

Paper AP-216

Using SAS® ODS EXCEL Destination "Print Features" to Format Your Excel Worksheets for Printing as You Create Them.

William E Benjamin Jr, Owl Computer Consultancy LLC, Phoenix Arizona

ABSTRACT

This presentation will demonstrate features of the SAS® ODS EXCEL Destination that allow you to use various ODS EXCEL sub-options to prepare a worksheet to be printed, as it is written out by SAS. The sub-options that impact page level features are the following. "Choose to print in color or Black and White only"; "Center the output either horizontally or vertically"; "Print in draft quality or normally"; "Print horizontally or vertically"; "Arrange the data across the page differently"; "Select where to put the output"; "Print headers, footers, and row breaks"; "Adjust the size of headers and footers"; "Adjust the print scale to improve the look of lines in graphs".

INTRODUCTION

This paper is one of a series of short papers each describing suboptions of the ODS Excel Destination. Here I will list "Actions", "Options", and "Suboptions" that apply to creating an Excel Workbook and preparing print ready features available as the workbook is being created. Unlike the ODS tagset called EXCELXP, the ODS Excel Destination cannot be modified by you the SAS user. This paper is too short to cover all aspects of the print features and therefore can only cover a small focused topic set.

PROBLEM

The ability to apply specific Excel print features to SAS output and SAS graphs in Microsoft Excel workbooks has long been something that both SAS and Excel users have wanted. The SAS Tagset EXCELXP was limited by not being able to include SAS Graphs in the generated XML output files. SAS users wanted better ways to output more detailed and complex data because their boss wants the data in an Excel workbook or reports needed to be delivered to clients with graphs. Also, Excel users want the data in Excel because they can easily process "What – If ..." questions. Therefore, both SAS and Excel users really want better ways to produce Excel workbooks. Preparing Excel worksheets for printing is often done manually after the workbook is created. If a workbook contains multiple worksheets the time to prepare individual sheets can quickly multiply from a few minutes to hours.

ODS EXCEL DESTINATION FEATURE DESCRIPTION

ODS Excel Destination "Actions", "Options", and "Suboptions" work with different parts of the Excel Workbook. This paper will describe some sub-options associated with the ODS EXCEL Destination features that modify the printed output, not all print related features will be described.

ODS EXCEL DESTINATION "ACTIONS", "OPTIONS", AND "SUBOPTIONS"

The following tables list the full list of "Actions", "Options", and "Suboption" available for the ODS Excel Destination as presented in SAS V9.4 (TS1M3). Newer versions of SAS may contain additional features or sub-options.

List of ODS Excel Actions

Actions Include

NONE	Sends Excel output to the SAS Default output directory. Depending on your version of SAS, the default directory is shown in the bottom left or right side of the display manager window.
CLOSE	Closes an ODS EXCEL statement with or without an ID= option.
EXCLUDE	An ODS EXCLUDE statement prevents an ODS object from being output.
SELECT	An ODS SELECT statement includes an ODS object in the output.
SHOW	An ODS SHOW statement writes the current selection or exclusion list to the log

List of ODS Excel Options

Optional Arguments		
ANCHOR=	AUTHOR=	BOX_SIZING=
CATEGORY=	COMMENTS=	CSSSTYLE=
DOM=	DPI=	FILE=
GFOOTNOTE	NOGFOOTNOTE	GTITLE
NOGTITLE	IMAGE_DPI=	KEYWORDS=
ID=	OPTIONS	SASDATE
STATUS=	STYLE=	TEXT=
TITLE=	WORK=	

Suboptions of the OPTIONS option of the ODS EXCEL statement

Suboptions of the OPTIONS Argument		
ABSOLUTE_COLUMN_WIDTH=	ABSOLUTE_ROW_HEIGHT=	AUTOFILTER=
BLACKANDWHITE=	BLANK_SHEET=	CENTER_HORIZONTAL=
CENTER_VERTICAL=	COLUMN_REPEAT=	CONTENTS=
DPI= or IMAGE_DPI	DRAFTQUALITY=	EMBEDDED_FOONOTES=
ENBED_FOOTNOTES_ONCE=	EMBEDDED_TITLES=	EMBED_TITLES_ONCE=
FITTOPAGE=	FORMULAS=	FROZEN_HEADERS=
FROZEN_ROWHEADERS=	GRIDLINES=	HIDDEN_COLUMNS=
HIDDEN_ROWS=	INDEX=	MSG_LEVEL=
ORIENTATION=	PAGE_ORDER_ACROSS=	* PAGES_FITHEIGHT=
* PAGES_FITWIDTH=	PRINT_AREA=	* PRINT_FOOTER=
* PRINT_FOOTER_MARGIN=	* PRINT_HEADER=	* PRINT_HEADER_MARGIN=
ROWBREAKS_COUNT=	* ROWBREAKS_INTERVAL=	ROWCOLHEADINGS=
ROW_HEIGHTS=	ROW_REPEAT=	* SCALE=
SHEET_INTERVAL=	SHEET_LABEL=	SHEET_NAME=
START_AT=	SUPPRESS_BYLINES=	TAB_COLOR=
* TITLE_FOOTNOTE_NOBREAK=	* TITLE_FOOTNOTE_WIDTH=	ZOOM=

NOTE – Only the **BOLD** options will be described in this paper, other sub-options also impact Print Features. These are annotated by a “*”.

THE ODS EXCEL DESTINATION SYNTAX

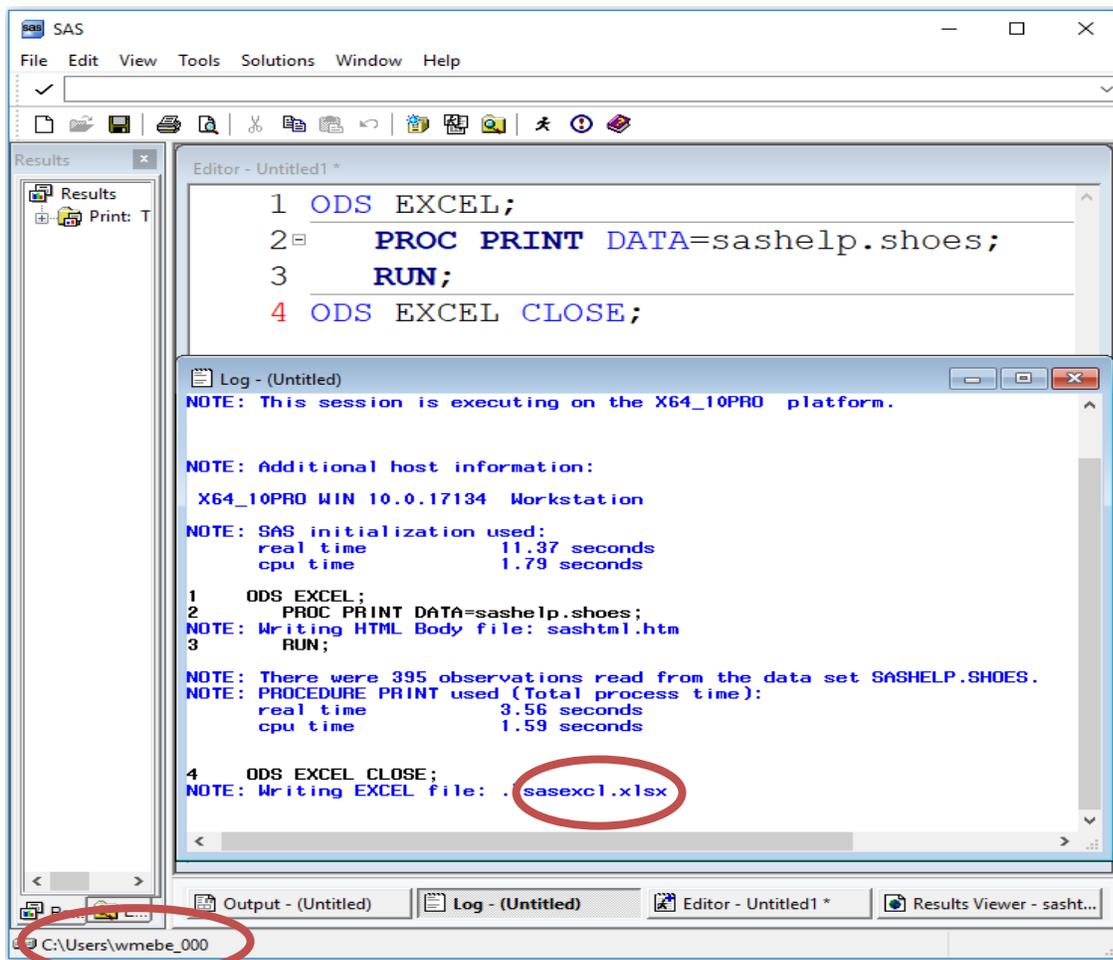
Simple ODS Syntax for the ODS EXCEL destination.

```
ODS EXCEL <(<ID=> identifier)> < action> ;
ODS EXCEL <(<ID=> identifier)> <option(s)> ;
ODS EXCEL <(<ID=> identifier)> < action> <option(s)> ;
```

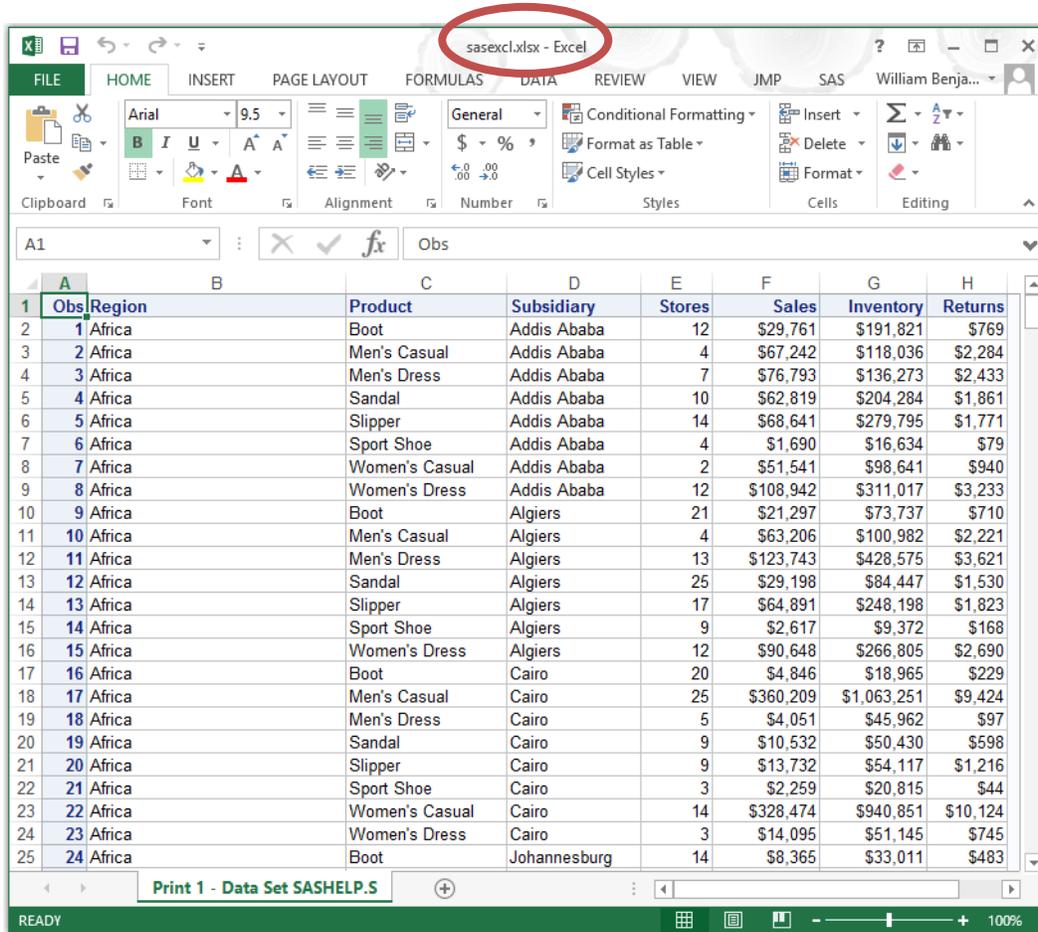
The SAS ODS Excel destination syntax shown above is just the tip of the iceberg. As shown, everything except “ODS EXCEL;” is optional. One thing to point out is that there is an “Argument” called “OPTIONS” that has many “SUB-OPTIONS”, they are described in the SAS HELP under the Base SAS 9.4 (TS1M3) topic “ODS EXCEL Statement. In its simplest form the following SAS code will produce an Excel workbook. As shown here.

```
ODS EXCEL;  
  
PROC PRINT DATA=sashelp.shoes;  
  
RUN;  
  
ODS EXCEL CLOSE;
```

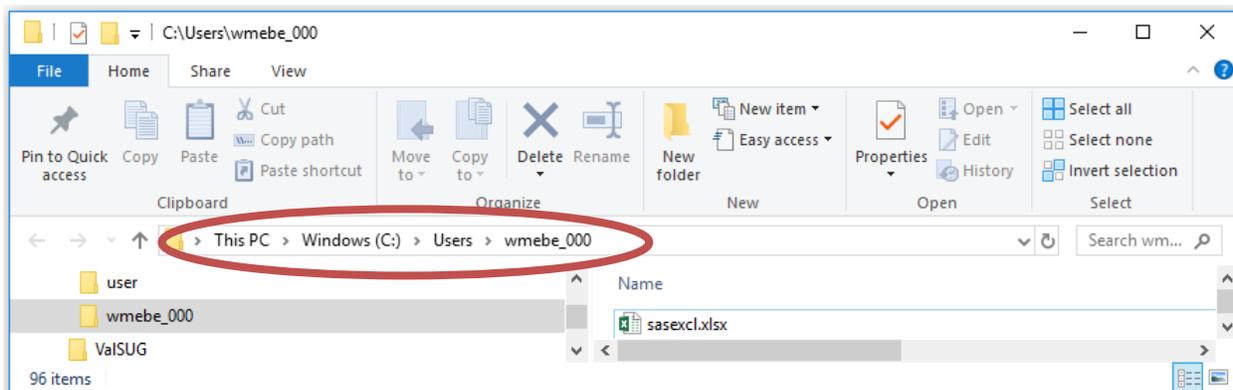
The SAS output looks like this, note that without a FILE= statement the output Excel Workbook goes to the current default directory with the default file name sasexcl.xlsx. The sheet name is also a default name composed of the procedure name and the SAS Dataset name.



The Excel output workbook looks like the following. On the bottom of the PC SAS display manager window the default output directory name is listed. The actual location on the screen varies depending on the version of SAS that you are using. This form of execution selects the filename at execution time, while the FILE= option enables you to select an output filename. In this example, the name defaults to sasexcl.xlsx, but on other operating systems the default name might be different. Depending on the operating system that the SAS code was running on, and the TOOLS> Options> Preferences “Results” tab selections, the output EXCEL workbook can be forced open using EXCEL.



The windows output directory is shown below; the directory was empty before the SAS code was executed. Afterward, the directory shows the output Excel workbook. Since the workbook was opened the temporary file generated by Excel is also visible.



SOME ODS EXCEL DESTINATION OPTIONS IMPACTNG PRINT FEATURES

The syntax for the ODS Excel Destination "OPTIONS" feature looks something like the following.

```
ODS EXCEL OPTIONS(suboption_1=parms_1 suboption_2=parms_2 ... suboption_n=parms_n);
```

The information about the sub-options discussed in this paper are listed below.

Suboptions of the OPTIONS Argument		
Action Parameter	Options	Description
Choose to print in color or Black and White only		
BLACKANDWHITE=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses change the print mode to black and white printing only, negative responses allow color printing.
Center the output either horizontally or vertically		
CENTER_HORIZONTAL=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses center the worksheet horizontally on the printed page, negative responses do not horizontally center the printed output.
CENTER_VERTICAL=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses center the worksheet horizontally on the printed page, negative responses do not horizontally center the printed output.
Print in draft quality or normally		
DRAFTQUALITY=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses for this option will cause the output to be printed in "DRAFT" quality mode. However, graphs will not be printed when this option is in effect.
Print horizontally or vertically		
ORIENTATION=	'PORTRAIT', 'LANDSCAPE', Default= 'PORTRAIT'	This option aligns the printed output as either PORTRAIT or LANDSCAPE on the printed page.
Arrange the data across the page differently		
PAGE_ORDER_ACROSS=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	This option controls what order the information in the spreadsheet is printed. Positive responses cause the data to be printed across the page first, and then down the page. Negative responses cause the printing to be down the page first then across the page.
Select where to put the output		
PRINT_AREA=	'ITEM', Default= NONE	This option enables you to define an output print area that is a subset of the values (cells) of the spreadsheet. 'ITEM' is a quoted string of values that represent the top left cell and the bottom right cell of the spreadsheet to be printed. An example would be 'b,4,f,10'.

Print headers, footers, and row breaks		
ROWCOLHEADINGS=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses indicate that row and column headings should be printed. Negative responses indicate that row and column headings should not be printed.
ROWBREAKS_COUNT=	'number'	This option specifies that a page break will be inserted after the number of data lines specified are printed.
Adjust the size of headers and footers		
ROW_HEIGHTS=	'number_list', Default = use font size to define row heights	Provides a quoted string of positional parameters to identify row heights (0 = use the font height) for the following (ordervalue might be skipped but skipped parameters require a comma to show the parameter is missing. Except the last used value.) <ul style="list-style-type: none"> • Table header rows • Table body rows • BY value lines • Titles • Footers • Page break height • Paragraph skip height
EMBEDDED_FOOTNOTES=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	This option specifies whether footnotes should be embedded within the worksheet. Negative options cause footnotes not to be added to the Excel worksheets
EMBEDDED_TITLES=	'OFF', 'ON', 'YES', 'NO' Default='OFF'	Positive responses center the worksheet horizontally on the printed page, negative responses do not horizontally center the printed output.
SHEET_INTERVAL=	'BYGROUP', 'PAGE', 'PROC', 'NONE', 'TABLE', Default = 'TABLE'	Positive responses center the worksheet vertically on the printed page, negative responses do not vertically center the printed output.
Adjust the print scale to improve the look of lines in graphs		
DPI= or IMAGE_DPI=	'number'	Dots per inch to use for print or graphical output

The following SAS code builds a small dataset that can be printed on one page, I use this to keep the examples simple. You may need to update the PATH macro variable to fit your system. Also due to space limits within this paper I will be combining several features within each example to save space. Also, verify your quotes when copying code from a PDF into a SAS Code module.

Simple SAS Code to create a small dataset to work with here.

```
/******  
/** This code creates the SAS work data set ASIA_ONLY */  
/******  
data ASIA_ONLY;  
    set sashelp.shoes (where=(region="Asia"));  
run;  
%let path = C:\temp;
```

Using several commands to adjust printed output of the Excel Worksheet.

```
ods excel file = "&path\Example_one.xlsx"  
    options(BLACKANDWHITE='yes'  
            CENTER_HORIZONTAL='YES'  
            CENTER_VERTICAL='Yes'  
            DRAFTQUALITY='on'  
            );  
proc print data=Asia_only;  
run;  
ods excel close;
```

Note the parameter values are not case sensitive and can vary slightly (yes, no, on, off).

Showing the Output workbook

Obs	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns
1	Asia	Boot	Bangkok	1	\$1,996	\$9,576	\$80
2	Asia	Men's Dress	Bangkok	1	\$3,033	\$20,831	\$52
3	Asia	Sandal	Bangkok	1	\$3,230	\$15,087	\$120
4	Asia	Slipper	Bangkok	1	\$3,019	\$16,075	\$127
5	Asia	Women's Casual	Bangkok	1	\$5,389	\$16,251	\$185
6	Asia	Boot	Seoul	17	\$60,712	\$160,589	\$1,296
7	Asia	Men's Casual	Seoul	1	\$11,754	\$2,176	\$833
8	Asia	Men's Dress	Seoul	7	\$116,333	\$251,803	\$2,443
9	Asia	Sandal	Seoul	3	\$4,978	\$21,483	\$105
10	Asia	Slipper	Seoul	21	\$149,013	\$469,007	\$2,941
11	Asia	Sport Shoe	Seoul	1	\$937	\$455	\$10
12	Asia	Women's Casual	Seoul	2	\$20,448	\$36,576	\$790
13	Asia	Women's Dress	Seoul	7	\$78,234	\$140,628	\$1,891
14	Asia	Sport Shoe	Tokyo	1	\$1,155	\$15,602	\$22

Page Setup window showing the “Black and White” and “Draft quality” indicators are set for printing

The Page Setup dialog box is open, showing the 'Print' tab. The following options are checked:

- Gridlines
- Black and white
- Draft quality

Other visible options include: Print titles, Rows to repeat at top, Columns to repeat at left, Print, Comments: (None), Cell errors as: displayed, Page order (Down, then over selected), and Print area.

The results of centering vertically and horizontally

The screenshot shows the Excel Print dialog for 'Example_one.xlsx'. The printer is set to 'HP Officejet 6700 (Copy 1)'. The settings are: Print Active Sheets, Print One Sided, Collated, Portrait Orientation, Letter, and No Scaling. The preview window displays the following table:

Site	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns
1	Asia	Shirt	Dangshik	1	\$1,568	\$2,341	\$81
2	Asia	Men's Dress	Dangshik	1	\$1,033	\$20,831	\$52
3	Asia	Shirt	Dangshik	1	\$1,230	\$15,087	\$129
4	Asia	Shoe	Dangshik	1	\$3,039	\$16,079	\$327
5	Asia	Women's Casual	Dangshik	1	\$5,389	\$16,261	\$185
6	Asia	Shirt	Sesud	17	\$61,712	\$181,960	\$1,286
7	Asia	Men's Casual	Sesud	1	\$11,784	\$2,178	\$313
8	Asia	Men's Dress	Sesud	7	\$116,533	\$231,823	\$2,443
9	Asia	Shirt	Sesud	3	\$4,178	\$31,483	\$105
10	Asia	Shoe	Sesud	21	\$145,013	\$461,037	\$2,941
11	Asia	Sport Shoe	Sesud	1	\$827	\$405	\$10
12	Asia	Women's Casual	Sesud	2	\$21,448	\$38,518	\$190
13	Asia	Women's Dress	Sesud	7	\$19,224	\$142,621	\$1,951
14	Asia	Sport Shoe	Tokyo	1	\$1,155	\$15,852	\$22

Using the "Orientation" and "Page_Order_Across" options

```
ods excel file = "&path\Example_two.xlsx"
  options(ORIENTATION='landscape'
          PAGE_ORDER_ACROSS='yes'
          );
* add a var command to fill page with data columns;
proc print data=Asia_only;
var Region Product      Subsidiary  Stores Sales  Inventory  Returns
      Region Product      Subsidiary  Stores Sales  Inventory  Returns
      Region Product      Subsidiary  Stores Sales  Inventory  Returns;
run;
ods excel close;
```

Example two with multiple copies of variables to fill the screen

Obs	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns	Region	Product	Subsidiary	Stores
1	Asia	Boot	Bangkok	1	\$1,996	\$9,576	\$80	Asia	Boot	Bangkok	1
2	Asia	Men's Dress	Bangkok	1	\$3,033	\$20,831	\$52	Asia	Men's Dress	Bangkok	1
3	Asia	Sandal	Bangkok	1	\$3,230	\$15,087	\$120	Asia	Sandal	Bangkok	1
4	Asia	Slipper	Bangkok	1	\$3,019	\$16,075	\$127	Asia	Slipper	Bangkok	1
5	Asia	Women's Casual	Bangkok	1	\$5,389	\$16,251	\$185	Asia	Women's Casual	Bangkok	1
6	Asia	Boot	Seoul	17	\$60,712	\$160,589	\$1,296	Asia	Boot	Seoul	17
7	Asia	Men's Casual	Seoul	1	\$11,754	\$2,176	\$833	Asia	Men's Casual	Seoul	1
8	Asia	Men's Dress	Seoul	7	\$116,333	\$251,803	\$2,443	Asia	Men's Dress	Seoul	7
9	Asia	Sandal	Seoul	3	\$4,978	\$21,483	\$105	Asia	Sandal	Seoul	3
10	Asia	Slipper	Seoul	21	\$149,013	\$469,007	\$2,941	Asia	Slipper	Seoul	21
11	Asia	Sport Shoe	Seoul	1	\$937	\$455	\$10	Asia	Sport Shoe	Seoul	1
12	Asia	Women's Casual	Seoul	2	\$20,448	\$36,576	\$790	Asia	Women's Casual	Seoul	2
13	Asia	Women's Dress	Seoul	7	\$78,234	\$140,628	\$1,891	Asia	Women's Dress	Seoul	7
14	Asia	Sport Shoe	Tokyo	1	\$1,155	\$15,602	\$22	Asia	Sport Shoe	Tokyo	1

Print output screen showing the "Landscape" option is set

Print

Copies: 1

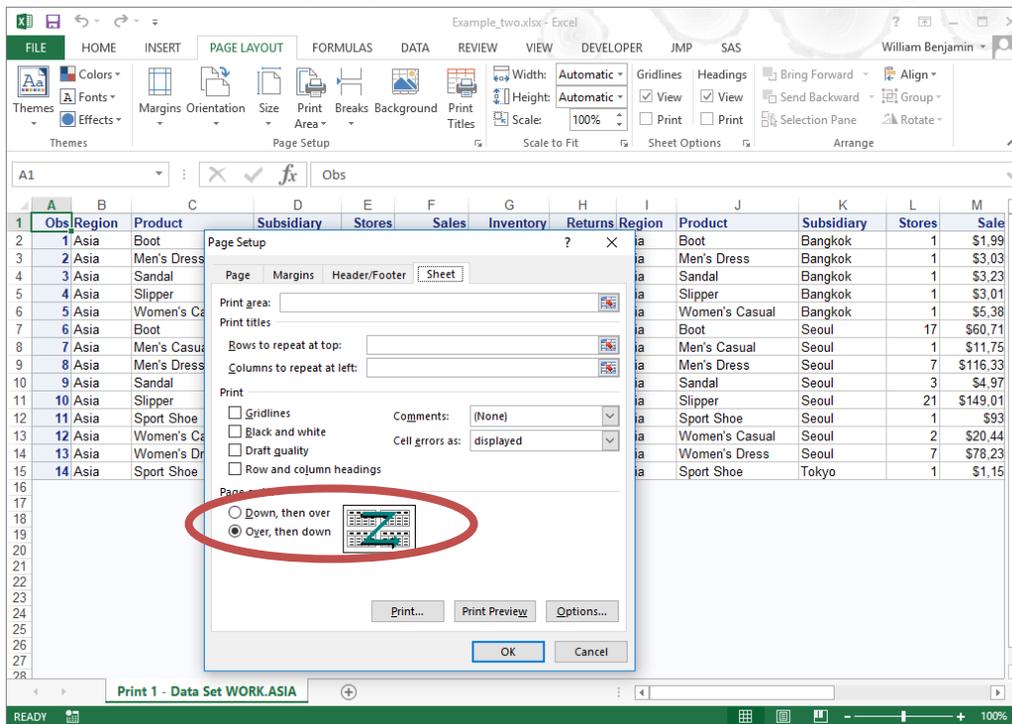
Printer: HP Officejet 6700 (Copy 1) Offline

Settings:

- Print Active Sheets
- Pages: 1 to 1
- Print One Sided
- Collated
- Landscape Orientation
- Letter 8.5" x 11"
- Custom Margins
- No Scaling

Print preview showing the SAS System output table.

Page Setup screen showing “Page Order” “Over and Down” is set by the “Page_Order_Accross” option



More options for adjusting the printed output

```
ods excel file = "&path\Example_three.xlsx"

options(PRINT_AREA='B,4,f,10'

        ROWCOLHEADINGS='yes'

        ROW_HEIGHTS='25'

        DPI='700'

        );

proc print data=Asia_only;

run;

ods excel close;
```

Sample Excel output for example three

The screenshot shows an Excel spreadsheet with the following data:

Obs	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns
1	Asia	Boot	Bangkok	1	\$1,996	\$9,576	\$80
2	Asia	Men's Dress	Bangkok	1	\$3,033	\$20,831	\$52
4	Asia	Sandal	Bangkok	1	\$3,230	\$15,087	\$120
5	Asia	Slipper	Bangkok	1	\$3,019	\$16,075	\$127
6	Asia	Women's Casual	Bangkok	1	\$5,389	\$16,251	\$185
7	Asia	Boot	Seoul	17	\$60,712	\$160,589	\$1,296
8	Asia	Men's Casual	Seoul	1	\$11,754	\$2,176	\$833
9	Asia	Men's Dress	Seoul	7	\$116,333	\$251,803	\$2,443
10	Asia	Sandal	Seoul	3	\$4,978	\$21,483	\$105
11	Asia	Slipper	Seoul	21	\$149,013	\$469,007	\$2,941
12	Asia	Sport Shoe	Seoul	1	\$937	\$455	\$10
13	Asia	Women's Casual	Seoul	2	\$20,448	\$36,576	\$790
14	Asia	Women's Dress	Seoul	7	\$78,234	\$140,628	\$1,891
15	Asia	Sport Shoe	Tokyo	1	\$1,155	\$15,602	\$22

Print output screen showing only the selected output cells and Excel Column and Row headers

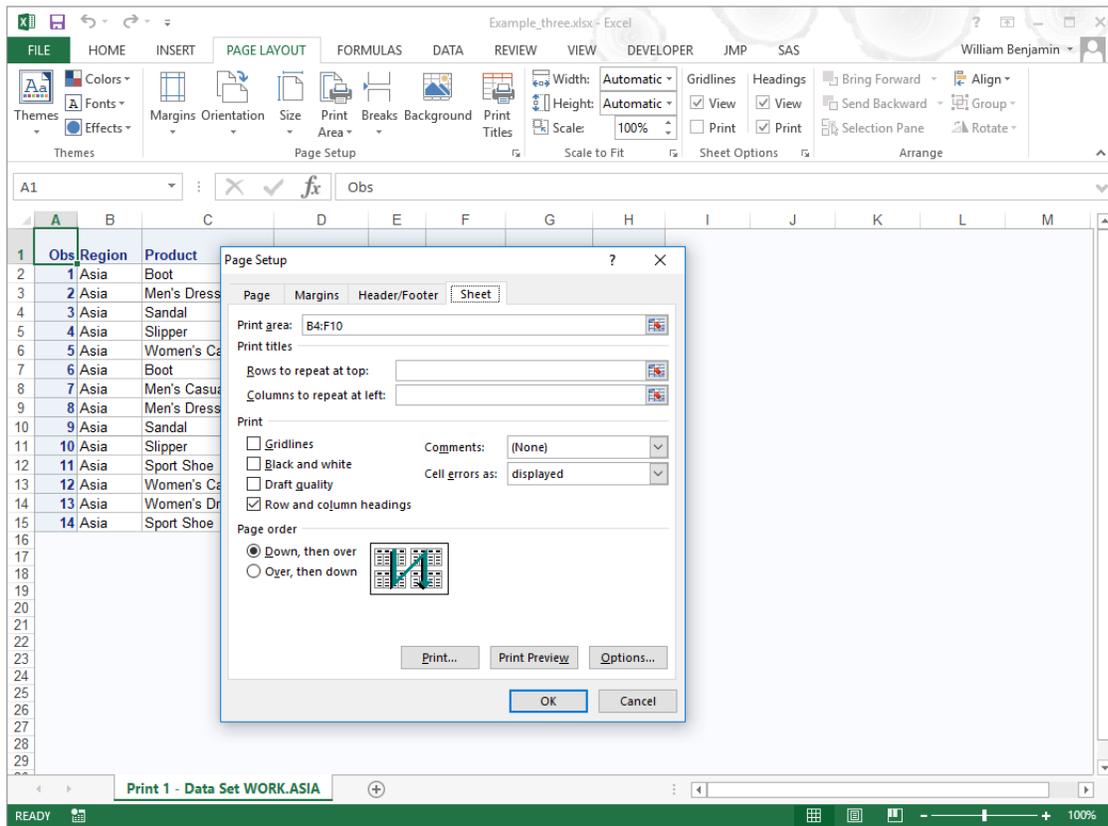
The screenshot shows the Excel Print dialog box with the following settings:

- Copies: 1
- Printer: HP Officejet 6700 (Copy 1) - Offline
- Settings:
 - Print Active Sheets: Only print the active sheets
 - Pages: 1 to 1
 - Print One Sided: Only print on one side of th...
 - Collated: 1,2,3 1,2,3 1,2,3
 - Portrait Orientation
 - Letter (8.5" x 11")
 - Custom Margins
 - No Scaling: Print sheets at their actual size

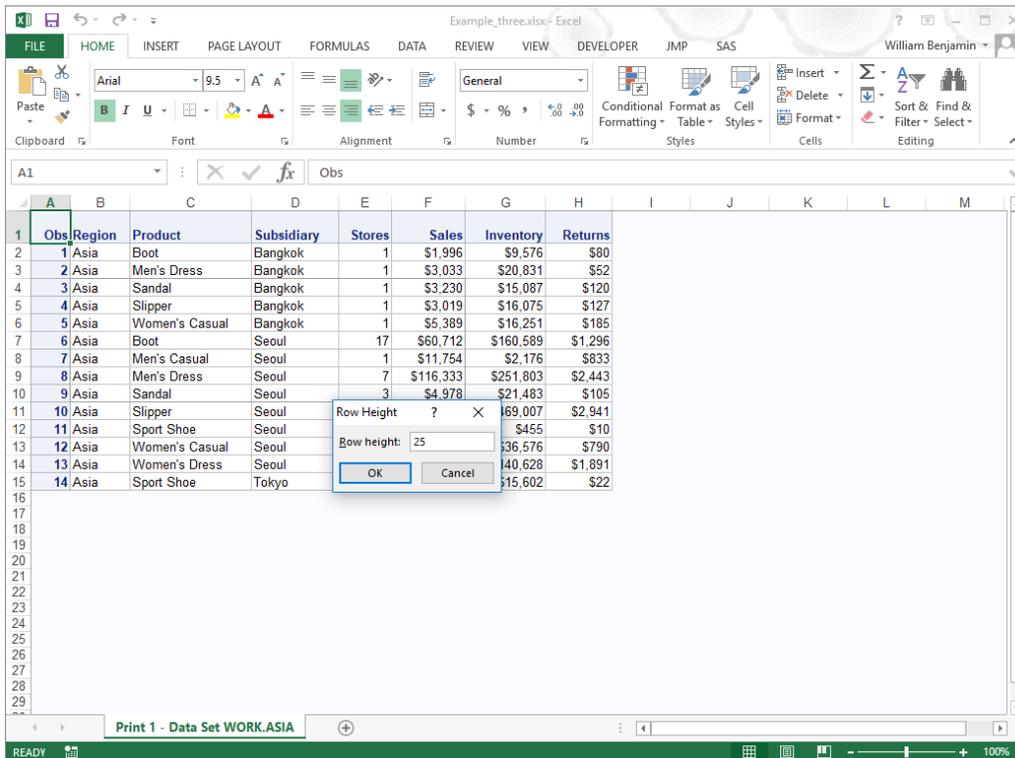
The print preview shows a table with the following data:

Obs	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns
4	Asia	Sandal	Bangkok	1	\$3,230	\$15,087	\$120
5	Asia	Slipper	Bangkok	1	\$3,019	\$16,075	\$127
6	Asia	Women's Casual	Bangkok	1	\$5,389	\$16,251	\$185
7	Asia	Boot	Seoul	17	\$60,712	\$160,589	\$1,296
8	Asia	Men's Casual	Seoul	1	\$11,754	\$2,176	\$833
9	Asia	Men's Dress	Seoul	7	\$116,333	\$251,803	\$2,443
10	Asia	Sandal	Seoul	3	\$4,978	\$21,483	\$105

Page Setup screen showing the Print area values and the Row and Column Headings indicator

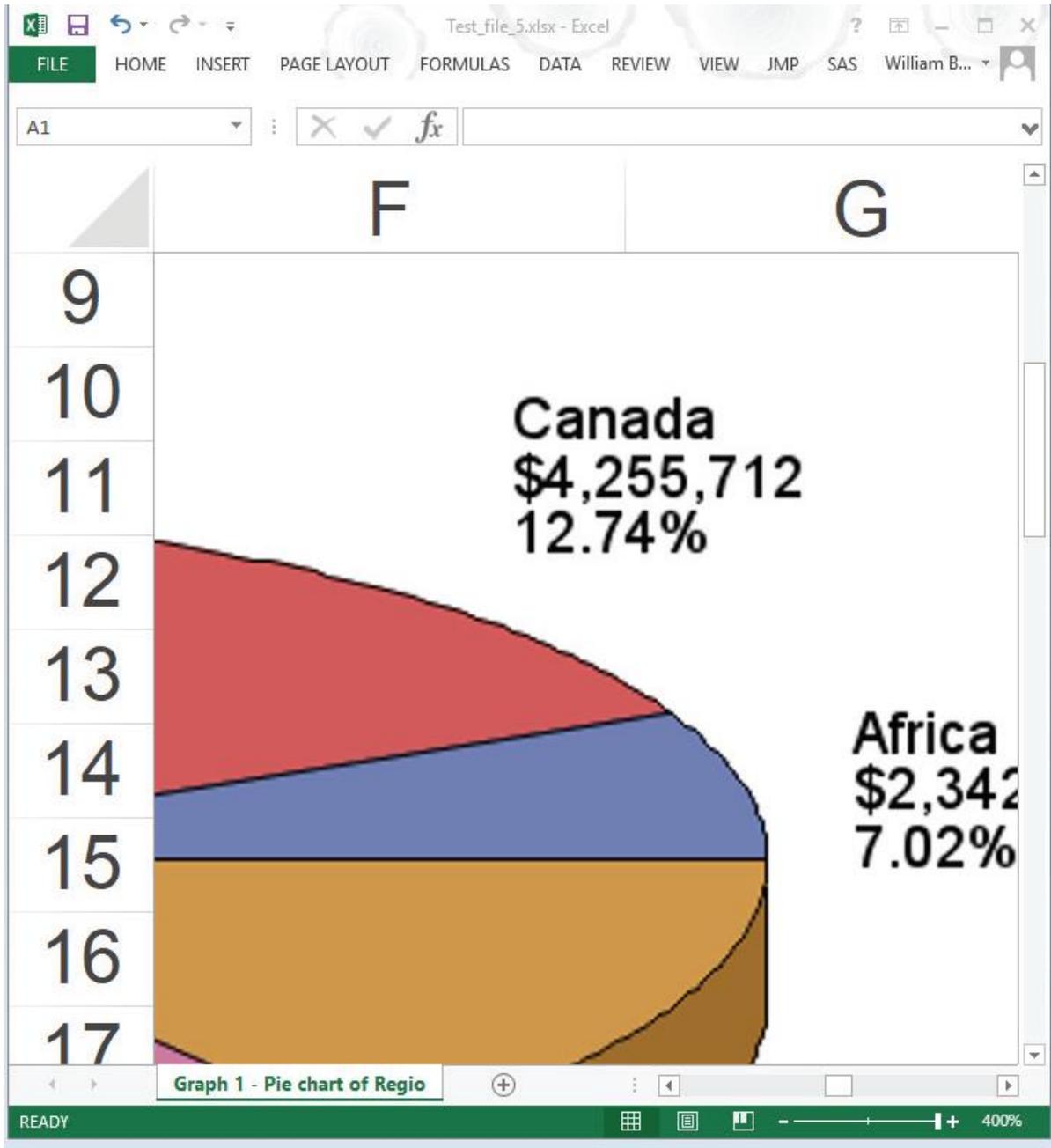


Row Height screen showing the setting of 25

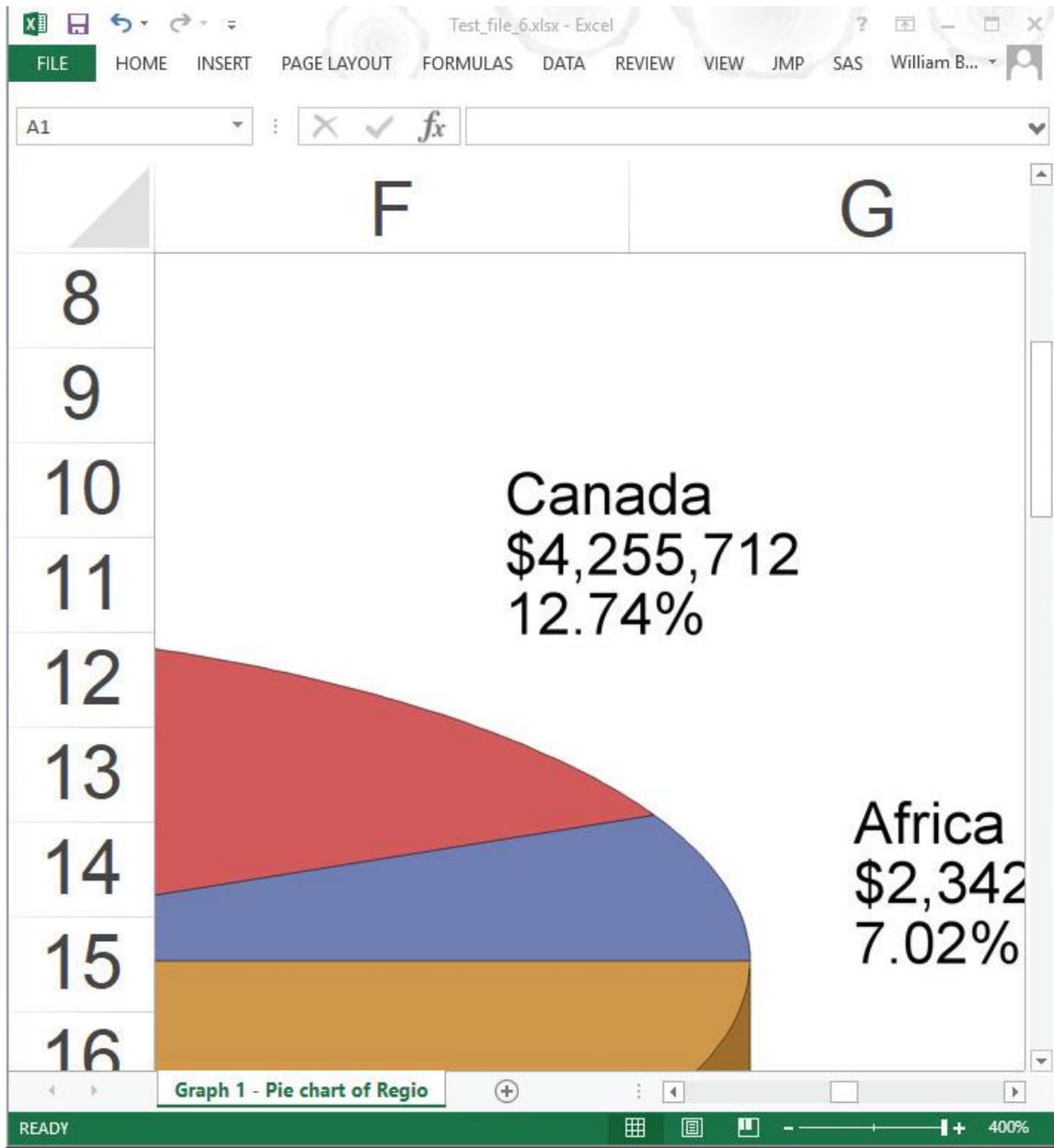


While I am not showing the source code for the following two outputs the difference is the DPI/IMAGE_DPI that SAS used to generate the graphs. It is clearly visible that a higher DPI creates a better image.

Using the default DPI value the following graph segment shows rough outlines



The IMAGE_DPI='700' clearly shows a sharper image and text



Example of using the ROWBREAKES_COUNT= sub-option

```
ods excel file = "&path\Example_four.xlsx"
  options(ROWBREAKES_COUNT='5'
    );
proc print data=Asia_only;
run;
ods excel close;
```

After turning on the page break indicators it is possible to see there would be 3 pages output

Obs	Region	Product	Subsidiary	Stores	Sales	Inventory	Returns
1	Asia	Boot	Bangkok	1	\$1,996	\$9,576	\$80
2	Asia	Men's Dress	Bangkok	1	\$3,033	\$20,831	\$52
3	Asia	Sandal	Bangkok	1	\$3,230	\$15,087	\$120
4	Asia	Slipper	Bangkok	1	\$3,019	\$16,075	\$127
5	Asia	Women's Casual	Bangkok	1	\$5,389	\$16,251	\$185
6	Asia	Boot	Seoul	17	\$60,712	\$160,589	\$1,296
7	Asia	Men's Casual	Seoul	1	\$11,754	\$2,176	\$833
8	Asia	Men's Dress	Seoul	7	\$116,333	\$251,803	\$2,443
9	Asia	Sandal	Seoul	3	\$4,978	\$21,483	\$105
10	Asia	Slipper	Seoul	21	\$149,013	\$469,007	\$2,941
11	Asia	Sport Shoe	Seoul	1	\$937	\$455	\$10
12	Asia	Women's Casual	Seoul	2	\$20,448	\$36,576	\$790
13	Asia	Women's Dress	Seoul	7	\$78,234	\$140,628	\$1,891
14	Asia	Sport Shoe	Tokyo	1	\$1,155	\$15,602	\$22

CONCLUSION

The ODS Excel Destination sub-option to change the printed output can be useful is setting up the Excel workbooks and worksheets to be printed while they are being created. This gives you the ability to prepare your data without spending time opening the workbooks and making changes to them manually. Of course any time you can eliminate a manual change you can eliminate a chance for an error. These features make it almost effortless to prepare your output for printing. Doing it while the workbook is being built is also a big time saver.

REFERENCES

- SAS Institute Inc. 2016. SAS® 9.4 Output Delivery System: User's Guide, Fifth Edition. Cary, NC: SAS Institute Inc.
- Benjamin, William E., Jr. 2017. *Exchanging Data From SAS to Excel: The ODS Excel Destination*. Cary, NC: SAS Institute Inc.

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

William E Benjamin Jr
 Owl Computer Consultancy, LLC
 Phone – 623-337-0269

Email - Wmebenjaminjr3@juno.com

SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries. ® indicates USA registration.

Other brand and product names are trademarks of their respective companies.