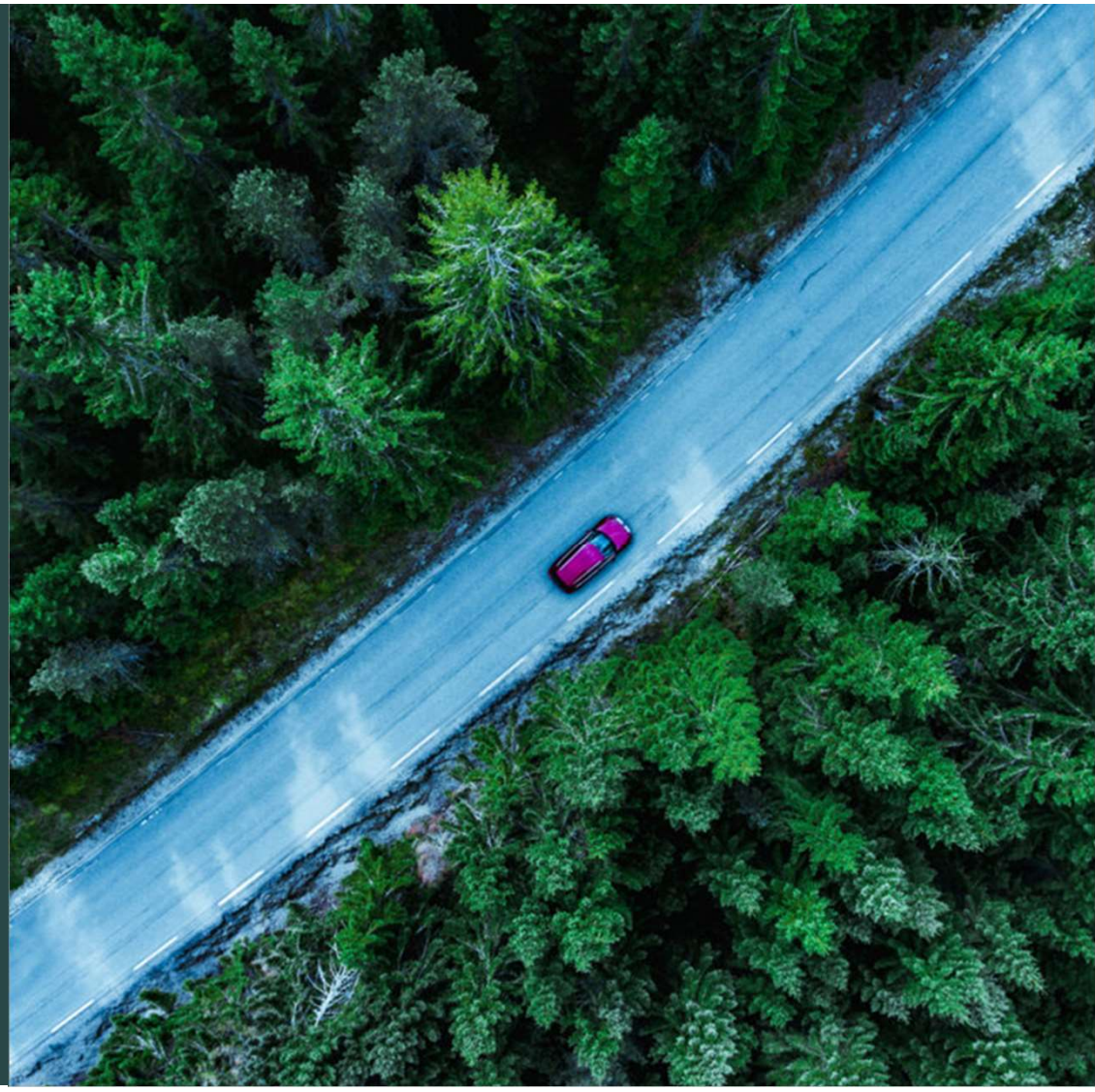
Model review tools

Joshua Grimm

2 November 2022



mazars

Your presenter

Introduction

Joshua Grimm

Manager
Training Lead (APAC)

- Chartered Accountant (CA ANZ)
- Bachelor of Commerce - Accounting (BComm)

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- Passionate about financial modelling from both corporate and project finance perspectives
- Experience includes modelling and analysis for large scale project finance transactions and operational models with particular focus on renewable energy projects
- Specialising in operational models and accounting
- Experienced in training and coordination of project finance model development courses

About Mazars

Figures as of 1 January 2022

Growing with our clients globally

€2.1bn
fee income

1
Global partnership

90+
countries & territories

1,000
partners

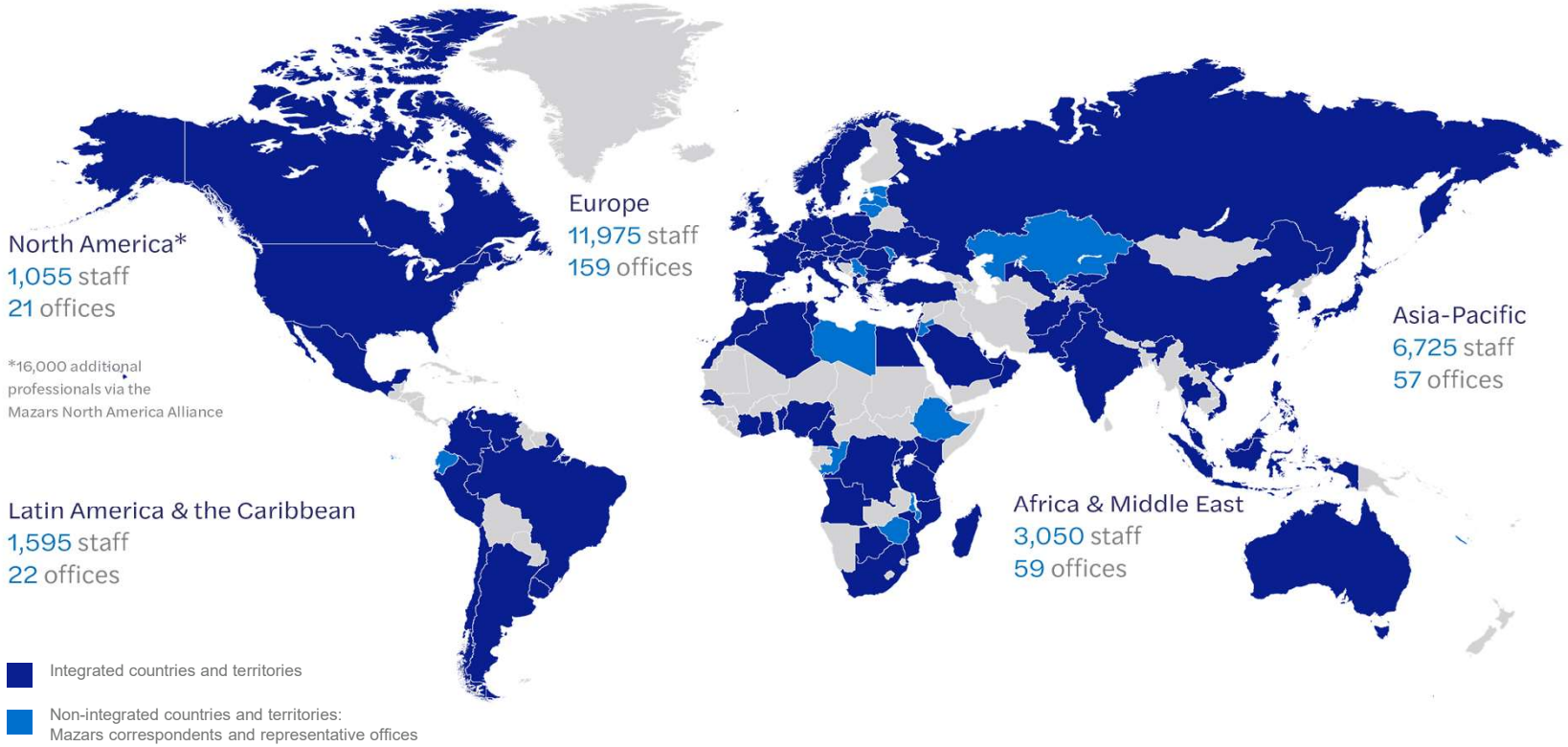
+12.3%
growth

300+
offices

54%
of our global workforce are women

44,000+
professionals: 28,000+ in our integrated partnership and 16,000+ via the Mazars North America Alliance

About Mazars
Our global coverage



Online Resources
Webinars, blog posts, tutorials and more

We have developed our approach to financial modelling since 2005, and have a continued focus on sharing our expertise in webinars and tutorials to keep pushing the industry ahead. Our webinar series is an opportunity to learn more about our approach to financial modelling and transaction analysis.

We recommend the DSCR webinar below as an example of the 'look and feel' of our financial model and the Portfolio webinar for our broader skillset.

Modelling portfolios: What are the options and how to choose between them

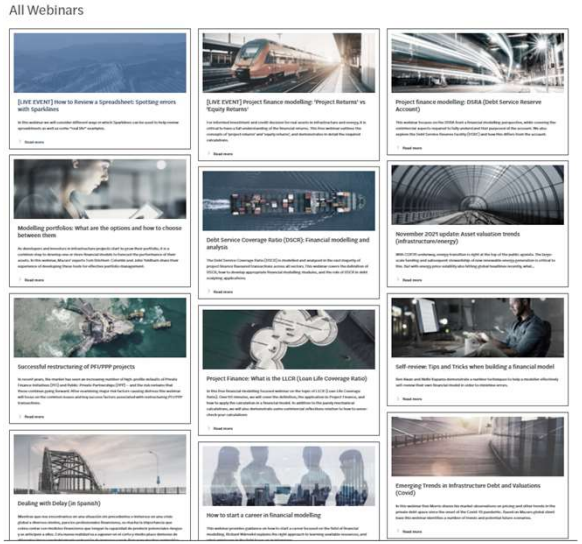
As developers and investors in infrastructure projects start to grow their portfolio, it is a common step to develop one or more financial models to forecast the performance of their assets. In this webinar, Mazars' experts Tom Brichieri-Colombi and John Yeldham share their experience of developing these tools for effective portfolio management.

Read more

Debt Service Coverage Ratio (DSCR): Financial modelling and analysis

The Debt Service Coverage Ratio (DSCR) is modelled and analysed in the vast majority of project finance flavoured transactions across all sectors. This webinar covers the definition of DSCR, how to develop appropriate financial modelling modules, and the role of DSCR in debt sculpting applications.

Read more



financialmodelling.mazars.com/resources/modelling-portfolios-webinar/ https://financialmodelling.mazars.com/resources/dscr-webinar/ https://financialmodelling.mazars.com/online-resources/webinars/

Outline
Model review tools

- Principles of model review
- Inspection review techniques (using inquire, formula auditing tools, Go To special cells)
- Analytical review techniques (using sparklines, scenario analysis, dashboards, watch window)
- Common errors typical in models
- Review exercise: Finding errors
- Review exercise: Building a delta sheet
- Review exercise: Fixing debt calculations

01

Section 01:

Principles of a model review

Model errors
Principles of a model review

Key risks

- Models contain errors:
  - 100% of models contain errors of some kind [Ernst & Young]
  - 90% of all Excel spreadsheets with more than 150 rows of Excel formulae contain material errors [KPMG]
  - MBA students with over 250 hours of spreadsheet development experience had a 24% chance of introducing spreadsheet errors in to the first worksheet they built [R. Panko, 1998]
- Business and financiers rely on these models
  - Objective of a model validation (not an audit) is to provide assurance that results can be relied upon
  - Otherwise, bad decisions can be made
  - Intention is to reduce financial risk

Model errors
Principles of a model review

Examples of how model risk manifests

- Model developed generically or ad hoc without a planning and design phase
- Insufficient training of the model developer (and often user)
- Lack of use of a methodology such as the Mazars Modelling Methodology
  - No segregation of inputs, calculations and outputs
  - Inconsistent formulae across row
  - Sub-optimal spreadsheet architecture
- No model documentation when model is headed over between users
- Complex / non-transparent formula (nested logic, unnecessary functions)
- Occurrence of un-trapped circular references

Model errors
Principles of a model review

Quality control: Process

Model risk can be largely mitigated with a practical “modelling policy” which covers

- What modelling methodology is to be used (i.e. Mazars Modelling Methodology)
- What is the starting file (template) for models
- Style guide (logos, colour codes, legal disclaimer etc)
- Specific do’s and don’ts (functions to avoid, circular ref expectations, size of formulas)
- Built in checks – signal versus intergrity
  - E.g. Does the Balance Sheet Balance?
  - E.g. Do sources of funds equal uses of funds
  - E.g. is cash negative?
- Internal review guidelines / expectations prior to submission to management
  - Who should review a model
  - When it is performed
  - Method for finding, reporting and fixing issues

Model errors
Principles of a model review

Quality control: Model review

Model risk can be formally mitigated through a model review process (either internal or external)

External

- Appointment of an independent professional service
- Reporting of errors is formalised and categorised according to type / importance
- Checking of revised versions until issues are satisfactorily addressed
- Issuance of a formal Opinion Letter

Internal

- This should be done by yourself as a self review and someone independent

Model auditing
Principles of a model review

The review / audit process

Key techniques in the process:

- Review by inspection,
  - supported by Inquire (or other similar packages)
  - formula auditing toolbar
- Analytical review
  - sparklines
  - scenarios analysis / delta sheets
  - dashboard
- Re-performance (or shadow modelling)

02

Section 02:

Inspection review techniques

Inquire
Inspection review techniques

Spreadsheet Inquire add-in

- In-built add in within Excel 2013 onward

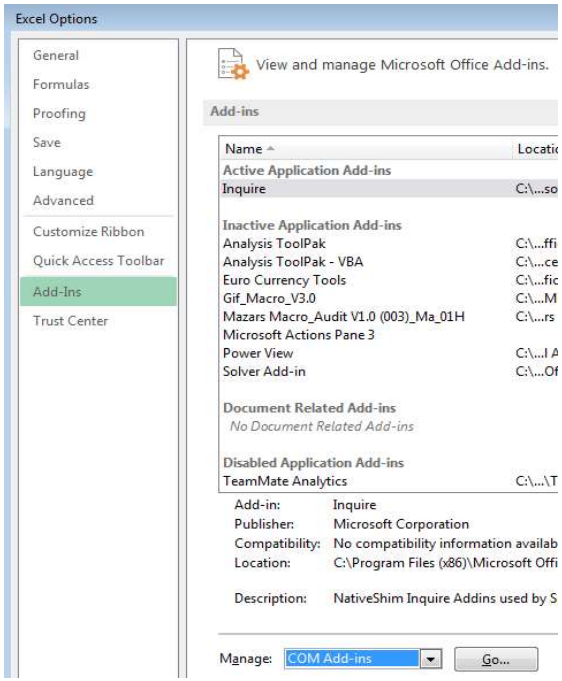
- Analysis of a workbook:
  - Logical structure
  - Error status
  - Compare files
  - Help assess workbook risk

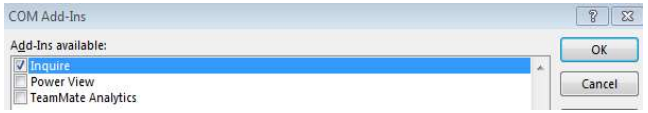
How to activate

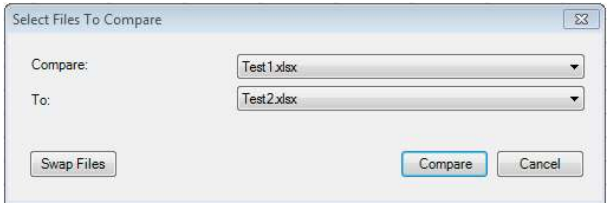
- File > Options > Add-Ins

- “Manage” > select “COM Add-ins” and check “Go”

- Tick on “Inquire” and click “OK



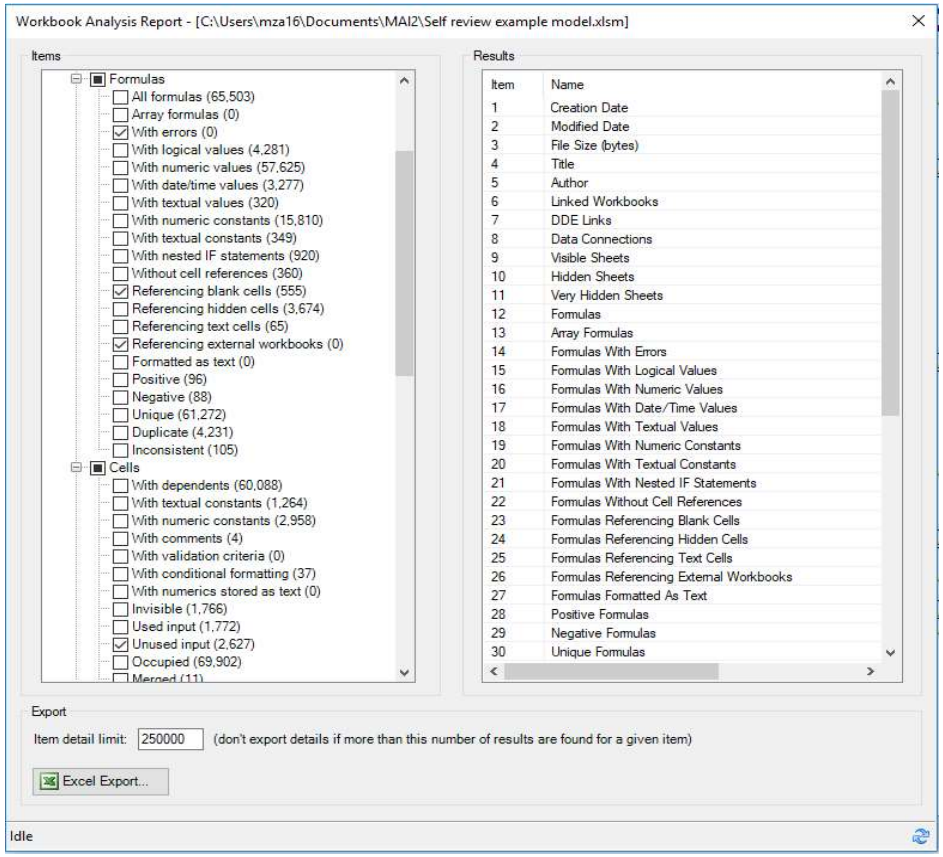




Inquire: Generic excel errors
Inspection review techniques

The most common errors are the generic excel errors

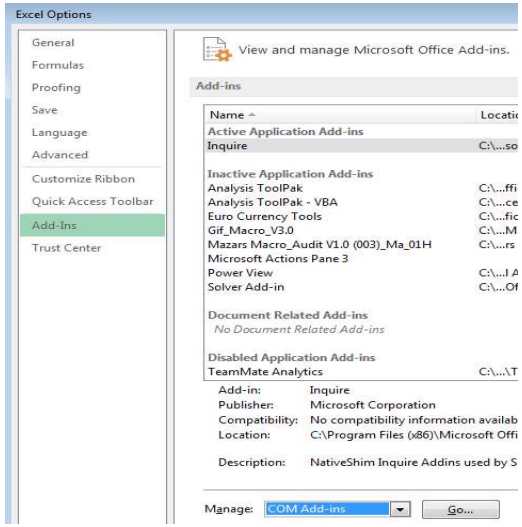
- Formulas with errors (#REF!, #DIV! etc)
- Formulas referencing to blank cells
- Formulas referencing to external workbooks
- Unused inputs
- Inconsistent formulae across rows
- Mistakes often made when unknown changes have been made to the model

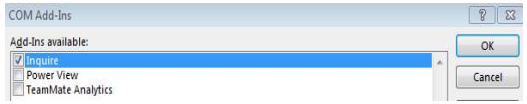


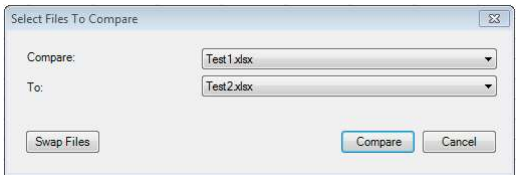
Inquire: Comparing files
Inspection review techniques

Mistakes are often made when unknown changes have been made to the model

- How to activate Inquire
  - Go to File > Options on most versions of Excel 2013 onwards
  - Click on “Add-Ins” in “Excel Options”
  - At the bottom of “Excel Options”, go to “Manage” , select “COM Add-ins” and check “Go”
  - Tick on “Inquire” and click “OK
- Select “Inquire” and go to “Compare Files”
- You will need to filter the comparison files as it provides differences in all formulas rather than just unique formulas





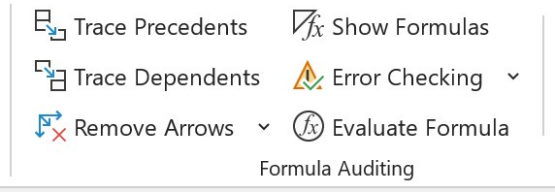


Spreadsheet Inquire - demonstration

Excel's Native Tools
Inspection review techniques

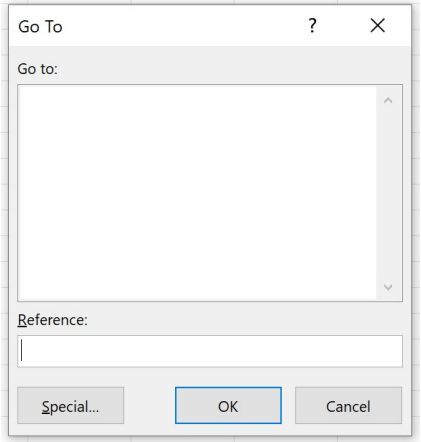
Auditing toolbar:

- Error checking
- Trace dependents
- Trace precedents
- Show watch window
- Evaluate formula



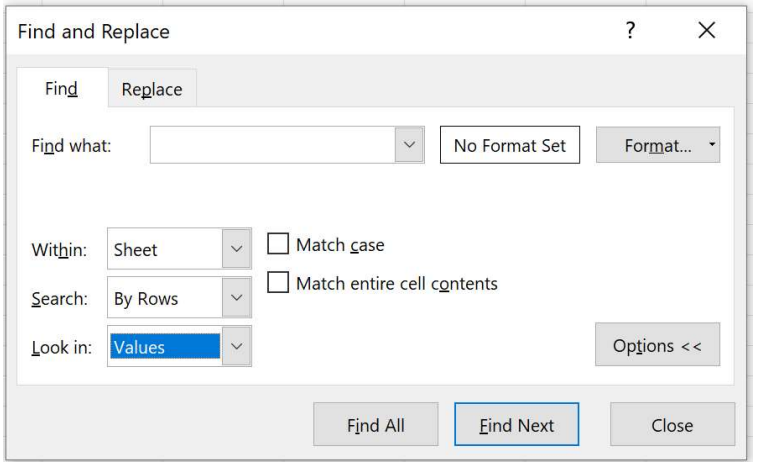
Go To:

- Ctrl+G or F5
- 'Special':
  - Row differences
  - Column differences
  - Constants



Other tools:

- Ctrl-F – look for '#' - in values
- Options –> error checking rules

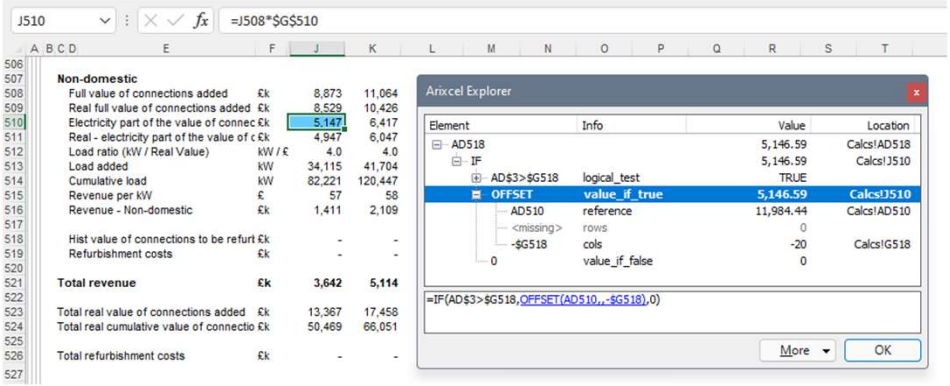


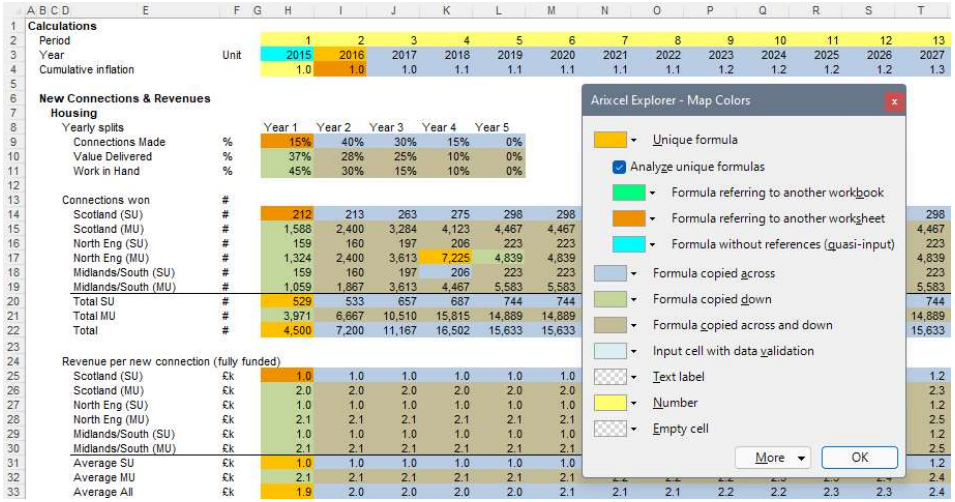
Excel’s native tools - demonstration

Third-party add-ins
Inspection review techniques

Third party add-ins also offer a range of useful features

- Formula auditing
  - Easily trace dependants/precedents
  - Target locations (e.g. SUMIF, OFFSET)
  - Traverse name ranges
  - Step through evaluation
  - Navigate with ease
- Workbook mapping
- Spreadsheet comparisons
- Calculation flow
- Shortcuts & tools
- Reports





Arixcel Explorer - demonstration

03

Section 03:

Review exercise #1 – finding errors

04

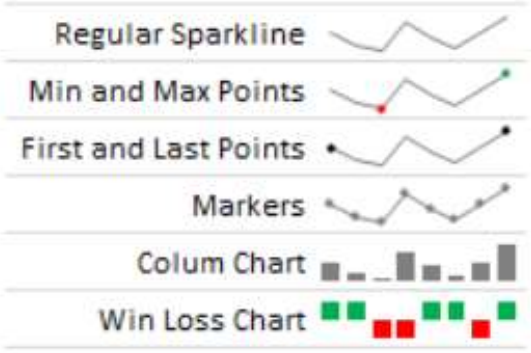
Section 04:

Analytical review techniques

Sparklines
Analytical review techniques

An unexpected peak or trough in the numbers may indicate an error

- How to draw sparklines
- Design of sparklines
- Type of sparklines
- Axis for comparisons



Scenario analysis
Analytical review techniques

Scenarios

Scenario analysis is critical in helping to identify errors in a financial model

Key characteristics

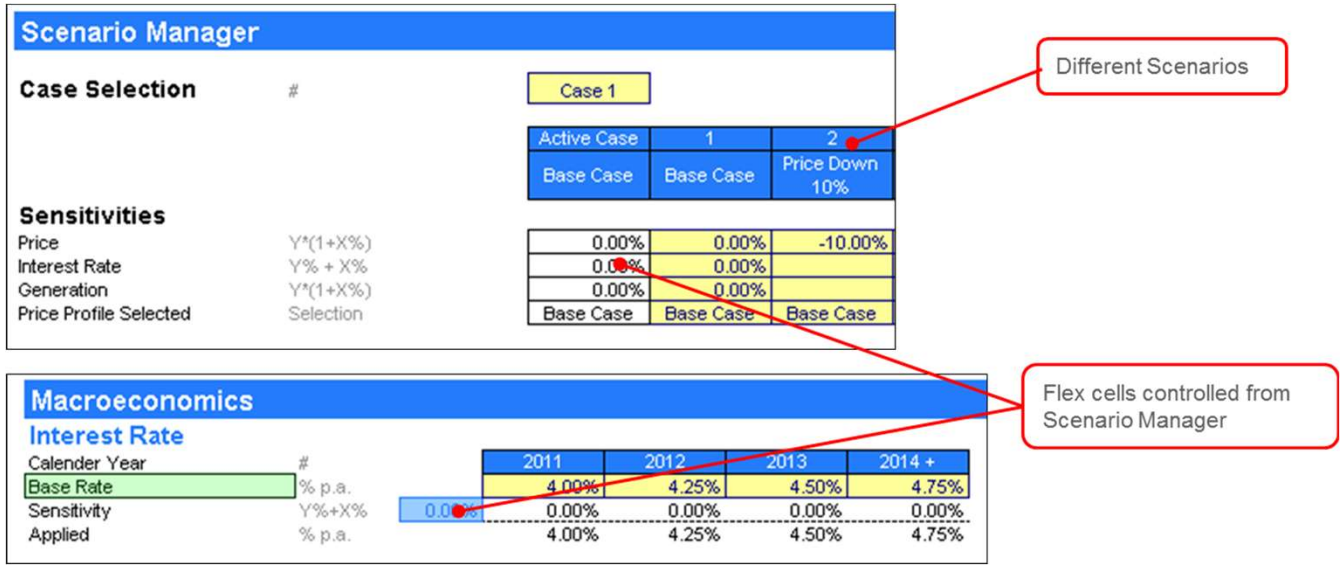
- Flexes are an efficient way to test sensitivity of key model drivers without altering the structure of the model (e.g., generation/turbine, price, interest rate)
- Two types of flexes:
  - Multiplicative: base case * (1 + flex%)
  - Additive: base case + flex%
- If adding flexes retrospectively, take caution to ensure the new applied line is correctly linked into calculation tabs

Scenario analysis
Analytical review techniques

Scenario manager

Mazars' method:

- Set up a separate sheet for the scenario manager
- Flex implemented to inputs/calculations without altering underlying calculations

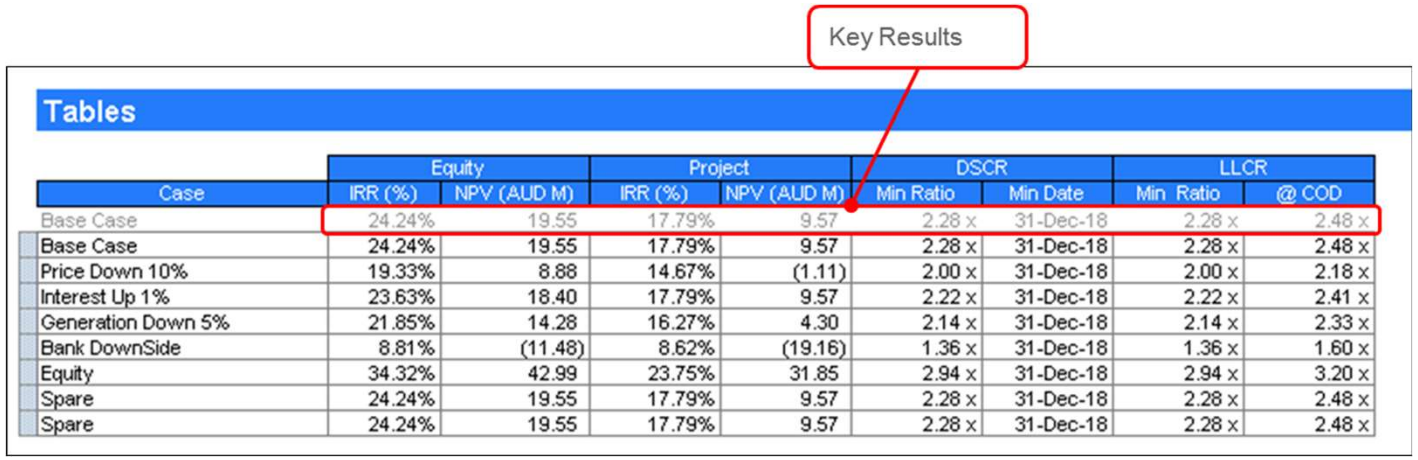


Scenario analysis
Analytical review techniques

Tips

Data table

- Key results to be laid out in the first line of table
- F9 to update table
- CAUTION : Too many data tables may slow down a workbook

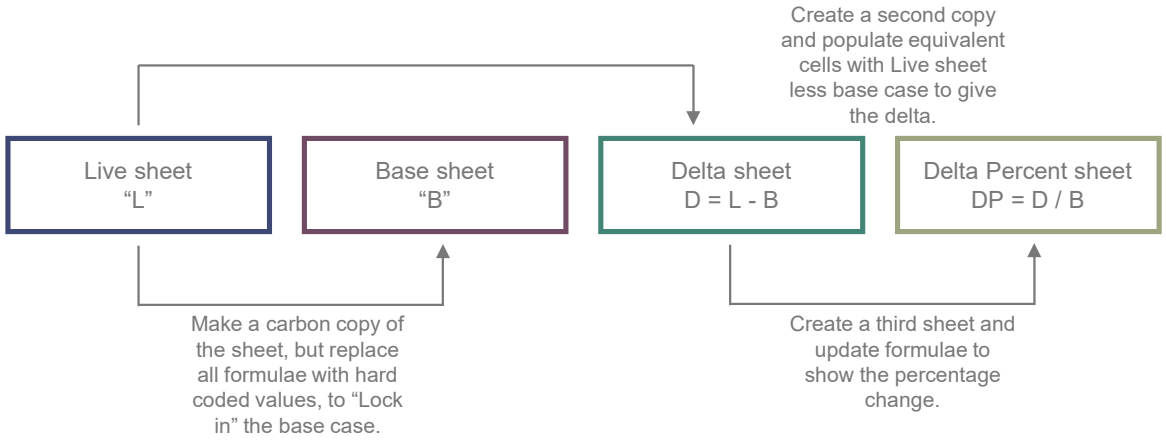


Case	Equity		Project		DSCR		LLCR	
	IRR (%)	NPV (AUD M)	IRR (%)	NPV (AUD M)	Min Ratio	Min Date	Min Ratio	@ COD
Base Case	24.24%	19.55	17.79%	9.57	2.28 x	31-Dec-18	2.28 x	2.48 x
Base Case	24.24%	19.55	17.79%	9.57	2.28 x	31-Dec-18	2.28 x	2.48 x
Price Down 10%	19.33%	8.88	14.67%	(1.11)	2.00 x	31-Dec-18	2.00 x	2.18 x
Interest Up 1%	23.63%	18.40	17.79%	9.57	2.22 x	31-Dec-18	2.22 x	2.41 x
Generation Down 5%	21.85%	14.28	16.27%	4.30	2.14 x	31-Dec-18	2.14 x	2.33 x
Bank DownSide	8.81%	(11.48)	8.62%	(19.16)	1.36 x	31-Dec-18	1.36 x	1.60 x
Equity	34.32%	42.99	23.75%	31.85	2.94 x	31-Dec-18	2.94 x	3.20 x
Spare	24.24%	19.55	17.79%	9.57	2.28 x	31-Dec-18	2.28 x	2.48 x
Spare	24.24%	19.55	17.79%	9.57	2.28 x	31-Dec-18	2.28 x	2.48 x

Scenario analysis
Analytical review techniques

An unexpected change in outputs from a change of inputs may indicate an error

- What is the change in the results I am expecting? Is this what happens?
- Create a delta sheet



Dashboards
Analytical review techniques

- Do the key results and outputs make sense?
  - Can you explain them?
- Do you have a summary check in your dashboard sheet?
  - Is one of your checks failing. If so why?

05

Section 05:

Scenarios & delta sheets - demonstration

06

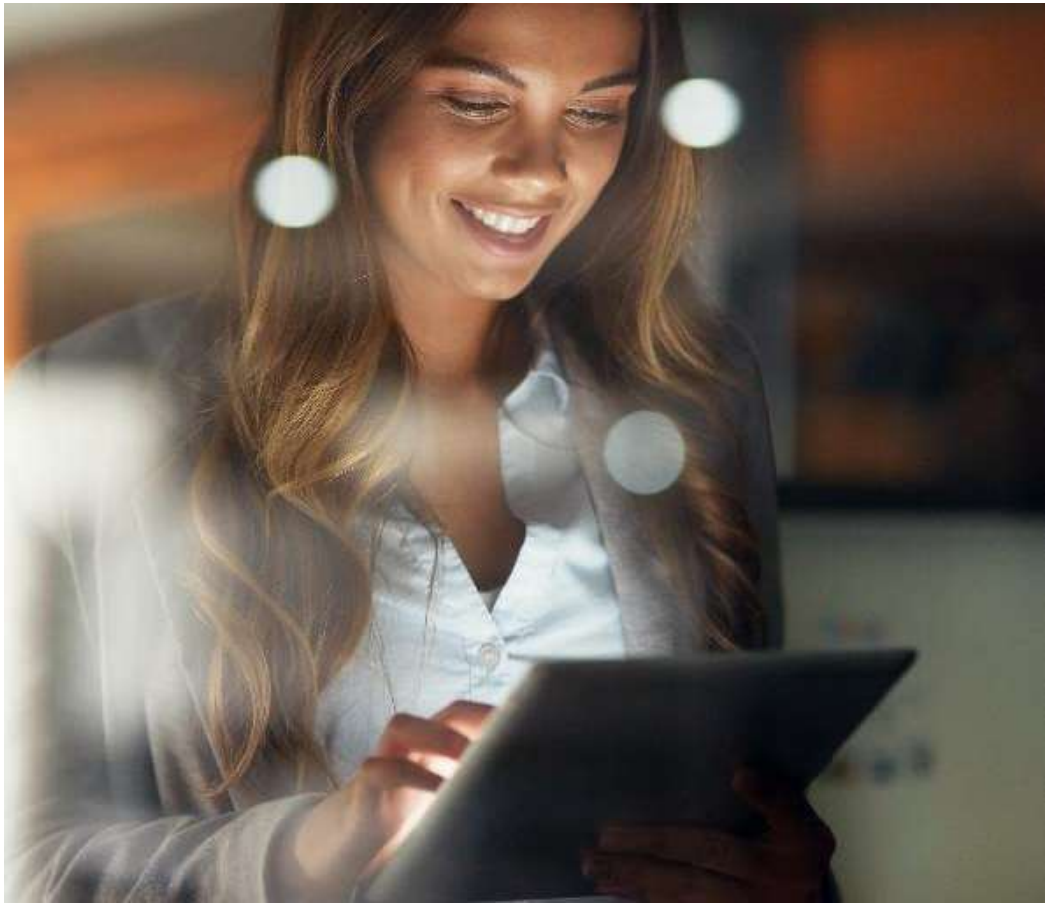
Section 06:

Replication

Replication
Model review

This is what we do at Mazars

- For us this means shadow modelling.
- It is end to end analysis approach which can be reviewed
- Evidence suggests this is a much more robust approach than ‘cell by cell’



07

Section 07:

Top Ten Errors

Model audit
Top 10 errors

ERROR #1

General excel

- Formulas inconsistent across rows
- Hash errors IF(AND(L$2>=$E8,L$3<=$F8),1,#REF!)
- Unused inputs
- Labels

Run a few simple tests to avoid these silly errors

F5 Special -> Row Differences

Ctrl + F

L	F	>	>	>	>	>	>	>	>	>
L	F	>	>	>	>	>	>	>	>	>
L	F	>	>	>	>	>	>	>	>	>
L	F	>	>	>	>	>	>	>	>	>
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L	F	>	>	>	>	>	>	>	>	>
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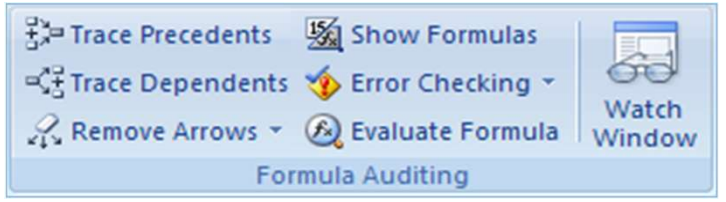
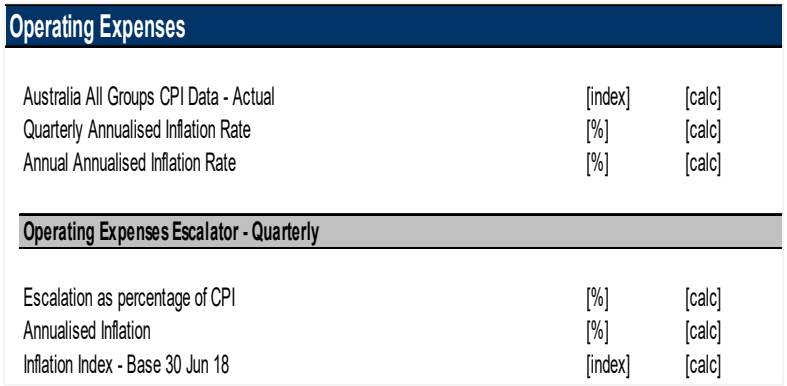


Model audit
Top 10 errors

ERROR #2

Escalation

- Base date of escalation
- Date of uplift (e.g. 1 Jan or 1 July)
- Frequency of the escalation factor
- Should it be applied or not



Operating Expenses		
Australia All Groups CPI Data - Actual	[index]	[calc]
Quarterly Annualised Inflation Rate	[%]	[calc]
Annual Annualised Inflation Rate	[%]	[calc]
Operating Expenses Escalator - Quarterly		
Escalation as percentage of CPI	[%]	[calc]
Annualised Inflation	[%]	[calc]
Inflation Index - Base 30 Jun 18	[index]	[calc]

A small change in escalation can have a large impact on outputs due to the compounding effect

Make sure that the escalation formula is consistent with the contract

Model audit
Top 10 errors

ERROR #3

Financial statement irregularities

- Incorrect signs:
  - Cash
  - Fixed Assets
  - Debt Balance

- Where is this account??

Graph (using sparklines) the financial statements and see what happens when you change the scenario

Model audit
Top 10 errors

ERROR #4

Macros

- Macros not solving
- Macros taking too long to run
- Save the file
- Use name range

Make sure you press the macro button and it solves

Model audit
Top 10 errors

ERROR #5

Loan life coverage ratio

- We have seen a number of issues in the calculation of ratios, in particular the LLCR

> LLCR = NPV of CFADS during Loan Life / Debt Outstanding

- The most common errors:
  - CFADS not matching the financing documents
  - Discounting of CFADS not done right
  - It's LLCR not PLCR

Check how the LLCR is defined in the financing documents

Model audit
Top 10 errors

ERROR #6

Returns

- Project cashflow and equity cashflow calculations
- Pre versus post tax cashflows
- Nominal versus real cashflows
- Discount rates
- XNPV and XIRR formulae

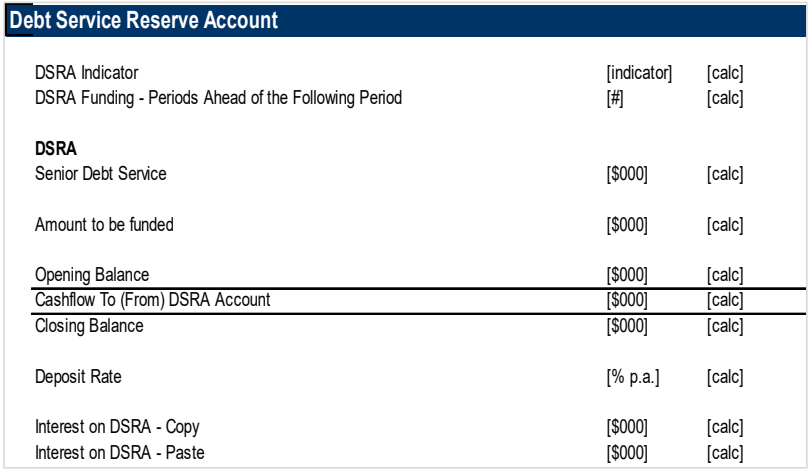
Check each of these labels and references

Model audit
Top 10 errors

ERROR #7

Debt service reserve account

- Target balance not met
- Distributions paid when the DSRA is not fully funded
- DSRA maintained until the project timeline
- Funds not being released at maturity
- Cash inflow/outflows are the wrong way around
- Circularity macro not run (as a result of forward looking target balance)



Debt Service Reserve Account		
DSRA Indicator	[indicator]	[calc]
DSRA Funding - Periods Ahead of the Following Period	[#]	[calc]
DSRA		
Senior Debt Service	[$000]	[calc]
Amount to be funded	[$000]	[calc]
Opening Balance	[$000]	[calc]
Cashflow To (From) DSRA Account	[$000]	[calc]
Closing Balance	[$000]	[calc]
Deposit Rate	[% p.a.]	[calc]
Interest on DSRA - Copy	[$000]	[calc]
Interest on DSRA - Paste	[$000]	[calc]

A step-by-step DSRA calculation is on the Mazars training website

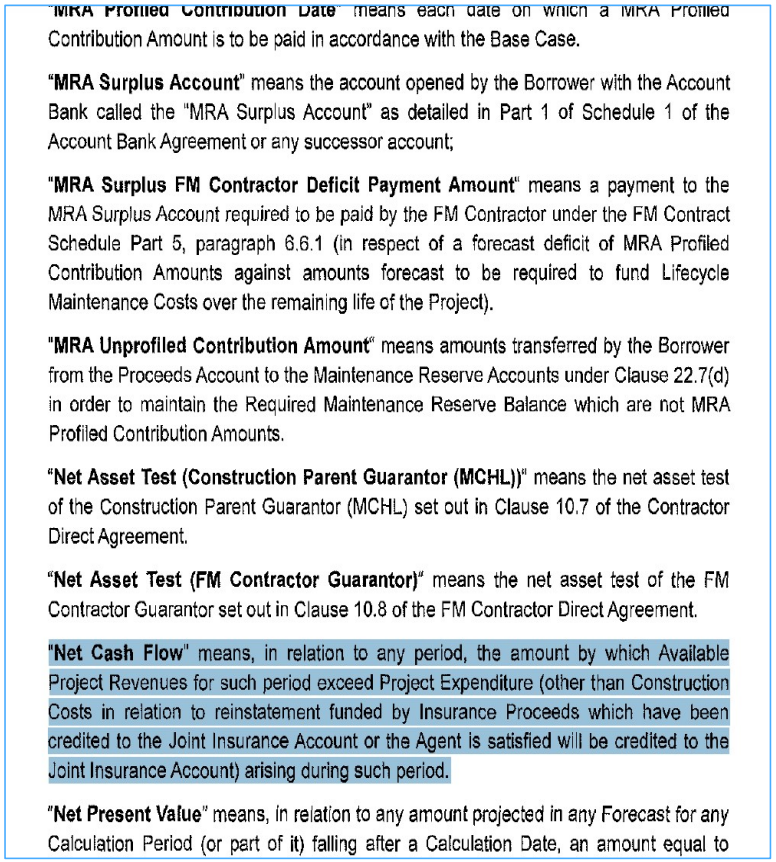
Debt Service Reserve Account (DSRA) | Mazars Financial Modelling

Model audit
Top 10 errors

ERROR #8

Financing documents

- Debt covenants
  - Lock-up ratio
  - Gearing ratio
- Timing and rates
  - Margin
  - Upfront fee
- Dividend restrictions



"**MRA Profiled Contribution Date**" means each date on which a MRA Profiled Contribution Amount is to be paid in accordance with the Base Case.

"**MRA Surplus Account**" means the account opened by the Borrower with the Account Bank called the "MRA Surplus Account" as detailed in Part 1 of Schedule 1 of the Account Bank Agreement or any successor account;

"**MRA Surplus FM Contractor Deficit Payment Amount**" means a payment to the MRA Surplus Account required to be paid by the FM Contractor under the FM Contract Schedule Part 5, paragraph 6.6.1 (in respect of a forecast deficit of MRA Profiled Contribution Amounts against amounts forecast to be required to fund Lifecycle Maintenance Costs over the remaining life of the Project).

"**MRA Unprofiled Contribution Amount**" means amounts transferred by the Borrower from the Proceeds Account to the Maintenance Reserve Accounts under Clause 22.7(d) in order to maintain the Required Maintenance Reserve Balance which are not MRA Profiled Contribution Amounts.

"**Net Asset Test (Construction Parent Guarantor (MCHL))**" means the net asset test of the Construction Parent Guarantor (MCHL) set out in Clause 10.7 of the Contractor Direct Agreement.

"**Net Asset Test (FM Contractor Guarantor)**" means the net asset test of the FM Contractor Guarantor set out in Clause 10.8 of the FM Contractor Direct Agreement.

"**Net Cash Flow**" means, in relation to any period, the amount by which Available Project Revenues for such period exceed Project Expenditure (other than Construction Costs in relation to reinstatement funded by Insurance Proceeds which have been credited to the Joint Insurance Account or the Agent is satisfied will be credited to the Joint Insurance Account) arising during such period.

"**Net Present Value**" means, in relation to any amount projected in any Forecast for any Calculation Period (or part of it) falling after a Calculation Date, an amount equal to

Every time there is a change to the financing documents ensure the model is also updated

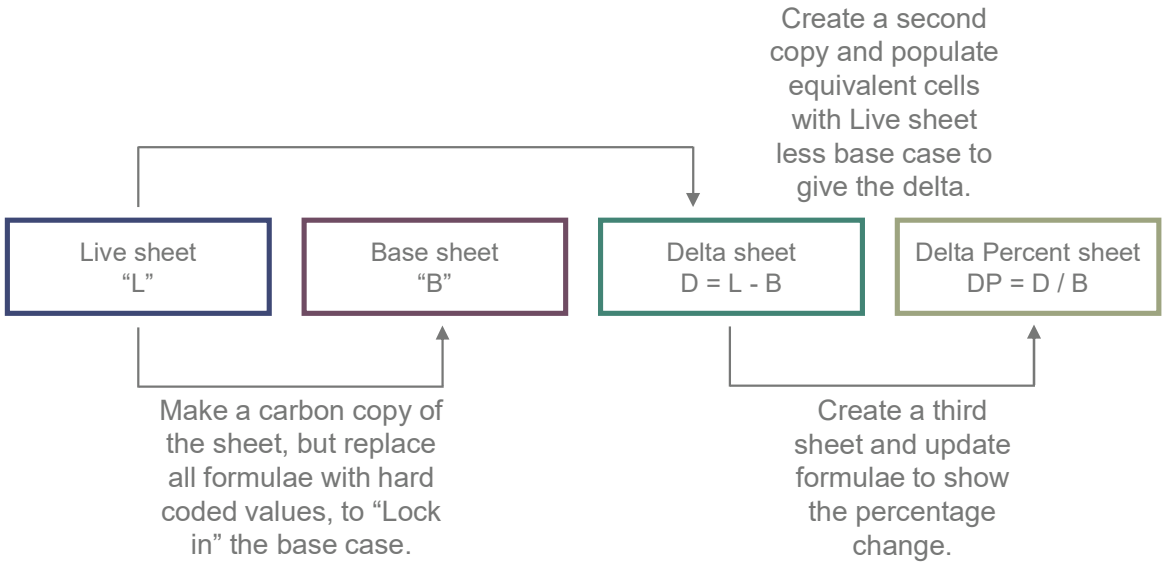
Model audit
Top 10 errors

ERROR #9

Sensitivities and scenarios

- Inputs not linked
- Facilities are not active in delay scenarios
- Lock-ups / cash sweeps / LDs etc

Make sure you understand the deltas



Advanced Technique: Delta Sheets Webinar | Mazars Financial Modelling

Model audit
Top 10 errors

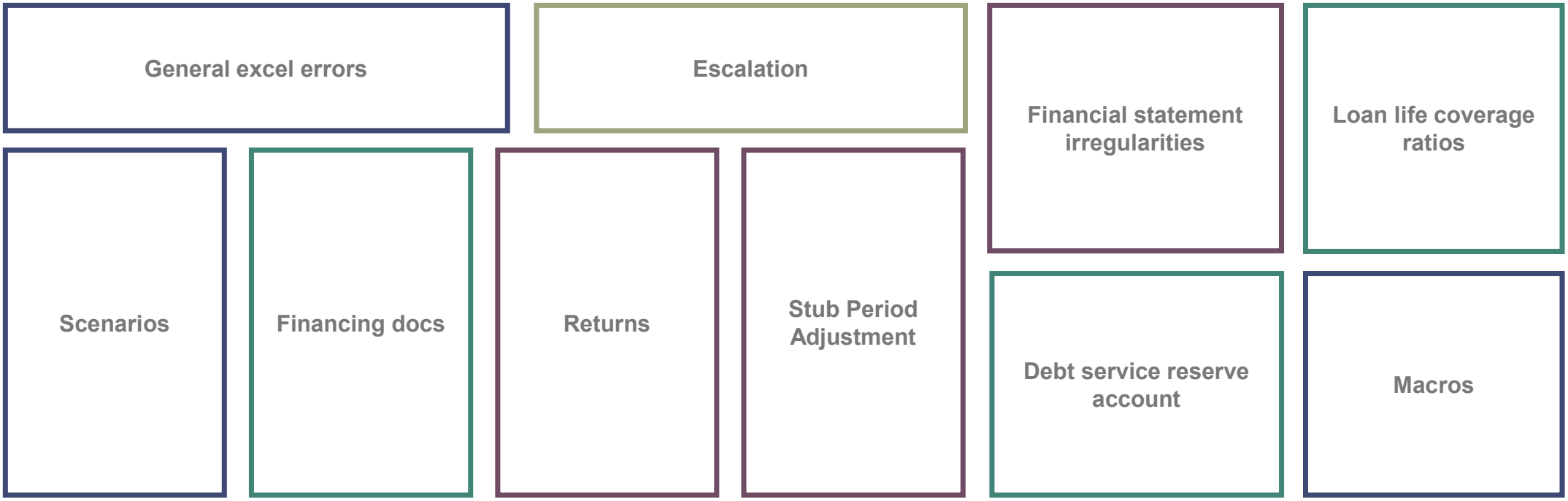
ERROR #10

Stub period adjustments

- Mid-period start/end dates
- Common issues relate to:
  - Revenues and costs
  - Interest
  - Commitment fees

Double check the first period and last period of calculations when there is a stub period

Model audit
Top 10 errors



‘Top 10 Ways To Fix An Unbalanced Balance Sheet’ blog post

https://financialmodelling.mazars.com/top-10-ways-to-fix-an-unbalanced-balance-sheet/

1. Make sure your Balance Sheet check is correct and clearly visible
2. Check that the correct signs are applied
3. Ensuring we have linked to the right time period
4. Check the consistency in formulae
5. Check all sums
6. The delta in Balance Sheet checks
7. Double and half the Balance Sheet check
8. Work from right to left
9. Opening balance testing
10. Check changes period to period of Balance Sheet items

08

Section 08:

Review exercise #2 – sparklines, delta sheets & scenarios

11

Section 11:

Course wrap up

Other resources
Follow our webinar series

We have developed our approach to financial modelling since 2005, and have a continued focus on sharing our expertise in webinars and tutorials to keep pushing the industry ahead. Our webinar series is an opportunity to learn more about our approach to financial modelling and transaction analysis.

We recommend the DSCR webinar below as an example of the ‘look and feel’ of our financial model and the Portfolio webinar for our broader skillset.

Modelling portfolios: What are the options and how to choose between them

As developers and investors in infrastructure projects start to grow their portfolio, it is a common step to develop one or more financial models to forecast the performance of their assets. In this webinar, Mazars' experts Tom Brichieri-Colombi and John Yeldham share their experience of developing these tools for effective portfolio management.

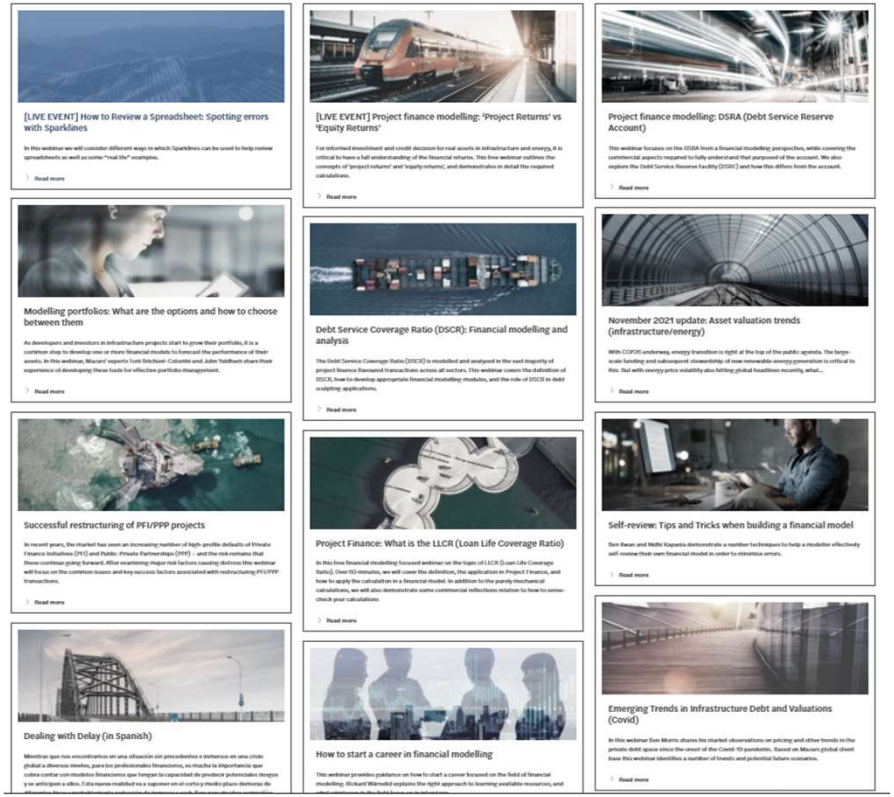
Read more

Debt Service Coverage Ratio (DSCR): Financial modelling and analysis

The Debt Service Coverage Ratio (DSCR) is modelled and analysed in the vast majority of project finance flavoured transactions across all sectors. This webinar covers the definition of DSCR, how to develop appropriate financial modelling modules, and the role of DSCR in debt sculpting applications.

Read more

All Webinars



https://financialmodelling.mazars.com/resources/dscr-webinar/
https://financialmodelling.mazars.com/resources/dscr-webinar/
https://financialmodelling.mazars.com/online-resources/webinars/

Other resources
ICAEW

THE INSTITUTE OF CHARTERED ACCOUNTANTS IN ENGLAND AND WALES

https://www.icaew.com/-/media/corporate/files/technical/technology/excel-community/20-principles-of-good-spreadsheet-practice-2018.ashx
https://www.icaew.com/-/media/corporate/files/technical/technology/excel-community/how-to-review-a-spreadsheet-report.ashx

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