The Practitioner's Introduction to the Concepts and Practices of

Project Financial Analysis

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CHAPTER 1: INTRODUCTION

Structure of this book

This book an introduction to the philosophy and mechanics of performing financial analyses on projects. This material is designed for the practitioner interested in learning the art and techniques of financially assessing a project. That practitioner may be a university student just learning the art or an employee desiring to assist their organization in making better, informed evidenced-based decisions. The book extends beyond the topic's conceptual introduction by providing "how to" details that will allow the novice to advance from little understanding of financial analysis to being able to perform the tasks necessary to fully assess the financial impact of proposed projects. This is accomplished by providing detailed examples, via this text and associated videos and spreadsheets, that illustrate how to build complex financial models overlaid with sensitivity analyses.

Project management decisions hinge on an understanding of the project's financial impact on the organization. That understanding must also be communicated to the organization's decision-makers in a way that the insight gained from the analysis can be properly utilized. No project analysis is complete until its findings are communicated to the organization's decision-makers. Given that the analyst is typically not the organization's decision-maker, the topics of this book extends from the creation of the financial models to instruction on communicating the results of the analysis in a clear, concise, direct actionable and fact-based report.

The teachings of this "book" are not limited to the text and graphics on the pages of this document. The entire "book" is considered the integration of this text with two important companion pieces: videos and Excel® documents. There are eight videos (see list below, Figure 1.1) that are referenced throughout this book. These videos provide step-by-step instruction using Excel® to perform various financial assessment tasks.

V2.1 Static Vs. Dynamic Spreadsheets
V2.2 Discounting Future Values
V4.1 Project NPV Calculations
V4.2 IRR using Goal Seek
V5.1 Project Finical Model Building
V6.1 Tornado Diagram Input Table
V6.2 Tornado Diagram Graphic Creation
V6.3 Project Success Conditions

Figure 1.1. List of Videos that integrate with this written document

All of the spreadsheets used in the videos, all the spreadsheets presented in the text, plus a number of templates that are useful as starting points for financially assessing projects are included in the second companion piece. These individual worksheets are organized into three Excel ® workbooks. The first workbook, "Project_Finance_Video_Spreadsheet_Compilation.xls," includes all the spreadsheets utilized in all the videos plus a couple of generic templates. The inclusion of these spreadsheets allows the reader

to gain skills by working in in Excel® in parallel with the video descriptions. The sequential tabs of that workbook are:

V2.1_Static_vs_Dynamic
V2.2_Discounting_Future_Values
V4.1_Project_NPV_Calculations
V4.2_IRR using Goal Seek
Project NPV Evaluation Template
Project Description
V5.1_Project Financial Model Building
V6.1_Tornado_Diagram Input
Tornado Diagram Template
V6.2_Tornado_Diagram_Graphic
V6.3_Success_Conditions

The second Excel® workbook, "Project_Finance_Chapter_Spreadsheets_&_Templates.xls," includes spreadsheets that appear in this text as well as templates utilized as a starting place for some of the tasks described. The sequential tabs of that workbook are:

Chapter 2
Chapter 4
Project NPV Evaluation Template
Tornado Diagram Template
WACC Calculation Template
WACC_Industry Averages 2022

The third workbook entitled "ACN_Free_Cash_Flow_Model_Data_0422.xls" contains information for Chapter 3. The first tab of this Excel® workbook is a generic free cash flow model template that can be utilized with any downloadable income statement, balance sheet, and statement for any firm. The workbook provides an example of mapping publicly-available data to this generic free-cash-flow template using data for Accenture (ACN, 2022). The sequential tabs of this workbook are:

ACN FCF Model
ACN Income Statement
ACN Balance Sheet
ACN Cash Flow

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Project Valuation Context

Project finance, or in other words, the financial evaluation and/or assessment of projects, is but one aspect of corporate finance. Like all financial analyses, it is built upon the development of prior financial skills.

Figure 1.2 is an illustration of the financial skill-set development that is foundational, to being able to perform project financial evaluations. Figure 1.2 illustrates this cumulative skill-development as ascending a flight of stairs. There is no elevator that will drop us off at the top of the project financial assessment staircase. We must climb there. Skimp on understanding any of these foundational elements and you will find yourself, at some point, losing your footing and sliding down the staircase before reaching its apex. In other words, the content that leads to project financial analysis is cumulative and builds upon the step that preceded it.

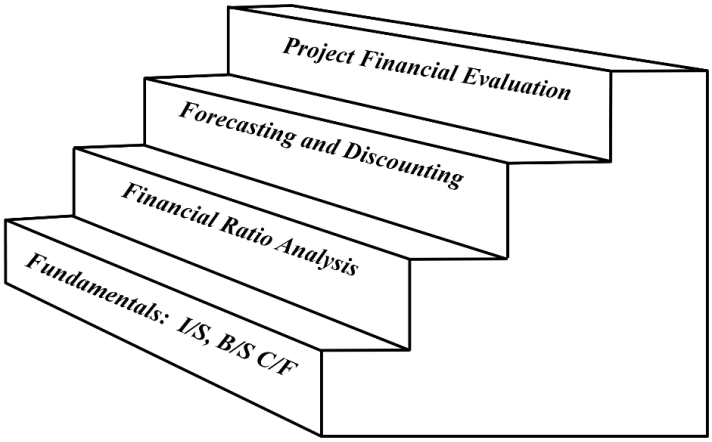

Figure 1.2. Foundational Element Staircase leading to Project Financial Evaluation Skills

Project Financial Analysis Introduction

Project Good decisions are made based on good judgment. Good judgement, as they say, is often based on our prior poor decisions. But what if we could improve our judgement in a less 'painful' manner, by "seeing" the impact of mistakes before we make them? What if we could gain that insight by seeing things most others cannot. What if we could then leverage that insight to make better decisions? Wouldn't it be great to have that kind of "vision" that allowed us to insightfully see what most others cannot? Imagine how valuable we would be to ourselves and to our employers. Imagine the contribution we could make – the impact we could have – if we had such a 'gift.'

Beyond that, every employee of any organization is obligated to perform ethically. Included in those ethical standards is being "fiduciarily responsible" (Peppers, 2014). Pepper defines fiduciary responsibility this way:

> "Fiduciary Responsibilities. We rarely act alone, but usually as members of organizations. As business people, we have an ethical duty to further the interests of our employers and shareholders. No one has the right to impose his own personal moral views on the actions of the company he works for – unless he owns 100% of the company himself."

What if we could simultaneously be fiduciarily responsible to our organization AND help that organization improve its judgement in making decisions? That is the potential power that project financial assessment holds.

Every organization has "projects." These projects that the company initiatives are intended to improve some aspect of the organization. There are lots of "ideas" floating around any organization that could be executed, but which should the organization actually do? No organization has the time, people or resources to act on every idea. Which ones should they choose to do? How would they prioritize them? Based on the charisma of the project champion? Oh, no! Rather, wouldn't it be advantageous to be able to peer into the future and "see" which projects would most benefit the organization? If you had such ability, you could travel into the future, assess the impact of the project, and then travel back to the choose the projects that created the most impact. What a great "super-power" that would be to possess! But that super-power is neither mystical nor unattainable. It is also not an innate 'gift' bestowed on the precious few. It is a learnable skill. It is called project financial analysis or assessment, which can be developed through the teachings of this book.

Example

Let's say that you work for a specialty chemical company with annual revenues of $50 million. That firm is seeking to expand. Since the firm is currently selling everything it can currently produce, it must expand production capacity in order to increase sales. The sales people are clamoring for additional product to sell (not surprisingly as a portion of their pay is tied to sales commissions). The production group is lobbying for the same thing (bigger is better and more prestigious in their world, after all). As a result, what is being proposed is a production expansion project. This capital project is estimated to cost $4.75 million, according to the engineering study. But is this a good move for the firm? Is this a viable financial project for the firm? Would the company be better off investing that money in other aspects of the company?

The expansion project *feels* like a good idea. Of course we would want to make sure the project runs on-time and on-budget. But that's not nearly good enough to make a nearly $5million dollar decision. Your "gut feel" is simply not enough to make a $5 million decision, regardless of your level of experience. In addition, beyond the project's "go" or "no go" decision, we would like to know the project's risks before we begin. Yes, everything is risky, but we need more specifics. What elements of the projects are crucial to its success? Where should the firm be focusing its managerial attention? The company needs real insight, not just a vague "sense" of what should be done. Insight that can only be derived from thorough analysis. But what analysis? And how do you communicate the results of that analysis in a way the decision-makers can comprehend and make informed, fact-based decisions versus "gut feel" ones?

This example will be assessed in detail in Chapters 5 and 6. Chapter 7 will then provide an example report to communicate the findings of this analysis to busy executives.

Analysis Approach: QMCR^3

There is a lot we want to know about the aforementioned project, so where do we even begin? To make things more complicated, every project will have its own nuances, its own subtleties that are associated with it. Fortunately, there is a general approach that can be applied to all projects. An approach that will allow us to provide the insight we need to properly evaluate the risks and rewards of any project. While the details of every project may be different, the general approach can be the same. There may exist a a

variety of approaches that could work, but the general approach that will utilized throughout this text is described by the mnemonic QMCR^3: Question, Measure, Calculate, then Recommendation, Risk, Relevant context.

- **Q**: What **Q**uestion are we trying to answer?
    - In the example presented the question is straight-forward: do we move forward with this expansion plan or not? No question, however, is quite that simple. The real question is under what conditions should this project be forwarded?
- **M**: The second issue is what **M**easure will be utilized to address this issue?
    - There may be more than one potential measure, but if a specific measure is not determined up-front, then anyone can rationalize a decision based on pretty much any measurement that fits their position. That is the opposite of data-informed leadership. That is leadership by data-manipulation and is just a phantom version of "gut-feel" leadership. In this example, there are lots of options. Do we simply go by the say-so of our trusted advisory board? The majority vote wins? (Massive gut-feel, versus single-data-point gut-feel management?) Probably not. Do we look at how the move impacts the overall company valuation? That may be understandable if we are a public company and our compensation is partially based on the company's stock price. A better measure would be would be to directly determine the potential value of the project itself. Does the project add-value to the firm or not? Over what period of time? If we are looking over time, then we must take into account how the value/cost of money of the organization over time. In addition, the money the firm spends on this project likely means that it has less to spend on other projects. Is this project financially better than the other projects under consideration? Ideally, we would like a measure that would put all projects on a financial level playing field. These measures will be discussed in detail in Chapter 4.
- **C**: After we know what we are going to measure to judge the outcome of our decision, we will need to determine how to **C**alculate those measures. Chapter 4 will also provide those details.
- **R^3**
    - **R**: **R**ecommendation? What is our recommendation for moving forward? Explain this recommendation in plain ENGLISH, not jargon or numbers. What is the basis for the recommendation? Reporting the results of the analyses is covered in Chapter 7.
    - **R**: What are the **R**isks? Any recommendation that is made must be accompanied with a description of the project's risks. They need to be specific. What does management need to focus on to make this project financially successful? What are the successful bounds of the project? In other words, what are the conditions that will allow this project to be financially successful? Remember, the analysis is are not being performed in order to find some singular numerical "answer," it is insight that is being sought. Insight comes from "what if" analyses.
    - **R**: **R**elative context, if any. Is there context – background or history—that will help the decision-maker? Has the organization done this type of thing before or does it require the setting of some sort of hitherto unattainable new world record?

Communication Approach

The above is the general approach to analyzing any project. Communicating the results of the analysis to decision-makers is an entirely separate issue. Bosses tend to be very busy, meaning that the analysis should be delivered in a concise and actionable fashion. Knowing and not communicating what one knows is the same as not knowing. If the analysis, for example, revealed major project risks yet we were unable to communicate those risks in a manner comprehensible to decision-makers, then the result is equivalent to our not knowing the risks at all.

Any project's complete financial analyses, including the sensitivity analysis that may have been done, will take some serious effort. Impressive insights will be gained as a result of that effort. But all that will be for naught if the findings are not communicated in a manner that creates impact for our organization. That means we need to communicate the findings of the detailed analysis in as simple a way possible. Knowing how to properly report the results of an analysis is as important as doing the analysis. An entire section of this document, Chapter 7, is dedicated to report-writing. For now, the general approach of writing such reports will be outlined.

Financial Analysis Report:

1. Background
   Remind the reader what the company issue is (be sensitive to the fact that they are juggling many balls). Put in any important-to-know background here, but be BRIEF. You can explain details later in the report, but here you are just reminding the reader of the issues and its context.

2. What's the recommendation?
   What action are you proposing? You are not writing a mystery novel that will "reveal" the recommendation at the end, put it up-front! The remainder of the report will support this recommendation, but say it first, then justify your position. This is the opposite of how you arrived at this conclusion, of course, but the report is not a chronology of your analysis.

3. Analysis Overview
   a. What's the recommendation based upon?
      What did you **M**easure? How does it compare to alternatives? (Don't forget that "doing nothing" is an alternative.) What significant assumptions were made in this analysis? Don't get bogged down in all the details of your calculations here, but do point out the important underlying assumptions made in your analysis (particularly if they relate to the risks you uncovered.)

   b. What are the key risks that would subvert the success of this project?
      All projects have risks and unknowns. Some are critical to the project's economic viability and others are less so. Good managers focus on the significant issues and don't get mired with the trivial ones. But they first have to know which is which. Again, a good financial analysis can greatly improve on "gut feel." Simply stating that a project is "risky" is not really helpful. To manage the risks -- you need to know "HOW" it is risky? What elements of the project most significantly determine the project's financial success?

Only after these risks have been identified can you make recommendations on how to mitigate those risks.

Appendixes

a. The main body of a report should definitely not be 1000-page tome, but brief decision-making guide. The specific details of your approach to assessing this project, that may be important for historic reasons or for others to perform similar analysis, should definitely *not* be in the main body of the report. Those details will be captured in the appendices of a final report. The body should include the overview of the approach you took, but the methods utilized in calculating those values are saved for the appendixes. Even still, the "how" that is included in the report is **not** the minute details of the calculations… not an explanation of "cell B6 times C34" or even "used Excel's 'goal-seek' function to…." No. the "how" is greater detail of the *approach* you took to that lead to the insight. You calculated a 10-year NPV at the company discount rate, etc. You performed a sensitivity analysis across 7 different input-variables. What did you assume for upper and lower limits for each of these variables? How were these boundary conditions determined? Remember, you want to present enough information in the body of the report to allow the decision-makers to make a data-based decision. The details of what you did will be in the appendix of a final report in case someone else has to go back and revisit and/or update this analysis in the future. (It is good to keep in mind that that *you* may be that future analyst, so do your future self a favor by providing enough detail in the appendices that would allow you to re-do the calculations a year or more from the time you did them originally.) A "final" project report can also include screen-shots of the excel models in the appendices.

Chapter 7 will present an example report for a fictious project that was assessed in Chapters 5 and 6.

Remaining Book Context

As mentioned, the content of this book is delivered as a combination of the text of this document, the associated videos listed in Figure 1.1 and the worksheets included in the previously-mentioned Excel® workbooks. The videos and spreadsheets will provide step-by-step instruction so you can develop your actual analysis skills, not just your understanding of that theoretical construct.

Below is an outline of the remaining chapters of this document. Sections that contain related Excel-based videos are noted with a "V." Those videos, and the spreadsheets utilized in those videos, will be specifically called out at the appropriate point in each of those chapters.

- Chapter 2: Project Financial Analysis Background (**V**)
  This chapter provides some mathematical and analysis background that may or may not be familiar to the burgeoning financial analyst. This chapter can be skipped by those already familiar with the concepts provided
  - Mathematics of Change

- Present Value of Future Cash
  - Components of future cash value changes
  - Corporate WACC
  - Calculating the Present Value of Future Cash Flows
  - Discounting at a Project Hurdle Rate
- Static versus Dynamic Spreadsheets
- Chapter Summary

- Chapter 3: Financial Statements
  This chapter provides background on an organization's financial statements and how these concepts are utilized in performing project analyses. Readers familiar with these statements can skip this chapter.
  - Income Statement
    - Direct Costs
      - COGS: Cost of Goods Sold
      - Depreciation and Amortization
      - Teasing our COGS from Cost of Revenue
    - Indirect Costs
    - EBITDA
    - Common Sizing
  - Balance Sheet
    - Working Capital
  - Statement of Cash Flows
    - Sources and Uses of Cash
    - Cash Flow Activities

- Chapter 4: Project Financial Measures (**V**)
  This chapter describes the measures that are generally utilized to financially assess projects. Beginning in Chapter 5, these measures will be applied to the example introduced in this chapter.
  - Question(s)
  - Measure(s)
    - Present and Future Values
      - Project Measure Values: DCF, NPV and IRR (an introduction)
  - Calculation(s): DCF, NPV and IRR
    - Calculation Overview: Cumulative DCF, NPV and IRR
  - Chapter Summary

- Chapter 5: Project Financial Model Building (**V**)
  This chapter begins the detailed analysis of an example project. The project that was introduced in this chapter will be detailed and assessed beginning in this chapter. The details of this example will be carried through Chapters 6 and 7.
  - Example
    - Discount Rate
    - Invested Capital
    - Revenue
    - Operating Costs

        - Completed Dynamic NPV Project Analysis Spreadsheet
    - Chapter Summary

- Chapter 6: Project Sensitivity Analysis (**V**)
  This chapter will perform the sensitivity analyses required to understand "under what conditions" this project is financially viable. The aim is not to determine a single base-case project value, but to gain insight into the implementation of this project. That insight is obtained by carrying out the sensitivity analysis of this chapter. In addition, this chapter introduces the "Tornado Diagram" which is a visual means to communicate the results of the sensitivity analysis.
    - Example
        - Project Tornado Diagram Development
            - Input Variable Ranges
            - Variable Impact on 10-Year NPV
            - Tornado Diagram Graphic
            - Deeper Dive
    - Chapter Summary

- Chapter 7: Project Financial Report
  Communicating results in in a manner that is clear, concise, direct, fact-based and actionable is critical (and too often overlooked) element of the analysis. This report continues the example project of the last two chapters by creating a mock report of the financial assessment of that hypothetical project.
    - QMCR^3
    - Report
        - Audience
        - Report Document
            - Report Outline
    - Final Report Thoughts
    - Example Report
        - Background
        - Conclusion and Recommendations
        - Analysis Overview
        - Appendices

- Chapter 8: Book Summary
  This chapter wraps up the learnings of this book.