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FINANCIAL MODELLING

MODEL REVIEW & RISK MANAGEMENT

F1F9.com

The management of modelling risk is important for all organisations that use Excel to support business decisions. To be effective you will need to consider a number of complementary practices. Some will reduce the likelihood of an error, such as training and the use of modelling best practice. Others, including model reviews, will identify errors so they can be corrected.

We can help you manage your exposure to modelling risk with an approach suited to your particular risk profile.

Our established services are outlined here, and can be tailored to meet your specific requirements.

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FIT FOR PURPOSE MODEL REVIEW

Timeframe
4 working days
Fee
3,000 – 5,000 GBP
depending on the size of your model

Consider a *Fit for Purpose Model Review* if you have built or inherited a model and want independent confirmation that it has been professionally constructed in a way that will minimise the risk of errors.

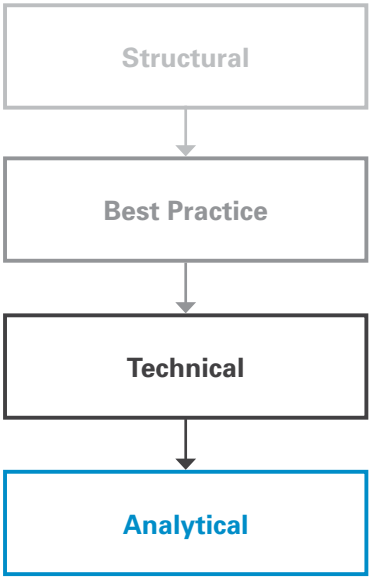
We will provide a written report that provides an opinion using narrative-based (*qualitative*) analysis and risk-based (*quantitative*) scoring for each element of the review.

Structural
We review how key structures have been combined to form the complete model, the method of any 'model solving', and the use of checks and balances. We also review key structures including how timing and indexation are modelled.

Best Practice
We will check for all elements of generally accepted best practice, and place additional emphasis on elements that are most material to the risk of error.

Technical
We use software to identify technical issues that create errors in the model or increase the risk of an error occurring. Examples are unused inputs, inconsistent formulas and embedded values.

Analytical
We will perform a high-level analytical review of each line item on the financial statements. Simple data visualisation identifies any unexpected trends over time, considering the line item in isolation and with respect to related line items.



COMPREHENSIVE REVIEW

Timeframe
first iteration within 5 working days
Fee
5,000 – 8,000 GBP
depending on the size of your model

Consider this review if you need confidence in the results of a business-critical model.

Our *Comprehensive Review* has a clearly defined scope, which fully describes the review activities we undertake and their impact on reducing the likelihood of a material error. We will provide a written report that clearly sets out the work undertaken, the issues identified and the actions taken to resolve them.

Technical
We use software to identify technical issues that cause errors in the model or increase the risk of an error occurring – some examples are unused inputs, inconsistent formulae and embedded values.

Timing and indexation
Timing and indexation errors account for a large proportion of the issues we find. We interrogate the model logic to identify model timings, compare them to relevant inputs and then cross check against related timings. The indexation logic for every cost and revenue is reviewed in the same way.

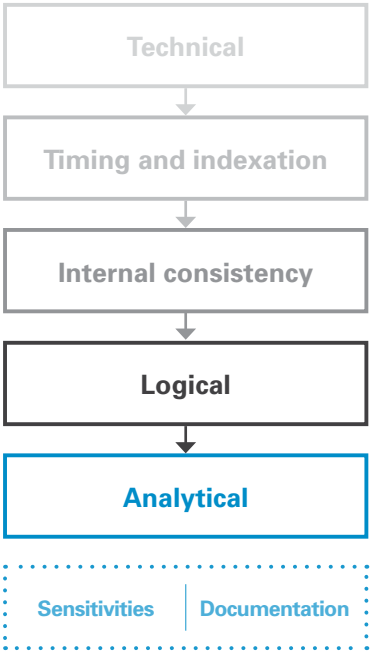
Internal consistency
We perform defined tests to identify any currency denominated inputs that do not flow through to the model's outputs, the consistency of units and signs of each calculated line item, and the integration of the financial statements.

Logical
We review standard model calculations - such as NPV and IRR - cell by cell. We review all other model logic alongside a bespoke checklist that prioritises issues with the highest likelihood and impact. We also define the function of any macros in the model and fully review them against this definition.

Analytical
We undertake a high-level analytical review of each line item on the financial statements.
We use simple data visualisations to identify any unexpected trends over time, considering the line item in isolation and with respect to related line items.

Sensitivities (Optional)
We run defined sensitivities in your model to track, analyse and interrogate the impact on the financial statements and other model outputs.

Documentation (Optional)
We review inputs and model logic against source documents, including credit agreements and contracts. Depending on your requirements, we will review complete documents or particular sections or clauses.



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TRAINING

Timeframe
1 day
Fee
4,000 GBP per day (maximum 6 people)

You should consider this training course if you or your staff need to review financial models in order to gain confidence in the model's construction and the presented results.

Equip modellers and model users with the skills required to:

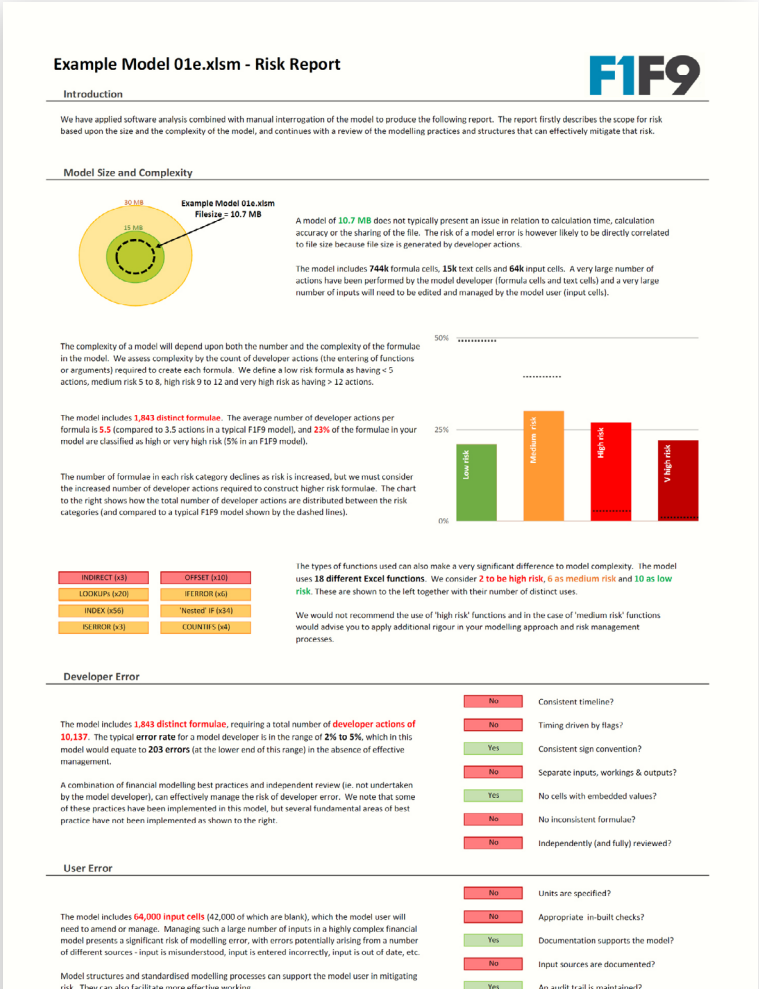
- Use Excel functionality to navigate and interrogate complex spreadsheets
- Understand the model environment, including timing within model periods
- Be aware of the potential scope of model review and what can be achieved
- To be aware of modelling best practices and bad modelling practices
- To employ high level review techniques for maximum impact

MODEL RISK CHECK

Timeframe
48 hours
Fee
350 GBP per report

This review is ideal if you want information to support the case for remediation work to a model, or otherwise to confirm that remediation is not required.
The report is generated using our own proprietary software.

The single page report displays data in relation to model size and complexity and presents it alongside our own benchmarks.
It also presents information relevant to the occurrence of a developer error (an error in model construction), and the occurrence of a user error (input, operation and interpretation).



Example Model 01e.xlsm - Risk Report

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Introduction

We have applied software analysis combined with manual interrogation of the model to produce the following report. The report firstly describes the scope for risk based upon the size and the complexity of the model, and continues with a review of the modelling practices and structures that can effectively mitigate that risk.

Model Size and Complexity

A model of 10.7 MB does not typically present an issue in relation to calculation time, calculation accuracy or the sharing of the file. The risk of a model error is however likely to be directly correlated to file size because file size is generated by developer actions.

The model includes **744k** formula cells, **15k** text cells and **64k** input cells. A very large number of actions have been performed by the model developer (formula cells and text cells) and a very large number of inputs will need to be edited and managed by the model user (input cells).

The complexity of a model will depend upon both the number and the complexity of the formulae in the model. We assess complexity by the count of developer actions (the entering of functions or arguments) required to create each formula. We define a low risk formula as having < 5 actions, medium risk 5 to 8, high risk 9 to 12 and very high risk as having > 12 actions.

The model includes 1,843 distinct formulae. The average number of developer actions per formula is 5.5 (compared to 3.5 actions in a typical F1F9 model), and 23% of the formulae in your model are classified as high or very high risk (5% in an F1F9 model).

The number of formulae in each risk category declines as risk is increased, but we must consider the increased number of developer actions required to construct higher risk formulae. The chart to the right shows how the total number of developer actions are distributed between the risk categories (and compared to a typical F1F9 model shown by the dashed lines).

INDIRECT (x3)	OFFSET (x10)
LOOKUPs (x20)	IFERROR (x6)
INDEX (x56)	'Nested' IF (x34)
ISERROR (x3)	COUNTIFS (x4)

The types of functions used can also make a very significant difference to model complexity. The model uses **18 different Excel functions**. We consider 2 to be high risk, 6 as medium risk and 10 as low risk. These are shown to the left together with their number of distinct uses.

We would not recommend the use of 'high risk' functions and in the case of 'medium risk' functions would advise you to apply additional rigour in your modelling approach and risk management processes.

Developer Error

The model includes 1,843 distinct formulae, requiring a total number of **developer actions of 10,137**. The typical **error rate** for a model developer is in the range of **2% to 5%**, which in this model would equate to **203 errors** (at the lower end of this range) in the absence of effective management.

A combination of financial modelling best practices and independent review (ie. not undertaken by the model developer), can effectively manage the risk of developer error. We note that some of these practices have been implemented in this model, but several fundamental areas of best practice have not been implemented as shown to the right.

No	Consistent timeline?
No	Timing driven by flags?
Yes	Consistent sign convention?
No	Separate inputs, workings & outputs?
Yes	No cells with embedded values?
No	No inconsistent formulae?
No	Independently (and fully) reviewed?

User Error

The model includes 64,000 input cells (42,000 of which are blank), which the model user will need to amend or manage. Managing such a large number of inputs in a highly complex financial model presents a significant risk of modelling error, with errors potentially arising from a number of different sources - input is misunderstood, input is entered incorrectly, input is out of date, etc.

Model structures and standardised modelling processes can support the model user in mitigating risk. They can also facilitate more effective working.

No	Units are specified?
No	Appropriate in-built checks?
Yes	Documentation supports the model?
No	Input sources are documented?
Yes	An audit trail is maintained?

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If you would like to talk about how
we can help you then please contact

John Dimberline
Model Review &
Risk Management Director

john.dimberline@f1f9.com
+44 79 7756 1507