

Updates to G7, Compare, and the Inforum Website

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1. Introduction

Each year, Inforum strives to improve the fleet of econometric software used by employees, partners, and clients. Since the last Inforum World Conference, many improvements have been made to G7 and other Inforum software. By adding capabilities and repairing software bugs, Inforum can provide a suite of programs that are more intuitive to use, more powerful, and more robust. Documentation relating to Inforum software also is updated continually to reflect updates.

This document describes recent development of G7, Inforum's econometric software package, over the past year. This document also details various scripts that demonstrate G7's capabilities, using sample code and examples. Additionally, this document summarizes new features of Compare, Inforum's report-generating program. Lastly, this document reviews changes to the Inforum website³ and file server.⁴

2. G7 Development

G7 is used to construct and analyze data, estimate econometric equations, and to build large-scale structural econometric model. This text summarizes many of the significant changes that recently have been made. Many additional changes were made in the form of bug fixes and small adjustments, but we omit mention of these. The G7 Reference manual and Help files have been extended and updated to reflect recent changes in the software.

2.1 String Management and Manipulation

G7 now offers the ability to create, manage, and employ strings. When created, these strings are given a name. In subsequent use of the string, reference is made to the name of the particular string. After they have been created, these strings may be employed nearly anywhere within a G7 script to perform a wide variety of tasks. For example, strings may be employed to execute particular commands, to provide special dates, to build a switch to turn on or off certain portions of code, to construct titles for graphs, and so on.

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The string syntax is very simple. The following command will construct the string.

str <string title> = "<rhs>"

str <string title1> = <string title2>

str <string title1> = <string title2> + "<text>"

Strings are declared using the *str* command. The string definition *rhs* may be specified as text presented within quotation marks, given as the name of a previously-defined string, or defined as a sequence of text and/or strings linked by '+'.

EX: str title = "Textile Machinery Manufacturing"

EX: str industry = "Retail Trade"

%s(<string title>)

To employ a string, use the %s() function with the name of the desired string. This function will expand the string, replacing the %s() command with the contents of the specified string. In this way, strings may be employed with a variety of *G7* routines. For example, they can be used to create a graph title.

EX: str industry = "Retail Trade"
ti %s(title)

Several other commands are provided to manage strings.

str clear

The *str clear* command erases all defined strings from memory.

str save <filename>

Store all defined strings in a text file named *filename*. Later, the saved strings may be loaded into memory again with the *G7 add* command.

EX: str save myStrings.txt
add myStrings.txt

A variety of tools is provided to analyze strings. This set of tools will grow over time. The following list of tools will allow string lengths to be calculated and will allow two strings to be compared in several ways.

%strlen(<string>)

Calculate the number of characters in a string.

```
EX:  str  industry = "Retail Trade" # A string of length 12.  
     ic %strlen(industry)          # This calculates and prints the number 12.
```

%strcmp(<string 1>,<string 2>)

%strncmp(<string 1>,<string 2>)

Compare two strings. The %strcmp() function is case-sensitive, while the %strncmp function is not. Arguments may be given as character strings in quotes or by providing the name of a declared string. In most cases, these functions will be used within if-else statements. These functions are very similar to their C/C++ counterparts. If the strings match, then a value of zero (0) will be returned. If the strings do not match, then the return value will not be zero.

```
EX:  str a = "Nominal Sales"  
     str b = "Real Sales"  
     str c = "nominal sales"  
  
     if (%strcmp(a,b)== 0){ text The strings are identical }  
     else {                  text The strings are different }  
  
     if (%strncmp(a,c)==0){text Strings are identical except for capitalization }  
     else {                  text The strings are different }
```

%strncmp(<string1>, <string2>, <N>)

%strncmpi(<string1>, <string2>, <N>)

The %strncmp and %strncmpi functions compares the first *N* characters of the specified strings. The %strcmp function is case-sensitive, while the %strncmpi function is case-insensitive. Strings can be named or specified as a character string surrounded by quotes ("..."). These functions are very similar to their C/C++ counterparts. If the strings match, then a value of zero (0) will be returned. If the strings do not match, then the return value will not be zero.

EX: str a = "Nominal Sales"
str b = "Nominal Output"

```
if (%strncmp(c,d,9)== 0){ text The first 9 characters are identical }  
else { text The strings are different }
```

%strstr(<string1>,<string2>)

Look for the first instance of *string2* within *string1*. If found, then return the portion of *string1* beginning at that point. Otherwise, return an empty string. This is similar to the function in the standard C libraries.

%strnset(<string>, <N>)

Construct a string composed of *N* repetitions of *string*. The length of the resulting string is limited to 90 characters. This function loosely follows the standard C libraries.

For additional examples, please see the *G7* demonstration routines that are provided on the installation CD, that are included with the *G7* installation package provided on the Inforum web site, and that are available for individual download on the web site.

2.2 G7 Extensions for Managing Excel Spreadsheets

Several years ago, *G7* gained the ability to read and write data in spreadsheet file formats. These features are available on Windows machines that have the Microsoft Excel software installed. Over the past year, *G7* has gained the capacity to format text written to Excel spreadsheets, to print entire vectors of data, and more.

xl font <c1> <r1> <c2> <r2> <setting>

xl setfont <setting>

G7 can add formatting to Excel spreadsheets. This particularly is helpful when a document must be published repeatedly. In the syntax specified above for *xl font*, *c1* and *r1* are the starting column and row and *c2* and *r2* are the ending column and row. This allows you to change the font format for a single cell or a range of cells. The *xl setfont* command specifies a font that will be employed for all data that later are printed to the spreadsheet. Finally, *setting* is the specified change to the font formatting. Please note that more than one setting can be applied, and the available font settings are provided below. Please recall that the displayed precision of numerical data is controlled with the *G7* format command.

Color

The font color can be changed by entering a color surrounded by quotes. The following color options are available: none, aqua, black, blue, cream, dark gray, fuchsia, gray, green, lime green, light gray, maroon, medium gray, mint green, navy blue, olive green, purple, red, silver, sky blue, teal, white, yellow. Note that all multiple-word settings must be specified within quotation marks.

EX: xl font A 1 A 1 blue
EX: xl font A 1 A 1 "navy blue"

Size

The font size can be changed simply by entering an integer after the cell start and end range. The following example will change the color to red and the size to 24:

EX: xl font A 1 C 8 red 24

Typeface

The font typeface can be changed by entering most font types inside of quotes. See the *G7 Reference Manual* or *G7 Help* files for a complete list of supported typeface options. Most typefaces that were provided with Windows 2000 or Office 2000 should be supported. Note that all multiple-word settings must be specified within quotation marks. The following example will change the font to times new roman:

EX: xl font B 3 H 3 "times new roman"

Other Options

The following basic settings are available: bold; italic; underline; horizontal alignment options left, center, right, and justify; and vertical alignment options top, vcenter, bottom, and vjustify. Several additional underlining options are detailed in the *G7 Reference Manual* and *G7 Help* files.

EX: xl font A 1 I 2 bold underline bottom

xl formula <row> <column> "<formula>"

G7 has the capability to insert simple formulas into the Excel spreadsheet. Make sure to surround the Excel formula with double quotes. Enter the any formula as you would within cell in Excel.

EX: xl formula E 11 "=sum(e3:e9)"

xl print missing "<value>"

With the *xl print missing* command, *G7* can insert a string to indicate a missing value when printing data to a Excel spreadsheet. Thus, when a missing value code (-0.000001) is encountered when *G7* is printing data from a data bank to a spreadsheet, an unambiguous code can be inserted to help eliminate confusion.

EX: `xl print missing "N/A" # Print N/A in place of missing values`

EX: `xl print missing "" # Print an empty cell when a missing value is encountered`

xl vecwrite < vector > < v (index) > < c (cols) > < r(rows) > < direction > [< start > [end]]

G7 can print entire vectors of data for multiple years to a Microsoft Excel workbook using the *xl vecwrite* command. The *xl vecwrite* command must be used with a vector that is stored in a VAM (vector and matrix) bank. In the syntax specification above, *vector* is the root name of the data vector. *index* lists the elements of the vector that are to be printed. The *cols* and *rows* settings provide the row or column positions for the first-period values of the vector. Either *cols* or *rows* must have the same number of elements as *index*, and the other must have exactly one element. The *direction* must be *right* or *down*; this provided the direction within the spreadsheet for the printing of additional periods of data, with the range of periods given by *start* and *end* dates. The following example will print vector elements 1-10 of the 'sales' vector to an open Excel spreadsheet, with the 2008 values of sales printed to column B, rows 5-14, and data for additional periods extending to the right.

EX: `xl vecwrite a.sales v(1-10) c(B) r(5-14) right 2008 2010`

%xl col (<int>)

This command will convert a positive integer into its corresponding letter.

EX: `do{
text printing Column %xlcol(%1) # This will return A, B, ..., AA
xl write %1 1 down x%1 2000 2010
}(1-27)`

2.3 Variables and Arguments in G7

Experienced *G7* users are familiar with variables specified as %1, %2, and so on that are employed in add files, fadd files, do loops, and elsewhere. This section provides details of several related features that have been introduced.

The appearance of a percent symbol (%) within a *G7* script always signifies that the following character or word should be interpreted as a variable, a keyword, or a function. In each case,

when the variable, keyword, or function is encountered and evaluated, the value of the result effectively will be inserted into the script and subsequently processed by *G7*.

Variables

The treatment of variables in *G7* are similar to the treatment in DOS batch files. Up to 99 variables typically may be passed to an add or fadd file, within a do loop or function, and so on. The first argument that is passed to a file is referenced by '%1', the second by '%2', ..., and the ninety-ninth by '%99'.

%{}

Integers often are passed to an add file or function, and integers are used as indexes for a do loop. Sometimes a calculation is needed that is based on that integer, but some adjustment to the integer value is needed. The %{} operation allows such calculations. Numerical variables and constants may be referenced within the brackets, and addition, subtraction, multiplication, and division of variables and constants is permitted. For example, suppose we need to print vector data to a spreadsheet. Suppose the vector elements range from 1-10 and we want to print these series in rows 6-15. We could use the *xl vecwrite* command introduced earlier, or we could construct a do loop like the following:

```
do{ xl write A %{5 + %1} vec%1 2000 2010 }(1-10)
```

Note that for each iteration '%1', element '%1' is referenced to specify an element in the "vec" vector, and that data contained in that vector element is written to row '5+%1' in the spreadsheet.

Another common use of %{} is to provide unambiguous specification of variables within a script. Recall that variables '%1' through '%99' are legal. However, there may be ambiguity between a two-digit variable and a single-digit variable that is followed by another digit that is not part of the variable. For example, if '%9' is followed by a '9', it looks the same as '%99' and so *G7* will attempt to find and employ the 99-th variable definition. To remove such ambiguity, use the following approach:

```
f x = %{%9}9 # Variable 9, followed by '9'  
f x = %99 # Variable 99
```

Keywords

Several keywords are available. These may be employed almost anywhere within a *G7* script. The following lists the keywords that currently are available.

%dates

Insert the current date.

%time

Insert the current time.

%NARGS

Calculate the number of arguments that currently are in scope; i.e., calculate how many variables %1, %2, ... currently are defined.

%%

Treat the second '%' as text, so that "%%" is evaluated as a single '%'.

Functions

A variety of functions also are available. The functions that are available have been described elsewhere in this document. The current list of available functions includes routines to operate on strings and to support operations with the *x/* routines. An additional important function is specified here.

%getval(<expression>, <date>)

The value of *expression* in period *date* is calculated or retrieved. Any legal algebraic expression or stored variable may be specified. The floating-point value is converted to text, and the precision for the conversion is controlled by the *G7 format* command.

EX: ti Real GDP in 2010: %getval(gdpR, 2010)

2.4 Other G7 Developments

Several additional changes are listed here.

autocomplete [<setting>]

The default behavior of *G7*'s command box is to attempt to complete a partially typed command based on previous entries. To disable this feature, enter "autocomplete no". To turn it back on, enter "autocomplete yes". If no setting is specified, then the current setting is displayed. The setting will be saved when *G7* is closed, and the same setting will be restored when *G7* next is run. Alternatively, the setting may be controlled from the *G7* File menu.

lv [-sr] [<bank_location> [<wildcard>]]

lvc [-sr] [<bank_location> [<wildcard>]]

The *lv* command now can list the names of vectors and matrix contained within a specified bank. These names may be sorted alphabetically or in reverse alphabetical order. The *lvc* command will print vector and matrix names in column form.

A number of other changes and improvements have been made. Additional detail may be found in the *G7* Help file, and is summarized in the “New for 2010” page of that document. Advanced users may find the update logs helpful; these are provided on the Downloads page of the web site.

3. Compare

Compare, Inforum’s report generating and data publication program, is used to export *G7* and model data to text files, to printer format files, or to spreadsheet files via Excel. Since the last Inforum conference in Jurmala, *Compare* has gained the ability to print formatted spreadsheet files and to employ the Excel software to create documents in a variety of file formats. The changes are summarized below. Please see the *Compare* reference manual for additional details; it is available on the Inforum web site and is bundled in the software installation package.

Please note that while *Compare* can generate documents of several types without the help of auxiliary software, it requires the installation of Microsoft Excel in order to create spreadsheet documents in Excel (XLS) format. All of the features described below require the installation of Microsoft Excel. In addition, these formatting and other features will work only when the “\xls” command is given within the *Compare* stub file, where the “stub” file contains the *Compare* commands to generate a document.

3.1 Spreadsheet Formatting

Compare now allows the user to format specific parts of a spreadsheet by inserting commands into a stub file. The font in the header, title, dates, banks, series names, and data may be controlled separately, or a single specification may be given to for all data that subsequently are printed. Controls are available for the typeface, size, color, vertical and horizontal alignment, bold status, italic status, and underline status and type. The various settings that are desired may be given in any order.

The typeface is specified by giving the name surrounded by double quotes; the quotation marks are required for any name with multiple words. Size is adjusted by entering “size” followed by an integer, with no space in between (e.g. “size10”), or simply by specifying the integer. Horizontal alignment is controlled by entering "justify", "center", "right", or "left" for the horizontal alignment. Vertical alignment similarly is specified as "top", "vcenter", "bottom", or "vjustify". To clear the formatting settings, enter “clear” as the setting. A complete listing of Excel font settings are listed in the *Compare* Reference Manual.

The following specifications will control the font for various portions of text and data that are printed to a spreadsheet.

\fonthead <settings>

This command will control formatting for the \head output.

\fonttitle <settings>

This command will control formatting for the \title output.

\fontdate <settings>

This command will control formatting for the specified dates. By default, dates will be printed in bold face, with double underlining, and with horizontal alignment set to *center*.

\fontbank <settings>

This command will control formatting for the printing of bank titles.

\fontname <settings>

This command will control formatting for series names and other text.

\fontdata <settings>

This command will control formatting for the numerical output.

As an alternative to specifying the formatting values separately for each section, the formatting parameters for all text and data that subsequently are printed may be controlled with the next command.

\font <settings>

This command is used to set the default formatting and will override all other font commands.

3.2 Spreadsheet File Types

The “\xls” command tells *Compare* that the current document should be printed in the form of a spreadsheet, with the help of the Microsoft Excel software. By default, this document will be recorded in the Excel (XLS) file format. A variety of alternative file formats now may be specified, such as HTML, CSV, and text (TXT) files in several varieties.

We begin with a reminder of the syntax for the \xls command, followed by the specification of the file format.

\xls [<filename>]

Issue this command to create spreadsheet documents. If a filename is specified, then it will be employed to name the document. If no name is given, then the name will be specified according to the last line of the *.IN configuration file or according to the specification provided in the *G7 Compare* window.

\filetype <type>

At times, the user may need to create a spreadsheet of a file type different than the default Excel (XLS) type. To do so, issue the *\filetype* command immediately after the *\xls* command. Alternative Excel file types include .CSV, .HTML, and .TXT. A complete listing of supported file types is available in the *Compare* Reference Manual.

Please note that *Compare* still can publish spreadsheets in WK1 format. The advantage of creating files in WK1 format is that the task is performed very quickly. Disadvantages include 1) no font formatting is provided and 2) only one worksheet can be created per file. Still more important is that Microsoft has discontinued support for the format in its Office software. Office 2007 and later has no ability to read or create WK1 files. Fully patched versions of Office 2003 and earlier may have the ability to read the files, but the display or creation of such files is not allowed.⁵ Alternative spreadsheet software, including OpenOffice, still supports this format. With increasing reliance on Excel 2007 and later, it seems prudent to move away from reliance on the WK1 format toward a modern alternative.

4. Inforum Website

The Inforum web site has undergone several significant updates in the past year, in addition to routine maintenance and the posting of software and data updates. Most important is the introduction of an improved interface for browsing Inforum documents on the Research page. In the past, research papers and other documents were organized by type and were spread across several pages. Now, these documents are referenced from a single page. The viewer can filter the listed documents according to document type (Working Paper, Conference Presentations, Other Papers, Published Work, or All) and sort the results by author, title, or date.

Please recall that the website provides search tools in the form of a search box that appears on each web page and as a link in the standard menu. The search tools index the documents that are available on the web site, and so searches will be conducted over the contents of each document in addition to the contents of each web page. This provides a useful tool for finding a paper on a particular topic.

The EconData portion of the site provides a variety of data, primarily for the U.S. These include macroeconomic and industry data, in addition to regional and other data. These data originally are published by U.S. statistical agencies; we republish the data without modification in G7 database formats. EconData continues to be updated as new data publications are released. In most cases, these banks are updated within a few days of publication. A wide range of annual, quarterly, and monthly data have been compiled in Inforum database formats.

⁵ Note that this control can be bypassed with Office 2000 and 2003 by making certain registry changes, but such changes require acceptance of risks described on the Microsoft web site.

Current news items can be found on the Inforum homepage and on the News page. Typical news items include announcements of the publication of recent work, the appearance of Inforum staff in the media, and the announcement of Inforum conferences.

Most of the software developed and maintained by Inforum is available on the Software section of the web site, along with documentation. A growing list of demonstration routines also is available. Recent additions include demonstrations of string manipulation, spreadsheet formatting, and more. Software and documentation for G7 and Compare has been updated.

A page has been created for each of the Inforum partners and for each International Conference. We attempt to maintain these pages with current information, but we are successful only with the help of each team. A page has been created for the 2010 Inforum World Conference, and documents from the conference will be posted.

5. The Inforum File Server “Sartoris”

For many years, Inforum has operated an FTP file server at the sartoris.umd.edu address. Following a recent failure of the server, an upgrade to a newer machine was made. In addition, the popular but inherently risky FTP (File Transfer Protocol) protocol was left behind. In its place, we now employ the SFTP (SSH File Transfer Protocol) protocol. A primary advantage of SFTP is that all communications are encrypted, thus offering security that is far superior to the unencrypted FTP communications.

A variety of tools is available for gaining access to the files on this machine. Graphical interfaces include extensions for web browsers and stand-alone programs. The FireFTP extension is available for Firefox; configuration is done as for the old machine, but now select SFTP from the list provided on the Connection tab when setting up the account. WinSCP provides a stand-alone graphical interface (<http://winscp.net/eng/index.php>). Both have been tested with the new server and work properly.

A Windows command-line interface is available through Putty (<http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html>). Those familiar with Cygwin may prefer to install the Cygwin OpenSSH feature; this will include support for SFTP. Both Cygwin SFTP and Putty have been tested with this machine. Finally, SFTP command-line support also should be included on most Linux distributions. Note that the SFTP syntax is very similar to the FTP syntax; details may be found here: www.openbsd.org/cgi-bin/man.cgi?query=sftp&sektion=1.

Login details for the server otherwise are identical to those employed in the past. Additional support is available; please contact one of the authors directly or e-mail the Inforum webmaster at Inforum.Webmaster@gmail.com.

6. Conclusion

Since the 2009 Inforum World Conference, *G7* and companion software have been refined and extended. Most work described in this document is available for download on the Inforum web site. Inforum team members already are making progress on new features of *G7*. We look forward to cooperation with Inforum partners to further improve and extend the work.