

Introduction to Finance – II
Problem set to prepare for Quiz 4

Problems. Show all work. Clearly indicate your answer to each question.

Suppose that you work for ITT Corp, and you are considering building a plant to make volutes for your pumps. You currently purchase the volutes from a supplier, at an average price of \$7,500 per unit. You currently purchase 3,500 units from this supplier per year. On your request, ITT engineers have provided an estimate for the construction of a new plant that would make the volutes for your pumps. You already own a 5 acre site in Syracuse that would house the small plant, which would only require 12 employees to run at full capacity. This land is currently appraised at \$30,000 per acre. The engineers estimate that the total cost per unit would be \$3,800. The engineers also have a construction plan that suggests that the plant could be built in one year for a total cost of \$80 million—half would be paid immediately and the remainder upon completion. The plant would last for 15 years at which point it would have no salvage value. Your tax attorney says that the plant and equipment is a 7-year MACRS asset. And the MACRS depreciation schedule is provided below. The engineers note that running the factory will require maintaining an additional amount of materials inventory of \$750,000 at the site, and ITT will have to keep an average 100 finished volutes on hand to prevent production delays.

With 12 employees, the plant can manufacture between 3,200 and 3,600 volutes per year. Most of the costs of running the plant are fixed, but if revenue slumps, up to 4 workers could be laid off. 11 employees could produce 3,000 - 3,199 volutes annually; 10 employees 2,700 - 2,999; nine employees 2,400 - 2,699; and 8 employees 2,100 - 2,399. Each employee cut would save \$90,000 per year in annual operating costs. The engineers think that in a pinch the plant could produce up to 4,000 volutes, but operating in excess of 3,600 units would increase operating costs by \$650 per unit (and this applies to *all* units).

ITT has a capital structure that is 35% debt and 65% equity. It has a beta of 1.4 and the ytm of its latest 30-year bond is 6.3%. The current ytm on 30-year Treasury bond is 3.8% and the expected return on the market is 9%. ITT's marginal income tax rate is 23%.

1. What is ITT's weighted average cost of capital?
2. Should ITT build the plant?
3. Ceteris Paribus, what is the break-even cost savings per volute for this project?
4. Your boss worries that your beta may be wrong. Conduct a sensitivity analysis to show her the effect that beta has on the decision to undertake this project.

MACRS 7-year depreciation schedule

Year	Depreciation (%)
1	14.29
2	24.49
3	17.49
4	12.49
5	8.93
6	8.92
7	8.93
8	4.46