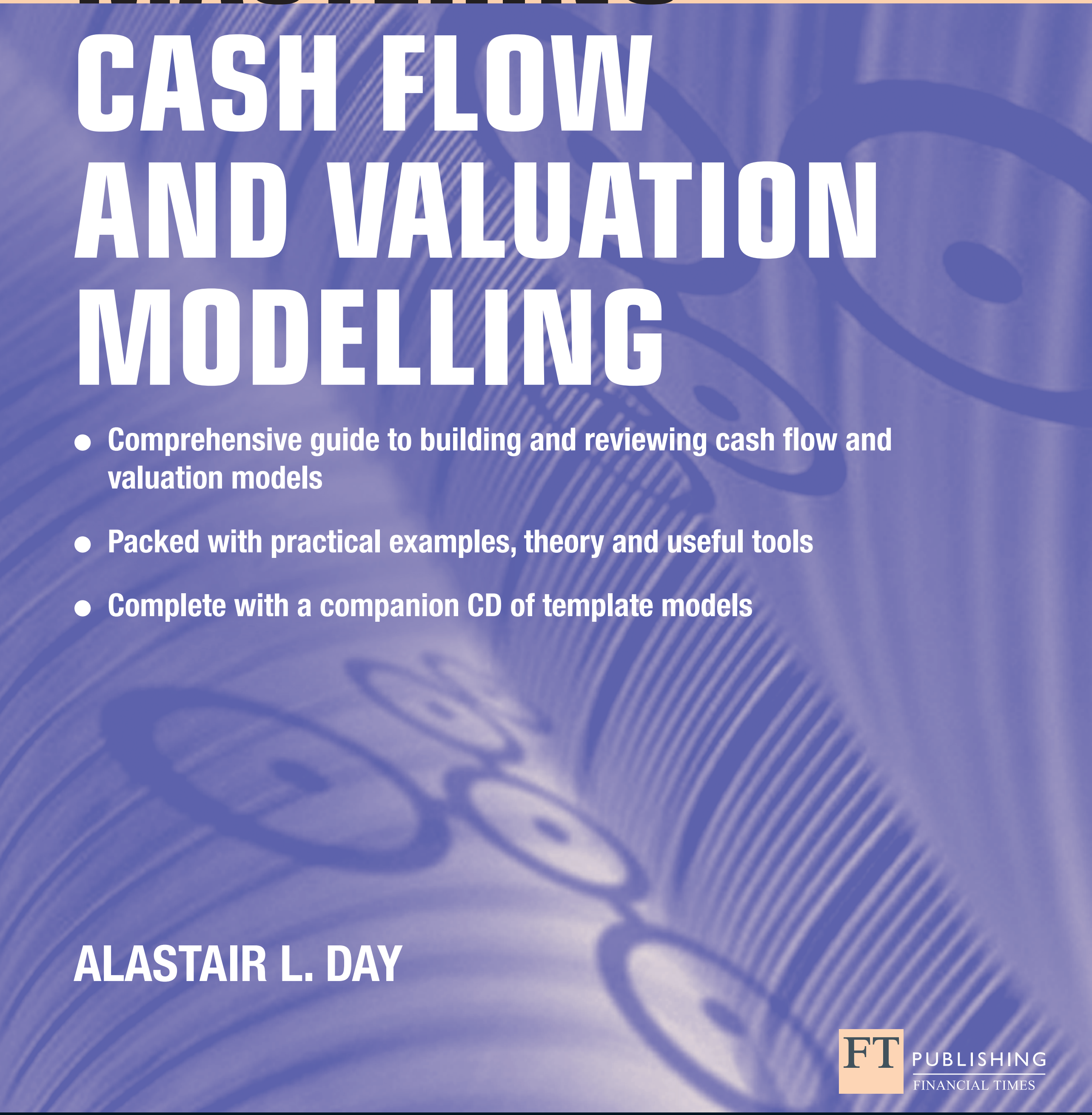
A practical guide to planning
and building valuation models

MASTERING CASH FLOW AND VALUATION MODELLING



- Comprehensive guide to building and reviewing cash flow and valuation models
- Packed with practical examples, theory and useful tools
- Complete with a companion CD of template models

ALASTAIR L. DAY

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Mastering Cash Flow and Valuation Modelling

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16 15 14 13 12

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About the author

Alastair Day has worked in the finance industry for more than 25 years in treasury and marketing functions and was formerly a director of a vendor leasing company specialising in the IT and technology industries. After rapid growth, the directors sold the enterprise to a public company and he established Systematic Finance as a consultancy specialising in:

- financial modelling – design, build, audit and review to provide a full range of modelling services;
- training in financial modelling, corporate finance, leasing and credit analysis on an in-house and public basis throughout Europe, Middle East, Africa, Asia and America;
- finance and operating lease structuring as a financial lessor and consultant advising on pricing and evaluation.

Alastair is the author of three modelling books published by FT Prentice Hall: *Mastering Financial Modelling*, *Mastering Risk Modelling* and *Mastering Financial Mathematics in Microsoft® Excel*. He has also written a number of other books and publications on financial analysis, credit and leasing.

Alastair has a degree in Economics and German from London University and an MBA from the Open University Business School.

Conventions

- The main part of the text is set in AGaramond, whereas entries are set in Courier. For example:

  Enter the Scenario Name as `Base Case`

- Items on the menu bars also shown in Courier. For example:

  Select `Data, What-if Analysis, Goal Seek`

- The names of functions are in Courier capitals. This is the payment function, which requires inputs for the interest rate, number of periods, present value and future value.

  `=PMT(INT,NPER,PV,FV,TYPE)`

- Cell formulas are also shown in Courier. For example:

  ```
  =IF($C$75=1,IF($B25>C$22,$B25-C$22-C$23,-C$23),
  IF($B25<C$22,C$22-$B25-C$23,-C$23))
  ```

- Equations are formed with the equation editor and shown in normal notation. For example, net present value:

$$NPV = \frac{(CashFlow)^N}{(1+r)^N}$$

- Genders. The use of 'he' or 'him' refers to masculine or feminine and this is used for simplicity to avoid repetition.

Overview

WHO NEEDS THIS BOOK?

Mastering Cash Flow and Valuation Modelling is a practical book for developing flexible financial models rather than an Excel textbook or a corporate finance manual. It seeks to bridge the gap between the two and describes a practical approach to developing an efficient financial model from a blank sheet. You can work through each of the chapters and build the model yourself in stages. The disk provides skeleton models with basic data on the disk for you to work on, modify and develop. Financial modelling is a practical subject and you need to work through each of the stages and overcome problems to understand the process of building a model. On completion you will be able to build better models with improved accuracy and analysis using a greater range of Excel functionality.

My other modelling books published by FT Prentice Hall, *Mastering Financial Modelling*, *Mastering Risk Modelling* and *Mastering Financial Mathematics in Microsoft® Excel*, provide further examples and combine finance with standardised, consistent model design using ideas of best practice coupled with methods of auditing and testing. These books use a tried and trusted design standard that many people have adopted and the author has received many emails praising the methodology. This book adheres to spreadsheet best practice and adopts the same basic style, method and layout as the other books.

The key objectives for this book are to:

- show how to build a model from a blank sheet rather than showing a series of individual examples;
- explain key methods needed for financial analysis and valuation;
- describe how to build in flexibility and what-if analysis;
- reduce coding and other errors through consistent adoption of the design method;
- provide a library of basic techniques for further development and use in other models.

This book aims to assist two key groups:

- practitioners who want a manual of financial analysis and valuation from which they can gain immediate use and payback;
- business students who need a textbook which is more geared to Excel solutions than some college manuals and corporate finance textbooks.

The areas of responsibility where the book should be of interest are:

- CFOs and finance directors;
- financial controllers;
- financial analysts and executives;
- accountants;
- corporate finance specialists;
- treasury managers;
- risk managers;
- academics, business and MBA students.

Therefore, people interested in this book range from an M&A specialist who wants a reference book to academics and business students who need a reference book for course work. The book has an international bias and provides examples that are relevant to the UK and overseas.

HOW TO USE THIS BOOK

- Install the Excel application templates using the simple SETUP command. The files will install automatically together with a program group and icons. There is a key to the file names at the back of the book.
- Work through each of the chapters and the examples building the model from the templates. There is a skeleton file with all the labels for you to use as a starting point.
- Use the manual, spreadsheets and templates as a reference guide for further work.
- Practice, develop and improve your efficiency and competence with Excel.

Alastair L. Day
Email: aday@system.co.uk or Internet: www.financial-models.com

Executive summary

This is a summary of the book by chapter presented in a tabular form to show the progression from a blank sheet to a completed comprehensive model.

Chapter	Topic	Subjects covered
1	Introduction and overview	Scope of the book and the objective to write a generic cash flow model incorporating a range of Excel features and techniques Model design methodology and the need for modelling standards Example models to display the method
2	Functions	Finance functions for time value of money, discounted cash flow and loan analysis Mathematics functions such as `SUMPRODUCT` Time for producing robust timelines in a model Logic such as `IF`, `OR` and `AND` Text functions for joining and manipulating strings Analysis ToolPak and the extra functions and statistics methods
3	Model template	Framework and setting objectives Setting up sheets as modules Sheet templates for future use Efficiency techniques to enter code quickly without errors Planning for sensitivities and building in flexibility
4	Historic statements	Historic income statement components Entering the historic balance sheet and applying the modelling standard

Chapter	Topic	Subjects covered
5	Sales forecast	Generating income from volume and price Using sales forecast Fixed and variable costs Other elements of costs
6	Assets	Assets sheet Depreciation methods such as straight line, declining balance and sum of digits Calculations and required Excel functions Tax depreciation methods
7	Debt	Debt sheet and types of debt Setting out the debt calculations Interest rates and cumulative costs
8	Balance sheet	Forecast current assets Forecast current liabilities Equity Making the accounting statements balance
9	Cash flow	International IFRS statements Modelling techniques Ensuring integration of financial statements
10	Ratios	Financial ratios Debt ratios Returns ratios Reconciliation and checking Ensuring consistency
11	Cost of capital	Weighted Average Cost of Capital (WACC) theory Risk free and risk premiums Deriving betas Modelling methods Calculated cost of capital
12	Valuation	Terminal value methods Using different methods Single enterprise and equity valuation

Chapter	Topic	Subjects covered
13	Other approaches	Peer groups comparisons Market and multiples models
14	Alternative methods	Adjusted present value (APV) method Economic profit output as a comparison with free cash flow
15	Sensitivity	Building in sensitivities Flexing and stress testing the model Essential Excel techniques Dashboard methods for displaying multiple answers Charting techniques for reporting purposes
16	Optimisation	Excel methods Optimising outputs Checking for the ‘best’ mix of return, coverage and leverage
17	Reporting	Reporting and summarising data for reporting purposes Presenting results to different audiences
18	Auditing and review	Error detection Excel auditing techniques Other methods for ensuring consistency Documenting the findings
19	Documentation	User documentation Model maintenance Protecting the model for distribution Final model audit and review

Warranty and disclaimer

The financial models used in the book have not been formally audited and no representation, warranty or undertaking (express or implied) is made and no responsibility is taken or accepted by the author, Systematic Finance and its directors as to the adequacy, accuracy, completeness or reasonableness of the financial models and the company excludes liability thereof.

In particular, no responsibility is taken or accepted by the company and all liability is excluded by the company for the accuracy of the computations comprised therein and the assumptions upon which such computations are based. In addition, the reader receives and uses the financial models entirely at his own risk and no responsibility is taken or accepted by the company, and accordingly all liability is excluded by the company for any losses which may result from the use of the financial models, whether as a direct or indirect consequence of a computer virus or otherwise.

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3

Model template

Design objectives

Systematic design method

Case objectives

Templates

Input sheet

Timeline

Summary

DESIGN OBJECTIVES

Chapter 1 outlined some of the common modelling errors related to layout, mixed formulas, inconsistent code etc., which often result in poorly structured models with errors or inadequate analysis. Some models seem to follow an emergent process rather than exhibit an overall plan. It is often difficult to set aside time to plan a complete model and changes to the specification and user requirements may become evident as the model progresses. Sometimes another department or client will have different objectives or provide input late in the process. For example, it is better to integrate a multi-language or currency early on in the modelling process rather than at the reporting and sign-off stage. Nevertheless, planning should be the first part of the process with clear objectives for the key outputs required.

SYSTEMATIC DESIGN METHOD

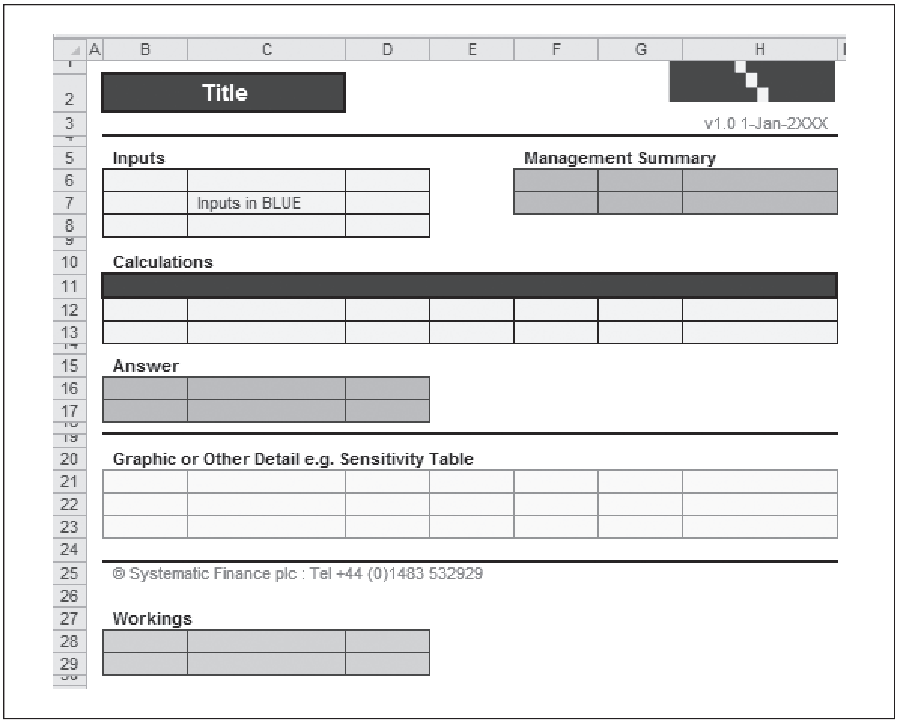
The Systematic Design Method is a collection of procedures and techniques that you can use in all types of models. The method seeks to speed up model development, reduce modelling errors and provide suitable analysis. By using the method consistently, others will understand your models quickly since all the spreadsheets will follow the same methodology. The method begins with the layout shown in Figure 3.1 which you can scale across multiple sheets as the models become more complex. The method emphasises the use of:

- modular structure with multiple sheets for different ‘chapters’;
- simple colour schemes for inputs, headers, calculations, outputs, etc.;
- styles for inputs, outputs and other key cell types;
- validation of key inputs to prevent inaccurate input;
- limited names for clarity of coding;
- specific number formats especially to highlight negative numbers and units;
- use of form controls such as scroll bars and combo boxes for simple selection;
- self-checks on balance sheets, loans and cash flows to improve accuracy;
- version control on all sheets;
- charts for model checking and presentation of results;
- clear output reports and management summaries;
- documentation and explanation of procedures and techniques.

Figures 3.2 and 3.3 summarise the topics covered in this book.

Figure 3.1

Layout



Title

v1.0 1-Jan-2XXX

Inputs

Inputs in BLUE

Management Summary

Calculations

Answer

Graphic or Other Detail e.g. Sensitivity Table

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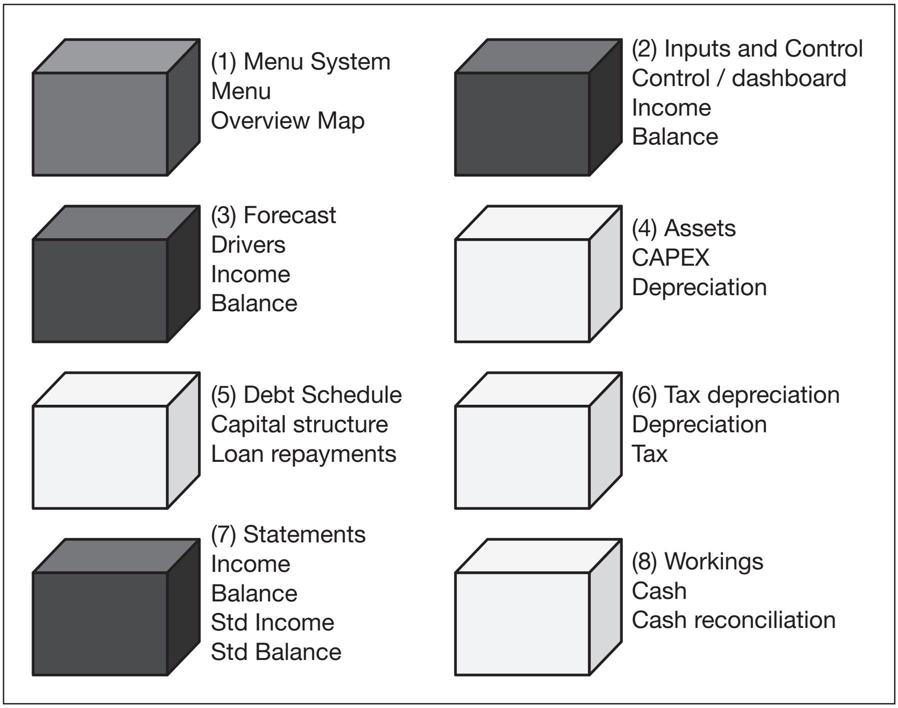
Workings

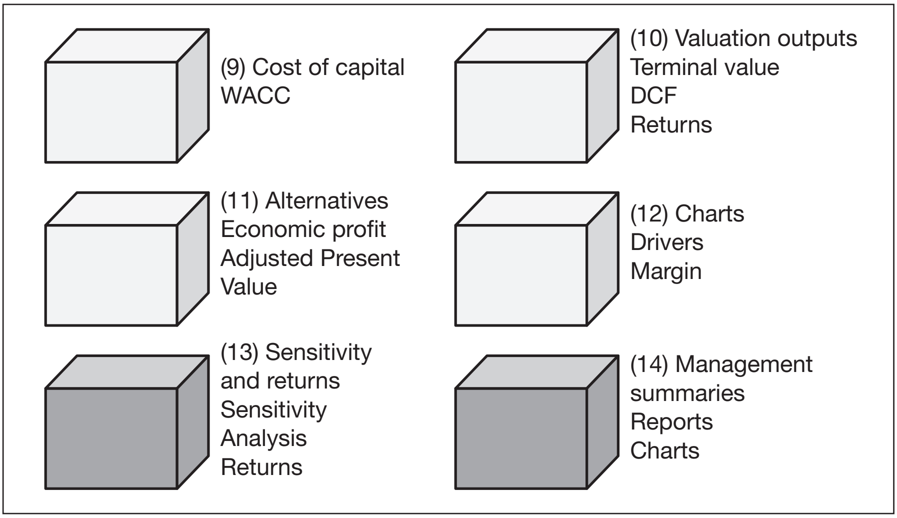
Figure 3.2

Map



(1) Menu System
Menu
Overview Map
(2) Inputs and Control
Control / dashboard
Income
Balance
(3) Forecast
Drivers
Income
Balance
(4) Assets
CAPEX
Depreciation
(5) Debt Schedule
Capital structure
Loan repayments
(6) Tax depreciation
Depreciation
Tax
(7) Statements
Income
Balance
Std Income
Std Balance
(8) Workings
Cash
Cash reconciliation

Figure 3.3



Map

(9) Cost of capital
WACC
(10) Valuation outputs
Terminal value
DCF
Returns
(11) Alternatives
Economic profit
Adjusted Present Value
(12) Charts
Drivers
Margin
(13) Sensitivity and returns
Sensitivity
Analysis
Returns
(14) Management summaries
Reports
Charts

CASE OBJECTIVES

The case model spreads a set of five annual reports into an income statement and balance sheet and then treats the case as an outline acquisition. The key objective is to calculate the value of the enterprise and check the structure against basic banking covenants, such as the debt service coverage or the ratio of debt to value (leverage).

The model pays off the existing debt on inception and replaces it with a loan structure based on an enhanced share price as the existing price plus a premium. The case could be further analysed with individual forecasts of the company's divisions, operating companies or geographic split to allow forecast accounting statements to be produced for the sub-units. Key workings comprise the assets, loans, debt repayable and tax. With completed forecast statements and cash flows available to the firm, the model shows the financial benefits and allows the user to check the results against standardised or common size statements and compare them with historic and forecast ratios. With the cost of capital inputs, a free cash flow valuation is possible and the model can compare the findings against peer groups and multiples. Other modules with alternative approaches, such as economic profit and adjusted present value, are possible additions. Using a modular framework you can easily add new features to the model.

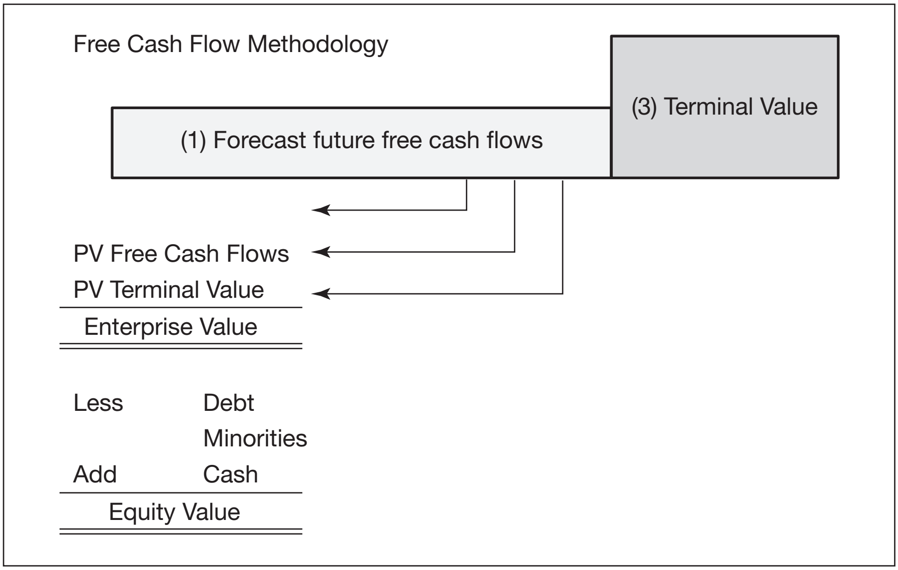
A model that produces a single answer does not produce a suitable level of analysis as you need more information for decisions. You need to understand:

- what happens to the key outputs as a variable changes or flexes;
- the relative importance of different variables, e.g. are sales more important than capital expenditure?

It is important that the model is designed from the outset to allow sensitivity and 'what-if' analysis. Some models use macros or duplicate sheets to attain some form of multiple answers, but this is inefficient, inflexible and prone to error. This model will use tables and types of scenarios to demonstrate changes in value or ability to pay.

The model needs summaries and charts for reporting since different audiences require varied levels of information. Finally, some documentation of the model would be useful in order to explain the mechanics, where to enter data, the reports available and generally how to use the model (see Figure 3.4).

Figure 3.4 **Framework**


Free Cash Flow Methodology
(3) Terminal Value
(1) Forecast future free cash flows
PV Free Cash Flows
PV Terminal Value
Enterprise Value
Less
Debt
Minorities
Add
Cash
Equity Value

The model shown in Figure 3.4 needs to provide a range of outputs to satisfy banking covenants and valuation. It is not enough to generate a value since you need to know if it is 'enough' to satisfy the requirements of various stakeholders. The table below sets out the general values for returns and debt service:

Source and use of funds	
Equity allocation	
Goodwill calculation	
Firm and equity valuation	
Firm internal rate of return (IRR)	12.5%
Equity internal rate of return	25%
Purchase enterprise value/EBITDA	7×
Maximum senior debt/EBITDA	3×
Exit EV/EBITDA	5×
Total debt/EBITDA	4×

Enterprise value, in simple form, comprises the market value of debt and equity as opposed to an accounting value shown in annual reports. EBITDA stands for earnings before interest, tax, depreciation and amortisation. This represents the net operating profit with non-cash items such as depreciation added back to form a simple proxy to operating cash flow. It should not be confused with operating cash as it does not include changes in working capital. A company can generate a healthy EBIT but still consume cash by the inefficient management of working capital.

The model can be broken down into stages as reflected in the chapters in this book:

- Cover – front sheet with disclaimer as the first sheet any user sees on opening the model.
- Menu – basic information such as the author, version number, file name, etc.
- Map – pictorial representation of each of the modules and sheets to illustrate the model framework.
- Summary – executive management summary showing the findings against the key criteria above.
- Control – input and dashboard sheet with case information such as the dates, units, currency, loan restructuring and results against management criteria.
- Income – historic income statement for five years.
- Balance – historic balance sheet for five years.
- Forecast – calculation of key drivers such as sales growth, cost percentages, capital expenditure and other metrics needed to map the accounting statements over the forecast period.
- Sources and Uses Charts – pie charts with the sources of debt and equity and how the funds are used in the initial purchase price.
- Assets – capital expenditure profile with depreciation calculations and net book value as a workings sheet. This generates entries for the forecast income statement and balance sheet.
- Debt Schedule – drawdown of new debt together with repayment profile used to calculate the interest payable, debt payments and net debt outstanding.
- Tax Depreciation – tax depreciation and written down value using straight line or double declining method depending on the tax jurisdiction.
- Tax – taxable income adding back accounting depreciation and taking into account the tax depreciation along the lines of US or UK tax.
- Forecast Income – historic and forecast income statement in landscape mode.
- Forecast Balance – historic and forecast balance sheet on the same sheet.

- Standard Income – standardised or common size income statement with sales factored to 100 and all other lines expressed as a factor against sales. This provides a ratio to sales for every line on the income statement and is useful for highlighting revenue and costs trends.
- Standard Balance – common size balance sheet with items expressed as a factor of total assets or liabilities.
- Forecast Cash – forecast IAS cash flow working down from EBITDA, through cash from operations, investing and financing to reconcile with the balance sheet change in cash.
- Forecast OpCash – reworked cash flow statement to calculate the cash available to service debt as the starting line for the next sheet.
- Forecast DebtCash – debt waterfall sheet starting with the cash available and subtracting the interest and principal payment for each of the new debts. The net cash reconciles back to the residual cash in the balance sheet.
- Ratios – financial and debt ratios based on a ratio pyramid starting with return on equity and leading down in to return on sales, asset leverage and asset turnover.
- Charts Dashboard – single page report of important ratios charts such as return on equity, return on assets, gearing and interest cover.
- WACC – weighted average cost of capital calculation from equity, preference shares and debt for the forecast periods expressed as a historic value, forecast value and cumulative percentage.
- WACC Calculation – pictorial representation of the make-up of the cost of capital.
- Valuation – free cash valuation using the cash flow statement and cost of capital with a terminal value based on an EBITDA multiple or a growth model output.
- Economic Profit – alternative methodology showing the profit after a charge for the capital utilised and reconciled to the free cash method. This method is useful for showing the source of the value.
- APV – adjusted present value breaking up the free cash valuation into segments to demonstrate the value of cost savings or leverage as a proportion of the total.
- Sensitivity – matrices illustrating the change in outputs from alterations in key variables.
- Analysis-dynamic charts from every schedule in the model to allow a user to review any aspect of the model.
- Returns – cash flows and returns available to the different providers of capital.

- Workings – backing sheet with lists, combo box workings, dates, binary flags and counters used in all the schedules. This sheet could be hidden on any distribution of the model.
- Version Log – history sheet listing the different versions of the file to show what has changed over time.
- Styles – sheet setting out the basic styles used in the model. As described earlier, styles represent a more efficient method of formatting cells and promoting consistency of presentation.
- Audit – memo sheet to record tests carried out on the model. All models contain errors and it is a feature of best practice to show the tests carried out to prove the integrity of the model.

Each of the sheets has a reference and line number of the left-hand side as this is useful for showing references and calculations. This example shows the calculation of accounts receivable:

Accounts receivable: `FP010*FF039`

The general notation used in the model is:

- SM – summary
- IN – control
- IP – input income
- IR – input balance
- SP – standard income
- SB – standard balance
- FF or F – forecast
- FP – income
- BD – assets
- TD – tax depreciation
- CS – debt schedule
- TW – tax
- FB – balance sheet
- CF – cash
- CO – forecast operating cash
- DB – debt cash
- SL – standard forecast income
- SA – standard forecast balance
- RT – ratios
- WA – WACC
- VA – valuation

- MA – market valuation
- PE – peer groups
- AP – APV
- EP – economic profit
- RE – IRR returns

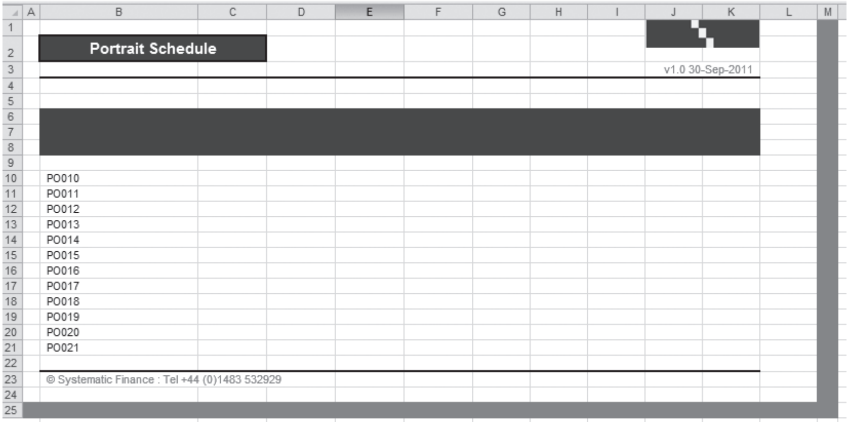
TEMPLATES

The first step is to be organised and reduce the unnecessary duplication of effort: some people start with a blank spreadsheet and re-create each page again and again in every model. This leads to unnecessary duplication and potential errors. You should always use templates for sheets, workbooks, charts and basic code in order to speed up development.

Figure 3.5 shows a standard portrait schedule with precise measurements. Column A is set to two wide and not used for stylistic reasons. When the row and column headers are removed it forms a margin with row 1. Row 2 is 18.75 high rather than the standard 11.25 and the font is set to 11 points. The rest of the sheet is set to an 8 point font size with an accounting number format. The default protection for each cell is locked and hidden. Styles are in place for the sheet header, version, copyright and other cells. A red line is drawn around the edge of the spreadsheet to specify the end of the code. This is used in preference to the grey area that some developers prefer.

Figure 3.5

Schedule


A
B
C
D
E
F
G
H
I
J
K
L
M
Portrait Schedule
v1.0 30-Sep-2011
PO010
PO011
PO012
PO013
PO014
PO015
PO016
PO017
PO018
PO019
PO020
PO021
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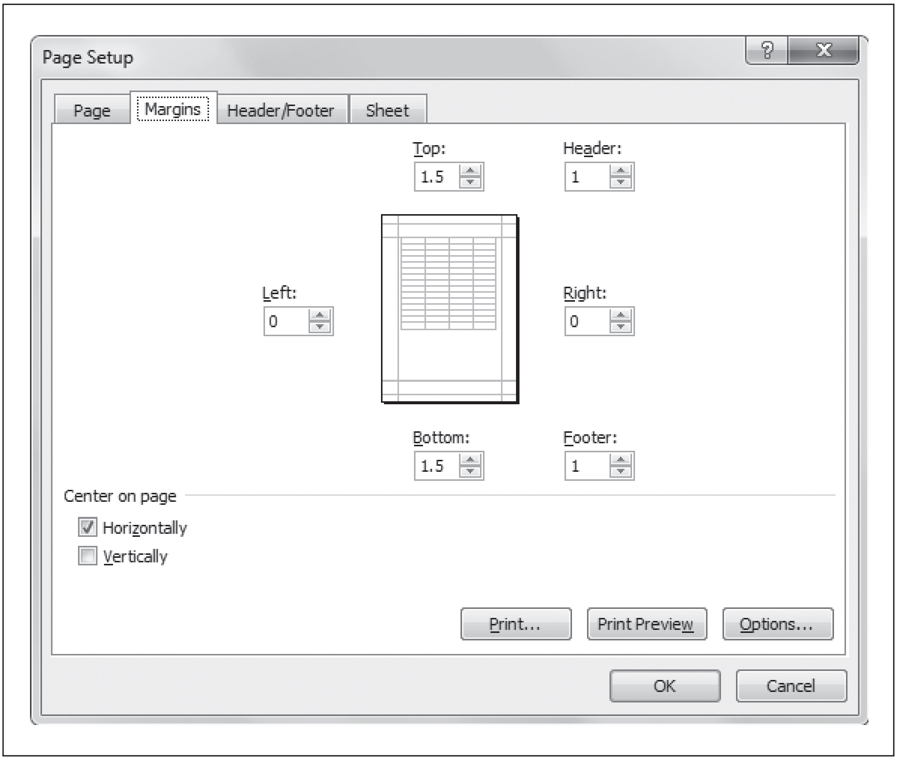
The company uses standard headers, footers and margins:

- Header: file name, sheet name, date, time.
- Left footer: company name, last saved date.
- Right footer: sheet name, page number.
- Margins: settings as in Figure 3.6.

Figure 3.6

Margins



Top: 1.5

Header: 1

Left: 0

Right: 0

Bottom: 1.5

Footer: 1

Center on page

☑ Horizontally

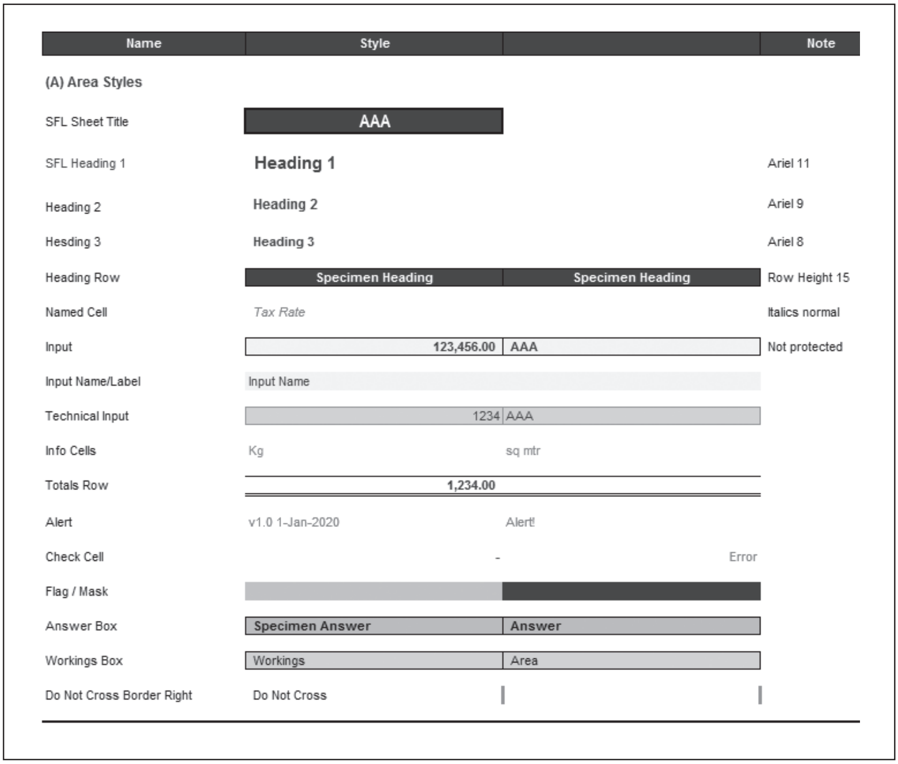
☐ Vertically

You need both landscape and portrait schedules as standards as it is quicker to right-click and copy basic sheets rather than set up the printing on every sheet. The landscape schedule needs to be wide enough for the timeline together with extra information such as units and, if necessary, narrow blank columns can also be included. You do not want to have to insert columns on 30 sheets at a later stage so it is useful to set up some 'dummy' columns now in case they are needed. In this model there are likely to be five historic periods followed by a forecast period of ten years.

You can import styles from a basic style sheet in another workbook to follow corporate colours and standards. In any case you should develop your own style sheet in corporate colours to be used on all models. It is best not to create too many styles; however, basic styles are needed for headers, headings, numbers, checks and alerts in the same way as a well-structured Word document (see Figures 3.7 and 3.8).

Figure 3.7

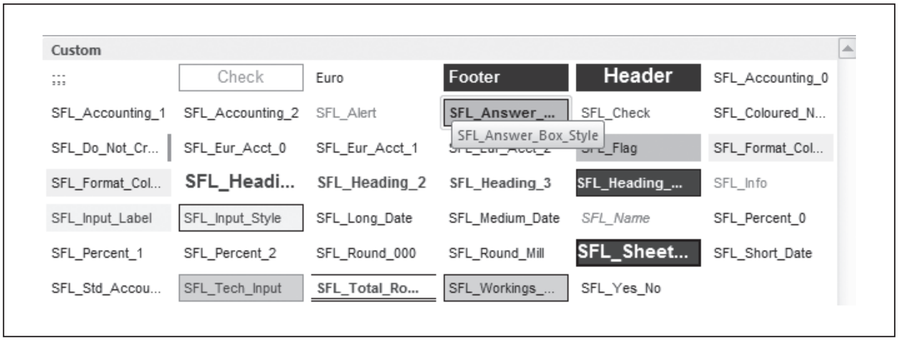
Style sheet



Name	Style		Note
(A) Area Styles			
SFL Sheet Title	AAA		
SFL Heading 1	Heading 1		Ariel 11
Heading 2	Heading 2		Ariel 9
Hesding 3	Heading 3		Ariel 8
Heading Row	Specimen Heading	Specimen Heading	Row Height 15
Named Cell	*Tax Rate*		Italics normal
Input	123,456.00	AAA	Not protected
Input Name/Label	Input Name		
Technical Input	1234	AAA	
Info Cells	Kg	sq mtr	
Totals Row	1,234.00		
Alert	v1.0 1-Jan-2020	Alert!	
Check Cell	-	Error	
Flag / Mask			
Answer Box	Specimen Answer	Answer	
Workings Box	Workings	Area	
Do Not Cross Border Right	Do Not Cross		

Figure 3.8

Available styles



Custom

;;;	Check	Euro	Footer	Header	SFL_Accounting_0
SFL_Accounting_1	SFL_Accounting_2	SFL_Alert	SFL_Answer_...	SFL_Check	SFL_Coloured_N...
SFL_Do_Not_Cr...	SFL_Eur_Acct_0	SFL_Eur_Acct_1	[illegible]	SFL_Flag	SFL_Format_Col...
SFL_Format_Col...	SFL_Headi...	SFL_Heading_2	SFL_Heading_3	SFL_Heading_...	SFL_Info
SFL_Input_Label	SFL_Input_Style	SFL_Long_Date	SFL_Medium_Date	*SFL_Name*	SFL_Percent_0
SFL_Percent_1	SFL_Percent_2	SFL_Round_000	SFL_Round_Mill	SFL_Sheet...	SFL_Short_Date
SFL_Std_Accou...	SFL_Tech_Input	SFL_Total_Ro...	SFL_Workings_...	SFL_Yes_No	

SFL_Answer_Box_Style

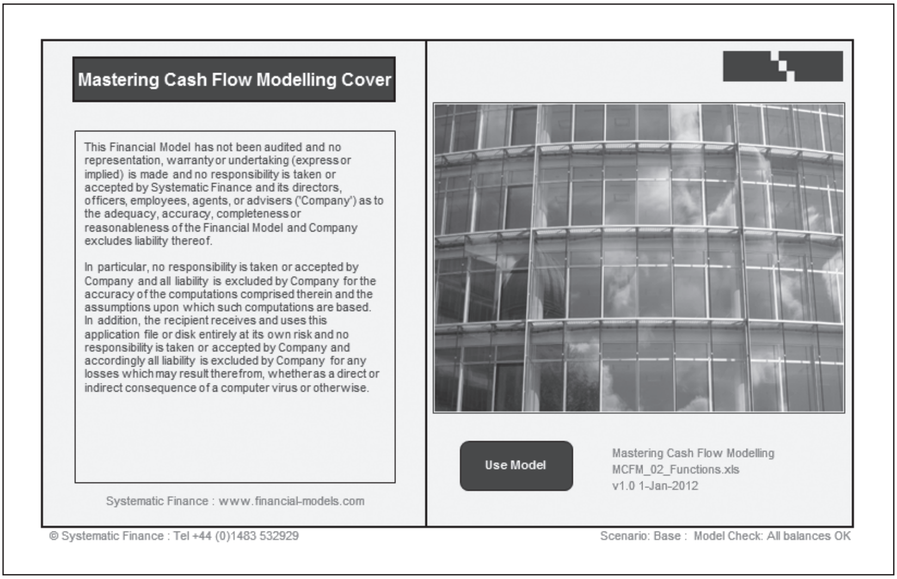
Initially, you can copy a number of sheets from initial templates by right-clicking the tab and selecting the Copy option:

- cover;
- menu;
- landscape schedule;
- portrait schedule;
- workings;
- version;
- audit;
- styles.

You can think of spreadsheet models as a book with a cover, table of contents, summary and chapters representing individual sheets. Figure 3.9 contains a specimen disclaimer and a confirmation of the product name, file name and version.

Figure 3.9

Cover



Mastering Cash Flow Modelling Cover

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In particular, no responsibility is taken or accepted by Company and all liability is excluded by Company for the accuracy of the computations comprised therein and the assumptions upon which such computations are based. In addition, the recipient receives and uses this application file or disk entirely at its own risk and no responsibility is taken or accepted by Company and accordingly all liability is excluded by Company for any losses which may result therefrom, whether as a direct or indirect consequence of a computer virus or otherwise.

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Mastering Cash Flow Modelling
MCFM_02_Functions.xls
v1.0 1-Jan-2012

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Scenario: Base : Model Check: All balances OK

The menu sheet contains basic information about the file, such as:

- author;
- manager;
- company;
- contact details;
- file objective;
- last revision date;

- file name;
- version;
- audit status.

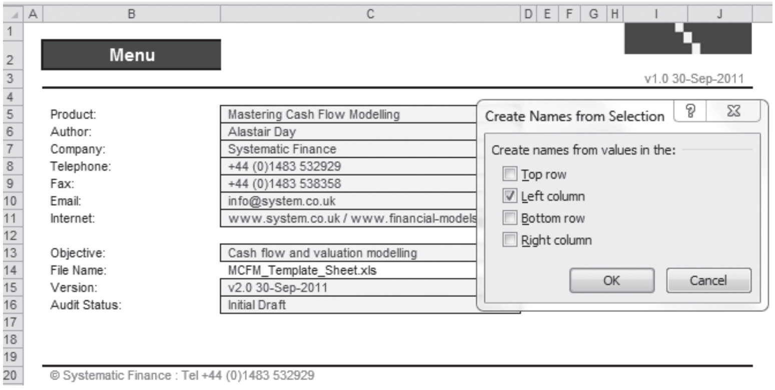
You can return the current file name with `=CELL("Filename")`, but this inserts the full path, file and sheet name. A simple way is to insert a Visual Basic function into the file:

```
Function FileSheet(No)

Select Case No
'Inserts the required sheet name or file name as
a function

'1=Full name and path
'2=Directory path
'3=File name
'4=Sheet name

Case 1: FileSheet = ActiveWorkbook.FullName
Case 2: FileSheet = ActiveWorkbook.Path
Case 3: FileSheet = ActiveWorkbook.Name
Case 4: FileSheet = ActiveSheet.Name
End Select
End Function
```

As basic inputs, it is a good idea to name these cells as this sheet can form part of an application template. The simplest method is to use ‘`Create from Selection`’ in Formulas and use the text in the left-hand column (see Figure 3.10). You can quickly apply styles to the input cells as an alternative to individual formatting.

Figure 3.10

Names



v1.0 30-Sep-2011

Product:	Mastering Cash Flow Modelling
Author:	Alastair Day
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Telephone:	+44 (0)1483 532929
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Internet:	www.system.co.uk / www.financial-models
Objective:	Cash flow and valuation modelling
File Name:	MCFM_Template_Sheet.xls
Version:	v2.0 30-Sep-2011
Audit Status:	Initial Draft

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Create Names from Selection

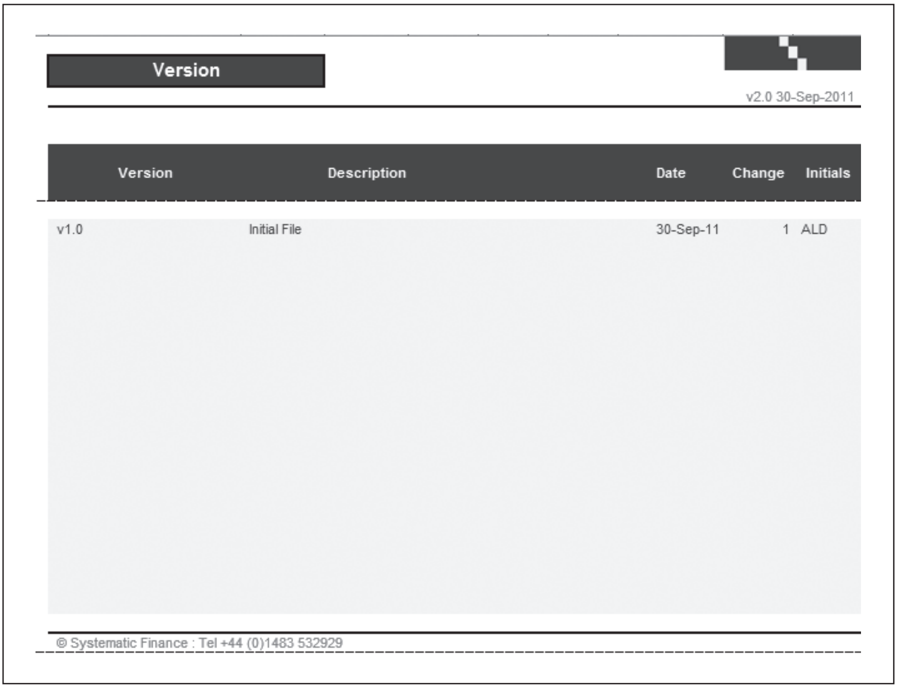
Create names from values in the:

☐ Top row
☑ Left column
☐ Bottom row
☐ Right column

Other standard sheets are the version and audit sheets as basic sheets for recording information (see Figures 3.11 and 3.12). It is important to note what has changed, or any errors found in the model, and to be sure that a specific version number continues to derive the same answers as earlier versions.

Figure 3.11

Version



Version

v2.0 30-Sep-2011

Version	Description	Date	Change	Initials
v1.0	Initial File	30-Sep-11	1	ALD

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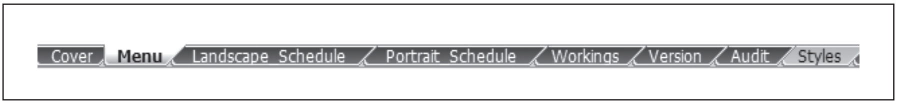
Figure 3.12

Sheets



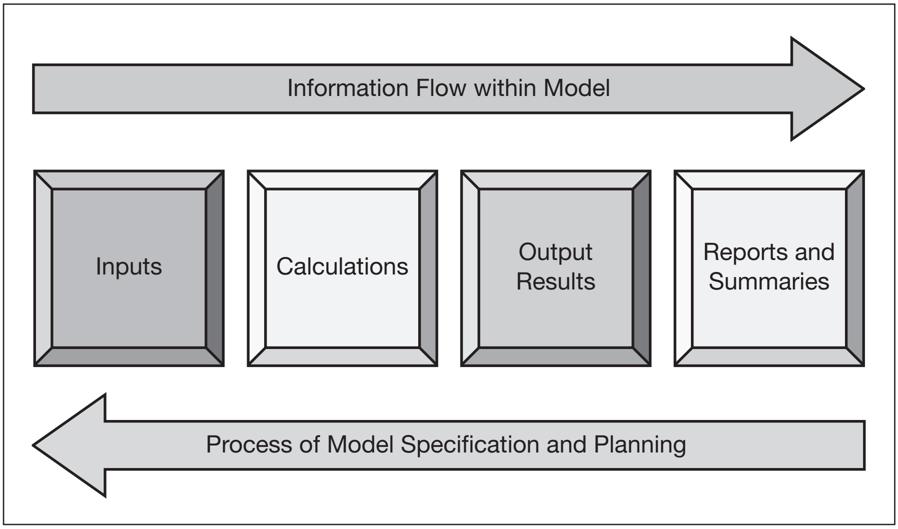
INPUT SHEET

The dashboard acts as a control or input sheet. It is important that the model follows a clear information flow from inputs through calculations to output and reports (see Figure 3.13). Anybody using the model needs to know where to enter data. Similarly, protection is difficult to complete if cells are not colour-coded and you forget to unlock the cells where you need to enter data.

You can copy a new sheet from the portrait template and the data entered on the sheet. The basic inputs are:

- client name in text form;
- revision reference;
- start date for the model used to set up timelines;
- interval in months (1,3,6,12);
- currency as a Swift code, e.g. USD;
- units, e.g. millions;
- forecast period beyond the initial historic results;
- number of ordinary shares outstanding;
- current share (stock) price;
- offer premium as a percentage of the ordinary share price;
- existing debt retired;
- fees and transaction costs relating to the restructuring;
- new debt and equity structure.

Figure 3.13 **Information flow**


Information Flow within Model
Inputs
Calculations
Output Results
Reports and Summaries
Process of Model Specification and Planning

The table in Figures 3.14 and 3.15 shows the raw data with the numbers formatted with the basic styles of a two-digit accounting number, short date and percentages. The accounting format does not display negative numbers in red on most versions of Excel and so this is a simplified format to ensure that negative numbers are shown correctly. The hash means that a number is entered as applicable and a comma forms the thousand separator.

```
#,##0.00 ;[RED](#,##0.00);-;"Please enter a
number!"
```

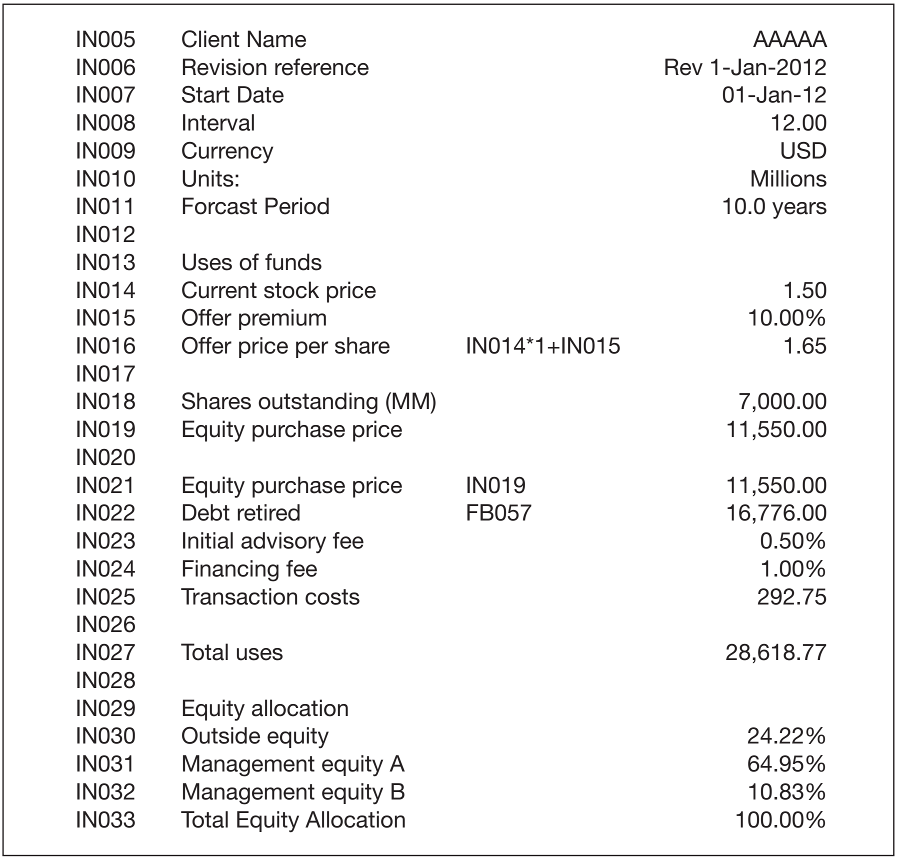


Figure 3.14

Control inputs 1

IN005	Client Name		AAAAA
IN006	Revision reference		Rev 1-Jan-2012
IN007	Start Date		01-Jan-12
IN008	Interval		12.00
IN009	Currency		USD
IN010	Units:		Millions
IN011	Forcast Period		10.0 years
IN012			
IN013	Uses of funds		
IN014	Current stock price		1.50
IN015	Offer premium		10.00%
IN016	Offer price per share	IN014*1+IN015	1.65
IN017			
IN018	Shares outstanding (MM)		7,000.00
IN019	Equity purchase price		11,550.00
IN020			
IN021	Equity purchase price	IN019	11,550.00
IN022	Debt retired	FB057	16,776.00
IN023	Initial advisory fee		0.50%
IN024	Financing fee		1.00%
IN025	Transaction costs		292.75
IN026			
IN027	Total uses		28,618.77
IN028			
IN029	Equity allocation		
IN030	Outside equity		24.22%
IN031	Management equity A		64.95%
IN032	Management equity B		10.83%
IN033	Total Equity Allocation		100.00%

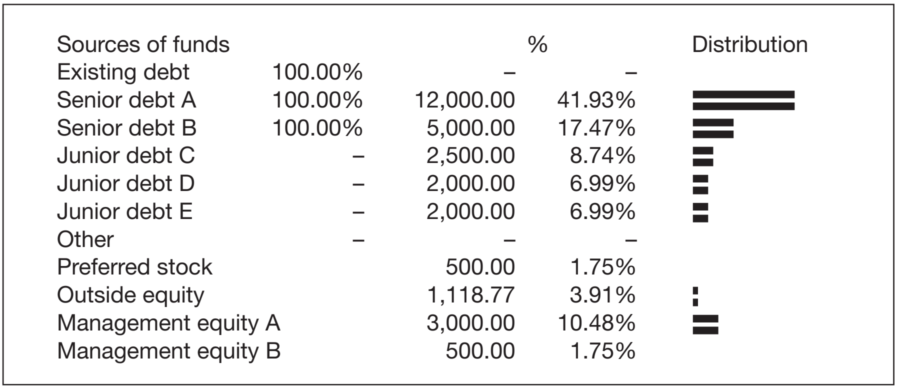


Figure 3.15

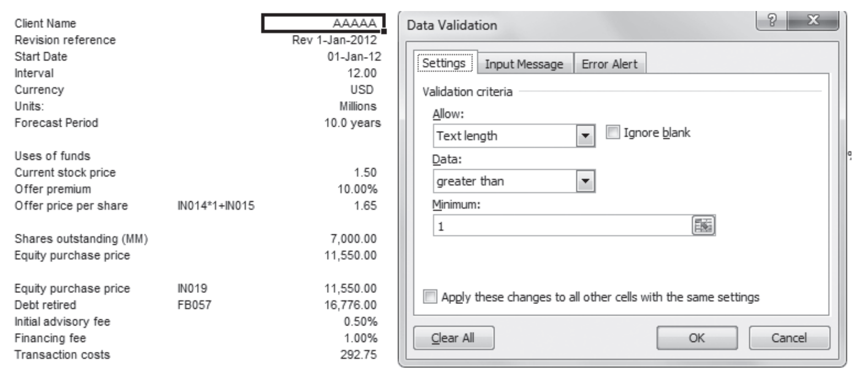
Control inputs 2

Sources of funds			%	Distribution
Existing debt	100.00%	–	–	
Senior debt A	100.00%	12,000.00	41.93%	▬▬▬▬▬▬
Senior debt B	100.00%	5,000.00	17.47%	▬▬
Junior debt C	–	2,500.00	8.74%	▬
Junior debt D	–	2,000.00	6.99%	▬
Junior debt E	–	2,000.00	6.99%	▬
Other	–	–	–	
Preferred stock		500.00	1.75%	
Outside equity		1,118.77	3.91%	▪
Management equity A		3,000.00	10.48%	▬
Management equity B		500.00	1.75%	

The inputs can be validated to ensure that the correct inputs are present using `Data, Data Tools, Validation` (see Figure 3.16). The validations are a mix of text length, whole numbers, percentages, list and custom formats. You can always use `Edit, Find and Replace, Special` to highlight the validated cells on a sheet where validation is only one of the search options.

Figure 3.16

Validation



Client Name		AAAAA
Revision reference		Rev 1-Jan-2012
Start Date		01-Jan-12
Interval		12.00
Currency		USD
Units:		Millions
Forecast Period		10.0 years
Uses of funds		
Current stock price		1.50
Offer premium		10.00%
Offer price per share	IN014*1+IN015	1.65
Shares outstanding (MM)		7,000.00
Equity purchase price		11,550.00
Equity purchase price	IN019	11,550.00
Debt retired	FB057	16,776.00
Initial advisory fee		0.50%
Financing fee		1.00%
Transaction costs		292.75

Data Validation

Validation criteria

Allow: Text length

☐ Ignore blank

Data: greater than

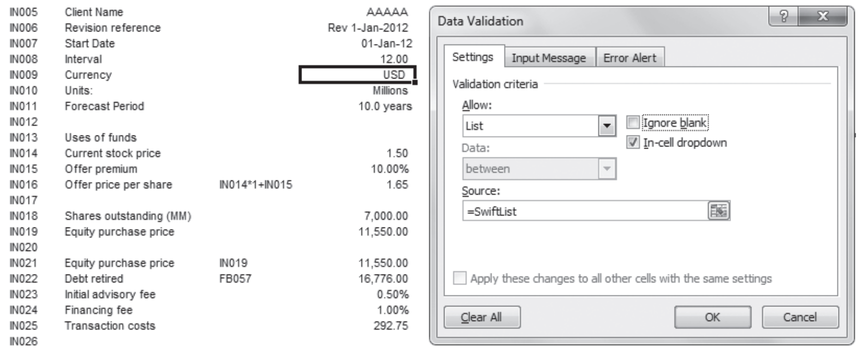
Minimum: 1

☐ Apply these changes to all other cells with the same settings

List validations are best for units and currency since these are pre-defined lists (see Figure 3.17). To save cluttering the input sheet, you can locate these lists on the workings or backing sheet. If the source appears on a different sheet, you have to name the range required for the validation to work, and these lists are therefore named `SwiftList` and `UnitsList` respectively.

Figure 3.17

List validation



IN005	Client Name		AAAAA
IN006	Revision reference		Rev 1-Jan-2012
IN007	Start Date		01-Jan-12
IN008	Interval		12.00
IN009	Currency		USD
IN010	Units:		Millions
IN011	Forecast Period		10.0 years
IN012			
IN013	Uses of funds		
IN014	Current stock price		1.50
IN015	Offer premium		10.00%
IN016	Offer price per share	IN014*1+IN015	1.65
IN017			
IN018	Shares outstanding (MM)		7,000.00
IN019	Equity purchase price		11,550.00
IN020			
IN021	Equity purchase price	IN019	11,550.00
IN022	Debt retired	FB057	16,776.00
IN023	Initial advisory fee		0.50%
IN024	Financing fee		1.00%
IN025	Transaction costs		292.75
IN026			

Data Validation

Validation criteria

Allow: List

☐ Ignore blank

☑ In-cell dropdown

Data: between

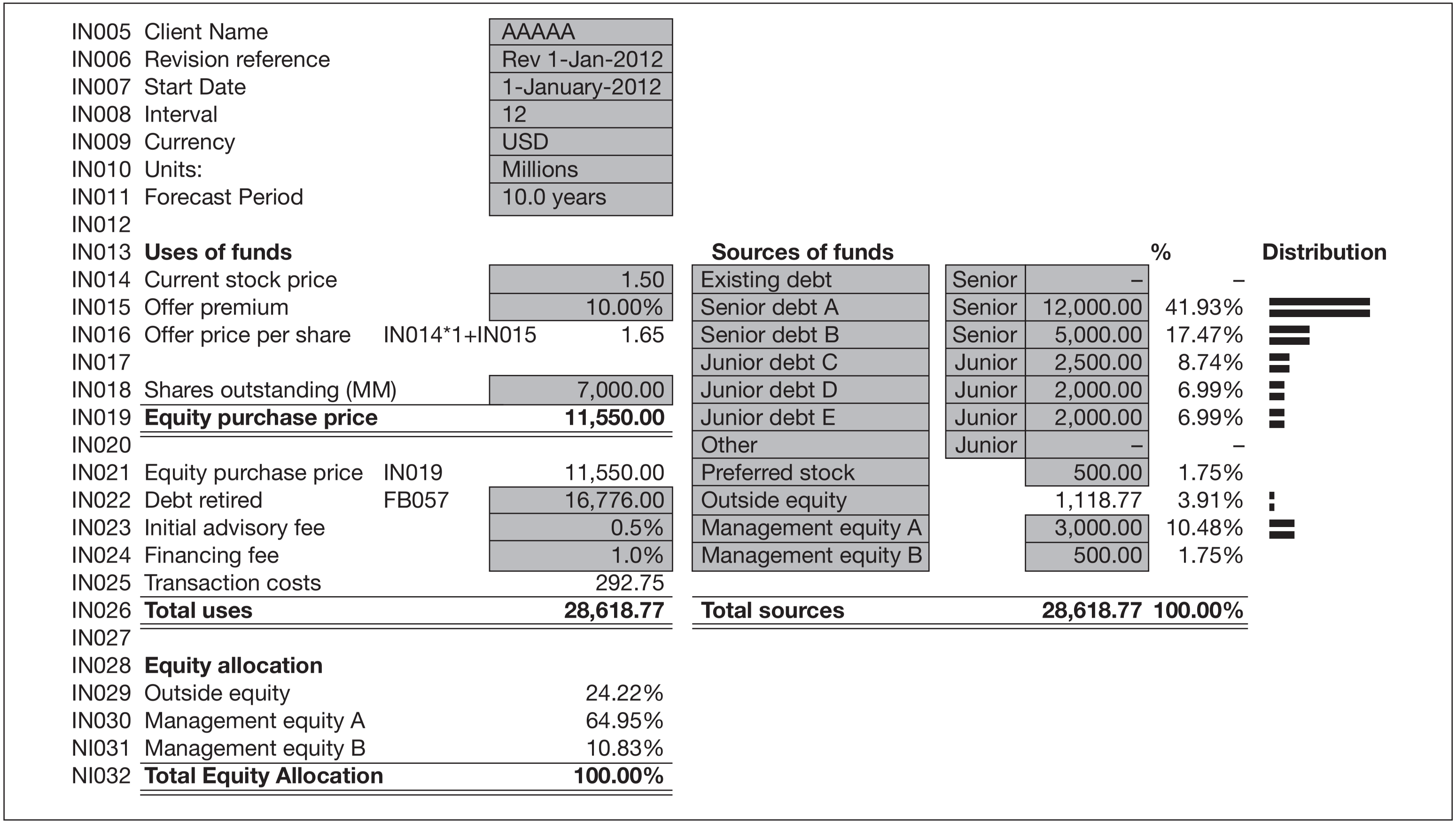
Source: =SwiftList

☐ Apply these changes to all other cells with the same settings

Finally, apply formatting styles to ensure that the schedule is correctly marked. The names of the new loans, their seniority and the amounts will be needed in later schedules. The principle is that these names will cascade through the model to save re-entering the names on the debt sheet, accounting statements and so on.

Figure 3.18

Colour coding



IN005	Client Name		AAAAA					
IN006	Revision reference		Rev 1-Jan-2012					
IN007	Start Date		1-January-2012					
IN008	Interval		12					
IN009	Currency		USD					
IN010	Units:		Millions					
IN011	Forecast Period		10.0 years					
IN012								
IN013	**Uses of funds**			**Sources of funds**			%	**Distribution**
IN014	Current stock price		1.50	Existing debt	Senior	–	–	
IN015	Offer premium		10.00%	Senior debt A	Senior	12,000.00	41.93%	
IN016	Offer price per share	IN014*1+IN015	1.65	Senior debt B	Senior	5,000.00	17.47%	
IN017				Junior debt C	Junior	2,500.00	8.74%	
IN018	Shares outstanding (MM)		7,000.00	Junior debt D	Junior	2,000.00	6.99%	
IN019	**Equity purchase price**		**11,550.00**	Junior debt E	Junior	2,000.00	6.99%	
IN020				Other	Junior	–	–	
IN021	Equity purchase price	IN019	11,550.00	Preferred stock		500.00	1.75%	
IN022	Debt retired	FB057	16,776.00	Outside equity		1,118.77	3.91%	
IN023	Initial advisory fee		0.5%	Management equity A		3,000.00	10.48%	
IN024	Financing fee		1.0%	Management equity B		500.00	1.75%	
IN025	Transaction costs		292.75					
IN026	**Total uses**		**28,618.77**	**Total sources**		**28,618.77**	**100.00%**	
IN027								
IN028	**Equity allocation**							
IN029	Outside equity		24.22%					
IN030	Management equity A		64.95%					
NI031	Management equity B		10.83%					
NI032	**Total Equity Allocation**		**100.00%**					

There is a simple chart on the right of Figure 3.18 that shows the distribution of funds as an alternative to spark lines. This uses the `REPT` function to repeat a character:

```
REPT("¦",L15*50)
```

All schedules in the book contain a line number for reference purposes. The input sheet begins 'IN'. This is useful in explaining the source of data on other sheets such as ratios or cash flows. It allows any user to track calculations from the line references listed. This is a dynamic reference in the form:

```
="IN"&TEXT(ROW(B5),"000")
```

The `TEXT` function translates a number into text and formats it with leading zeroes. The formula uses an ampersand in preference to the `CONCATENATE` function.

TIMELINE

When models are not planned at the outset, one common mistake is to hard code time and the model to calculate it in several places. The principal aim should be to calculate time once, and once only. Other sheets can use the information on the initial timelines on all other schedules. The most important Excel functions for timelines are `EDATE` and `EOMONTH`. The first advances in whole months from a specific date and the second derives the end of the month from a multiple of months. These are Analysis ToolPak functions from the add-in, and if they are not displayed in the function list, you can install it manually at `File, Options, Add-Ins`.

In some parts of the world, such as Germany, these functions do not automatically translate to `EDATUM` and `MONATSENDE` and replacement Visual Basic functions are therefore provided below. To use them, you will need to ensure that macros are enabled in `File, Options, Trust Center, Trust Settings, Macro Settings`.

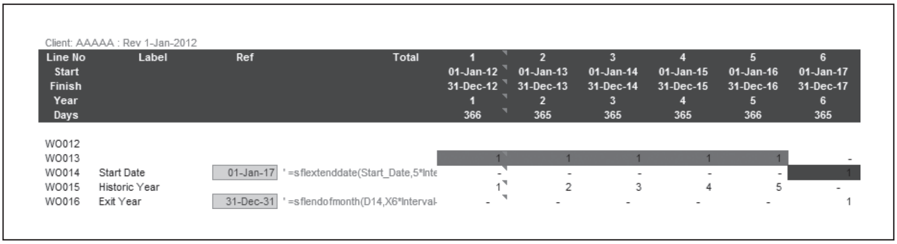
```
Function SFLEndOfMonth(ByVal InStartdate As
Double, ByVal InMonths As Integer)'replaces the
EOMONTH function

SFLEndOfMonth = DateSerial(Year(InStartdate),
Month(InStartdate) + InMonths + 1, 0)
End Function

Function SFLExtendDate(ByVal InStartdate As
Double, ByVal InMonths As Integer)'replaces the
EDATE function
```

```
SFLExtendDate = DateSerial( Year(InStartdate),
Month(InStartdate) + InMonths, Application.
WorksheetFunction.Min(Day(InStartdate),
Day(DateSerial( Year(InStartdate),
Month(InStartdate) + InMonths + 1, 0))))
End Function
```

The header for the timeline on the Workings sheet can be looked up elsewhere in the model, the objective being to provide all the counters that may be needed. There are five historic periods followed by up to ten forecast periods and these need to be clearly marked.

Timeline

Figure 3.19



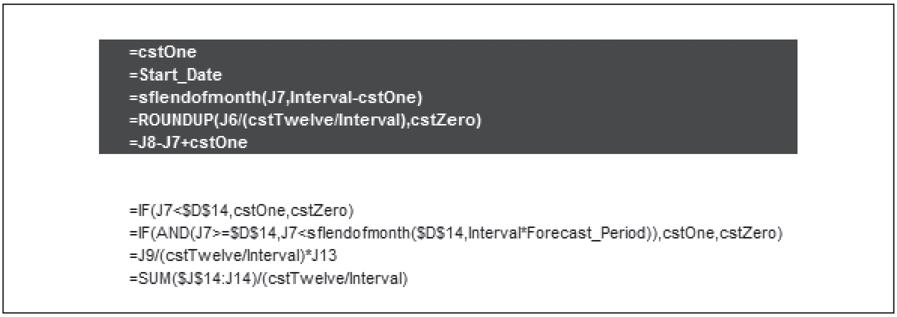
Client: AAAAA : Rev 1-Jan-2012

Line No	Label	Ref		Total	1	2	3	4	5	6
Start					01-Jan-12	01-Jan-13	01-Jan-14	01-Jan-15	01-Jan-16	01-Jan-17
Finish					31-Dec-12	31-Dec-13	31-Dec-14	31-Dec-15	31-Dec-16	31-Dec-17
Year					1	2	3	4	5	6
Days					366	365	365	365	366	365
WO012										
WO013					1	1	1	1	1	-
WO014	Start Date	01-Jan-17	' =sflextenddate(Start_Date,5*Inte		-	-	-	-	-	1
WO015	Historic Year				1	2	3	4	5	-
WO016	Exit Year	31-Dec-31	' =sflendofmonth(D14,X6*Interval-		-	-	-	-	-	1

The start date is brought forward from the Control sheet and the beginning and end of each period are calculated with `EOMONTH` or the Visual Basic user function `SFLEndofMonth` (see Figures 3.19 and 3.20).

End of month

Figure 3.20



```
=cstOne
=Start_Date
=sflendofmonth(J7,Interval-cstOne)
=ROUNDUP(J6/(cstTwelve/Interval),cstZero)
=J8-J7+cstOne


=IF(J7<$D$14,cstOne,cstZero)
=IF(AND(J7>=$D$14,J7<sflendofmonth($D$14,Interval*Forecast_Period)),cstOne,cstZero)
=J9/(cstTwelve/Interval)*J13
=SUM($J$14:J14)/(cstTwelve/Interval)
```

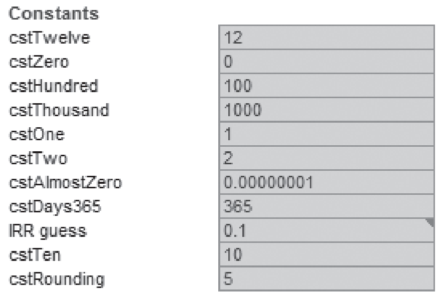
The model uses named constants from the list in Figure 3.21 instead of typing 0 or 12. This is to confirm that no formulas are produced which mix formulas and numbers. When you audit or review the model, it is important to check that input constants have not been hard coded in formulas, thereby breaking the lines of calculation.

The binary flags denoting the historic or forecast will be important later in the model to simplify the code. Rather than using multiple `IF` statements, it can be more straightforward to multiply by one or zero such that there is only one logic statement to maintain. For example, the forecast period is ten years and all cash flows have to cease at the end of this period. It is therefore simpler to multiply 50 rows by the flag rather than maintaining 50 `IF` statements.

You can copy the formulas across the heading and the last date should be 31 December 2026 with ten forecast years.

Figure 3.21

Constant names



Constants	
cstTwelve	12
cstZero	0
cstHundred	100
cstThousand	1000
cstOne	1
cstTwo	2
cstAlmostZero	0.00000001
cstDays365	365
IRR guess	0.1
cstTen	10
cstRounding	5

SUMMARY

It is important to 'get organised' in modelling with standard procedures, templates and lots of reusable code. This chapter introduces the basic case and sets up an outline application template. Methods such as styles, colours, number formats, names and formats are important in standardising sheets and workbooks and in reducing the incidence of avoidable mistakes. The basic template consists of standard sheets for menus, schedules, timelines, version data and other backing sheets. You can save the basic application file as a template for future use. It is now ready for accepting the historic data.

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