A Software Development Summary for the 2009 Inforum World Conference

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Abstract

This article summarizes work at Inforum over the past year on the G7 *and* Compare *software. We document recent development of* G7*, the database and econometric software package developed at Inforum with the assistance of its partners. We also describe the collection of demonstration programs available for* G7*. We introduce extended spreadsheet capabilities of our document-preparation program,* Compare*. Finally, we discuss other improvements to the Inforum collection of software for building and operating macro-industry models, and we discuss improvements to the Inforum web site.*

1. Introduction

Many improvements have been made to the *G7* program and other Inforum software that together provide tools for building macroeconomic and interindustry-macro models. These improvements yield a suite of programs that are integrated more tightly, are more convenient and easier to use, and yet are even more powerful than before. This software and related documentation also is easier than ever to obtain, as most programs and documentation now are available for download on the Inforum web site.[2]

We begin with a review of recent developments of *G7*. These developments also are described in the latest *G7* Help files and Reference Manual that are available in the Software section of the Inforum web site.[3] The site also provides a collection of demonstration programs that introduce *G7* and related software, demonstrate some of the tools available in *G7*, and provide step-by-step guidance through some advanced procedures.

Of particular importance is the improved integration of *G7* and Inforum modeling tools. While *G7* long has provided full support for the construction and operation of macroeconomic models, the capability to operate interindustry-macro models from within *G7* has been more limited. These constraints have been relaxed considerably, and the process now is easier to master, more flexible, and more powerful.

We proceed to describe development of companion software for modeling and data management. In particular, we note updates to the *Compare* program and its improved integration with *G7*. Especially important is its new capability to create spreadsheet documents in the Microsoft Excel format.

Finally, we review other improvements to the Inforum web site. Recent extensions include the addition of several software packages and an extensive set of documentation.

In summary, work since the last report, delivered to the 2008 World Conference in Cyprus, has corrected bugs, refined existing tools, and introduced important new capabilities to aid model builders and other researchers. The improvements should make Inforum software more accessible to new users

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and should help experienced users to operate more efficiently.

2. *G7*

G7 is used to construct and analyze data, estimate econometric equations, and to build large-scale structural econometric models. 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* Help files have been updated extensively, not only to incorporate recent changes to *G7*, but also to improve formatting, organization, and accuracy. The *Reference Manual* and *G7 Tutorial* also have been extended and updated. This new documentation better reports the capabilities of *G7* and guides the model builder through difficult steps of data development.[4]

If you do not have *G7* installed on your machine, please download the *PDG.exe* program from the Inforum web site and run it. This will extract a set of installation routines; by default, these files will be placed in the C:\Temp directory. Navigate there and run Setup.exe to install *G7* and related files. While this package may not always provide the latest version of each program, it will provide a comprehensive set of programs. You then can upgrade particular programs, when they are available, by downloading the individual files linked at the bottom of the Software Downloads page. These files should be stored in the C:\PDG directory. They will replace the files that were installed earlier. Please check the Software Downloads page periodically; as software updates become available, they will be posted to this page. Also, check the Software Documentation page periodically for updates.

Improvements to *G7* are presented in four following sections. First, we present new tools and features introduced to the *G7* scripting language. This section also lists a few of the problems that have been fixed and describes some of the new demonstration routines. Second, we describe refinements of the *G7* graphical interface. Third, we describe the revised interfaces between *G7* and various companion programs. Finally, we conclude by reporting extensions and improvements to the documentation.

2.1 Extensions to the Language

G7 primarily is a tool for processing scripts. These scripts read and manipulate data, estimate econometric equations, assemble structural models, and display and store forecasts and other data.

Many recent developments improve and extend the set of tools that were introduced earlier. For an introduction or review of *G7*, see the introductory demonstration routine on the web site or CD. A few other commands and tools are brand new. Note that some of these routines are preliminary and need additional testing. See the *G7* Help files and the *Reference Manual* for additional details. Demonstration routines available on the Inforum web site and distributed with this paper provide additional guidance.

We begin by reviewing extensions to the *xl* tools for reading and writing in the Excel format. The most important addition is the capability of creating new workbooks and worksheets.

[4] For the G7 software and for additional documentation on the material introduced here, please visit the Inforum web site at www.Inforum.umd.edu. A copy of this document and related materials may be found on the "Inforum World Conference XVII" page. The current *G7* version number is 7.38.

xl create
xl create workbook [<filename>]
xl create worksheet [<name>]

The *xl create* command can create a new workbook or add new worksheets to an existing document. When new files are created, they will include one sheet per workbook. Additional sheets can be added as needed, and names can be assigned to these sheets.

xl name worksheet <sheetname>

This command names the worksheet that currently is open. Note that *G7* still refers to each sheet according to its position in the workbook: counting from the left, the first worksheet to appear is "1," the second is "2," and so on.

xl save [<filename>]

A *save* command has been added so that new and modified worksheets can be saved from *G7*. If the workbook has not been named already, then a file name must be provided.

xl column width <column> <width>

This command sets the specified column in the current worksheet to indicated width.

In addition, several of the tools for reading and writing now can do so in any direction. *G7* now is much more stable, as it can interpret a wider range of responses from the Excel program. The *xl* routines have been revised extensively and now are more reliable and run much faster than before.

These and other techniques for working with spreadsheets are demonstrated in a collection of *G7* scripts available on the Inforum web site. The *xl read* script illustrates how spreadsheets available from U.S. statistical agencies can be read by *G7*. The routines include reading single data series, vectors of data, and matrices. A companion script demonstrates the use of *G7* for creating spreadsheets and printing data.

if([comparisons]){ [...] }
[else if([comparisons]){ [...] }]
[else{ [...] }]

The *G7* flow control capabilities were introduced at the 2006 Inforum World Conference. The most common flow control tool is the *if-else* statement. A very important feature has been added this year. Values stored in a data bank now can be evaluated by the *if* command. The syntax is

eval(<series> , <date>)

The value of *series* in period *date* is retrieved, either from the workspace or from the specified data bank. The value may be compared to a scalar or to a second *eval* result.

Note that the *if-else* routines are demonstrated in several of the sample scripts. An advanced demonstration shows how the *if* command with the *eval* test can be employed to spot trouble in a model forecast.

@ functions

G7 offers many tools for manipulating time series in algebraic expressions. Several of these have been added to the *G7* Help file, though they were added to *G7* in previous years. Some of these are functions to calculate the mean, year-on-year growth rates, geometric growth rates, maximum and minimum values, and a period-by-period *if* function. At least one new routine has been added this year: the *@stdev()* function for calculating the sample standard deviation of a series.

(lis)tnames [-srgv] <w | a> [wildcard]

(lis)tnamescol [-srgv] <w | a> [wildcard]

The *listnames* and *listnamescol* commands will type the names of the variables in the workspace or specified bank. Use of wildcard is optional, and like in DOS, '*' will match any number of characters. The *listnamescol* routine prints the series as a single column. The other options were introduced this year. Option *s* sorts the series in alphabetical order, and *r* reverses the order. If a Vam file is associated with the specified *G* bank, then option *g* prints only macro series and option *v* prints only Vam bank series.

pause [<“message”>]

The pause command causes *G7* to pause and await instructions. *G7* now can print a message to provide information to the user.

Improved Group Management

Finally, the mechanism by which *G7* forms groups has been revised. Such groups are used in several ways: to control looping in scripts, to define a group of industries by sector number, to specify a set of spreadsheet rows or columns, and other uses. Most users will not notice any difference in the behavior of *G7*. Advanced users may notice increased flexibility and reliability in all routines that employ groups, including the *add* function, the *group* command, *do* loops, *xl* routines, many Vam routines, and commands. While groups typically are specified as sets of numbers, the routine now has the capability to include named groups, dynamic groups, or to specify spreadsheet column groups according to the column letters.

Many of the demonstration scripts employ these grouping routines. The *xl* scripts, for example, use groups to specify column positions, row positions, and vector elements. The script for balancing matrices employs the group technology to indicate matrix rows and columns. Several scripts use looping, which is controlled by groups.

2.2 Interface Improvements

A number of improvements have been made to the *G7* graphical interface. These include improvements both the main window and to the editor. Additional improvements have been made to the interfaces between *G7* and companion software, including user-built models.

Improvements to the *G7* editor are modest but useful. The editor now has “redo” capability. The user

now can select a file name in the text and, with a mouse click, open the file in a new editor window. The menu layout has been improved. Finally, a small but serious problem was fixed that previously could lead to lost work. When modified text in an editor is not saved but the *G7* window is closed, the editor previously would close without warning. The editor now will prompt the user to save the work, choose to discard the changes, or to cancel the operation. If the user chooses to cancel, *G7* now will stay open where previously it would close and discard the changes, thus avoiding an opportunity to lose data.

Handling of font selection has been improved for the *G7* output window, for the editor, and for graphs. Each of the settings now is stored and loaded when *G7* is started. Previously, this was done only for the output window. While a font dialog box for controlling graphs previously was offered, it did not work. The user now can specify the font for graph titles, subtitles, keys, and axis labeling, though some restrictions remain in place.

The menus and tool bar have been improved in main *G7* window to improve clarity and to provide additional interactive capabilities. For example, a new feature is the ability to close all banks from the menu, and the *G7* menu now describes the obscure "zap" command to improve clarity.

The graphical interface to assign data banks has been revised to allow multiple banks to be assigned at once. If banks already are loaded, then they are listed in the window. New banks can be added by typing the name or browsing. Banks can be closed by clearing the text, and banks can be reassigned by editing or by browsing. While additional work is needed to polish the interface, the benefits of the recent changes seem clear.

A minor annoyance in earlier versions was that the File | Change Directory menu item and Change Directory button operations would begin from the location of the *G7.exe*. This seldom is near the desired destination. These operations now load the current working directory when the dialog opens.

2.3 G7 Control of Companion Software

While the capabilities of *G7* are extensive, several additional tools are useful for building models and viewing data. Several of these can be controlled by *G7*. These include constructing and running macroeconomic models; assembling equations, compiling, and running interindustry-macro models; and building spreadsheet, text, or printer format files to display data.

G7 and the companion *Build* program long have been used to construct macroeconomic models. The entire model can be designed, estimated, and assembled in *G7*. The *Build* program then is run from the *G7* menu to assemble data banks for running the model, to convert the model's equations to C++ code, and finally to compile the model code as an executable program. A second item is available in the *G7* menu to execute and control the model. This process has not changed, though it has been polished slightly. An improvement is that the model controls now are saved to file when *G7* is closed. These same specifications will be loaded the next time that *G7* runs. This is useful if the same model is run repeatedly across several sessions.

A similar procedure is available for constructing, compiling, and running interindustry-macro models, though some additional, user-specified C++ code typically is needed. Many identities and regression equations can be specified in *G7*, and the *IdBuild* program then is run from the *G7* menu to collect data and translate equations to C++. The same operation also will compile the code, together with the *InterDyme* library and user-specified code, to form the model. This too remains largely unchanged from earlier editions of *G7*.

What has changed is the process for running an *InterDyme* model from the *G7* menu. Before running the model, the *Fixer* and *MacFixer* programs must be configured and run. Previously, the programs were run separately from the *G7* menu, followed by another menu selection to run the model. These steps have been combined so that a single menu selection can run *Fixer*, *MacFixer*, and the model. This selection will open a window with many dialog boxes. The Help button on the window provides detailed instructions. The dialog boxes at the top provide the content for the model configuration file. Below that are several boxes to provide historical bank names, a name for the simulation, and the model name. Note that many of these settings will be stored when *G7* is closed; the next time that *G7* is run in the same directory and the window is opened, the boxes again should be filled.

Two check boxes indicate whether configuration utilities for *Fixer* and *MacFixer* should appear. These configuration files seldom change, and so they seldom need to be modified. Note that this is not a means to specify the fixes; these fix files must be established earlier.

Finally, a small editor appears at the bottom of the window. The contents of Run.bat or another batch file appear and may be edited. If no file exists, then *G7* can create a batch file using the entries in the dialog boxes above. All steps necessary for running the model and saving results must be specified here. This includes copying historical banks as model banks, if necessary, and running the fixer programs. Next, the model should be run. Finally, the forecast banks and configuration files may be copied and renamed for future use. This process has been used for many years at Inforum, but it marks a slight change in the way that models are run from *G7*.

G7 control of *Compare* also has been revised. *Compare* may be run from the *G7* menu using the Model | Tables menu item. A window will appear that allows the user to search for a configuration file or to type the desired settings. These will be stored when *G7* closes and will reappear the next time that *G7* is run. While the process should be familiar to *G7* users, the interface has been improved.

Note that *G7* controls most of these companion programs through batch files. When the user selects a menu item, *G7* will check whether the corresponding batch file exists. For example, *G7* relies on the TablesX.bat file when running *Compare*. If the batch file does not exist, it will be created and filled with typical instructions. If it does exist, then *G7* will not modify the file. This allows the user to alter the standard process. Once in place, *G7* will execute the batch file to carry out the operation.

2.4 Documentation Descriptions

The *G7* Help files and Reference Manual largely have been brought up to date. They are available on the Inforum web site, both in the PDG package and as separate files on the Software Documentation page. For additional information on recent changes to *G7*, see “New for 2009” on the Features tab of the Help files. When they become available, future updates to the documentation and the software will be posted on the web site.

3. *Compare*

Compare now has the ability to create documents in the Microsoft Excel format. This greatly improves the convenience of printing large data sets and comparing alternative forecasts. While the routine

largely mimics the existing routine for generating spreadsheet files in the WK1 format, an important new feature is the ability to create documents with multiple worksheets.

The use of the new features is simple.

\xls

Include the \xls command near the top of the stub file. The root name of the new workbook will be taken from the .IN configuration file or the Model | Tables dialog box.

\wstitle <name>

As with text files, new pages are specified with the * command. The current worksheet is named with the \wstitle command.

Currently, the user has little ability to specify the formatting of the spreadsheet. *Compare* does set the precision according to the specified setting, and it does increase the width of the first column. Greater formatting control will be added in future editions.

Many other small changes have been made to improve stability, but few of these will be obvious to the user.

4. The Inforum Web Site

The biggest change in the Inforum web site is the expansion of the software section. Many more programs now are available for download on the Software Downloads page. An Other Software page was added to list and describe many of the auxiliary programs that are available in the PDG package. A page dedicated to software documentation has been added and currently features 15 documents. The Software Demonstrations page has been extended and currently features nine routines. The pages describing Inforum's modeling software also have been improved.

The software for building macroeconomic models has been revised; it is included in the PDG package. The AMI model has been tested with this software, and the model is available for download.

The list of data banks featured on EconData continues to grow. 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.

Eight new papers and projects have been announced on the home page and described in greater detail on the News page. These include a paper by Horst and Werling that appeared in Peace Economics, Peace Policy, and Public Policy;[5] a set of projections constructed with the Lift model that was cited by the Council of Economic Advisers;[6] and a major report on the economics of climate change policy.[7]

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[5] Macroeconomic and Industry Impacts of 9/11: An Interindustry Macroeconomic Approach, available at www.bepress.com/peps/vol15/iss2/5

[6] Preparing the Workers of Today for the Jobs of Tomorrow, available at www.whitehouse.gov/administration/eop/cea/Jobs-of-the-Future/

[7] The Balancing Act: Climate Change, Energy Security & the U.S. Economy, available at businessroundtable.org/sites/default/files/2009.06.24_The_Balancing_Act_FINAL.pdf

Detail on the International Partners pages continues to be updated as we receive new information.

5. Conclusions

G7 and companion software have been refined and extended. Much of this work is available for download on the Inforum web site. This site also has been improved considerably.

A number of people in the U.S. and elsewhere have contributed to these many improvements. Our partners in Italy, Japan, and Poland again deserve recognition for submitting reports of their experiences and for suggesting improvements. Troy Wittek and Matias Antonio have helped to edit and update the *G7* Help files and other documents, to construct the demonstration routines, and to test the software. As always, we welcome the suggestions and participation of Inforum partners in the continued development of these tools.