



FINANCIALMODELING
INSTITUTE



LEVEL I:
ADVANCED FINANCIAL
MODELER (AFM)

BODY OF KNOWLEDGE

2017

Introduction

This Body of Knowledge is a reference document to help prospective candidates prepare for the Advanced Financial Modeler (AFM) exam.

The AFM exam is the first of three levels of modeling certifications offered by the Financial Modeling Institute.

For purposes of the AFM exam and this Body of Knowledge, a financial model is considered to be a spreadsheet forecast model of a full company.

This document contains important information on model design, structure, technical skills and components that candidates will be tested on during the exam.

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I. Financial Modeling Best Practices

1. Modeling as a Discipline

- Financial Modeling is its own discipline
- A financial model needs to serve as a powerful communication tool to clearly and effectively tell the story of a company to management and stakeholders
- A financial model is a critical decision-making tool that allows users to make accurate and informed financial decisions about a company
- A builder of financial models requires multiple skills in order to effectively forecast a company's financial statements into the future

2. Model Attributes

- To achieve the goals set out above, a model needs to be developed with the following attributes:
 - a. **Dynamic:** a changed assumption flows through the model
 - b. **Flexible:** modular to facilitate easy expansion and changes to the model
 - c. **Intuitive:** layout/flow mirrors how people think about the business
 - d. **Transparent:** easy to follow with no giant formulas or hidden sections
 - e. **Printable:** in a clear and easy-to-read format on paper
 - f. **Transferable:** built by one person but usable by many
- When a model achieves the criteria above, it creates tremendous credibility for the builder and inspires confidence with the reader
- A well designed model needs to work in two ways:
 - Electronically – a model must be simple to review / audit / manipulate in Excel to ensure it can be used as a tool in the decision making process
 - On paper – most senior executives prefer to review financial analysis on paper (rather than reviewing an Excel worksheet file)
- This Model Standards document has been developed so that model builders can create models of the highest caliber that achieve the conditions set out above

3. Model Planning

- It is critical to properly plan and design a model before it can be built
- Whenever a model becomes an illegible error-prone mess, it is almost always because the modeler didn't properly devise a model plan
- A model builder needs to first understand how a business operates, which requires:
 - Review of the historical financial statements of the company (including the Management Discussion & Analysis and Notes to the Financial Statements)
 - Learning about the industry in which the company operates (i.e. reading industry journals and equity research reports)
 - Deciding on the key drivers / critical success factors for the industry / company
 - Creating a list of questions to identify / gather all the assumptions that need to be made in the model
- Identify the required schedules and components to be included in the model
- Understand the purpose of the model (i.e. is the model to be used for valuation? Credit assessment? Project evaluation?)
- As part of the planning process, the model builder should also be able to answer the following questions:
 - i. Can a reader of the model understand the operations of the company?
 - ii. Have the operations been modeled correctly?
 - iii. What is the right level of detail required in the model?
 - iv. Have the assumptions been challenged and vetted?
 - v. Which assumptions should become scenarios?
 - vi. Is there enough historical detail to validate the amount of forecast detail that is required?
 - vii. What is the important output that the client wants to know?
 - viii. What metric is used to measure results?
 - ix. How many time periods should be included in the forecast? Why?
 - x. What is the most logical order to present the data?

4. Design / Presentation

- The design of a model is critical to ensure that it conveys information clearly and professionally
- The following are some design recommendations:
 - a. **Design Tips**
 - i. Include a cover page
 - ii. If the model is large, include a Table of Contents
 - iii. Repeat the company name (or project name) at the top of every page
 - iv. Include a subtitle on every page that describes the purpose of the particular page
 - v. Ensure that every cell is labeled clearly
 - vi. Include a column that describes the units of measurement for a particular row
 - b. **Headers / Footers**
 - i. Include the file path on every page (typically the bottom left corner)
 - ii. Include page numbers on every page (typically the bottom centre)
 - iii. Include a date and time stamp on every page (typically the bottom right corner)
 - iv. Incorporate a Scenario Tag on every page that displays the case being run

5. Tab Structure

- The following is the recommended tab structure for a financial model:
 - a. **Cover**
 - sets the tone for the model
 - can include key information such as: client name, project name, date, model creator
 - b. **Summary**
 - executive summary that summarizes the key metrics required to make a decision
 - there might be more than one summary tab depending on the nature and complexity of the model
 - c. **Assumptions**
 - all assumptions are presented on one tab in the model (some models may require a few tabs with assumptions – if that’s the case, the assumptions tabs should all be beside each other towards the front of the model)
 - this makes it easy to update the model and to review the model on paper
 - d. **Scenarios**
 - additional assumptions that represent the key drivers of the business
 - key drivers are assumptions that are difficult to forecast and hard to control
 - these assumptions should be created with multiple cases and a switch to change the case being run
 - e. **Model**
 - typically, the longest sheet within the model
 - includes all the financial statements and schedules
 - for models with multiple time periods (eg. quarters and years), there may be two model sheets – one for the quarterly forecasts and one for the annual forecasts
 - for a large complex company, it may be advisable to create additional tabs (eg. Operating Facility A, Operating Facility B, etc.) to provide greater clarity
 - f. **Outputs**
 - Should include all the output calculations in the model, such as ratios and valuation calculations
- It is recommended that these tabs are organized in the same order within the Excel spreadsheet (i.e. “Cover” is the first tab, all the remaining tabs are found to the right)

6. Model Construction Tips

- The following are some tips to construct a model effectively:
 - a. **Structural Tips**
 - i. Use a manageable number of worksheets in the model (5 to 10 is recommended)
 - ii. Each sheet should be built vertically (financial statements and schedules should be on the same sheet)
 - iii. Keep all assumptions up front
 - iv. Only type the company name once (every other instance of the company name should link back to a prior instance within the model)
 - v. Never enter the same variable twice within the model (a second instance should be linked back to the actual input cell)
 - vi. Never hardcode values within formulas
 - vii. Do not insert blank columns in between years (for extra space, make the columns wider / to add calculated growth rates, these should go on a different row)
 - viii. Within each sheet, each time period must always be in the same column
 - ix. Unless absolutely necessary, avoid the use of Macros
 - x. Never delete a row or column until you have checked to see whether it is being used in other formulas
 - b. **Formatting Tips**
 - i. Font colours – blue inputs; black formulas – a third dark colour can be used to signify cells that are linked to the assumptions tabs (or for another reason as stated by the modeler)
 - ii. Think about how the model will be printed and make sure the various schedules are created in page-sized units
 - iii. Review a model on paper before delivering it to colleagues or clients
 - iv. Format the model as you build it – don't wait until the very end to do all the formatting
 - v. Use "Model Checks" and flags to indicate when there are problems within the model
 - c. **Formula Tips**
 - i. Don't build any large formulas directly on the financial statements – the statements should largely contain links to schedules (which are on the same sheet)
 - ii. All formulas and calculations should be built on the various schedules
 - iii. The formulas and calculations on schedules should be as short and simple as possible
 - iv. To keep the formulas efficient, repeat and link all data from the assumptions onto the respective schedules
 - v. Never build large formulas that include multiple cell references to different worksheets

II. Excel Skills

1. Excel Tools

- It is important to be able to work quickly and efficiently with Excel in order to build powerful financial models
- Candidates should be comfortable with the following topics:
 - a. **Formatting skills including custom formatting**
 - Proper formatting provides several benefits to the builder and user of a financial model:
 - Well-formatted models are easier to read and follow
 - An attractive model will be taken more seriously since the reader will assume that time and care have been used in its creation
 - The reader will always have context for the presented analysis (e.g. units being used, item descriptions, nature of the analysis) so that they remain focused on the flow of the analysis without interrupting with questions
 - Formatting should be done as the model is being built – “format as you go”
 - The builder will never understand the context of a number better than when it has been calculated or added to the model so formatting at that moment saves time
 - Formatting can be viewed as incorporating four distinct skills:
 - Changing output appearance such as bolding, number format and font colour
 - Create custom formats that include special characters, words and unique number formats
 - CTRL + 1, then select “Custom” on the Number tab of the Format Cells menu
 - Copying formatting quickly and efficiently using paste special or a shortcut sequence such as ALT + H + V + R
 - Building descriptive labels, titles and footnotes that use formulas instead of static text entry that require maintenance (i.e. CONCATENATE, TEXT)
 - b. **Lookup Functions**
 - All financial models require the linking of data or calculations in one part of a model to subsequent formulas in different cells
 - There are a variety of lookup functions that facilitate these connections and modelers need to be proficient in the use of them in order to build elegant and flexible models

c. Absolute References

- The ability to create formulas with absolute references is extremely important when manipulating data and building financial models
- By default, Excel uses relative referencing
- Absolute references allow you to “freeze” a reference to a particular cell, row or column by inserting dollar signs in front of the row reference, the column reference or both

d. Paste Special

- Allows you to paste specific elements from one cell to another
- Can be used to paste Formats, Values, or Mathematical Operations
- Can also be used to transpose text or data

e. IF Statements

- The IF function is the most used (and abused) function in Excel due to its flexibility and most modeller’s familiarity with IF, THEN, ELSE logic.
- IF functions can also be nested (put inside another successive IF statement) multiple times, allowing a modeller to organically “think through” a data problem rather than implement good design

f. Conditional Formatting

- This feature applies formatting to cells that meet pre-specified criteria
 - Conditional Formatting makes it easy to highlight interesting cells or ranges of cells and emphasize unusual values
 - If you have more than one rule, the first rule will take priority over the second rule, so it’s important to enter the rules in the appropriate order
 - Conditional formatting only allows you to change font style, underline, color, and strike-through as well as borders and shading. You cannot change the font or the font size.
- Excel provides a number of built-in formatting rules which allow a user to format based on predefined tests (such as top or bottom ranked values, etc.)
- Using a formula to apply conditional formatting gives additional flexibility

g. Forms & Drop-down Boxes

- The Choose function is a simple and clean way of creating scenarios rather than using an IF Statement
- To create a more user-friendly interface on a scenario switch, a pull down menu can be used to control the CHOOSE function
 - A pull down menu restricts the values that can be entered into the switch cell, thereby reducing the possibility of causing an error
 - It is also visible even if the cell is not active and also shows up on printed copies of the model (unlike other techniques such as Data Validation)

h. Printing

- Set up the model in print-size pages. If the model is not well designed, it won't be easy to print
 - Approximately 8 to 10 columns of numbers with row labels
 - Approximately 35 to 50 rows with page titles
- File – Page Setup Menu – Page tab:
 - Set to Landscape
 - Scaling should be 85% to 95%
- File – Page Setup Menu – Margins tab:
 - Minimize the margins: .25" to .4"
 - Click the option to centre on page horizontally
- File – Page Setup Menu – Header/Footer tab:
 - Click Custom Footer and click on the [Page] and [Pages] buttons
 - Can also use the date, time, and file path buttons
- File – Page Setup Menu – Sheet tab:
 - This is the key technique to maintain consistent print ranges that do not have to constantly be reset. In the Sheet box, enter each page range separately, separated by a comma
 - Each page on the model should be separated by at least one blank row

III. Keyboard Shortcuts

1. Shortcuts

- Every advanced Excel user needs to understand the importance of using keyboard shortcuts
 - It is the quickest way to work in Excel, allowing you to save significant amounts of time by not reaching for and using the mouse
 - It is the most efficient and accurate way to work in Excel, allowing you to maximize productivity
- There are many keyboard shortcuts in Excel, and they vary regionally and by operating system
- Model builders should be comfortable with the following categories of shortcuts:
 - a. Navigating shortcuts
 - b. Selecting Cells
 - c. Function Keys
 - d. Function Shortcuts
 - e. Formatting Shortcuts
 - f. Editing Shortcuts
 - g. ALT Navigation Key Shortcuts

IV. Scenario Analysis

1. Rationale for Scenario Analysis

- Flexibility in models is critical, as stakeholders typically like to know what the impacts of changing key drivers would do to the overall business
 - Key drivers are assumptions that are difficult to forecast, hard to control, and they materially affect the business. These can include:
 - Sales Price
 - Sale Volume Growth
 - Cost Inflation
 - FX Rates
 - Input Costs
 - An effective model should be able to switch between different operating cases, or scenarios, and these assumptions should dynamically flow through the model and ultimately through to the financial statements
- An effective model will have at least three different scenario cases:
 - 1 = Base Case
 - 2 = Upside Case
 - 3 = Downside Case
- It is important to note that having a high number of scenario variables is not ideal
- Scenarios should be reserved only for key driver assumptions that materially affect the business

2. Scenario Analysis Skills

- When financial modelers need to choose from a number of items [in this case 1, 2, and 3], the IF statement is typically the go to function to perform the task
 - However, there are simpler and cleaner ways to do this:
 - CHOOSE function
 - INDEX function
 - OFFSET function
- Instead of manually typing in the numbers “1”, “2”, or “3” for the three different operating cases, or scenarios, a Combo Box can be inserted
 - This is a more user friendly way to toggle between scenarios and will allow the model user to effectively choose the case they want utilizing a drop-down that states the name of the case (the number associated with the case is hidden behind the combo box)

3. Saving a Model

- Version control is extremely important to ensure the modeler always knows which is the latest version of the model
 - i. The only criterion that should be used when saving a new version of a model is “time”
 - ii. A proper naming convention is [Company Name] [Date].xls
 - iii. Never use “Save As” to re-save a version that is running a different operating case – all cases should be captured using Scenarios in the same model
- Save using “Password to Modify” – provides read-only access to avoid situations where another user inadvertently introduces an error into the model

V. Model Components

1. Financial Statements

- It is crucial for model builders to have a solid grasp of accounting fundamentals in order understand the linkages between the various numbers on the financial statements
- When modeling a company, the Model tab will typically contain the following financial statements
 - a. Statement of Earnings (Income Statement)
 - b. Statement of Cash Flows (Cash Flow Statement)
 - c. Statement of Financial Position (Balance Sheet)
- A financial model of a company may also include other statements:
 - d. Statement of Comprehensive Income
 - e. Statement of Changes in Shareholder's Equity
 - f. Sector-specific statements (i.e. for banks)
- It is critical to understand the framework of each schedule and connectivity to other sheets within the workbook

2. Model Schedules

- For a financial model of a company, the model should also include a number of schedules to calculate the values that will be required on the financial statements
- The most common schedules to include in a model are:
 - a. Operating Schedules**
 - i. Revenue Schedule
 - calculate based on (i) number of units sold and (ii) selling price
 - ensure business is not producing at greater than operating capacity
 - ii. Operating Cost Schedule
 - calculate both the (i) variable and (ii) fixed costs
 - both types of costs should be shown on a per unit and aggregate \$ basis
 - iii. Capex / Depreciation Schedule
 - ensure assets are not being over depreciated
 - iv. Income Tax Schedule
 - show the differences between accounting and taxable income
 - reflect any unique industry and/or company tax issues
 - reflect any timing differences between accounting and government earnings
 - v. Working Capital Schedule
 - calculate based on (i) income statement items (i.e. revenue, COGS) and (ii) number of days (or turns)
 - b. Capital Structure Schedules**
 - i. Debt Schedule
 - build a separate schedule for each piece of debt
 - calculate interest expense for each piece of debt
 - ii. Equity Schedule
 - build a separate schedule for each of piece of equity (including retained earnings)
 - calculate dividends (if any) for common and preferred stock

VI. Selected Readings

Accounting, Microsoft Excel, and Financial Modeling

- The following represents a list of selected readings to be used as additional reference material. These readings are not mandatory, but meant as supplemental resources to aid in exam preparation.

1. ***Building Financial Models*** by John Tjia

- a. Chapter 1: A Financial Projection Model
- b. Chapter 2: Best Practices
- c. Chapter 3: Setting the Stage
- d. Chapter 4: Accounting for Modeling
- e. Chapter 5: The Model Building Toolbox: F Keys and Ranges
- f. Chapter 6: The Model Building Toolbox: Functions
- g. Chapter 7: Building a Pilot Model
- h. Chapter 8: Circular References and Iterative Calculations
- i. Chapter 9: Variations on Balancing Plugs
- j. Chapter 10: Preparing to Build a Full Model
- k. Chapter 11: Building an Integrated Financial Model: Part 1
- l. Chapter 12: The Cash Flow Statement
- m. Chapter 13: The Cash Sweep
- n. Chapter 15: Forecasting Guidelines
- o. Chapter 19: Tips and Tricks

2. ***Crunch The Numbers - Accounting Fundamentals*** by AdkinsMatchett&Toy

- a. Chapter 1: Introduction
- b. Chapter 2: Revenues and Costs
- c. Chapter 3: What is Working Capital?
- d. Chapter 4: What are Non-Current Assets?
- e. Chapter 5: The Sources of Funding
- f. Chapter 6: Organizing the Cash Flows

3. ***Crunch The Numbers – Modeling*** by AdkinsMatchett&Toy

- a. Chapter 1: Introduction
- b. Chapter 2: Modeling Basics
- c. Chapter 3: Setting up the Model Templates
- d. Chapter 4: Input Historical Numbers
- e. Chapter 5: Calculating Ratios and Building Assumptions
- f. Chapter 6: Projecting the Income Statement
- g. Chapter 7: Projecting the Balance Sheet
- h. Chapter 8: Balancing the Balance Sheet
- i. Chapter 9: Interest Income and Interest Expense

4. **Excel 2016 Bible** by Walkenbach
 - a. Chapter 1: Introducing Excel
 - b. Chapter 2: Entering and Editing Worksheet Data
 - c. Chapter 3: Essential Worksheet Operations
 - d. Chapter 4: Working with Cells and Ranges
 - e. Chapter 6: Worksheet Formatting
 - f. Chapter 7: Understanding Excel Files
 - g. Chapter 8: Using and Creating Templates
 - h. Chapter 9: Printing Your Work
 - i. Chapter 10: Introducing Formulas and Functions
 - j. Chapter 11: Creating Formulas That Manipulate Text
 - k. Chapter 12: Working with Dates and Times
 - l. Chapter 13: Creating Formulas That Count and Sum
 - m. Chapter 14: Creating Formulas That Look Up Values
 - n. Chapter 15: Creating Formulas for Financial Applications
 - o. Chapter 16: Miscellaneous Calculations
 - p. Chapter 24: Customizing the Excel User Interface
 - q. Chapter 25: Using Custom Number Formats
 - r. Chapter 27: Creating and Using Worksheet Outlines
 - s. Chapter 29: Excel and the Internet
 - t. Chapter 30: Protecting Your Work
 - u. Chapter 31: Making Your Worksheets Error Free
 - v. Appendix A: Worksheet Function Reference
 - w. Appendix B: Excel Shortcut Keys

5. **Financial Accounting: An Introduction to Concepts, Methods and Uses** by Schipper, Francis, Weil, Stickney
 - a. Part 1: Overview of Financial Statements
 - b. Part 2: Accounting Concepts and Methods
 - c. Part 3: Measuring and Reporting Assets and Equities Using Generally Accepted Accounting Principles
 - d. Part 4: Synthesis

6. ***Financial and Managerial Accounting*** by Warren, Reeve, Duchac
 - a. Chapter 1: Introduction to Accounting and Business
 - b. Chapter 2: Analyzing Transactions
 - c. Chapter 3: The Adjusting Process
 - d. Chapter 4: Completing the Accounting Cycle
 - e. Chapter 5: Accounting for Merchandising Businesses
 - f. Chapter 6: Inventories
 - g. Chapter 8: Receivables
 - h. Chapter 9: Fixed Assets and Intangible Assets
 - i. Chapter 10: Current Liabilities and Payroll
 - j. Chapter 11: Corporations: Organization, Stock Transactions, and Dividends
 - k. Chapter 12: Long-term Liabilities: Bonds and Notes
 - l. Chapter 14: Statement of Cash Flows
 - m. Chapter 19: Cost Behaviour and Cost-Volume-Profit Analysis

7. ***Financial Modeling and Valuation: A Practical Guide to Investment Banking and Private Equity***
by Paul Pignataro
 - a. Part One: Financial Statements and Projections

8. ***Financial Modeling in Excel For Dummies*** by Danielle Stein Fairhurst
 - a. Chapter 1: Introducing Financial Modeling
 - b. Chapter 2: Getting Acquainted with Excel
 - c. Chapter 3: Planning and Design Your Financial Model
 - d. Chapter 4: Building a Financial Model by the Rulebook
 - e. Chapter 5: Using Someone Else's Financial Model
 - f. Chapter 6: Excel Tools and Techniques for Financial Modeling
 - g. Chapter 7: Using Functions in Excel
 - h. Chapter 8: Applying Scenarios to Your Financial Model
 - i. Chapter 9: Charting and Presenting Model Output
 - j. Chapter 10: Building an Integrated Financial Statements Model
 - k. Chapter 12: Budgeting for Capital Expenditure and Depreciation
 - l. Chapter 13: Ten Strategies for Reducing Error
 - m. Chapter 14: Ten Common Pitfalls to Avoid

9. ***Financial Statements: A Step-by-Step Guide to Understanding and Creating Financial Reports*** by Ittelson
 - a. Section A: Financial Statements: Structure & Vocabulary

10. ***Using Excel for Business Analysis: A Guide to Financial Modelling Fundamentals*** by Danielle Stein Fairhurst
 - a. Chapter 1: What is Financial Modeling
 - b. Chapter 2: Building a Model
 - c. Chapter 3: Best Practice Principles of Modeling
 - d. Chapter 4: Financial Modeling Techniques
 - e. Chapter 5: Using Excel in Financial Modeling
 - f. Chapter 6: Functions for Financial Modeling
 - g. Chapter 7: Tools for Model Display
 - h. Chapter 8: Tools for Financial Modeling
 - i. Chapter 9: Common Uses of Tools in Financial Modeling
 - j. Chapter 10: Model Review
 - k. Chapter 11: Stress-Testing, Scenarios and Sensitivity Analysis in Financial Modeling
 - l. Chapter 12: Presenting Model Output



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