

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

Required reading:

(The attached PDF file has better formatting.)

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{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.}

Read section 10.1, "sensitivity analysis." The title is a bit presumptuous; Brealey and Myers show how to determine the expected value, not how to do stochastic sensitivity analysis. (This is its sensitivity analysis for non-actuaries.) Read also the section "value of information" on pages 256-257.

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 10.1.

Read the sub-sections on "break-even analysis" on pages 259-261 and "operating leverage and break-even analysis" on pages 261-262. Break-even analysis is useful, and it is not used by actuaries as much as it ought to be.

Skip section 10.2, "Monte Carlo simulation." This section is useful for non-actuaries, who have never dealt with simulation. You cover simulation in detail in Courses M and C; there is no need to duplicate that knowledge with these pages from Brealey and Myers. Monte Carlo simulation is not tested on the final exam.

Read section 10.3, "Real options and decision trees," and make sure you understand the concepts. We cover real options in more detail in a later module; this is an introduction. Brealey and Myers emphasize option components of financial analysis, and the final exam tests this subject.

The "option to expand" on pages 269-270 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 nine locations. If it succeeds, the insurer can market in the other 9 locations.

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

Rachel: 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 returns in favorable and unfavorable scenarios, we can determine whether test marketing is a good decision.

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.)

The "option to abandon" on pages 270-271 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 277. The Magna Charter example is good, and it explains the option aspects well. Read the summary on pages 278-279, but you can skip the mini-case on pages 283-284.