### Paper 1483-2014

## The Armchair Quarterback:

# Writing SAS® Code for the Perfect Pivot (Table, That Is)

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## ABSTRACT

"Can I have that in Excel?" This is a request that makes many of us shudder. Now your boss has discovered Excel pivot tables. Unfortunately, he has not discovered how to make them. So you get to extract the data, massage the data, put the data into Excel, and then spend hours rebuilding pivot tables every time the corporate data are refreshed. In this workshop, you learn to be the armchair quarterback and build pivot tables without leaving the comfort of your SAS® environment. In this workshop, you learn the basics of Excel pivot tables and, through a series of exercises, you learn how to augment basic pivot tables first in Excel, and then using SAS. No prior knowledge of Excel pivot tables is required.

## INTRODUCTION

In today's world the static report, although still required, is no longer enough; analysts and managers at all levels are looking deeper into interactions in the data. To help look at these interactions most people turn to Online Analytical Processing, commonly called OLAP cubes. For the more technical analysts, SAS provides exceptional OLAP capabilities using the OLAP server and SAS Enterprise Guide (EG). However, many business analysts, and business managers and executives prefer to work within the tool with which they are familiar – Microsoft Excel. Since Excel pivot tables offer much of the functionality of OLAP cubes, and managers and executives are demanding OLAP type 'reports' it is not surprising that more and more we are asked to provide data in the form of pivot tables.

In this paper we will look at the anatomy of an Excel Pivot table – first its components and then how a pivot table is created and accessed. This will allow us to see the terminology used so we can relate this back to our SAS emvironment. From there we will look at the SAS technology required to create pivot tables – and ODS markup destination called *tableEditor*. The paper will then step through a series of examples first showing how to perfom a function in Excel (for example, change the default statistic from *sum* to *average*) followed by the SAS code needed to create a pivot table the same way. There are a great number of ways a pivot table can be created and formatted; this paper will only touch on a few. After following through these examples you will be able to create your own pivot tables in a format that is consistent with your business requirements.

You do not need any prior experience with Excel pivot tables to follow the examples in the papers. In addition, anyone with an introductory level of SAS will be able to do the examples. The purpose of the paper is to demonstrate the use of the tableEditor tagset, so all the SAS examples are extremely simple. It practice, much more data manipulation would be required.

The examples in this paper closely follow Parker 2010; for more explanation on the how the tagset works refer to that paper.

# DATA

The examples in the paper use data from the SAS supplied data set *sashelp.shoes*; this will allow anyone with access to SAS the ability to follow these examples. Although this is a small dataset, it has enough variety to demonstrate.

## TERMINOLOGY

In this paper there are a number of terms that mean the same thing and will often be used interchangeably. Some of the terms are used in SAS while others are used in Excel. In general we will try to use the term appropriate to the environment to which it applies; that is, in Excel we will use the Excel term and in SAS we will use the SAS term. The one term used most will be *field* (an Excel term), *variable* (the SAS DATA step term), and *column* (the SQL term).

# **EXCEL PIVOT TABLES – IN EXCEL**

#### What is a Pivot Table

Pivot table is a generic term to describe data summarization in spreadsheets. In simple terms creating a pivot table is similar to creating a cross-tab report in SAS using PROC Tabulate or PROC Report – tabular data are summarized with one (or more) variable in the table becoming rows in the report, and one (or more) variables becoming columns in the report. For example, if our data had five variables – three classification variables Quarter, Product\_Group and, Product\_Category, and two analysis variables Sales and Quantity, we could create a cross-tab with values of Product\_group on the rows, values of Quarter as the columns, and total Sales as the cell value. This type of cross-tab report is easily generated in PROC Tabulate. Like a PROC Tabulate report, a pivot table is built from a data table (in this case a spreadsheet table). Unlike a SAS PROC Tabulate report, a pivot table can dynamically change the variables used for rows, columns and cell values. To change the values, rows, or columns in the pivot table you drag and drop fields through the pivot table interface. To change the values, rows, or columns in the PROC Tabulate report you must change your code and re-run the PROC. Needless to say, when there are numerous classification variables, the process of changing the table is simpler in the spreadsheet. Pivot tables can be seen as a simplification of the more complete and complex OLAP concepts.

Whereas the term pivot table is generic, the term PivotTable is trademarked and specific to Microsoft Excel. In this paper all examples were shown using Excel 2010. Earlier versions of Excel (2003, 2007) have the similar functionality however some of the interface components look different.

#### What are the Components of a PivotTable

The four components of a PivotTable are:

- 1. Report Filter to apply a filter to the entire PivotTable. In Figure 1, Year is the report filter. This is not required.
- 2. Column Labels the variables (fields) that will be in the columns. In Display 1, Quarter is the column label.
- 3. Row Labels the variables (fields) that will be in the row. In Display 1, *Product\_Group* is the column label.
- 4. Summary values the variables (fields) and summary statistic to be displayed in the cells. In Display 1, *Profit* is the summary field and *sum* is the statistic.

In Display 1, there is only one field in each component; it is possible to have multiple fields in each component.

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Display 1. A PivotTable with the four components highlighted

#### How is a Pivot Table Created

To create a PivotTable you first need to have a suitable data table in the spreadsheet. By suitable we mean it must have regular rows and columns in manner of a SAS data table. Normally at least one of the columns (variables) will be a numeric and several of the columns will be classification variables (commonly character). The classification variables are used in the Report Filter, Column Labels, and Row Labels components; the numeric variables are used in the Summary Values component. This is the same type of data that would be used in a PROC Tabulate report.

Once a suitable data table is loaded into Excel, the steps create a PivotTable are:

1. From the Excel menu select Insert tab and select PivotTable. See Display 2

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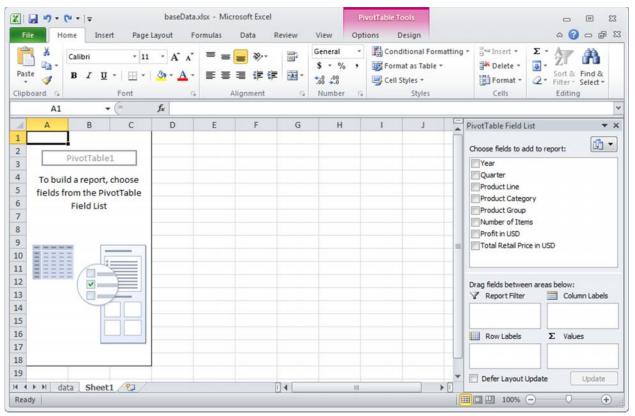
Display 2. Select PivotTable from Insert tab

2. In the Create PivotTable dialogue box select the data source (Select table or range) and the worksheet that will hold the PivotTable (Choose where you want the PivotTable to be placed). See Display 3.

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Display 3. Select source data and the PivotTable destination

3. Once you select the data and destination Excel will present the interface to allow you to select the fields that go into each of the components. You can drag-and-drop fields from the PivotTable Field list into the component area. If you drop a field into the wrong area you can drag it to the correct area or drag it back to the field list. See Display 4



Display 4. The interface to drag-and-drop fields to the appropriate component area.

4. After creating a PivotTable you can easily change the layout/content by changing the fields in the component areas. For example, in Display 1 Product\_Group is in the Row Labels. To change this from Product\_Group to Product\_Category simply drag Product\_Category into the Row Labels area and drag Product\_Group back to the Field List area. Note, the order in which you drag-and-drop is not important; that is you can first drag the field out of the area then drag the new field into the area.

Of course there are virtually unlimited amounts of formatting and customization that can be done in Excel. The best way to discover them is to open a workbook, create a PivotTable, and try out the options.

## **EXCEL PIVOT TABLES – FROM SAS**

To create PivotTables from SAS you only need Base SAS and the *TableEditor* tagset ; since the TableEditor tagset is not included in the SAS distribution you will need to download it from the SAS website. At the time of writing the location is:

support.sas.com/rnd/base/ods/odsmarkup/tableeditor/index.html

Once the TableEditor file is downloaded you can open and submit it in SAS.

# Note that at the time of writing some of the tagset options did not work properly in SAS 9.3; errors are generated although the PivotTable appears to be created correctly. All of the examples in this paper were written and tested in SAS 9.2 on a Windows 7 64 bit computer.

As noted, to create PivotTables SAS uses an ODS tagset destination. Since you have access to the tagset source code you can customize the tagset to meet your specific needs. For this paper no tagset customizations were made.

In order to create a PivotTable you wrap some ODS around code that will create the data table upon which the PivotTable is based. The ODS will cause SAS will create an HTML page with the data along with a command button. Through the use of JavaScript the code behind the button on the HTML page will generate the necessary objects to start Excel and create the PivotTable using the ODS options you supply. For more discussion on the TableEditor tagset refer to the papers by Parker cited in the references.

Since this paper and the supporting workshop are intended to show the various options that can be used to create PivotTables the examples are very simple – they have an ODS statement with the options being demonstrated followed by a simple PROC Print. All the examples can be run by using the *sashelp.orasales* table distributed with SAS. There are a number of SAS macro variables used to define paths; see Appendix 2 for the autoexec.sas code that sets these variables.

#### **TableEditor Options**

The TableEditor can take a variety of options; most of the option names are have self-evident meanings. For a list of all the options available and a brief description of the option see Appendix 1.

#### Example 1 – Creating a PivotTable

The first example will show how a PivotTable is created in SAS. We have already walked through creating a PivotTable in Excel.

```
ods tagsets.tableeditor file="&resultsHome\example1.html"
options(
       button_text = "Create PivotTable"
       auto_excel = "yes"
       pivotrow = "product_line"
       pivotcol = "quarter"
       pivotdata = "profit"
       pivotpage
                   = "year"
       excel_save_file="&JavaResultsHome\example1.xlsx"
       quit="NO"
       );
Title1 "Example 1 - Create the First Pivot Table";
proc print data=data.sales;
run;
ods tagsets.tableeditor close;
```

Example one is the template for all the other examples. As can be seen there is a simple PROC Print surrounded by ODS commands. In the example we specify the four main PivotTable components; notice that the tagset options have similar names to the Excel 'command'. The important mappings all the tables will have are:

Tagset Option	Excel Equivalent	Description
pivotpage	Report (page) filter	Subsets the data in the table. NOT REQUIRED
pivotcol	Column Labels	variable for the PivotTable columns
pivotrow	Row Labels	variable for the PivotTable rows
pivotdata	Summary Values	the cell variable

Let's look at the other options:

- button\_text = "Create PivotTable"
  - The text to put on the command button on the HTML form. The default test is "Exprort"
- auto\_excel = "yes"
  - Start Excel when the page is loaded
- excel\_save\_file="&JavaResultsHome\example1.xlsx"
  - Tells Excel to save the file with the name supplied.
- quit="NO"

Automatically quit Excel. Default is NO.

This example will automatically open Excel, create the PivotTable, and save the workbook as example1.xlsx in the folder specified by &JavaResultsHome. Excel will be automatically opened, but because quit="NO" was specified Excel stays open. See Display 5 for the HTML page generated by SAS, and Display 6 to see the Excel PivotTable created.

		Examp	le 1 - Create	e the First Pivot	Table	
Obs	Year	Quarter	Product_Line	Product_Category	Product_Group	Quar
1	2003	2003Q1	Children	Children Sports	A-Team, Kids	
2	2003	2003Q1	Children	Children Sports	Bathing Suits, Kids	
3	2003	2003Q1	Children	Children Sports	Eclipse, Kid's Clothes	
4	2003	2003Q1	Children	Children Sports	Eclipse, Kid's Shoes	
5	2003	2003Q1	Children	Children Sports	Lucky Guy, Kids	
6	2003	2003Q1	Children	Children Sports	Mad Dash	
7	2003	2003Q1	Children	Children Sports	N.D. Gear, Kids	
8	2003	2003Q1	Children	Children Sports	Olssons, Kids	
9	2003	2003Q1	Children	Children Sports	Orion Kid's Clothes	
-	2002	200204	Children	Children Canda	Conver Vide	

Display 5. The HTML Page generated by SAS

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1	Year	(All) 👻							1			<b>1</b> -
2										Choose fields to a	dd to report:	[H] -
3	Sum of Profit	Quarter 💌							_	Obs		
1	Product_Line 💌		2003Q2	2003Q3		2004Q1	2004Q2	2004Q3	2	Vear Quarter		
5.0	Children	98950.54	201211.5			108969.56				V Product Line		
5	Clothes & Shoes	1436261.92								Product Categ		
7	Outdoors	1278990.97	1373321.3					1 1332289.		Product_Group		
	Sports				1499091.83			3 1999996.	_	Quantity		
9	Grand Total	4072252.28	5719978.43	3 5229456.09	4657217.23	4705578.16	6709303.52	2 6378758.	74	Profit		
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Display 6. The Excel PivotTable generated by SAS

#### Example 2 – Multiple Summary Values

In the discussion on PivotTables and in Example 1 we only had one Summary Value – Sum of Profit. Excel will allow us to have multiple Summary Values. We will first look at creating multiple Summary Values in the Excel interface, then create a PivotTable with multiple Summary Values through SAS.

In Excel. to add Average Profit as one of the Summary Values fields:

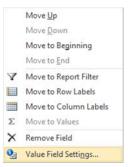
1. Drag Profit from the Field List to the Summary Values area. Since the default statistic is sum notice the new entry in the Summary Values area is listed as *Sum of Profit 2*. Since I wanted to see the two summary statistics one under the other I moved statistic from Column Labels to Row Labels. See Display 7

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2	Product Line	Data	2003	2004	2005	2006	2007	Choose fields to add to report:
3	and the owner where the owner	Sum of Profit	647694.56	753247.81	634305.69	855004.08	684600.82	Obs
4		Average of Profit2	12455.66462	14485.53481	12198.18635	16442.38615	13165.40038	V Year
5	Clothes & Shoes	Sum of Profit	8209301.44	9691556.29	8513792.88	9640795.34	8627105.26	Quarter
6		Average of Profit2	93972.28909	110131.3215	96747.64636	109554.4925	98035.28705	Product_Line
7	Outdoors	Sum of Profit	4755243.8	5885151.63	5315410.03	6183372.75	4769871.26	Product_Category
8		Average of Profit2	132090.1056	163476.4342	147650.2786	171760.3542	132496.4239	Product_Group
9	Sports	Sum of Profit	6006404.23	7284376.45	6177826.88	7109016.69	6269552.84	7 Profit
10		Average of Profit2	68254.59352	82777.00511	70202.57818	80784.28057	71244.91864	salesTotal
11	Total Sum of Prof	fit	19678904.03	23614332.18	20641335.48	23788188.86	20351130.18	
12	Total Average of	Profit2	74541.30314	89448.22795	78186.87682	90106.77598	77087.61432	Drag fields between areas below:
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Display 7. A second field added to Summary Values

#### The Armchair Quarterback, continued

 Right on the "more" arrow beside Sum of Profit 2. This will bring up a menu – select ValueField Settings. (see Display 8.



Display 8. "More" options for Sum of Profit2

3. Select Average from the list and click OK. See Display 9.

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ustom Name:	Averag	ge of Profit2
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Average Max		
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Display 9. Changing the summary to Average

4. The updated PivotTable is displayed. See Display 10.

To create a similar table using SAS we submit the following code. Note, to demonstrate that different fields in addition to different statistics for the same field can be created this example creates total profit and average quantity. See Display 11 for the PivotTable.

In this code example we see one new option and a different usage of a previous option

• pivotdata = "profit,quantity"

This tells Excel we want multiple fields in the data area – profit and quantity. We separate the field with a comma

• pivotdata\_stats = "sum,average"

This tells Excel we want two statistics – sum and average. We separate the statistics with a comma. If no pivotdata\_stats are specified, all the fields get the sum statistic. If only one statistic is specified, all fields get that statistic. It is a good practice to specify the statistic for all fields, even if they will all get the same statistic

As we specified multiple fields to be included in Summary Statistics we can also specify multiple fields in any of the other areas. In all cases we enter the list of fields separated by a comma.

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7 8	Outdo	oors			e of Pro Profit2		090.1056 755243.8		147650 53154		1760.35 183372.	42 1324 75 476	96.4 987	Product_Cat Product_Gro		
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Display 10. PivotTable after changing the summary statistic in Excel

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5		-			_		of Qu	antity	2334.147				2377.181818	2663.125		Product_Cat			
	Outd	oors			-	of Pr			475524		588515		5315410.03	6183372.75	1	Product_Gro			
3					_		-	antity	1839.666	-	2245.333		2000.527778	2367.666667	-	Quantity			
	Sport	ts				of Pr			6006404		728437		6177826.88	7109016.69	18	Profit			
0	T	Sum of	0		Ave	rage	of Qu	intity	148					1844.863636 23788188.86	-	salesTotal			
-				Quantity			_							1993.757576	-				
23	TOLA	Averag	eon	quantity		_	-		1033.635	1040	1747.034	275	1/05.754040	1995.757576	-	Report Filt	een areas below:	n Labels	
4							-										Year	101002-02	
5	-																rear		
6	-												_		6	Row Labels	s Σ Values		-
7				<b>—</b>		مان	~~ i	n th		~~~						Product L			-
8				1 1 1		aiu	621	ii u	e Sur	ш	iary v	aiu			≯	Σ Values	PROFESSION PROPERTY AND INCOME.		
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		Table	1	Table 1	pivot	10	1/			1	4	100			P II	Defer Layou	it Update	Update	
	dy										1.1.1.1				the second second	100%	0 0	(4	5

Display 11. Example 2 PivotTable with two Summary Values from SAS

#### Example 3 – Multiple PivotTables

In Example 2 we looked at adding multiple fields into the Summary Values area, and by extension into the other areas of the PivotTable. What if we want each Summary Statistic on a different PivotTable. In Excel we would add a sheet for each PivotTable we want, then step through the process of creating the PivotTable; see the section "Creating PivitTables" above for this process.

In SAS we have a options to specify we are going to create multiple PivotTables - **pivot\_series**. Specifying pivot\_series="yes" will tell Excel to create multiple PivotTables from the one data table. In addition to telling Excel we want multiple PivotTables we have to indicate what will be in the areas of each of the PivotTables. To do this we make another change to how we specify the areas:

```
ods tagsets.tableeditor file="&resultsHome\example3.html"
options(
                button_text = "Excel"
                pivot_series="yes"
                pivotrow="Product_Line | Product_Line | Product_Line"
                pivotcol=" Quarter | Quarter | Quarter"
                pivotdata="Profit | Profit | Profit "
                pivotdata_stats="Min | Max | Average"
);
Title1 "Example 3 - Multiple Sheets";
proc print data=data.sales;
run;
ods tagsets.tableeditor close;
```

To specify we wanted multiple fields in one area of a PivotTable we separated the list of fields using a comma (,). To specify the fields we want in each area in each PivotTable we separate the fields with the vertical bar (|). In the example above we

- pivotrow="Product\_Line | Product\_Line | Product\_Line" we will create three PivotTables, each will have Product\_Line as the Row Label
- pivotcol=" Quarter | Quarter | Quarter" we will create three PivotTables, each will have Quarter as the Column Label
- pivotdata="Profit | Profit | Profit "

we will create three PivotTables, each will have Profit as the Summary Field

 pivotdata\_stats="Min | Max | Average" we will create three PivotTables, the first Summary Field will have the Min statistic, the second the Max statistic, and the third the Average statistic.

See Display 12 for the Excel workbook created by this code.

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Pas	Calibri	Ū		1 - А́ А <u>Э</u> - <u>А</u>	· = = [	■ 》· ■ 译 律	S - 3	eneral • % • • % • • • 0 • • 0 • • 0 • • 0	•	Conditiona Format as T Cell Styles Sty	il Formatting Table *	g ▼ 📲 Insert ▼ Polete ▼ Format ▼ Cells	Σ * . 	Sort & Filter *	Find &	
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A	A			С	D	E	F		G	H		PivotTable Field	List		3	- >
-		-	arter 💌	2003Q2	2003Q3	2003Q4	2004Q1	2004	102	2004Q3	2004Q4	Choose fields to a	dd to rep	ort:	(J)	•
-	Children		309.43	344.8	479.28	453.04	315.7		388.06		453	Obs		5155). 		_
	Clothes & Shoes		2250.15	3703.15	4237.65	2202.31			472.69		249	Year				
-	Outdoors	_	4236.18	1964.01	1955.8	4107.88	5157.1		248.53		6551	Quarter				
-	Sports		2939.29	1458.86	2171.41	2403.67			783.05		3799	Product_Lin	e			
	Grand Total		309.43	344.8	479.28	453.04	315.7		388.06		453	Product_Cate	- 10 C			
8												Product_Grou	р			
9																
0												salesTotal				
1																_
2												Drag fields betwe	en areas b	below:		
3												Report Filter		Colun	nn Labe	els
4														Quarter		٠
5																
6					Eirot Di	votTable	with the	mi	antot	iatia		Row Labels	Σ	Value	s	
7					FIISLER	voriable	with the	; ,,,,,,	ารเลเ	istic.		Product_Line	-> N	4in of Pr	ofit	Ŧ
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9											-	Defer Layout	Undate	6	Update	
4	Table_1	Tab	le_1_piv	ot_1 Ta	ble_1_pivot_	2 Table_	1_pivot_3		111		•	- ocier cayout	opodie		opuou	-
ea	ady											⊞□□ □ 100%	0	-0-		+

Display 12. The Excel Workbook with multiple PivotTables.

#### **Example 4 – Percentages**

Instead of showing values in the cells, we may want to calculate the percent of that cell of row total, column total, table total etc. In Excel we can do this by changing the Value Field Setting; we saw the use of the Value Field dialogue earlier. To change from a number to a percentage, right click on any value cell in the PivotTable and select Value Field Settings from the context menu; see Display 13. When the Value Field Settings dialogue appears, select the Show Values As tab and select the appropriate base for our percentage. In Display 14 the % of Row Total was selected. Display 14 shows the resulting PivotTable.

X	Image: Image			Book3 - Microsoft Excel				PivotTabl	e Tools			- O 2
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	tTable v Table v Tab			2↓ 2Z Z↓ Sort Insert Sort & Filter	Change Source Data	Data	Clear Clear Select Move I Acti	+ PivotTable	Calculati		LAP Tools -	Field List +/- Buttons Field Headers Show
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1	A Sum of Quantity	Ye	Calit	bri - 11 - A A \$ - 9	6 , 5	G	Н	1	J	ĸ	PivotTable Field List	-
2	Product Category		в	I 🛎 🏈 • 🗛 • 🖽 • *,8	.00 J	2008	2009	2010	2011	Grand 1	Choose fields to add to	report:
3	Assorted Sports Articles	4		1 57858 48947 55869	49261	61417	52435	58413	51177	48	Obs	
4	Children Sports		1	Copy	35942	40847	35858	45168	37641	34	Vear Year	
5.	Clothes	10	ũ	Eormat Cells	10830	140310	117058	136108	118020	110	Quarter	
6	Golf	1		Number Format	14970	18531	16545	19400	15775	15	Product_Line	
7	Indoor Sports			Refresh	4970	5629	4334	5702	5197	4	Product_Catego	ry
8	Outdoors	6	-	Sort ≯	67289	84789	75247	86762	72220	69	V Quantity	
9	Racket Sports				9213	10242	8933	10514	9529	8	Profit	
10	Running - Jogging	1	×	Remove "Sum of Quantity"	19089	23768	20805	25228	20073	19	salesTotal	
11	Shoes	•		Summarize Values By	98487	110776	98687	109930	104845	92	- Heart Contraction	
12	Swim Sports			Show Values As	8962	10259			9534	8	Drag fields between an	
13	Team Sports	1	92	Show Details	18088	22115	18784	28010	19481	18	P Report Filter	Column Labels
14	Winter Sports	1	-		11821	14625		12187	11949	11		Year 🔻
15	Grand Total	4	0	Value Field Settings	48922	543308	470388	549668	475441	441		
16			_	PivotTable Options						_	Row Labels	Σ Values
17				Hide Fiel <u>d</u> List							Product_Cate •	Sum of Quantity -
18	-											
19										Ŧ	🔲 Defer Layout Upda	te Update
÷	♦ ▶ ■ Qty_By_Year Qt ady	<u>y_</u>	By Y	/ear_pivot	14			84		•	<b>I</b> II 100% (	0 (+)

Display 13. Getting the Value Field Setting from the context menu

Justom Name:	Sum of Quantity	
Summarize Va	alues By Show Values As	
Show value	s as	
% of Row To	otal	
Dase field:	case item:	
Obs Year Quarter Product_Line		
Product_Gro	up T	

Display 14. Selecting % of Row Total

To perform the same type of calculation in SAS we use the *pivotCalc* option; the pivotCalc option tells Excel to create a perentage and the basis of the percentage. In this example we are creating a % of row total. Valid values are *row*, *column*, *total*, *percentOf*, *index*, and *runningTotal*. See Display 16 for the Excel PivotTable created from this code.

X	🖬 🤊 • (* -  =	r)		Book	3 - Micro	soft Excel	E.			PivotTabl	e Tools				• 23
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	tTable Active	Group Sele Ungroup Group Fiel Group		Ž↓ Ž Ž Ž↓ Sort Sort 8	Insert Slicer	Refres	ih Change Sourc	Data	Clear Clear Select Move Acti	* PivotTable	Calculatio	ns the o	votChart LAP Tools = /hat-If Analysis = Tools	Field List +/- Buttor Field Head Show	
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A	A		В	С	D	Ε	F	G	н	1	J	K	PivotTable Field	List	* >
1	Sum of Quantity	1	Year 💌												<b>1</b>
2	Product_Catego	iry 💌	2003		2005	2006	2007	2008			2011	irand 1	Choose fields to a	add to report:	[60]
3	Assorted Sports	Articles	9.78%	11.99%	10.14%	11.58%	10.21%	12.73%	10.87%	12.10%	10.60%	100	Obs		
	Children Sports			11.34%			10.36%					100	V Year		
-	Clothes						10.02%					100	Quarter		
б	Golf		9.32%	11.59%			9.92%					100	Product Cal	tenony	
7	Indoor Sports			11.93%		0	10.89%			12.50%		100	Product_Grou		
8	Outdoors				10.43%	12.34 Va	um of Qua			12.56%		100	Quantity		
9	Racket Sports				9.90%	11.61 Ro	w: Indoor	Snorte	10.53%	12.40%	11.24%	100	Profit		
	Running - Joggir	ng					olumn: 200			13.10%	a faith and the second second	100	salesTotal		
11	Shoes	20	10.44%	11.26%	10.30%	11.45%	10.65%	11.98%	10.68%	11.89%	11.34%	100			
12	Swim Sports		9.77%	11.07%	9.60%	12.91%	10.17%	11.64%	10.12%	13.90%	10.82%	100	Drag fields betwe		
13	Team Sports		9.34%	11.17%	9.73%	13.69%	9.53%	11.65%	9.89%	14.75%	10.26%	100	Y Report Filter	- Co	lumn Labels
14	Winter Sports		10.52%	12.58%	10.43%	10.28%	10.48%	12.97%	11.33%	10.81%	10.60%	100	1	Year	•
15	Grand Total		9.90%	11.66%	10.19%	11.92%	10.17%	12.30%	10.65%	12.45%	10.77%	100			
16													Row Labels	Σ Val	ues
17													Product_Cate	. V Sum of	f Quantity 🔻
19													-		
	IN OTV BY	Year Ot	Du Ve	ar phio	- 01	1				14	-	• []	Defer Layout	update	Update

**Display 15. PivotTable with Percentages** 

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	A1 -		fx Sum	of Quan	tity										
	A	В	С	D	E	F	G	н	1	J	K	PivotTable Field	List		- )
1	Sum of Quantity	Year -	]											G	
2	Product_Category *	2003	2004	2005	2006	2007	2008	2009	2010	2011	Grand 1	Choose fields to a	add to report	: 6	Ø •
3	Assorted Sports Articles	9.78%	11.99%	10.14%	11.58%	10.21%	12.73%	10.87%	12.10%	10.60%	100	Obs			
4	Children Sports	9.93%	11.34%	9.61%	12.80%	10.36%	11.77%	10.33%	13.01%	10.85%	100	V Year			
5	Clothes	9.85%	11.99%	10.30%	11.61%	10.02%	12.68%	10.58%	12.30%	10.67%	100	Quarter			
6	Golf	9.32%	11.59%	10.26%	12.35%	9.92%	12.28%	10.96%	12.86%	10.45%	100	Product_Line	tanant		
7	Indoor Sports	10.37%	11.93%	8.98%	12.11%	10.89%	12.34%	9.50%	12.50%	11.39%	100	Product_Grou			
8	Outdoors	9.59%	11.70%	10.43%	12.34%	9.74%	12.28%	10.90%	12.56%	10.46%	100	Quantity	Ψ.		
9	Racket Sports	10.18%	11.19%	9.90%	11.61%	10.86%	12.08%	10.53%	12.40%	11.24%	100	Profit			
10	Running - Jogging	9.45%	11.60%	10.17%	12.20%	9.91%	12.34%	10.80%	13.10%	10.42%	100	salesTotal			
11	Shoes	10.44%	11.26%	10.30%	11.45%	10.65%	11.98%	10.68%	11.89%	11.34%	100	-			_
12	Swim Sports	9.77%	11.07%	9.60%	12.91%	10.17%	11.64%	10.12%	13.90%	10.82%	100	Drag fields betwe			
13	Team Sports	9.34%	11.17%	9.73%	13.69%	9.53%	11.65%	9.89%	14.75%	10.26%	100	Y Report Filte	r 🛄	Column La	bels
14	Winter Sports	10.52%	12.58%	10.43%	10.28%	10.48%	12.97%	11.33%	10.81%	10.60%	100		Yea	NT .	•
	Grand Total	9.90%	11.66%	10.19%	11.92%	10.17%	12.30%	10.65%	12.45%	10.77%	100				
16												Row Labels	Σ	Values	
17												Product_Cate	. • Sur	n of Quant	ity 🔻
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**Display 16. PivotTable with Percentages from SAS** 

#### **Example 5 – Formatting Numbers**

When Excel creates a PivotTable any formatting of the source data is not honoured. If you want the values to be formatted (say as currency) then you must apply the format after the PivotTable is created. As with any standard work sheet cell or range you can right click and format the cell; although this works you should go through the PivotTable interface to format the area. Once again you bring up the Value Field Settings dialogue; this time click on the **Number Format** button and apply the format that is appropriate. The dialogue box presented is the same dialogue used to format cells in any worksheet. After you click out of the dialogue the formats are applied.

When using the *Custom Format* option in Excel you can specify formats for the four main value types of a number – when positive, when negative, when zero, and when the cell contains text; different formats for each of these value types can be entered, sepatated by a semi-colon (;); if only one format is specifies all value types get this format. See the Excel help for all the of options available to format a number. In our examples we will apply a different colour to each Summary Field, that is for Profit the cell font will be blue, for Quantity the cell font will be red, and for salesTotal the cell font will be the default (black). In addition, the Profit and salesTotal fields will have a dollar sign (\$). The PivotTable created by this code is in Display 17.

The option to format the Summary Vallues is *pivotdata\_fmt*. We *must* provide one set of formats for each field in our pivotdata list. Also note that we have another delimiter here, the tilde ( $\sim$ ) – each format set is separated with a tilde. In this example we are only providing one format for each Summay Field (eg [blue] #,### for Profit). If we want to provide formats for negative and zero values we would use the semi-colon to separate them as we would in Excel , for example to provide a format for positive, negative and zero values only for Profit we would use:

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F	File	Home	Insert	Pa	ige Layo	ut F	ormulas	Data	1	Review	View	Options	Design				a 🕜	-	3 B
		Active Field *	Group S Ungroup Group F Grou	ield P	2	Sort &	Inse Slice Filter			hange Data Source *	11 s	Clear + Select + Move PivotTable Actions	Calculations	10	votChart LAP Tools + /hat-If Analysis + Tools	ч.	ield List /- Buttons ield Header Show		
_	-	A1	• (*	·	fx	1													1
			A			В		С		D		E	F		PivotTable Field	List			* >
1				4				Year	*		_							1	1 -
2	-	uct_Line	2	- and a second	Data		_		003		2004	2005		_	Choose fields to	add to	report:	1	
3	Child	ren				Profit		\$647,			3,248	\$634,306			Obs Vear				
4		Average of Qua Max of salesTot							2.69		756.9	641.54			Quarter				
5	Clash	Max of salesTot hes & Shoes Sum of Profit					tal	\$87,434	-	\$110,02	_	\$82,077.7			Product Li	ne			
6	Cloth	Max of salesTot					\$8,269,		\$9,691	0.75	\$8,513,793		_	Product_Cat	egory				
7 8						salesTo		\$862,420				\$876,634.06			Product_Gro	up			
8 9	Outdo					Profit	tai	\$4,755,	-	\$930,55	_	\$5,315,410			Quantity				
9 10	Outou	oors				e of Qu	antitu	1.839			15.33	2.000.53			V Profit				
11					-	salesTo		\$691.22				\$726,769.81	and the second second	See.	<b>▼</b> salesTotal			_	_
12	Sport	c		-		Profit	-tai	\$6,006,		\$7,284		\$6,177,827			Drag fields betw		an helow		
13	spore	-				e of Qu	antity	1.489			.793.	1.536.53			Report Filte		Colum	n Lab	els
14					and the same of the	salesTo			-		And a state of the second	\$1,029,997.62					Year	0.0222	*
15	Total	Sum of	Profit					\$19,678,				\$20,641,335							
16	Total	Averag	e of Quanti	ity			-	1,655	5.86	1,94	19.85	1,703.73	1,993.	76	Row Labels		Σ Values		
18	Total	Max of	salesTotal					\$959,66	55.6	\$1,287,46	55.63	\$1,029,997.62	\$1,073,587.	16	Product_L		Sum of Pr Average		
19														-	Defer Layou	t Updat	te	Upda	te

pivotdata\_fmt="[blue] #,###;[red] (#,###); #,###~[green] \$#,###.##~\$#,###.##"

Display 17. PivotTable with Formats from SAS

#### Example 6 – Applying Excel Styles

Excel provides a number of built-in styles that can be applied to the PivotTable; these styles are PivotTable design tab. In Excel 2010, if you run your mouse over any of the styles Excel will display your PivotTable in that style; this gives you an opportunity to see how the style would appear with your data without having to apply the style. Display 18 shows these styles. In Display 18, the mouse is over **Pivot Style Light 8** (note the pop-up window beside the style). You can use this style name to apply in your code.

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0.7		Blank 📝 Column Headers	Banded Colu								
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â	A	В	С		11111	ITTT	EEEEE		IIII	IIII	
1	Sum of Profit	11-2	Year 👻			Piv	ot Style Light	8			
2	Product_Line -	Product_Category *	2003		11111			=====	EEEEE	IIII	
3	Children	Children Sports	647694.56	75	(212 2 2 2)	22222	22222		22222	22222	00000
4	Children Total		647694.56	75			88888				
5	Clothes & Shoes	Clothes	3448479.99	434							
б		Shoes	4821081.45	534							
7	Clothes & Shoes Total		8269561.44	969							
8	Outdoors	Outdoors	4755243.8	588							
9	Outdoors Total		4755243.8	588							
10	∃ Sports	Assorted Sports Articles	2365199.05	289	Medium	_		_	-		_
11		Golf	840524	104							
12		Indoor Sports	364615.04	44							
13		Racket Sports	487370.33	56							
14		Running - Jogging	516256.38	64	22222	EEEEE	IIIII	EEEEE	EEEEE	EEEEE	SEEEE
15		Swim Sports	171498.76	19							
16		Team Sports	262824.78	31			-				
17		Winter Sports	998115.89	117				=====			
18	Sports Total		6006404.23	728							-
19	Grand Total		19678904.03	2361							

**Display 18. Previewing a Style in Excel** 

To apply the same style in SAS we use the pivot\_format option. You will need to use the interface and mouse to roll over the different styles to get the style name. In our experience, not all of the styles get applied correctly so you may have to experiment with different style names. In this example *light8* was applied. See Display 19 for the results.

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F	ile Home Insert	Page Layout Formula	s Data R	eview View	Options	Design			۵ 🕜	- 62 8
1	* Totals * Layout * F								•	
-	A1 -	f Sum of Pro	ityle Options			Pivotia	ble Styl	es		1
A	A	B	c	D	E	F		PivotTable Field List		- )
1	Sum of Profit Product Line	1	Year 💌	2004	2005	200	. Î	Choose fields to add to	e report:	<b>1</b> -
3	Children	Children Sports	647694.56	753247.81	634305.69	855004.0	_	Obs		
4	Children Total	children sports	647694.56	753247.81	634305.69	855004.0	-	Vear		
	- Clothes & Shoes	Clothes	3448479.99	4349460.33	3681077.44	4193304.5	and the second se	Quarter		
1	Ciotiles & Silves	Shoes	4821081.45	5342095.96	4832715.44	5447490.7		Product_Line		
7	Clothes & Shoes Total		8269561.44	9691556.29	8513792.88	9640795.3		Product_Catego	ry	
3	Outdoors	Outdoors	4755243.8	5885151.63	5315410.03	6183372.7		Product_Group		
•	Outdoors Total	Outdoors	4755243.8	5885151.63	5315410.03	6183372.7		Quantity		
10	= Sports	Assorted Sports Articles		2896541.55	2426049.28	2714228.8		Profit salesTotal		
1	oporto	Golf	840524	1049831.42	912442.59	1104773.6		Cladestora		
2		Indoor Sports	364615.04	441445.23	297426.71	439330.34		Drag fields between an	eas below:	
3		Racket Sports	487370.33	561206.14	507386.11	578237.4		Y Report Filter		n Labels
4		Running - Jogging	516256.38	645634.86	567269.11	676667.7	5		Year	
5		Swim Sports	171498.76	194433,43	172600.23	231942.1	7			
6		Team Sports	262824.78	317397.61	285322.5	381164.0	L	Row Labels	Σ Values	
17		Winter Sports	998115.89	1177886.21	1009330.35	982672.4	1	Product Line *	Sum of Pr	
8	Sports Total	an a	6006404.23	7284376.45	6177826.88	7109016.6		Product_Cate *		
9	Grand Total		19678904.03	23614332.18	20641335.48	23788188.8	5 21_	Personal and the second second second		
-	+ H Table 1 Table	e 1 pivot / 1		4			• 11	Defer Layout Upda	ste	Update

**Display 19. A Style Applied by SAS** 

#### Example 7 – Placing the PivotTable on the same sheet as the data table

Normally we will be placing the PivotTable on a different sheet than the data table. First, even in Excel, the data tables can become very large and navigation of the sheet will be more difficult. Second, by separating the two we minimize the risk that the base table is inadvertently changed as the analyst is examining and changing the PivotTable. In order to place the PivotTable on the same sheet as the data table you simply select a PivotTable destination on the data sheet (see Display 3).

In SAS we use the *ptdest* option; this instructs Excel to write the PivotTable to the same sheet as the data and starting in the range specified; in the example the PivotTable will start in cell G1. Also note this example told Excel to apply an AutoFilter to the data table (*excel\_autofilter=*"yes"). The results are in Display 20.

```
ods tagsets.tableeditor
file="&resultsHome\example7.html"
options(
        button_text = "Excel"
        SHEET NAME="Pivot With Data"
        excel_autofilter="yes"
        ptdest_range="g1"
        pivotrow="product_category"
        pivotcol="year"
       pivotdata="profit"
       );
Title1 "Example 7 - Placing the Pivot Table on the Data Sheet";
proc print data=data.sales;
var product_category year salesTotal profit;
run;
ods tagsets.tableeditor close;
```

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-	1	Product_Category - Children Sports	2003	salesTot - 9713.94	Pro1 - 5380.65		Sum of Profit		<b>T</b>	-
8	2	Children Sports	2003	2664.91	1540.36		Product_Category	- 200		-
	- 2	Children Sports	2003	18768.8	9348.95		Assorted Sports Artic		Company of the Second Second	
		Children Sports	2003	14208.42	7072.7		Children Sports	647694.5		
- 8	4	Children Sports	2003	13425.12	7399.4		Clothes	3448479.9		
8	5		2003	10367.82	5742.84		Golf	84052		
	6		2003	33932.95	18975.47		Indoor Sports	364615.0		
	7	Children Sports	1000000000	L. Calabababababababab			Outdoors	4755243		
	8		2003	3243.43	1918.64		Racket Sports	487370.3	33 561206.14	1
2	9	Children Sports	2003	621.86	309.43		Running - Jogging	516256.3	645634.86	i
1	10	Children Sports	2003	14675.5	8142.49		Shoes	4821081.4	45 5342095.96	i
2	11	Children Sports	2003	10988.67	6086.73		Swim Sports	171498.7	76 194433.43	
3	12	Children Sports	2003	43658.14	23816.44		Team Sports	262824.7	78 317397.61	
4	13	Children Sports	2003	5701.41	3216.44		Winter Sports	998115.8	89 1177886.21	
5	14	Clothes	2003	173624.13	86689.09		Grand Total	19678904.0	03 23614332.18	
6	15	Clothes	2003	7570.89	4541.7					Т

Display 20. Data and PivotTable on the same worksheet from SAS

#### Example 8 – Adding Sheets to an Existing Workbook

In Excel it is easy to add sheets to an existing workbook. In this example we will add a new sheet and PivotTable to the workbook created in Example 7. The option to specify we are writing to an existing workbook is **update\_target**, the value of the option is the fully qualified name of the Excel workbook to update. Display 21 has the results of this program.

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A	A	В	с	D	E		F	G	Н	E	
1	Obs	Year	Quarter	Product_Line	Product Ca	tegory	Product_Group	Quantity	Profit	sale	
2	1	2003	2003Q1	Children	Children Sports		A-Team, Kids	309	5380.65		
3	2	2003	2003Q1	Children	Children Sports		Bathing Suits, Kids	102	1540.36		
1	3	2003	2003Q1	Children	Children Sports		Eclipse, Kid's Clothes	588	9348.95		Data
5	4	2003	200301	Children	Children Sports		Eclinse Kid's Shoes	331	7072 7		Sheet from
5	5	2003	2003Q1	Children	Children Sports		Lucky Guy, Kids	313	7399.4	-	Example 8
,	6	2003	2003Q1	Children	Children Sports		Mad Dash	340	5742.84		
	7	2003	2003Q1	Children	Children Sports		N.D. Gear, Kids	748	18975.47		
	8	2003	2003Q1	Children	Children Sports		Olssons, Kids	203	1918.64		
0	9	2003	2003Q1	Children	Children Sports		Orion Kid's Clothes	15	309.43		PivotTable
1	10	2003	2003Q1	Children	Children Operte		Osproy, Kida	504	01 12 10		from
2	11	2003	2003C1	Children	Children Sports		Top Dog	364	6086.73	-	Example 7
3	12	2003	2003C1	Children	Children Sports		Tracker Kid's Clothes	1355	23816.44		
4	13	2003	2003C1	Children	Children Sports		Ypsilon, Kids	148	3216.44		
5	14	2003	2003C1	Clothes & Shoes	Clothes		Eclinse Clothing	2997	86689.09	1	Shoot from
6	15	\$ 703	2003	Clothes Shoes	Clothes		Green Tomato	165	4541.7		Sheet from
4 I		ales 🦯 S	ales_pivot /	Pivot With Data 🦯 😏	7			D D 100% (-		► [] (+)	Example 7

Display 21. Adding a Data Sheet and PivotTable to Existing Workbook from SAS

#### Example 9 – Updating a Range in an Existing Workbook

One common problem we often encounter is the need to update a range in an existing Excel workbook; perhaps there are reports and graphs in Excel that need to be refreshed on a daily basis. By only updating the data in the range you can keep the existing reports and graphs from having to be recreated every time the data are refreshed. If you have SAS/Access for PC File Formats you can read/write the named ranges directly, however if you do not have SAS/Access for PC File Formats you had to be more creative in order to update data in a range. Using the TableEditor tagset we can update a range. Display 22 shows a worksheet before we update it

To tell Excel we want to update a range in an existing workbook we need to tell which workbook to update, which sheet in the workbook, and the starting location (row, col) to update. The options are update\_target, update\_sheet, and update\_range respectively. In this example we are updating workbook Example9.xlsx, sheet Sales, and starting in row 1 column 11:

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1	Obs Pr	roduct_Line	Year	salesTotal	Profit										1
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1	530 C	hildren	2005	2542.1	1470.23										
1	531 C	hildren	2005	14556.59	7236.99										
5.3	532 Ci	hildren	2005	13657.67	6798.38										
5	533 C	hildren	2005	10265.72	5620.17										
7	534 C	hildren	2005	8925.83	4936.69										
	535 CI	hildren	2005	35450.22	19832.47										
	536 C	hildren	2005	3320.94	1962.18										
0	537 C	hildren	2005	464.53	230.78										
1	538 CI	hildren	2005	12544.81	6961.26										
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**Display 22. An Existing Worksheet** 

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d	A	В	С	D	E	F	G	н		1	J	K	L		1	M	ñ
1	Obs	Product_Line	Year	salesTotal	Profit		Obs	Product_L	ine 1	Year	salesTotal	Profit					1
2	529	Children	2005	8752.92	4841.05		1849	Children		2010	8497.15	4701.42	2				
3	530	Children	2005	2542.1	1470.23		1850	Children		2010	3136.58	1811.12	2				
4	531	Children	2005	14556.59	7236.99		1851	Children		2010	19499.71	9727.9	9				
5	532	Children	2005	13657.67	6798.38		1852	Children		2010	16188.74	8058.48	3				
б	533	Children	2005	10265.72	5620.17		1853	Children		2010	13332.49	7296.6	5				
7	534	Children	2005	8925.83	4936.69		1854	Children		2010	8729.17	4829.79	)				
8	535	Children	2005	35450.22	19832.47		1855	Children		2010	36642.38	20504.98	3				
9	536	Children	2005	3320.94	1962.18		1856	Children		2010	3344.69	1997.58	3				
10	537	Children	2005	464.53	230.78		1857	Children		2010	626.45	311.1					
11	538	Children	2005	12544.81	6961.26		1858	Children		2010	14516.97	8020.64					
12					59890.2		-					67259.61					
13							11						1				
14																	
15																	
16																	
17																	
18																	1
19																	
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Display 23. An Existing Worksheet with updates starting in Cell G1 (1, 7)

#### Example 10 – Placing the PivotTable on the same sheet as the data table

It is a sad reality that there are some that do not originate in SAS; sometimes spreadsheets are updated or created from other sources. Just because SAS did not generate the source data from the PivotTable does not mean we cannot use SAS to automate the creation of the PivotTable. In this example we will add PivotTables to a workbook with three existing data sheets. See Display 24.

Once again we need to identify the workbook (update\_target) and sheet (sheet\_name) with the data from which the PivotTable will be built; since we are also creating PivotTables we also need to supply the necessary options for the PivotTables. In this example we are creating three PivotTables, one for each of the sales, profit, and quantity sheet;

note the sheet names are separated by commas in the option. We are using the same field as the Row Label so it is specified three time separated by the vertical bar (|). Finally we specify the summary field for each of the PivotTables, again separated by the vertical bar.

Since this example is not creating the data in an HTML page, we will create a "dummy" page with the DATA \_NULL\_. The results of this code are in Display 25.

```
ods tagsets.tableeditor file="&resultsHome\example10.html"
options(
    update_target="&javaDataHome\example10.xlsx"
    sheet_name="Profit, Quantity, Sales"
    pivotrow="Product_line |Product_line |Product_line"
    pivotdata="Profit |Quantity |Sales"
    );
Title1 "Example 10 - Using An Existing Worksheet As A Data Source";
data _null_;
file print;
put "Create Pivot Tables";
run;
ods tagsets.tableeditor close;
```

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	A1	• (*	fx	Product_Li	ine									
A	A	В	С	D	E	F	G	н	1	J	K	L	M	E
1	Product_Line	Year	sales											Ê
2	Children	2003	119669	4										
3	Children	2004	139174	0										
4	Children	2005	117307	2										
5	Children	2006	157764	0										
6	Children	2007	126417	3										
7	Children	2008	145216	1										
8	Children	2009	125598	0										
9	Children	2010	159608	7										
10	Children	2011	131403	6										
11	Clothes & Shoes	2003	1620888	4										
12	Clothes & Shoes	2004	1898246	8										
13	Clothes & Shoes	2005	1670669	6										
14	Clothes & Shoes	2006	1891151	5										
15	Clothes & Shoes	2007	1690786	9										
16	Clothes & Shoes	2008	1985161	4										
17	Clothes & Shoes	2009	1760574	5										
18	Clothes & Shoes	2010	1962262	1										
	Clothes & Shoes		1754482	2										
4 -	+ H sales pr	ofit / Quan	itity 2	Ú.				14			10			•
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**Display 24. Data Sheets in an Existing Workbook** 

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	Sum of sales									ñ				<b>3</b> -
	Product_Line 💌	Total										fields to add to rep	port:	( <u>1</u>
	Children	12221581.37									and the second	fuct_Line		
	Clothes & Shoes	162342233.9									Year			
	Outdoors	93270663.93									<b>⊘</b> sale	s		
	Sports	113686061.2												
	Grand Total	381520540.3												
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Display 25. New PivotTables in an Existing Workbook

#### Example 11 – Creating PivotCharts

It is almost inevitable that when data are added to Excel, charts and graphs are soon to be built. In this example we will use SAS to create our first PivotChart. To create PivotCharts we use the option **pivotcharts="yes"**; this tells Excel to build a chart based on the PivotChart it creates. We will also need to tell Excel the type of chart to produce with the **chart\_type** option. In this example we are creating a conecol chart. See Display 26 for the results of the program.

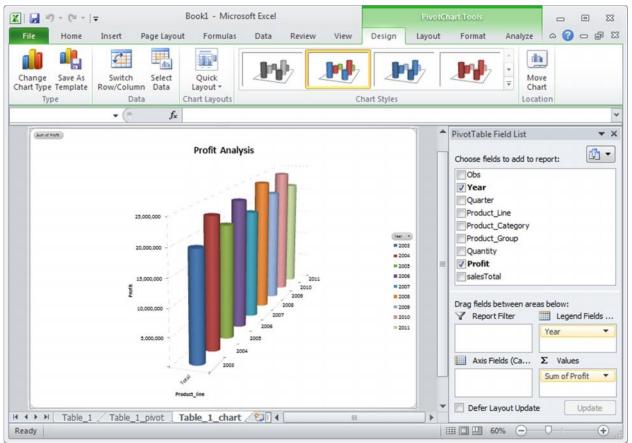


**Display 26. A PivotChart** 

#### Example 12 – Enhancing PivotCharts

There are numerous chart options within the tagset; see Appendix 1 for the full list of options. In this example we will change the chart title (chart\_title), the axis titles (xhart\_yaxes\_title, chart\_xaxes\_title) and the x-axis orientation (chart\_xaxes\_orientation). The results are in Display 27.

```
ods tagsets.tableeditor
   file="&resultsHome\example12.html"
options(
        button_text = "Excel"
        pivotcol="year"
        pivotdata="profit"
        pivotdata_fmt="#,###"
        pivotcharts="yes"
        chart_type="cylindercol"
        chart_title="Profit Analysis"
        chart_yaxes_title="Profit"
        chart xaxes title="Product line"
        chart_xaxes_orientation="45"
       );
Title1 "Example 12 - Changing Pivot Chart Options";
proc print data=data.sales;
run;
ods tagsets.tableeditor close;
```



Display 27. A PivotChart with options set

There are many more chart options available. You are encouraged to examine the options in Appendix 1 and work through different combinations to see the variety of charts and chart effects that can be produced. Also keep in mind that examining and changing chart options through the Excel interface is relatively easy; once you produce basic PivotCharts, your Excel users can create the charts that best fit their wishes.

# CONCLUSION

This paper has attempted to show how easy it is to create Excel PivotTables and PivotCharts from SAS. We only touched on a few of the options available yet saw how we can create a wide variety of PivotTables and PivotCharts. Since the purpose of a PivotTable is to allow analysts and managers to see and interactively change interactions of the data variables you will probably find you only need to provide basic PivotTables and the users will quickly learn to exploit them on their own.

It also became clear that it can be considerably easier to generate – and re-generate – PivotTables and PivotCharts from within SAS than using the Excel interface. Although the drag-and-drop interface is easy to use, creating SAS programs to pass in a few parameters will usually be faster, and certainly less error prone.

Now, when your boss says "Can I have that in Excel?" you can still shudder, but you can also quickly and easily provide the results.

# REFERENCES

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# **APPENDIX 1 – TABLEEDITOR OPTIONS**

The following tables have the options that are available for the TableEditor tagset. Tagset options are entered in name/value pairs. For example:

pivotrow = "product\_line"

The options are grouped by the nature of the option, that is Style options, Positioning options, Display options etc.

Style Options	
banner_color_even="color"	creates alternate row colors
banner_color_odd="color"	creates alternate row colors
fbanner_color_even="color"	creates alternate even foreground colors
fbanner_color_odd="color"	creates alternate odd foreground colors
col_color_even="color	creates alternate even background column colo
col_color_odd="color"	creates alternate odd background column colo
gridline_color="color	color internal rules
gridline="yes no"	removes internal gridline
background_color="color"	controls background color
background_image="path"	adds background image
scrollbar_color="color"	modifies scrollbar color
image_path="path"	adds logo or image
image_just="left right center"	justifies logo or image
	creates mouse-over color;
	generated when there is no background
highlight_color="color"	color such as styles.mystyle
highlight_cols="column#color"	modifies background color of columns
fontfamily="font"	modifies fonts overall if none specified
header_bgcolor="color"	modifies header background color
header_fgcolor="color"	modifies header foreground color
header_size="size"	modifies header font size
header_font="font"	modifies header font name
rowheader_bgcolor="color"	modifies header background color
rowheader_fgcolor="color"	modifies header foreground color
rowheader_size="size"	modifies header font size
rowheader_font="font"	modifies header font

## The Armchair Quarterback, continued

Style Options	
data_bgcolor="color"	modifies data background color
data_fgcolor="color"	modifies data foreground color
data_size="size"	modifies data font size
data_font="font"	modifies data font
title_bgcolor="color"	modifies title background color
title_style="slant roman italic"	modifies data foreground color
title_size="size"	modifies data font size
title_fgcolor="color"	modifies foreground of title

Dynamic Positioning	
pageheight="value"	specifies height before scroll bars
pagewidth="value"	specifies width before scrollbars;
	percentage value works best
frozen_headers="yes no"	freeze column headers;
	single table option.
frozen_rowheaders="yes no column#"	freeze row headers;
	single table option used for wide and
	not long tables; do not use for tables
	over 700 observations, which would be
	excessively slow

Page Setup Options	
print_header="string"	generates header text; uses ActiveX and is supported
	by I.E. and Windows only
print_footer="string"	generates footer text; uses ActiveX and is supported
	by I.E. and Windows only
print_zoom="value"	scale printed output

Page Setup Options	
orientation="landscape"	modifies orientation; uses ActiveX and is supported
	by I.E. and Windows only
	(To use this option you have to go to the below
	file and download the activex control http://www.meadroid.com/scriptx/)
pagebreak="yes no number"	deletes, add page breaks;
	also specifies the number of tables per page
left_margin="value"	changes the left margin
right_margin="value"	changes the right margin
top_margin="value"	changes top margin
bottom_margin="value"	changes bottom margin;
fit2page="yes no"	allows output to be scaled to fit the printed page; you can also use this in conjunction with the orientation and the margin properties to reduce scaling

Table of Contents Options	
open_image_path="path"	adds open image
closed_image_path="path"	adds closed image
leaf_image_path="path"	adds leaf image
toc_background="path"	adds toc background color
toc_print="yes no"	adds print button to the toc;
	this prints the individual body file
toc_expand="yes no"	expand toc

Display Options	
drag="yes no"	allow items on page to be dragged;
	dragged items are not persisted when
	the page is saved
zoom="percentage"	scale items on the screen;
	applies to all tables
zoom_toogle="yes no"	adds dynamic selection list to page

Display Options	
table_zoom="100%,200%,300%"	scales list of tables separated by commas
sort="yes no"	sort data by clicking on headers
sort_arrow_color="color"	color of arrows
sort_image="image path"	image indicating sort ;
	sample images located in zip file
sort_underline="yes"	underline column header;
	alerts reader that headers are sortable
header_underline="yes no"	underline column header;
	underlines regardless sort
exclude_summary="yes"	allows filters and sorts to exclude summary;
	allows sort and filters to exclude
	grand total in report
data_type="value1,value2"	overrides the default data type for columns;
	valid types are Number,Numberx(formatted numbers),
	String, Date, None
describe="yes no"	add color to identify data type
design_mode="yes no"	allows the HTML to be edited;
	edited output is not persisted when
	the page is saved
pagebreak_toggle="yes no"	interactive control of page breaks
zoom_toggle="yes no"	interactive scaling control
autofilter="yes no"	allows data to be filtered
autofilter_width="value"	allows the width of the filter to be modified;
	by default the width is the same as
	the width of the cell
autofilter_endcol="value"	column number to end filter
autofilter_table="value"	table to filter;
	the default is ALL
filter_cols="1,2,3"	column to add filter info
style_switch="yes"	allows styles to be switched on the fly;
	requires that you read existing CSS
	files to add to the selection

Display Options	
hide_cols="yes no"	allows removal of columns;
	double click on column headers to remove
reorder_cols="yes no"	provides the ability to dynamically reorder columns
web_tabs="Label1,Label2"	allows tabs on web page which names output
web_tabs_bgcolor="blue"	specifies background color for tabs
web_tabs_fgcolor="red"	specifies foreground color for web_tabs
panelcols="number"	number of columns to panel tables and graphs
header_display="yes no"	allows removal of the column headers
header_vertical="yes no"	allows the headers to be displayed vertically
nowrap="yes no"	prevents wrapped text in the browser or when exported to Excel
align_cols="left,right"	Allows columns to be aligned based on the position in the list

Exporting Data	
excel_sheet_prompt="yes no"	prompt to name sheet
excel_save_prompt="yes no"	prompt to save file
excel_save_dialog="yes no"	provide dialog to save file
excel_save_file="path"	save file by providing path
excel_autofilter="yes no number"	generate autofilters
excel_frozen_headers="yes no number"	freeze headers
excel_orientation="yes no"	page orientation
sheet_name="name"	specify a sheet name
sheet_name="first"	
excel_table_move="1"	table from the page to move to Excel;
excel_table_move="1,2,3"	this can a single value or a list of
	values separated by commas (This was depracated with release v2.30)
file_format="ext"	supply format of excel file ;
	default is xls which is native Excel
	format; other formats are
	txt, csv, doc, xml, slk, html

Exporting Data	
auto_format="format name"	specifies Excel's format
auto_format_select="yes no"	allows Excel's format to be chosen dynamically+B206
excel_macro="'file!macro'"	specify VBA macro to execute
excel_scale="number"	scale output printed output
excel_zoom="number"	specifies zoom for the worksheet
excel_default_width="number"	default width of each cell;
	helps prevent wrapping
excel_default_height="number"	default height of each cell;
	helps prevent wrapping
query_range="value"	location to begin writing data;
	query_ange="A11"
query_target="file-path"	file which is updated
query_file="file-path"	file which will provide the updating
	to
update_target="xls-file"	file to update;
	can be used with the sheet_name= and the
	excel_table_move option to update workbooks
update_range="value"	location to write the file
	update_range="11,1"
update_sheet="sheet name"	specifies the sheet to update
open_excel="yes no"	determines if Excel is visible or not
quit="yes no"	quits Excel and frees memory
pivotrow="name(s) number(s)"	column names or numbers for pivot rows;
	to select more than one, separate
	list items with commas
pivotcol="names(s) number(s)"	column names or number for pivot columns;
	to select more than one, separate
	list items with commas
pivotpage='names(s) number(s)	column names or numbers for pivot page;
	to select more than one, separate
	list items with commas

Exporting Data	
pivotdata="name(s) number(s)	column names or numbers for data;
	to select more than one, separate
	list items with commas
Pivotrow_fmt="@"	formats the row fields in the pivot table
Pivotcol_fmt="@"	formats the column fields in the pivottable
Pivotdata_fmt="#,###,\$###"	formats one or more values specified inthe data area
Pivotdata_stats="max,min"	provides summary functions for one or more values specifed in the data area
	default is sum statistic;
	other summary functions are
	average, count, countnums, max,min, product,stddev,stddev,sum,var, varp
Pivotcalc="row"	performs calculation on the statistics such as percentage of row, column and total;
	valid values are row, column, total, percentOf, index, and runningTotal
Pivot_format="light1"	provides excel style for the pivot table;
Pivot_series="yes"	specifies that one or more pivot tables are created from the same worksheet
pivotcharts="yes"	indicates that you want to generate a pivotchart;
	used in conjunction with the chart_type= option
ptsource_range="range"	range of data to add to pivot table
ptdest_range="range"	range to write the pivot tables;
	if omitted, pivot table writes to
	a new worksheet
chart_type="type"	Excel's chart type to be used
chart_source="d:d"	data range to use for the chart
chart_title="string"	string sprecified for chart title
chart_title_size="size"	provides font size to the chart title
chart_title_color="color"	provides color for the chart title
chart_xaxes_title="string"	specifies a title for the X axes
chart_xaxes_size="size"	specifies size for the X axes title

Exporting Data	
chart_xaxes_orientation="45"	modifies the orientation of the axis
chart_yaxes_title="string"	specifies a title for the Y Axes
chart_yaxes_numberformat	modifies the format of the axis
Chart_yaxes_title="string"	specifies size for the Y axes title
chart_yaxes_orientation="45"	modifies the orientation of the axis
chart_yaxes_maxscale="4000"	modifies the axis scale
chart_yaxes_minscale="1000"	modifies the axis scale;
chart_area_color="color"	specifies color for chart area
chart_plotarea_color="color"	specifies color for the plot area
chart_datalabels="yes no value"	adds data labels to the chart;
	valid values are value, percent,
	labelandpercent, showbubblesizes
Chart_location="same_sheet new_sheet  sheet_name"	
	specifies location to place charts;
	places charts on a new sheet by default
chart_location="0,100,300,400"	specifies top,left,height and width forembedded charts
chart_style="light1"	specifies the style for charts;
	values are light1-light13,medium1- medium13,dar1-dark13
chart_legend="bottom"	modifies the location of the legend
auto_excel="yes no"	starts export to Excel after the page has been loaded
embedded_title="yes no"	adds titles within worksheets for a single table
embedded_tables="yes yes"	adds multiple tables within a worksheet
number_format="@ #,##"	applies excel formats to each column separated by a " ".

Informative and window Options	
include="file"	allows other files to be included to
	the page such as HTML, RTF, PDF
window_title="string"	name the window;
	this title is also used whensaved
	as favorite

Informative and window Options	
load_msg="yes no"	generates a message while page is loading
load_image="image"	generates message and image while pageloading;
	see zip file for animated image which can be used
alert_text="string"	specifies string to display when the page is loaded
window_status="string"	text to display in the task bar
window_size="500,500 max"	allows window size to be specified;
	can specify coordinates or max to
	maximize window
fit2page_msg="yes no"	adds information on the percentage output is scaled
caption_text="caption1,caption2"	text added to the caption of the table
caption_just="left right center"	justifies the caption of the table
caption_backround="color"	specifies background color for the caption
caption_color="color"	specifies foreground color for the caption
caption_style="normal italic oblique"	modifies style of the caption
caption_image="path"	provides image for the caption
doc="help"	display valid options and description
button_text="string"	replace text for export button
button_fgcolor="color"	foreground color of export button text
button_bgcolor="color"	background color of export button text
button_size="12pt"	size of export button text
powerpoint_master="primary#secondary"	specifies text to display on the masterslide;
	primary and sub title are separate by "#"
powerpoint_slides="a.html,b.html"	specifies HTML files to provide as individual slides
powerpoint_template="path"	supplies a PowerPoint to use for the formatting
powerpoint_saveas="path"	saves PowerPoint presentation to a slide
powerpoint_runs="yes no"	runs PowerPoint presentation
auto_powerpoint="yes no"	starts export to PowerPoint after the page has been loaded

## **APPENDIX 2 – THE AUTOEXEC TO CREATE THE MACRO VARIABLES**

/\* autoexec.sas \*/
/\* the autoexec to start the workshop \*/
%let home = C:\HoW\Eberhardt-Kong\_13173;
%let solutionHome = &home.\solutions;
%let exerciseHome = &home.\exercises;
%let dataHome = &home.\data;
%let resultsHome = &home.\results;
%let javaHome = C:\\HoW\\Eberhardt-Kong\_13173\;
%let javaDataHome = &javaHome.\data\;
%let javaResultsHome = &javaHome.\results\;
/\* assign the libraries \*/
libname data "&dataHome";
options fullstimer source source2;