

Corporate Finance, Module 9, "Capital Budgeting and Risk"

Corporate finance module 9: Readings for Eleventh Edition

(The attached PDF file has better formatting.)

The page numbers here are for the *eleventh* edition of Brealey and Myers. You may also use the seventh, eighth, ninth, or tenth editions of this text. The page numbers for earlier editions are in separate postings. The substantive changes in the textbook are slight among these editions, but the final exam problems are based on the eleventh edition.

{The Brealey and Myers 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.}

The introduction on page 245 and Section 10.1, "The Capital Investment Process," on pages 246-248 are optional. They summarize the topic and explain the terms and concepts, but they are not directly tested on the final exam.

Read section 10.2, "sensitivity analysis," on pages 248-254. This is sensitivity analysis for non-actuaries; Brealey and Myers explain expected values, not stochastic sensitivity analysis. Focus on the section "value of information" on page 249.

The next two subsections, "limits to sensitivity analysis" and "scenario analysis," do not add anything of substance; you may skip them if you want (no final exam questions are taken from these subsections). But it takes only a minute or two to read them; they have no equations and no difficult concepts, and you may want to read the whole of section 10.2.

Read the sub-sections on "break-even analysis" on pages 251-252 and "operating leverage and break-even analysis" on pages 253-254. Break-even analysis is useful, and it is not used by actuaries as much as it ought to be.

Skip section 10.3, "Monte Carlo simulation." This section is useful for non-actuaries, who have never dealt with simulation. You cover simulation on the actuarial exams; there is no need to duplicate that material with these pages from Brealey and Myers. Monte Carlo simulation is *not* tested on the final exam for this course.

Read section 10.4, "Real options and decision trees" on page 258-265. Later modules cover real options in more detail; this is an introduction. Brealey and Myers emphasize option components of financial analysis, and the final exam tests this subject. Real options are particularly important for insurers, who can easily expand or contract writings in a territory or line, and whose strategies affect income for many years.

The "option to expand" on pages 258-259 can be illustrated by test marketing. Suppose an insurer has a new life insurance product with a 50% chance of giving a 20% return and a 50% chance of a 0% return. The average return is 10%. If the opportunity cost of capital is 12%, the project has a negative NPV.

But suppose the insurer might market this product in 10 locations (such as 10 cities in a state). The correlation of success between locations is 50%: success in one location does not ensure success in another location, but it is a good sign. The insurer should test the product first in one location. If it fails, the insurer can decide not to market in the other locations. If it succeeds, the insurer can market in the other nine locations.

Question: Isn't this obvious? It is always better to test market a product to see its value.

Answer: The idea is obvious, but the mathematics of options can be difficult. One prices the choice to expand into nine other locations as an option. Given the correlations and the return in each scenario, we can determine if test marketing is worthwhile.

For some products, speed in bringing the product to market is important. Test marketing sacrifices speed. For clothing, movies, and high-tech products, test marketing may cost more than its benefits. A marketing "blitz," which is sometimes used for new movies, is the opposite of test marketing. For many products, manufacturers keep their ideas secret until the product is sold.

The "option to abandon" on pages 259-261 has equally many applications. Suppose an insurer can market a life insurance product in two cities, neither of which has a resident life insurance agent. One city has a small population, but average income is high, all residents buy auto insurance from an agent in town. The chances of success for the life insurance product are high, but if the product fails, the insurer can *not* use the agents (and sunk expenses) to market other products (such as auto insurance), since all the town's residents already have auto insurance.

The other city has a larger population, but average income is low and there is no auto insurance agent in town. The chances of success for the life insurance product are lower, but if the product fails, the same agents can market auto insurance. Auto insurance by itself may not be a positive NPV project, but if sunk costs are paid for life insurance, selling auto insurance is profitable. The second city may be the better location for the new product. We use option pricing techniques to determine which city is better.

Read the rest of this section, though page 265. Figure 10.6 on page 264 shows complex real options in real business cases. Pharmaceutical firms may spend ten years testing a new medication in animal and clinical trials. Real option analysis is essential for knowing when to stop and when to keep going.

Read the summary on pages 265-266.

Review problem 19 on page 269 and problem 22 on page 270; the Magna Carter challenge problem 22 on page 270 is a good review of real options concepts.

The mini-case on pages 271-272 is interesting and easy to read. You will enjoy it if you want to buy a home; but the mini-case is not tested on the final exam.