	5.9	5.3
17	Coke, refined petroleum products and nuclear f	473608.7	3120860.2	8141928.0	16652029.0	22553020.0	31406344.0	41450424.0	71.1	23.9	6.1	6.6	5.5
18	Chemicals, chemical products and man-made fibr	3772381.8	7864410.5	16375114.0	28642558.0	33275612.0	47004612.0	61788364.0	36.7	18.6	3.0	6.9	5.5
19	Rubber and plastic products	1227201.9	3578856.2	8229753.5	15951295.0	21112242.0	29471580.0	38760572.0	47.6	22.1	5.6	6.7	5.5
20	Other non-metallic mineral products	1660708.6	4647320.0	10218996.0	20843756.0	26060078.0	38512848.0	51287828.0	45.4	23.8	4.5	7.8	5.7
…													
45	Insurance and pension funding services, except	234430.2	523443.2	1102190.6	2001339.9	2637061.2	3577372.8	4657473.0	38.7	19.9	5.5	6.1	5.3
46	Services auxiliary to financial intermediation	216583.5	507864.9	1058320.6	1988765.9	2818704.5	3745957.2	4851531.5	39.7	21.0	7.0	5.7	5.2
47	Real estate services	7885745.5	19595492.0	39862288.0	77401232.0	115833344.0	149569104.0	192318128.0	40.5	22.1	8.1	5.1	5.0
48	Renting services of machinery and equipment wi	201163.0	460465.6	930384.6	1781153.1	2430436.2	3292484.5	4283796.0	38.3	21.6	6.2	6.1	5.3
49	Computer and related services	304217.1	731386.2	1510045.0	2862218.2	4046275.5	5436066.5	7059735.5	40.1	21.3	6.9	5.9	5.2
50	Research and development services	322897.4	686373.4	1392538.6	2595567.5	2976979.5	4391504.0	5830059.0	36.5	20.8	2.7	7.8	5.7
51	Other business services	3407864.2	7925279.0	16205344.0	31040198.0	42324080.0	57859408.0	75458872.0	39.0	21.7	6.2	6.3	5.3
52	Public administration and defence services; co	4003641.0	10839823.0	24802936.0	42303224.0	66970616.0	85993376.0	110418080.0	45.6	17.8	9.2	5.0	5.0
53	Education services	2078467.6	5514917.5	12242413.0	21629114.0	33816184.0	43479432.0	55847464.0	44.3	19.0	8.9	5.0	5.0
54	Health and social work services	1530906.9	4035733.0	8864816.0	15855230.0	24661834.0	31721040.0	40748872.0	43.9	19.4	8.8	5.0	5.0
55	Sewage and refuse disposal services, sanitatio	90701.1	232506.3	492883.7	915792.7	1400201.5	1803390.0	2317357.5	42.3	20.7	8.5	5.1	5.0
56	Membership organisation services n.e.c.	1049652.1	2612257.8	5335629.5	10319312.0	15426365.0	19948290.0	25659944.0	40.6	22.0	8.0	5.1	5.0
57	Recreational, cultural and sporting services	854599.2	2106855.0	4460197.0	8225115.0	12234070.0	15878101.0	20442900.0	41.3	20.4	7.9	5.2	5.1
58	Other services	227935.6	577422.8	1191906.4	2281312.5	3456484.5	4446066.0	5711488.5	41.4	21.6	8.3	5.0	5.0
59	Private households with employed persons	98231.2	247320.6	501798.9	979609.9	1480110.9	1900500.1	2440290.5	40.8	22.3	8.3	5.0	5.0
…													

Box 14 : TurkTiny.out

Run all the model

We merge into a file all the different files written to run the model, to graph the results and to create tables. The file content is in Box 15

```
#

#------------------------------------------------------------------------

#   TURKTiny - a Turkish Tiny model

#------------------------------------------------------------------------

#

#   This file contains all the instructions to load the data,

#   to run the model, to draw the graphs and to produce the reports.

#

#------------------------------------------------------------------------

#   2008 - Paul Salmon, Gazi Ozhan and Meral Ozhan

#------------------------------------------------------------------------

#

#  Load data and run the Tiny model

#

add TurkModel.pre

#

#  Graphs of the results

#

fdates 1998 2007 2020

#

#  Graphs of the GDP

#

add gdpgraphs.add

#

#  Graphs of the Final demand components by sectors

#

fadd fdgraphs.add sectors02.ttl

#
```

```
#  Graphs of the Value added components by sectors

#

fadd vagraphs.add sectors02.ttl

#

#  Tables of the results with Compare.

#

dos compare TurkTiny.inp

#

#-----------------------------------------------------------------------

#   End of TURKTiny_All.add

#-----------------------------------------------------------------------

#
```

Box 15 : Code to run the model from the loading of data to the table

Corrections of troubles

TURKTiny is now running. We have created all the code needed to realize all the operations: reading the data, computations, graphics, and tables. Nevertheless, when we look at some graphics we see odd things. We have to study what has happened.
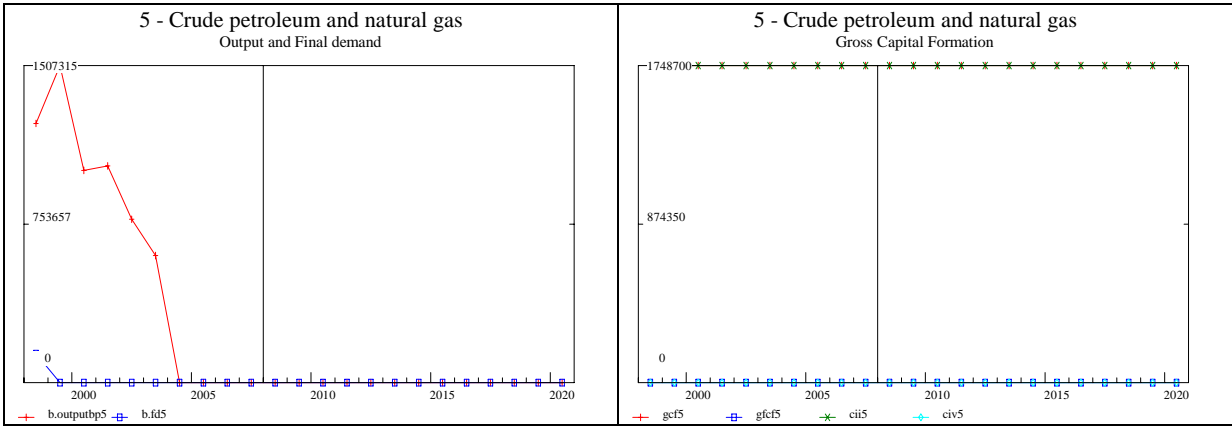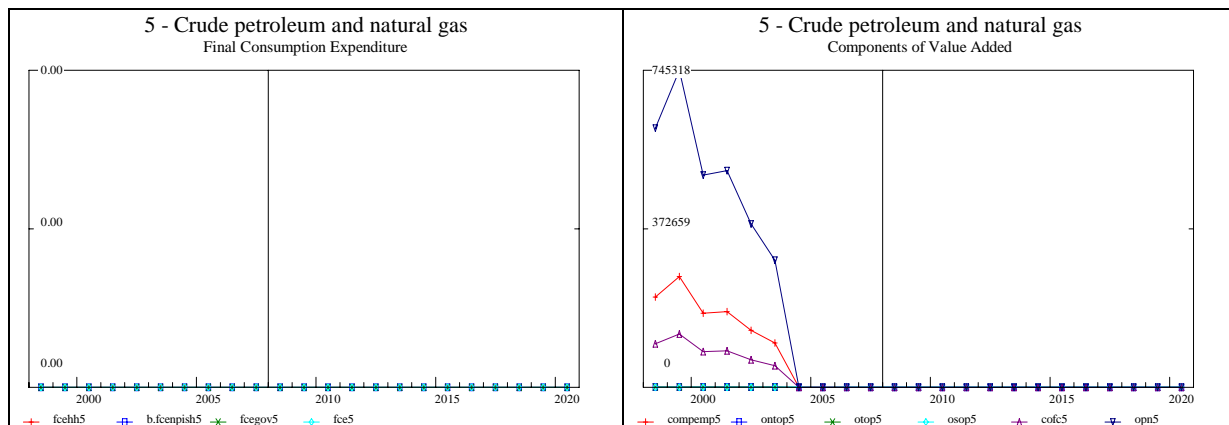
Figure 12: Graphics with mistakes

For output, final demand and the different components of value added, we obtain negative numbers. Therefore, the mean we use to build the series, on the past and on the future, is not the good one.

We remind to the reader of the fact that the different data we have used are not historical data except for the year 2002. All the series are built.

It is possible to spend time to correct all the different series and to try to give them a "real economic shape". However, we have decided to stop our investigation at this level.

Conclusions

When we have begun this work, we begin it with disappointment. We were ready to build a model but there is not the sufficient data to do it, even disposable income does not exist. It is always possible to create one to go further in the building of the model.

During all the preparation of this paper, we have discussed with TurkStat, we have discovered the entire problem that exist from the statistical point of view to integrate European Union.

This exercise is a very good practice to become a model builder if you are a beginner and a very good way to think of your practice and your knowledge if you are an advanced model builder.

If it is not yet possible now to build a complete Inforum model for Turkey, it will be possible to do it in a near future.

This paper comes in addition of the Clopper Almon's work with a European touch.

References

Almon Clopper (2008), *"The Craft of economic modeling",* Part 1, Inforum, http://inforumweb.umd.edu/papers/publishedwork/books/craft1.pdf.

Almon Clopper (2008), "*The Craft of economic modeling"*, Part 2, Inforum. http://inforumweb.umd.edu/papers/publishedwork/books/craft2.pdf.

Almon Clopper (2008), "*The Craft of economic modeling"*, Part 3, Inforum. http://inforumweb.umd.edu/papers/publishedwork/books/craft3.pdf.

Compare, Inforum

G user guide and reference, Inforum.

   http://inforumweb.umd.edu/papers/inforum/software/GBook.pdf.

G Help and especially the New features which Ron Horst has presented in the last Inforum World Conferences.

SNA 1993

   http://unstats.un.org/unsd/sna1993/

   http://www.oecd.org/dataoecd/37/12/38451313.pdf or

   http://puck.sourceoecd.org/vl=3135196/cl=35/nw=1/rpsv/una/

ESA 95 Web Site

http://circa.europa.eu/irc/dsis/nfaccount/info/data/esa95/en/titelen.htm

TurkStat Web Site

http://www.turkstat.gov.tr/Start.do

Appendices

Appendix A: TurkTiny_Data.add file

Appendix B: Matrices, vectors and time series of the TURKTiny model

Appendix C: List of files

Appendix A

TurkTiny_Data.add file

```
#

#-------------------------------------------------------------------------------

#                   Turkish Inforum Model

#-------------------------------------------------------------------------------

#

#   Annual Data Banks for Turkey

#

#   Sources : Turkish Statistical Institute

#

#-------------------------------------------------------------------------------

#

zip

#

#-------------------------------------------------------------------------------

#   National Accounts

#-------------------------------------------------------------------------------

#

#   GDP by Expenditure Approach

#

#       Base year 98

#

add ExpendituresGDP_Cur98_ann.add

#

#   Input-Output tables

#

#   Read IOT 2002 Basic Prices - Current (All, Domestic, Imports)

#

add iot2002_bp_read.add
```

```
#
#    Management of files
#
del temp
#
#    Rename of the all variables
#
add renameGbank_98_Tiny.add
#
#
#
btitle w TURKTINY DataBank
#
#
#
dos copy ws.* turkey_ann_98.*
#
#
#
zap
#
#
#
ba turkey_ann_98
#
#
#
lis a
#
#-------------------------------------------------------------------------------
#   End of the building of Turkish databank
```

```
#------------------------------------------------------------------
#                                   58
```

Appendix B

List of the matrices, vectors, and time series used in Turkish Tiny.

Acronym	A	B	C	Title
gdpaea	TS	Calc	Id	Gross Domestic Product
fcerhh	TS	Calc	id	Final Consumption Expenditure of Resident Households
fcernrhhet	TS	Basic	read	Final Consumption Expenditure of Resident and Non Resident Households on the economic territory
fcenrhhet	TS	Basic	read	Final Consumption Expenditure of Non Resident Households on the economic territory
fcerhhrow	TS	Basic	read	Final Consumption Expenditure of Resident Households in the Rest of the World
gfce	TS	Calc	id	Government Final Consumption Expenditure
gfcece	TS	Basic	read	Compensation of Employees
gfcepigas	TS	Basic	read	Purchases in Goods and Services
gfcf	TS	Calc	id	Gross Fixed Capital Formation
pubs	TS	Calc	read	Public Sector
pubsme	TS	Basic	read	Machinery-Equipment
pubc	TS	Basic	read	Construction
pris	TS	Calc	id	Private Sector
prime	TS	Basic	read	Machinery-Equipment
pric	TS	Basic	read	Construction
cis	TS	Basic	read	Changes in stock
expgs	TS	Basic	read	Exports of Goods and Services
impgs	TS	Basic	read	Imports of Goods and Services
FM	Mat	Basic	read	Flow Matrix
totc	vec	Calc	id	Total of Intermediate Consumption by columns
totr	vec	Calc	id	Total of Intermediate Consumption by rows
tlsopic	vec	Basic	read	Taxes less subsidies on products
toticpp	vec	Calc	id	Total intermediate consumption at purchasers' prices
coe	vec	Basic	read	Compensation of employees
ontop	vec	Basic	read	Other net taxes on production
otop	vec	Basic	read	Other taxes on production
osop	vec	Basic	read	Other subsidies on production
cofc	vec	Basic	read	Consumption of fixed capital
osn	vec	Basic	read	Operating surplus, net
osg	vec	Calc	id	Operating surplus, gross
vaabp	vec	Calc	id	Value added at basic prices
oabp	vec	Calc	id	Output at basic prices
impcif	vec	Basic	read	Imports, cif
sabp	vec	Calc	id	Supply at basic prices
fcehh	vec	Basic	read	Final consumption expenditure by households
fcenpisb	vec	Basic	read	Final consumption expenditure by non-profit organisations serving households (NPISH)
fcegov	vec	Basic	read	Final consumption expenditure by government
fce	vec	Calc	id	Final consumption expenditure
gfcf	vec	Basic	read	Gross fixed capital formation
civ	vec	Basic	read	Changes in valuables
cii	vec	Basic	read	Changes in inventories
ciiv	vec	Calc	id	Changes in inventories and valuables
gcf	vec	Calc	id	Gross capital formation
expcob	vec	Basic	read	Exports, fob
fuabp	vec	Calc	id	Final uses at basic prices
tuabp	vec	Calc	id	Total use at basic prices
fcehh_tot	TS	Calc	id	Final consumption expenditure by households
fcenpisb_tot	TS	Calc	id	Final consumption expenditure by non-profit organisations serving households (NPISH)
fcegov_tot	TS	Calc	id	Final consumption expenditure by government

fce_tot	TS	Calc	id	Final consumption expenditure
gfcf_tot	TS	Calc	id	Gross fixed capital formation
civ_tot	TS	Calc	id	Changes in valuables
cii_tot	TS	Calc	id	Changes in inventories
ciiv_tot	TS	Calc	id	Changes in inventories and valuables
gcf_tot	TS	Calc	id	Gross capital formation
expcob_tot	TS	Calc	id	Exports, fob
fuabp_tot	TS	Calc	id	Final uses at basic prices
tuabp_tot	TS	Calc	id	Total use at basic prices
fcehh_tlsopfd	TS	Basic	read	Final consumption expenditure by households
fcenpisb_tlsopfd	TS	Basic	read	Final consumption expenditure by non-profit organisations serving households (NPISH)
fcegov_tlsopfd	TS	Basic	read	Final consumption expenditure by government
fce_tlsopfd	TS	Basic	read	Final consumption expenditure
gfcf_tlsopfd	TS	Basic	read	Gross fixed capital formation
civ_tlsopfd	TS	Basic	read	Changes in valuables
cii_tlsopfd	TS	Basic	read	Changes in inventories
ciiv_tlsopfd	TS	Basic	read	Changes in inventories and valuables
gcf_tlsopfd	TS	Basic	read	Gross capital formation
expcob_tlsopfd	TS	Basic	read	Exports, fob
fuabp_tlsopfd	TS	Basic	read	Final uses at basic prices
tuabp_tlsopfd	TS	Basic	read	Total use at basic prices
fcehh_totapp	TS	Calc	id	Final consumption expenditure by households
fcenpisb_totapp	TS	Calc	id	Final consumption expenditure by non-profit organisations serving households (NPISH)
fcegov_totapp	TS	Calc	id	Final consumption expenditure by government
fce_totapp	TS	Calc	id	Final consumption expenditure
gfcf_totapp	TS	Calc	id	Gross fixed capital formation
civ_totapp	TS	Calc	id	Changes in valuables
cii_totapp	TS	Calc	id	Changes in inventories
ciiv_totapp	TS	Calc	id	Changes in inventories and valuables
gcf_totapp	TS	Calc	id	Gross capital formation
expcob_totapp	TS	Calc	id	Exports, fob
fuabp_totapp	TS	Calc	id	Final uses at basic prices
tuabp_totapp	TS	Calc	id	Total use at basic prices
AM	Mat	Calc	mod	Coeficient Matrix
LINV	Mat	Calc	mod	Leontieff Inverse
fd	vec	Calc	mod	Final demand
fcehhr	vec	Calc	mod	Final consumption expenditure by households
fcenpishr	vec	Calc	mod	Final consumption expenditure by non-profit organizations serving households NPISH)
fcegovr	vec	Calc	mod	Final consumption expenditure by government
fcer	vec	Calc	mod	Final consumption expenditure
gfcfr	vec	Calc	mod	Gross fixed capital formation
civr	vec	Calc	mod	Changes in valuables
ciir	vec	Calc	mod	Changes in inventories
ciivr	vec	Calc	mod	Changes in inventories and valuables
gcfr	vec	Calc	mod	Gross capital formation
exofobr	vec	Calc	mod	Exports, fob
impcifr	vec	Calc	mod	Imports, cif
compemps	vec	Calc	mod	Compensation of employees / outputbp
ontops	vec	Calc	mod	Other net taxes on production / outputbp

otops	vec	Calc	mod	Other taxes on production / outputbp
osops	vec	Calc	mod	Other subsidies on production / outputbp
oofcs	vec	Calc	mod	Consumption of fixed capital / outputbp
opns	vec	Calc	mod	Operating surplus, net / outputbp
opgs	vec	Calc	mod	Operating surplus, gross / outputbp
x	vec	Create	mod	Workspace
y	vec	Create	mod	Workspace

Appendix D

List of files

The list is the list of the file we have written to build the model. The data are contained in another directory. All the files and the data are available from the authors.

You find information on the contents of the file in the file itself. We give to the file implicit name.

```
ExpendituresGDP_cur98_ann.add
ExpGDP98.bnk
ExpGDP98.ind
ExpGDP98_All.add
ExpGDP98_Bank.add
ExpGDP98_identities.add
ExpGDP98_read.add
ExpGDP98_read_do_cur98.add
ExpGDP98_Type.add
fdgraphs.add
G.cfg
gdp.add
graphs.add
groups.bin
Hist2002.stb
hist2002.vam
IOT2002_BP_Col.txt
IOT2002_BP_identities.add
IOT2002_BP_read.add
IOT2002_BP_read_cols.add
IOT2002_BP_Row.txt
IOT2002_BP_Show.add
listefichiers.txt
Matlist.cfg
RenameGbank_98_Tiny.add
sectors02.ttl
sectors0213.ttl
si.add
tables.cfg
tablex.bat
turkey_ann_98.bnk
turkey_ann_98.ind
TurkModel.pre
Turktiny.inp
turktiny.out
TURKTiny.stb
TurkTiny.tab
TURKTiny_All.add
TurkTiny_Data.add
TurkTiny_graphs.add
Vam_iot2002_BP.cfg
```