

## Combining SAS® LIBNAME and VBA Macro to Import Excel® file in an Intriguing, Efficient way

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### ABSTRACT

There are different methods such PROC IMPORT/LIBNAME to Import Excel file using SAS. While importing the data in SAS, due to technical limitations these traditional methods might corrupt your data by applying their own automatic formatting. Few examples are, importing column with mixed data types in numeric format or importing the regular data containing hyphen/slash/colon/letter 'e' into date/time/scientific formats. The best way to avoid automatic formatting is to import Excel data into pre-defined format for e.g. character. This paper will introduce a unique method where Excel file is imported using a combination of Visual Basic for Applications (VBA) macro via Dynamic Data Exchange (DDE) in SAS and SAS LIBNAME statement. This convenient and reliable solution will help SAS Programmers/Statisticians to have better control over the quality of data and save significant time with minimal coding.

### INTRODUCTION

While SAS can import from a variety of formats, Excel files (XLS) are among the most common. Currently there are many ways to import Excel data into SAS: The Import Wizard, PROC IMPORT, and using a LIBNAME statement. But, due to technical limitations in SAS these traditional methods might create missing values while reading the columns in Excel file containing mixed data types (both numeric and character). For e.g. we receive clinical lab data from different vendors in Excel format which normally has the mixed data in the results column.

In particular, when the Excel file is large then it is hard to debug the loss of data. These methods mostly depend upon SAS to decide the formats of the data and can create different attributes for similar variables when same Excel file is read by different traditional methods. So, both programmer and validator might need to do some extra programming to match the data which can be time consuming. If the header in the Excel file is not on the first line then it will require further processing of the data to get the right header which might be time consuming. Due to the above mentioned issues there is a desperate need for a new method to import Excel which can import the data properly and programmers can predefine the variable formats with minimal coding.

In my previous paper, to meet the above challenge I had introduced a method to read excel using Microsoft Access. However, previous method requires having Microsoft Access on your PC and also Access is not very popular among the SAS programmers. There was a need to have a simpler and cost effective method with minimal interaction with other system and SAS.

This paper introduces another useful (and probably simpler) method to import data from Excel file using SAS. For Import, the entire process involves SAS, Excel VBA macro which is automated by a SAS macro called %Convert\_Excel2\_SAS. It will import the entire contents while reserving the Excel layout and structures, including tables with multiple columns, into SAS data. Since variable formats will be predefined as character using the VBA macro, this will avoid any formatting changes occur to the data during the conversion process. In this macro the user can define the line number containing the header and the macro will assign the header variables from the given line number.

### TECHNIQUE & MECHANISM

The general process to convert an Excel file into a SAS dataset is as follows (note that the first item is a one-time setup, and the rest can be managed via SAS code):

1. Record a macro 'IMPORT' in Excel which will perform the following functions:
  - Open the target file in Excel and insert a line on the row one. After insertion you will have a blank line on row one.
  - Insert a character for e.g. 'C' in blank row (here less than 256 columns). This will later help to predefine Excel column as character.
  - Save the macro in Personal.xls and stop recording.
2. Open the relevant Excel file 'Raw.xls' and execute the VBA macro 'IMPORT'. The updated Excel file will have an extra first row with character 'C'. Further, save the Excel as 'Raw\_1'.xl

3. Read the content from 'Raw\_1'.xls into SAS using LIBNAME procedure using HEADER='No' and MIXED='Yes'. This will allow SAS to read all the columns as character which will eventually prevent any data conversion.
4. Execute macro %Excel\_Header to get header from Excel file and remove first row from dataset. Also, this macro will get rid of blank rows and columns.
5. Delete the 'Raw\_1.xls' from the production location.
6. Compare the original file with 'Raw\_1'.xls. This step is optional.

To automate these steps, the DDE solution is leveraged to build the communication bridge between SAS v9.1.3 and Excel 2003. Excel v4.0 macro functions (Microsoft Corporation, 2000) can be sent from SAS via DDE to enable SAS to take control of Excel.

## RECORD VBA MACRO IN EXCEL TO INSERT A CHARACTER

For many, perhaps most SAS developers the easiest and fastest way to write VBA code is to first go into a Microsoft application (in this paper Microsoft Excel is used as the application), turn on the macro recorder, perform the steps and functions desired, and then terminate the macro recorder. The end result is a stored VBA program (macro) that can be executed at a later date. This makes it possible for a SAS developer to automate tasks in the Microsoft application, and therefore vastly improve the functionality of an integrated system that takes advantage of the relative strengths of the SAS System and the Microsoft application.

### Steps to record VBA Macro are as follows:

1. Open Excel.
2. Select Tools, Macro, and Record New Macro from the pull down menus.
3. Enter the name of macro as 'IMPORT'.
4. Select Ok. Make sure to store the macro in Personal Macro Workbook.
5. Select first cell A1. Right click and go to 'Insert' and then select entire row.
6. Select Ok. This will insert a blank row on the top.
7. Add a character 'C' on the entire columns of first row or require columns of first row using copy/paste commands.
8. Select the stop recording button.
9. Close the Excel and saved the macro in the Personal Macro Workbook.

## OPEN THE TARGET FILE IN EXCEL AND EXECUTE THE VBA MACRO

In order for a client/server communication link to be established, both SAS and Excel must be running. Therefore, for the first iteration, it is necessary to programmatically launch Excel from a SAS session. There are several techniques available to launch Excel from SAS. The simplest one is the following statement:

```
%LET RC=%SYSFUNC(SYSTEM(START EXCEL));
```

The above command is dependent on the completion of previous commands. Note, the SLEEP function can be used frequently in the SAS command/datastep that is dependent upon completion of previous jobs. This will help avoid errors from occurring due to delays in the execution of previous SAS commands/data steps.

The syntax for the SLEEP function is given below:

```
DATA _NULL_ ;  
  x=SLEEP(5) ;  
RUN;
```

The above step will pause the SAS session for five seconds.

To communicate with Excel from SAS, the following FILENAME statement is used to establish the linkage between SAS and Excel via the DDE triplet:

```
FILENAME EXCEL DDE 'EXCEL|SYSTEM';
```

The next step is to open the target file "&in" by sending the OPEN command to Excel with a DATA\_null\_step. Once the file is open in Excel, execute the excel macro 'Import' and further save the file as 'Raw\_1.xls' as shown in the following:

```
DATA _NULL_;
  FILE excel;
  PUT '[ERROR(false)]';
  PUT '[OPEN("' &in" ')]';
  PUT '[RUN("personal.xls!import")]';
  PUT '[SAVE.AS("' &location\raw_1.xls" ')]';
  PUT '[FILE.CLOSE()]';
  PUT '[QUIT()]';
RUN;
```

It is necessary to programmatically close the document with the CLOSE command. Further, the QUIT command will exit Microsoft Excel.

## READ THE CONTENT INTO SAS USING LIBNAME PROCEDURE

After the text or data is saved into an Excel, it is time to read it into SAS by using the LIBNAME Statement. If the SASACCESS license is available, the following libname can be used:

```
LIBNAME xls excel "&location\Raw_1.xls" HEADER=no MIXED=yes;
LIBNAME dat "&location";

DATA dat.&out.;
  SET test."$Sheet1"n (firstobs=2);
RUN;
```

In the above dataset, "&location" is the production location and "&out" is the output dataset created and saved in library "dat".

## GET HEADER FROM THE EXCEL FILE BY EXECUTING MACRO %EXCEL\_HEADER

If the Excel file has header variables then the following macro %Excel\_Header will rename the variables from SAS dataset with the one from Excel.

There are only two keyword parameters if used independently:

**Header\_num:** Line number for header for e.g 1.

**Special:** Delete any special character from header variable for e.g. '%'.

Below is the simple macro call to %Excel\_Header.

```
%Excel_Header(header_num=, special=);
```

## DELETE THE RAW\_1.XLS FROM PRODUCTION LOCATION

To avoid any overwriting of the data, EXCEL file can be deleted as follows:

```
FILENAME db "&location\Raw_1.xls";
%LET RC=%SYSFUNC(FDELETE(db));
FILENAME db clear;
```

"&location" is the production location.

## COMPARISON BETWEEN THE RAW.XLS EXCEL AND RAW\_1.XLS:

Finally, the original file Raw.xls having mixed data is imported in SAS and further compared with the SAS dataset created by the above macro using Raw\_1.xls. Below is the screen shots of Raw.xls and compare procedure which clearly indicates that the above discuss macro has captured a character value 'NA' which was initially detected missing.

	A	B	C
1	SUBJECT	AGE	RESULTS
65516	101	23	89
65517	101	23	33
65518	101	23	100
65519	101	23	NA
65520	101	23	55
65521	102	23	99
65522	102	23	44
65523	102	23	89

Display 1. Screen shot of Raw.xls containing mixed data.

```

The SAS System          03:18 Friday, March 22, 2013    1

                The COMPARE Procedure
      Comparison of WORK.TEST2 with WORK.TEST3
      (Method=EXACT)

NOTE: Values of the following 1 variables compare unequal: RESULTS

                Value Comparison Results for Variables

-----
              || RESULTS
              || Base Value      Compare Value
Obs || RESULTS                results
-----||-----
        65518 || NA                      .
-----
    
```

Output 1. Proc Compare Output.

### %Convert\_Excel2\_SAS

To facilitate and automate the above discussed steps from opening the Excel file to reading the Excel file into SAS, a SAS macro called %Convert\_Excel2\_SAS was developed for SAS v9.1.3 or above. The user can easily extend the macro to fit other SAS versions.

There are only five keyword parameters:

**In:** Define the path and the name of the input Word file, e.g., C:\Demo\test.xls.

**Out:** Define the SAS dataset name, for e.g., raw.

**Location:** Production Location, for e.g., C:\Demo.

**Header:** Need header for e.g. Y or N.

**Header\_num:** Line number for header for e.g. 1.

**Special:** Delete any special character from header variable for e.g. '%'.

Below is the simple macro call to %Convert\_Excel2\_SAS.

```
%Convert_Excel2_SAS (in= C:\Demo\test.xls, out=raw, location=C: \Demo,
header=,header_num=,special=);
```

## CONCLUSION

%Convert\_Excel2\_SAS can convert the Excel into SAS datasets without any manual pre-process. Since variable formats are predefined using VBA macro, this will avoid any formatting changes from occurring to the data during the conversion process. Hence, the integrity of keeping the original content (including special characters) and structure of Excel is guaranteed.

## REFERENCES

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## APPENDIX

```

%MACRO Convert_Excel2_SAS(in=, out=raw, location=,
header=,header_num=,special=);

OPTIONS NOXWAIT NOXSYNC;

%LET RC=%SYSFUNC(SYSTEM(START EXCEL));

DATA _NULL_;
    x=SLEEP(10);
RUN;

FILENAME EXCEL DDE 'EXCEL|SYSTEM';

DATA _NULL_;
    FILE excel;
    PUT '[ERROR(false)]';
    PUT '[OPEN("' &in" ')]';
    PUT '[RUN("personal.xls!import")]';
    PUT '[SAVE.AS("' &location\raw_1.xls" ')]';
    PUT '[FILE.CLOSE()]';
    PUT '[QUIT()]';
RUN;

DATA _NULL_;
    x=SLEEP(10);
RUN;

LIBNAME XLS excel "&location\raw_1.xls" HEADER=no MIXED=yes;

DATA &out._raw;
    SET XLS."sheet1$"n(FIRSTOBS=2);
RUN;

LIBNAME xls clear;

%IF &header="Y" %THEN %DO;

    %MACRO excel_header;

    DATA header;
        SET &out._raw (FIRSTOBS=&header_num OBS=&header_num);
    RUN;

    PROC TRANSPOSE DATA=header OUT=header2;
        var _ALL_;
    RUN;

    DATA header2;
        SET header;
        IF MISSING(coll) THEN DELETE ;
        coll=STRIP(COMPRESS(coll,&special.));
        coll=TRANWRD(STRIP(coll),' ','_');
    RUN;

    PROC SQL NOPRINT;
        SELECT COUNT(*) INTO:n FROM header2;

        SELECT coll INTO:file1-:file%COMPRES(&n)
            FROM header2;

        SELECT _name_ INTO:file11-:file1%COMPRES(&n)

```

```
        FROM header2;
QUIT;

DATA &out.;
    SET &out._raw(FIRSTOBS=%SYSEVALF(&header_num+1));
    RENAME
        %DO i=1 %TO &n;
            &&File1&i=&&file&i
        %END;;
RUN;

DATA &out.;
    SET &out.;
    LABEL
        %DO i=1 %TO &n;
            &&File&i="&&file&i"
        %END;;
    KEEP
        %DO i=1 %TO &n;
            &&File&i
        %END;;
RUN;

%MEND excel_header;
%excel_header;
%END;

FILENAME db "&location\Raw_1.xls";
%LET RC=%SYSFUNC(FDELETE(db));
FILENAME db CLEAR;

%MEND Convert_Excel2_SAS;
```