KATHOLIEKE UNIVERSITEIT LEUVEN

CENTRUM VOOR ECONOMISCHE STUDIEN

USERS' GUIDE FOR ASTER

A MICROSIMULATION MODEL FOR INDIRECT TAXES

VERSION 2

André Decoster
Patrick Delhaye
Guy Van Camp

Februari 1996

For more information Contact:

André Decoster Tel. +32-16-326823
E-mail: André.Decoster@econ.kuleuven.ac.be

Guy Van Camp Tel. +32-16-326807
E-mail: Guy.VanCamp@econ.kuleuven.ac.be

INTRODUCTION

ASTER is a micro simulation model for indirect taxes developed at Leuven. It has been inspired a lot by the SPIT-model (Simulation Program for Indirect Taxes) from the Institute for Fiscal Studies in London. The main adjustments took place to model the Belgian structure of indirect taxes, to make the model more user friendly, and to construct a more elaborate evaluation model once a simulation has been run. Due to a more restricted database we have been more limited than the SPIT-model in the estimation of behavioural parameters.

The version which is presented here is only a first attempt to catch up with the rapid development of micro simulation models abroad. It is by no means a final version. The behavioural parameters could be estimated better, the budget survey used gets out of date, the problem of grossing-up the figures to the national accounts data should be investigated and there are many interesting theoretical problems which deserve a closer look (equivalence scales, zero expenditures, durable expenditures, definition of the welfare concept etc.).

The model is limited to simulation of changes in indirect taxes (value added, excise and ad valorem). The acronym ASTER has no meaning. Ex post it has been explained by one of the users as **A**nalysis and **S**imulation of **T**axes and **E**valuation of **R**eforms.

ASTER; M_ASTER; F_ASTER; E_ASTER: What's in a name?

The structure of the program is illustrated in figure 1. A complete run consist of three consecutive steps.

First the user has to define a reform: which indirect tax rates have to be changed? This is done in the first module: **M**_ASTER (the M stands for **M**odelling)
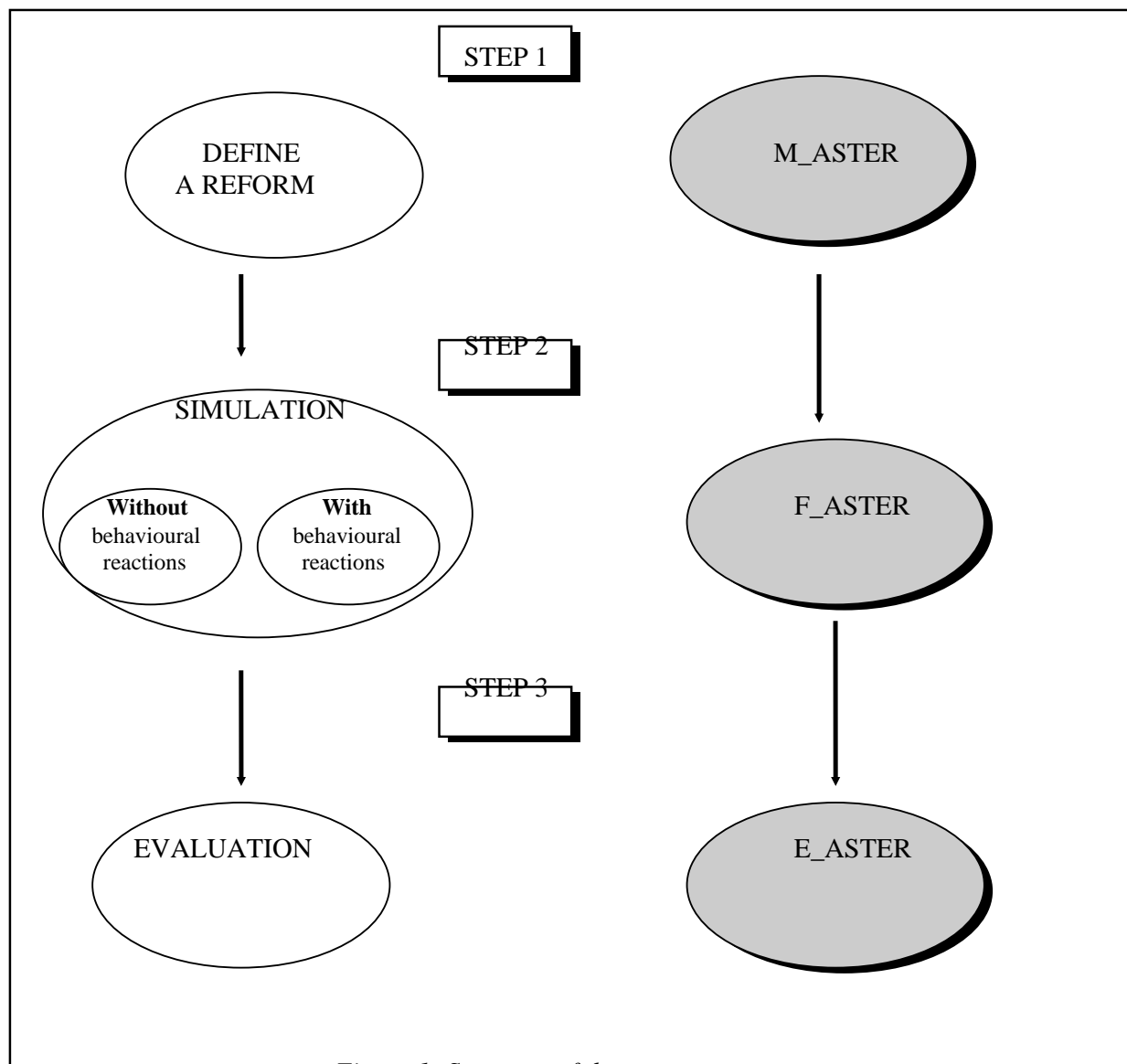
Figure 1: Structure of the program

The resulting change in consumer prices will probably affect expenditure behaviour and hence tax payments by the household. The simulation of the new expenditure pattern and resulting tax payments for each individual household takes place in the second step: module **F**_ASTER (the F stands for **F**orecasting).

Finally the **E**_ASTER module (the E of **E**valuation) evaluates the reform. It provides answers to questions such as: 'What is the average gain or loss for all households?',

'Has inequality increased or decreased?', 'Do younger households lose more or less than older ones?', etc...

The three modules can be run separately. The same reform (the result from M_ASTER) can be pushed through F_ASTER (the simulation) several times with different options. And a given output of the simulation can be analysed by E_ASTER in different ways.

How do I install ASTER?

To install ASTER on your PC you first have to copy the different parts of the program from the installation diskette to the hard disk or a network drive of your PC. Then it is possible to set up the ASTER-program as a part of the Program Manager within the MS Windows® operating system.

The ASTER program on the installation diskette consists of two parts: The first part contains all the programs that we developed and all the data files which are necessary. Some of the programs we developed are in Visual Basic, others are written in Fortran. All programs which require user input and which present results (the 'user interface' programs) are written in Visual Basic as this language uses the same presentation objects as the Windows operating system. We believe that one of its main characteristics is a high degree of user friendliness. Also MS Windows® seems to be the most popular operating system nowadays. The programs that do the calculations run in Fortran. All these files can be installed in whichever directory you want, but is a directory with the name ASTER not the most obvious choice?

The second part of the installation diskette contains files which are necessary to run a Visual Basic Program. These files should be installed in the C:\WINDOWS\SYSTEM -directory.

For economical reasons we compressed the files using the popular PKZIP®-program so that all files of the first part are packed together in one file: ASTER_1.EXE and all files of the second part are packed in a file named ASTER_2.EXE. These two files are so-called 'self-extracting' files: when you run them they will start to unpack

themselves in the directory where they are in. (Look at the paragraph 'How to start the program' to find details on how to run a program in MS Windows[®])

There are basically two ways you can install the ASTER program: either you simply run the installation program that is on the installation disk, or you do all the steps it needs one by one by yourself. First we will describe the easiest way and a little variant of it. Then we'll explain the more complicated way. However no matter which way you follow, you nearly always must add an extra line in the CONFIG.SYS of your system. This file is in the C:\-directory and it can be changed using a normal text editor like e.g. the Notepad Editor. When you see the contents of the CONFIG.SYS-file try to find the phrase '**ANSI.SYS**'. This is the name of the driver we use to display the current state of the Fortran-part of the F_ASTER module. If you don't find it you must add the line '**DEVICE=C:\DOS\ANSI.SYS'** at the bottom of the file. People using WindowsNT should use the ANSI.SYS of DOS5, all others can use the ANSI.SYS which is the package itself. The name of the driver must be preceded by the subdirectory where it is stored. In most cases (with a standard installation of DOS) this is C:\DOS. Then save this new CONFIG.SYS-file and reboot the system.

The easiest way to install ASTER is to use the program INST_AST.BAT which is also on the diskette. If you run this program then the programs will be installed in C:\ASTER and the system-files in C:\WINDOWS\SYSTEM. To do this:
1. Put the diskette in the A:-drive
2. From the WINDOWS operating system.
   - Go with the file manager to drive A:
   - Click on INST_AST.BAT
   OR From the DOS-operating system:
   - Type 'A:' ↵
   - Type 'INST_AST.BAT' ↵

If you prefer another directory than C:\ASTER we advise that you first edit the INST_AST.BAT-file on the diskette: You can e.g. replace all occurrences of C:\ASTER with the name of the subdirectory you prefer. Then run the

INST_AST.BAT-program the way it is described above in point 2. If you use another name than ASTER, you should also change the directory name in the FASTER.PIF file If your system files are not in the C:\WINDOWS\SYSTEM you should change this directory as well in the INST_AST.BAT file

Instead of running the installation program of the diskette, you can also install ASTER in a more 'manual' way where you have all the control:

1. Create a directory where you want to store the programs and data-files, e.g. C:\ASTER. This can be done using the File Manager of the Windows operating system: Thereto use the ***Create Directory*** of the ***File*** menu after you positioned yourself on the root-directory of the C:-drive. If you prefer another directory you have to correct the contents of the F_ASTER.PIF substituting the 'C:\ASTER'-string with the name of the directory you have chosen.

2. Copy the ASTER_1.EXE file from the diskette to the directory you created in step 1. This can also be done using the File Manager of the Windows operating system: Click on the icon of the A:-drive on the top of the screen, then press the left mouse button while your cursor is on the name ASTER_1.EXE, keep the button pressed down, and move the cursor to the icon of the C:-drive. Be sure that you are still positioned on the root-directory of the C:-drive before you do the copying.

3. Position yourself in the directory where you just have copied the ASTER_1.EXE program. Then run that program. That is very easy if you are still using the File manager. You just can click two times on the name ASTER_1.EXE.

4. Copy the ASTER_2.EXE file from the diskette to the C:\WINDOWS\SYSTEM directory.

5. Position yourself in that directory and run the ASTER_2.EXE program

Table 1 shows the files that are in the ASTER_1.EXE file, while table 2 shows the files which are in ASTER_2.EXE.

FILE NAME	Description
ASTER.EXE	Visual Basic Program
ASTER.INI	File with the options for the Visual Basic Program
FASTER.OPT	Simulation options for the F_ASTER module
EASTER.OPT	Simulation options for the E_ASTER module
KAR.ASC	Household characteristics
UITG96.ASC	Expenditures 1996
ASTER.ICO	ASTER Icon
PAR2.EST	Price-coefficients, used in F_ASTER
ENG1.EST	Engelcurve parameters, used in F_ASTER
PRE96.MAS	Tax-rates for of the goods, used in M_ASTER
FASTER.PIF	Pif-file with the settings of the Fortran programs
F_ASTER.EXE	Fortran program of F_ASTER
E_ASTER.EXE	Fortran program of E_ASTER

Table 1: Program files and data files of ASTER

FILE NAME
CMDIALOG.VBX
GRAPH.VBX
MSOUTLIN.VBX
SPIN.VBX
THREED.VBX
VBRUN300.DLL

Table 2: Visual Basic System files of ASTER

Now you can make an icon in the Program Manager to start the ASTER program. You can do this either by placing the ASTER program in a group which already exists (e.g. Main) or you can place the program in a separate, newly created group. You can create a new group by clicking on the *File* option in the menu bar of the Program Manager. Then you click on the first line - *New* - of the pull down menu. The dialogue box of Figure 2 appears on the screen.
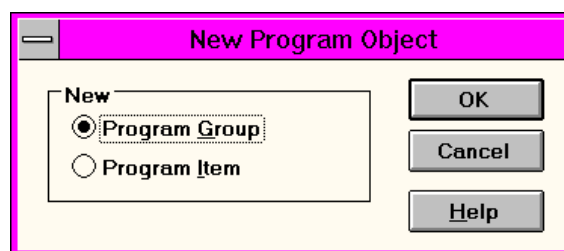

Figure 2: Dialogue box to create a Program Group

How do I install ASTER?

You click on the radio button on the left of **Program Group** and then on the **OK** button. You get the dialogue box titled *Program Group Properties* (Figure 3) where you can give a name to the newly created program group. Type 'A S T E R' for instance, and then click on the **OK** button. The newly created group appears in the Program Manager now and is active. If you did not create a new group, the group *Main* is active. We will now put the program in the active group.
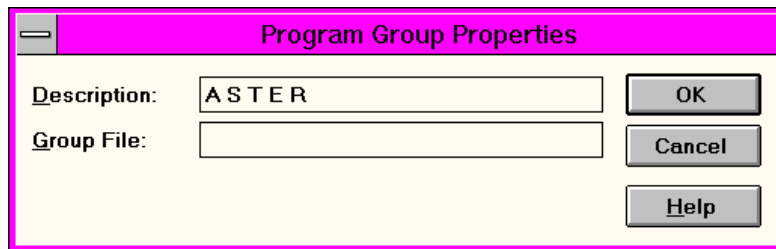
Figure 3: Dialogue box to assign properties to a Program Group

Click again on the **_File_** option in the menu bar of the Program Manager and click again on the **New** option on the first line of the pull down menu. The dialogue box of Figure 2 appears again but now you click on the radio button at the left of **Program Item**. Click on the **OK** button and you get the dialogue box of Figure 4 in which you have to enter where you have installed the program for this icon.
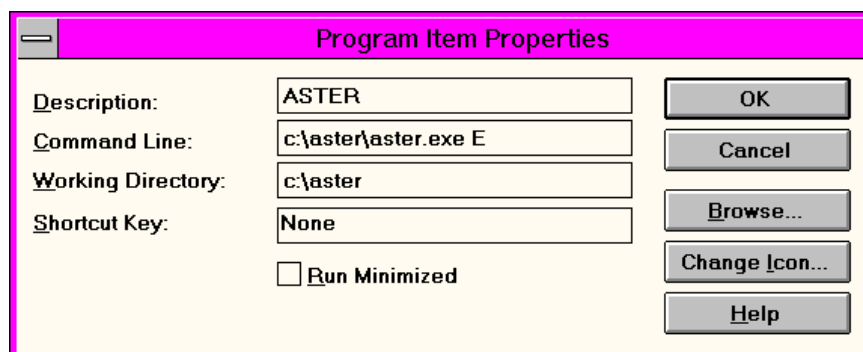
Figure 4: Dialogue box to append the ASTER program to its icon

In the first line you type the name which will be appended at the icon. We suggest 'ASTER' but any choice is possible.

On the second line you type *'C:\ASTER\ASTER.EXE E'* as we suppose that you have installed the software in the directory 'C:*\ASTER'* of your hard disk and '*E'* is one of the two choices for the language-parameter you can submit to the program. The

How do I install ASTER?

alternative for the language-parameter is '*N*'. When you choose '*E*' some names of goods, aggregates and some titles in reports will be in English while 'N' selects Dutch names. The default value of this language-parameter is '*E*'.

Finally on the third line you type 'C*:\ASTER*'. Click on the **OK** button and the ASTER program will appear as an icon.

You are now ready to start the program. However, before you do so we advise you to create first one or more directories like e.g. C*:\ASTER\WORK*. When running ASTER you will be asked in which files and in which subdirectories you want to store the results of ASTER. As you cannot create a new subdirectory from within ASTER - you can only select an existing one- you should do that before. (An alternative is the use of another session with a program that can create directories at the same time as you are running ASTER E.g. you can have a session that runs the File Manager.).

How do I start ASTER?

The program can be started if you double click on the appropriate icon in The Windows Program Manager. ASTER can also be started from the File Manager. Position yourself in the ASTER directory (this is the directory where the ASTER-programs were installed) and click on the ASTER.EXE-filename.

A third way is with the use of the **_Run_** command of the File Manager. After you positioned yourself in the ASTER directory call the **_Run_** command of the **_File_** menu. Then enter 'ASTER' followed by a space and the language parameter of your choice, e.g. 'ASTER E'. Then click on the **OK** button or press **Enter**.

The first time that you run ASTER it is possible that an error is generated due to some options of your operating system, more specifically the number format. When an error message, like the one in figure 5, appears you must click on **OK** and then you have to change the number format of your system.
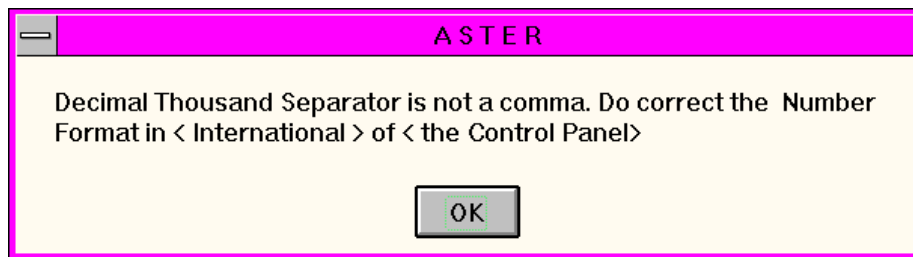
Figure 5: Error Message due to a wrong number Format of the o.s.

To change the number format open the **Main** *Program Group*.   Then click successively on the **Control Panel** and on the **International** icon. This will open a window with the title **'International'.** In the corner at the bottom right the number format of your system is displayed. If you received an error the number most likely will look like '1**.**234**,**22' while the correct format is '1,234.22'. To change the format to the correct format click on the change button next to the number. Then the dialogue box displayed in figure 6 will appear.
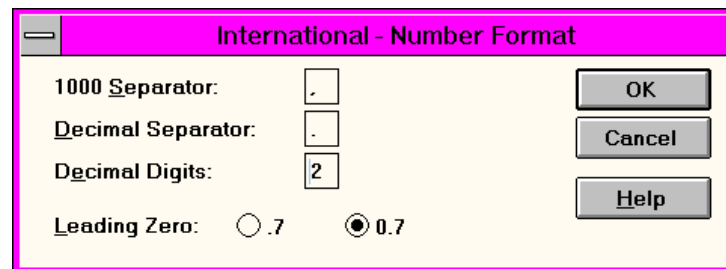

Figure 6: Dialogue box to set the Number Format

In figure 6 the correct format is displayed. This means a comma for the 1000 separator and a point for the decimal separator. If your settings differ, do change them and click on the **OK** button. Then you can start ASTER again.

After you started the program a window pops up with information on how to contact the authors of the program.
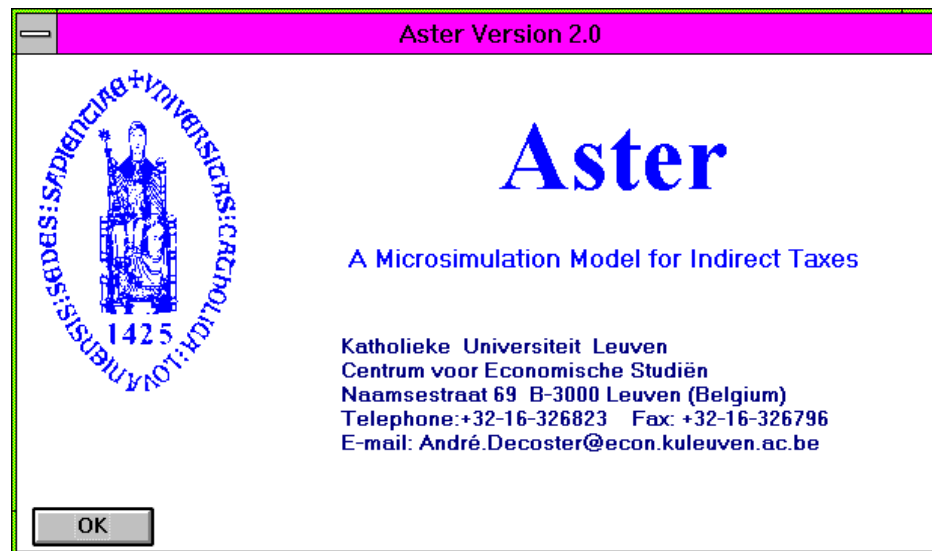
Figure 7: The information window of ASTER

Click on *OK* or press *Enter* to come in the Main Window of the program from where
you can start the different modules of the program. To work with one of the three
main modules click the *__File__* Menu and you get the pull down menu represented in
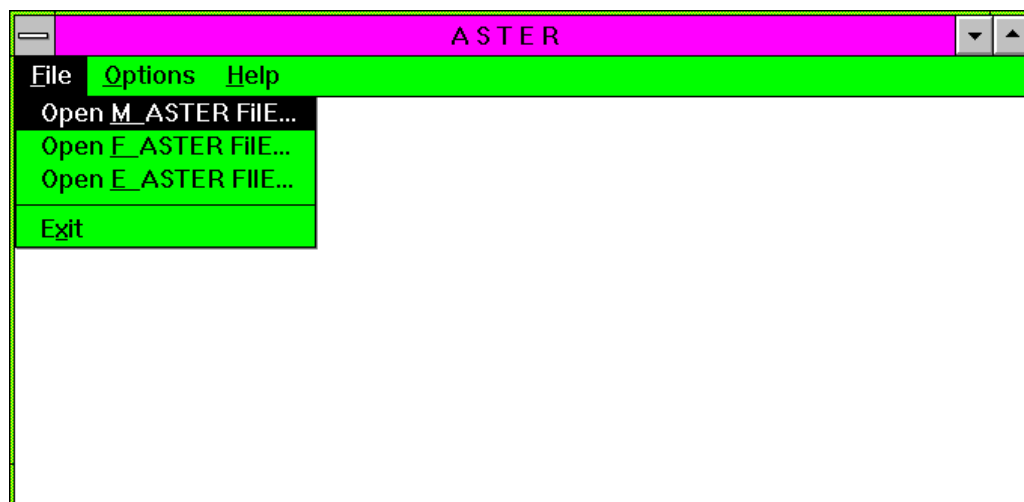Figure 8.

Figure 8: The starting window of ASTER

The menu offers three possibilities corresponding to starting up M_ASTER,
F_ASTER or E_ASTER. On your first use of the program, start with the M_ASTER
option.

How do I start ASTER?

How do I Quit ASTER?

You can exit the program using one of the following methods when you are in the Starting Window of the ASTER program:

1. You can select the ***E<u>x</u>it*** option of the ***<u>F</u>ile*** menu.

2. You can double click on the Control menu box, which is on the upper left corner of the screen.

3. It is possible to select the ***<u>C</u>lose*** option of this Control menu.

4. Finally you can also press ALT+F4.

M_ASTER: When do I use It?

The M_ASTER program is designed to calculate price changes resulting from a change in indirect tax rates: You can _m_odel (or define) a reform by changing the indirect tax rates of 747 items of goods and services. You can select which tax rates you want to change by entering the new post reform tax rates. The program will store the post reform tax rates in a different file with a user defined filename.   So essentially you define two series of prices (called pre- and post reform) and the difference between both can be considered as the effects of a proposed tax reform.

Although it is possible to use a created post reform file as a new pre reform file in a next simulation (just fill in the name of such a post reform file) the main goal of this module is the creation of a file which holds this tax rate changes. Such a file can then be used as the input for the F_ASTER module. It is generated when you actually run the M_ASTER program: normally this is done after changing the prices. So by creating and using different files as pre- and post reform you can generate different inputs for the simulation program. The report functions of M_ASTER allows you to visualise the effects of the changed tax rates.

How do I start M_ASTER?

When M_ASTER is started there appears a dialogue box titled M_ASTER: Select Files. We have reproduced it in figure 9. The M_ASTER program is designed to calculate price changes resulting from a change in indirect tax rates. The baseline situation is called Pre Reform. The changed situation is called Post Reform. The data for both pre and post reform situations are kept in two separate files. These files have exactly the same structure.
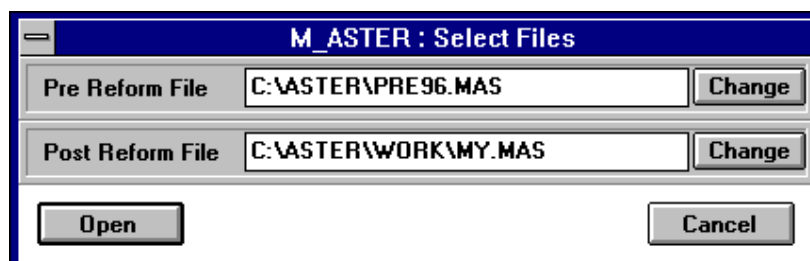

M_ASTER : Select Files

| Pre Reform File | C:\ASTER\PRE96.MAS | Change |
| Post Reform File | C:\ASTER\WORK\MY.MAS | Change |

Open   Cancel

Figure 9: The Select Files window in M_ASTER

The first time you start the program the system will suggest to use the file PRE96.MAS, located in the ASTER subdirectory (by default this is C:\ASTER). This file contains the Belgian indirect taxes on the first of January 1996. But you can use whichever file with the same structure as PRE96.MAS. An example of such a file is the file holding the post reform prices and taxes which is produced in the M_ASTER program. E.g. you might create a uniform post reform tax rate for all goods with M_ASTER and then use that file in a next run as the input file. You can then investigate the effects of raising that uniform rate with a certain percentage.

If you know a filename by heart you can just overtype the name of the Pre Reform File. The default extension for the files used in the M_ASTER Program is **.MAS**. Likewise the default extension for the files in the F_ASTER module is **.FAS**. We advise to keep this convention as this makes it easy to recognise the files that can be used as pre Reform Files. Instead of typing in the name of the file you can also use the *Change* Button at the right of each line. This opens a standard dialogue box for choosing files within a displayed directory structure. This is very handy when the file which you want to use already exists. For more details we refer to the text under the header 'How do I select a file?' further in this manual.

How are Commodities structured in M_ASTER?

Figure 10 is the main window of the M_ASTER program. It has three parts. The upper part contains an option which is not operational yet and hence it is not explained here (a change has no effect).

In the middle part of the screen you will introduce your changes of tax parameters. When it is first displayed, the left part of the screen shows a list (always in Dutch) of 14 aggregates, each preceded by a plus sign. These aggregates are the upper levels of the tree that is used to structure the 747 items.

Figure 10: M_ASTER main window

The tree contains three levels. The upper level consists of 14 aggregates. Each aggregate can be unfolded by clicking the *plus* sign at the left of the aggregate. E.g. the first aggregate 'Voedsel (Food)' can be unfolded into 9 items on the second level: 'Brood (Bread)', 'Vlees (Meat)', 'Vis (Fish)', and six others. There are in total 33 items on this second level. Except for the last group 'N.E.G. (Not Classified Elsewhere)' this second level corresponds to the structure of the matrix of price and total expenditure elasticities used in the F_ASTER program. Deploying the aggregates one step further you find the 747 leaves of the tree. E.g. 'Vlees (Meat)' can be unfolded into 41 different kinds of meat, among which chicken, steak, lambsmeat, etc. These items at the third level are the individual commodities for which the respondents of the budget inquiry have recorded their expenditures and quantities. Clicking on the *plus* sign changes it into a minus sign. To close an aggregation you click on the *minus* sign.

When there are more items in the list box than can be simultaneous displayed you can scroll through the list by clicking somewhere on the scroll bar, or by putting the

mouse pointer on the upper or down arrow of the scroll bar and then keep the left mouse button pushed in.

The very bottom of the window displays the total tax rate on the whole consumer budget in both the pre and post reform situation. This tax rate is calculated by dividing the total amount of taxes by the total amount of expenditures. In 1996 the Total Indirect Tax Rate equals 12.8%.

The boxes with the information about the consumer price index are not operational yet.

How do I select a Commodity in M_ASTER?

Every item that is displayed in the left window of the M_ASTER main window can be selected. It is not sufficient to scroll over the items in the list box by moving the cursor with the up or down arrow keys. You really must move the mouse to an item and then click once with the left mouse button. Then the name of the commodity will appear in the right part of the screen to the right of the word '*commodity*'. Of course, to select an item that is on the third level you first have to go down to that level. But it should be clear that elements on the three levels can be selected.

How do I get Tax Information from M_ASTER?

When an item is selected the tax rates for that item are shown. The first row under the name of the commodity gives the VAT rate of the item, the second row the Excise rate and the third row shows the Ad Valorem rate. In the fifth row the total tax rate is shown. The fields in the left column present the pre reform situation while the middle column gives the post reform situation. In the right column the difference between post-and pre reform situation is calculated.

The fields on the right of 'Expenditures' show the amount of money spent on the commodity. These are not the real figures of the budget survey but the figures of the survey multiplied by a factor such that they are in prices of January 1996. The budget shares are displayed in the last row and are the true shares from budget survey.

Furthermore, both figures are means over all households, therefore sometimes unrealistic expenditures as 7 Bfr. will appear.

The price of those products which have an excise in the pre reform situation is also shown. This price is the consumer price. The price is only shown on the third level. Except for the price, all information is available at all three levels of the tree structure. It should also be clear that on the first two levels the excises are expressed proportional to one, while on the third level values are expressed in Belgian francs.

When we look e.g. at the taxes of 'Voedsel (Food)' we see that at the upper level the mean excise is only 0.001 %. This is so low because there are only excises for 'koffiebonen (coffee-beans)' and 'oploskoffie (grind coffee)'. When you go to the third level you can see that the respective amounts are 10 and 28 Bfr.

How do I Change Tax Parameters in M_ASTER?

Where do I make the Change?

Most fields displaying information about the tax rates of a commodity have a light yellow background colour. However, some of the fields have a white background colour. These *white* boxes indicate the fields where you can enter new data. This can be the post reform VAT Rate, the post reform Excise Duty and the post reform Ad Valorem Rate. The difference between the post and pre reform value is calculated and displayed after you filled in a new value and pushed the ***Enter*** button or click on another item of the list.

How do I change an excise duty?

In changing tax rates we must make a distinction between changing the VAT rate and the Ad Valorem taxes on one hand and changing the excises on the other hand. This is because the excise is expressed in Belgian francs per unit of the good. This unit is e.g. one kilo for coffee or one litre for beer. ASTER transforms the excise ***duty*** into a tax ***rate*** (i.e. the excise duty divided by the price). Hence you need a price when there

is an excise for a product. To change a post reform *excise* you must go down to the lowest level of the disaggregation. If you change an already existing excise duty the pre reform consumer price is already available in the dataset. So you don't have to worry about consumer prices in that case. But when you enter a post reform excise for a product that does not have a pre reform excise, you must provide the program with the consumer price in the pre reform situation. Therefore you position the cursor on the price field and click *Enter*. By default the consumer price has been set to 1 Bef, which is a standard normalisation under the assumption of constant producer prices and has nothing to do with the observed market prices. You can now enter a new pre reform price. Keep in mind that you use a price for the same unit as the one on which the excise duty is based (e.g. if you introduce an excise for one kilo of bread, you should give the consumer price for a bread of one kilogram). When you press *Enter* again the post reform price is displayed.

For any other level than the one of the individual items, the excise box displays the tax after it has been transformed into a tax *rate*.

How do I change a VAT or Ad Valorem rate?

For the *VAT and the Ad Valorem rate* things are much easier. You can introduce a new rate at any level of the aggregation. Of course changing a tax rate of an item of the first or second level changes all tax rates of the items of the level beneath that belonging to it.

Besides changing the *VAT rates* for each item separately M_ASTER has an option to change a post reform tax rate in a *global* manner. Assume that you want to increase the VAT rate of 6% to 7%. It would be a huge amount of work to look up all items with a pre reform rate of 0.06 and to change the rate to 0.07. Instead you can use the **_ReplacE_** Option of the **_Edit_** Menu. Click this **_ReplacE_** option and you get the window of Figure 11.

You can change the post reform tax rate on the base of the value of either a pre reform or a post reform tax rate. Click on one of the radio buttons in the inner box. At the

bottom of the window you enter the new tax rate. When you have chosen the upper button ***Pre Reform VAT rate of x%*** this means that the post reform VAT rates of all goods that have a pre reform VAT rate of x% will be changed. This is a good way to undo the entered post reform VAT rates.

Figure 11: The Window for a global change of VAT rates

It is also a good tool to see the effects of a gradual increase of VAT rates of e.g. 6% to 10% in steps of 0.5 %. If you choose the second button (***Post Reform Vat Rate of x%***) things run differently. Then the post reform VAT rates of all goods that have a post reform VAT-rate of x% will be changed. Take the example where we first change the 6% rate into 20.5%. But then we change our mind , and decide to replace 20.5% again into 6%. If you choose the second button for this, not only the goods which had 6% before the first step, but also all other commodities with a 20.5% rate will be set to 6%. Note that it is always the post reform value which is changed, never the pre reform one. The global change is put into effect by clicking the ***Replace*** option at the bottom. Before you return to the main M_ASTER window a message box will appear with the number of items which have been affected by the change. Clicking on ***Cancel*** instead of ***Replace*** cancels the request of changing the values.

Why and how do I run M_ASTER?

You can run the M_ASTER module by clicking on the **Run** menu. This generates the input file for the simulation program F_ASTER. This file will contain the pre- and post reform tax rates and consumer prices for the 32 commodity breakdown. The pre- and post reform prices are put together to be used later on in the F_ASTER program.

The name of the file can be chosen in the window which appears immediately after you have clicked on the **Run** menu (which is in the title bar of the ASTER window). The resulting window, with 'Run: Generate F_ASTER File' in the title bar, is a general purpose dialogue box that is used everywhere in Windows-programs to select a file. We refer to the paragraph on selecting files - 'How do I select a File?' - further in this manual for more details about this mechanism. In the window you can enter or select the name of the file which transfers the tax and price information to the F_ASTER module. The default extension for these files is **.FAS**. As explained above the default path and name are the same as those of the post reform M_ASTER file.

How do I get a Report of the Changes in M_ASTER?

After changing some tax rates it may be interesting to see an overview of these changes. This can be obtained by clicking on the **_Report_** option in the menu bar of the ASTER window. You get a window like in figure 12.
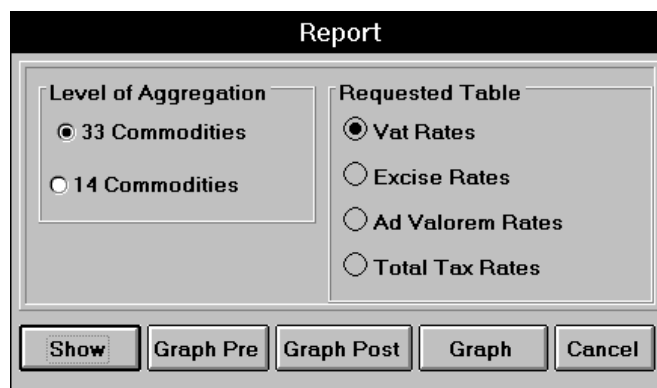

Figure 12:

M_ASTER: the Report Window.

In all modules of ASTER it is possible to see the results displayed in both a text mode showing the exact numbers in a tabular format or in a more graphical way. Both modes can be printed as you can print out all screens.

To see the summary of what you have changed to the tax structure in the M_ASTER program you can click on one of the four buttons at the bottom of the Report window. By clicking on the *Show* button you get a summary table showing aggregate name, pre reform rate, post reform rate and the difference between both values. These values are all expressed in percentage changes. You will get 14 or 33 aggregates depending on which level of aggregation you select in the upper left part of the Report Window. Indicate which kind of tax rate you want to see by selecting the appropriate rate in the upper right part of this window. It is clear that by combining these choices 8 different summary tables can be generated. For information on how to print these tables we refer to the description of the general reporting facilities below (See section: 'How do I make a Report in Text Mode?').

In M_ASTER we offer three different ways to display the differences in tax structure among the aggregates graphically. By clicking on the *Graph Pre* button the pre reform values of the selected tax in the right column is displayed. The post reform tax rates of the aggregates can be obtained by clicking on the *Graph Post* tax rate while both pre- and post rates are shown when you click on *Graph*. In all presentations the type of graph can be chosen, as is also explained further on in this text below (See section: 'How do I make a Report in Graphical Mode?').

How do I quit M_ASTER?

To close the M_ASTER window double click on the upper left corner of the M_ASTER window or click on the *Close* option of the *File* menu of the M_ASTER window. Be careful not to close the window of the main ASTER window, the title bar of which is above the M_ASTER window. If you have made changes to the data you get the standard dialogue box to define the filename under which you want to save the changed post reform situation. The file with the pre reform information is

never changed. (Unless you used the name of the pre reform file as the post reform file in the dialogue box when starting M_ASTER, cf. figure 9). But in a later run of M_ASTER you can load the file you have now saved as post reform, as the pre reform situation.

How do I quit M_ASTER?

F_ASTER: What does it do?

The F_ASTER program simulates the new expenditure pattern and resulting tax payments for each individual household based on the changes in consumer prices as defined in M_ASTER. So the main information source is a file with tax and price information resulting from the reform defined in M_ASTER. When F_ASTER has run the effects can be seen for every household as well as on a summary level. The user can change the value of five parameters of the simulation process.

How do I start F_ASTER?

To start the F_ASTER program click on the *File* option in the menu bar of the main ASTER Window. Choose the second line of the pull down menu: *Open F_ASTER file...* You get the dialogue window shown in Figure 13 which allows you to define a set of input and output files. It also allows you to set the simulation options.
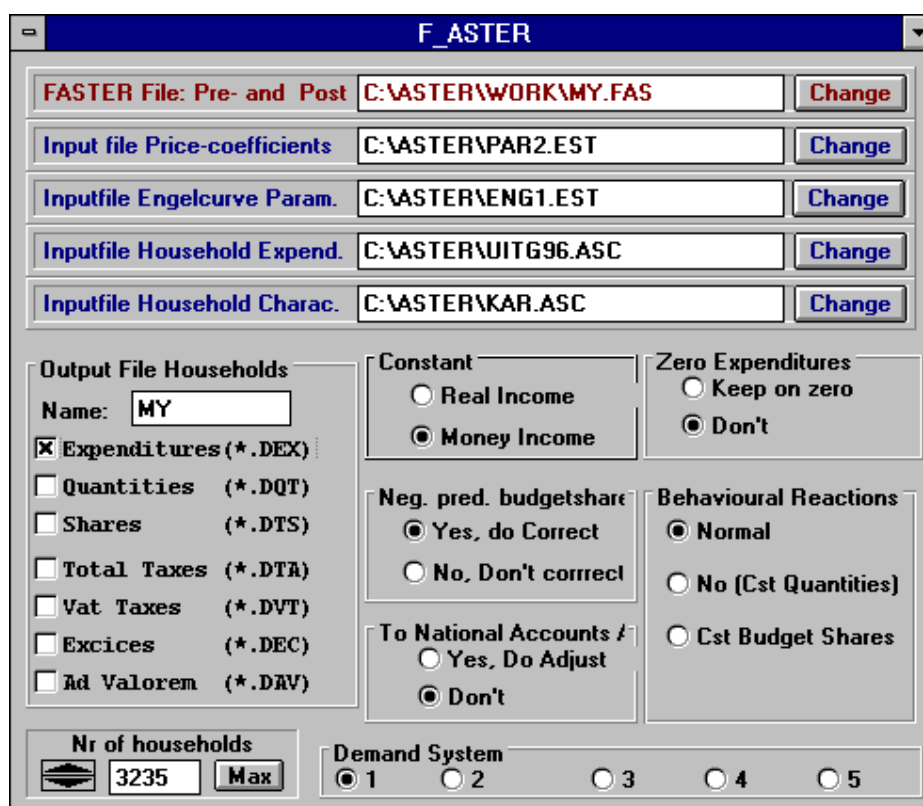

Figure 13: F_ASTER Main Window

How do I define the input Files in F_ASTER?

The first line defines the file with the tax and price information, resulting from the reform defined in M_ASTER. By default the last generated **.FAS** file is displayed here. If you want to choose another name, either enter the name directly on the line, or click the *Change* button. You can select a file in the standard dialogue box with directory structure and file names. On the next four lines the names of the files holding Price coefficients, Engelcurve parameters, household expenditures and household characteristics can be defined. If you installed ASTER in the standard way these files can be found in the C:\ASTER directory. For the moment no alternative sets of parameters are available. We strongly discourage the user from changing these files with a text editor or any other editing tool.

How do I define the output Files for F_ASTER?

The output files are generated in the **same directory** as the file which holds the pre- and post reform taxes. This is also the directory that is specified in the upper line of the F_ASTER Main Window. This facilitates the grouping of all files which are involved in a particular run of the whole ASTER program. F_ASTER can produce a maximum of 9 output files. All these files have the same name but a different extension. This name can be specified in the window to the left of the prompt 'Name' under the title 'Output File Households'. (In the example of Figure 13 this name is 'MY.'). Be careful to enter only valid filenames as there is no validity check that the name you enter conforms to the naming conventions of the operating system of your PC. (Do not use spaces e.g.)

F_ASTER always produces at least two output files. The first is the **S**ummary **S**tatistic **O**utput file with the extension **.SSO**. This file holds the main simulation results. The second file contains the information about total tax payments for every household in the sample. Its extension **.TPO** stands for **T**ax **P**ayments **O**utput. It is this file which will be transferred to the third module, E_ASTER, to assess the distributional impact of the reform.

The output of the 7 files holding household information is controlled by the user: when the corresponding fields to the left of the described output files (used file-extensions are between brackets) are marked the files will be generated. You are not able to see all possible results if you don't select all options. On the other hand, if you do not select any option, the simulation program still will run and it will be possible to see the main simulation results as these results are stored in the **.SSO** file. It is worthwhile noticing that when you select all options and you choose the maximum number of households, you need about 10 Mbytes free diskspace (which you can of course delete after you have seen the results).

The first **.DEX** file holds the **D**etailed **EX**penditures for every household in the sample. It has the same structure as UITG96.ASC, the file we provide with expenditure data. Hence this generated .DEX file can be used as the input file for Household Expenditures in a next simulation run of F_ASTER. The exact format of the .UITG96.ASC file and a DEX-file is: On the first line there is an indication of the type of the file. The subsequent lines contain first a '*'-sign, then the household number (6 positions) and finally the values for each commodity, 7 positions each.

The file with the **.DQT** extension keeps information about **D**etailed **Q**uan**t**ities while the **.DSH**-file holds **D**etail **Sh**are data for every household in the simulation. The last four files **.DTA**, **.DVT**, **.DEC** and **.DAV** hold information about the **D**etailed Total **Ta**xes, the **D**etailed **VAT** **T**axes, the **D**etailed **Ex**c**i**ses and the **D**etailed **A**d **V**alorem taxes for every household in the F_ASTER simulation run. The format of the data is similar for all these files. Every line starts with an '*', then there is the household number (6 positions) and then there are the 32 pre reform values (one for every commodity) followed by the 32 post reform values (one for every commodity). The length of each reform value is always 8, except for the file with the detailed Shares (**.DSH**) where it is only 5 long.

All this information, when selected before the simulation runs, can be seen in one of the reports. It is also possible to analyse these files with standard statistical programs like SAS or to use the results in Excell or other spreadsheets.

How do I change the Options for a Simulation in F_ASTER?

There are 5 different options the user can select before he runs the program and which influence the outcome of the simulation.

How do I change the Sample Size?

You can determine how many households the simulation will use. Type the number of households in the left field at the bottom of the F_ASTER Main Window or increase or decrease the number by clicking on the corresponding sign on the left of the indicated number. You can also select the maximum number of households (this is 3235) by clicking on the *Max* button. This maximum number will also appear if you type a larger number than this allowed maximum. The minimum number of households for a simulation is 10. Normally you will simulate with the complete sample, but the option can be interesting to shorten run time during test simulations. The choice of the households if you enter a figure smaller than 3235 is sequential, not random, nor based on household characteristics. If you work with a test sample of 100 households several times, the sample will always contain the same 100 households.

How do I keep Money or Real Income constant?

You have the choice between keeping *Money* or *Real* Income constant. If you choose to hold real income constant, nominal expenditures are adjusted for price changes as computed by a price index.

How do I correct if the predicted Budgetshare is negative?

Nothing prevents our behavioural model to produce negative budget shares. If you do not like this, choose the option *Correction*. A negative share is then set to zero, and all other shares are adjusted proportionally to keep adding up of the budget constraint satisfied.

How do I keep Zero Expenditures on zero?

Due to the fairly disaggregated structure of the demand system, there are many zero expenditures in the survey. It is a topic for future research how one should deal with the zeros during simulation. Waiting for satisfactory results of this research, we have solved the problem in a pragmatic way. Either the zeroes are fixed on zero and there is a proportional adjustment in the other budgetshares. This is the option *Keep on zero*.

Or you choose not to intervene in the simulation if pre reform zero expenditures turn into non-zero values during simulation. This is the option *Don't*.

How do I choose the Behavioural reactions?

Here you have three possibilities. The first option is *Normal* which means normal behavioural reactions. The simulation then uses the price and total expenditures elasticities from the estimated demand system.

The option *No (Cst Quantities)* stands for no behavioural reactions and Constant quantities. This means that all price and total expenditures elasticities are assumed to be zero. Since prices have been changed and quantities are kept constant this implies that nominal expenditures have to be adjusted. New prices are multiplied by old quantities to compute the new total expenditures. This might conflict with what you have chosen under the **Money Income held constant-***option*. The latter option will be neglected when constant quantities is selected.

The third choice *Cst Budget Shares* lets the simulation work with the assumption that all total expenditure elasticities equal one, all own price elasticities equal minus one and all cross price elasticities equal zero. This produces effects on the quantities so that the budget shares remain unaffected.

There are two more options on the screen which do not (yet) influence the program.

Can I adjust Budget Survey Expenditures to National Accounts Aggregates?

One of the main topics for future research is the study of grossing up the data of the budget survey to the national level. Choosing *Yes, Do Adjust* gives the impression that you could do this task now already. But the data and procedures to gross up the figures in a reliable way are not available yet. So whichever option you choose, the effect will be the same. So we advise you to select the *No* option as this corresponds to what is really happening.

Can I use another Demand System?

In future versions of ASTER we intend to provide other demand systems. For the moment there is only one and this demand system is always used, whichever option you indicate.

How do I run F_ASTER?

You can start the actual simulation program by clicking on the **Run** Menu. The program then asks for a title as you can see in Figure 14.
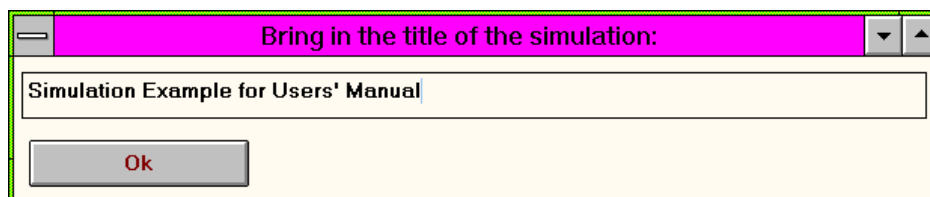
Figure 14: F_ASTER Simulation Title

When you have finished typing the title click on **Ok** and the simulation program will start running. This brings up a screen like the one in figure 15a. This screen looks slightly different from the windows seen so far as it is not a Visual Basic window but an output screen of the Fortran program that was called to perform the simulation. During the run of the simulation program the title of the simulation is displayed on a green background, as well as the progression of the program. If you have a black instead of a green background, you probably did not install the ansi.sys correctly. (see p.4)
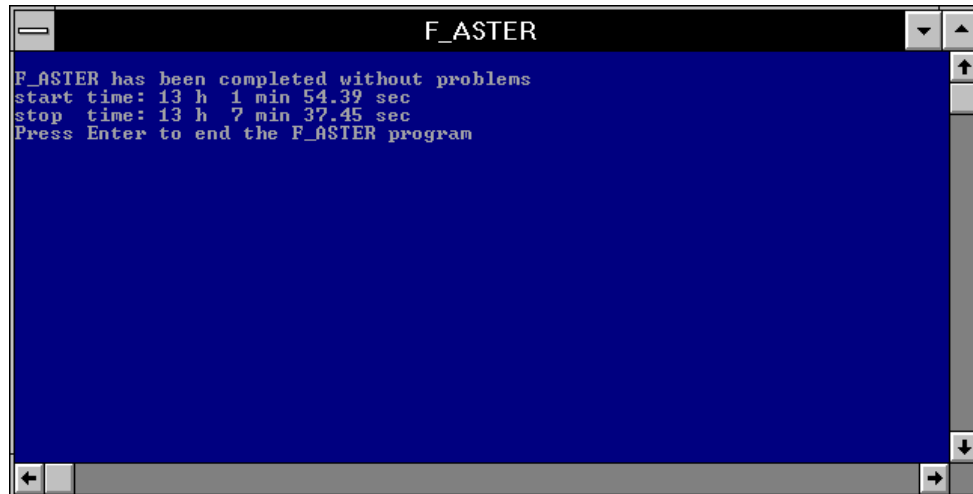
Figure 15a: F_ASTER Fortan Output Screen during the Run

When all households (this is the number you indicated) are processed, the program clears the screen and changes the background colour to blue. As shown in figure 15b a message and the start and stop time of the simulation program is displayed. Of course the time it takes to complete the simulation depends on the number of households you have selected and on the type of computer you use.

You can proceed with the program by pressing the **Enter** key. This closes the Fortran-output screen and returns control to the Visual Basic program again. You then are ready to look at the results of the simulation.

The input-files and the options that have been used for the run are saved in the file FASTER.OPT

Figure 15b: F_ASTER Fortan Output Screen at the End of the Run

How do I get a Report of the F_ASTER Output?

The Report-menu of F_ASTER has several options. When you click on *Report* you can choose to see the results of the simulations done so far with F_ASTER (option Results) as well as to see information of the parameters that have been used (Engel-curve parameters, total expenditures elasticities, price Coefficients and price elasticities)

How do I view the Engelcurve Parameters?

The Engelcurves are specified with a linear and a quadratic term in the log of real expenditures, denoted respectively by β and λ. They have been estimated for four different subgroups of the households, depending on whether there is a smoker in the household and whether the household has at least one car. It is possible to view the values of the β and λ parameters of the file that was specified on the third line of the F_ASTER main window as the Input File for the Engelcurve parameters. In figure 16 we show the β-parameter values for all 32 commodities by subgroup, and a weighted average in the last column. The layout of the results for the λ-parameters are alike.

How do I view Total Expenditures Elasticities?

Although the simulation program uses the β- and λ-parameters, the user might be more interested in the implied total expenditure elasticities. These elasticities are computed with the weighted mean budget shares of each subgroup in the budget survey inquiry of 1987-1988. Once again this is done for the 32 aggregates in function of the four possible combinations of the two household characteristics. Figure 17, which shows these values, can be obtained by clicking on the option *Total Expenditure Elasticities* of the pull-down menu of *Report*.

Beta Parameter from file C:\ASTER\ENG1.EST

File   Copy

Aggregate	no car no smoker	car no smoker	no car smoker	car smoker	weighted mean
Bread	0.04999	-0.00955	0.11108	0.05153	0.03565
Meat	0.30121	-0.03412	0.34814	0.01281	0.08169
Fish	0.07831	0.00774	0.08454	0.01397	0.03041
Dairy	0.02668	0.03055	0.02583	0.02970	0.02907
Oil Fats	-0.01291	-0.03675	-0.00584	-0.02967	-0.02677
Vegetables	0.12687	0.05975	0.13816	0.07104	0.08382
Coffee	0.01274	-0.00385	-0.00517	-0.02176	-0.00757
Sugar	0.06257	0.04866	0.05854	0.04462	0.05067
Other Food	0.02691	-0.00718	0.03277	-0.00132	0.00510
Soft drink	0.04949	0.01706	0.02846	-0.00397	0.01632
Beer	0.05526	0.02622	0.02479	-0.00425	0.02012
Alcohol	-0.00784	0.01128	-0.00421	0.01491	0.00762
Wine	-0.00640	-0.00115	-0.00272	0.00253	-0.00090
Tobacco	0.04794	0.00579	-0.05243	-0.09458	-0.02928
Clothing	0.35153	0.36619	0.38904	0.40370	0.37960
Rent, Tax and W	-0.39454	0.36010	-0.99201	-0.23737	-0.13022
Coal	-0.18882	-0.01288	-0.30038	-0.12444	-0.11424
Gas	0.03647	-0.05365	0.06529	-0.02483	-0.01496
Electr Heat	0.00991	0.00049	0.01833	0.00891	0.00706
Fuel	-0.12544	-0.10789	-0.03451	-0.01697	-0.07034
Electr Light	-0.00071	-0.01678	-0.07278	-0.08885	-0.04594
Durables	-0.06309	-0.31387	-0.30381	-0.55459	-0.35607
House Maintenan	0.04697	-0.09229	-0.01181	-0.15107	-0.08075
Hygienics	0.14216	0.22165	0.35372	0.43321	0.29819
Use Private Tra	0.00207	0.01764	0.00966	0.02523	0.01682
Gasoline	-0.01784	-0.14407	0.08845	-0.03778	-0.05909
Gasoil	0.02085	0.05755	-0.00148	0.03522	0.03685
LPG	0.00940	0.00592	0.01439	0.01091	0.00922
Public Traffic	0.02125	0.02207	0.05084	0.05167	0.03566
Other Transport	-0.05086	-0.01317	-0.04682	-0.00913	-0.02183
Leisure goods	-0.43512	-0.23854	-0.04890	0.14768	-0.11321
Services	-0.17499	-0.17292	0.04086	0.04293	-0.07270

Figure 16: Beta Engelcurve Parameter as calculated from ENG1.EST

How do I get a Report of the F_ASTER Output?

```
┌─────────────────────────────────────────────────────────────────────┐
│ ─        Total Expenditure Elasticities from file C:\ASTER\ENG1.EST   │
├─────────────────────────────────────────────────────────────────────┤
│ File   Copy                                                           │
└─────────────────────────────────────────────────────────────────────┘
```

Aggregate	no car no smoker	car no smoker	no car smoker	car smoker	weighted mean
Bread	0.60693	0.37922	0.69808	0.38032	0.45421
Meat	0.82388	0.41574	0.81252	0.42310	0.53123
Fish	1.13914	0.74456	1.00509	0.64296	0.80373
Dairy	0.63190	0.42652	0.62960	0.39169	0.47163
Oil Fats	0.52467	0.09618	0.54494	0.08081	0.21322
Vegetables	0.77415	0.50397	0.77116	0.48129	0.57137
Coffee	0.61469	0.38941	0.47450	0.23592	0.38239
Sugar	0.89865	0.68342	0.78452	0.56531	0.68900
Other Food	0.81277	0.47533	0.84606	0.48056	0.57559
Soft drink	0.89901	0.56481	0.79469	0.59429	0.65623
Beer	1.11664	0.69743	0.61333	0.50795	0.68898
Alcohol	0.71797	0.89713	0.80827	0.92532	0.86752
Wine	1.16864	1.16682	1.18230	1.13778	1.15885
Tobacco	0.00000	0.00000	0.43235	0.26565	0.14390
Clothing	1.10787	1.06411	1.08389	1.03141	1.06213
Rent, Tax and W	1.17403	1.12037	1.24591	1.23252	1.18298
Coal	-0.20884	0.38766	-0.21716	-0.38792	-0.05025
Gas	0.68340	0.51952	0.71677	0.41621	0.53342
Electr Heat	1.17743	1.65645	0.92635	1.12912	1.30894
Fuel	0.18293	0.33839	0.52230	0.64524	0.44203
Electr Light	0.64949	0.44649	0.56004	0.39313	0.47411
Durables	1.67072	1.87096	1.47802	1.90338	1.80324
House Maintenan	1.12296	1.13136	1.07064	1.19600	1.14528
Hygienics	1.06592	1.11560	1.13614	1.03649	1.08252
Use Private Tra	1.86839	0.87656	1.70216	0.86850	1.13169
Gasoline	0.54715	0.55824	1.50244	0.52858	0.65849
Gasoil	1.33460	0.94131	0.13308	0.91894	0.90066
LPG	1.11038	0.80870	1.18704	0.72204	0.87214
Public Traffic	0.59506	0.94670	0.71825	0.75620	0.79660
Other Transport	0.76292	1.35128	0.92406	1.44029	1.23669
Leisure goods	0.86464	1.04077	1.02072	1.02689	1.00520
Services	0.90500	1.15343	1.05470	1.02590	1.05730

Figure 17: Total Expenditure Elasticities as calculated from ENG1.EST

How do I view the Price Coefficients?

A third series of values that can be displayed on the basis of an input file of ASTER are the price coefficients. These are the γ-parameters of the QUAIDS specification. When you click on the option *Price Coefficients* of the pull-down menu of *Report* the dialogue box as displayed in figure 18 appears.
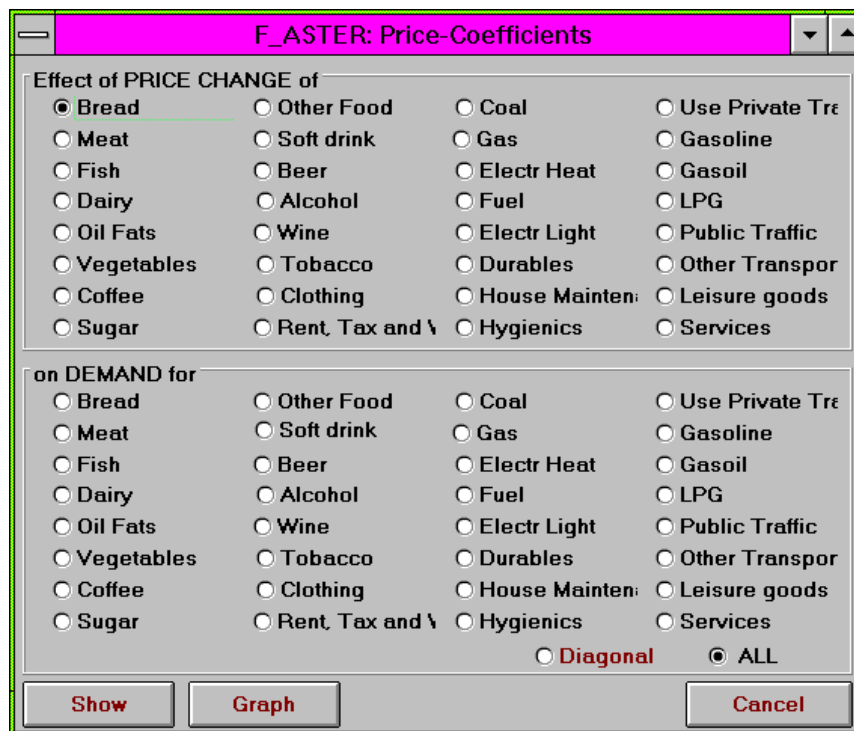
Figure 18: Dialogue window to select aggregates for showing price-coefficients

The dialogue window of figure 18 basically consists of two parts. In both parts all aggregates are displayed, preceded by a selection button. In the lowest part there are two extra selections: Diagonal and all. To see the effect of a price change of one aggregate on the demand for one or more aggregates click on an aggregate in the upper part of the window and on an aggregate in the lower half. E.g. you can click on 'Bread' in the upper half and on 'Meat' in the lower part to see the effect of a price change of bread on the demand for meat. To actually see the value of that price-coefficient click on the **Show** button.

To see the effect of a price change of one aggregate on the demand for all other aggregates you must select **ALL** instead of one particular aggregate in the lowest part of the window. When you click on **Show** a report, like the one in figure 19, will be displayed. Instead of clicking the **Show button** you can also click on the **Graph** button. Then you will see a graph of these price-coefficients. An example of such a graph can be seen in figure 20.

How do I get a Report of the F_ASTER Output?

```
─    Price Coefficients from file C:\ASTER\PAR2.EST
File   Copy
```

```
        Effects of changes in the price of Bread

on the demand for:
        Bread                        0.01204210
        Meat                        -0.00054640
        Fish                         0.00402549
        Dairy                       -0.00258475
        Oil Fats                     0.00029352
        Vegetables                  -0.00104646
        Coffee                       0.00057389
        Sugar                        0.00427507
        Other Food                   0.00254892
        Soft drink                  -0.00022321
        Beer                        -0.00029177
        Alcohol                     -0.00010972
        Wine                        -0.00026615
        Tobacco                     -0.00039779
        Clothing                    -0.00182152
        Rent, Tax and Water         -0.00268494
        Coal                        -0.00009331
        Gas                         -0.00030653
        Electr Heat                 -0.00010367
        Fuel                        -0.00037742
        Electr Light                -0.00041463
        Durables                    -0.00323761
        House Maintenance           -0.00094854
        Hygienics                   -0.00270603
        Use Private Traffic         -0.00063531
        Gasoline                    -0.00053296
        Gasoil                      -0.00016994
        LPG                         -0.00000766
        Public Traffic              -0.00014999
        Other Transport             -0.00007370
        Leisure goods               -0.00219629
        Services                    -0.00183272
```

Figure 19: Effect of a price change of one aggregate on the demand for the others
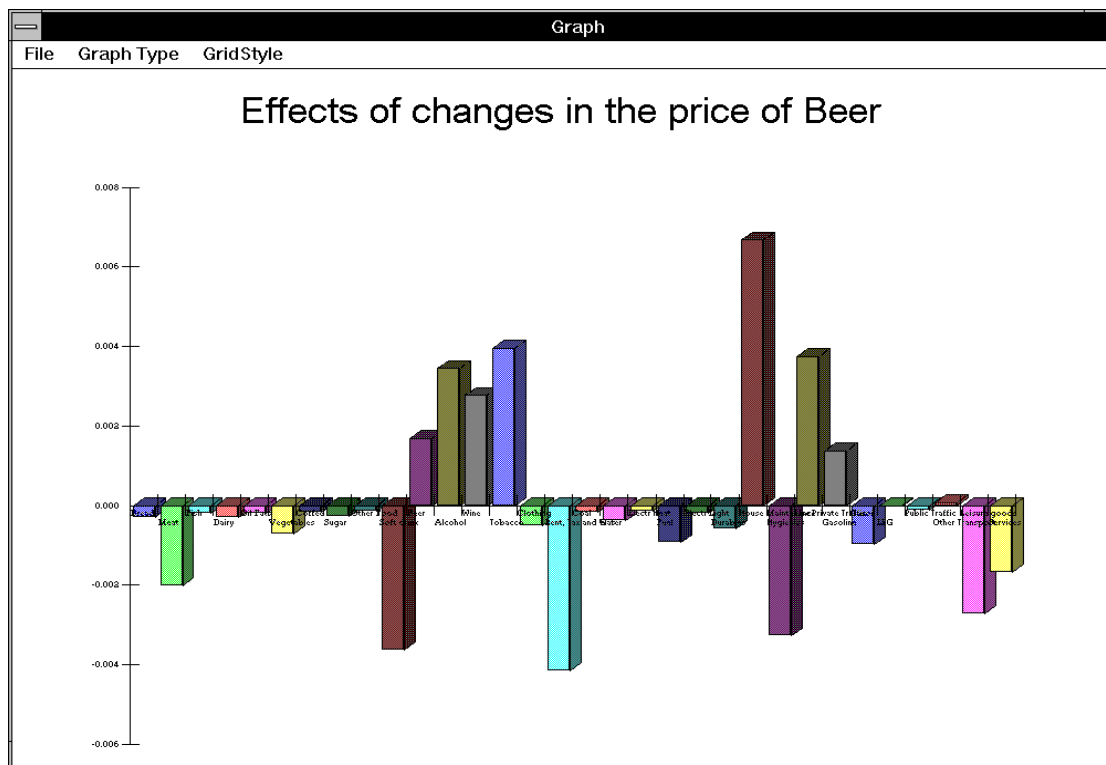
Figure 20: Graph of a price change of one aggregate on the demand for the others

How do I get a Report of the F_ASTER Output?

A third possibility is the report of the diagonal price-coefficients. This can be obtained by clicking on *Diagonal* and subsequently on the *Show button* or on the *Graph* button.

How do I view Price elasticities?

The same mechanism as described above (How do I view price coefficients?) is used to show the price elasticities between aggregates: You first get a selection window with the same possibilities as above and after you have made your selection a table or graph is displayed. The price elasticity not only depends on the parameter γ but also on the expenditure elasticity. Therefore price elasticities are calculated for the four subgroups (smokers, non smokers, car owners and non car owners).

How do I view the Results of the simulation?

Whereas the former reports were based on the values of input-files, clicking on the option *Results* of the pull-down menu of *Report* gives you information of a simulation you have run. This means that contrary to the already explained reports you first have to run a simulation before you can see these results. A second important remark is that it is not always possible to see all possible results as that depends on what you have selected as output files. It is obvious that only those results can be displayed that are selected by putting a cross before their name in the 'Output File Household'-section of the F_ASTER main window. (see the section on 'How do I define the output-files for F_ASTER?'). Of course you cannot get information about a household that did not take part in the simulation because you limited the number of households for the simulation. But it is always possible to get all information on the aggregates.

Clicking on *Reports* results in a window like the one in figure 21 being displayed. In the title of the window the file name which was chosen for the output files is shown. In this window you can indicate which results of the simulation you want to see.
A selection in the upper part - if possible - shows information about the household whose number is displayed on top of that window. You can change this number by

clicking on the up-arrow or down-arrow or by typing in a number. It is obvious that this number cannot be bigger than the number of households involved in the simulation.
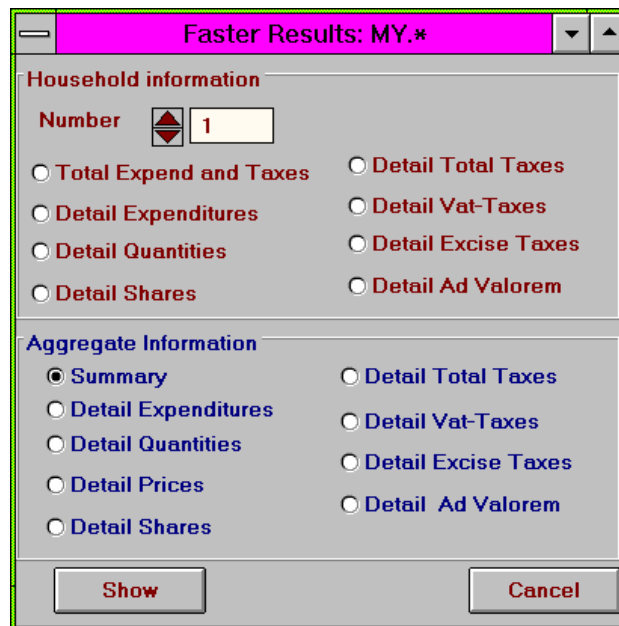
Figure 21: F_ASTER Simulation Reports

Figure 22 e.g. shows the total expenditures and taxes for the eleventh household of the simulation. This is the household with the number 1681. This selection of ***Total Expend and Taxes*** results in a report that gives a.o. information on the total expenditures and taxes which that particular household is supposed to spend in pre- and post reform under the specified conditions of the simulation.   The Total Expenditures and the first four Tax figures are again in Belgian francs of January 1996. The second table of the report situates the household on 18 variables. Among these are e.g. 'Leeftijd gezinshoofd (Age head of the family)', 'Aantal auto's (Number of cars)' and 'Roker/Niet Roker (Smoker/ Non Smoker)'.

The other reports on households give a more detailed picture of the different taxes, expenditures, quantities, and shares for the 32 commodities.

Figure 22: Total Expenditures & Taxes for a particular household in F_ASTER

The information on the aggregates can be seen after the selection of an alternative in the lower part of the Report window of figure 21. A summary of the simulation is reported after clicking on the **Show** button when **Summary** has been selected first. In fact this is the default option as it gives a report about the files and options that were used in the simulation, as well as an overview of the main results of the simulation. An example of a possible *summary* of a F_ASTER simulation is shown in figure 23. This report shows the date and time of the simulation, the title, the number of households used and the options and files used in the simulation. In the second half of the report the pre- and post reform values of the total expenditures and the total amount of taxes are shown in prices of January 1996. Two tax rates, computed over all aggregates, the Stone Price Index and the real total expenditures are also displayed in this screen. All this information is calculated from the file with the **.SSO** extension.

The other reports on aggregates give a more detailed picture of the pre- and post reform values of taxes, expenditures, quantities, prices and shares for all 32

commodities. The difference between the post- and the pre reform value is also shown, as well as the percentage change.

Figure 23: F_ASTER: Summary Report

How do I quit F_ASTER?

The F_ASTER module can be closed in the same way as the M_ASTER module was closed: you can double click at the upper left corner of the F_ASTER window or you click on the *Close* option of the *File* menu of the F_ASTER window. Be careful not to close the window of the main ASTER window, the title bar of which is above the F_ASTER window.

Table of Contents

What does E_ASTER do?

E_ASTER is used to assess the distributional impact of the reform. What is the average gain or loss for all households? Has inequality increased or decreased? Do younger households lose more or less than older ones?
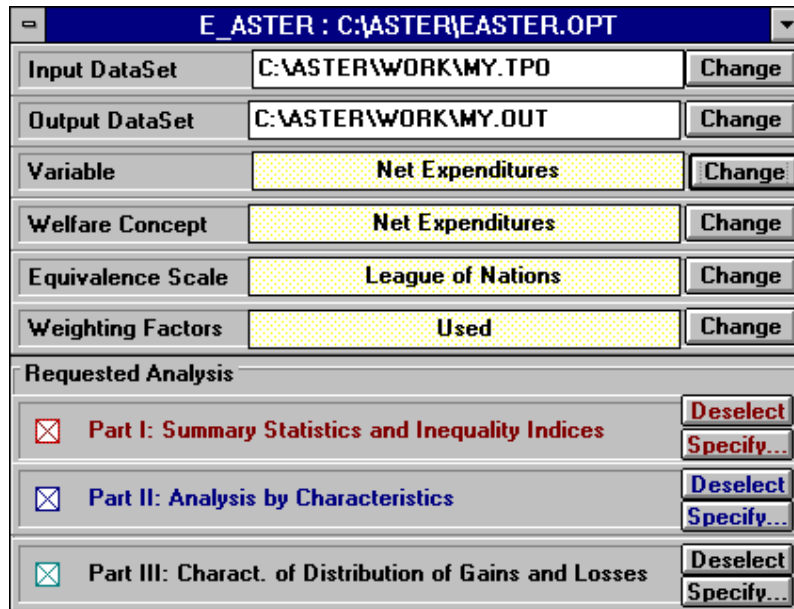
How do I start E_ASTER?

The start of the evaluation program is the same as for the first two parts of the program Click the *File* option in the menu bar of ASTER and choose *Open E_ASTER file* in the pull down menu. The standard dialogue box for selecting a file appears allowing you to select a file with the options for the evaluation program. In the E_ASTER program you can make many choices: which variable do you want to analyse? Do you want to use equivalence scales? Which characteristics do you want to use in the distributional analysis? What values do you want to use for the parameter of inequality aversion? All these options and settings will be saved into a file with the extension .OPT. The first time you start E_ASTER you find the file C:\ASTER\EASTER.OPT which is set up during the installation of the program. As you can also save options you make (see the section 'How do I quit E_ASTER?') this mechanism relieves you from the tedious task of resetting all these options in a next run of E_ASTER. *A warning should be made here.* You can give this file whatever name you want as long as it has the extension .OPT but be sure you save it under the C:\ASTER directory (or the basic directory if you gave it another name). If you don't do this you will have to move it back to this directory if you want to use it again in a following run of ASTER.

When you click on the *Ok* button after selecting the appropriate file you get the window presented in figure 24 which allows you to select the different options. The title bar shows the filename you have just chosen in the previous window.

How do I set the options for E_ASTER?

The different options can be selected from within the window which is represented in figure 24. The displayed options are retrieved from the file which is mentioned in the title bar.

Figure 24: E_ASTER: Select Options and settings window

The window consist of two parts. The upper half are global settings for the E_ASTER program. The second half of the window reveals that the E_ASTER program consists of three different parts. You indicate whether or not you want to have a part executed by using the small check boxes at the left. We now look at the different options in detail.

How do I define the Input file for E_ASTER?

The first line specifies the 'Input Data Set'. Here you specify the name of the output file of the simulation program (F_ASTER) where you have saved the individual information about tax payments and total expenditures in the pre and post reform situation. This is always a file with a .TPO extension. In this example we will analyse the file C:\ASTER\WORK\MY.TPO. If this is the last generated .TPO file, it will already be displayed in the field of the first line. Another possibility is to choose

the file from the dialogue box which is activated by the ***Change*** button at the right of the line. This is the standard dialogue box to define directories and/or filename extensions. You can now choose a file from the list and click on the ***OK*** button. This not only results in the display of the selected file on the first line of the window, the second line will also be changed in such a way that the same subdirectory is chosen as the one of the selected input file, with the same file name as the input file and with an .OUT extension**.**

How do I define the Output file for E_ASTER?

The same procedure applies to the second line: 'Output Data Set'. This is the dataset where the results of the E_ASTER program which appear on the screen, will be saved. This file is also used to report the results of the E_ASTER program. We choose for the output filename: C:\ASTER\WORK\MY.OUT. The ***Change*** button at the right works in the same way as described in the previous paragraph except that a warning message is displayed when you select an already existing file. This is done because this file will be overwritten when you run the E_ASTER program. It makes sense to select an existing file if you want to use that file to show the results of a previous run of E_ASTER. By doing this you should select the output data set not directly by using the ***Change*** button next to the second line, but by selecting the right .OPT-file in the start of the E_ASTER program.

Which variable is analysed in E_ASTER?

E_ASTER calculates gains or losses for different subgroups, or compares inequality within the population covered by the sample between pre and post reform situation. The variable for which these differences or inequality is calculated is specified in the next line. But other choices are possible. You find them in Figure 25 which represents the dialogue box that appears if you click on the ***Change*** button at the right of the line.
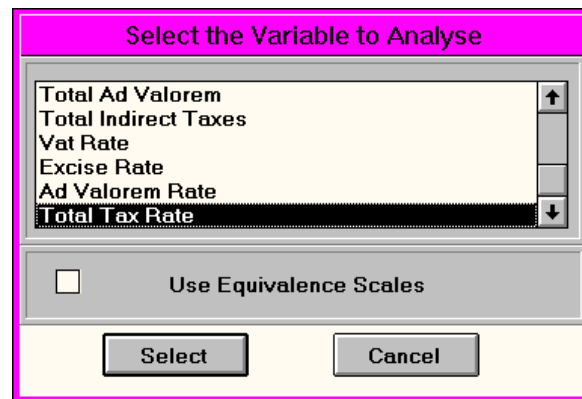
Figure 25: E_ASTER: Select the variable to analyse

There are 12 possible choices: four expenditure concepts and eight tax concepts, among which are four tax rates. If you select a tax rate, and only then, a new window will appear to select the denominator for the rate. This window is displayed in figure 26.

Figure 26: E_ASTER: Select denominator of tax rate to analyse

As you can see in figure 26 you can select a different denominator for pre- and post reform tax rates.

How do I start E_ASTER?

At the bottom of the dialogue box with the 12 variables (figure 25) there is a check box by which you indicate whether the variable should be corrected by an equivalence scale. You select this correction by clicking on the check box. If you have activated the option there is a mark in the check box. You can reset t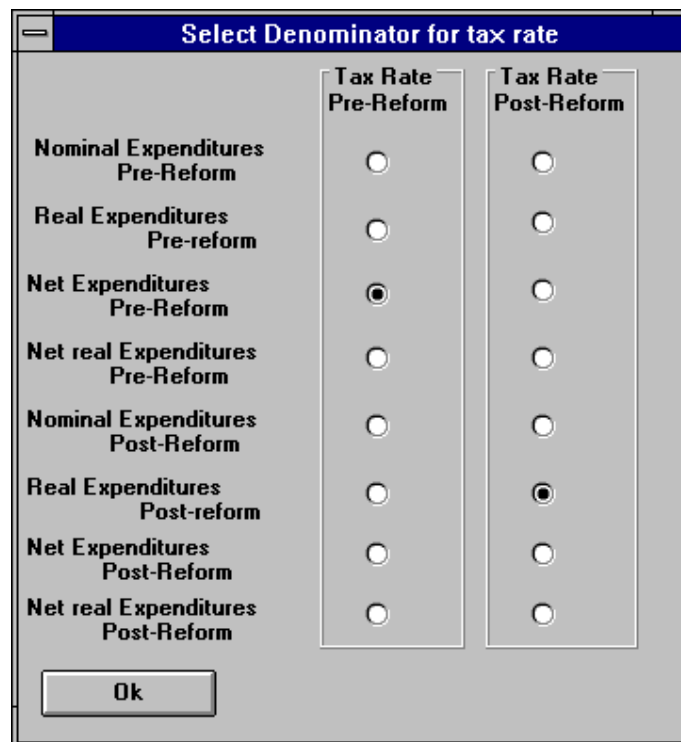he option by clicking again on the check box. You close this dialogue box by clicking on the button at the bottom: *Select.*

How do I select a welfare concept in E_ASTER?

The next line in the upper part of the selection window of E_ASTER (Figure 24) is called 'Welfare Concept'. In some parts of the program the households will be ordered from poor to rich. This line determines on which variable this ordering should be based. Click on the *Change* button and you get the dialogue box of Figure 27. It is very similar to the previous one but only presents the four expenditure concepts now. Again you can choose to use an equivalence scale or not. We propose to construct the welfare distribution on the basis of Net Expenditures. Therefore we click on the third line. We also want to correct the concept with an equivalence scale and click on the check box for equivalence scale use. Note that this choice to use an equivalence scale is independent from the one made in the previous paragraph. Click on *Select* to leave this dialogue box.
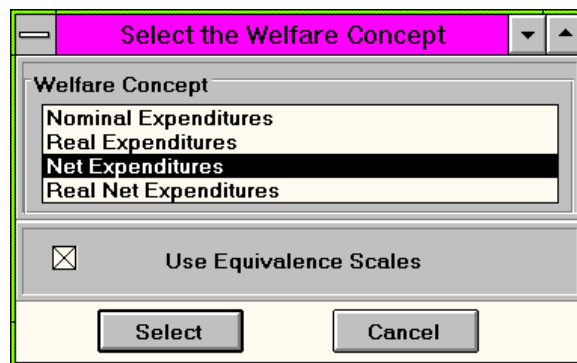
Figure 27: E_ASTER: Select the welfare concept

How do I choose equivalence scales in E_ASTER?

The fifth line in the main selection window of E_ASTER (figure 24) is intended to let you specify which 'equivalence scale' should be used. This specification is irrelevant if you have specified above not to use an equivalence scale. Moreover there is no choice for the moment. At the current stage of development of ASTER it is only possible to use the equivalence scale which is in the original data of the National Statistical Institute. This is the equivalence scale based on old research at the League of Nations. We hope to present more flexibility in the future.

Does E_ASTER always use weighting factors?

The last global setting in the main selection window of E_ASTER (figure 24) concerns the choice whether you want to use the weighting-factors to make the sample representative for the Belgium population. The weighting factors which are available are the original weighting factors, constructed by the National Statistical Institute. You can change the option by clicking on the *Change* button at the right. The dialogue box gives two possibilities: used or not used. If you select not used, then each household gets a weight equal to one in the calculations. The normal practice will be to use the weighting factors.

Which part of the E_ASTER module is executed?

The second part of the main window (Requested Analysis) allows you to choose which part of the program has to be executed. This is useful since some parts may require much time (e.g. part 2 and 3 if you request an analysis for many characteristics). You select this part of the program by clicking on the check box at the left or by clicking on the *Select* button at the right of the appropriate line in this bottom part of the main selection window of E_ASTER. If you have selected this part of the program then you can also use the *Specify...* button at the right to set further options.

The first part of the program produces summary statistics and inequality indices. For the variable specified above you get mean, minimum, maximum, median, standard deviation, and some other statistical measures for both the pre and post reform situation. The same statistical measures are calculated for the absolute and relative change between pre and post reform situation. The calculations are based on the absolute and relative change for individual households.

If you have clicked on the *Specify...* button of this first part you get the dialogue box of Figure 28. The way it works is basically the same as previous dialogue boxes with check boxes. You can activate three subprograms in part 1: the overall statistical measures, the inequality indices and the measure of distributional change.
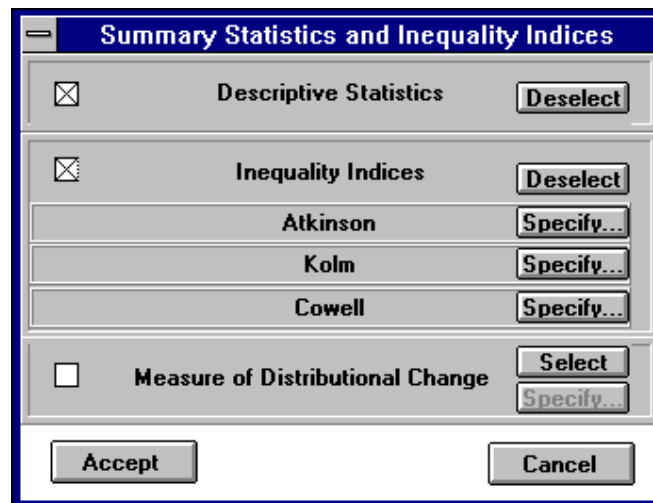
Figure 28: *E_ASTER: dialogue box of part 1*

The part Descriptive Statistics can only be selected or deselected. For the second and the third subprogram you can also change parameter values. Take the case of the Atkinson inequality measure. People familiar with this type of inequality measurement know that one has to specify an inequality aversion parameter. You can specify three values for this parameter by clicking on the *Specify...* button at the right You now get a dialogue box (Figure 29) in which you can enter or change three values. The same procedure applies to set the value of the parameter in the inequality measure of Kolm and Cowell and in the measure of distributional change (See

Figure 29). Be aware that the calculation of the measure of distributional change takes quite a bit of time.

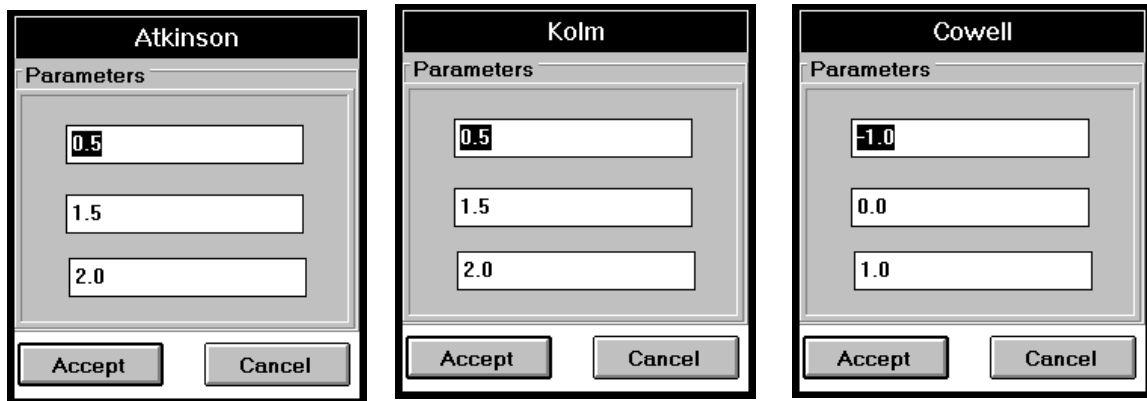*Figure 29*: *Dialogue Windows for setting the parameters of resp. the Atkinson, Kolm and Cowell formulas.*

We close the dialogue box of part 1 by clicking on the *Accept* button at the bottom and are again in the main dialogue box of the E_ASTER program.
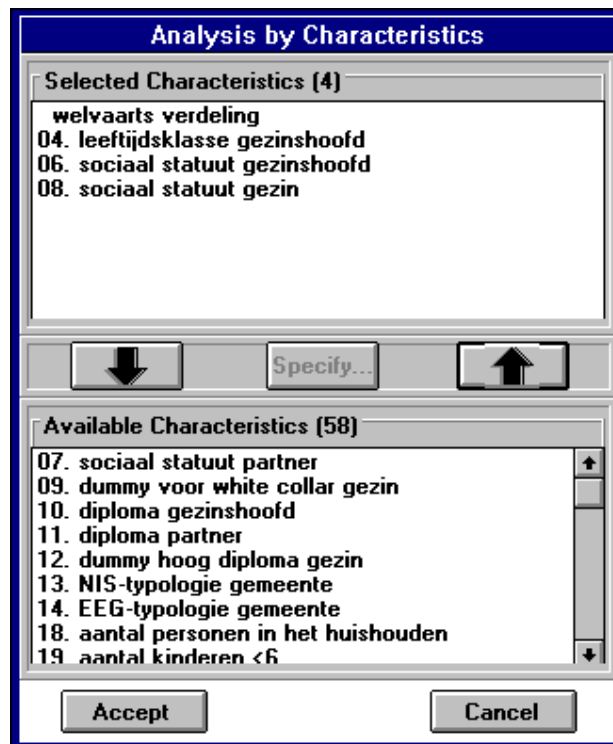

Figure 30: E_ASTER: dialogue box of part 2

How do I start E_ASTER?

You activate part 2, the Analysis by Characteristics, by clicking on the check box at the left of the last but one line of the main selection Window of E_ASTER (Figure 24). Click on the *Specify...* button at the right and you obtain the dialogue box of Figure 30.

How do I analyse the effects for subgroups?

The purpose of the analysis by characteristic is to calculate gains and losses of the reform for subgroups in the population. The subgroups are specified on the basis of characteristics available in the budget survey. You can e.g. be interested whether the loss is greater for older than for younger households. You therefore need the characteristic 'leeftijdsklasse (age class)'. There are 62 characteristics available and they are listed at the bottom of the dialogue box. Their numbering corresponds to the list in annex 1. To select a characteristic (take the case of 'leeftijdsklasse') you click on the appropriate line and then on the great black arrow pointing upside. The selected characteristic jumps to the upper part of the dialogue box and joins the group of the Selected Characteristics. You can repeat this operation for any other characteristic. If you want to deselect a characteristic, select it in the upper part of the dialogue box and click on the left arrow which points downwards.

There is one *characteristic* which deserves a bit more attention. It is the first one, labelled 'welvaartsverdeling (welfare distribution)'. It has no number since it is not a characteristic from the original dataset but it is calculated by the program on the basis of the variable you have specified above. The best known welfare distribution is the one which partitions the population in deciles. If the household belongs to the bottom decile, the characteristic takes the value 1, if the household belongs to the top decile the characteristic takes the value 10. But E_ASTER also allows to choose a different quantile distribution than the one in deciles. If you have selected the characteristic 'welvaartsverdeling', you get a dialogue box which allows you to specify the number of groups in which the population has to be divided. You can choose between the values 2 (subgroups with 50% of the population each), 4 (subgroups of 25% or quartiles), 5 (subgroups of 20% or quintiles), 10 (subgroups of 10% or deciles) and 20 (subgroups of 5%). This dialogue box is shown in figure 31.
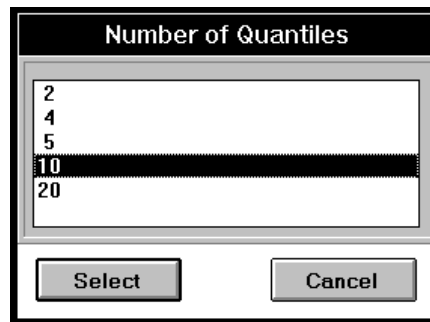
How do I start E_ASTER?

Figure 31: Window to select the number of groups for 'welvaartsverdeling'

If the characteristic has been selected before and you want to change the number of groups, you activate the characteristic by clicking it in the upper part. The button *Specify...* in the middle, between the two selection arrows, has become active now. Click on the button and you get the dialogue box described above and shown in Figure 31.

Click on the *Accept* button at the bottom to close this dialogue box. You are again in the main selection window of E_ASTER where eventually you still have to specify the options for part 3.

How do I analyse characteristics of gainers and losers?

Click on the *Specify...* button of part 3 and you get the dialogue box of Figure 32. It is very similar to the one of part 2 and it also works in the same way. In part 3 E_ASTER calculates the average value of the characteristic for a partition of the population in subgroups of gainers and losers. It is the reverse picture of part 2. The main part of the screen is set up to select the characteristics as in the previous part. Note that in part 3 the total number of characteristics available is different from that in part 2. The reason is that in part 2 it makes no sense to use continuous variables, like age, while in part 3 it makes no sense to use non-ordered discrete variables like Social Satus.
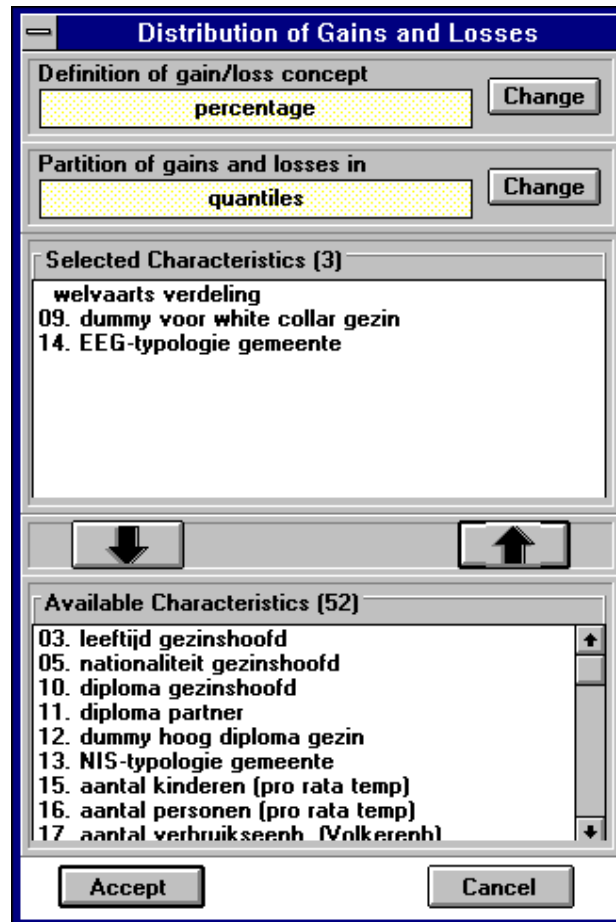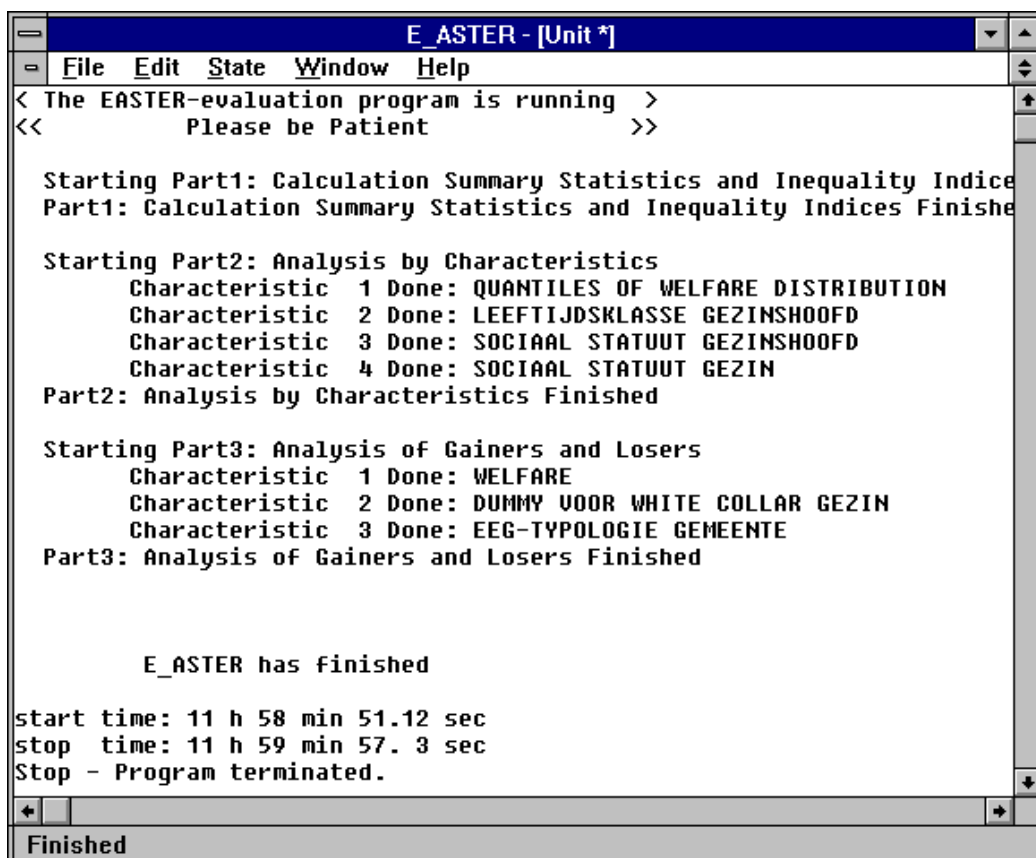
Figure 32: E_ASTER: dialogue box of part 3

The top of the dialogue box is different from the one for part 2. In the first line you determine whether the ordering from the greatest loser to the greatest gainer has to be based upon the absolute or percentage loss. You switch between the two options by clicking on the *Change* button at the right. The second line determines how to partition the ordered population. In this box only the option quantiles is available. To determine the number of quantiles you click on the *Change* button. Then click on the *Select* button at the bottom and you get the dialogue box to specify the number of quantiles.

We are back in the window where we can select the characteristics. Click on the *Accept* button at the bottom to return to the main window of E_ASTER.

How do I run E_ASTER?

After you made the appropriate selection you are ready for the execution of the evaluation program. Click on **Run!** in the menu bar and the E_ASTER program starts running. This means that a Fortran program has started that does the calculations. For the whole sample of 3235 households, the calculations of E_ASTER may require some time. Information about the status of the program is written to a new window in the middle of your screen.

```
┌──────────────────────────────────────────────────────────────────┐
│                       E_ASTER - [Unit *]                    ▼  ▲  │
├──────────────────────────────────────────────────────────────────┤
│  File   Edit   State   Window   Help                           ⬍ │
│ < The EASTER-evaluation program is running  >                  ↟ │
│ <<              Please be Patient                >>              │
│                                                                  │
│  Starting Part1: Calculation Summary Statistics and Inequality Indice │
│  Part1: Calculation Summary Statistics and Inequality Indices Finishe │
│                                                                  │
│  Starting Part2: Analysis by Characteristics                     │
│         Characteristic  1 Done: QUANTILES OF WELFARE DISTRIBUTION │
│         Characteristic  2 Done: LEEFTIJDSKLASSE GEZINSHOOFD       │
│         Characteristic  3 Done: SOCIAAL STATUUT GEZINSHOOFD       │
│         Characteristic  4 Done: SOCIAAL STATUUT GEZIN             │
│  Part2: Analysis by Characteristics Finished                     │
│                                                                  │
│  Starting Part3: Analysis of Gainers and Losers                  │
│         Characteristic  1 Done: WELFARE                          │
│         Characteristic  2 Done: DUMMY VOOR WHITE COLLAR GEZIN     │
│         Characteristic  3 Done: EEG-TYPOLOGIE GEMEENTE           │
│  Part3: Analysis of Gainers and Losers Finished                  │
│                                                                  │
│                                                                  │
│          E_ASTER has finished                                    │
│                                                                  │
│ start time: 11 h 58 min 51.12 sec                                │
│ stop  time: 11 h 59 min 57. 3 sec                           ▼    │
│ Stop - Program terminated.                                       │
├──────────────────────────────────────────────────────────────────┤
│ ← ░░                                                         → │
├──────────────────────────────────────────────────────────────────┤
│  Finished                                                        │
└──────────────────────────────────────────────────────────────────┘
```

Figure 33: E_ASTER: Output of the Fortran program during the run

Such an output is displayed in figure 33. As you notice the program sends a message to the screen when every part of the evaluation program starts and stops. During the second and third part it also shows when the calculations of a characteristic have finished. When the whole program has finished the message 'E_ASTER has finished' comes on the screen, as well as the start and stop times. Then a window as shown in

figure 34 comes on the screen informing you on the outcome of the program. An exit code 0 means that everything went well.
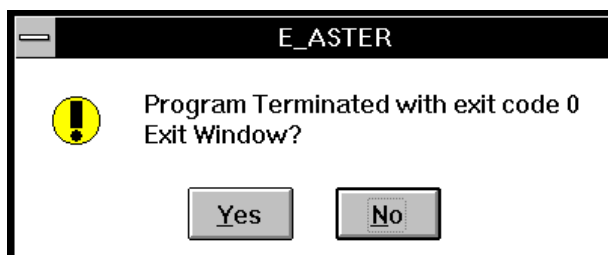

Figure 34: End of E_ASTER Run

This window can be closed by clicking on the **Yes** button. You then will be back in the main E_ASTER window. If you don't click on the **Yes** button of the window that is displayed in figure 34, but on the **No** button you can scroll in the window that shows the statuts of the run. When you then close this window in the normal way you will be back in E_ASTER.

How do I view the reports of E_ASTER?

Clicking on **Report** in the menu bar of the E_ASTER program reveals a dialogue window like the one in figure 35. In this window you can select the different reports of E_ASTER. One report shows the different options and files that were used in the evaluation program and the preceding F_ASTER run. It can be obtained by selecting the option button on the left of 'Shows settings used during the evaluation and files used' in the upper window of the report dialogue box. This report is quite similar as the summary report of the results of F_ASTER as is shown in figure 22.

The other reports of E_ASTER correspond to the three parts of the program we already explained in the preceding paragraph on setting the options: Part 1 gives a summary of different statistical measures, Part 2 shows the results of the analysis of the selected characteristics while Part 3 shows information about the gainers and losers on the selected characteristics.

The results of part 1 can be seen in three different tables. If you click on the ***Show*** button at the bottom of the screen after selecting the option on the left of '***Table 1: Description of the distribution'*** of ***'Part 1'*** various measures like the mean, median, standard deviation, etc. are shown, as well as the absolute and proportional number of winners and losers. An example of such a report is given in figure 36.
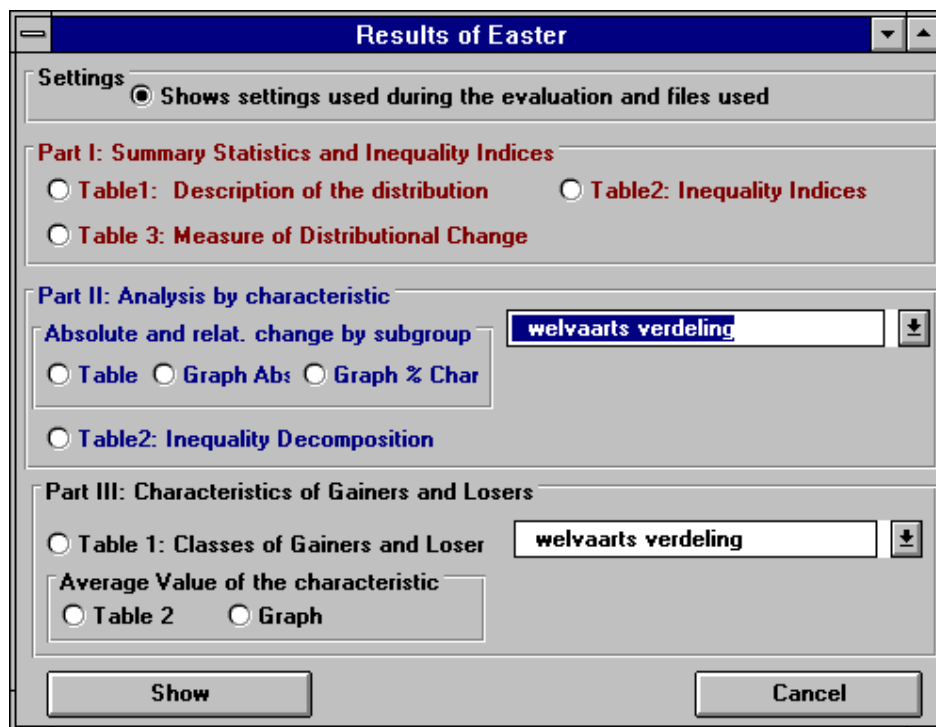

Figure 35: E_ASTER: Report Window

The second summary report of E_ASTER informs on some inequality indices. It is generated when the option on the left of ***'Table 2: Inequality Indices'*** of ***'Part 1'*** is selected. The results for Cowells measure of distributional change will pop up if one selects the button on the left of ***Table3: Measure of Distributional Change***

The reports of Part 2 and Part 3 all show information for one characteristic. You first have to select the characteristic in the drop down list box in the right half of the screen. When you click on the down-arrow to the right of these lists the available characteristic are shown. It is obvious that only the characteristics are shown that were selected before the evaluation run.

How do I view the reports of E_ASTER?

After you have selected a characteristic you can see different tables and graphs for the selected characteristic.

Figure 36: E_ASTER: Report on the Description of the distribution

How do I quit E_ASTER?

The E_ASTER module is closed in the same way as the other two modules are closed: you can double click at the upper left corner of the E_ASTER window or you click on the *Close* option of the *File* menu of the E_ASTER window. Be careful not to close the window of the main ASTER window, the title bar of which is above the E_ASTER window.

How do I select a file in ASTER?

The dialogue box you can see in Figure 37 can be obtained everywhere in the program where you have to select or to define a file name. The currently selected or defined filename is in the one line box at the upper left part of the dialogue box. In the right part of the dialogue box you can redefine the drive and the directory for which filenames have to be displayed. You can enter or select any other file name in the appropriate field at the upper left corner of the window. We suggest you use the same name for all files of one run through the different modules of this program. It is also recommended to keep all generated files of such a run in the same directory. By installation the C:\ASTER\WORK directory will be created for your first run. If you plan to store your data on other directories then you should create these directories before you run the ASTER program as it is only possible to select an existing directory. You cannot create a new directory from within this dialogue box.
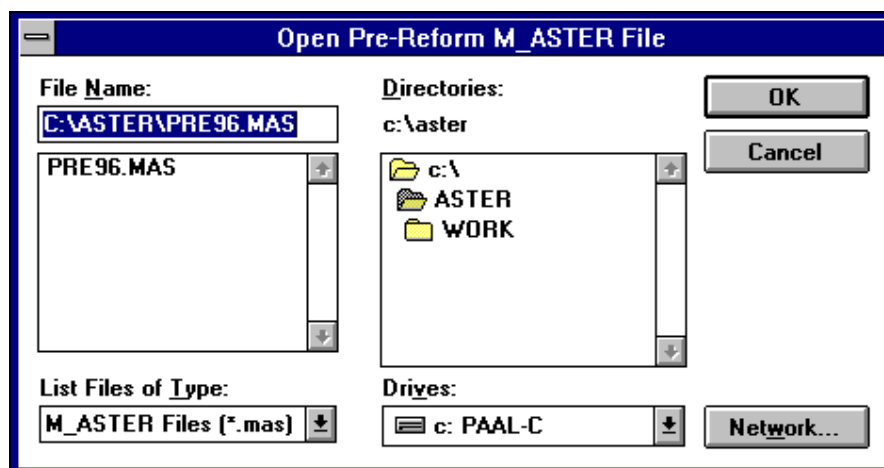

Figure 37: The standard dialogue box for selecting a file

How do I make a Report in Text mode in ASTER?

ASTER presents reports in two ways: In text mode, which means that results are presented in tables, or with graphs. In this paragraph we explain the first possibility.

When you are on a screen that reports in text mode there is always a *File* option in the Menubar. When you select this option you can then choose to click on either *Print Topic* to print out the information displayed or on *Edit Titles* to edit the titles and the footnote that are printed on the page with the results.
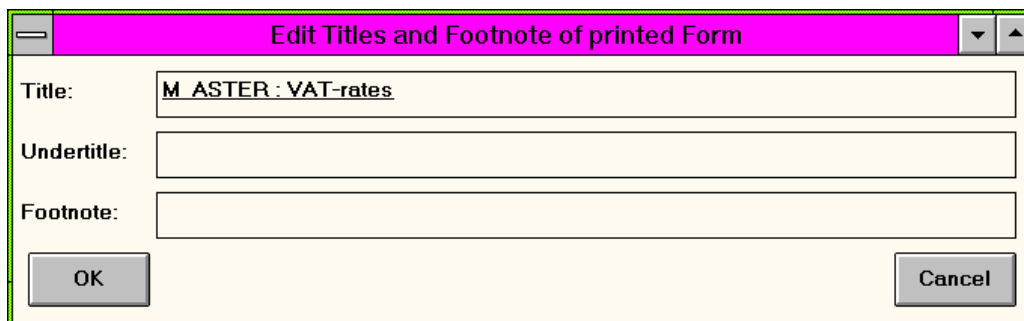

Figure 38: Title Editing Window for printing tables in ASTER.

By clicking on the *Edit Titles* option of the File menu a window as shown in figure 38 appears. The first line is always the same as the title of the report that is shown. It can be changed however using the normal editing functions. It remains until a new report is generated. The undertitle and the footnote on the other hand remain the same as long as you run the program. Both are blank when the program is started up. When filled in, the undertitle appears as the second line on the printed page while the footnote is at the bottom of the printed page. It is obvious that you first have to edit these lines before you select the *Print Topic* option if you want to print out the textlines you entered.

The *Print Options* option can be used if you want to change the printer settings of the printer. It generates the normal Windows-dependent printer driver options as you get in other Window programs. One of the options e.g. is to select a landscape orientation instead of the default portrait orientation.

How do I make a report in Graphical mode in ASTER?

When you have chosen to view information in a graphical way, by default a three-dimensional bar diagram with vertical bars is displayed. This is shown in Figure 39.
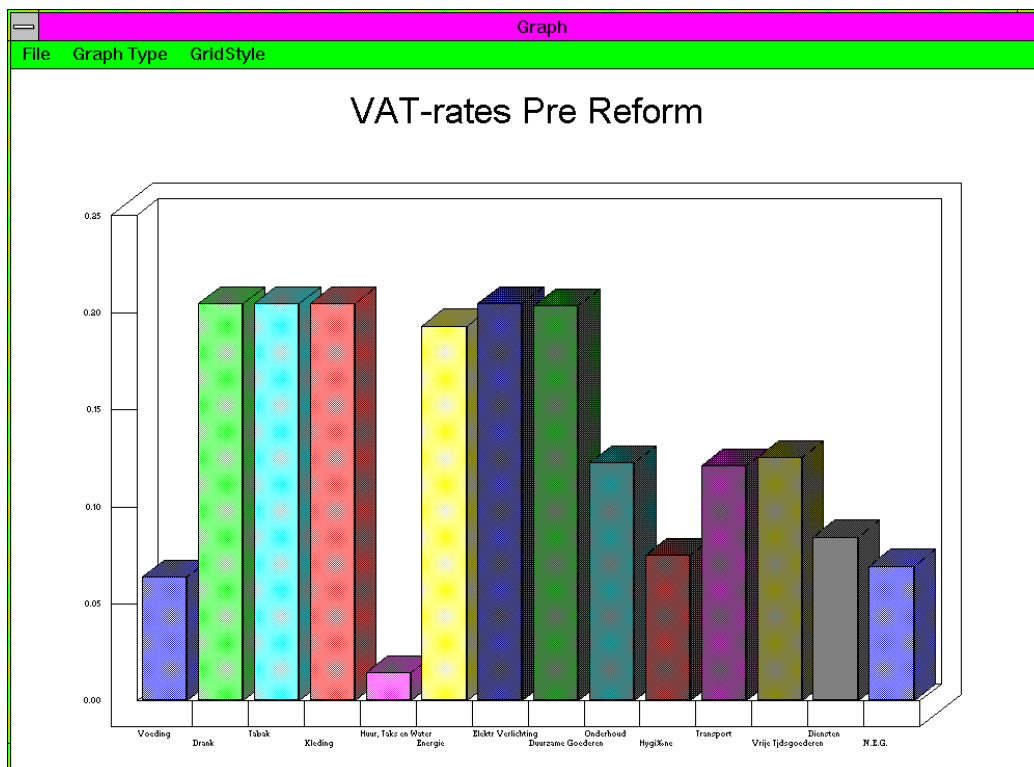

Figure 39: Example of a Graphtype: 3D-Bar Diagram.

It is possible to change the type of graph by choosing one of the many options of the *Graph Type* menu. There are 2D- and 3D-Bar Diagrams, 2D- and 3D-Pie Charts; Gants-, Line- and Log/lin Graphs; Area, Scatter, Polar and HLC Graphs. Furthermore for each kind of mentioned graphs some options are available to select e.g. orientation, the way of labelling, used symbols and so on.

Depending on the nature of the displayed data not all options make sense.

Another option that can be chosen by clicking on *Gridstyle* is the appearance of vertical and/or horizontal lines.

All graphs (or combinations of grahtypes and gridstyles) can be printed by clicking the *Print* option on the *File* menu.

References

QUAIDS
J. Banks, R. Blundell and A. Lewbel, 1992, Quadratic Engel Curves, Welfare Measurement and Consumer Demand, UCL Discussion Papers, 94/04.

Inequality Indices
F.A. Cowell, 1995, *Measuring Inequality*, Sage London, 228 p.

A.B. Atkinson, 1970, On the measurement of inequality, *Journal of Economic Theory*, 2, 244-263.

S.C. Kolm, 1976, Unequal Inequalities, I and II, *Journal of Economic Theory*, 12, 416-442 and 13, 82-111.

F. Cowell, 1980, Generalized entropy and the measurement of distributional change, *European Economic Review*, 47, 521-531.

ASTER
A. Decoster, 1995, A Microsimulation Model for Belgian Indirect Taxes with a Carbon/Energy Tax Illustration For Belgium, *Tijdschrift voor Economie en Management*, Vol. XL, 2,

A. Decoster, E. Schokkaert en H. Van Dongen, 1994, Een microsimulatiemodel voor indirecte belastingen in België, *Eindrapport Project PE/01/008 van de Diensten voor de Programmatie van het Wetenschapsbeleid*

A. Decoster, E. Schokkaert en G. Van Camp, 1995, Een misplaatst taboe: De regressiviteit van indirekte belastingen op haar waarde geschat, *Samenleving en Politiek*, jaargang 2, nr. 6

A. Decoster en G. Van Camp, 1996, Alternatieve Finaciering van de Sociale Zekerheid door Indirecte Belastingen, *Documentatieblad van het Ministerie van Financiën*, te verschijnen.

ANNEX 1: LIST OF AVAILABLE CHARACTERISTICS

WELFARE

3. LEEFTIJD GEZINSHOOFD

4. LEEFTIJDSKLASSE GEZINSHOOFD

5. NATIONALITEIT GEZINSHOOFD

6. SOCIAAL STATUUT GEZINSHOOFD

7. SOCIAAL STATUUT PARTNER

8. SOCIAAL STATUUT GEZIN

9. DUMMY VOOR WHITE COLLAR GEZIN

10. DIPLOMA GEZINSHOOFD

11. DIPLOMA PARTNER

12. DUMMY HOOG DIPLOMA GEZIN

13. NIS-TYPOLOGIE GEMEENTE

14. EEG-TYPOLOGIE GEMEENTE

15. AANTAL KINDEREN (PRO RATA TEMP)

16. AANTAL PERSONEN (PRO RATA TEMP)

17.   AANTAL   VERBRUIKSEENHEDEN (VOLKERENB)

18. AANTAL PERSONEN IN HET HUISHOUDEN

19. AANTAL KINDEREN JONGER DAN 6

20. AANTAL KINDEREN TUSSEN 6 EN 11

21. AANTAL KINDEREN TUSSEN 12 EN 15

22. AANTAL KINDEREN TUSSEN 16 EN 24

23. AANTAL KINDEREN TEN LASTE

24. EEG-TYPE GEZIN

25. REFERENTIEPERSOON ACTIEF?

26. PARTNER ACTIEF?

27. AANTAL KINDEREN ACTIEF

28. AANTAL ANDEREN ACTIEF

29. TOTAAL AANTAL ACTIEVEN

30. WOONSTATUUT

31. EIGENAAR TWEEDE VERBLIJF?

32. SOORT WONING

33. BOUWJAAR WONING

34. DECIELNR. NOMINALE BESTEDINGEN

35. DECIELNR. NOMINALE BESTEDINGEN PER VERBR.

36. DECIELNR. NETTO BESTEDINGEN

37. DECIELNR. NETTO BESTEDINGEN PER VERBR.

38. DECIELNR. BESCHIKBAAR INKOMEN

39. DECIELNR. BESCHIKBAAR INKOMEN PER VERBR.

40. SOORT HOOFDVERWARMING

41. ENERGIEBRON HOOFDVERWARMING

42. BIJVERWARMING?

43. ENERGIEBRON BIJVERWARMING

44. GEWEST

45. PROVINCIE

46. STROMEND WATER?

47. STROMEND WARM WATER?

48. BADKAMER?

49. WC BINNEN WONING?

50. TELEFOON?

51. GARAGE?

52. AANTAL AUTO"S

53. DUMMY VOOR AUTO

54. AANTAL CARAVANS

55. AANTAL MOTORFIETSEN

56. AANTAL ZWART-WIT TV"S

57. AANTAL KLEUREN TV"S

58. AANTAL VIDEORECORDERS

59. AANTAL HUISCOMPUTERS

60. AANTAL KOOKHAARDEN ELECTRISCH

61. AANTAL KOOKHAARDEN BUT-PROPAAN

62. AANTAL KOOKHAARDEN AARDGAS

63. AANTAL KOELKASTEN

64. AANTAL DIEPVRIEZER

65. AANTAL VAATWASMACHINE

66. AANTAL ELECTRISCHE NAAIMACHINE

67. AANTAL WASMACHINE

68. DUMMY VOOR ROKERS

ASTER 3.0: WAT IS ER VERANDERD T.O.V. VERSIE 2.0?

André Decoster, Guy Van Camp en Frederic Vermeulen – 23 Februari 2001

Voor Aster2.0 werd een handleiding geschreven, die u of in gedrukte vorm of in de vorm van een MS-Word document ontvangen hebt. Deze handleiding kan, in grote mate, nog steeds gebruikt worden voor Aster3.0. Toch is het nodig om bij sommige secties in de handleiding van Aster2.0 kanttekeningen te maken. Daarom hebben we in wat volgt de inhoudstafel van deze handleiding overgenomen. Indien nodig wordt onder een bepaalde sectietitel de nodige uitleg gegeven om het verschil tussen Aster2.0 en Aster3.0 te verduidelijken.

Zoals u zal merken zijn de schermen zelf nauwelijks veranderd, de belangrijkste verschillen tussen Aster2.0 en Aster3.0 hebben te maken met de onderliggende data en het gebruikte vraagsysteem. In Aster2.0 werd gewerkt met de Budgetenquête van 1987-88 en werd een vraagsysteem van 32 goederen gebruikt. In Aster3.0 wordt de Budgetenquête van 1997-98 gebruikt en kan men slechts voorspellen met een vraagsysteem van 12 goederen.

Table of Contents Aster2.0

ANNEX 1:LIST OF AVAILABLE CHARACTERISTICS 59

	Welvaartsconcept
3.	Leeftijd gezinshoofd
4.	Leeftijdsklasse gezinshoofd
5.	Sociaal statuut gezinshoofd
6.	Diploma gezinshoofd
7.	Aantal volwassenen
8.	Gemiddelde leeftijd volwassenen
9.	Aantal kinderen 13-17
10.	Aantal kinderen 7-12
11.	Aantal kinderen 0-6
12.	Aantal personen
13.	Aantal verbruikseenheden (oeso-schaal)
14.	Typologie gemeente
15.	Eeg-type gezin
16.	Referentiepersoon actief?
17.	Partner actief?
18.	Totaal aantal actieven
19.	Woonstatuut
20.	Soort woning
21.	Geschatte huurwaarde
22.	Enegiebron verwarming
23.	Decielnr. Nominale bestedingen
24.	Decielnr. Nominale bestedingen per verbr.
25.	Decielnr. Beschikbaar inkomen
26.	Decielnr. Beschikbaar inkomen per verbr.
27.	Gewest
28.	Provincie
29.	Aantal auto"s
30.	Dummy voor auto
31.	Dummy voor rokers
32.	Inkomen gezin
33.	Hoe komt u rond met uw inkomen?
34.	Soms moeite om voedingswaren te betalen?
35.	Soms moeite om kleding te betalen?
36.	Soms moeite om verwarming te betalen?
37.	Soms moeite om dokters enz. Te betalen?