SumProduct

NEWSLETTER #7 - June 2013

SumProduct is proud to announce we've just published the first of a (hopefully) ad hoc series on Microsoft's very own blogging site, www.blogs.office.com.

Check out our article at
http://blogs.office.com/b/microsoft-excel/archive/2013/05/01/summing-data-across-multiple-criteria-on-multiple-worksheets.aspx

What's it on..? Why the **SUMPRODUCT** function of course!

Microsoft Most Valuable Professional

Newsletter 007?

The name's Bond, licensed to expand operations. Indebted to Ian Fleming's catchphrase, this month we look at the spectre of modelling debt. If you're still retaining interest through these terrible puns, you may spy some useful tips to make you a modelling gun, with tricks such as avoiding circularities, and discussions on the importance of a debt cascade and modelling key debt metrics. That's right: we're gearing up to consider borrowings this month. Let SumProduct lend you a modelling hand...

Liam Bastick, Managing Director, SumProduct

Keep it simple

Over the years, we have seen various forms of business and project financing, including equity, shareholder loans, senior debt, mezzanine finance, hire purchase, bonds, convertibles, warrants and so on. Prima facie, this myriad of financial instruments can obfuscate the uninitiated, but like this last phrase, the jargon can be simplified.

No matter what the financial instrument, the mechanics essentially boil down to two key elements:

- **Return on finance**: the yield to investors or the costs of capital to the recipient of capital (e.g. interest, dividends); and
- **Return of finance**: repayments (or conversion) of original capital issued / drawn down.

And it really is as simple as that. The logic behind how the calculations may vary, such as when capital and returns are paid or rolled up, what order it is paid in and so on, but the computations may be summarised by two control accounts (i.e. summaries that show / reconcile how the Balance Sheet varies from one period to the next):

Returns on Finance

Opening Balance (e.g. Debt / Equity) b/f	XX	*Previous period Balance Sheet item*
Additions (e.g. drawdowns / issuances / conversions)	X	*Typically in Cash Flow Statement*
Returns on finance rolled up (e.g. "interest capitalised")	X	*Usually a Balance Sheet movement*
Deductions (e.g. repayments / buybacks / conversions)	(X)	*Typically in Cash Flow Statement*
Closing Balance (e.g. Debt / Equity) c/f	XX	*Current period Balance Sheet item*

Returns of Finance

Opening Return Payable (e.g. Interest Payable) b/f	XX	*Previous period Balance Sheet item*
Return Accrued (e.g. Interest Expense)	X	*Income Statement or Balance Sheet movement*
Return Paid (e.g. Interest Paid)	(X)	*Cash Flow Statement*
Closing Return Payable (e.g. Interest Payable) c/f	XX	*Current period Balance Sheet item*

The 3 R's of Debt Modelling

When both businesses and lenders consider debt they look at two key aspects: risk and return. These are important for credit risk modelling / portfolio analysis, etc. However, when undertaking financial modelling, it is the third 'R' that is often the most important.

In a financial model, risk and return are usually modelled via simple inputs and occasional what-if analysis. Ranking, on the other hand, affects the entire financial structure of the model.

As the graphic (right) shows, if the order of service repaying capital changes, the entire logic will change. This may affect interest / debt service cover ratios (see below). It is important in scoping any such model that the order is understood and how it will be affected by such factors as:

- Breach of covenants
- Conversion of financial instruments
- Breach of covenants or other ratios
- Liquidation / insolvency.

It is not correct to assume that the order of financing will never change. For specific queries, please do not hesitate to contact us at contact@sumproduct.com.

1. Debt Cascade

	Date 1	Date 2	Date 3	Date 4	Date 5	Date 6	Date 7	Date 8	Date 9	Date 10	Date 11	Date 12
Cashflow Before Funding	(16.0)	(0.2)	(0.5)	(0.5)	(0.5)	4.3	6.7	6.8	6.8	7.1	7.3	7.4
Funding	16.0	-	-	-	-	-	-	-	-	-	-	-
Cashflow After Funding	-	(0.2)	(0.5)	(0.5)	(0.5)	4.3	6.7	6.8	6.8	7.1	7.3	7.4
Tax	-	-	-	-	-	-	-	-	-	-	-	-
Cashflow Available before WC Funding	-	(0.2)	(0.5)	(0.5)	(0.5)	4.3	6.7	6.8	6.8	7.1	7.3	7.4
Working Capital Facility Funding	-	0.2	0.5	0.5	0.5	-	-	-	-	-	-	-
Cash Flow Available for Debt Service (CFADS)	-	-	-	-	-	4.3	6.7	6.8	6.8	7.1	7.3	7.4
Senior Debt Service	-	(0.4)	(0.4)	(0.4)	(0.4)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)	(1.7)
Cashflow Available for Debt Service Reserve Account	-	(0.4)	(0.4)	(0.4)	(0.4)	2.6	5.0	5.1	5.1	5.4	5.6	5.7
Debt Service Reserve Account	-	4.0	0.0	-	-	(2.6)	(0.8)	0.0	0.0	(0.0)	(0.0)	0.0
Cashflow Available for Mezzanine	-	3.6	(0.4)	(0.4)	(0.4)	-	4.2	5.1	5.1	5.4	5.6	5.7
Mezzanine Debt Service	-	(2.7)	-	-	-	-	(3.1)	(3.8)	(3.8)	(4.1)	(4.2)	(4.3)
Cashflow Available for WC Facility	-	0.9	(0.4)	(0.4)	(0.4)	-	1.0	1.3	1.3	1.4	1.4	1.4
Working Capital Facility	-	(0.2)	(0.0)	(0.0)	(0.0)	-	(1.0)	(0.5)	-	-	-	-
Cashflow Available for Equity	-	0.7	(0.4)	(0.4)	(0.5)	-	-	0.7	1.3	1.4	1.4	1.4
Dividends	-	5.3	5.2	5.2	5.3	(2.0)	(2.0)	(2.2)	(2.3)	(3.0)	(3.1)	(3.4)
Net Cashflow	-	5.9	4.7	4.8	4.8	(2.0)	(2.0)	(1.4)	(1.0)	(1.6)	(1.7)	(1.9)
Cash Balance B/f	-	-	5.9	10.7	15.4	20.2	18.3	16.2	14.8	13.8	12.1	10.4
Cash Balance C/f	-	5.9	10.7	15.4	20.2	18.3	16.2	14.8	13.8	12.1	10.4	8.4

Who Knew? New News

Over the coming months, our website will be adding new features (watch this space). For now, check out the 'News' section, now open for business at http://sumproduct.com/news. Updated on an ad hoc basis, we'll be adding various comments in real time. If you have suggestions or a topic, drop us a line.

SumProduct can help

Here at SumProduct we are experienced professionals, having undertaken many debt modelling assignments, including credit risk assessments, investment appraisal, project finance and debt sculpting. Moreover, we also offer training in debt modelling and applied courses in project finance, M&A and valuations modelling.
For more information, please drop us a line at contact@sumproduct.com.

Avoiding circularity

When a formula refers back to its own cell, either directly or indirectly, it is called a circular reference. Microsoft Excel cannot automatically calculate all open workbooks when one or more of them contains a circular reference and usually will put zero as the default value in the cell(s) instead.

You can remove a circular reference, or you can have Excel calculate each cell involved in the circular reference using the 'calculate iterations' feature. This requires you enabling iterations:

- Go to Excel Options (ALT + T + O)
- Choose 'Formulas' from the list in the left hand column
- In the first section, 'Calculation options', ensure the check box 'Enable iterative calculation' is checked
- Amend the Maximum Number of Iterations (maximum is still 32,767) as required
- Amend the Maximum Change as required (the smaller the number, the longer it will take for Excel to calculate the answer)
- Click 'OK'.

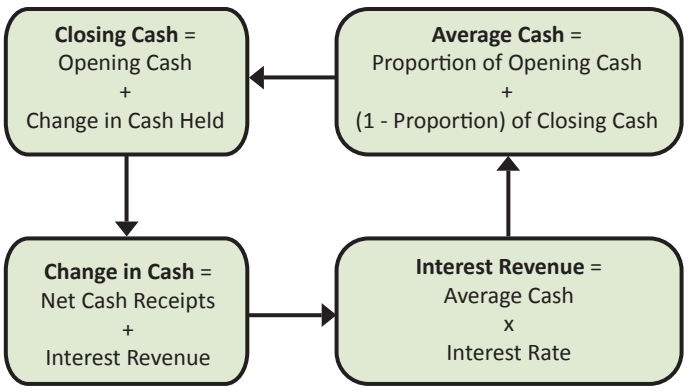
Various problems may arise with circular references:

- Many users will agree that circular arguments can cause the Excel file to become unstable and even crash;
- When solved, Excel may give one solution when there may be several, only one of which is correct in the given circumstances. If the problem is not fully understood, the danger is an incorrect solution may be accepted;
- If Excel stops calculating after a given number of iterations / when the difference between iterations becomes miniscule, users expect the resulting values to be a solution when it may not be (you must always verify that the value reported provides the result required).

Therefore, circular arguments are not recommended, although it is conceded on occasion there may be no alternative viable solution.

Calculating interest without circularity

In a financial model, it is commonplace to have to calculate interest. For this illustration, let's assume we are calculating interest received on the business's average cash balance for certain periods of time (it could just as simply be interest paid on a debt balance, etc.). This gives rise to a perceived circular logic:



This problem can be solved algebraically in, er, a relatively straightforward manner without creating circularities – and is therefore our recommended approach.

In a newsletter, we wouldn't normally publish the following, but the derivation of the formula has proved to be one of our most popular web pages (http://www.sumproduct.com/thought/interest-received).

Therefore, we apologise for the following mathematical assault (for those not interested in the derivation, simply skip to the end) – unfortunately, Excel modelling sometimes boils down to solving simultaneous equations!

Let:
- **OB** = opening cash balance for the period
- **CB** = closing cash balance for the period
- **M** = non-interest cash movement for the period
- **I** = interest cash movement for the period
- **r** = interest rate
- **t** = tax rate (it is assumed this cannot equal 100%)
- **x** = proportion into the period that the non-interest cash movements are assumed to occur, e.g.
  - If x = 0%, this means the movement occurred at the start of the period
  - If x = 100%, this means that the movement occurred at the end of the period
  - If x = 50%, this means that the movement occurred midway through the period

So,

$$\mathbf{CB} = \mathbf{OB} + \mathbf{M}(1-\mathbf{t}) + \mathbf{I}(1-\mathbf{t}) \quad \text{and}$$

$$\mathbf{I}(1-\mathbf{t}) = (\mathbf{x}.\mathbf{OB} + (1-\mathbf{x}).\mathbf{CB}).\mathbf{r}.(1-\mathbf{t}) \quad \text{so (as } \mathbf{t} \neq 100\%)$$

$$\mathbf{I} = (\mathbf{x}.\mathbf{OB} + (1-\mathbf{x}).\mathbf{CB}).\mathbf{r}$$

$$\mathbf{I} = (\mathbf{x}.\mathbf{OB} + (1-\mathbf{x}).(\mathbf{OB} + \mathbf{M}(1-\mathbf{t}) + \mathbf{I}(1-\mathbf{t}))).\mathbf{r}$$

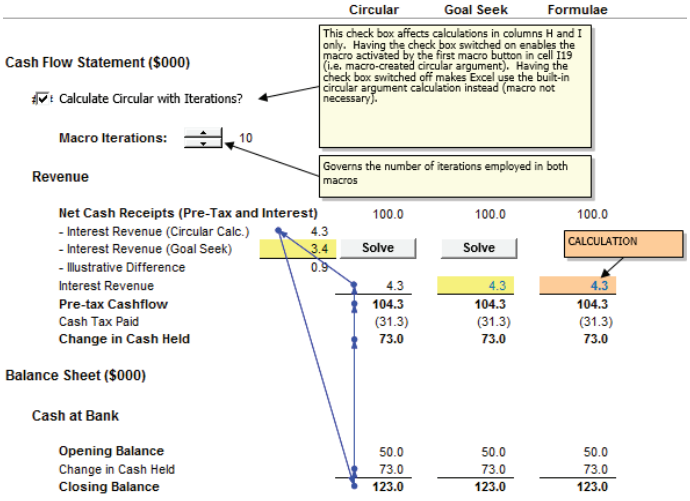
$$\mathbf{I} = \mathbf{OB}.\mathbf{r} + (1-\mathbf{x}).\mathbf{M}.(1-\mathbf{t}).\mathbf{r} + (1-\mathbf{x}).\mathbf{I}.(1-\mathbf{t}).\mathbf{r}$$

Therefore,

$$\mathbf{I}.(1-(1-\mathbf{x}).(1-\mathbf{t}).\mathbf{r}) = \mathbf{OB}.\mathbf{r} + (1-\mathbf{x}).\mathbf{M}.(1-\mathbf{t}).\mathbf{r}$$

$$\Leftrightarrow \quad \mathbf{I} = \frac{\mathbf{OB}.\mathbf{r} + (1-\mathbf{x}).\mathbf{M}.(1-\mathbf{t}).\mathbf{r}}{(1-(1-\mathbf{x}).(1-\mathbf{t}).\mathbf{r})}$$

Hence, we can calculate interest from this final equation and have no circular references or goal seek. Please see http://www.sumproduct.com/thought/interest-received for an example Excel file that illustrates this technique:



Key Functions

It's in this section we usually provide useful keyboard shortcuts. However, in keeping with this month's theme, 'Key Strokes' takes a break as we present several useful functions for assisting with debt calculations.

Function	What it does
PMT	Minimum payments to pay off debt in a certain timeframe
PPMT	Principal element of above payment
IPMT	Interest element of above payment
CUMPRINC	Calculates remaining loan balance at a point in time
NPER	Calculates the duration of the loan for a set repayment plan

These functions are discussed in detail at http://www.sumproduct.com/thought/a-debt-to-repay.

Upcoming SumProduct training courses

Melbourne:

Valuations Modelling: 3rd Jun

M&A Modelling: 4th-5th Jun

Power of PowerPivot: 6th-7th Jun

Perth:

Forecasting & Financial Modelling Techniques (CPA): 11th Jun

Key Driver Analysis Modelling (CPA): 12th Jun

Forecasting & Financial Modelling Techniques (CPA): 13th June

Hong Kong:

Forecasting & Budgeting: 18th-21st Jun

Brisbane:

Forecasting & Financial Modelling Techniques (CPA): 19th Jun

Key Driver Analysis Modelling (CPA): 20th Jun

Sydney:

Power of PowerPivot: 2nd-3rd Jul

Brisbane:

Power of PowerPivot: 4th-5th Jul

Financial Modelling Fundamentals: 9th-10th Jul

Perth:

Financial Modelling Fundamentals: 9th-10th Jul

Capitalised vs. Rolled Up

There is confusion between the jargon used by the banking industry and accountants when considering debt mechanics:

Scenario	Banking term	Accounting term
Interest is not paid (either by agreement or due to insufficient funds) and is added to the outstanding principal for future interest calculations	Interest capitalised	Interest rolled-up
Interest is not added to the balance but is paid (although there may be a slight timing issue)	Interest amortised (principal is amortised similarly)	When accrued: interest expense When paid: interest paid
Regardless of whether paid or not in reality, interest meets the criteria specified in the relevant accounting standards to be held in the Balance Sheet	n/a	Interest capitalised
When capitalised under accounting rules, the interest charge is released to the P&L over the life of a project on some agreed equitable basis	n/a	Interest amortised

When holding conversations with financiers, be sure you are on the same page before building interest into a financial model!

Key Outputs

We often get asked which common metrics should be included in a financial model focusing on debt and other sources of funding. The following is one such list, but we stress that as always in finance, it does depend upon circumstances.

Suggested metric	Calculation	Explanation / Justification
Interest Cover Ratio (ICR)	Cash Flow Available for Debt Service (CFADS) divided by Interest Paid, Payable or Expensed (depending upon agreement)	Often used in early stages of projects to assess whether scheduled interest only payments for a period can be covered by cash generated in that period (rather than total cash available which may disguise erosion of cash balance)
Debt Service Cover Ratio (DSCR)	CFADS divided by Total Debt Service (Principal + Interest)	Regularly used to assess the risk regarding scheduled payments being met from operating cashflows (after tax). A ratio of less than 1 requires payments from cash reserves. However, lenders usually require the ratio to be above, say, 1.40, else cash is "locked up" or the debt has to be repaid, etc.
Loan Life Cover Ratio (LLCR)	Net Present Value (NPV) of future CFADS over the remaining life of the loan divided by the opening balance of the debt in that period	Measures how many times the discounted cashflows can repay the loan balance over the duration of the loan
Project Life Cover Ratio (PLCR)	NPV of future CFADS over the remaining life of the project divided by the opening balance of the debt in that period	Measures how many times the discounted cashflows can repay the loan balance over the duration of the project

For more information and / or training on debt modelling including calculation of outputs and sculpting the repayment profile to optimise key metrics, please ask us about our Debt Modelling or Applied Project Finance training courses. Please email training@sumproduct.com for details.

Services

We have undertaken a vast array of assignments over the years, including:

- Business planning
- Building three-way integrated financial statement projections
- Independent expert reviews
- Key driver analysis
- Model reviews / audits for internal and external purposes
- M&A work
- Model scoping
- Project finance
- Real options analysis
- Refinancing / restructuring
- Strategic modelling
- Valuations
- Working capital management

If you require modelling assistance of any kind, please do not hesitate to contact us at contact@sumproduct.com.

Please forward!

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If you have received a forwarded newsletter and would like to receive future editions automatically, please subscribe by completing our newsletter registration process found at the foot of any http://www.sumproduct.com web page.

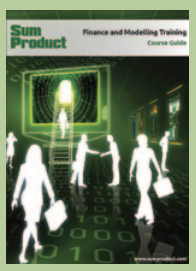
Any questions?

If you have any tips, comments or queries for future newsletters, we'd be delighted to hear from you. Please drop us a line at newsletter@sumproduct.com.

Training

SumProduct offers a wide range of training courses, aimed at finance professionals and budding Excel experts. Courses include Excel Tricks & Tips, Financial Modelling 101, Introduction to Forecasting and M&A Modelling.

Check out our more popular courses in our training brochure:



Email us at training@sumproduct.com for a copy of the brochure, or download it directly from: http://www.sumproduct.com/training.

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