An introduction to Tykoh Training's Course : Financial Modeling

Disclaimer: Tykoh Group ("Tykoh") disclaims all warranties of quality, accuracy, correctness, or fitness for a particular purpose. The user assumes the entire risk as to the quality , accuracy and correctness of this work. The user assumes the entire risk as to consequences of any actions user may take or not take as a result of anything in this work. In no event will Tykoh be liable for any indirect, special, or consequential damages.

This work may not be reproduced in whole or in part by any means nor posted to a website or stored in any medium without the express written permission of Tykoh.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

Introduction

This is an introduction to the course: "Financial Modeling " conducted by Tykoh Training. Information about the course and others conducted by Tykoh Training is available at www.tykoh.com.

This document can be downloaded from: www.tykoh.com/downloads/fm.pdf

About the course

The Financial modeling course is a practical workshop conducted internationally. The course is aimed at those who wish to learn the principles and practice of financial modelling for the purpose of designing or maintaining their own models.

Level

This is an intermediate through to advanced level course.

Duration

The course is presented on two consecutive days. The first day covers the core concepts and practice of financial modelling. The second day extends the first day and covers advanced concepts and practice of financial modelling. Participants can enrol on either one of or on both days of the course.

Prerequisites

For the first - core - day of the course you should be able to use spreadsheet formulae, and understand how cells are referenced (e.g. $A1:$B5). You should understand basic accounting concepts like balance sheets and profit and loss and finance concepts like discount rates and internal rate of return. For the second - extended - day of the course you should have a level of knowledge equivalent to that covered on the first day.

Format

The course has a "hands-on" format. Each participant works with a laptop for the major part of the course on practical financial modelling topics.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

Self assessment

To try a free interactive self-assessment of your spreadsheet and modeling skills you can download the spreadsheet at the following link:

www.tykoh.com/downloads/TykohFinMod.xls

A document showing the contents of the self assessment can be downloaded from the following link:

www.tykoh.com/downloads/FinMod/pdf/TykohFinMod/all.pdf

Free course tutorial

A free interactive tutorial which gives useful information about spreadsheets and modeling can be downloaded from the following link:

www.tykoh.com/downloads/SpreadsheetGuide.xls

A document showing the contents of the tutorial can be downloaded from the following link:

www.tykoh.com/downloads/SpreadsheetGuide.pdf

Purpose of this document

The purpose of this document is to give the reader an insight into the content and style of the second –extended - day of Spreadsheet Modelling for Finance course. Sections of the course are "sampled" and reproduced and commented on here so that the reader may make an informed judgement as to the course's value to them.

A sample exercises from the course

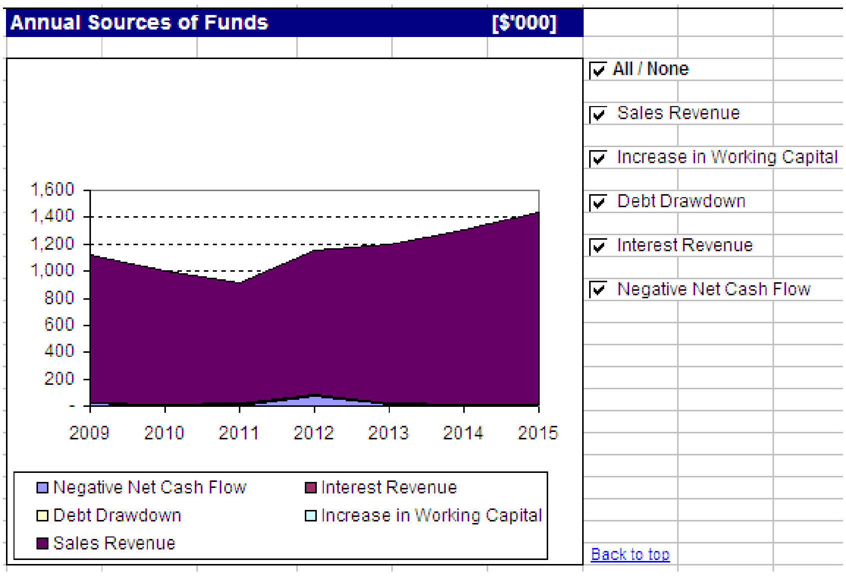
A model which is covered early in this course represents the present and future states of a company.

The model contains a number of tools and utilities that help course participants understand and form insights into the model. The following sections describe some of those tools and utilities.

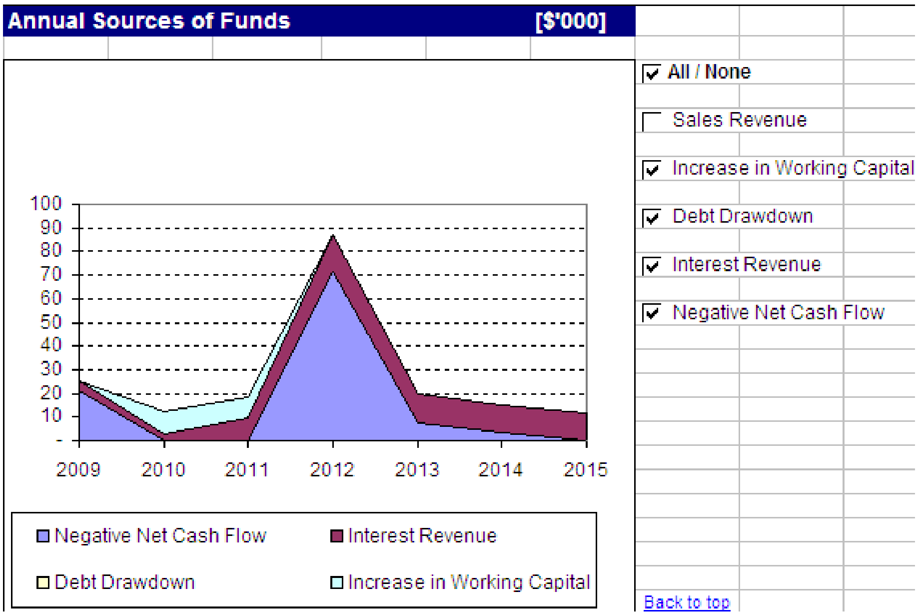
Summary tab

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

One of the worksheets in the model is a Summary tab. This provides a high-level "executive summary" of all of the critical inputs and outputs of the model. On the Summary tab is a "Sources of Funds" chart.

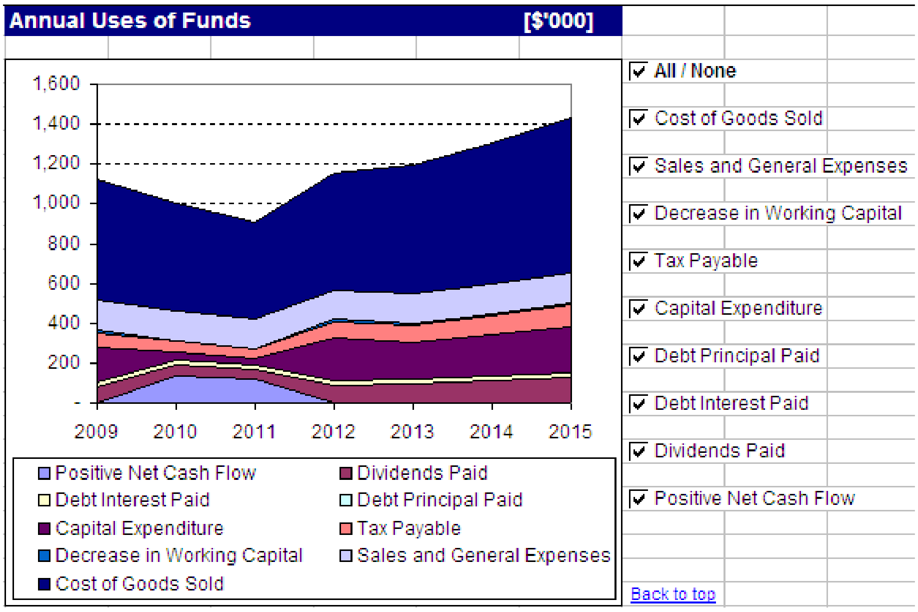


Participants can click on a checkbox to include or not include a particular contributor to the sources of funds. In the preceding illustration the "Sales Revenue" figure dominates the others and that can be "hidden" by un-selecting the "Sales Revenue" checkbox. When that is done the other contributions are shown more clearly:



Similarly a Uses of Funds chart shows some or all of the uses in any combination:

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

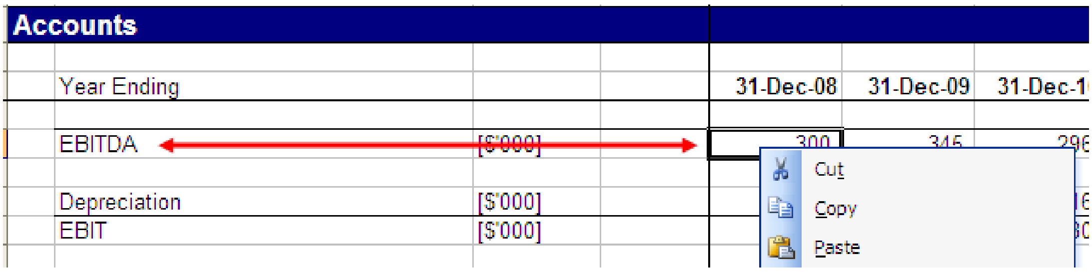


Analysing the sources and uses individually and collectively gives insights into the dynamics of the model.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

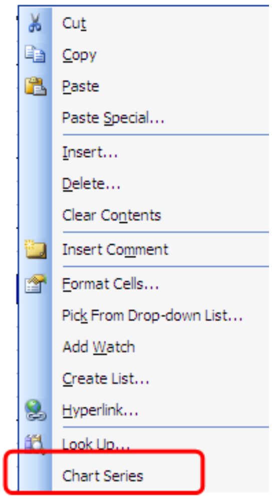
Charting

A second utility in the model constructs charts - Charts are often more comprehensible than sets of numbers. To construct a chart participants begin by right clicking anywhere on the row they want to chart.

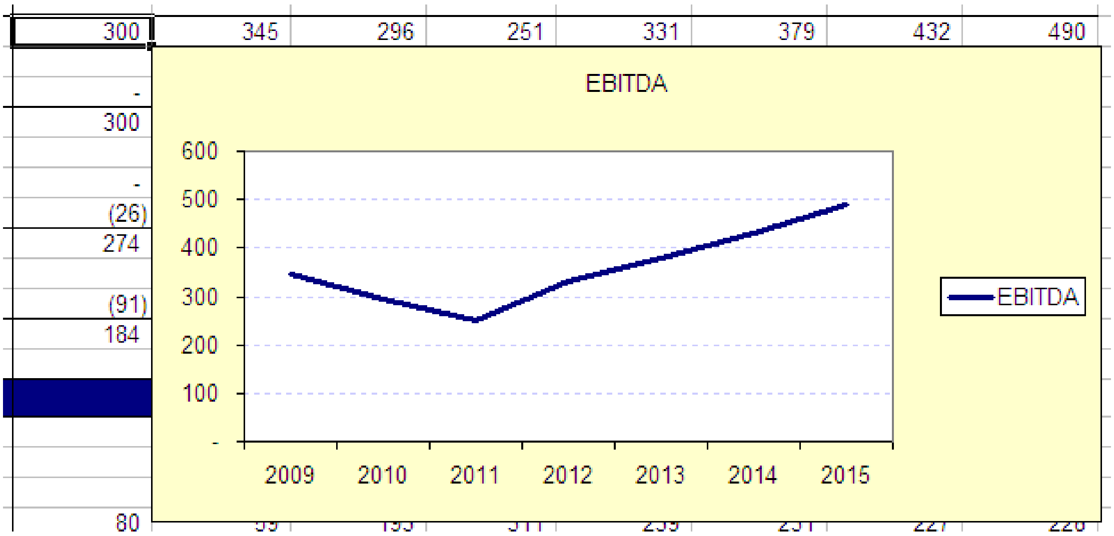


In the following example EBITDA (Earnings before Interest, Taxes, Amortisation and Depreciation) has to be charted.

A pop-up menu appears. Clicking on the "Chart Series" item will cause the series to be charted automatically.



Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com



The top of the chart is positioned just below the row being charted. This makes it easy to see both the numbers being charted and the chart itself.

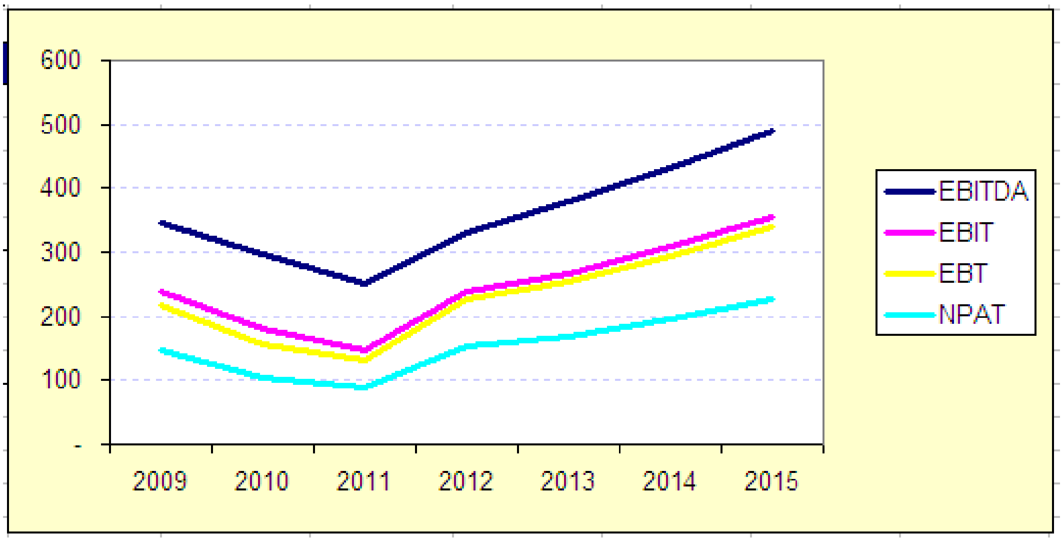
If the chart appears near the bottom of the page then the window automatically scrolls up so that the full chart is revealed.

Several items can be charted together. To do that the CTRL key is pressed and then each item is selected in turn.

In this example EBITDA, EBIT, EBT and NPAT will be charted:

EBITDA	[$'000]	300
Depreciation	[$'000]	-
EBIT	[$'000]	300
Interest Revenue	[$'000]	-
Interest Expense	[$'000]	(26)
EBT		274
Tax Expense	[$'000]	(91)
NPAT	[$'000]	184

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

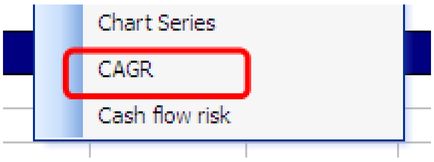


The Remove Chart Series" pop-up menu item removes all of the charts that have been added to a tab.

On some of the model tabs the "Chart Series" menu item doesn't appear. That is because there are no series on that tab to chart.

Compound Annual Growth Rate (CAGR)

Another utility that helps analyse the model's behaviour is accessed by using the CAGR menu item:



The CAGR menu item reports the compound annualised growth rate of a selected row in the model.

In one of the exercises we use the model to value Equity cash flows. Using one method of valuation a critical factor in the value of these cash flows is the CAGR in the later years of the company's life. We find the CAGR to be 8.48%.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

14	Opening Share Capital	[$'000]		380
15	Equity Contributed	[$'000]		1
16	Closing Share Capital	[$'000]		381
17				
18	**Distribution Analysis**			
19				
20	Distribution to Equity	[$'000]		71
21				

Microsoft Excel
CAGR is 8.48%
OK

One of the exercises asks participants to explain why the equity CAGR differs from the growth rate (of sales) assumed in the model (which is 5%):

Annual Assumptions						
Year Ending		31-Dec-08	31-Dec-09	31-Dec-10	31-Dec-11	31
Assumptions						
Annual Growth in Units Sold	[%]		5%	5%	5%	
Unit Price	[$]	1	1	1	1	

In the course we explain why there is a difference.

Cash flow risk

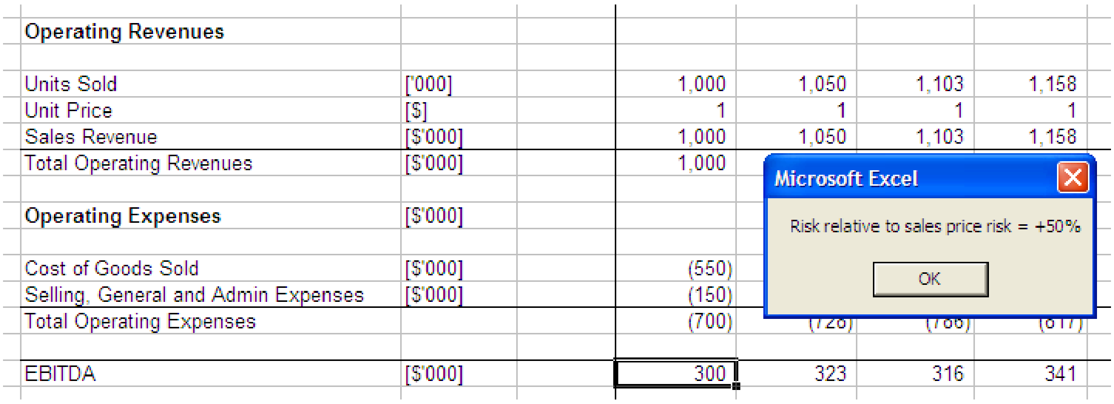
Cash flow risk is another menu item accessible by right-mouse clicking anywhere in the model. This measures the riskiness of cash flows relative to risk (or uncertainty) in a nominated factor. In the following example we measure the riskiness of total operating revenues as a function of the sales price risk. Not surprisingly, as total operating revenues depend on sales prices, the riskiness of the revenues is the same as the riskiness of the sales prices.

Year Ending		31-Dec-08	31-Dec-09	31-Dec-10	31-Dec-11	3
Profit and Loss						
Operating Revenues						
Units Sold	[000]	1,000	1,050	1,103	1,158	
Unit Price	[$]	1	1	1	1	
Sales Revenue	[$'000]	1,000	1,050	1,103	1,158	
Total Operating Revenues	[$'000]	1,000				
Operating Expenses	[$'000]					
Cost of Goods Sold	[$'000]	(550)				
Selling, General and Admin Expenses	[$'000]	(150)				
Total Operating Expenses		(700)	[illegible]	[illegible]	[illegible]	

Microsoft Excel
Risk relative to sales price risk = same
OK

In a subsequent exercise course participants are asked to determine the riskiness of EBITDA. When they do that they find the EBITDA risk is 50% greater than sales price risk.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com



Operating Revenues						
Units Sold	['000]		1,000	1,050	1,103	1,158
Unit Price	[$]		1	1	1	1
Sales Revenue	[$'000]		1,000	1,050	1,103	1,158
Total Operating Revenues	[$'000]		1,000			
Operating Expenses	[$'000]					
Cost of Goods Sold	[$'000]		(550)			
Selling, General and Admin Expenses	[$'000]		(150)			
Total Operating Expenses			(700)	[illegible]	[illegible]	[illegible]
EBITDA	[$'000]		300	323	316	341

In the course we explain why this is so and also look at other factors that determine the evolution and growth of risk from the "top line" to the "bottom line". We also look at how such risks can be accounted for in the valuation process.

Visual Basic

The charting feature described earlier, the custom pop-up menu, the checkbox-linked "Sources" and "Uses" charts introduced earlier and the CAGR and Cash flow risk measures are all implemented in Visual Basic. In the course we review Visual Basic and show some of its applications to modelling (including the applications just discussed).

More exercises using the model

In the course we work with the model discussed earlier to see whether the results it generates are those we would expect. Sometimes we find the results to be reasonable and expected. But sometimes the results indicate the model needs to be refined or improved.

Following are a few "snapshots" from the course regarding this topic.

Price growth vs Volume growth

Suppose you were a shareholder in the company being modelled. Would you prefer: A) The number of units sold each year to increase by 10% and the sale price each year to decrease by 10% or, B) The number of units sold each year to decrease by 10% and the sale price to increase by 10%. You can study each scenario by putting appropriate values into the annual assumptions tab. Scenario A [volume growth] looks like this:

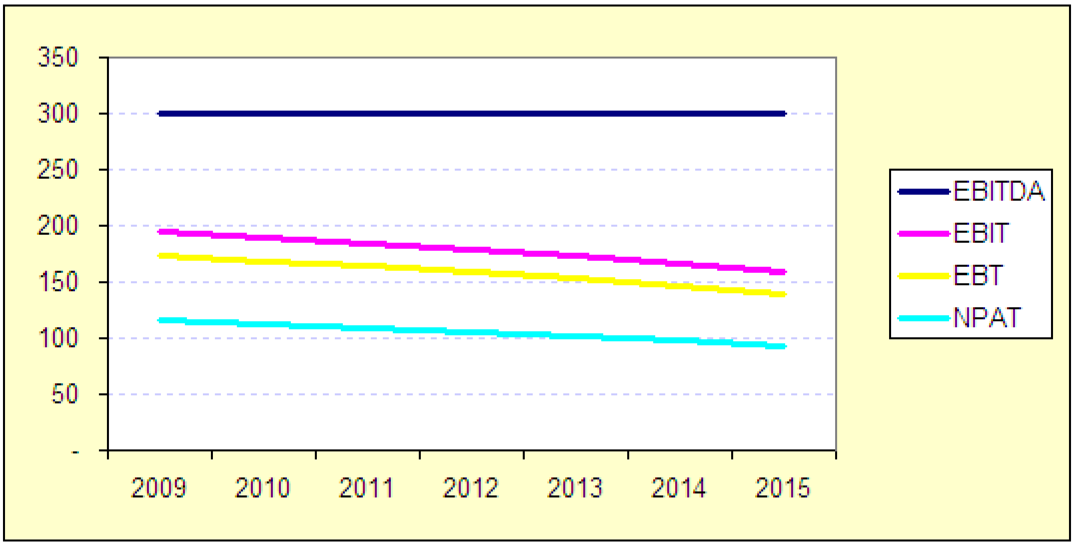
Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

B	C	D	E	F	G
nual Assumptions					
Year Ending			31-Dec-08	31-Dec-09	31-Dec-10
sumptions					
Annual Growth in Units Sold	[%]			5%	5%
Unit Price	[$]		1	=E10/1.05	0.91

.. and Scenario B [price growth] looks like this:

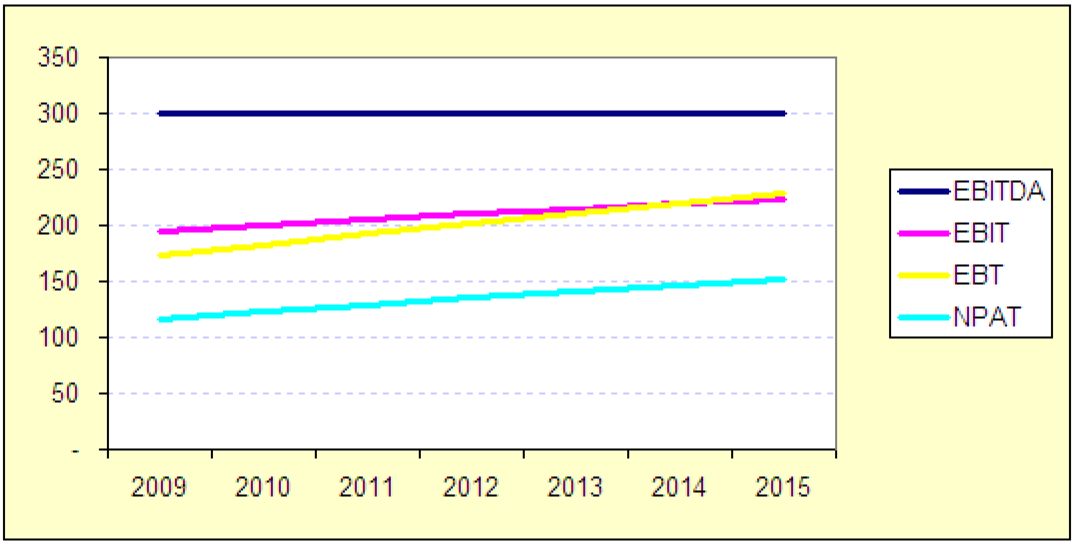
B	C	D	E	F	G
nual Assumptions					
Year Ending			31-Dec-08	31-Dec-09	31-Dec-10
sumptions					
Annual Growth in Units Sold	[%]			-5%	-5%
Unit Price	[$]		1	=E10/0.95	1.11
Selling, General and Admin Expenses	[$'000]		(150)	(150)	(150)

The EBITDA (Earnings before Interest, Taxes, Debt and Amortisation) , EBIT, EBT and NPAT (Net Profit after Tax) chart for the volume growth scenario looks like this:



.. and for the price growth scenario looks like this:

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com



So the answer to the question is: We'd prefer to see price growth than volume growth. As to why that is - that is covered in the course. It relates to the model's assumption about the level of asset backing needed to sustain a given volume (not value) of business.

Stress Testing Models

It is important to "stress test" models - to verify they give expected results in extreme - but theoretically possible - conditions. The spreadsheet modelling course gives examples of this technique. Here we'll review an example from the course: We'll look at a scenario where growth is consistently high.

High growth

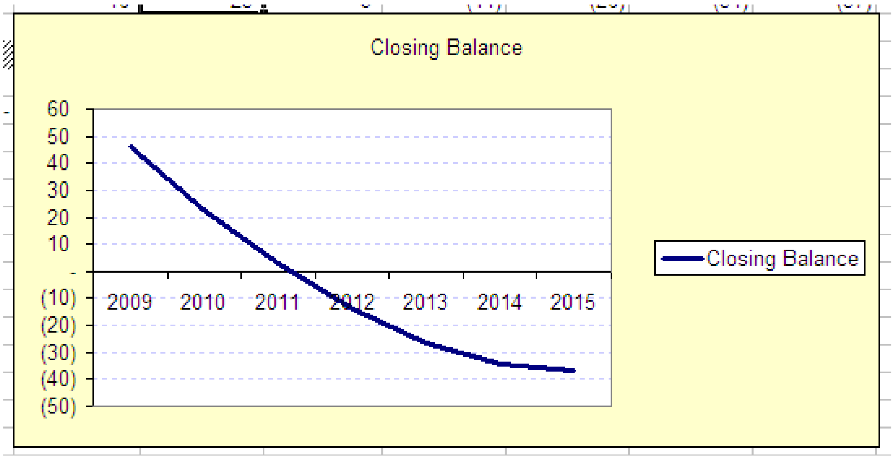
Assume sales increase by 12% per year. Set the "Annual Growth in Units Sold" to 12% in the Annual_Assumptions tab. The tab should look like this when complete:

CHECK							
Annual Assumptions							
Year Ending			31-Dec-08	31-Dec-09	31-Dec-10	31-Dec-11	31-Dec-12
Assumptions							
Annual Growth in Units Sold	[%]			12%	12%	12%	12%
Unit Price	[$]		1	1	1	1	1
Selling, General and Admin Expenses	[$'000]		(150)	(150)	(150)	(150)	(150)

After you do that you'll notice the CHECK indicator comes on in cell A1 - One (or more) of the model checks has failed. On further investigation course participants

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

find that the check that failed is one generated in the Cashflow tab. That tab checks that the cash account doesn't go into debit. If we go to the Cashflow tab and chart the Cash Balance we see a chart that looks like this:



In this scenario the company runs out of cash. (Why that happens is covered in the course.) One solution to this problem is to get more cash. From where? Options include: Selling assets, increasing borrowings, calling on equity and reducing net working capital. Alternatively the business could scale back to reduce its cash needs.

The model will have to be extended to use one or a combination of these (and possibly other) methods. The method or methods should be the ones the company would use if it found itself in the current situation. If a combination of methods is used the model needs to arbitrate the relative contributions from each method. In doing that the model might also need to take into account certain constraints or goals (e.g. debt-service coverage ratios, desired gearing ratios and the like).

In the course we look at the types of spreadsheet logic needed to solve these kinds of problems.

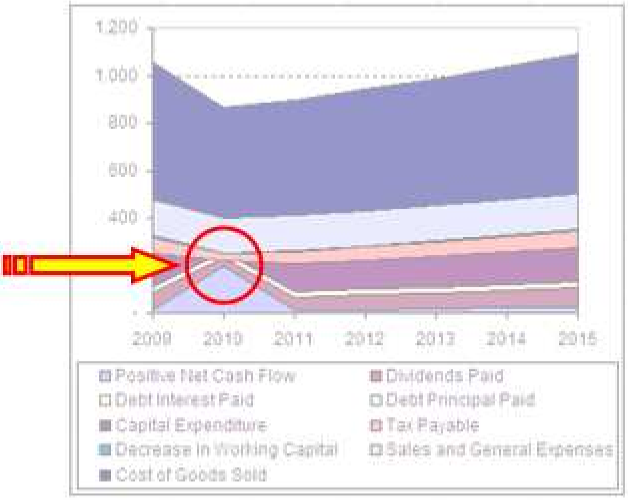
Revenue shock

Next we stress the model on the downside: We subject it to a revenue "shock". We assume in 2010 sales volume drops by 20%:

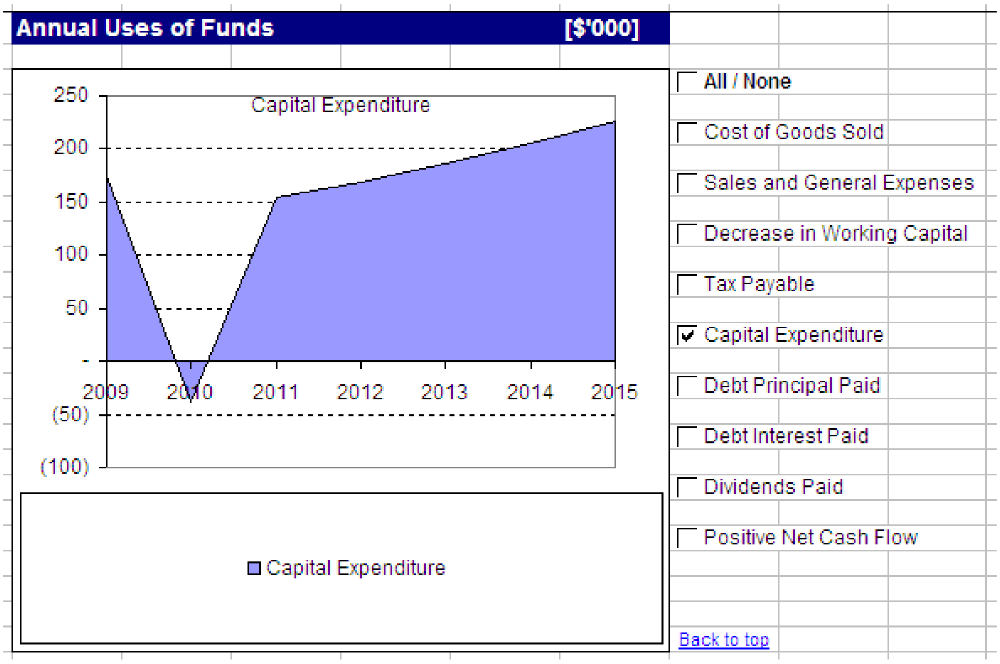
Annual Assumptions					
Year Ending		31-Dec-08	31-Dec-09	31-Dec-10	31-Dec-11
Assumptions					
Annual Growth in Units Sold	[%]		5%	-20%	5%
Unit Price	[$]	1	1	1	1
Selling, General and Admin Expenses	[$'000]	(150)	(150)	(150)	(150)

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

Having applied the shock if we now look at the "Uses of Funds" chart on the Summary tab a part of it looks slightly odd:



If we "drill-down" by unselecting all of the "Annual Uses of Funds" checkboxes and then selecting just the CAPEX (Capital Expenditure) checkbox we see a chart that looks like this:



Capital expenditure turns negative (i.e. the model is now selling assets instead of buying them). In the current version of the model the fixed (i.e. long term) asset base is tied to sales volume. Because volume has dropped dramatically the model is selling off its asset base to keep it in scale with the reduced volume. This has exposed a weakness in the model: In real life (probably) the business would maintain its asset base or reduce it only slightly in the face of a transient downturn. We can adjust the

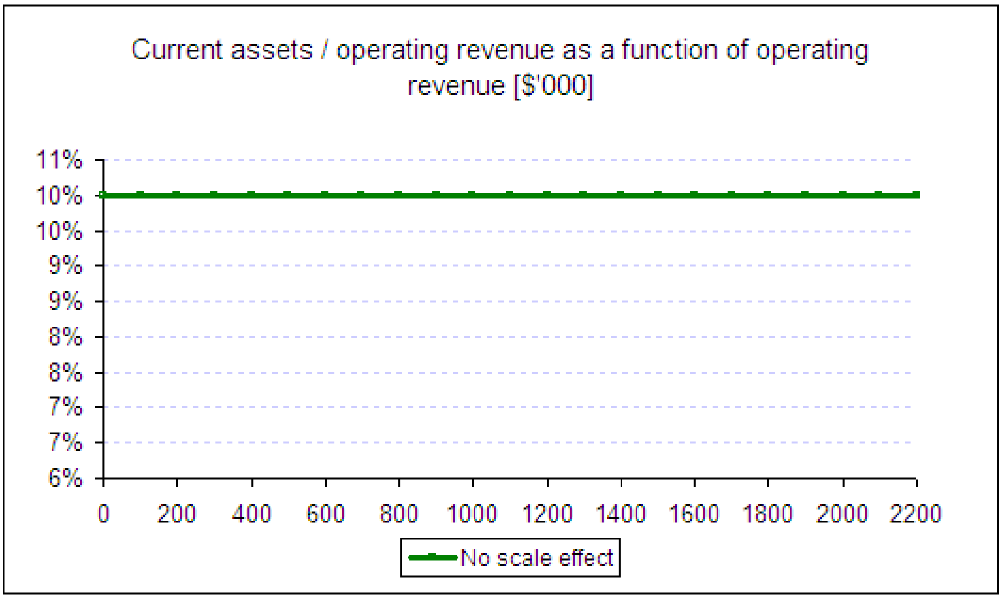
Copyright © 2009 Tykoh Group Pty Limited
All rights reserved

model to limit aggressive changes in settings. Generally this can be done by putting "floors" or "caps" on parameters or limiting the rate at which they can change. In the modelling course we look in more detail at how to do that.

Scale-effects

Our simple model is currently scale-independent: If we double all the absolute numbers and leave percentages as they are then the new model behaves exactly the same as the old one. In real life, though, scale effects make financial systems non-linear. In the modelling course we perform an exercise to incorporate scale effects. The first phase of that is fairly simple and can be done with lookup tables. But a subsequent phase is more complex.

The model, as initially constructed, assumes that current assets are a fixed proportion of operating revenues ..

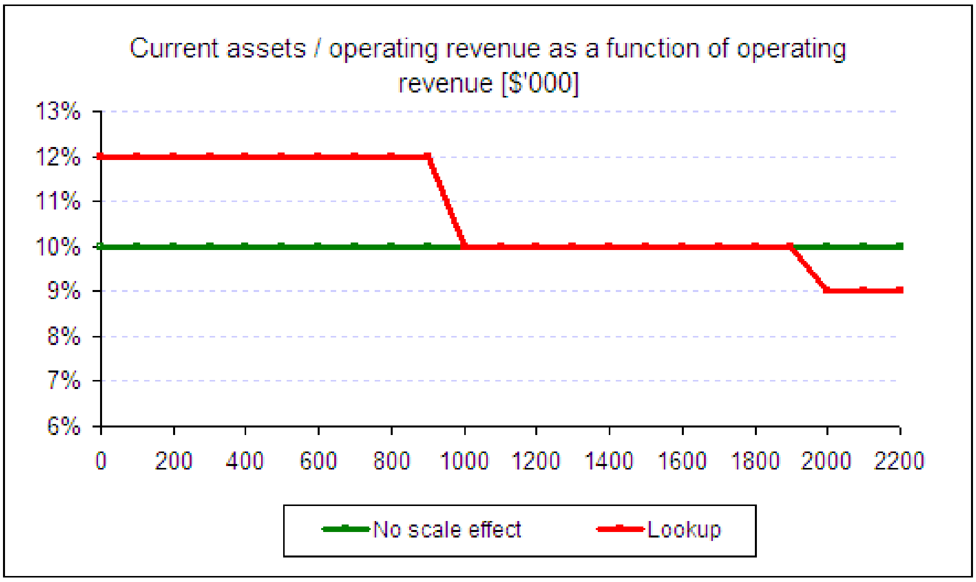


Suppose we have reason to believe that due to economies of scale the ratio of current assets to operating revenue will decrease if operating revenues increase. We want to change the model so that the following schedule applies.

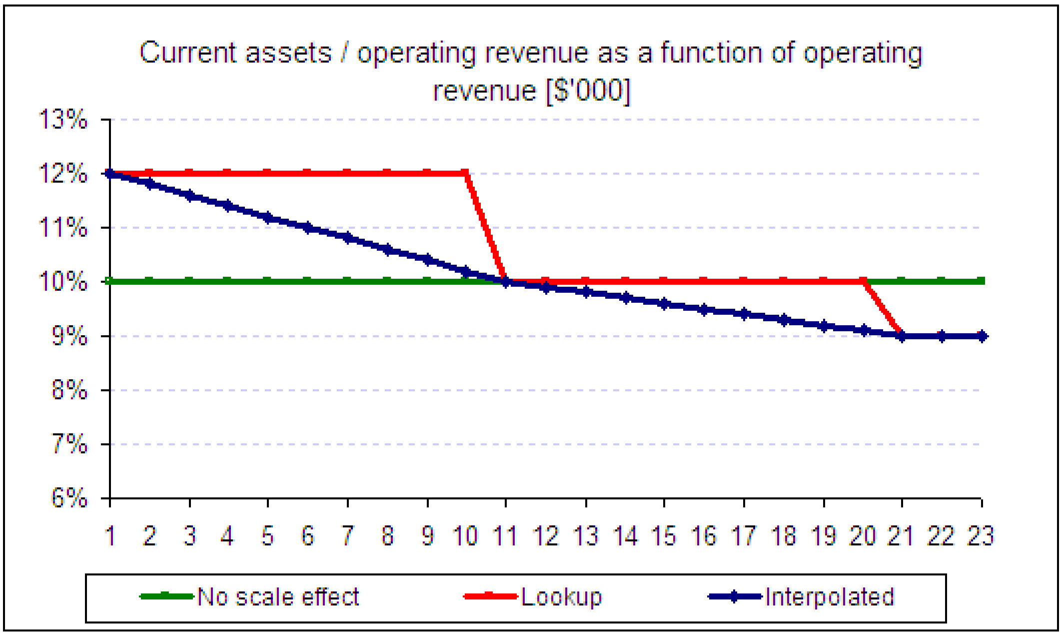
Operating Revenue [$'000]	Current assets / operating revenue	
0	12.00%	0<= revenue <1000
1000	10.00%	1000<= revenue <2000
2000	9.00%	2000 <= revenue

We show in the course how to modify the model to use the preceding schedule so that current assets as a ratio of operating revenues takes the stepped profile shown in the next figure.

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com



We then refine the profile further to show how interpolation can be used to achieve a smooth transition between "waypoints" - as shown next.



Periodicity and non-periodic events

Financial models generally have a time scale in which time progresses in regular intervals. Events that occur within an interval are grouped together. It is important that the model's timescale has sufficient resolution to capture significant events. If the underlying business activity, for example, is strongly seasonal then the model period

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com

should be short enough to capture seasonal variations. If debt covenant ratios are calculated quarterly then the model should have at least a quarterly frequency.

Sometimes events may not be periodic and then it can be a challenge to model them accurately.

An example from the course relating to this follows: A resource needed to operate a business will have periods of "downtime". For some of these periods the resource will be completely unavailable but for others it might be partially available.

	Resource interruption schedule (inclusive start and end dates)		
	Availability	Start Interruption Date	End Interruption Date
	0%	18-Dec-09	23-Dec-09
	15%	28-Dec-09	3-Jan-10
	5%	12-Jan-10	3-Feb-10
	0%	15-Feb-10	22-Feb-10
	85%	30-Apr-10	15-Jul-10
	31-Dec-09	**31-Jan-10**	**28-Feb-10**
Productive days	??	??	??

The model needs to calculate the numbers of (weighted) productive days within one-month intervals. There may be zero, one or more interruption periods in any month. Interruption periods may span month ends and month beginnings. An interruption period may be as short as one day or as long as several months. An interruption period may already be in effect at the start of the first model month and another (or the same) may persist past the end of the last model month.

For any given model month some interruption periods will be already be entirely past and therefore not relevant and others will be entirely in the future and again not relevant. Interruption periods which span either the start or end (or both) of the model month or which begin and end within the model month are relevant.

This exercise captures some of the complexities and subtleties of modelling non-periodic events.

Conclusion

This completes our brief sampling of parts of the course. Remember that these notes are not the course notes themselves. The purpose of these notes is to introduce the reader to aspects of the style and content of the course.

-----oooooooooOOOoooooooooo----

Copyright © 2009 Tykoh Group Pty Limited
All rights reserved
www.tykoh.com