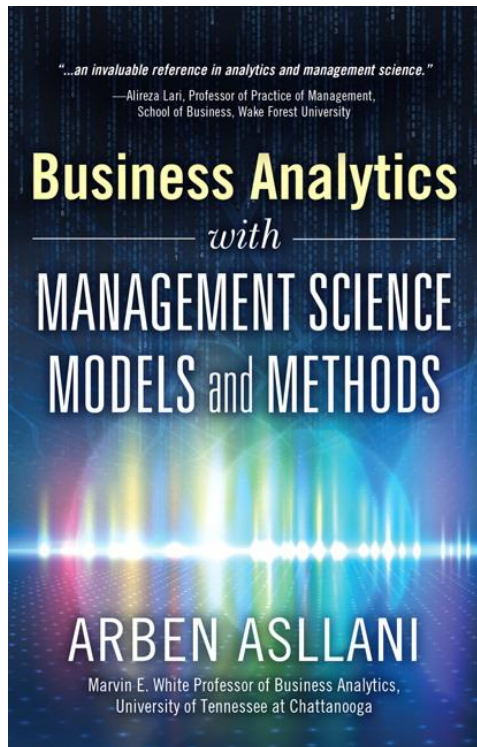


Business Analytics Prescriptive Models



Based on
**Business Analytics
With
Management Science
Models and Methods
by
Arben Asllani**

Appendix A

EXCEL TOOLS FOR THE MANAGEMENT SCIENTIST

***Business Analytics with Management Science
Models and Methods***

SHORTCUT KEYS

- Shortcut keys offer an easy way to navigate through records, fields, and select a single or range of values

CTRL + down arrow	To get to the bottom row of your data set
CTRL +up arrow	To get the top row of your data set
CTRL + right arrow	To get to the last column of your data set
CTRL + left arrow	To get to the first column of your data set
CTRL + Home	To get to the first cell (top left) in your data set
CTRL + End	To get to the last cell (bottom right) in your data set
Any of the Above + Shift	To select an entire range

Summary of Shortcut Keys for Large Data Sets

SHORTCUT KEYS *tasks*

1. Quickly identify how many transactions are in the file;
2. What is the sales value of the last transaction in the record set?
3. What is the sales value of the first transaction in the record set?
4. Select all the dates of the transaction in the transaction sales column
5. Select all the transactions and all the columns for each transaction

SUMIF

- ◆ The SUMIF function

- It can be used to total values that meet specified criteria in a given range.

- ◆ Syntax

- = SUMIF (range, criteria, [sum_range])

AVERAGEIF

- ◆ The AVERAGEIF function
 - It can be used to average the values that meet specified criteria in a given range.
- ◆ Syntax
 - = AVERAGEIF (range, criteria, [average_range])

COUNTIF

- ◆ The COUNTIF function
 - It can be used to count how many values meet specified criteria in a given range
- ◆ Syntax
 - = COUNTIF (range, criteria)

Examples of Using SumIf, AverageIf, and CountIf Functions

	A	B	C	D	E	F	G	H	I	J	K
1	Example data										
2	Transaction date	Customer Name	Salesperson	Sales							
3	11/11/2014	Nathan	Lawrence	\$908.70							
4	11/11/2014	Jonathan	Lawrence	\$385.64		Salesperson	Sum If				
5	11/11/2014	Mathew	Lawrence	\$535.79		Joseph	\$202,392.79	=SUMIF(\$C\$3:\$C\$1081,F5,\$D\$3:\$D\$1081)			
6	11/11/2014	Mathew	Lawrence	\$456.67		Lawrence	\$208,841.82				
7	11/11/2014	Mathew	Matt	\$834.81		Matt	\$231,051.99				
8	11/11/2014	Nathan	Matt	\$502.92							
9	11/11/2014	Mathew	Matt	\$302.40							
10	11/11/2014	Nathan	Matt	\$482.00		Salesperson	Average If				
11	11/11/2014	Mathew	Matt	\$423.15		Joseph	\$593.53	=AVERAGEIF(\$C\$3:\$C\$1081,F11,\$D\$3:G10)			
12	11/11/2014	Nathan	Matt	\$719.45		Lawrence	\$596.69				
13	11/11/2014	Mathew	Lawrence	\$560.43		Matt	\$595.49				
14	11/11/2014	Jonathan	Matt	\$317.97							
15	11/11/2014	Mathew	Matt	\$436.95							
16	11/11/2014	Mathew	Matt	\$339.62		Salesperson	Count If				
17	11/11/2014	Jessica	Joseph	\$849.22		Joseph	341	=COUNTIF(\$C\$3:\$C\$1081,F17)			
18	11/11/2014	Jonathan	Lawrence	\$455.54		Lawrence	350				
19	11/11/2014	Nathan	Joseph	\$609.80		Matt	388				
20	11/11/2014	Jonathan	Lawrence	\$736.94							
21	11/11/2014	Jonathan	Joseph	\$582.45							
22	11/11/2014	Nathan	Lawrence	\$548.37							

IFERROR

- ◆ If a formula cannot properly evaluate a result, Excel will generate an error value.
 - (#N/A, #VALUE!, #NAME?, #DIV/0! , or #NULL!.)
- ◆ Often, the decision maker needs to ignore these errors or replace them with another value.
- ◆ The IFERROR function
 - It tests a cell or calculation to determine whether an error has been generated. It will show TRUE for any type of error and FALSE if no error is found.
- ◆ Syntax
 - =IFERROR (Cell to be tested), where “Cell to be tested” can be a cell reference or a formula.

Illustration of IFERROR Function

	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Example data						Salesperson											
2	Customer Name	Salesperson	Sales			Customer	Lawrence	Matt	Joseph									
3	Jessica	Joseph	\$37.96			Andrew	\$ 237.87	\$ 339.95	\$ 257.70	<---=AVERAGEIFS(\$D\$3:\$D\$1081,\$B\$3:\$B\$1081, \$G3, \$C\$3:\$C\$1081,J\$2)								
4	Jonathan	Lawrence	\$115.21			Elizabeth	\$ 719.50	\$ 278.16	\$ 292.95									
5	Nathan	Lawrence	\$744.98			George	\$ 365.83	\$ 212.68	\$ 308.51									
6	Elizabeth	Lawrence	\$200.93			Jessica	#DIV/0!	#DIV/0!	\$ 322.85									
7	Mathew	Joseph	\$147.70			Joel	\$ 349.42	\$ 318.38	\$ 294.76									
8	Jonathan	Joseph	\$28.18			Jonathan	\$ 403.09	\$ 260.43	\$ 299.10									
9	Jessica	Joseph	\$82.67			Mathew	\$ 294.09	#DIV/0!	\$ 266.15									
10	Joel	Lawrence	\$713.39			Nathan	\$ 417.78	\$ 303.53	\$ 260.11									
11	Joel	Lawrence	\$281.51															
12	Jonathan	Joseph	\$117.94				Salesperson											
13	Mathew	Joseph	\$162.90			Customer	Lawrence	Matt	Joseph									
14	Nathan	Joseph	\$2.34			Andrew	\$ 237.87	\$ 339.95	\$ 257.70	<---=IFERROR(AVERAGEIFS(\$D\$3:\$D\$1081,\$B\$3:\$B\$1081, \$G14, \$C\$3:\$C\$1081,J\$2), "NA")								
15	Jessica	Joseph	\$581.42			Elizabeth	\$ 719.50	\$ 278.16	\$ 292.95									
16	Jonathan	Joseph	\$118.46			George	\$ 365.83	\$ 212.68	\$ 308.51									
17	Jonathan	Joseph	\$636.13			Jessica	NA	NA	\$ 322.85									
18	Nathan	Lawrence	\$157.15			Joel	\$ 349.42	\$ 318.38	\$ 294.76									
19	Jonathan	Lawrence	\$316.80			Jonathan	\$ 403.09	\$ 260.43	\$ 299.10									
20	Jonathan	Lawrence	\$263.02			Mathew	\$ 294.09	NA	\$ 266.15									
21	Jonathan	Lawrence	\$173.72			Nathan	\$ 417.78	\$ 303.53	\$ 260.11									
22	George	Joseph	\$27.19															
23	Jonathan	Matt	\$38.10															
24	Jonathan	Joseph	\$506.88															
25	Nathan	Matt	\$23.79															

TRANSPOSE

◆ The Transpose Function

- It copies data from a range, and places it in a new range, turning it so that the data originally in columns is now in rows, and the data originally in rows is in columns
- The transpose range must be the same size as the original
- The function needs to be entered as an array formula

◆ Syntax

- =TRANSPOSE(Range).

STEPS to transpose rows into columns and columns into rows

- ◆ Step 1: Select the range where the transposed table will be located.
- ◆ Step 2: Enter '=Transpose (A2:D10)' function in the upper left corner of the selected, transposed table.

[illegible]

- ◆ Step 3: Simultaneously, hit CTRL+SHIFT+ENTER keys and the values will be accordingly stored in the transposed table.

[illegible]

SUMPRODUCT

- ◆ The Sumproduct Function
 - It multiplies corresponding cells from two or more arrays and calculates the total of these products
- ◆ Syntax
 - =SUMPRODUCT (array1, array2, array3...).
- ◆ Calculating Total Sales with SUMPRODUCT

	A	B	C	D	E
1	Salesperson	Average Sales			
2	Joseph	\$290.94			
3	Lawrence	\$402.47			
4	Matt	\$281.51			
5					
6					
7	Salesperson	Number of Sales			
8	Joseph	678			
9	Lawrence	206			
10	Matt	195			
11					
12	Total Sales:	\$335,060.65	<--=SUMPRODUCT(B2:B4,B8:B10)		

IF

◆ The IF Function

- It can be used to returns one value if a certain condition is TRUE and another value if the same condition is FALSE

◆ Syntax

- =IF(logical_test, value_if_true, value_if_false)

◆ Three Components:

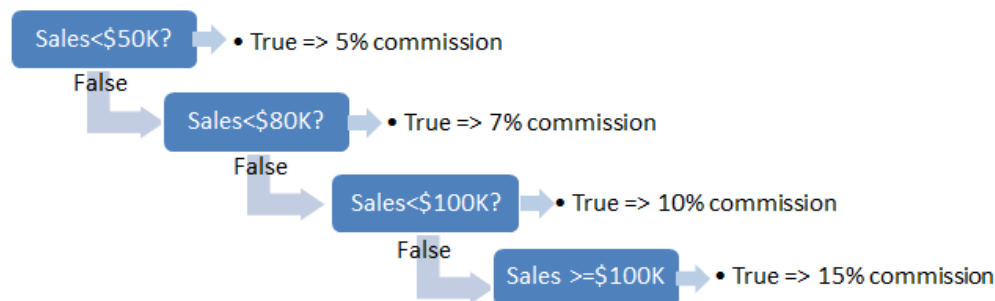
- logical test
- Value if true
- Value if false.

IF

♦ Applying IF Statements to Calculate Sales Commissions

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q													
1	Salesperson	Total Sales	Goal																											
2	Joseph	\$197,256.31	Achieved	<--=IF(B2>100000, "Achieved", "Not achieved")																										
3	Lawrence	\$82,908.97	Not achieved	<--=IF(B3>100000, "Achieved", "Not achieved")																										
4	Matt	\$54,895.38	Not achieved	<--=IF(B4>100000, "Achieved", "Not achieved")																										
5	Total:	\$335,060.65																												
6	Part a: Simple IF Statements																													
7	Salesperson	Total Sales	Commission																											
8	Joseph	\$197,256.31	\$29,588.45	<--=IF(B8<50000,B8*5%,IF(B8<80000,B8*7%,IF(B8<100000,B8*10%,B8*15%)))																										
9	Lawrence	\$82,908.97	\$8,290.90	<--=IF(B9<50000,B9*5%,IF(B9<80000,B9*7%,IF(B9<100000,B9*10%,B9*15%)))																										
10	Matt	\$54,895.38	\$3,842.68	<--=IF(B10<50000,B10*5%,IF(B10<80000,B10*7%,IF(B10<100000,B10*10%,B10*15%)))																										
11	Total:	\$335,060.65																												
12	Part b: Nested IF Statements																													
13	Salesperson	Total Sales	Number of Sales	Commission																										
14	Joseph	\$197,256.31	678	\$29,588.45	<--=IF(AND(B14<50000,C14<400),B14*5%,IF(AND(B14<100000,C14<400),B14*7%,IF(AND(B14<100000,C14>400),B14*10%,B14*15%)))																									
15	Lawrence	\$82,908.97	206	\$5,803.63	<--=IF(AND(B15<50000,C15<400),B15*5%,IF(AND(B15<100000,C15<400),B15*7%,IF(AND(B15<100000,C15>400),B15*10%,B15*15%)))																									
16	Matt	\$54,895.38	195	\$3,842.68	<--=IF(AND(B16<50000,C16<400),B16*5%,IF(AND(B16<100000,C16<400),B16*7%,IF(AND(B16<100000,C16>400),B16*10%,B16*15%)))																									
17	Total:	\$335,060.65	1079																											
18	Part c: Nested IF Statements with Multiple Conditions																													

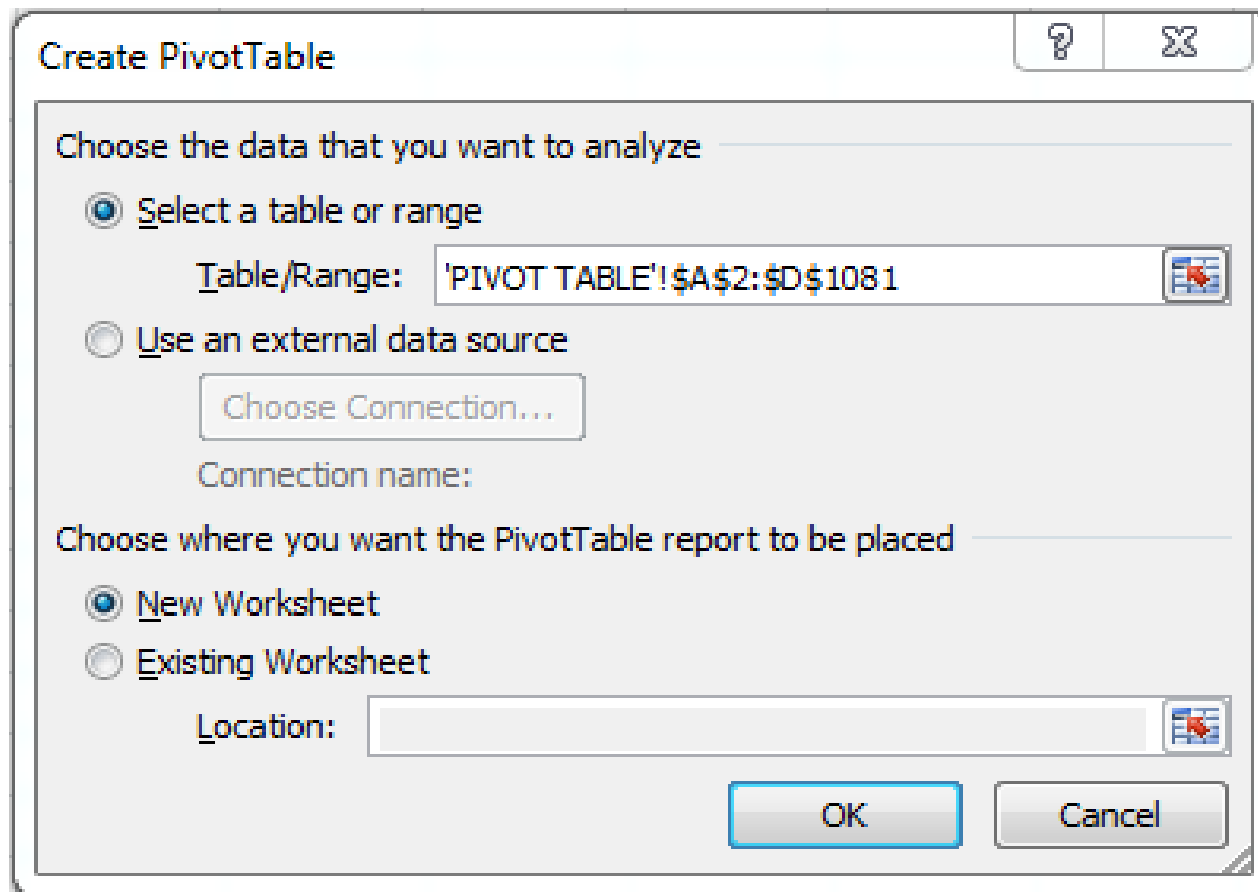
♦ Cutoff Points for the Commission Plan



PIVOT TABLE

- ◆ Pivot tables are a powerful data summary tool.
 - Pivot tables can be used to conveniently summarize large transactional data into averages, sums, maximum values, minimum values, and so on.
 - Pivot table reports can also be used to show sub-totals, custom formats, dynamic pivot chart, filtering, sorting, and can be used to drill-down data.
- ◆ To create a pivot table
 - Step 1: Select the data
 - Step 2: Go to Insert and click on new Pivot table option
 - Step 3: Select the target cell where you want to place the pivot table
 - Step 4: Create the pivot report with required criteria

Create Pivot Table Wizard



The screenshot shows the 'Create PivotTable' dialog box. The title bar reads 'Create PivotTable'. In the top right corner, there are icons for help (a question mark) and cancel (an 'X'). The main area is divided into two sections. The first section, 'Choose the data that you want to analyze', has a radio button selected for 'Select a table or range'. Below this, the 'Table/Range:' text box contains the value ''PIVOT TABLE'!\$A\$2:\$D\$1081'. To the right of this text box is a small icon of a grid with a red arrow. The second option, 'Use an external data source', is not selected. Below it is a 'Choose Connection...' button and a 'Connection name:' label. The second section, 'Choose where you want the PivotTable report to be placed', has a radio button selected for 'New Worksheet'. Below this, the 'Location:' text box is empty. To the right of this text box is another small icon of a grid with a red arrow. At the bottom right, there are 'OK' and 'Cancel' buttons.

Create PivotTable

Choose the data that you want to analyze

☒ Select a table or range

Table/Range: 'PIVOT TABLE'!\$A\$2:\$D\$1081

☐ Use an external data source

Choose Connection...

Connection name:

Choose where you want the PivotTable report to be placed

☒ New Worksheet

☐ Existing Worksheet

Location:

OK Cancel

[illegible]

PivotTable Field List

Choose fields to add to report:

- ☐ Transaction date
- ☐ Customer Name
- ☒ Salesperson
- ☒ Sales

Drag fields between areas below:

Report Filter	Column Labels
	Σ Values
Row Labels	Σ Values
Salesperson	Sum of Sales
	Average of S...
	Count of Sales2

Summary of Transactions with Two Pivot Tables

	A	B	C	D	E	F	G	H	I	J
2	Transaction date	Customer Name	Salesperson	Sales						
3	11/10/2014	Jessica	Joseph	\$37.96			Row Labels	Sum of Sales	Average of Sales2	Count of Sales2
4	11/10/2014	Jonathan	Lawrence	\$115.21			Joseph	\$197,256.31	\$290.94	678
5	11/8/2014	Nathan	Lawrence	\$744.98			Lawrence	\$82,908.97	\$402.47	206
6	11/6/2014	Elizabeth	Lawrence	\$200.93			Matt	\$54,895.38	\$281.51	195
7	11/6/2014	Mathew	Joseph	\$147.70			Grand Total	\$335,060.65	\$310.53	1079
8	11/5/2014	Jonathan	Joseph	\$28.18						
9	11/4/2014	Jessica	Joseph	\$82.67						
10	11/4/2014	Joel	Lawrence	\$713.39						
11	11/1/2014	Joel	Lawrence	\$281.51			Row Labels	Sum of Sales	Average of Sales2	Count of Sales2
12	11/1/2014	Jonathan	Joseph	\$117.94			Andrew	\$4,848.60	\$269.37	18
13	10/30/2014	Mathew	Joseph	\$162.90			Elizabeth	\$4,984.48	\$383.42	13
14	10/30/2014	Nathan	Joseph	\$2.34			George	\$7,983.18	\$295.67	27
15	10/29/2014	Jessica	Joseph	\$581.42			Jessica	\$78,451.51	\$322.85	243
16	10/29/2014	Jonathan	Joseph	\$118.46			Joel	\$8,663.12	\$320.86	27
17	10/27/2014	Jonathan	Joseph	\$636.13			Jonathan	\$82,705.64	\$321.81	257
18	10/27/2014	Nathan	Lawrence	\$157.15			Mathew	\$64,814.45	\$266.73	243
19	10/25/2014	Jonathan	Lawrence	\$316.80			Nathan	\$82,609.70	\$329.12	251
20	10/24/2014	Jonathan	Lawrence	\$263.02			Grand Total	\$335,060.65	\$310.53	1079
21	10/23/2014	Jonathan	Lawrence	\$173.72						
22	10/22/2014	George	Joseph	\$27.19						
23	10/19/2014	Jonathan	Matt	\$38.10						
24	10/19/2014	Jonathan	Joseph	\$506.88						
25	10/19/2014	Nathan	Matt	\$23.79						
26	10/19/2014	Nathan	Joseph	\$657.27						