Excel Solutions for Accountants: Book 1

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Book 1

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Contents

1 Introduction

This is the first in a series of three books with the title of *Excel Solutions for Accountants*.

The essence of the book is that we have chosen a series of topics that we believe are of direct interest and relevance to accountants: we know that from the work we do every day. That is not to say that everything an accountant ever needs or does is included in this book; rather it's a general book aimed at the accountant who knows that Excel can be made to do a lot more than it does but he just doesn't know what that might be.

We have taken a very hands on approach with this book and for everything we talk about there is something for you to do: there is a spreadsheet for you to work with, too, so that you can always check your work and your accuracy at every stage.

One of our over riding ambitions was to make this book both as direct and as easy to use as possible. You will not find massive files with hideously complex formulas in them, each of which might take you an hour or two just to begin to unravel. What we have done is to give you straightforward examples with non complex lists and databases so that you come to learn the techniques and functions rather than worrying about the database.

Part One of the book comprises the following

- Accountant Specific 1
- Excel Tables
- Depreciation
- Ratio Analysis 1
- Graphs 1
- Pivot Tables 1

You can see immediately from the titles of these chapters that the accountant is the target here!

Secondly you should see that four of the chapters have the number 1 after them: that tells you that in books 2 and/or 3 there is another chapter or chapters on the same topic. Take a look at the contents of books 2 and 3:

Part Two	**Part Three**
Accountant Specific 2	Accountant Specific 3
Compound Interest and Discounting: the time value of money	Dashboarding
Data Validation and Form Controls	Pivot Tables 3
Ratio Analysis 2	Forecasting
Graphs 2	Budgeting
Pivot Tables 2	AGGREGATE, OFFSET and SOLVER

More than one way to skin a cat! We present one or more solutions to the problems we present in this book and from time to time we say: Excel provides more than one way to solve this problem. If you already know a better way to solve a problem than we are presenting, stay with it. Even if you think our method is better but are happy with your own method, stick with it if it doesn't mean you are wasting time or being inefficient. Don't be stubborn though: like the cost accountant who saw our solution to his problem but preferred not to follow our advice: that meant he preferred to wait 20 minutes every morning for his main Excel file to open and then wait a further 45 seconds or so **every time he pressed the Enter key**. Our solution meant no waiting time at all as we replaced his 30,000 volatile function workbook with a Pivot Table based solution that provided almost instant responses.

Templates: we have tried at every stage of every chapter of this book to provide templates for you to work with and/or create. After all, what's the point of programming a spreadsheet over and over again when you shouldn't have to? Excel deals with some of the most predictable things you can do and templates are consistent with that. Therefore, take each of our examples either as a template or as your template in the making. We stress **PPP** too: **paper, pencil, plan**. The PPP approach means, don't just dive in to a spreadsheet problem, take you time and plan it out on paper first. Then develop your solution. Then derive your template if appropriate.

A total of 18 chapters and by the end of all three books we believe you can easily call yourself an intermediate user of Excel. We also feel that you will have unlocked so much potential in Excel that you will want more and more from it.

This book has been written with **Excel 2013 for Windows**: that will mean that some of the things we have done will be a little bit different sometimes from what any other version of Excel might do. We have kept such differences to a minimum, however. Nevertheless, we would encourage you to upgrade to 2013 soon anyway.

Excel Files Available

All of the Excel files mentioned in this book can be found on this book's page at http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.

Other sources of help for Excel: there are many sources of help other than Excel itself. Here are just a few examples of where to get help: just search for these online to get there!

excelmaster.co: my own Excel Blog
Excel-G: online/email based discussion list for general level questions on Excel. There are about 1,000 members of this group and they are friendly and really helpful people. Please note, this is a general level list and anything too advanced should be directed at…
Excel-L: online/email based discussion list for Excel Developers. This is the more advanced list and seems to concentrate mainly on VBA problems and solutions.
OzGrid: this is a free and commercial site offering some brilliant resources.
chandoo.org: this is another really useful site whose founder, Chandoo, has the objective of making you *awesome in Excel*! A lot of the materials on this site are free but some of them are commercial. Chandoo also offers online and offline courses.
Jon Peltier: Jon seems to be the world's foremost authority on graphs and charts. Again, this is a combined free and commercial site but there are many wonderful free resources on there.
Mr Excel: Bill Jelen is a prolific Excel materials developer and explanator! Bill provides a lot of free and highly commendable materials, again both free and commercial.
Charley Kyd: Charley has specialised in the past in dashboarding and whilst he still does that, he offers a lot of free Excel based materials too. Well worth searching out.
John Walkenbach: John has been around for ages and he writes the *Excel Bibles*, among other Excel based titles. John is always comprehensive and has a lot of useful things to offer
YouTube: there are many thousands of videos on YouTube now and more appear every day. Some of them are really very good and others will leave you wondering what on earth they were trying to say. It's pot luck really but once you find a good YouTube provider, stick with them!

There are many more people/organisations/lists that can help you so these are just a few of the ones we recommend.

2 Accountant Specific 1

Introduction

In this first of three chapters in which we work through a series examples and techniques that accountants need for their everyday work, we will discuss:

- Custom Formatting
- Goal Seek
- COUNTIF and COUNTIFS
- Classifying and Analysing a List
- Monthly Ratio Analysis
- Piecework Analysis
- How to Highlight the Y Axis

Not all accountants need all of these but every accountant needs some of them!

2.1 Custom Formatting: I didn't know it could do THAT!

Custom formatting in Excel is extremely powerful and, well, much more useful than you might think. When we enter something in a spreadsheet we can accept the formatting that is applied by default or we can change the font and the font size; we can change 1234.56 to read £1,234.56 and we can make things bold, italic, bold and italic…just look at the Home Ribbon to see what you can do via the Home Tab, Number, Category settings if nothing else.

Let's look now at custom formatting and if you don't know it, you are in for a pleasant surprise since it can make your life easier and it can give you spreadsheet security you had never thought of.

Open the file *acc_spec_2.xlsx* **custom** tab. The first thing you need to know is that every cell is built on this syntax:

<POSITIVE>;<NEGATIVE>;<ZERO>;<TEXT>

For example, a budget variance can be positive, negative or zero. If it's positive, we might want to label it Favourable, if it's negative we could want to label it Adverse and if it's zero, we want to leave it at zero with no label. **We could** program each cell where there is to be a variance calculation something like this:

- =IF(B5-C5<0,ROUND(B5-C5,2)&" Adverse",IF(B5-C5>0,ROUND(B5-C5,2)&" Favourable",0)). Figure 1 shows how this is used in column E with the ordinary variance calculations shown I column D.

This formula takes care of the positive, negative and zero requirements and it takes care of the **rounding** to two decimal places in case there are more than two!

	A	B	C	D	E
1	**Variance Analysis**				
2	**Custom Formatting**				
3					
4	**Account**	**Actual**	**Budget**	**Variance 1**	**Variance 2**
5	Sales	156000	160000	-4000	-4000 Adverse
6	Cost of sales	84325	83500	-825	-825 Adverse
7	**Gross Profit**	**71675**	**76500**	**-4825**	-4825 Adverse
8	Administration	15248	12750	-2498	-2498 Adverse
9	Selling	14582	15000	418	418 Favourable
10	Distribution	3265	6000	2735	2735 Favourable
11	ICT	7456	5450	-2006	-2006 Adverse
12	**Net Profit**	**31124**	**37300**	**-6176**	-6176 Adverse

Figure 1 Budget Report Showing Variances

In this case, since there are no decimal places you could use TEXT() instead of ROUND().

The purpose of this tip, though is to show you this:

- Enter your calculation in the variance column, column E
- Select the range D5:D12
- Right click that range
- Click Format Cells
- Select Custom at the bottom of the list on the left of the dialogue box and type this in the Type box you can see in Figure 2 #,##0.00 “Favourable”;-#,##0.00 “Adverse”;#,## 0.00
- Click OK

Please note: if you copy and paste that formula from here to Excel it MIGHT give you an error message. Try typing it instead.

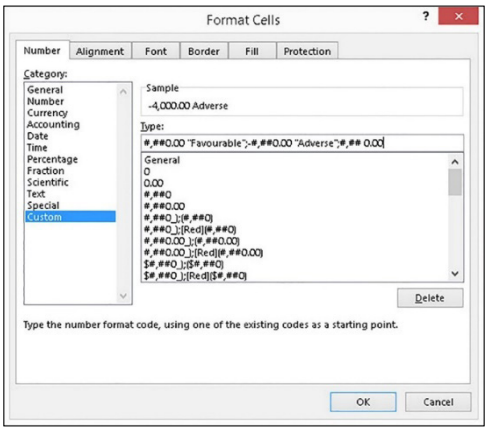


Figure 2 Custom Format Dialogue Box

Look at what you see now in column D:

	A	B	C	D	E
1	**Variance Analysis**				
2	**Custom Formatting**				
3					
4	**Account**	**Actual**	**Budget**	**Variance 1**	**Variance 2**
5	Sales	156000	160000	-4,000.00 Adverse	-4000 Adverse
6	Cost of sales	84325	83500	-825.00 Adverse	-825 Adverse
7	**Gross Profit**	**71675**	**76500**	**-4,825.00 Adverse**	-4825 Adverse
8	Administration	15248	12750	-2,498.00 Adverse	-2498 Adverse
9	Selling	14582	15000	418.00 Favourable	418 Favourable
10	Distribution	3265	6000	2,735.00 Favourable	2735 Favourable
11	ICT	7456	5450	-2,006.00 Adverse	-2006 Adverse
12	**Net Profit**	**31124**	**37300**	**-6,176.00 Adverse**	-6176 Adverse

Figure 3 Custom Formatting Applied

Firstly, if you don't need the decimal places, change the custom formatting to this:
#,##0 "Favourable";-#,##0 "Adverse";#,## 0

Notice, we have now put values AND words in the same cell as each other but Excel still treats the cells as values. **Magic!**

Try this: repeat the custom formatting with this variation now:
[Blue]#,##0 "Favourable";[Red]-#,##0 "Adverse";#,## 0

Do you see this in column D now?

Variance 1
-4,000 Adverse
-825 Adverse
-4,825 Adverse
-2,498 Adverse
418 Favourable
2,735 Favourable
-2,006 Adverse
-6,176 Adverse

Figure 4 Custom Formatting with Colours

Good! However, if you want to return to the previous example, without the Blue and Red, go back to the custom formatting dialogue box and scroll to the bottom of the Type listing and every format you create will be stored there so you can select it again at any time rather than entering it again.

Also notice in that list that there are already many custom formats to choose from and you should explore them and apply them. For example:

- You can format your dates as d/m/yy or dd mm yyyy or ddd mmm yy or ddd dddd mmm yyyy…try them all
- You can format your times as h:mm or hh:mm or h:mm:ss or [h]:mm AM/PM
- Then there are “yes”;”yes”;”no” or “true”;”true”;”false” or #,##0.00;[Red](#,##0.00);”?”;

We mentioned security in the introduction to this section: why? The answer is, not many people know how to do these things so you can safely program them to your heart’s content and no one will be able to interfere with them!

2.2 Goal Seek Car Loan

Goal Seek is a handy utility that we find in the Data Tab, Data Tools…What if Analysis…Goal Seek. Let’s look at a realistic example of a car loan to buy a car from Company T:

- For goal seek to work we need to construct two sections
- Input data…whatever you are trying to test
- Output results…whatever it is you are trying to achieve.

To begin with, why not add Goal Seek to the Quick Access Toolbar (QAT)?

In this example the inputs, which must be values only, are:

- List price of a vehicle
- Deposit to put down
- Length of the loan: months
- Interest rate the loan company will charge

Look at the *acc_spec_2.xlsx* file, **goal** tab. See Figure 5

	A	B	C	D
1	**Goal Seek**			
2	**Loan Calculations: buying a vehicle**			
3				
4	Inputs			
5	List price of a vehicle	50,000.00		
6	Deposit I am going to put down	25.00%		
7	Length of the loan: months	48		
8	Interest rate (annual) the loan company will charge me	5.00%		
9				
10			Calculations	
11			Amount of Loan	37,500.00
12			Monthly repayment	863.60
13			Total Repayments	41,452.73
14			Total Interest	3,952.73

Figure 5 Goal Seek Car Loan Example

- Cells B5:B8 contain hard coded values only and you can change them as you wish and the Calculations section will evaluate them
- Cells D11:D14 contain these formulas
  - D11 =B5*(1-B6)
  - D12 =PMT(B8/12,B7,-D11,0)
  - D13 =B7*D12
  - D14 =D13-D11

Let's imagine that we can only afford £700 a month to buy the vehicle but we don't know how that would affect the price, the duration, the interest rate and even the deposit. We use Goal Seek **one variable at a time**, like this:

- Data Tab, Data Tools…What if Analysis…Goal Seek
- In the dialogue box select D12 as the target cell
- Type 700 as the amount
- Select B6 (the deposit %) as the changing cell
- OK

Excel says…to change the monthly payment to £700 you need to **change your deposit to 30.52%**…can you afford that?

- Ctrl+Z and start again and in this case
- D12 is still the target cell
- Type 700 as the amount
- Select B7 as the changing cell
- OK

Excel says **60.75 months is needed** with a 25% deposit and an interest rate of 5% a year for a £50,000 vehicle: that's an extra 12.75 months…13 months in reality

Finally, Ctrl+Z and start again and in this case

- D12 is still the target cell
- Type 700 as the amount
- Select B8 as the changing cell
- OK

Excel says **the rate of interest changes to -5.28%**: which is not realistic. This means that this option is not feasible: you cannot hope to pay off £50,000 over 48 months with just a 25% deposit.

Goal Seek is really useful and it can cope with advanced calculations. However, it can only deal with one variable change at a time and in a complex situation that is probably going to get tedious. For something like the above example it is ideal!

2.3 Countif And Countifs

Imagine that you are working with a database of things and you want to count the number of instances of a value or values within a range: such as greater than zero and less than 1.

You might already know that you can use COUNTIF() for this but when you then express the result of that function as a fraction of the total number of values in this database, it might give you an answer of greater than 1! Clearly that's not possible because there can't be more than 100% of values in a sub range of a range! To solve this problem, which is based on a real case, we set up a spreadsheet and added COUNTIFS() as the potential way forward.

For example, maybe you want to know the values that are greater than, say, 2 but less than, say, 4. We incorporated selecting 2 and 4 from cells (G6 and H6 respectively) rather than hard coding, since that would essentially give you a template and give you greater flexibility in your analysis: just change 2 to 'x' and 4 to 'y' to see instant updates to your query. In the end we suggest this layout:

Open the file *acc_spec_2.xlsx* and the **COUNT** tab.

The data start in cell A4 but please note the comment in cell A3 relating to RANDBETWEEN() …

Notice, to use COUNTIFS() with criteria in a cell rather than hard coded in a formula, you need to do this: ">"&G8…the greater than sign must be enclosed in double inverted commas and you must then CONCATENATE the cell reference to that.

Look at the count tab in the *acc_spec_2.xlsx* file to see what we have done and notice the formulas in the range D4:D6:

- D4 =COUNTIF(data,">1")
- D5 =COUNTIFS(data,">0",data,"<1")
- D6 =COUNTIFS(data,">"&G6,data,"<"&H6)

COUNTIF() is fine when you are testing one relationship but you need COUNTIFS() when there are several relationships or parameters that need to be tested at the same time.

2.4 Shopping List

Analysis of a Shopping List On the one hand, you might think that analysing someone's shopping list is a bit geeky. On the other hand, let's see what we can do with a shopping list!

What the file *shopping.xlsx* does is to take a list of items bought over time at a supermarket on 11 different occasions. We have just left out some of the data to keep the list from being overwhelming. The file is then structured as follows but you are free to do with it what you wish once you have opened it.

data tab

The data in this sheet are the actual data collected from the till receipts relating to the 11 trips to a supermarket or grocery deliveries made over a number of weeks.

Your task is to analyse the data you can see here in the way you think best. Consider the following, however:

Classification of data: since this file will be used around the world, we have provided our classification of every item to help you. Plus,

- Excel Table
- Graphs/Charts
- Pivot Table(s)
- Pivot Chart(s): we have not included any of these
- Descriptive Statistics

The content of these tabs really tells you what the purpose of this exercise is: it's the application of a series of Excel functions and utilities in a given setting.

excel_table Tab: Excel Table

We copied and converted the original list into an Excel Table:

- **The classifications are what they are and you might disagree with them. Additionally, h**ow would you sub classify the vegetables? the biscuits? and so on?

excel table

Now that you have prepared your Excel Table, what can we do with it?

- sort…analyse the data to quantify differences between shopping trips, such as with the items we bought, the changes in costs…
- filter
- count…there are 238 items in the list
- totals…we spent £355.88 on these items
- averages…the average cost per item is £1.50
- standard deviation of all items is £0.93
- the minimum amount spent on any item is £0.66
- the maximum amount spent on any item is £6.60

classify Tab

The Sub Classification of data…since this file will be used around the world, we have provided sub classifications of every item to help you. We have further classified dairy as, for example,

- processed cheese
- British cheese
- foreign cheese
- yoghurt
- butter
- milk
- eggs
- and so on

Please note we have marked some items in column G with ***: in these cases we have changed the classification since the initial, original, data sheet. Now that there is another level of classification, you can further analyse these shopping habits by trip, again, by sub classification and so on.

Excel Files Available

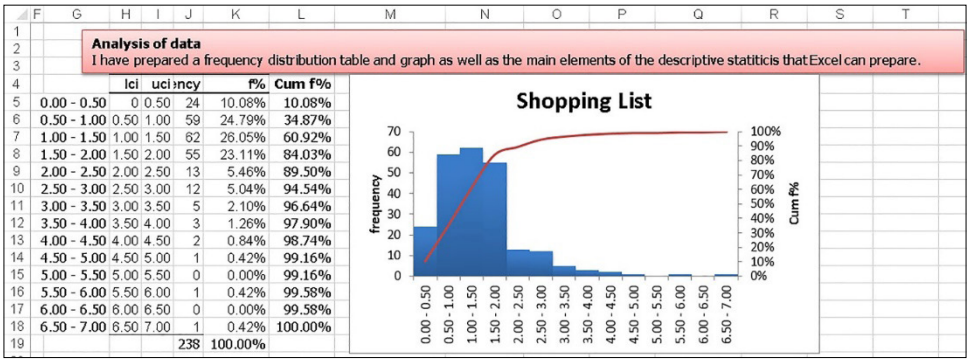
All of the Excel files mentioned in this book can be found on this book's page at: http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.

analysis Tab

On tab 4 we have given you some ideas of how to analyse such data:

- class intervals: amount spent per item…
- frequency distribution
- cumulative frequency distribution
- descriptive statistics
- histogram

Just look at Figure 6: we have analysed the data and from it we have created a Pareto Graph and we can see the values of items bought in different cost bands: £0.00–0.50, £0.50–1.00 and so on.



	lci	uci	ncy	f%	Cum f%
0.00 - 0.50	0	0.50	24	10.08%	10.08%
0.50 - 1.00	0.50	1.00	59	24.79%	34.87%
1.00 - 1.50	1.00	1.50	62	26.05%	60.92%
1.50 - 2.00	1.50	2.00	55	23.11%	84.03%
2.00 - 2.50	2.00	2.50	13	5.46%	89.50%
2.50 - 3.00	2.50	3.00	12	5.04%	94.54%
3.00 - 3.50	3.00	3.50	5	2.10%	96.64%
3.50 - 4.00	3.50	4.00	3	1.26%	97.90%
4.00 - 4.50	4.00	4.50	2	0.84%	98.74%
4.50 - 5.00	4.50	5.00	1	0.42%	99.16%
5.00 - 5.50	5.00	5.50	0	0.00%	99.16%
5.50 - 6.00	5.50	6.00	1	0.42%	99.58%
6.00 - 6.50	6.00	6.50	0	0.00%	99.58%
6.50 - 7.00	6.50	7.00	1	0.42%	100.00%
			238	100.00%	

Figure 6 Analysis of Shopping Data

We concluded our analysis by looking at what a Pivot Table could do for this shopping list.

pivot Tab

The analysis of such data is made relatively simple by using a pivot table. The classification and sub classification steps are vital here: so there are related learning points here for you! With almost no effort, we have created a shopping report showing:

- Number of items bought under the main classification
- Total cost under those classifications
- Average cost for each classification

	A	B	C	D
1				
2				
3				
4		Values		
5	Classification	No Transactions	Total Cost	Average Cost
6	biscuits	30	33.90	1.13
7	bread	1	1.10	1.10
8	breakfast	6	11.30	1.88
9	cleaning	1	5.00	5.00
10	coffee	6	17.21	2.87
11	cupboard	16	18.60	1.16
12	dairy	45	80.57	1.79
13	dried peas	2	2.18	1.09
14	drinks	3	8.32	2.77
15	fruit	26	45.58	1.75
16	meat	1	0.45	0.45
17	non food	9	21.58	2.40
18	peanuts	1	2.34	2.34
19	ready made	8	15.69	1.96
20	store	1	6.00	6.00
21	sweet	5	2.93	0.59
22	tinned	8	5.76	0.72
23	treats	5	7.85	1.57
24	vegetables	64	69.52	1.09
25	**Grand Total**	**238**	**355.88**	**1.50**

Figure 7 Pivot Table Analysis

Overall, a simple shopping list becomes a significant piece of work for anyone starting out in data analysis and this section and the file you can open and work on will help you with that. Take a close look at what we did and how we did it. Would you have done things differently? Probably…so have a go!

2.5 Monthly Financial Ratios

Just over ten years ago we got a message from a friend in Malta: an email/web site friend who was doing an MBA and we helped him with his accounting work. The message related to monthly as opposed to annual financial ratio analysis. Read the message and then take a look at the suggestions, which are still valid ten years later!

Dear Prof. Williamson,
I hope you remember me!!
I was looking at your extremely interesting and informative contribution (on RATIO ANALYSIS) present in the Bized website, however I cannot find one particular answer. Basically, I am looking for a way to set a number of dynamic indicators for my firm which include the Debtors, Creditors and Stock turnover Ratios, however in all the material I consulted, I only found out comparatives from year to year. No comparisons are made from month to month (WITHIN THE SAME YEAR).
When I tried these, I simply ended up with funny results, in view of the fact that the turnover figures DO NOT reflect a full 12 month period.
Am I right, therefore, in assuming that if for instance I am calculating the ratio for period 4 (in the financial year) I need to divide the result by 4?
For example:
Credit Sales (up to period 4) £825,000
Debtors' Balance as at end of period 4 = £413,500
Hence, Debtors Collection period is £413,500/£825,000 × 365days = 182days (which is clearly unrealistic! However, if I had to divide the 182 days by 4 (ie period 4), the result would change to 46 days (which is much more factual).

Also, in for instance the Dr%, do you agree that rather than using the formula Average Debtors/(Credit Sales/365) I should replace the 365 by the number of days relative to periods 1 to 4 i.e. 120 days??
Am I right in my logic please?
Thanks in advance for your feedback!
K

In the file *monthly.xlsx*, **monthly** tab you will find our suggestions for K which is followed by a snapshot of the formulas we used: See Figure 8.

	A	B	C	D	E	F	G	H	I
1	**Ratios for less than a year**								
2									
3	We have used	btors and creditors in this example but the same logic applies to using end of period figures							
4									
5		**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**Total**	**Excluding Total**
6	**Days in perio**	**31**	**28**	**31**	**30**	**31**	**30**	**181**	
7	Credit Sales	140,560	107,957	127,308	147,030	111,674	121,404	755,933	
8	Cost of Sales	68,965	56,197	72,448	58,486	57,270	63,501	376,867	
9	Stock b/d	15,498	16,224	20,063	22,039	21,517	21,791	15,498	
10	Stock c/d	20,378	16,928	19,275	17,324	20,498	22,179	22,179	
11	Debtors b/d	23,590	19,737	28,118	27,397	30,406	34,794	23,590	
12	Debtors c/d	31,169	25,873	23,982	32,604	25,040	31,877	31,877	
13	Creditors b/d	8,973	9,172	6,837	9,670	4,590	6,833	8,973	
14	Creditors c/d	9,458	7,672	9,815	7,530	9,879	9,556	9,556	
15									
16	**Ratios**								
17									
18	Stock turnover	8.06	8.26	8.42	10.10	11.37	10.39	9.05	
19	Debtors turnover	6.04	5.91	6.34	6.12	7.70	8.24	6.64	
20	Creditors turnover	4.14	4.20	3.56	4.41	3.92	3.87	4.45	
21									

Many accountants would use 30 for every month rather than actual days

Figure 8 Ratios for Less than a Year

The ratios for stock, debtors and creditors turnover are

- B18 =AVERAGE(B9:B10)/(B8/B6)
- B19 =AVERAGE(B11:B12)/(B7/B6)
- B20 =AVERAGE(B13:B14)/(B8/B6)

Which we then fill right to compete the Ratios table.

We have brought the file up to date a little by adding some Sparklines and we know some of you will find it interesting as we are asked this question two or three times a year.

2.6 Piece Work Analysis

We found someone's piece work records for a part of a particular month and asked them if we could create a spreadsheet for it…thankfully they said yes and here we are! We won't provide any details except to say that our friend is providing a consumer service in an outlet in the centre of a capital city. The basic data she recorded was:

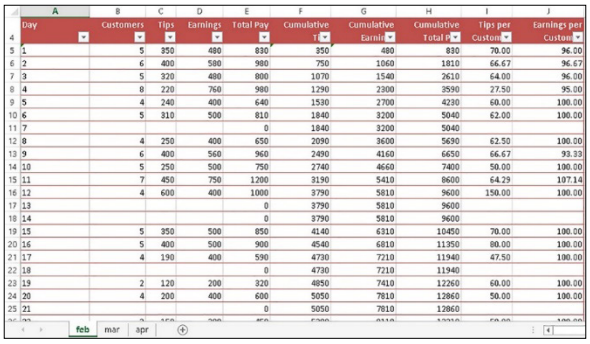
- number of customers served per day
- total tips received from all customers that day, received in cash and kept by the employee
- total earnings that day, to be paid at the month end as salary

We set to work and the following table contains the following basic and additional columns:

- Day
- Customers
- Tips
- Earnings
- Total Pay
- Cumulative Tips
- Cumulative Earnings
- Cumulative Total Pay
- Tips per Customer
- Earnings per Customer

At the bottom of the Cumulative total Pay column we have programmed an **annualised taxation warning** that shows the employee that at the current rate of earnings they will be liable for income tax during this tax year. This is not a PAYE country and you need to open the file to see that formula.

The file is *n_pay.xlsx* and we can concentrate on any of the tables: we chose **feb** in this case: Figure 9

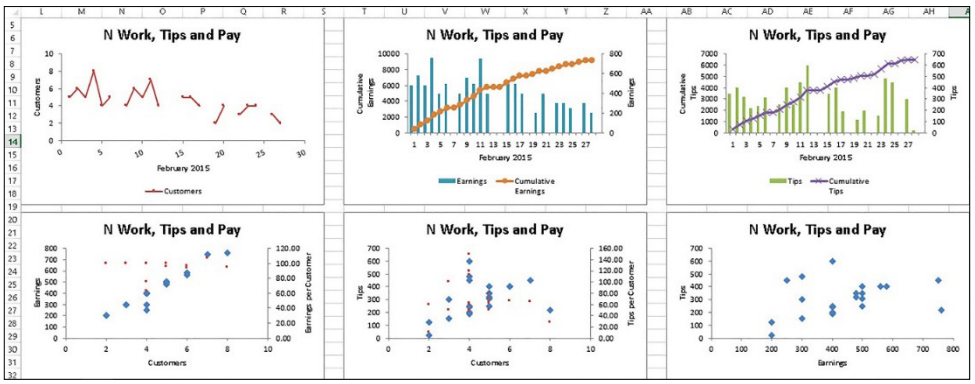


Day	Customers	Tips	Earnings	Total Pay	Cumulative	Cumulative Earnings	Cumulative Total Pay	Tips per Custom	Earnings per Custom
1	5	350	480	830	350	480	830	70.00	96.00
2	6	400	580	980	750	1060	1810	66.67	96.67
3	5	320	480	800	1070	1540	2610	64.00	96.00
4	8	220	760	980	1290	2300	3590	27.50	95.00
5	4	240	400	640	1530	2700	4230	60.00	100.00
6	5	310	500	810	1840	3200	5040	62.00	100.00
7				0	1840	3200	5040		
8	4	250	400	650	2090	3600	5690	62.50	100.00
9	6	400	560	960	2490	4160	6650	66.67	93.33
10	5	250	500	750	2740	4660	7400	50.00	100.00
11	7	450	750	1200	3190	5410	8600	64.29	107.14
12	4	600	400	1000	3790	5810	9600	150.00	100.00
13				0	3790	5810	9600		
14				0	3790	5810	9600		
15	5	350	500	850	4140	6310	10450	70.00	100.00
16	5	400	500	900	4540	6810	11350	80.00	100.00
17	4	190	400	590	4730	7210	11940	47.50	100.00
18				0	4730	7210	11940		
19	2	120	200	320	4850	7410	12260	60.00	100.00
20	4	200	400	600	5050	7810	12860	50.00	100.00
21				0	5050	7810	12860		

Figure 9 Piecework Analysis

We then prepared a series of graphs from this table: Figure 7 reading from left to right and top to bottom:

- graph one shows the days worked and days off…the days off are shows as gaps in the curve
- graph two shows daily earnings and cumulative earnings
- graph three shows daily tips received and cumulative tips received
- graph four shows earnings v tips…the potential relationship between them: being able to predict tips from earnings might be an ambition!
- graph five shows earnings per day and average earnings per customer
- graph six shows tips per day and average tips per customer



For this individual employee this analysis is neither here nor there. In the grand scheme of things it is not that important. If you take a bigger view and consider this information for every one of the 20 employees in this organisation, their tips v earnings, their taxation positions and so on, there is a whole mine full of data just waiting to be analysed!

Take a look at these, for example and ask yourself,

- why is the earnings per customer not a constant 100?
- why has this employee taken more days off than the allowed one day per week?
- can you see a pattern emerging that would help this employee to predict tips from earnings?

We are sure you can find other questions to ask.

Finally, this worksheet is now a template for this employee and her colleagues and possibly for anyone involved in some kinds of piece work.

2.7 How to Highlight the Y Axis?

This section helps to illustrate that a lot of the work of the accountant revolves around graphs as well as tables and this example comes from a message on the Excel-G discussion list:

Excellists
I have a line chart with two series of points (5,000 in each) and the value points (Y axis) are concentrated in the middle region of the axis.

I would have more focus in the middle of the Y axis, to show the differences between series.
It is possible build the axis with two different scales, one in the middle (like a magnifying lens) and the other at both ends? Sorry if I can't send the chart in annex.

Thank You AC

After a bit of thought we replied as follows:

I hope I have understood this AC. I have created a chart with just 12 data points for two variables rather than 5,000 data points, to keep it simple. I calculated the average for each variable.
I set up a new, highlight, column for each variable by entering the following formula into the appropriate cells: C9=IF(AND(B4/average>=0.8,B4/average<=1.2),B4,NA())…

That is, I am highlighting the range 80%–120% of the average for each variable and you can change these as you wish since I have created an upper limit cell and a lower limit cell for these values…these are the highlights of the Y axis you mentioned.

I then created an XY Scatter chart for the X axis and the four Y variables: data1 and highlight1; data2 and highlight2

Our further thought is that a statistical process control chart is the kind of thing that AC may be looking for.
We prepared an Excel workbook to simulate what we think AC needed, as follows, Figure 10 which comes from the file *highlight_y.xlsx* **highlight** tab:

	A	B	C	D	E	F
1	**Statistical Process Control Chart**					
2	**Highlight 1 Mid Points**					
3	**Highlight 1 Mid Points and Adding New Chart Type**					
4						
5						
6	**standard deviation**	**97.18**	**Upper lim**	1.2		
7	**average**	**261.75**	**Lower lim**	0.8		
8	Month	Product 1	Highlight1	Average	Stdev+1	Stdev-1
9	Jan	171	#N/A	261.75	358.93	164.57
10	Feb	292	292	261.75	358.93	164.57
11	Mar	285	285	261.75	358.93	164.57
12	Apr	100	#N/A	261.75	358.93	164.57
13	May	358	#N/A	261.75	358.93	164.57
14	Jun	253	253	261.75	358.93	164.57
15	Jul	317	#N/A	261.75	358.93	164.57
16	Aug	397	#N/A	261.75	358.93	164.57
17	Sep	393	#N/A	261.75	358.93	164.57
18	Oct	155	#N/A	261.75	358.93	164.57
19	Nov	169	#N/A	261.75	358.93	164.57
20	Dec	251	251	261.75	358.93	164.57

Figure 10 Highlighting Critical Data Including the use of NA()

There is a similar range for Highlight 2, relating to a second product. The range C9:C21 contains the formula

- C9=IF(AND(B9/average>=$D$7,B9/average<=$D$6),B9,NA())

that we mentioned in the reply to AC. Note the use of the NA() function…what is it and what is it doing?

We prepared three charts, as follows:

Chart 1: this shows Product 1 sales data, blue diamond markers and those sales values that fall in the middle of the sales data, red square marker. We chose the four middle range values by telling Excel to choose any value that is greater than or equal to 80% of the average and less than or equal to 120% of the average…using that formula in column C.

What is happening here is that the blue diamond markers show all of the sales data; and the red square markers show an additional series of data, selecting just the ≥80% and ≤120% data points. Where did the 80% and 120% come from? We just decided on 80% and 10% out of the blue…see below for an alternative approach to that.

Note, the order in which you prepare the data series in the chart wizard is important to ensure that the red squares are shown above the blue squares where there are red and blue squares at a particular point: see Figure 11:

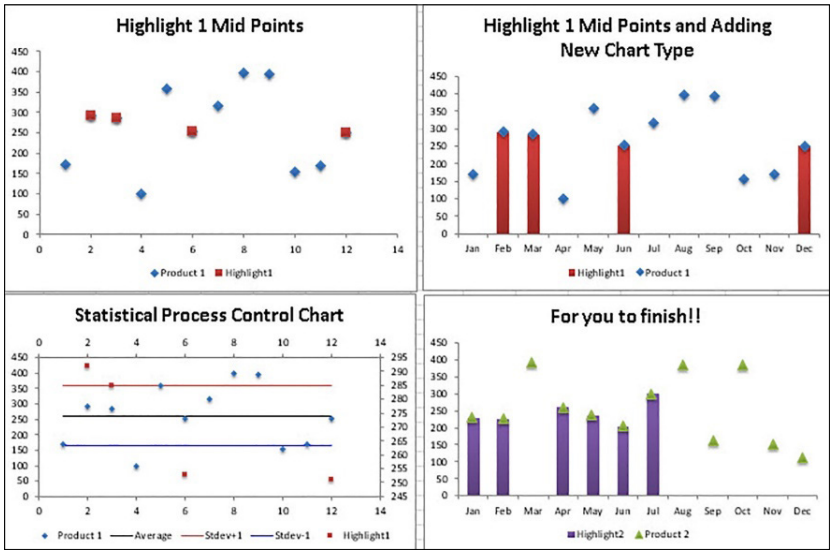


Figure 11 Highlighting: the order of data is critical

Chart 2: In this second chart, we have chosen and used exactly the same inputs as for chart 1. The difference here, though, is that we selected the **highlight 1** data points and changed the chart type for them to 2D Column Chart: again see Figure 11.

Chart 3: this is the same as charts 1 and 2, essentially, except that we have made it a more formal Statistical Process Control style chart. What that means is that we have left the two data series alone, the same as charts 1 and 2. However, we have added the average line, the average plus one standard deviation (σ) line and the average minus σ line. Read about SPC charts and what we are doing here, then, is to show the average, upper and lower warning/action lines.

Although we have left the highlight 1 data series on the chart, we could easily delete them now. What that means is that we forget the ≥80% and ≤120% data points and concentrate on the data points that fall between the upper and lower warning/action lines.

Please note, we could have made the upper and lower warning/action lines range from ≥80% and ≤120% but we used the more formal ±σ. See Figure 11 again.

Conclusions

In this chapter we have demonstrated a series of examples and cases that will prove to be of use to the accountant. We have discussed and demonstrated

- Custom Formatting
- Goal Seek
- COUNTIF and COUNTIFS
- Classifying and Analysing a List
- Monthly Ratio Analysis
- Piecework Analysis
- How to highlight the Y Axis

We appreciate that not all readers of this book will want or appreciate all of these tools and techniques. However, together many of you will have learned something new and even exciting here. Accountant Specific 2 and 3 add even more cases and techniques ... and they can be found in books 2 and 3 in this series.

3 Tables

Introduction

In the world of Excel there are really only three types of table: Excel Tables, Pivot Tables and Data Tables. Everything else is a list or a range. We suppose that's a bit controversial but this chapter will explain the differences between a list and an Excel Table; it will show you the major benefits of using Excel Tables; and it will make you ready for the rest of the book, especially when we are dealing with graphs and Pivot Tables.

At the end of this chapter, in the conclusions, we set out very briefly the size of database that an Excel Table can easily deal with: a table with around 250,000 active cells. That's not to say that an Excel Table is always the perfect solution to such a database but it worked well in the context in which we used it.

3.1 Definitions

A **list** is a range of data comprising qualitative data (names, addresses…anything you can type in). A list does not have to be sorted and can be as big and as small as you like

An **Excel Table** is a list in a special format that gives all headings a data validation type of functionality, it is expandable at the press of the Enter key and it builds in fill down functionality without being asked.

A **Data Table** can be in the form of a One Way or Two Way Data Table and they are, essentially driven by a specific formula or model that solves a particular problem on a table by table basis.

3.2 Lists

In the file that accompanies this chapter, *tables.xlsx*, there is a tab called **list**: open this file and click on the list tab if necessary. Here is a screenshot of part of that list, Figure 1:

	A	B	C	D	E	F	G
1	**Sales Data for DW plc**						
2							
3	Month	Sales Person	ID	County	Region	Sales Type	Amount (£)
4	January	Harrington	345678	Essex	South East	Software	311,569
5	January	Harrington	345678	Essex	South East	Hardware	568,944
6	January	Drury	123456	Yorkshire	North East	Hardware	789,504
7	January	Drury	123456	Yorkshire	North East	Software	255,975
8	January	Harrington	345678	Essex	South East	Software	89,005
9	January	Harrington	345678	Essex	South East	Hardware	103,900
10	January	Smythe	567890	Essex	South East	Hardware	654,300
11	January	Smythe	567890	Essex	South East	Software	145,900
12	January	Williamson	456789	Derbyshire	Midlands	Software	54,900
13	January	Williamson	456789	Derbyshire	Midlands	Hardware	99,875
14	January	Baker	678901	Derbyshire	Midlands	Hardware	856,004
15	February	Harrington	345678	Essex	South East	Hardware	80,900
16	February	Baker	678901	Derbyshire	Midlands	Software	560,900
17	February	Drury	123456	Yorkshire	North East	Hardware	998,900
18	February	Drury	123456	Yorkshire	North East	Software	315,900
19	February	Harrington	345678	Essex	South East	Hardware	209,450
20	February	Drury	123456	Yorkshire	North East	Software	314,569
21	March	Harrington	345678	Essex	South East	Software	151,001
22	March	Harrington	345678	Essex	South East	Hardware	569,900
23	March	Smythe	567890	Essex	South East	Software	450,900
24	March	Smythe	567890	Essex	South East	Hardware	890,544
25	March	Williamson	456789	Derbyshire	Midlands	Hardware	900,500
26	February	Smythe	567890	Essex	South East	Software	133,131
27	January	Williamson	456789	Derbyshire	Midlands	Hardware	115,000
28	May	Williamson	456789	Derbyshire	Midlands	Hardware	98,750

list table pivot

Figure 1 Sales Data

As you can see, this is a list of sales data for a company and it's fine. It seems to be in date order although towards the bottom of the list that's not true, every column has a heading, every cell has an entry and there are 50 rows in the table. This list shows us some data: data is at the beginning of our trail. We want to take the data, manipulate it and derive information from it so that we can be better informed, take decisions, communicate and so on.

How well does this list do?

- What is the total sales amount?
- How many sales did Harrington make?
- What is the value of sales of Hardware in Yorkshire?

Well, we can use SUM functions, we can use the SUBTOTAL and other functions to find out these things but that means a lot more work, even just for this small table. If you work with lists, feel free to carry on and answer the above questions!

3.3 Let's Use Lists

For good practise, copy the list tab to create the **list_2** tab as that will protect the original data and it is the one we will work on.

- In cell H3 create a new heading: Sales % of Total
- In cell H4 create the formula =G4/SUM($G$4:$G$53)
- Fill Down the formula to cell H53
- Create a total for this new column in cell H54

Create this table, starting in cell J3

Sales Person	Number of Sales	Average Sales
Harrington	14	322,954.14
Drury	9	462,807.44
Smythe	13	434,407.00
Williamson	10	198,457.50
Baker	4	528,976.00
	50	

Table 1 Data Becoming Information

Use the COUNTIF() function in the Number of Sales column with the SUM() function in the final row
Use the AVERAGEIFS() function in the Average Sales column

We could even take it further and create an analysis based on Sales Type: hardware and software and so on: feel free to do that.

You will find our fully worked solution on the tab **list_2** but do these by yourself first then check.

Now ask yourself, how much time did you spend on those exercises: let's use lists? Five minutes? Ten minutes? More? What if you didn't have to spend so much time? Suppose there is an easier way! Well there is! Read on.

3.3.1 The Easier Way: Excel Tables

That's all we want to say about lists for now: they contain data and they are in the kind of format you see above. However, for what we are going on to do, we need to add the following:

- Copy the list tab again and give the new tab the name **list_3**
- Make sure every column has its own, unique, heading
- Try not to have empty rows or empty columns in your table: empty cells are sometimes inevitable because data is missing but not empty rows and columns, they can cause many problems
- If there are values in your table make sure they are numbers and not numbers as text: this can happen when you copy and paste from, say, Word or an internet page
- You don't need sub totals and totals at the bottom of the table or in any column: we will work on this aspect next.

3.4 Creating Excel Tables

We call what we are about to look at **Excel Tables** because what you are about to learn came with Excel in 2007 and not before: relatively new. I know you might tell me that you can create drop down boxes in lists…and so you can but that's not what Excel Tables are all about!

In the file *tables.xlsx* you will find the tab called **list_3**: click on there now to get ready to convert a list to an Excel Table that will look like this, Figure 2:

	A	B	C	D	E	F	G
1	Sales Data for DW plc						
2							
3	Month	Sales Pers		Cou	Regi	Sales Ty	Amount
4	January	Harrington	345678	Essex	South East	Software	311,569
5	January	Harrington	345678	Essex	South East	Hardware	568,944
6	January	Drury	123456	Yorkshire	North East	Hardware	789,504
7	January	Drury	123456	Yorkshire	North East	Software	255,975
8	January	Harrington	345678	Essex	South East	Software	89,005
9	January	Harrington	345678	Essex	South East	Hardware	103,900
10	January	Smythe	567890	Essex	South East	Hardware	654,300
11	January	Smythe	567890	Essex	South East	Software	145,900
12	January	Williamson	456789	Derbyshire	Midlands	Software	54,900
13	January	Williamson	456789	Derbyshire	Midlands	Hardware	99,875
14	January	Baker	678901	Derbyshire	Midlands	Hardware	856,004
15	February	Harrington	345678	Essex	South East	Hardware	80,900
16	February	Baker	678901	Derbyshire	Midlands	Software	560,900
17	February	Drury	123456	Yorkshire	North East	Hardware	998,900
18	February	Drury	123456	Yorkshire	North East	Software	315,900
19	February	Harrington	345678	Essex	South East	Hardware	209,450
20	February	Drury	123456	Yorkshire	North East	Software	314,569
21	March	Harrington	345678	Essex	South East	Software	151,001
22	March	Harrington	345678	Essex	South East	Hardware	569,900
23	March	Smythe	567890	Essex	South East	Software	450,900
24	March	Smythe	567890	Essex	South East	Hardware	890,544
25	March	Williamson	456789	Derbyshire	Midlands	Hardware	900,500
26	February	Smythe	567890	Essex	South East	Software	133,131
27	January	Williamson	456789	Derbyshire	Midlands	Hardware	115,000
28	May	Williamson	456789	Derbyshire	Midlands	Hardware	98,750

list table pivot

Figure 2 An Excel Table

This is how to create the Excel table:

Start by putting the cursor somewhere inside the list but if you don't Excel will ask you where your table is anyway…a bit more work for you.

With the cursor in the list click on **Format as Table** in the Home tab, Styles:

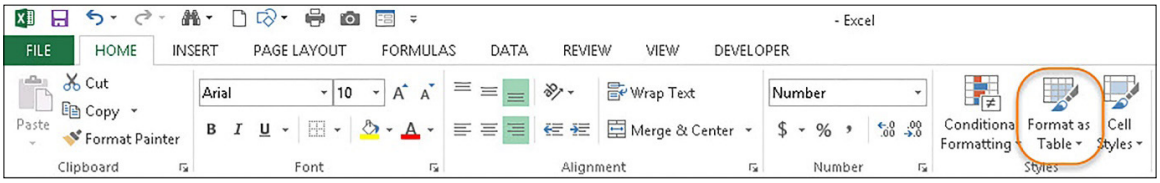


Figure 3 Format as Table

Excel then wants you to choose a style from the many it has already programmed:

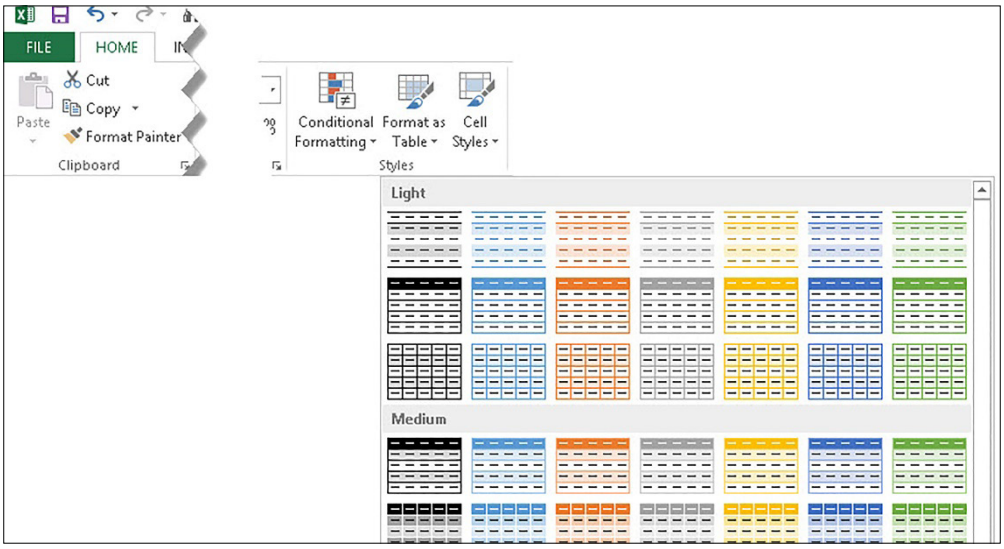


Figure 4 Table Format Styles

Choose the style you want or even create your own. We always choose Table Style Light 9, the one you see in our table above.

Once you have chosen the style, Excel now estimates the range of the list your cursor is sitting in: normally it gets this right. In this case it correctly suggests this and notice it asks if the first row has headers…checked by default:

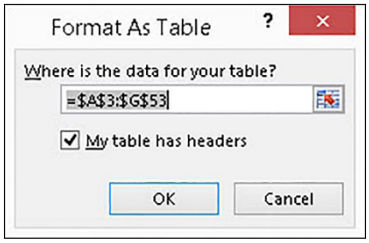


Figure 5 Is this your table range?

Please note if you have rows of information contiguous to your header rows or your final column, for example, Excel will find them and suggest that they are part of your new Excel Table…watch out for this and make sure your list has at least one row clear above it, below it, to the left and right of it.

3.4.1 Alternative Ways to Create an Excel Table

As with many things to do with Excel, there's more than one way to create an Excel Table: here are three more:

With your cursor in the list area you want to convert

Press CTRL+T …
Or
Press Ctrl+L …
Or
Go to the Insert Tab and Press Table …

Whilst these three alternative ways of creating the table are fine, they miss out the formatting stage that our first approach includes.

Now you have created the Excel Table you see at the start of this section, Figure 2, above.

So what? I can hear you asking! This is so what: let's answer all of those questions we asked a while ago:

- What is the total sales amount?
- How many sales did Harrington make?
- What is the value of sales of Hardware in Yorkshire?
- Let's Use Lists

Question one: the total sales amount: click anywhere on the table and then click on the new **Table Tools Design** tab that appears in the ribbon. On this table there is the **Table Styles Options** section in which you are able to tell Excel that you want a header row, a first column, banded rows, a last column, banded columns and a filter button.

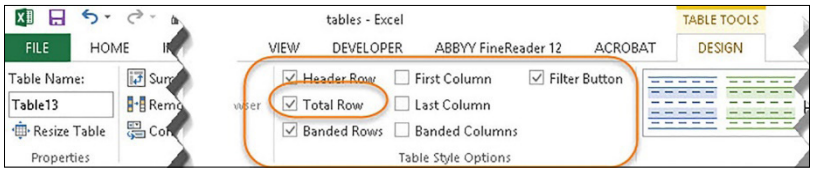


Figure 6 Table Tools Design Options

As you can see here we have a header row already and banded rows and now we have just ticked Total Row to give us an additional layer of functionality on the bottom row of the table, Figure 7:

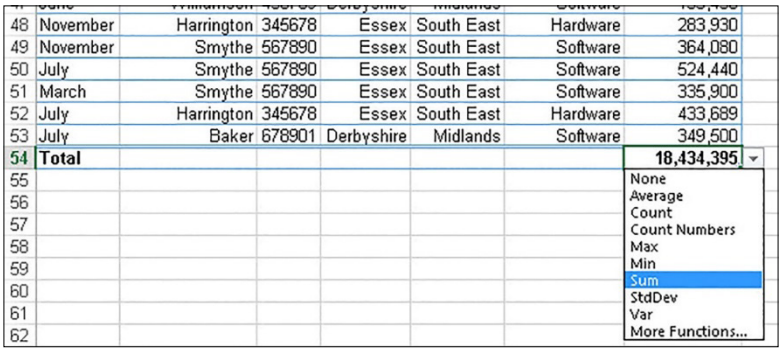


Figure 7 Functions to Include in your Table

In this case row 54 became the Total row and at the bottom of the Amount column you can click on it and then click on the down arrow to tell Excel that you want nothing, average, count…sum…and even more than that.

The answer to the first question is that total sales are 18,434,395.

That took a bit of work but we only need to do that once and the Table will keep that functionality built in.

Question two: number of sales made by Harrington:

- Click on the down arrow for Sales Person
- Deselect all and re select Harrington
- OK

Only Harrington is left in the Table now and we can see how many sales he has made…14

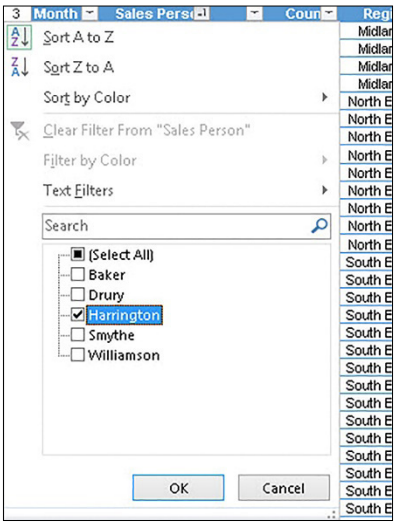


Figure 8 Harrington Sales…

Question three: the value of sales of Hardware in Yorkshire:

- Click on the Sales Person down arrow and select all to put everyone back in the table
- Select Yorkshire from the county
- Select Hardware from Sales Type

You get this table with the total sales adjusted purely to tell us the total sales value we are looking for:

	A	B	C	D	E	F	G
1	**Sales Data for DW plc**						
2							
3	**Month**	**Sales Pers**		**Coun**	**Regi**	**Sales Ty**	**Amount**
8	January	Drury	123456	Yorkshire	North East	Hardware	789,504
10	February	Drury	123456	Yorkshire	North East	Hardware	998,900
13	April	Drury	123456	Yorkshire	North East	Hardware	314,569
15	August	Drury	123456	Yorkshire	North East	Hardware	262,450
54	**Total**						**2,365,423**
55							

Figure 9 Sales of Hardware in Yorkshire

Notice: we also now know that only Drury works in Yorkshire.

Deselect everything to put your table back to the start.

3.4.2 Questions Let's Use Lists

Sales % of Total

- In cell H3 of your Excel Table create a new heading: Sales % of Total
- In cell H4 create the formula =G4/SUM($G$4:$G$53)

Did you see what happened after you entered the new column heading and then that formula? Excel automatically extended the table and then after you entered that formula just once, in cell H4, it filled down the rest of the column to the end of the table. Just format it now and select the row total function you want…SUM in this case, which should be 100.00%, of course!

Look at the exercises for you that follow now: if you have never used Excel Tables before, spend time working through these exercises.

Exercise for you to do

Think about this now: if these Excel Tables are new to you, experiment some more with this example and then look at the **table** tab for another example.

In this list, **table** tab, you will find a random sample of a much larger database that we will work on later. It contains just 200 financial results out of almost 4,500 from around the world from 1992 to 2008. The column headings are:

- Year
- Company
- Country
- Industry
- Profits ($Bil)
- Sales ($Bil)
- Assets ($Bil)
- Market Value ($Bil)

Convert the list to an Excel Table and carry out these investigations:
1 Which is the largest company by Profit by year in this table?
Which is the largest company by Sales by year in this table?
Which is the largest company by Assets by year in this table?
Which is the largest company by Market Value by year in this table?

2 Create a total row and find, in $ billions for all four variables: profits, sales, assets, market value

- the total values
- average values
- the standard deviation

3 a) Sort the table for the United Kingdom and report the averages for all four variables for all years and for all industries
b) repeat a) but only for 2006 this time
c) repeat b) but only for any industry with Food in the name as well as Retailing

4 Create one or more graphs to illustrate your answers to question 2

The answers are

1

2008 American Intl Group Profit $14.01 billion
2006 Toyota Motor Sales $173.09 billion
2008 Royal Bank of Scotland Assets $1,705.35 billion
2006 Pfizer Market Value $192.05 billion

2	Profit	Sales	Assets	Market Value
Total	255.39	3044.68	13237.03	4000.11
Average	1.28	15.22	66.19	20.00
Standard Deviation	2.53	23.86	196.68	33.99

3 **Averages**	Profit	Sales	Assets	Market Value
a) All UK	1.99	15.14	118.15	25.76
b) All UK 2006	1.23	10.90	12.59	21.97
c) UK 2006, Food and Retailing	0.32	12.35	10.74	7.62

3.4.3 Adding a new row to an Excel Table

Reset your table on the **table_2** tab and scroll to the bottom: we see this:

2008	Delta Air Lines	United States	Transportation	- 6.20	17.17	19.62	0.16
Total				**1.28**	**15.22**	**66.19**	**20.00**

Table 2 End of Table but you want more

That is the end of the table and the total row. We want to add another data record **before** the total row… do this: go to cell H207 and press the Tab key…done! The end of your table now looks like this and it's ready for you new data

2008	Delta Air Lines	United States	Transportation	- 6.20	17.17	19.62	0.16
Total				**1.28**	**15.22**	**66.19**	**20.00**

Table 3 End of Table and you got more

3.4.4 Formula Styles in Excel Tables

Remember when we said paste this formula into cell H4 in the table on the **list_3** tab…=G4/SUM($G$4:$G$53)? Well, try this:

- Delete that Sales % of Total Column by selecting the entire column, right click the header cell and click delete. The column will disappear.
- Create that column again with the same name as before Sales % of Total and press Enter
- In cell H4 and after you type =click on cell G4…type /…click on the total at the end of column G, the Amount column…
- It will fill down as before and needs to be formatted, as before
- Take a look at cell H4, though, because it says this

=[@[Amount (£)]]/Table13[[#Totals],[Amount (£)]] rather than =G4/SUM($G$4:$G$53)

It might look difficult at first and in reality you don't need to understand what it says. But if you are going to manage a significant database as a table then you should study this, which says:

=[@[Amount (£)]]
/
Table13[[#Totals],[Amount (£)]]

Take the value from this row in the Amount (£) column
Divide it by
The total of the Amount (£) column in the table that Excel knows as **Table 13**

3.4.5 Changing Table Names

We just learned that this table is called Table 13 too: we can change that, by the way, like this:

- Click anywhere in this table, Table 13
- Table Tools Design Tab
- On the extreme left hand side it says Table Name and in a box below there you see the name of the table…just over type it with something like **sales _dw**…notice: no spaces allowed

When you do that, you will see your formula in cell H4 changes to:

=[@[Amount (£)]]/**sales_dw**[[#Totals],[Amount (£)]]

This style formulation is called **structured referencing**.

3.4.6 Remove Duplicate Rows from a Table

We have to be very careful with Excel Tables, of course but we can create and manage them very easily. However, we might, accidentally, not have noticed when we created the table that there is duplicate data in it. Of course, we might not know how much duplicate data. Here's what to do to find and eliminate duplicate data in an Excel Table:

Click anywhere in the table.

- Table Tools…Design tab.
- Tools
- Remove Duplicates
- In the Remove Duplicates dialogue box, under Columns, select the columns that contain duplicates that you want to remove.

Try it with the Excel Table on tab **list_3**…there are no duplicates to be found but at least now you know!

Conclusions

Look around you now and see who else is using Excel Tables and see what they are doing with them: you will learn a lot that way too. For example, how about managing the data for 1,700 students: names, parents' names, addresses, record of achievement, decision making formula such as pass/fail a course, 4 semesters, 6 subjects per semester, each subject reporting 5 results each semester…about 250,000 data points. We did that using nothing more than an Excel Table and we could interrogate it student by student, class by class, subject by subject, semester by semester. We could have used a database but given where we were and the fact that we had to hand it over…Excel was our master.

Excel Tables are powerful and flexible and there is even more to learn. This chapter has given you a very good series of insights into them though and with confidence, together with more examples throughout this book, you will become an Excel Table master. Don't give up on them!

Excel Files Available

All of the Excel files mentioned in this book can be found on this book's page at:
http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.

4 Depreciation

Introduction

We will see in the definitions section following this introduction that depreciation is the difference between the cost of a fixed or non current asset and the amount we think we will receive for it when we dispose of it or scrap it. There are various methods of providing for a depreciation charge in the accounts of a business and in this chapter we will consider the following methods:

- Straight line method
- Reducing balance method or declining balance method
- Double declining method
- Sum of the Years' Digits Method
- Variable declining balance method

There are other methods in use but these are the major methods and the ones for which Excel has already got a built in function and in the Excel file that accompanies this chapter there are two further methods being discussed that are not, however, discussed in detail in the chapter:

- Units of Production Method
- Depletion Method

At the end of the chapter there is a brief review of a blog post that discusses the analysis of motor vehicle cost price behaviour and the estimation of depreciation from them.

4.1 Definitions

Depreciation arises because fixed assets lose value as they get older and wear out. Depreciation is the allocation of the depreciable amount of an asset over its useful life.

Depreciable assets are assets that are expected to have a limited working life that is greater than one year and that are used in the production or supply of goods or services or for administration purposes.

Useful life is the length of time that the organisation expects the asset to remain useful; or the number of units of production that can be expected to be made by the asset. The working life is also known as the ***Working Life***.

Depreciable Amount is very simply defined as follows:

Depreciable Amount = Cost−Residual Value

This means that to find the depreciable amount, all we need to know is the cost of our asset, how much we think we will received for it when we dispose of it

That's it: that's all we need to know to begin with.

Look at the next section, however, **Depreciation Methods and Calculations** to explore with Excel five different ways in which accountants might provide for depreciation.

4.2 Depreciation Methods and Calculations

As we have typically done in this book, we are working through basic examples here so that we can understand and apply the methods relatively easily. By working this way, we do not need to worry about numbers, decimal places and other complications of value. Consider firstly the basic example you can see in table 1 and then you can work on the second example, also found in table 1.

Non Current Asset Bought on 1/1/2016	**Basic Data**	**Second Example Data**
We buy a fixed or non current Asset for	£100,000	£200,000
The residual value of the asset is	£20,000	£25,000
The useful life of the asset is	5 years	4 years

Table 1 Basic and Second Example Data

For each of the methods that follow, **find**

- The annual provision(s) for depreciation
- The carrying cost or written down value at the end of each year
- The carrying cost at the end of the asset's useful life.

The solutions to this problem will be presented in at least two ways:

- Calculations
- Table(s)

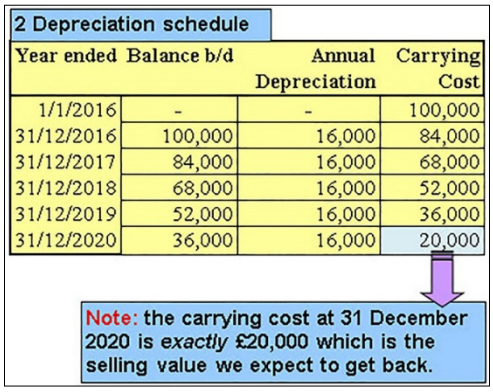
4.2.1 Straight line method

The simplest method of all for providing for depreciation is known as the straight line method and it can be defined by the following formula: using the basic data from Table 1 above:

$$\text{Annual Depreciation Provision} = \frac{\text{Cost} - \text{Residual Value}}{\text{Useful Life}} = \frac{£100000 - 20000}{5 \text{ years}} = \frac{£80000}{5}$$

$$= £16{,}000$$

That is, the straight line method provides for depreciation on the basis for a constant annual value.



2 Depreciation schedule

Year ended	Balance b/d	Annual Depreciation	Carrying Cost
1/1/2016	-	-	100,000
31/12/2016	100,000	16,000	84,000
31/12/2017	84,000	16,000	68,000
31/12/2018	68,000	16,000	52,000
31/12/2019	52,000	16,000	36,000
31/12/2020	36,000	16,000	20,000

Note: the carrying cost at 31 December 2020 is *exactly* £20,000 which is the selling value we expect to get back.

Figure 1 Depreciation Schedule Example 1

The data and calculations are in the *deprec.xlsx* file, **straight (1)** tab.

Excel has a built in function for the Straight Line Method: SLN()

And on the **straight (1)** tab you will see that we have used the SLN() function to check our calculations and please note, we have **hard coded the values**. See cell I17 for an example:

=SLN(cost,salvage,life)

The function will find for you the depreciation provision for all periods because they should be all the same:

I17=SLN(100000,20000,5) = £16,000

Exercise for you to do

Use the straight line method and the data for the second example in Table 1 above to find the annual provision for depreciation, the carrying costs year by year and the final carrying cost at the end of the useful life of the asset.

The data and calculations are in the *deprec.xlsx* file, **straight (2)** tab.

4.2.2 Reducing balance method or declining balance method

The reducing balance method uses the same data as the straight line method but it calculates the annual provision for depreciation based on a constant percentage rate rather than an absolute value amount. Using the basic example from Table 1 above, the formula for the reducing balance method finds the annual percentage rate, as follows:

$$Annual\ Depreciation\ Provision = 1 - \sqrt[n]{\frac{S}{C}}$$

$$= 1 - \sqrt[5]{\frac{20000}{100000}} = 1 - \sqrt[5]{0.2} = 1 - 0.7247 = 0.2753$$

In this case S is the residual value or selling value of the asset at the end of its useful life
C is the initial cost of the asset

This result translates into an annual reducing balance rate of 27.53%. As we have rounded the answer here to just two decimal places, we would have rounding errors if we used that figure. In *deprec.xlsx* **red_bal(1)** tab we didn't round off at all and our values are accurate:

2 Depreciation schedule

Year ended	Balance b/d	Annual Depreciation	Carrying Cost
1/1/2016	-	-	100,000
31/12/2016	100,000	27,522	72,478
31/12/2017	72,478	19,947	52,531
31/12/2018	52,531	14,457	38,073
31/12/2019	38,073	10,478	27,595
31/12/2020	27,595	7,595	20,000

Figure 2 Reducing Balance Method Example 1

The carrying cost at the end of balances exactly to the residual value in this case because we did not round off the annual provision percentage.

The data and calculations are in the *deprec.xlsx* file, **red_bal (1)** tab. On that tab you will see that we have used the DB() function to check our calculations and please note, we have hard coded the values. See cell I17 for an example:

=DB(cost,salvage,life,period)

The function will find for you the depreciation provision for the period you nominate. In this case, we have hard coded the first three terms but created a column of year numbers for the period value to give this example:

I17=DB(100000,20000,5,G17) = £27,500…for year one

Exercise for you to do

Using the reducing balance method and the data for the second example in Table 1 above to find the annual rate of provision for depreciation, the carrying costs year by year and the final carrying cost at the end of the useful life of the asset.

The data and calculations are in the *deprec.xlsx* file, **red_bal (2)** tab.

4.2.3 Double Declining Method

The double declining balance method computes depreciation at an accelerated rate. Depreciation is highest in the first period and it decreases in successive periods. DDB is based on the following formula to calculate depreciation for a period:

=MIN((cost – total depreciation from prior periods) * (factor/life), (cost – salvage – total depreciation from prior periods))

If you wish, you can change factor if you do not want to use the double declining balance method but if you omit the factor value from the function, it assumes you want double declining which uses a factor of 2. The syntax of the function is:

=DDB(cost, salvage, life, period, [factor])

Where:

- **Cost** The initial cost of the asset.
- **Salvage** The scrap or residual value at the end of the useful life
- **Life** The useful life of the asset
- **Period** The period for which you want to calculate the depreciation.
- **Factor** This is an optional variable meaning you can leave it blank and it is the rate at which the balance declines. If factor is omitted, it is assumed to be 2 (the double declining balance method).

Using the basic example from Table 1 above, we find this:

	G	H	I	J
11	Using the DDB Function:			
12		1	$40,000.00	100000
13		2	$24,000.00	20000
14		3	$14,400.00	5
15		4	$1,600.00	
16		5	$0.00	

Figure 3 DDB Schedule

In this example, the double declining rate is 2 * the straight line rate and the straight line rate is 1/useful life expressed as a percentage:

=1/5 * 100 = 20%

Therefore the double declining rate is 2 * 20% = 40%

In cell I12 you will find this formula: =DDB($J$12,$J$13,$J$14,G12) and the full depreciation schedule in Figure 1 as above. Notice what happens with this method:
Year 1 depreciation is 40% of the cost of the asset
Year 2 depreciation is 40% of the carrying cost at the end of year 1 (100,000 – 40,000)
Year 3 depreciation is 40% of the carrying cost at the end of year 2 (100,000 – 64,000)
Year 4 depreciation should be 40% of the carrying cost at the end of year 3 (100,000 – 78,400) but that would make the total depreciation for year 4 of £8,640 which would make depreciation to date of 87,040 which is impossible as total depreciation cannot be more than £100,000 – 20,000 = £80,000. Therefore year 4 depreciation is limited to £1,600 and therefore there is no provision for depreciation in year 5

Exercise for you to do

1. Using the manual method of calculating the double declining balance method of depreciation, program the schedule to ensure that the provisions for depreciation are calculated correctly: that is, stopping where it should stop to make total depreciation equal to cost – residual amount.
2. Using the double declining balance method and the data for the second example in Table 1 above find the annual provision for depreciation, the carrying costs year by year and the final carrying cost at the end of the useful life of the asset. Ensure that your depreciation provisions do not exceed cost – residual value.

The data and calculations are in the *deprec.xlsx* file, **dbl_dec (2)** tab.

4.2.4 Sum of the Years' Digits Method

For the sum of the years' digits method what we do is to find the useful life of the asset and then proceed as follows, using example one from Table 1 above:

- Useful life is five years
- Therefore sum of the years' digits is 5 + 4 + 3 + 2 + 1 = 15

This is an example of an arithmetic progression and there is a formula for that:

$$SYD = n\left[\frac{n+1}{2}\right] = 5\left[\frac{5+1}{2}\right] = 5\left[\frac{6}{2}\right] = 5 * 3 = 15$$

We then use this SYD result in the way that you can see in Figure 4, below

Year ended	Fraction	Balance b/d	Annual Depreciation	Carrying Cost
1/1/2016		-	-	100,000
31/12/2016	5/15	100,000	26,667	73,333
31/12/2017	4/15	73,333	21,333	52,000
31/12/2018	3/15	52,000	16,000	36,000
31/12/2019	2/15	36,000	10,667	25,333
31/12/2020	1/15	25,333	5,333	20,000

Figure 4 SYD Depreciation Schedule

There is a column in Figure 2 with the title Fraction that is based on SYD, which works this way, to find the provisions for depreciation:

Year 1 = 5/15 *(£100,000 – 20,000) = 5/15 * £80,000 = £26,667
Year 2 = 4/15 *(£100,000 – 20,000) = 4/15 * £80,000 = £21,333
Year 3 = 3/15 *(£100,000 – 20,000) = 3/15 * £80,000 = £16,000
And so on

4.2.5 Using the SYD() Function

The syntax of the SYD() function is

=SYD(cost,salvage,life,period)

In cell I17 in the *deprec.xlsx* file **syd (1)** tab you will find =SYD(K$17,K$18,K$19,G17)

In cell J11 we have programmed the depreciation calculation using the manual method which looks like this:

=($K$10-20000)*(5/15)

Figure 5 illustrates both manual and function based methods

	G	H	I	J	K
7					
8	2 Depreciation schedule				
9	Year ended	Fraction	Balance b/d	Annual Depreciation	Carrying Cost
10	1/1/2016		-	-	100,000
11	31/12/2016	5/15	100,000	26,667	73,333
12	31/12/2017	4/15	73,333	21,333	52,000
13	31/12/2018	3/15	52,000	16,000	36,000
14	31/12/2019	2/15	36,000	10,667	25,333
15	31/12/2020	1/15	25,333	5,333	20,000
16	Using the SYD Function:				
17	1		26,667		100,000
18	2		21,333		20,000
19	3		16,000		5
20	4		10,667		
21	5		5,333		

Figure 5 SYD Manual and Function Based Methods

Exercise for you to do

Using example two from Table 1, above, find the annual provision for depreciation using the SYD method: feel free to use the manual and/or the function based method.

The data and calculations are in the *deprec.xlsx* file, **syd (2)** tab.

4.2.6 Variable Declining Balance Method

The **VDB function** finds the depreciation of an asset for a given time period based using a variable declining balance depreciation method. This makes this method a little odd in that it might present provisions for depreciation based on two different calculation bases: the straight line method and the declining or reducing balance method. We have prepared a tab in the *deprec.xlsx* file, **vdb** that you might use as a template and that has been prepared to use over a five year period.

Consider the syntax of the VDB() function and then review the worked example on the **vdb** tab.

The syntax for the VDB function is:

=VDB(cost.salvage,life,start_period,end_period,[factor],no_switch])

Where:

- **Cost** is the original cost of the asset.
- **Salvage** is the residual value
- **Life** is the useful life of the asset
- **Start_period** is the starting period that you wish to calculate the depreciation for.
- **End_period** is the ending period that you wish to calculate the depreciation for.
- **Factor** is optional and it is the rate to use for the declining balance. If this parameter is omitted, the VDB function will assume a *factor* of 2: that is, by using 2 you are using the dobuble declining balance method, for example
- **No_switch** is optional and it can either be a value of TRUE or FALSE.
    - TRUE Excel will use the declining balance method of depreciation.
    - FALSE Excel will use the straight line depreciation method when the straight line depreciation is greater than the declining balance depreciation amount.

If the *no_switch* parameter is omitted, the VDB function will assume a *no_switch* value of FALSE.

4.2.7 VDB Examples

Go to the *deprec.xlsx* file and click on the **vdb** tab where you will see the worked example based on the first example from Table 1 above. Please note, the VD() function can be made to work month by month, half year by half year, year by year and so on: we have made our template monthly based.

Feel free to change some or all of the input values as you wish, to see what this function does.

Exercise for you to do

Use the **vdb** tab but change the input data to bring the example in line with example two from Table 1 above.

1. Units of Production and Depletion Methods of Depreciation

In addition to the examples demonstrated, the *deprec.xlsx* file contains two further depreciation methods that will be of interest to some of you:

- Units of Production Method
- Depletion Method

You are encouraged to work through these two additional methods that you will find in the *deprec.xlsx* file on the **units** and **depletion** tabs. Whilst there are two examples to consider, for the depletion method we have provided just one tab.

4.2.8 Analysis of Motor Vehicle Cost Data and Depreciation Methods

What follows is the introduction to an entry on our Excel Blog site in which we discuss this situation:

Introduction

Over the last few years I have used the prices of second hand cars in the United Kingdom to demonstrate how to derive a depreciation schedule from them. I have demonstrated the various calculations needed on a black/white board and in a spreadsheet.

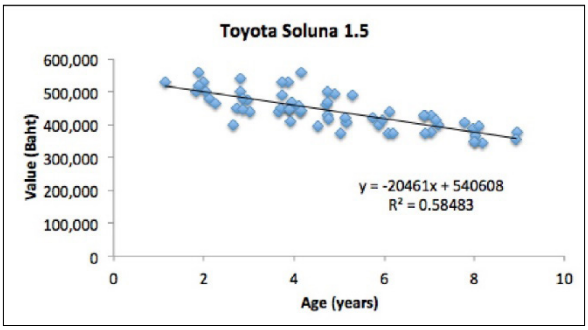
Initially, I used the prices of…Range Rover and a Rolls Royce car[*s*] *for demonstration and then used those cars for several years. In summary, what I found was that one of the cars seemed to depreciate in accordance with the straight line method whilst the other car seemed to depreciate more along the lines of the reducing balance method.*

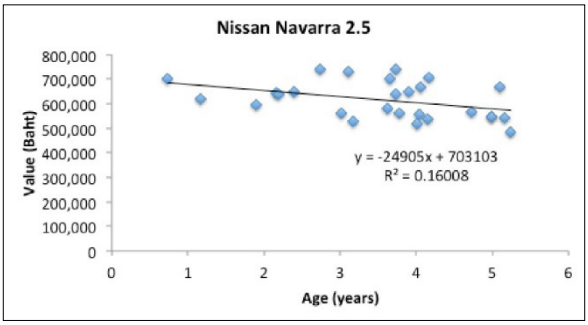
The cases I built, including later revisions, were not rigorously scientific in that I did not carry out any detailed analysis of the cars, where in the country, precise ages, modifications or customisation or anything like that. I didn't carry out any blind tests or control tests either. I was just collecting and using readily available data, processing it according to the rules of mathematics and depreciation and drawing the conclusions I drew.

See http://www.duncanwil.co.uk/costbeh.htm *for much more discussion on my previous work. There is a sister page on this blog that shows summary data for three new cars from the UK:* http://excel2007master.wordpress.com/depreciation-schedules-bmw-volvo-and-porsche/

In the current case, I did almost the same: I went to what appears to be a very well known car price web site in **Thailand** *and chose two cars, almost at random, to analyse. I then prepared graphs of what I found for each car. I derived the price function by using* **Add…Trendline** *in Excel: this gave me an estimate of the price of a new car and the annual provision for depreciation for that car.*
See: http://excelmaster.co/analysis-of-second-hand-car-prices-in-bangkok/

This Blog entry not only takes the basic price data and prepares graphs, it discusses the residuals and their analysis in detail and it draws conclusions on how appropriate the various methods of depreciation might be in the case of the two cars analysed. The Excel file we prepared is also included as part of the materials available for this book and is *thai_dep.xlsx*.





Conclusions

We have worked through a series of straightforward examples using Excel's built in depreciation functions: we have provided two examples for each function and as always we have kept the examples simple so that you can concentrate on the methods rather than worry about huge numbers, decimal places and so on.

In addition to the examples demonstrated, the *deprec.xlsx* file contains two further depreciation methods that will be of interest to some of you:

- Units of Production Method
- Depletion Method

You are encouraged to work through these two additional methods.

At the end of the chapter there is a brief review of a blog post that discusses the analysis of motor vehicle cost price behaviour and the estimation of depreciation from them.

Excel Files Available

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5 Ratio Analysis 1

Introduction

Financial ratio analysis is concerned with the arithmetical investigation of the financial results of an organisation. The purpose of this chapter is to set out the ratios that most accountants consider to be the fundamental ratios: the ratios that everyone first thinks of when they are asked to review the income statement, balance sheet and statement of cash flows of a business or entity. This chapter is chapter one in a two chapter series: Ratio Analysis 2 develops the theme of understanding ratios and financial statements by looking at their statistical analysis.

In this chapter we will consider ratios under these headings:

- Profitability
- Rates of return
- Liquidity
- Asset Usage
- Gearing or Leverage
- Cash Flow
- Investor

We will set out the ratios and define them. Following that definition stage we will discuss the setting up of a ratio analysis template and work through the use and maintenance of such a template.

This chapter will revolve around the financial results of four well known companies:

- amazon.com
- Apple
- Google
- Microsoft

We have chosen those companies for very basic reasons:

- Their data are very easy to find
- They are large companies
- The companies and their products and services are well known to most people
- It is always good to know something about the companies that have such a big impact on our business and personal lives.

Finally, the data: for the templates and their analysis we will be using data taken from the **Financial Times** markets database for each company. We will be using other sources of data and will identify them at the appropriate time.

5.1 Template Approach

One of the key aspects of this chapter is that we will be discussing the setting up and use of a **template**. A template can be used over and over again with little or no need to change anything but it should be designed in such a way as to be capable of being changed and updated as necessary.

5.2 The Financial Statements and their Source

As we mentioned in the introduction, we will be analysing the following financial statements:

- Income statement or statement of comprehensive income
- Balance sheet or statement of financial position
- Statement of cash flows

The Excel files we are using set out these statements in full exactly as they are downloaded from the Financial Times.

5.3 The Ratios: formulas/definitions

This is the schedule of ratios we will be working on in this chapter and we have to say that there are potentially hundreds if not thousands more ratios that we could include. The template we are presenting is so flexible that you can add your own ratios as and when you like. The ratios you see here are for **amazon.com** for the years 2010 to 2014.

You will notice for the Asset Turnover ratio and the Debt to Equity that there are multiple results for them: same name, different definitions.

Ratios	**Ratio Formula**
Gross Margin	Gross Profit/Sales
Operating Margin	Operating Income/Sales
Net Margin	Net Income/Sales
Rates of Return	
Return on Investment	Net Income/Total equity
Return on Assets	Operating income/Total assets
Liquidity	
current ratio	Total current assets/Total current liabilities
liquid ratio	(Total current assets-Total Inventory)/Total current liabilities
Asset Usage Ratios	
Asset Turnover 1	Total revenue/Total equity
Asset Turnover 2	Total revenue/Total assets
Stock Turnover	Total Inventory/(Cost of revenue total/365)
Debtors Turnover	Total Receivables, Net/(Total revenue/365)
Creditors Turnover	Accounts payable/(Cost of revenue total/365)
Working Capital Days	Stock Turnover + Debtors Turnover – Creditors Turnover
Working Capital to Sales	(Total current assets-Total current liabilities)/Total revenue
Gearing or Leverage	
Interest Cover	(Net income before taxes+Cash interest paid, supplemental)/Cash interest paid, supplemental
Debt to Equity 1	(Total debt+Notes payable/short-term debt+Current portion long-term debt/capital leases)/Total equity
Debt to Equity 2	Total equity/Total liabilities & shareholders' equity
Debt to Equity 3	Total liabilities/Total liabilities & shareholders' equity
Cash Flow Ratios	
CFFO/Net Income	Total cash from operations/Net income
CF from Sales/Total Assets	(Total cash from operations-Total cash dividends paid)/Total revenue
Cash Flow Coverage	(Net income+Depreciation/depletion)/Cash interest paid, supplemental

Investor Ratios	
Basic/primary eps incl. extra items	Basic/primary eps incl. extra items
Gross dividend – common stock	Gross dividend – common stock
Cash Flow/Share	Net income after taxes+Total cash dividends paid-Depreciation/depletion
Price/CF/Share	Price/CF/Share/Net income after taxes+Total cash dividends paid-Depreciation/depletion
BV/Share	Total equity/Total common shares outstanding
Tangible BV/Share	(Total assets-Goodwill, net-Intangibles, net)/Total common shares outstanding

Table 5 Ratios and the Definitions

Note: some of the terms in these definitions are peculiar to the Financial Times database and you will see their definitions on the **definitions** tab of the Excel file that accompanies this chapter: *ratio_analysis.xlsx*

5.4 Template Part 1: layout and fundamentals

Everything we will do vis a vis ratio analysis centres around this first worksheet so it's important that we get it right.

The first point to note about the *ratio_analysis.xlsx* file is the layout of the first part of the template: we have already committed ourselves to a certain layout because of the layout of the source of our data, the Financial Times. What this means is that we copy from the Financial Times and simply paste directly into our worksheet.

Secondly, we have placed the data in this order:

- Income statement
- Balance sheet
- Statement of cash flows

One on top of the other, vertically. Again, this is a basic decision and it is probably the simplest form of layout. All columns are the same size for each statement: column A is wide to allow for lengthy row names and columns B to F that contain the data are relatively short. For example,

	A	B	C	D	E	F
1	**amazon.com**					
2	http://markets.ft.com/research/Markets/Tearsheets/Financials?s=AMZN:NSQ&subview=IncomeStatement					
3	In millions of USD (except for per share items)					
4						
5	**Income Statements**					
6	Fiscal data as of Dec 31 2014	**2014**	**2013**	**2012**	**2011**	**2010**
7	REVENUE AND GROSS PROFIT					
8	Total revenue	88,988	74,452	61,093	48,077	34,204
9	OPERATING EXPENSES					
10	Cost of revenue total	62,752	54,181	45,971	37,288	26,561
11	Selling, general and admin. expenses, total	16,650	12,847	9,723	6,864	4,397
12	Depreciation/amortization	0	0	0	0	0
13	Unusual expense(income)	0	0	0	0	0
14	Other operating expenses, total	133	114	159	154	106
15	Total operating expense	88,810	73,707	60,417	47,215	32,798
16	Operating income	178	745	676	862	1,406

Figure 1 amazon.com income statement extract

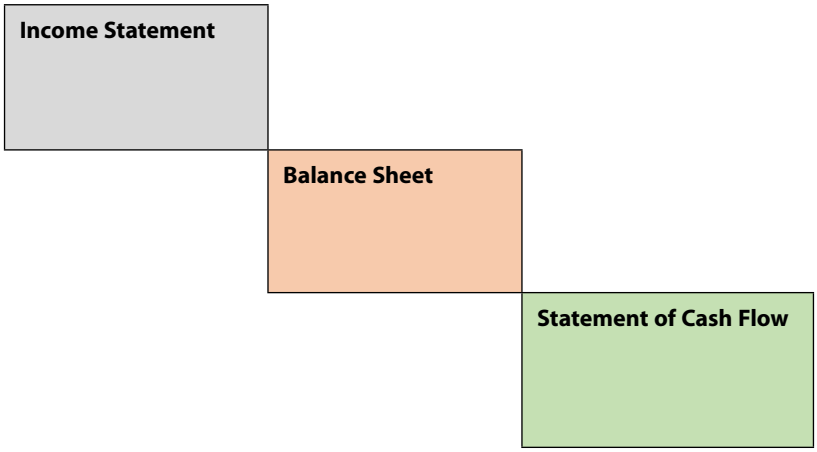
	A	B	C	D	E	F
54	**Balance Sheets**					
55	Fiscal data as of Dec 31 2014	2014	2013	2012	2011	2010
56	ASSETS					
57	Cash And Short Term Investments	17,416	12,447	11,448	9,576	8,762
58	Total Receivables, Net	5,612	4,767	3,817	2,571	1,587
59	Total Inventory	8,299	7,411	6,031	4,992	3,202
60	Prepaid expenses	0	0	0	0	0
61	Other current assets, total	0	0	0	351	196
62	**Total current assets**	**31,327**	**24,625**	**21,296**	**17,490**	**13,747**

Figure 2 amazon.com balance sheet extract

	A	B	C	D	E	F
95	**Statements of Cash Flow**					
96	**Fiscal data as of Dec 31 2014**	**2014**	**2013**	**2012**	**2011**	**2010**
97	**OPERATIONS**					
98	Net income	-241	274	-39	631	1,152
99	Depreciation/depletion	4,746	3,253	2,159	1,083	568
100	Non-Cash items	1,679	1,337	802	589	190
101	Cash taxes paid, supplemental	177	169	112	33	75
102	Cash interest paid, supplemental	91	97	31	14	11
103	Changes in working capital	974	767	1,523	1,464	1,581
104	Total cash from operations	6,842	5,475	4,180	3,903	3,495

Figure 3 amazon.com statement of cash flow extract

An alternative style of layout would be the cascade style which would look like this



When you open this file, feel free to change the layout if you prefer one style to another.

Because of the importance of these data, we strongly recommend that you create a copy of this worksheet and do all of your working on the copy, leaving the original data untouched. You might save your original data in a file by itself or, as we tend to do, in a worksheet entitled something like **data_original**. We never touch the data_original tab again unless we need to undo some kind of mistake.

5.5 Template Part 2: the ratios

We have a choice here: where do the ratios go? In the same worksheet as the copy of the data or on a sheet by itself? You might even create a separate file for the ratios but that is not something we do.

One big question here is, what do you want to do with the ratios?

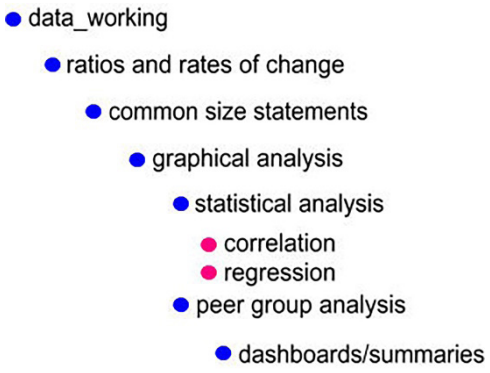
- Calculate, report, share?
- Calculate, report, share, keep for future reference?
- Calculate, report, share, create more detailed reports?
- Calculate, report, share, create more detailed reports, carry out statistical analysis?

Answer those questions and then decide what you need to do.

A second major question is to decide on or count the number of ratios you will be calculating. We have already listed and defined 27 ratios and by itself that is not that many until you appreciate that we will be creating:

- Basic ratio analysis
- Rates of change analysis
  - Raw values
  - The ratios
- Peer group analysis
- Common size statements
- Statistical Analysis
  - Correlation matrices
  - Regression analysis
- Graphs
- Dashboards/Summaries

Let's agree the following and again, these are recommendations that you are free to work with and change at any time. A logical and workable template work book could be set out this way:



The worksheet tabs in the *ratio_analysis.xlsx* file reflect these names.

5.6 data_working

This is the raw original data but on this tab you might add some formatting, add some titles…but remember this is a template tab so if you want to move any data then it means you have probably not fully understood the concept of a template.

A template is meant to be a one stop shop where, in this case, we go to www.ft.com, find our data, copy and paste it in the right place in this worksheet and all ratios, all rates of change, all graphs…everything is fully and automatically updated instantly. If you want to move things around, you are asking for trouble.

5.7 ratios_change

This worksheet gets all of its data from the **data_working** tab. All the formulas we are recommending are already there, classified according to profitability, rates of return and so on.

This is a template but you are free to change anything you wish. However, all it does is to calculate ratios under these headings:

- Ratios: calculated according to the formulas given above
- Rates of change ratios: eg, gross margin 2014/gross margin 2013 – 1 shown as a %
- Rates of change values: eg revenues 2014/revenues 2014 – 1 shown as a %

For the rates of change values, we have not shown every item in the income statement and so on but you can change the template if you want to do that.

You can amend the formulas we use if you wish, you can add more ratios and formulas if you wish. Just make the changes properly!

We have added no communication elements to this worksheet: no graphs, no conditional formatting, no Sparklines.

5.8 common_size

To create the common size statement we copied the data_working tab and then added the formulas we wanted. You will see large gaps in the common size statements and it is up to you what to do with them. The gaps relate to areas where a common size value makes no sense but we kept everything together: delete them, carefully, as you wish.

These are the full common size statements, based on the following formulas and notice how we have used the IFERROR() function throughout.

5.9 Income Statement

For each year, divide each line item of the income statement by revenues and show them as a %, like this:

Common Size Statements	
Income Statements	
Fiscal data as at Dec 31 2014	**2014**
REVENUE AND GROSS PROFIT	
Total revenue	**=IFERROR(data_working!B8/data_working!B$8,"")**
OPERATING EXPENSES	
Cost of revenue total	=IFERROR(data_working!B10/data_working!B$8,"")
Selling, general and admin. expenses, total	=IFERROR(data_working!B11/data_working!B$8,"")

Notice the $ in the addresses. The formulas in the 2014 column, starting in the Total Revenue row can then be filled right and then down.

5.10 Balance Sheet

For each year divide each line item of the balance sheet by total assets and show them as %, like this:

Balance Sheets	
Fiscal data as of Dec 31 2014	**2014**
ASSETS	
Cash And Short Term Investments	=IFERROR(data_working!B57/data_working!B$69,"")
Total Receivables, Net	=IFERROR(data_working!B58/data_working!B$69,"")

Notice the $ in the addresses. The formulas in the 2014 column, starting in the Cash And Short Term Investments row can then be filled right and then down.

By the way, if you prefer to use, say, Total Equity as the denominator here, feel free to change it!

5.11 Statement of Cash Flow

For each year divide each line item of the statement of cash flow by total cash from operations and show them as %, like this:

Statements of Cash Flow	
Fiscal data as of Dec 31 2014	**2014**
OPERATIONS	
Net income	=IFERROR(data_working!B98/data_working!B$104,"")
Depreciation/depletion	=IFERROR(data_working!B99/data_working!B$104,"")

Notice the $ in the addresses. The formulas in the 2014 column, starting in the Net Income row can then be filled right and then down.

By the way, if you want to use, say, Net Change in Cash as the denominator here, feel free to change it!

5.12 Graphics

The key work here is **communication**: your work here has to shine and in a sense every graph or chart you prepare should be able to stand alone. To that end, all of the graphs you will see in this worksheet have a main title, axes labels and so on. In some cases we will leave Excel's default work alone and in others we will change them.

This worksheet contains a variety of graphs: it does not pretend to show the entire range of graphs that Excel can prepare or that clever people can program using many of the functions and skills that high end users can use!

We will make just a few recommendations here but no more and, as always, if you don't like something, you are free to change, delete or replace.

You might have noticed that cell A1 in every sheet contains the name of the organisation we are analysing: good practise and not an accident. Not only does this show us exactly which company we are talking about but we can use it for things like graph titles.

For example, here is one of our graphs, Figure x, below: modelled on a graph you will see on the www.ft.com page:
Behind that graph, in cell B5 you will find this formula:
=A1&" total revenue"

And when you click on the title of that graph you will see this in the formula bar:
=graphics!$B$5

That means, whatever is in cell B5 in the graphics worksheet will appear as the main title of that graph. To make this work, do this:

- Click on the main title
- Click in the formula bar and type =
- Click on the cell where your formula or description are located
- Press Enter…

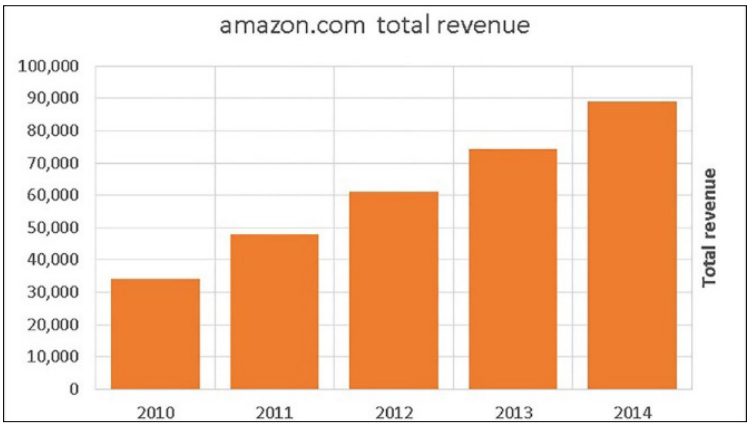


Figure 4

Test it: go to cell B5 and type something, anything and press Enter…your chart title should update to what you just typed. Ctrl+Z to undo that change!

You can do the same with axes labels: in the case of the column chart above, the vertical axis says Total Revenue…we took that from…=data_working!$A$8…of course we could have typed that phrase in, say, cell B6 of the graphics worksheet but why do that when everything you need is already in the file somewhere?

You should ask why the **Total Revenue** values are on the left hand vertical axis and the title is on the right hand vertical axis! The answer is that we reversed the horizontal axis to make it read from left to right rather than from right to left as it would have done by reading from the data in the **data_working** worksheet. To make that change, do this.

- Right click on the horizontal axis
- Choose Format Axis…
- Under Axis Options, scroll down to see Axis Position and check Categories in reverse order

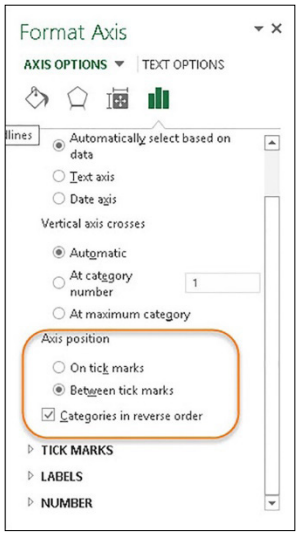


Figure 5 Axis Position

Here is a **Pie of Pie** graph to consider: you can see here how we are working on it

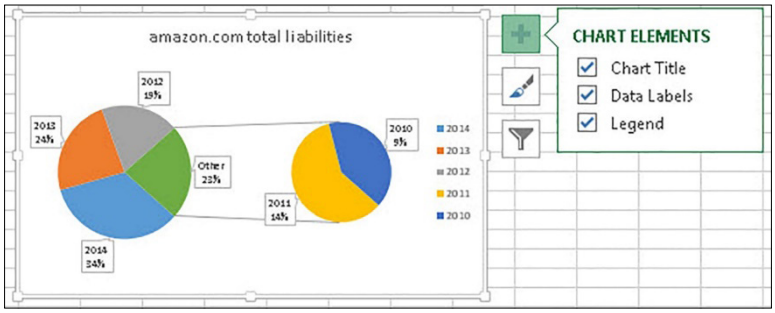


Figure 6 Pie of Pie Graph

A Pie of Pie graph is a slightly more advanced graph than just a Pie Graph: what it does is to show the main data, total liabilities for amazon.com in this case; and then split out two values that Excel considers to be important. In this case the main Pie shows:

- 2012
- 2013
- 2014
- Other: which comprises 2010 and 2011

Suppose you want a Pie of Pie but you don't want to show the data this way. Change the data around; and that will change what Excel puts where.

You can see Data Labels as Data Callouts…click on the Data Labels Chart elements to see that option. The Data Label choices are here:

Figure 7 Positioning Data Labels

You can see the years shown as the Legend.

Please note: after all of that there are some people who think that Pie graphs should not exist!

5.13 XY Scatter Graph

The graph below is a scattergraph or an XY Scattergraph: it's probably the graph most of us draw most of the time when are plotting just two or three variables.

- **Independent variable** on the X or horizontal axis: in this case Years or Time
- **Dependent variable** on the Y or vertical axis: in this case Total Revenue

There can be just one variable on the horizontal axis but two or more variables on the vertical axis. Notice how Excel has shown

- the horizontal axis in steps of half a year
- the vertical axis without a label

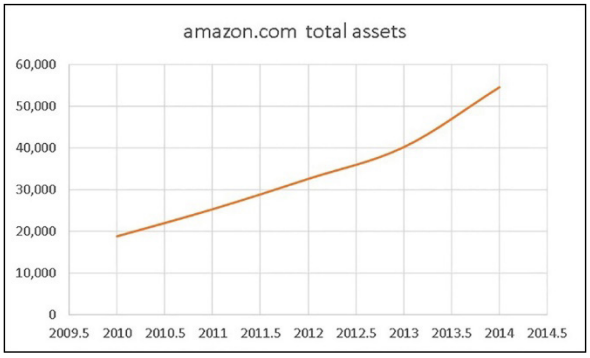


Figure 8 amazon.com total assets

After adjusting that graph, we see this:

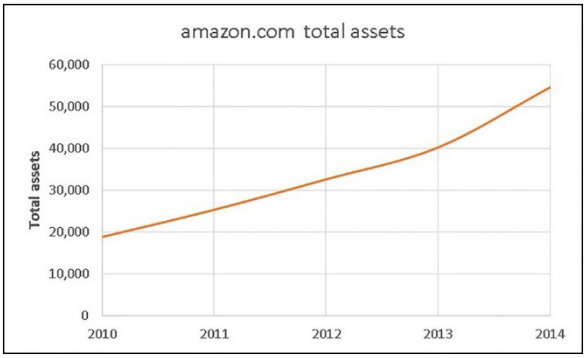


Figure 9 amazon.com total assets: adjusted

We changed the Horizontal axis by right clicking it and selecting Format Axis and then changing those values highlighted below by changing the minimum value to 2010 and the maximum value to 2014. We also changed the major axis units to 1 rather that 0.5 and the minor axis units to 0.5 rather than 0.1

Then we added just the vertical axis label: take a look at that label to see where and how we linked it to make it read Total assets.

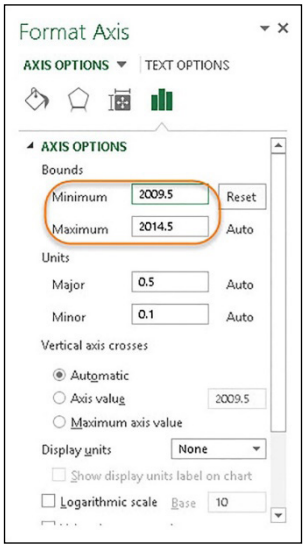


Figure 10 Axis Options

Conclusions

That concludes our initial review of ratios and their analysis. We are quite clear that there are many more ratios that we could have included and we have said that since we have developed a template, it is relatively easy for anyone to add more and more ratios as they wish.

This chapter has been concerned with setting up the work rather than analysing it so with that in mind, we will leave it there and say that in the next chapter in this series, **Ratio Analysis 2**, we will concentrate on the statistical analysis of financial data and financial ratios. You will find Ratio Analysis 2 in book two of this series.

Excel Files Available

All of the Excel files mentioned in this book can be found on this book's page at:
http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.

6 Graphs 1

Introduction

Excel Calls them charts, we call them graphs. Whatever you call them, this chapter will begin by exploring some of the basic graphs to ensure that everyone knows which graph goes with which situation.

This is the first of two chapters concerned with preparing graphs in Excel. In this chapter we will work through the basic graphs really quickly and then spend time on the equally useful but less well known variations. That is graphs such as multi Category Axis Graph, Histograms, Pareto or 80/20 Graph and graphs controlled by Combo Boxes.

Apart from introducing the techniques needed to create our graphs, we are, essentially, getting you ready for building your own dashboards too. To do this we will work on a series of graphs and techniques that we will find useful when we start to create our dashboards: those worksheets and workbooks in which we combine graphs, tables, text and other formatting and graphical ideas.

Altogether, in this chapter, we will be demonstrating twelve charts or charting techniques. We start with the most basic graphs: XY Scattergraph, Line Graph and so on and then introduce multi category Graphs together with illustrating the benefits of linking your graphs to an Excel Table. We introduce the idea of a Pareto Graph and a Combo Box controlled graph.

All of these graphs and more have their place in a dashboard and we will see more of them in the next chapter in this series, Graphs 2, which is in book two in this series.

6.1 Basic Graphs

The basic graphs that everyone knows from school are:

- XY Scattergraphs
- Line Graphs
- Column graphs
- Bar Graphs
- Pie Charts
- Area Graphs

- Open any Excel file
- Click the Insert tab
- Mouseover the icons in the Charts area to see these names and brief descriptions of them, such as this mouseover of the Scatter Graph:

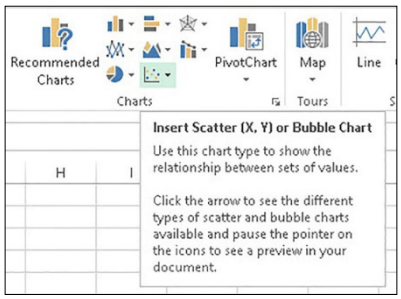


Figure 1 Mouseover an XY Scattergraph

Open the file *graphs.xlsx* and click on the **basic** tab where you will find the Budget, Actual and Variance data for an organisation. Using just the Budget data create the following graphs and keep them all on the basic tab:

- XY Scattergraphs
- Line Graphs
- Column graphs
- Bar Graphs
- Pie Charts
- Area Graphs

For every graph, include:

- Main title
- X and Y axis labels
- Legend if there is more than one data series

This is what we did and what yours should look like:

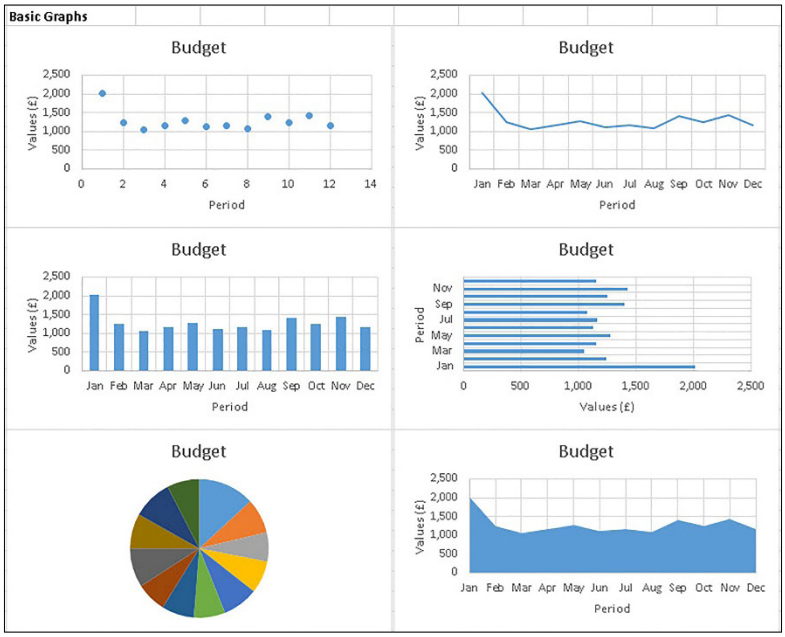


Figure 2 Six Graphs Drawn from the Same Data

Of course, you probably used different colours and maybe different titles and so on but essentially, you will have drawn something like these,

This is how we created these graphs:

- Select the range A5:B17
- Insert tab…Charts
- Click XY Scatter icon
- Choose the style you want: we chose the markers only version

- Then we clicked on the main title and linked it to cell B5
- Clicked the graph and then Axis Titles Chart element
- Clicked the X axis title and linked it to cell A5
- Clicked the Y axis title and typed Values (£) as there is no cell to link it to…we could have created a link but didn't!

Notice the horizontal axis shows 1, 2, 3…14 even though we want Jan, Feb, Mar…this cannot be changed.

- To create all of the other graphs we selected and copied the XY graph and then pasted it where we wanted a new graph to appear…we did this five times in this case
- Select one of the new graphs
- Chart Tools tab…Design …Change Chart type…select the new type you want

That's all we did so we got six different graphs in about five minutes.

6.2 Multi Category Axis Chart

When you want to fill the X Axis with more information than normal, do this: set up your table of data with, in the example that follows, three columns of information. Open *graphs.xlsx* file and click on the **multi_cat** tab where you can see this table:

3	**Regional Sales**				
4	**City**	**Region**	**Month**	**Projected**	**Actual**
5	Bangkok	Region 1	Jan	700	731
6			Feb	750	705
7			Mar	800	744
8	Chiang Mai	Region 2	Jan	450	489
9			Feb	475	494
10			Mar	500	470
11	Pattaya	Region 3	Jan	300	223
12			Feb	300	210
13			Mar	300	216

Figure 3 Data Ready to Prepare a Multi Category X Axis

- Select the whole table to prepare your **2D column graph** setting the first three columns as the X Axis data source

Then set up

- column four as the source for the projected line or bar and
- column five for the actual line or bar, depending on the type of chart you are preparing.

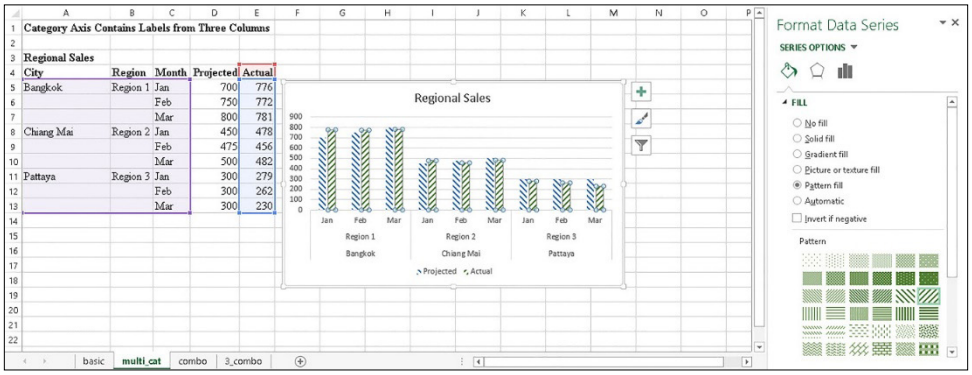


Figure 4 Data, Graph Formatting Tool

Please note, this doesn't look too good with a large chart as the horizontal axis gets very full indeed.

Exercise for you to do

There is a very similar set of data on the **car_prices** tab of the *graphs.xlsx* file and you use this technique to prepare a bar graph…just to be a little different…and/or a Line Graph. The table for this exercise is the same size and shape as the one above so you can simply copy and paste it there if you wish as you start to explore this technique on your own.

Springbok	Town	2000	7,900	7,634
		2200	8,750	8,745
		3000	10,000	9,999
Ibyx	Rugged	1800	7,450	8,192
		2000	9,475	9,382
		2500	11,300	11,575
Impala	Country	2500	10,350	10,950
		2800	12,700	12,675
		3500	13,900	14,200

Figure 5 Data for Car Price Graph

6.3 Graphs Linked to an Excel Table

We use Excel Tables quite a bit in this book and here is another must have feature of them.

One of the needs of accountants and other users is that of drawing graphs where the data expand. In these cases we want our graph to grow automatically as the data grows. As always, we can say that there are other ways of expanding graphs using Excel but here is a foolproof method that

- Expands as we add rows to an existing series
- Adds new series as we add columns to our table

Like this:

- Click on the **excel_table_graph** tab in the *graphs.xlsx* file and convert the table you see there to an Excel Table…notice the five rows and two columns gaps in the data…let's pretend to start with that we only have data up to 2010 and we do not have the Butter data so leave the data for 2010 to 2014 and the Butter data out of the Excel Table for now
- Excel will find the range =$A$1:$F$19 for the table…**that's not right**: see why and correct it
- Create a Line Graph for the years to 2010 for Poultry and Eggs

Make it look like this:

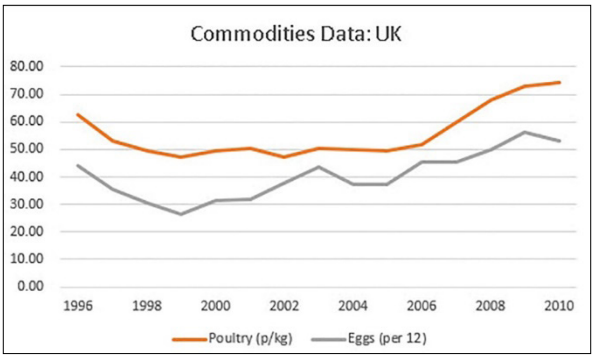


Figure 6 Poultry and Eggs Data

Now add the additional data for 2011, 2012, 2013 and 2014 to Poultry and Eggs and see what happens to your table AND to the graph. The table expands when you type or copy and paste the new data into the Excel Table and the graph updated automatically too: make that happen!

Exercise for you to do

We have left many opportunities for you to change this Excel Table and the graph: add more data to the graph and the table, add the extra, Butter, column to the table as well as moving data to a secondary axis. Again, make this work!

6.4 Histograms

Strictly speaking, what Excel and others call a histogram these days is not a histogram: they are column charts. However, let's call them histograms and learn how to prepare them since they are extremely useful graphs.

To prepare a histogram we need to do a bit of preliminary work on our data sets because we need to set up class intervals in Bins or Bin Ranges. If we know the maximum and minimum values of the data we are plotting, we can set up the Bin Range really easily, otherwise we are guessing! It also helps to think in terms of something you can use again and again: a histogram template. This is what we do.

Open the *graphs.xlsx* file and click on the **histogram** tab where you will see 20 **Gross Margin Results** and 20 **Current Ratio Results**. Let's work on the gross margins first and prepare this histogram:

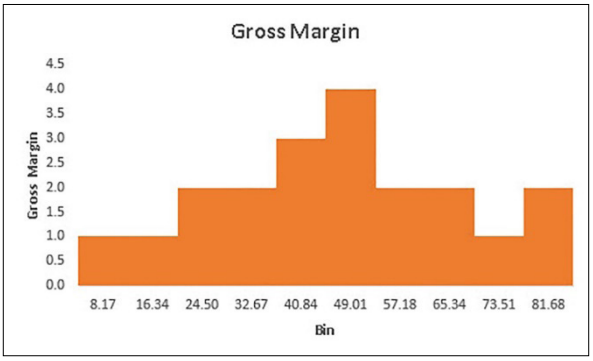


Figure 7 Histogram of Gross Margin Results

This is how to make this work: we could use the Data Analysis ToolPak but this is the manual method.

	A	B	C	D	E
1	Drawing a Histogram				
2					
3	Gross Margin	Current Ratios		Histogram	
4	42.7	2.4		Gross Margin	
5	-6.8	4.2			
6	66.0	1.0		maximum	74.85
7	35.6	2.0		minimum	-6.83
8	29.3	1.5		range	81.68
9	21.1	1.0		n	20
10	17.2	4.1			
11	14.0	4.1		Bin	Frequency
12	73.9	0.9		1.34	1
13	31.1	1.8		9.51	0
14	60.7	1.1		17.67	2
15	54.2	0.9		25.84	1
16	42.2	1.6		34.01	3
17	39.1	1.7		42.18	3
18	74.9	1.2		50.35	4
19	49.4	0.9		58.51	1
20	44.1	1.1		66.68	3
21	58.7	1.4		74.85	2
22	33.8	1.9			0

=MAX(A4:A23)
=MIN(A4:A23)
range = max - min
n = COUNT(A4:A23)

Bin Range
D12=E7+E8/10
D13=D12+E$8/10 ...
now copy that down to D21
Frequency
Select E12:E22 ...
=FREQUENCY
(A4:A23,D12:D21) ...CSE that
is, ARRAY ENTER

Figure 8 Manually Seting up a Histogam

Please note: we divide by 10 in D12, D13…D21 because we want 10 rows in our Bin: if we wanted, say, six rows then D12=E7+E8/6 and D13=D12+E$8/6…and follow the green arrow: **the final Bin value must be the same as the maximum value.**

Now create the **2D Column Graph** from the **Bin** and **Frequency** ranges, apart from cell E22 which is a cell that checks to see that we have included everything in our main frequency series: if it's 0 then we have. If the value in E22 is >0 then we need to check our Bin or Frequency formula.

Question: how did we get the columns in the Histogram to be so wide, touching each other? Like this:

Right click any column on the histogram and **Format Data Series** and follow this graphic:

Figure 9 Make Gap Width = 0%

Exercise for you to do

Repeat the previous histogram example but this time create it for the Current Ratio Results: consider this carefully and copy and paste as much as possible since you do not need to start from scratch as we are working on a template!

Your finished Histogram should look like this:

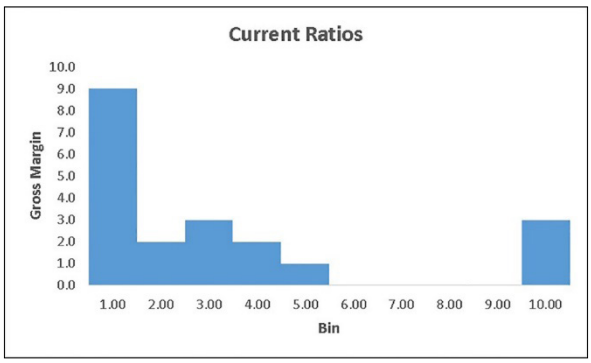


Figure 10 Histogram of Current Ratio Results

6.5 Same Data Different View

Remember we are accountants looking at a variety of graphs as we work towards setting up a dashboard and graphs are often a key element of any dashboard. Consider this situation now: you want to see if there is any difference between the volume of information and its value. I hear you saying that a **Pareto Graph** will show me that and you are right. In addition to a Pareto Graph, let's also consider two graphs: one showing volumes and the other showing values…three for the price of one!

Open the *graphs.xlsx* file and click on the **vol_val** tab.

Create 100% Stacked Column Graphs from the tables you see in the file: ensuring the data are in the right order with the right labels and so on; and make them look like this…or better, of course!

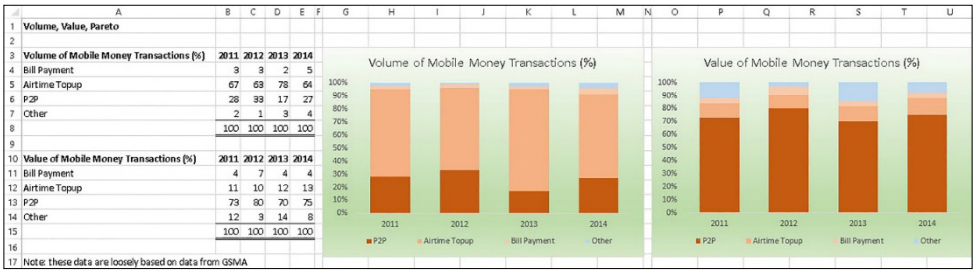


Figure 11 100% Stacked Column Graph

Exercise for you to do

We are still working in the *graphs.xlsx* file and on the **vol_val** tab.

6.6 Pareto Graph

A **Pareto Graph** shows the volumes and values on the same chart as each other and for 2014 it looks like this:

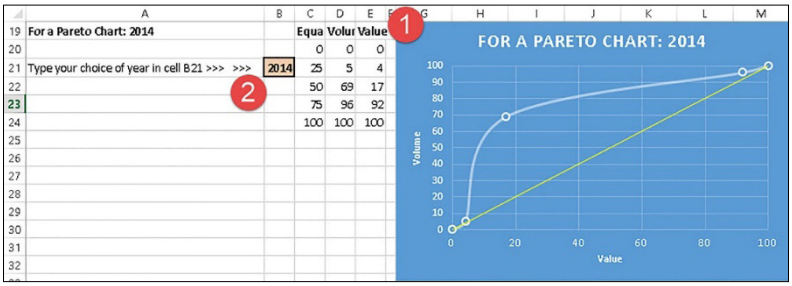


Figure 12

1) The input cells for the Pareto Graph have been generated by using a NESTED IF statement for the Volume and Value columns
2) The cell B21 is a Data Validation List input cell: go to the Data Validation chapter to remind yourself how to make that work

What this Pareto Graph is saying is, for 2014, 17% of the value has come from 69% of the volume: which is a typical Pareto or 80/20 type of analysis. That is, a large number of transactions, asset values and so on account for relatively small amounts of money. The next 75% of the value received comes from 27% of the volume.

The **Equality column** is simple 0, 25, 50, 75 and 100 that draws the straight line from 0,0 to 100,100 and shows how the data would behave if the values and volumes were equally distributed…and clearly they are not as both the column graph and this Pareto graph confirm.

As a bonus, there are **Panel graphs** on this **vol_val** tab that we will also demonstrate in the dashboard chapter.

6.7 Combo Box Controls your Graphs

We discuss **Combo Boxes** in detail in the **Data Validation** chapter: go there if you need a refresher.

Let's move straight onto graphs that are more interesting and more advanced than the six graphs we already all know how to prepare. What follows is the description of how to use a Combo Box **form control** to make one graph seem like three graphs at the same time.

In the *graphs.xlsx* file, there is already tab called **combo**
Click on the combo tab and notice it has already been set up for you

You are aiming at this:

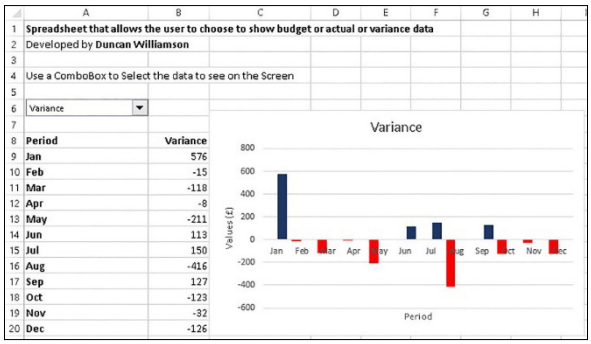


Figure 13 Combo Box Drives Graph Output

To make the new technique work, we do the following:

At first these two formulas will NOT work properly:

In cell B8 enter =VLOOKUP(D22,select,2)
In cell B9 enter =VLOOKUP(A9,budgtable,$D$22+1,0)…then drag this down to cell B20

- Developer tab…Controls…Insert…Combo Box…draw it to fill cell A6
- Right Click your Combo Box
- Input range D25:D27
- Cell link D22
- OK

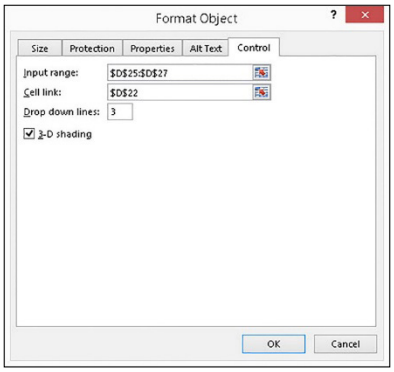


Figure 14 Combo Box Dialogue Box

Your VLOOKUP formulas will work now: click on the combo box and select:

- Budget or
- Actual or
- Variance

They should work…see what you have done! Make sure you can follow what we have just done.

Now for the magic part, if you've never thought of doing this before:

- Left Mouse click to select the range A8:B20
- Create a 2D Column Chart
- Link the Main Title to cell B8
- Link the X axis to cell A8
- Link the Y axis to cell F23
- Make any other changes to colours and styles that you want

Your graph should look like this:

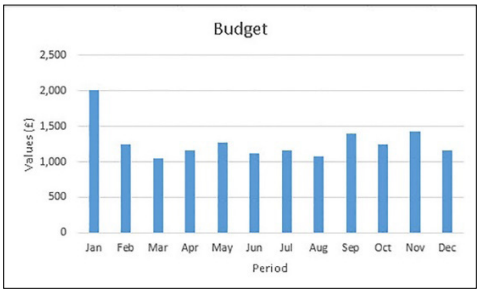


Figure 15 Budget Column Graph

- Click on the combo box and change from Budget to Actual…then from Actual to Variance …

Did the graph and titles change? Congratulations if they did: check your work if they didn't.

One more thing: you want your variance graph to look like this:

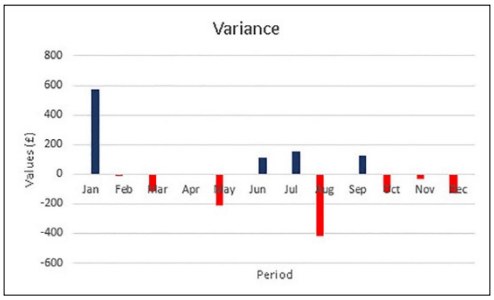


Figure 16 Double Colours One Data Series

That is, if a variance is positive, a column is blue, if the variance is negative, a column is red.

We need to create two new ranges of data: move the graph over to the right of the screen so you can see columns C and D

- In cell C8 type Negative and in cell D8 type Positive
- In cell C9 enter =IF(B10<0,B10,"")
- In cell D9 enter =IF(B9>0,B9,"")
- Right click on a blank part of the graph and choose Select Data
- Edit the data series you see there and change it to this:

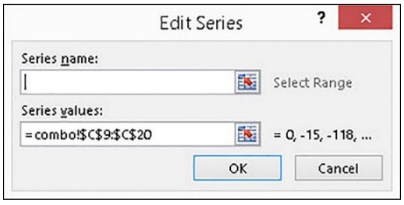


Figure 17 Edit Series Dialogue Box

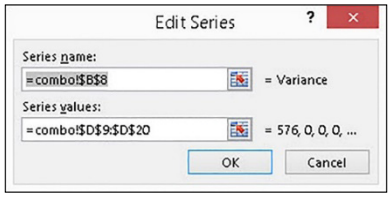


Figure 18 Edit Series Dialogue Box Completed

Create a new data series like this

- OK
- Move your chart back so it is next to column B now…this just hides the negative and positive columns that no one really needs to see!
- Check that it works!

6.8 Sparklines

Let's end with something simple AND powerful: Sparklines. These are relatively new to Excel but if you look at the Financial Times, google finance and many other financially oriented places you will see them now.

A Sparkline is a graph in a cell and it's a graph that might contain 2 data points, 32 data points and even 1,002 data points. We will discuss them in more detail in the dashboards chapter but take a look at the Insert Tab…Sparklines…on the basic worksheet of the *graphs.xlsx* file. Look at cells B18:D18 where you will see three grouped column Sparklines that look like this!

Figure 19

What are they doing? More later!

Conclusions

In this chapter we have demonstrated twelve charts or charting techniques as we work our way towards creating dashboards. We have created the most basic graphs: XY Scatteraph, Line Graph and so on and we have introduced multi category graphs together with illustrating the benefits of linking your graphs to an Excel Table. We also introduced the idea of a Pareto Graph and a Combo Box controlled graph.

All of these graphs and more have their place in a dashboard and we will see that in the next chapter in this series.

Excel Files Available

All of the Excel files mentioned in this book can be found on this book's page at:
http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.

7 Pivot Tables 1

Introduction

Pivot Tables are probably THE most important tool for many accountants and accounting staff members. They are able to take a list like the ones we saw in the chapter Tables and turn raw data into reports at the click of a button or field name. When allied to an Excel Table, Pivot Tables pack a data analysis punch almost like no other.

Pivot Tables can crack small nuts and they can crack the biggest nuts and in this chapter we will show you exactly what that means! As an example, we have created product cost systems for small and medium sized organisations that are based largely on Pivot Table functionality: we created asset registers, payroll analyses, overhead summaries…many different forms of analysis and by working through this chapter you will learn to do something similar.

There are three chapters in this book that are devoted to Pivot Tables.

7.1 Definition

A **Pivot Table** is a data summarisation tool and among other functions, a pivot table can, among others, automatically sort, count and give the average of the data stored in one table or spreadsheet, displaying the results in a second table showing the summarised data.
http://en.wikipedia.org/wiki/Pivot_table

7.2 Start with a List

The list/database we will work with in this chapter is large: we are using that one to demonstrate to power and grace of Pivot Tables. Of course, that brings some problems for us as the reports we might want to generate are relatively large too. However, when you work on your own examples, you can make them smaller and more compact and you will see how elegant your own Pivot Tables might be.

If you think you need to work hard to create a report using a pivot table, think again: you don't. You can take any list that is perfectly arranged and create a good pivot table. On the other hand, you can take the kind of randomly ordered list like we talked about in the **Tables** chapter and create a perfectly good pivot table. Let's try to prove what we have just said.

Open the file *pivot_tables.xlsx* that accompanies this chapter and notice that there are two tabs:

- **lists_3**
- **table_2**

The database we are working with contains just 50 records with the following columns or fields:

Month	Sales Person	ID	County	Region	Sales Type	Amount (£)

Table 1 Columns or Field Names

These data show the sales data for DW plc, the same data we used in the **Tables** chapter.

- You have been given the list in the form of an Excel Table. We want to analyse the data by sales person, by county and so on:
  - By Sales Person
  - By ID
  - By County
  - By Region
  - By Sales Type

- Create a total row and find sums, averages, standard deviations and so on

We want more out of this Excel Table: we are happy with it but we want to create financial reports:

- By Sales Person and County
- By Sales Person and County and Region
- By Sales Person and County and Region and Sales Type
- …

That is, there are so many ways in which we can analyse these data and whilst lists and Excel Tables can be fine, they have nothing on the Pivot Table so let's start creating them.

7.3 Create a Pivot Table

- Using the **list_3** tab
- Click anywhere in the **sales_dw** table
- Insert tab
- Tables…Pivot Table

Figure 1 Insert Tab the Pivot Table

This will open up the following dialogue box, Figure 2, where we have noted two things for you:

- The name of the table is sales_dw…this shows it's the right table
- Create a new worksheet…we ALWAYS recommend you create your pivot tables on a new worksheet, with very few exceptions. As you will see when we change things around in a pivot table they grow and shrink in size and if you put the table in the wrong place on an existing worksheet you could end up with a real mess.
- Click OK

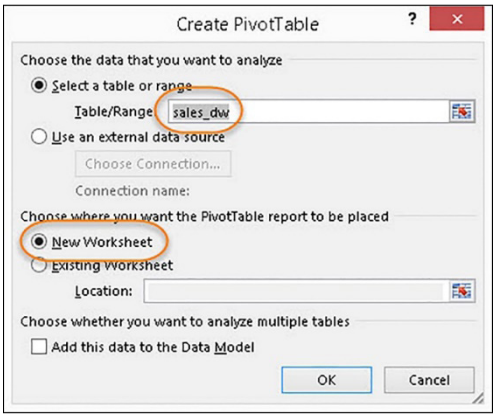
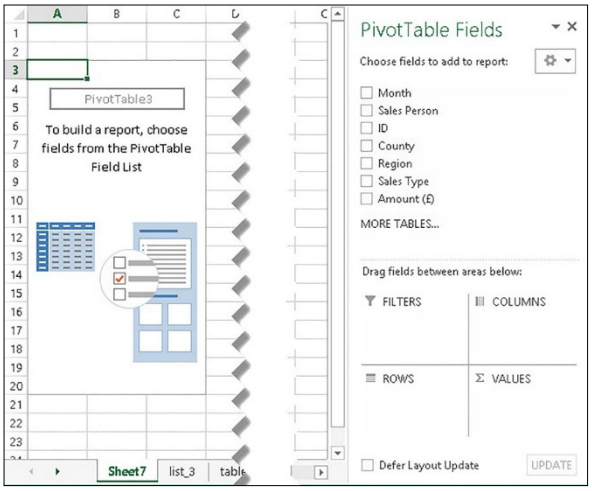


Figure 2 Pivot Table Dialogue Box

Having clicked OK you will find that your new pivot table has been prepared and you will see your new worksheet looking like this, Figure 3:



Please note, when you click away from or deselect your Pivot Table, the Pivot Table Fields panel on the right hand side of the screen will disappear.

Click on the Pivot Table again and it comes back.

Figure 3 Your Pivot Table is Served…

Your pivot table appears empty but it is there! What is happening is that Excel has moved all of your column headings to that pane on the right and created field ranges for them all. By clicking on these pivot table fields we will populate the pivot table.

In the Pivot table fields section:

- Check Country…it now says Country in the ROWS area of the Pivot Table Pane on the right hand side of your screen
- Check Amount…it goes in the VALUES area of the Pivot Table pane…

You should see this Pivot Table now:

Row Labels	Sum of Amount (£)
Derbyshire	4100479
Essex	10168649
Yorkshire	4165267
Grand Total	**18434395**

Figure 4 Your First Pivot Table?

You can see that it is very short table but everything is there and it really did happen quickly didn't it? We will worry about the design of the pivot table shortly.

- Click on ID…what did you notice? Where did it go? Because ID comprises numbers, Excel treats it as VALUES and puts it in that section of the Pivot Table. Left mouse click ID in the VALUES section and drag it to the ROWS section and drop it there:

Before:

Row Labels	Sum of Amount (£)	Sum of ID
Midlands	**4100479**	**7283494**
Hardware	**2450729**	**3876424**
Derbyshire	2450729	3876424
Software	**3223747**	**5703620**
Essex	3223747	5703620
Grand Total	**18434395**	**20616660**

Table 2 Part of the Pivot Table before IDs Added

After we dragged ID to the bottom of the list in ROWS

Row Labels	Sum of Amount (£)
Midlands	**4100479**
Hardware	**2450729**
Derbyshire	2450729
456789	1594725
678901	856004
Software	**3223747**
Essex	3223747
345678	1136265
567890	2087482
Grand Total	**18434395**

Table 3 Part of the Pivot Table after IDs Added

By the way, can you see why we said to put your Pivot Tables on a new worksheet? Every time we add or move something, the table changes in shape and size: from 2 × 4 to 3 × 17 to 2 × 27. Very volatile:

- Now check and uncheck whatever you like in the Table Fields Section as you learn to appreciate the power of Pivot Tables

7.4 Formatting a Pivot Table

Now you can create your own analysis, in real time, to do much of what you want. We will build on this next. Firstly, let's **format our Pivot Tables**: look at your pivot table to see why:

- Sum of Amount (£)…not very catchy is it?
- You can see large and unformatted values in the Sum of Amount (£) column
- Let's tidy things a little.

In the Pivot Table pane on the right hand side of your screen, click on the Sum of Amount (£)…in the VALUES area…that opens a new menu at the bottom of which you should click on **Value Field Settings**. This dialogue box opens, Figure 5:

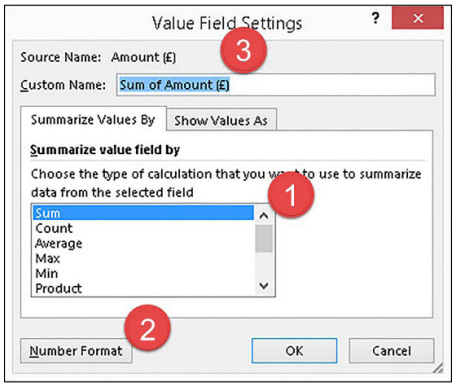


Figure 5 Format Field

1. Decide whether you want to add, SUM, everything or count them or average them…choose this first
2. Now click on Number Format to standardise the format of your numbers…as you wish, this is up to you and we are guessing that you already know how to do this!
3. Finally, change the name if you wish: we often choose Tot Amount or Ave Sales or Number… keep names as short and meaningful as possible. What you cannot do is to choose the same name as the filed name that already exists. That means you cannot have Amount (£) because it's already in use.

Do this for every VALUE field or variable you put into your Pivot Table.

7.5 Layout of a Pivot Table

One way to reduce the length of a Pivot Table is to change its layout, like this:

- Click on the Pivot Table
- PivotTable Tools Tab…Design
- Report Layout
- Choose Tabular Layout

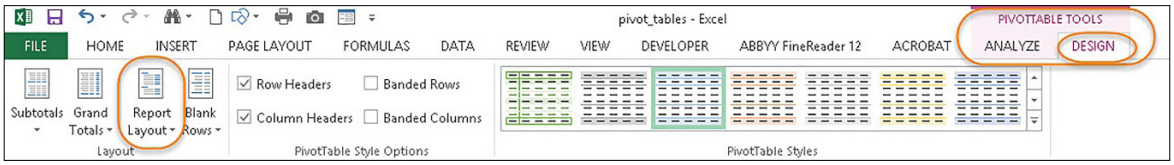


Figure 6 Choose the Tabular Layout

After those changes:

Region	Sales Type	County	ID	Tot Amount (£)
Midlands	Hardware	Derbysh	456789	1,594,725
			678901	856,004
		Derbyshire Total		2,450,729
	Hardware Total			2,450,729
	Software	Derbysh	456789	389,850
			678901	1,259,900
		Derbyshire Total		1,649,750
	Software Total			1,649,750
Midlands Total				4,100,479

Figure 7 Part of the Pivot Table with Tabular Layout Applied

7.6 Subtotals

Generally, we don't use the subtotals and you can see why here: in this case there are so many of them! In the Pivot Table Tools Design tab, click on the **Subtotals** icon you can see next but one to **Layout** and click on **Do Not Show Subtotals**: that shortens the table a little bit which now looks like this:

Region	Sales Type	County	ID	Tot Amount (£)
Midlands	Hardware	Derbysh	456789	1,594,725
			678901	856,004
	Software	Derbysh	456789	389,850
			678901	1,259,900
North East	Hardware	Yorkshir	123456	2,365,423
	Software	Yorkshir	123456	1,799,844
South East	Hardware	Essex	345678	3,385,093
			567890	3,559,809
	Software	Essex	345678	1,136,265
			567890	2,087,482
Grand Total				18,434,395

Figure 8 Subtotals Gone

Not perfect yet but better. You see those minus signs we've highlighted? Click on Hardware to see what happens…it collapses the hardware sales type for the midlands. That icon then turns into + that you can click to uncollapse those data…If you don't like them, get rid of them by doing this:

Figure 9 Get Rid of ± Buttons

- Select the Pivot Table Tools Analyze tab…Show
- Click the ± buttons and they've gone from the Pivot Table: put them back by clicking again.

7.7 FILTERS (Page Fields) and Pivot Table Layout

Everything we have just done has been useful but let's have a look now at what are called the **FILTERS**:

Left mouse click on County in the ROWS area and drag it to the FILTERS area then let it go. Can you see that the counties have gone from the Pivot Table but that at the very top of the table is a new entry: County…(All)

What has happened is that we have told Excel to deal with County in a new way, separate out the counties and allow us to show a report for:

- All counties: Derbyshire and Essex and Yorkshire
- Any county: Derbyshire or Essex or Yorkshire
- Any two counties: eg Derbyshire and Essex or Derbyshire and Yorkshire
- …

By clicking on the (All) down arrow we can make our choices:

- Check Select Multiple Items
- Then choose your county…let's choose just Yorkshire

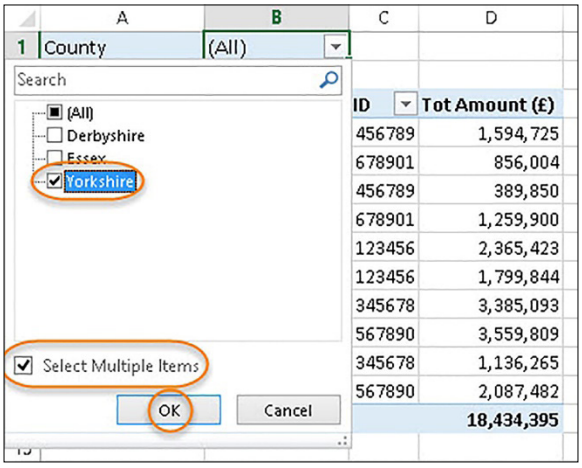


Figure 10 Select Yorkshire as the Page Field

Which then gives us:

County	Yorkshire

Region	Sales Type	ID	Tot Amount (£)
North East	**Hardware**	123456	2,365,423
	Software	123456	1,799,844
Grand Total			**4,165,267**

Table 4 Yorkshire Page Field Selected

Much more manageable isn't it!

Try this: change the County from Yorkshire then to Essex then to Derbyshire…then choose Yorkshire AND Essex…change anything you like! Move the fields in the ROWS area around …

In Table 5, below, we see *County (Multiple Items)* because we have selected more than one county. We have moved ID from being the third item in the ROWS area to being the first item

County	(Multiple Items)

ID	Region	Sales Type	Tot Amount (£)
123456	**North East**	Hardware	2,365,423
		Software	1,799,844
345678	**South East**	Hardware	3,385,093
		Software	1,136,265
567890	**South East**	Hardware	3,559,809
		Software	2,087,482
Grand Total			**14,333,916**

Table 5 Multiple Page Fields Selected

Exercise for you to do

On the **table_2** tab in the *pivot_tables.xlsx* file there is another small database that you should practise with. That database is a 200 record listing containing the following headings:

Year	Company	Country	Industry	Profits ($bil)	Sales ($bil)	Assets ($bil)	Market Value ($bil)

Table 6 Database Two Field Names

That table is already formatted as an Excel Table which makes setting up and managing any new Pivot Table much easier.

Feel free to create your own Pivot Table now: click on the table…Insert Tab on the Ribbon… Pivot Table…and then interrogate the data using the Pivot Table as you wish.

Alternatively, follow this structured work through:

- Create a copy of **table_2**…call it **table_3**
- Change the name of the table on **table_3** to **forbes_200**
- Create your new Pivot Table on a new worksheet, which we have called **table_3_pivot**
- Add the following fields to your Pivot Table (we'll call it PT from now on)
  - Year…ROWS
  - Country…ROWS
  - Sales ($bil)…VALUES…did it go to ROWS by any chance? It shouldn't have but if it has, drag it over to VALUES and if it says COUNT…left mouse click, Value Field Settings, SUM… format Number while you are there and change the title to Tot Sales ($bil)

There you are: how does that look? Hmm, 69 rows tall. Try something we haven't done yet:

- Drag Year from ROWS and drop it in COLUMNS: 36 rows only and four columns.
- If you don't want that fourth column, Grand Total, get rid of it by
- Pivot Table Tools…Design Tab…Layout Grand Totals…Off For Rows And Columns…or on for columns only…or as you wish

We are left with this now, no Grand Totals, Table 7, following:

Tot Sales ($bil)	**Column Labels**		
Row Labels	**1992**	**2006**	**2008**
Australia	3.64	30.62	30.48
Austria		5.63	18.42
Belgium	17.65	24.48	17.56
…	…	…	…
Thailand		0.66	
United Kingdom	13.56	98.06	130.67
United States	136.52	569.58	507.40
Venezuela			1.37

Table 7 Extract of the Finished PT

You can see that there are "holes", empty cells, in this table now, especially in the 1992 column because, for example, many countries shown in the list weren't in the list in 1992 but they are there in subsequent years.

7.8 Let's Improve: FILTERS

When we looked at Sales of DW plc earlier we used the FILTER area of the PT: let's do that again.

- Drag Years to FILTERS
- Your PT should have 34 rows
- All data are in there
- Click the down arrow next to Year (ALL)
- Check Select Multiple Items
- Select 1992 and all we see now are the 14 rows for 1992
- Select 2006 now and deselect 1992: all we see are the 27 rows relating to 2006
- Select 2008 now and deselect 2006: all we see are the 24 rows relating to 2006

7.9 Add More Fields

- Over to you now: add more fields to your PT and see what impact that has. Accept what you like, delete what you don't like.
- Change SUM to AVERAGE

- Change AVERAGE to MAXIMUM or STDEV
- Change the formatting of numbers

Be creative and remember:

- Layout
- +/- buttons
- Subtotals
- Grand Totals
- FILTERS…not only Years but Country maybe? Industry Maybe?
- We haven't talked about Styles but take a look: click on your PT…Design…PivotTable Styles… choose your scheme…they are very similar to Excel Tables

Move the fields around within ROWS…between ROWS and COLUMNS: sometimes it helps, sometimes it doesn't.

Spend at least half an hour on this exercise and make notes of what you do; look back at what we did before. Think big and see what you can come up with!

Conclusions

This has been a really good and gentle introduction to Pivot Tables and if you have done all of the work you will already have upgraded your skill levels enormously. However, take a look at the following chapter in this series, Pivot Tables 2 in which you will see, among other things:

- Sales report
- Profit report
- Calculated Fields
- Value As
- Grouping

As an accountant you will find Pivot Tables will have become one of your biggest Excel friends by the time you get to the end of Pivot Tables 2 or I'll eat my hat!

Excel Files Available

All of the Excel files mentioned in this book can be found on this book's page at: http://bookboon.com/en/excel-solutions-for-accountants-book-1-ebook.