Corporate Finance, Module 4, “Net Present Value and Other Investment Criteria”

Readings for the Fourteenth Edition (2022) of the Brealey, Myers, Allen, and Edmans text

(The attached PDF file has better formatting.)

The sections in this posting are for the *fourteenth* edition of the Brealey, Myers, Allen, and Edmans text. You may also use the seventh through thirteenth editions; final exam problems can be answered from any edition.

{The Brealey, Myers, Allen, and Edmans textbook is excellent. We say to read certain sections and to skip others. This does not mean that certain sections are better; it means that the homework assignments and exam problems are based on the sections that you must read for this course. Some of the skipped sections are fascinating, but they are not tested.}

You can skip the introductory skit (Vegetron) on pages 120-121; it is not particularly good (others in this text are better). On page 121, “net present value’s competitors,” focus on the internal rate of return; skip the sections on book rate of return and payback period. Know the bulleted list in “Five points to remember about NPV.” The fourth of the five points is the most important: “NPV depends only on forecasted cash flows and the opportunity cost of capital.” At the moment that cash is transferred (if it cannot be recouped), a forecasted cash flow becomes a sunk cost.

Skip section 5.2, “The Payback and Accounting Rate of Return Rules.” on pages 123-126. These are not financial yardsticks, they are not discussed in the rest of the course, and you need not read this material to understand the financial theory.

Read section 5.3, pages 126- 133 on the internal rate of return, and know equation 5.3 at the bottom of page 126 (under “Calculating the IRR”). The final exam may determine the internal rate of return given cash flows in three periods. The general case is a quadratic equation; exam problems focus on the theory, and the arithmetic is not difficult. You won't need a financial calculator. Know the IRR rule on page 128; it is tested in the final exam. Know how this rules applies to borrowing vs lending (Pitfall 1 – Lending or Borrowing?).

Read Pitfall 1 on pages 128-29; *skip* Pitfall 2 on pages 129-31; read Pitfall 3 on pages 131-133; and *skip* Pitfall 4 on pages 133-134. Pitfalls 1 and 3 apply to pricing insurance policies. Pitfall 2 is rare; the *expected* cash flows for insurance products have a single sign change and only one IRR. Pitfall 4 would be relevant if we could identify the opportunity cost of capital for different time periods. In practice, we can not do so; we use a single opportunity cost of capital.

Read the *verdict on IRR* on page 134. Many pricing actuaries use the IRR criterion. Both the SOA syllabus and the CAS syllabus use IRR, not NPV. Most actuaries don't agree with Brealey, Myers, Allen, and Edmans regarding the relative worth of NPV vs IRR, but you must know the textbook perspective for this course.

Skim section 5.4, “Choosing capital investments when resources are limited,” on pages 135-139. This is related to Pitfall 3, which is tested on the final exam. Section 5.4 has no direct problems on the final exam, but it summarizes the intuition for this chapter. Actuaries do not deal with capital rationing in the sense *discussed here*. This section is more important for start-up businesses than for the insurance industry. Actuaries deal with capital allocation by line of business, risk-based capital requirements, and rating agency capital adequacy measures. The issues are different from the material in these pages.

The practice problems for Module 4 have full comparisons of NPV and IRR, explaining the Brealey, Myers, Allen, and Edmans perspective and the common actuarial perspective.

Read the *key takeaways* on page 139; this is a good review of the chapter.

Review problems 6, 7, 8 on page 141. Skip the mini-case on pages 146-147, which deals with book rates of return.

Some of the problems in the textbook deal with the unusual situations discussed in the four pitfalls. The practice problems on the discussion forum for this course give standard scenarios with more explanation.

Question: If return on book equity (and other accounting ratios) is not a good profitability measure, why do Brealey, Myers, Allen, and Edmans discuss it?

Answer: The accounting measures are far more common than net present value. It is difficult to project cash flows for future years, and it is exceedingly difficult to compute or to understand economic income (as Brealey and Myers define it). Accounting measures define ratios that everyone (firms, investors, creditors) uses the same way. Investors know what a 12% return on GAAP equity means; they are not sure what the firm means by a 12% internal rate of return or a 12% profitability index.

The financial accounting course shows what firms actually evaluate: return on assets, return on equity, and earnings per share. The financial accounting textbook does not discuss net present value or internal rate of return. The accounting measures can be read directly from financial statements. The corporate finance text is correct that the accounting measures can be misleading, and good investors study financial statements of the firm to estimate the true IRR or NPV.

Question: Do actuaries use financial measures or accounting measures?

Answer: The readings on the actuarial syllabus encourage net present value or internal rate of return. The actuarial exams compare return on book equity, return on statutory surplus, and return on invested capital, in the same manner as Brealey, Myers, Allen, and Edmans.

Insurance executives listen to the actuarial models and the indicated returns. But no matter how often actuaries tell them that net present value is better than accounting measures, management generally uses a statutory or GAAP return measure, often recommended by the company's comptroller or CFO. You should understand these other measures for real work, though they are not covered here.

Question: Why isn't net present value used more often in practice?

Answer: Suppose a firm builds a factory to manufacture cars, or sets up a research center to develop new medications. These are long-term projects; the economic income in any year depends on the expected cash flows from now until the project ends. The firm has no ending date for the project, and it can not project cash flows more than a year or two in advance. A pharmaceutical firm starting a research project in 20X0 may not have positive cash flows until 20X9, and the probability of positive cash flows is small and uncertain.

Wealth drives from entrepreneurial vision. We see the firms that innovated well: Facebook, Amazon, Google, Apple, Microsoft, and dozens of others that are multi-billion dollar corporations. Many other firms have spent billions on research with no payoff: green energy, self-driving cars, as well as hundreds of competitors to the successful firms. Estimating cash flows for new projects is difficult, and less important than judging visions.

NPV may be theoretically correct, but it is hard to implement. GAAP returns are easy to compute. GAAP equity and GAAP income are in the financial reports; management simply divides one by the other. Banks, investors, bondholders, and the Board of Directors all know what the return on equity means.