

# Late nights with models

By Wade Glass



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If it was the headline that lured you into reading this article, then I had better confess that while I have spent many late nights with models, I'm referring to financial models, sometimes colloquially referred to as spreadsheets. I do apologise if you thought I meant anything else!

After working with financial models for a number of years, I've developed a keen interest in this relatively new and constantly evolving discipline. If you still think of spreadsheet software as a tool for simple addition and multiplication of numbers, then please read on. I will show that those tasks are at the lowest rung of a ladder of uses for off-the-shelf "spreadsheet"

packages, offer a definition of financial modelling and outline "where we're at" in this discipline. Finally, I will explain why a set of financial modelling standards is necessary to raise industry skill levels and how Chartered Accountants will benefit from contributing to this process.

This article, therefore, explains:

- what financial modelling is and why you should care
- the current state of financial modelling education and application
- the need for professional standards and guidelines for the construction and review of financial models.

## What is a financial model and what are they used for?

A generic definition of a financial model could be "a tool for the manipulation of data in a manner that enables the end user to make an informed financial decision based upon a predetermined collection of outputs". Let's examine the preceding sentence in more detail.

### 'Manipulation'

Financial models are commonly used to perform calculations in circumstances where there is either a large amount of data to be processed, or the interrelationships between the variables are complex.

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Often the calculations require modelling in a manner specific to the decision-making process of the model's builder, and thus construction of the model requires software with a large degree of flexibility. Spreadsheet-based programs are ideally suited to models that require a large degree of flexibility in their construction or outputs.

### 'Data'

Of course, a financial model must be fed data, in order to perform calculations and to provide the required outputs. Data that is entered by the users of a model is often referred to as assumptions. Assumptions can be defined as any variable that may be entered by a model's

user. Changing assumptions should not alter the structure of the model (its internal calculation framework).

Financial modellers use a variety of approaches to enter assumptions into a workbook. For example, some enter the assumptions at the top of each worksheet while others prefer to enter assumptions on dedicated assumptions sheets. It is crucial that assumptions are clearly identified and separated from the calculations area of a model.

Assumptions form the basis upon which calculations in the model are performed. Outputs are the result of calculations within a financial model, whereby data has been manipulated in accordance with

an algorithm (formulaic rules) entered by the model's creator. Unlike assumptions, outputs cells should not be altered by model users and utilising the cell protection feature of spreadsheet software is the best way to ensure this. Unprotected outputs cells are indicative of a financial model that is prone to serious error.

### 'Informed financial decisions'

Very complex models often take on the characteristics of a black box whose internal calculations are known only to the model's builder. Black boxes should be limited to in-flight recorders; they have no place in financial modelling. How can you place trust in the outputs of a financial model if you can't understand how they were derived? It's like leaping into an empty swimming pool because somebody said "trust me, the water's there!"

At the risk of stating the obvious, models are built for end users. End users are most likely the decision-makers for whom the model was built. If the end users find your model hard to use or downright confusing, they will have no trust in the outcomes.

End users almost never have an intimate knowledge of how a model has been constructed and the relationships between its various sections. It is important, therefore, that the relationships between the variables are clearly stated in the model. Assumptions should be grouped on dedicated assumptions sheets, so that the model user can quickly identify and manipulate all of the assumptions that affect a model's outputs. Calculations should proceed in a logical manner and should be broken into bite-size pieces, so that model users can understand the progression of the calculations and the composition of the outputs.

Financial models are used by Chartered Accountants and other professionals in commerce and professional practice. Some of the uses of financial models are illustrated in Table 1. Note that the applications for financial models are only limited by the builder's imagination, and that a comprehensive list of financial modelling applications would fill this *Journal*. ▶

Table 1

Application	Example
Corporate forecasting and budgeting	Long-term planning models for decision-making.
Mergers and acquisitions analysis	Bid pricing, scenario analysis.
Credit ratings	Loan portfolio modelling, credit risk assessment.
Company and business valuations	Discounted cash flow valuations
Product pricing	Activity-based costing systems
Project management	Due diligence timetable for capital raisings
Treasury management	Marking debt securities to market
Taxation management	Calculating deferred taxation, thin capitalisation "headroom"

Table 2

Tool	Application
Data tables	Enable simultaneous comparison of changes in multiple variables in a model.
Macros	<ul style="list-style-type: none"> <li>- Automation of any repetitive task in the spreadsheet.</li> <li>- User forms (dialog boxes) can be developed to standardise the user interface of the model and to interact seamlessly with the application software.</li> </ul>
Forms and controls	Examples are drop-down boxes, check boxes, option buttons, buttons, spinners and scroll bars. These enable the user to perform a number of functions, including variable changes, model functionality changes and model manipulation in an "intuitive" way. This makes a model much more user-friendly, robust and professional in appearance.
Pivot tables	Properly constructed pivot tables enable a user to "slice and dice" huge amounts of data, in order to present a concise and meaningful summary.
Hyperlinks	Enable construction of a "live" table of contents, so that a model may be navigated in a "click and point" manner, similar to the way a webpage works.

The calculations and complexity of the above models go well beyond the traditional arithmetical functions of spreadsheets. An entire article could be devoted to illustrating the power of financial models, but some examples of the more powerful functions of financial models are set out in Table 2.

The above items are a small fraction of the tools that can be combined to produce a financial model that is not only robust and powerful, but also looks good.

Like any tools, financial modelling tools must be applied correctly in order to take advantage of their benefits. For example, a macro that has been recorded is a poor example of the application of Visual Basic, and is likely to fail if parts of the model are changed. When these tools fail (mostly because of poor model design), management's confidence in financial modelling tools is diminished, and the organisation may miss out on future opportunities to create useful decision-support tools.

### Financial modelling education and application

I recently spent two years in Sydney, during which time I reviewed and built a number of large and complex financial models. Regrettably, I could have been forgiven for thinking that some of those models were built by Paris Hilton, after drinking a couple of bottles of her new perfume! All jokes aside, financial modelling (most often performed in Microsoft Excel) is a relatively new phenomenon. Because of the flexibility allowed by spreadsheet software, the approaches to financial modelling are as varied as the fingerprints of the individuals who create the models.

Whilst the model's creator may know the model intimately, variability in model design often causes the following problems:

- lack of transparency for end users
- no standardisation of modelling approaches within an organisation, meaning that each model's logic must be individually evaluated

- lack of continuity if the model's creator leaves the organisation
- lack of documentation of the model's logic or instructions for end users.

To be fair, a lot of financial models are constructed by professionals who lack the time and resources to apply best-practice financial modelling techniques. It is also difficult to educate organisational management about how a financial model will make their decision-making process easier and faster.

In the classic "chicken and egg" scenario, management normally realise the value of a comprehensive financial model only when they see it in action. To get the first model to that point, the model builder normally struggles through a number of late nights and a lack of human and technological resources.

Once management buy-in has been achieved, better hardware and software can be acquired, and essential training can be undertaken.

I often liken the ad hoc approaches to financial model construction to a world where each organisation prepares its financial statements with a different set of accounting standards. How can the readers make informed comparisons on which to base financial decisions? They can't. The same logic applies to financial models.

### The need for financial modelling standards

So far I've explained financial models and their uses, and I've described the current lack of uniformity in the approach to financial model construction. Now I put to you this proposition: builders of financial models require a set of standards governing the construction of financial models, and Chartered Accountants should be leading this initiative.

#### Why do we need standards?

The development of principles-based financial modelling standards would create a central point of reference for the construction of financial models. Any model builder who follows such financial modelling standards should be able to

produce a financial model that has the following characteristics, among others.

- The formatting of the model is consistent.
- The model has a user guide and a diagram illustrating the model's logic flows and interdependencies.
- The model's formulae are consistently applied and robust.
- Users can identify assumptions and can intuitively manipulate the assumptions to evaluate the outputs.
- The model's outputs update automatically with changes in any of the assumptions.<sup>1</sup>

Principles-based financial modelling standards would allow enough freedom for model builders to apply their personal preferences with regard to model construction. For example, the font type, colour and size of the text in the model can be customised, with the only requirement being that those formats are applied consistently throughout a model.

#### Why should Chartered Accountants be involved?

Through involvement with the development of standards for the construction of financial models, Chartered Accountants have an opportunity to reinforce our reputation as providers of "value-added" professional and financial services. With traditional taxation advisory services being slowly eroded by technological advances and market pricing pressure, we should embrace this technological change and pounce on the business opportunities it has created.

The strongest example of where the Chartered Accounting and financial modelling disciplines overlap is the provision of financial model audits. Financial model audits are becoming increasingly commonplace as the uses for and reliance upon financial models grow. Financial forecasting models are often submitted to banks and other lenders to support lending applications. Often the prospective lenders require that these financial models be audited by a third party, who will express an opinion on the consistency

and correctness of the financial model's calculations and (perhaps) the outputs. Nobody is better placed to express an audit opinion on financial matters than a Chartered Accountant.

Chartered Accountants in commerce can utilise financial modelling skills to further their careers and to provide powerful decision-support tools for their organisations. Members in professional practice have an opportunity to provide financial modelling construction and review services to their clients, which will lead to a greater understanding of our clients' businesses and the provision of more "value-added" services.

### Summary

Financial modelling is a relatively new discipline with few generally accepted rules or practices. The variations in financial model preparation methods mean that models are often difficult to understand, use and interpret. Financial models may be subject to significant errors which

could have been avoided if the model's builder had taken guidance from a source of financial modelling standards.

Chartered Accountants have the skills to contribute to the development of standards for the development of best practice financial models. By embracing this new financial discipline, Chartered Accountants will have opportunities to increase the range of financial solutions that we can offer our clients.

I welcome your views on any of the ideas expressed in this article. Please email me: [wade.glass@staplesrodway.com](mailto:wade.glass@staplesrodway.com).

Now if you'll excuse me, I must take my leave. I have to meet a client at her hotel to review a model she's built. I hope she hasn't been drinking this time!

### Further reading

You might well want to find out more about financial modelling, but unfortunately the sources of high-quality information are limited. Try an Internet search for financial

modelling books. John Walkenbach has authored a number of easy to understand books on applying Excel formulae and programming in Visual Basic; visit his website, [www.j-walk.com](http://www.j-walk.com).

For more information about financial modelling standards, please refer to [http://www.bpmglobal.com/bpm\\_standards.html](http://www.bpmglobal.com/bpm_standards.html). This site belongs to an Australian company which is, to my knowledge, the first organisation in the world to publish comprehensive financial modelling standards.

### Footnote

1 This will apply with the exception of some large or complex models that require macros or other adjustments to be run when certain of the model's assumptions are changed. However, this requirement would be clearly identified in the model's instructions for use.

• The views expressed in this article are those of the author and not necessarily of Staples Rodway Ltd. ■

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