

## Exploring G7 Fall 2009

The *G7* program is a powerful and free program developed by Inforum at the University of Maryland. It can be used to build or access databanks containing millions of time series. Data can be viewed in a grid or a graph, or saved to a spreadsheet for further manipulation. Tables of historical data or model forecasts can be easily created from the data in a *G7* databank. Many databanks that can be used with *G7* are also available for free at the Inforum web site, on *EconData* at [www.inforum.umd.edu/econdata/econdatacontents.html](http://www.inforum.umd.edu/econdata/econdatacontents.html). Included there are the National Income and Product Accounts (NIPA), Annual Survey of Manufacturing, Annual Retail Trade Survey, and many more.

To obtain *G7* directly from the Inforum website, go to [www.inforum.umd.edu/software/g7.html](http://www.inforum.umd.edu/software/g7.html). Follow the “Get *G7* Here” link and save the file *g7exe.exe* to a temporary folder. Next double click on that file in a Windows Explorer window. It will ask you what folder you would like to extract *G7* to. Specify *c:\g7*. Finally, go to the *c:\g7* directory in Explorer, and right-click on the *G7* icon, and then paste a shortcut to your desktop. Now you’ll have an icon on your desktop for *G7*. However, before starting *G7* you should also download a databank to work with.

Navigate to the *EconData* page at [www.inforum.umd.edu/econdata/econdatacontents.html](http://www.inforum.umd.edu/econdata/econdatacontents.html) and retrieve the quarterly NIPA bank into your temporary folder. The .zip filename is *nipaq.zip*. We recommend creating a new folder named *gbanks*, and then create a subfolder for this bank called *nipaq*. Extract the contents of the *nipaq.zip* file into *c:\gbanks\nipaq*. For the first several activities in *G7*, this folder will be the home folder.



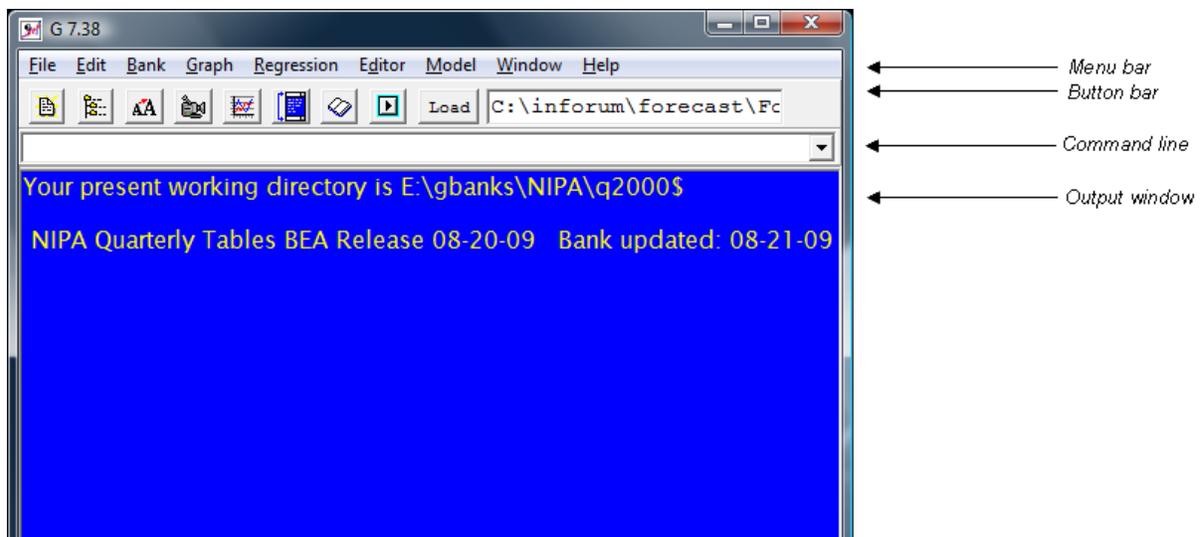
Now start *G7* by double-clicking the shortcut you just installed on the desktop. You will first see a dialog window similar to the one above. Click the ‘Browse’ button in the middle of the dialog, or if you prefer keyboard shortcuts, use Alt-B. Navigate in the explorer window to

c:\gbanks\nipaq, and double click on the file G.CFG. This establishes c:\gbanks\nipaq as the current directory for *G7*, and also reads in some configuration information specific to the nipaq databank, such as the default databank (nipa), the default frequency (quarterly), and the default range of dates for many commands. Now click the 'OK' button, or just hit [Enter]. The *G7* Main Window will appear.

### *The G7 Main Window and Some Basic G7 Commands*

The *G7* Main Window is shown below, and consists of a menu bar, a button bar, a *command box*<sup>1</sup> for typing commands, and an output window. At any time, you may click *Help*, or the little book button on the right of the button bar, and read an on-line tutorial on using *G7*.

#### **The G7 Main Window**



Many of the features of *G7* can be used either from the menu or from the command box. Where this is the case, we will show both methods. However, the real power of *G7* comes from its command language, which can be used to build programs or scripts, called *add files* that automate data manipulation and regression.

To use the command box, click the pointer in the white box if there is not already a blinking cursor there. The first command we will use is called “look”, which shows the contents of the currently assigned *G* bank.

Type “look” in the command box, and then hit the [Enter] key. If you want to use the menu, choose the menu option Bank, Look. A small dialog window will open with a list of the currently assigned banks. Only one bank is assigned, which is nipaq. Click on nipaq, and click OK, and this is equivalent to giving the “look” command from the command line.

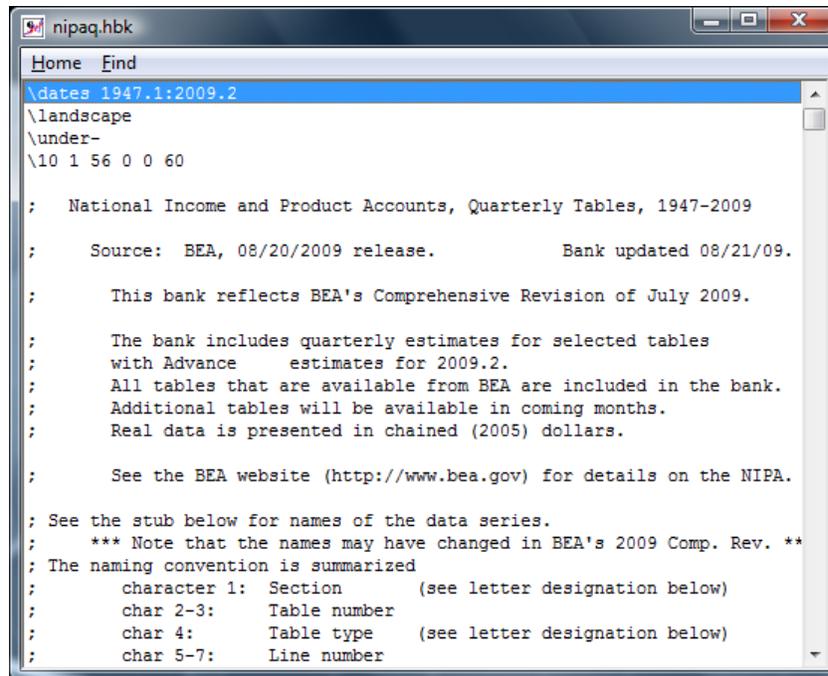
A window like the one shown below will appear. This *look window* provides a convenient way to navigate through the databank and look at graphs and printouts of the NIPA quarterly

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<sup>1</sup> In this tutorial, new terms will be italicized on first use. *G7* commands will always be given in quotes. Names of time series in the *G* banks will also be in italics. Text to be typed into the *G7* command line or add files is shown in small fixed width (Courier) font.

time series. The window is showing the contents of a *G stub file*. The stub file is simply a text file. Comment lines in this file begin with a semicolon (;). Lines with time series have the name of the series to the left of the semicolon, and descriptive text to the right of the semicolon. You can scroll through the stub file in the look window by using the [PgUp] and [PgDn] keys, the arrow keys, or the scroll bars. You can also use the Find command to search for text in the stub file.

### The look window



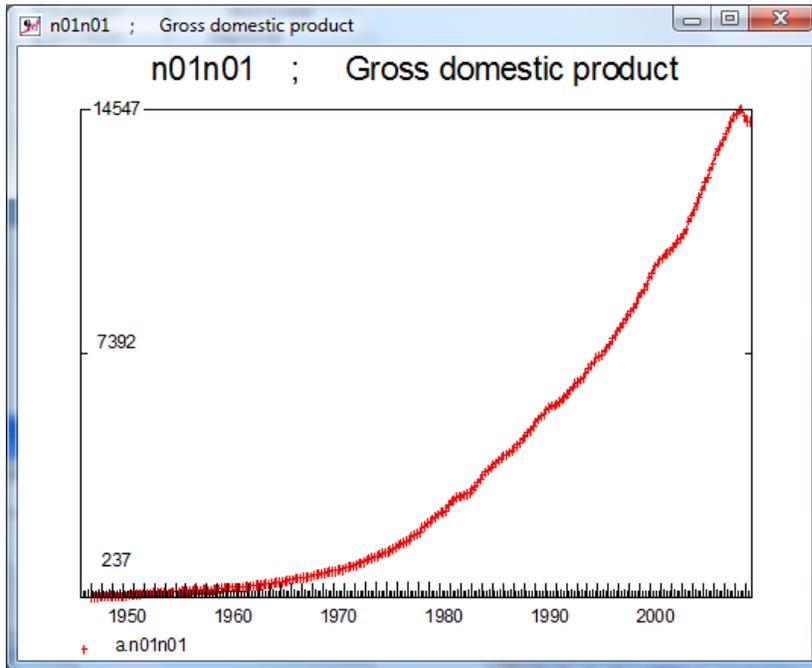
Use the Find command to find the series name *n01n01*. This is the *G7 seriesname* for Gross domestic product. It is found in NIPA table 1.1.5, as shown below.

```

;
;Table 1.1.5. Gross Domestic Product
; [Billions of dollars]; Seasonally adjusted at annual rates
; Quarterly data from 1947 To 2009,,,,,,,,
; Source: BEA, Data published August 17, 2009 File created 8/20/09
n01n01 ; Gross domestic product #
n01n02 ; Personal consumption expenditures #
n01n03 ; Goods #
n01n04 ; Durable goods #
n01n05 ; Nondurable goods #

```

Now double-click on the line for Gross domestic product. In the *G7* output window you will see a printout of the values of *n01n01* (GDP) for the values of the current dates for printing. You can scroll back through the *G7* output window using the scroll bar. If needed, output text in that window can be selected and copied to the clipboard, for pasting into other applications. A graph window (shown below) will also appear, showing a graph of the series for the current graph date interval.



You can resize the graph as you would any normal window. You can print the graph, in either landscape (full page) or portrait (half-page) mode, by picking Graph, Print. You can save the graph to a Windows metafile so that you can include it in another document by picking the menu item Graph, Save and then giving a file name.

Now, click in the command box again. Type the following command in the box, and hit the [Enter key]:

```
ty n01n01
```

You should see the same display in the output window that you got from double-clicking on the series line in the look window.

Now, graph the series manually by typing:

```
gr n01n01
```

You may see in the look window (still open) that the series *n01n02* is Personal consumption expenditures. We'll make a new graph of GDP and Personal consumption, this time giving our own title. Type the lines below in the command box, each time hitting [Enter] at the end of the line:

```
ti GDP and Personal consumption
gr n01n01 n01n02
```

You should now see the line for consumption appear in blue below the line for GDP. The "title" command (abbreviated "ti") is for supplying a title for the graph. This graph is very busy, showing quarterly data for a fairly long period. Perhaps you would like to graph the series for a shorter interval. To graph the same series from the 1<sup>st</sup> quarter of 1990 to the 3<sup>rd</sup> quarter of 2006, give the command:

```
gr n01n01 n01n02 1990.1 2009.2
```

This will now be the default starting and ending date for other graphs we make in *G7*. Similarly, we can change the dates of the “ty” command in the same way:

```
ty n01n02 1995.1 2009.2
```

As with the graph dates, these dates will be remembered for the next “ty” command. In case you were wondering if you could set these dates up front, you can. Set the graph dates using the “gdates” command, and the type dates using the “tdates” command. For example, the following lines would set the same dates we had used in the above commands:

```
gdates 1990.1 2009.2
tdates 1995.1 2009.2
```

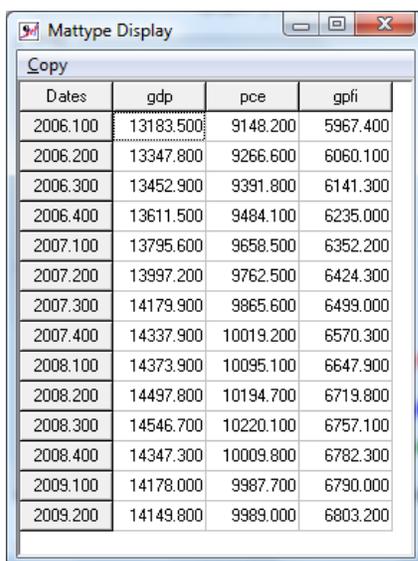
The series names that Inforum has developed for the NIPA bank are logical, and correspond directly to table and line numbers in the NIPA. However, they are hard to remember. You can create a copy of a series in the bank in the *G workspace bank* by using the “f” (form) command. For example, we can make copies of GDP, Personal consumption and Gross private fixed investment in the workspace bank, and then graph them, with the following commands:

```
f gdp = n01n01
f pce = n01n02
f gpfi = n01n06
ti GDP, PCE and GPFI
gr gdp pce gpfi
```

Another way of viewing the data is in grid format, with the “gridty” (grid type) command. Give the following command and you will see a small spreadsheet window appear:

```
gridty gdp pce gpfi
```

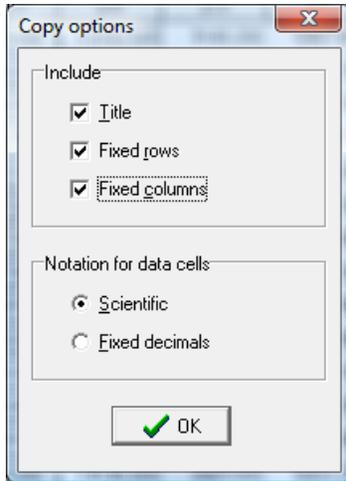
This grid will display data for the current “tdates” setting.



The screenshot shows a window titled "Mattype Display" containing a spreadsheet with the following data:

Dates	gdp	pce	gpfi
2006.100	13183.500	9148.200	5967.400
2006.200	13347.800	9266.600	6060.100
2006.300	13452.900	9391.800	6141.300
2006.400	13611.500	9484.100	6235.000
2007.100	13795.600	9658.500	6352.200
2007.200	13997.200	9762.500	6424.300
2007.300	14179.900	9865.600	6499.000
2007.400	14337.900	10019.200	6570.300
2008.100	14373.900	10095.100	6647.900
2008.200	14497.800	10194.700	6719.800
2008.300	14546.700	10220.100	6757.100
2008.400	14347.300	10009.800	6782.300
2009.100	14178.000	9987.700	6790.000
2009.200	14149.800	9989.000	6803.200

If you would like to copy data from the grid to an Excel spreadsheet, or other application, scroll to the bottom right of the grid window, and click in the lower, rightmost cell. Then click the Copy menu item at the top of the window. The following dialog will appear:



The “Title”, “Fixed rows” and “Fixed columns” check boxes allow you to specify if you would like the row and column headers (you probably do) and the title of the bank in your clipboard copy. The “Notation for data cells” choices allows you to copy the data in either scientific notation or fixed number of decimals. Now, open up an Excel or OpenOffice Calc window, and choose Edit, Paste, or Ctrl-V. The data from the *G7* grid window will now be in your spreadsheet.

These are some introductory commands, that enable you to browse the contents of a databank, print and graph timeseries data, and display and copy data in a spreadsheet format. We’ll explore some more *G7* commands in a minute. First we’ll discuss the *G7* command box in more depth, and the button bar that appears just above the command box.

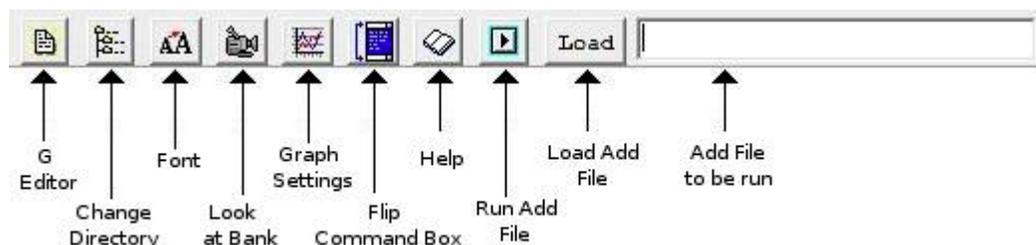
### *The G7 Command Box and Button Bar*

The command box remembers commands you have previously typed. You can scroll through a list of previous commands, pick and execute one by clicking the  at the right. You can also cycle through previous commands with the up or down arrow cursor keys. In addition, text can be copied and pasted into the command box from other applications (such as this Word document), or from text in the blue output window.

By typing just the first few letters of a previously given command, *G7* will try to guess what you want, and autocomplete the command. If you don’t accept *G7*’s suggestion, just keep typing the command you really want. If the new command is shorter than the one *G7* suggests, type a few spaces after it.

Many commands can also be executed by using the menus or the buttons just above the command line. The figure below shows the available buttons.

## Buttons Available on the G7 Console



For example, click the button that looks like a video camera. This is equivalent to choosing the Bank, Look menu item. *G7* has its own integrated editor, which can be used as a general text editor, or for running *add files* within *G7*. This is the function of the button on the far left. If you have a databank or model in a different directory than the current one, you can change to that directory with the Change Directory button. Use the Font button to change the current display Font in the *G7* output window. “Run Add File” will be discussed below, but this will open an explorer window showing possible *G7* add file scripts that can be run in the current directory. “Graph settings” allows you to change colors, line widths and styles, and other features of the *G7* graphs. “Flip Command Box” lets you choose whether to have the command box at the top or bottom of the screen. Finally, the “Help” button opens up the *G7* command reference, which explains many features of *G7* beyond the scope of this document.

### More on the “f” Command

One of the strengths of *G7* is its capacity for creating new series as transformations of already defined series. You create a new series in *G7* by using the “f” command that was introduced above. The “f” command can also be used to create new timeseries where new series are the on the left side of an equal sign and functions of previously defined variables are on the right. For example, to form the ratio of government consumption and investment to nominal GDP, you would:

- Decide on a name for the new variable. We’ll call this one *govshare*.
- Find the names for government consumption and investment and GDP, and create aliases in the workspace bank if you like. You can get these names either by using *look*. Let’s copy *n01n01* as *gdp* and *n01n20* as *govt*.
- Type the following equation:

```
f gdp = n01n01
f govt = n01n21
f govshare = govt/gdp
```

Now that *govshare* has been calculated, look at the results. Type:

```
ty govshare
```

To graph *govshare*, simply type:

```
ti Government share of GDP
gr govshare
```

To create a vertical axis title for your graph, use:

```
vaxti Billions of Dollars
```

### *Running G Commands in Batch (Add files)*

A powerful feature of *G7* is the ability to do a long sequence of commands in batch, much like a program. The commands are stored in text files we call add files. *G7* add files generally have certain file extensions to indicate their purpose. The “.add” extension is the most common, and indicates a file containing a sequence of *G7* commands for data manipulation or preparation. The “.sh” extension is a *show file* for presenting a visual show of data for analysis. Finally, the “.reg” extension is commonly used for regression files. However, you are free to name the files with any extension you like.

The nipaq bank comes with a show file called nipaq.sh. You can run it in *G7* using the “add” command.

```
add nipaq.sh
```

Alternative methods for executing add files include:

- Pick the menu item File, Execute, and then choose the file nipaq.sh
- Click on the "run add file" button , and then pick the file nipaq.sh.

This nipaq.sh file demonstrates the capabilities of *G7* and also plots out some of the series in the nipaq bank.

If an add file has many graphs, after each graph in the add file, the add file control panel will appear. This panel is shown below.

### **Add File Control Panel**



You continue executing the add file by clicking the *Cont.* button, and you stop the add file clicking the *Stop* button. Here are explanations for the other buttons.

- *Max* maximizes the graph to full screen.
- *Normal* puts it in its place in the bottom right hand corner.
- *Save* puts the graph into a file that can be included in other documents.
- *Print* sends a copy of the graph to your printer.

- *Shift1* and *Shift2* buttons allow you to view more than one graph at a time. There are two positions above the default graph position that the graph can be copied to if you click *Shift1* or *Shift2*.

The default button on the add file control panel is always the last button clicked, and the default button can be clicked by pressing the space bar, or the [Enter] key. Once you have clicked *Cont.* the first time, you can move through the entire add file by tapping the space bar.

In most cases, an add file will direct *G7* to act as if you had typed the commands in line by line in the command box, although there are a few multi-line commands that must be executed from within an add file. See the *G* reference manual and the *G7* help file for more details.

### Using the *G* Editor

Add files are simply text files. You can look at one, change it or create a new one within *G7* by using the “edit” command, which is often abbreviated as “ed” or even “e”. For example, if you had a show file called *gdp.sh* that showed various components of *gdp*, you could edit it with:

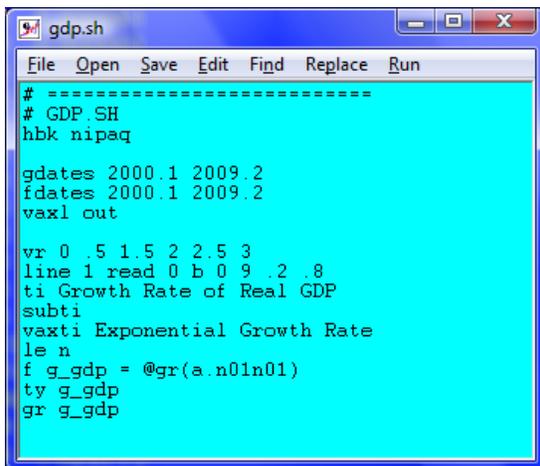
```
ed gdp.sh
```

in the command box. This will start the *G7* editor, opening a window at the upper right of the screen as shown in the figure below. The *G7* editor is a complete text editor, allowing you to examine and modify any text file, create new text files, and save your results.

You can use this editor to build up a *G7* add file by typing in lines of commands. To save your work, click Save on the menu bar, and give the file a name. You can then execute the commands in the file in *G* without closing the editor, by clicking on Run on the editor’s menu bar, or by hitting the F9 function key.

Clicking the  button on the button bar in the main *G7* window will start the editor, just as if you typed *ed filename* in the command box.

### G7 Editor, with GDP.SH File



*Using Compare to Make Tables*

*Compare* is the program that works with *G7* databanks to create tables in text or Excel format. You can create your own table definition files (called *stub files*) to develop a table of your own design.

In a typical *Compare* table, the columns are dates or ranges of dates. Rows of the table are variables or expressions involving matrices, vectors and macrovariables, with an optional title. *Compare* reads a stub file to learn the structure and format of the table, which the user defines. *Compare* reads the data series from one or more of several types of *G* databanks. In fact, the file used by the “look” command is a form of stub file.

A stub file consists of a list of commands or variables, one per line. The next example is of a small table stub file, which will print a summary of federal receipts, spending, and the surplus. It shows some of the rules for creating a valid line.

- Comments may be included anywhere in the file preceded by a hash sign (#).
- Most *Compare* commands begin with a backslash (\), which is a required part of the command. Commands are available for table formatting, doing data transformations, and other needed tasks.
- To include a variable in the table, type the variable name or expression, followed by a semicolon, followed by the title or label for that series.
- The `\xls` command instructs *Compare* to record the output in an Excel file. If this is absent, *Compare* will record output to a text file.
- A `\dates` command indicates the set of periods or growth rates that will define the columns of the table. The `\dates` command in the example tells the program to print quarterly data columns from the 1<sup>st</sup> quarter of 2005 to the 3<sup>rd</sup> quarter of 2006, and then to show 2005 and 2006 annual averages (using only the 3 quarters available fro 2006).
- The `&` command prints the current dates as a line in the table.
- A `*` causes the table to move to the next page.
- The `\announce` tells *Compare* to print the text following the command to the screen, to tell users what table is being created.
- The `\ti` command creates the title that is printed on the top of the table.

The other lines in the sample stub file are the names of the variables for which *Compare* will print data, and a label that will appear next to the data in the completed table.

### Sample Stub File

```
# FEDSMALL.STB - This is a simplified version of
# the Federal table, to illustrate features of Compare.
\xls
\dates 05.1 05.2 05.3 05.4 06.1 06.2 06.3 05 06
\announce FEDERAL GOVERNMENT RECEIPTS & EXPENDITURES
\ti FEDERAL GOVERNMENT RECEIPTS & EXPENDITURES
*
&
g0201 ; CURRENT RECEIPTS
;
g0202 ; Current tax receipts
g0211 ; Contributions for social insurance
g0212 ; Income receipts on assets
g0216 ; Current transfer receipts
g0219 ; Current surplus of government enterprises
;
g0220 ; CURRENT EXPENDITURES
;
g0221 ; Consumption expenditures
g0222 ; Current transfer payments
g0229 ; Interest payments
g0232 ; Subsidies
g0233 ; Less: Wage accruals less disbursements
g0234 ; Net federal government saving
```

Once the stub file is complete and saved, you can run the *Compare* program to create the table you want. To run *Compare*, pick Model, Tables from the *G7* menu. For the fedsmall.stb table above, we fill in the form as follows:

Specify Banks, Stub, and Output File for Tables

Stub file root name (without the .stb)

Name of output file

Show data from bank 2 and above as

Actual Values

Differences from bank 1

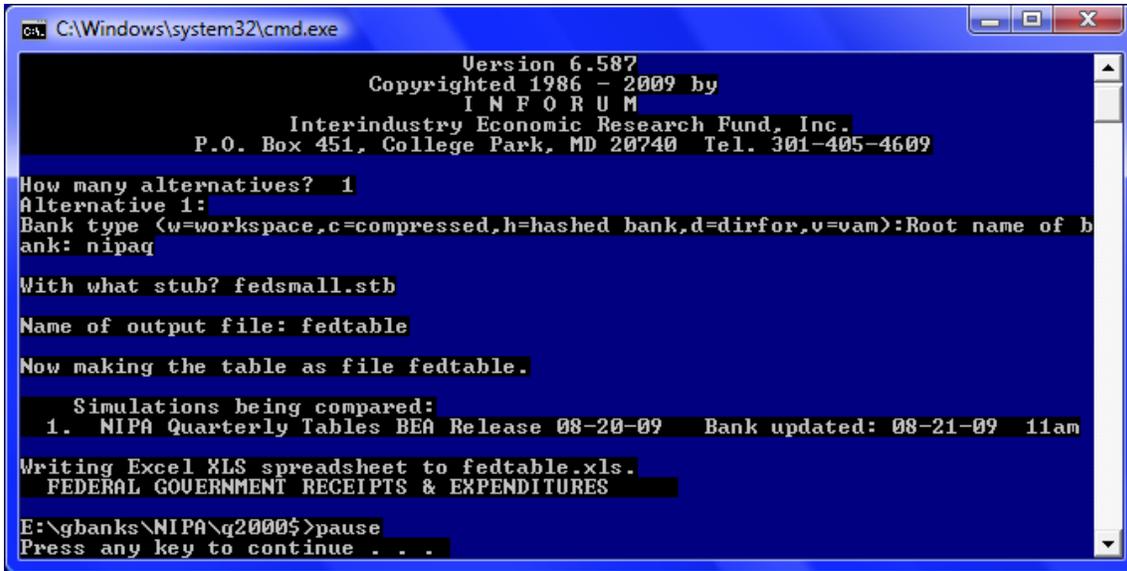
Percent differences from bank 1

Fill in a line for each bank from which you wish to draw data

	Bank type	Root name of bank	Bank type	Root name of bank
1	hashed	nipeq	6	
2			7	
3			8	
4			9	
5			10	

Using information from this form, the file Tables.in will be created. Clicking OK will cause TableX.bat to be run; if it does not exist, it will be created. You can use both files again with Model | Tables Express.

The name of the stub file is fedsmall (without the “.stb” extension), the name of the output table will be “fedtable”. The radio buttons in the middle (“Show data from bank 2 and above as”) only apply when you are comparing data from 2 or more banks, so it doesn’t matter which button is pressed, but we pick the first “Actual values”. The grid at the bottom allows the user to specify up to 10 alternative banks (usually model simulations) to be compared. Each has a drop down box “Bank type”, and a place to type the root name of the bank (without its file extension). In our case, the bank type is “hashed” and the bankname is “nipaq”. Click the OK button, and you should see the following window appear on your screen:



This window is a command window that shows *Compare* running and creating the table “fedtable”. Hit a key to continue, and the Federal government receipts and expenditures table will be created. The table below was copied and pasted from Excel.

*Sample Output Table from Compare*

FEDERAL GOVERNMENT RECEIPTS & EXPENDITURES									
	2005.1	2005.2	2005.3	2005.4	2006.1	2006.2	2006.3	2005	2006
CURRENT RECEIPTS	2230.7	2257.3	2305.4	2366.9	2473.8	2501.8	2547.4	2290.1	2524.5
Current tax receipts	1336.9	1357.0	1392.9	1448.0	1517.6	1541.6	1581.3	1383.7	1558.3
Contributions for social insurance	840.5	845.3	859.0	865.7	896.9	899.8	904.0	852.6	904.6
Income receipts on assets	23.9	24.3	23.8	22.8	24.3	25.5	26.5	23.7	26.1
Current transfer receipts	32.1	33.8	34.0	34.6	37.1	37.7	38.6	33.6	38.3
Current surplus of government enterpris	-2.7	-3.1	-4.3	-4.1	-2.1	-2.7	-3.0	-3.5	-2.8
CURRENT EXPENDITURES	2519.6	2545.4	2592.8	2634.6	2681.1	2731.2	2762.9	2573.1	2728.3
Consumption expenditures	756.9	758.8	780.6	767.1	810.4	808.5	813.1	765.8	811.0
Current transfer payments	1472.8	1472.6	1496.7	1523.1	1552.4	1588.9	1603.7	1491.3	1587.1
Interest payments	233.4	253.4	253.8	281.0	263.1	282.8	296.7	255.4	279.2
Subsidies	56.5	60.6	61.7	63.3	55.2	51.1	49.4	60.5	51.0
Less: Wage accruals less disbursemen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net federal government saving	-288.9	-288.1	-287.4	-267.7	-207.3	-229.4	-215.5	-283.0	-203.8

In order to print tables directly to a text file, simply remove the \xls command from the stub file. You can view and edit text tables using the G7 editor.

### *Printing Text Format Tables*

The procedures for printing text format tables depend on whether or not you can print directly from DOS. If you're on a network, check with your network administrator to find the name of the command that will allow you to print files directly from DOS to your network printer. If your system has such a command, then simply execute that command, referring to the file you created from running *Compare*. For example, if your network DOS print command were called *netprint* you might type

```
netprint table.out
```

from the DOS prompt.

If you can't print directly to your network printer using DOS, we suggest importing the output from *Compare* into your favorite word processor. If you choose this route, then you must also change the font of the tables to a fixed-width font, like Courier, or Line Printer to preserve the table formatting. You should also choose an 8 or 9-point font.

Further, you may also need to check that the page breaks divide the individual tables in suitable places. If they don't, changing the top and bottom margins will often allow the tables to print nicely. Some word processors have a Make it Fit, or AutoFit option that may automatically size the tables to fit on the page.

Here are some suggested instructions for *Word*

- Choose File, Open from the menu and select your file.
- Choose Edit, Select All (or hit CTRL+A).
- Choose the Line Printer or Courier font in the font selection box.
- To preview the document, choose File, Print Preview.

If you choose to import the text tables into a word processor, be sure that the \noformat option is turned on the TABLES.STB file. That option controls the printing characteristics for DOS printing, but may interfere with the formatting when a word processor is used.

*Where to Go to Learn More*

A fairly complete reference book on *G7* can be found at:

[www.inforum.umd.edu/papers/inforum/software/GBook.pdf](http://www.inforum.umd.edu/papers/inforum/software/GBook.pdf)

*G7* demos are available on Inforum's website at:

[www.inforum.umd.edu/software/demos.html](http://www.inforum.umd.edu/software/demos.html)

A somewhat outdated, though still useful FAQ on *G* can be found at:

[www.inforum.umd.edu/software/gfaq.html](http://www.inforum.umd.edu/software/gfaq.html)

*The Craft of Economic Modeling, Volumes 1-3* by Clopper Almon are available online in PDF form at:

[www.inforum.umd.edu/papers/TheCraft.html](http://www.inforum.umd.edu/papers/TheCraft.html)