

Chapter 7: Income tax & discounted cash-flow models (Numerical problems)

1. In year 0, an electrical appliance company purchased an industrial robot costing \$300,000. The robot, to be used for welding operations and classified as seven year recovery property, has been depreciated by the MACRS method. If the robot is to be sold after five years, compute the amounts of gains (losses) for the following three salvage values (assume that both capital gains and ordinary incomes are taxed at 34%):

(a) \$10,000

(b) \$125,460

(c) \$200,000

2. AmSouth, Inc., bought a machine for \$50,000 on January 2, 2004. Management expects to use the machine for 10 years, at the end of which time it will have a \$1,000 salvage value. Consider the following questions independently:

(a) If AmSouth uses straight-line depreciation, what will be the book value of the machine on December 31, 2007?

(b) If AmSouth uses double-declining-balance depreciation, what will be the depreciation expense for 2007?

(c) If AmSouth uses double-declining-balance depreciation, followed by switching to straight-line depreciation, when will be the optimal time to switch?

(d) If AmSouth uses 7-year MACRS and sells the machine on April 1, 2007, at a price of \$30,000, what will be the taxable gains?

3. Boston Machine Shop expects to have an annual taxable income of \$325,000 from its regular business over the next six years. The company is considering acquiring a new milling machine during year 0. The machine's price is \$200,000, installed. The machine falls into the MACRS five-year class, and it will have an estimated salvage value of \$30,000 at the end of six years. The machine is expected to generate additional before-tax revenue of \$80,000 per year.

(a) What is the total amount of economic depreciation for the milling machine if the asset is sold at \$30,000 at the end of six years?

(b) Determine the company's marginal tax rates over the next six years with the machine.

(c) Determine the company's average tax rates over the next six years with the machine.

4. An automobile-manufacturing company is considering purchasing an industrial robot to do spot welding, which is currently done by skilled labor. The initial cost of the robot is \$185,000, and the annual labor savings are projected to be \$120,000. If purchased, the robot will be depreciated under MACRS as a five-year recovery property. The robot will be used for seven years, at the end of which time the firm expects to sell it for \$40,000. The company's marginal tax rate is 35% over the project period. Determine the net after-tax cash flows for each period over the project life.

5. A highway contractor is considering buying a new trench excavator that costs \$200,000 and can dig a 3-foot-wide trench at the rate of 16 feet per hour. With the machine adequately maintained, its production rate will remain constant for the first 1,200 hours of operation and then decrease by 2 feet per hour for each additional 400 hours thereafter. The expected average annual use is 400 hours, and maintenance and operating costs will be \$15 per hour. The contractor will depreciate the equipment in accordance with a five-year MACRS. At the end of five years, the excavator will be sold for \$40,000. Assuming that the contractor's marginal tax rate is 34% per year, determine the annual after-tax cash flow.

6. An industrial engineer proposed the purchase of scanning equipment for the company's warehouse and weave rooms. The engineer felt that the purchase would provide a better system of locating cartons in the warehouse by recording the locations of the cartons and storing the data in the computer. The estimated investment, annual operating and maintenance costs, and expected annual savings are as follows:

- Cost of equipment and installation: \$65,500.
- Project life: 6 years.
- Expected salvage value: \$3,000.
- Investment in working capital (fully recoverable at the end of the project life): \$10,000.
- Expected annual savings on labor and materials: \$55,800.
- Expected annual expenses: \$8,120.
- Depreciation method: 5-year MACRS.

The firm's marginal tax rate is 35%.

- (a) Determine the net after-tax cash flows over the project life.
- (b) Compute the IRR for this investment.
- (c) At MARR = 18%, is the project acceptable?

7. A small children's clothing manufacturer is considering an investment to computerize its management information system for material requirement planning, piece-goods coupon printing, and invoice and payroll. An outside consultant has been retained to estimate the initial hardware requirement and installation costs.

He suggests the following:

PC systems	
(15 PCs, 4 printers)	\$85,000
Local area networking system	15,000
System installation and testing	4,000

The expected life of the computer system is five years, with no expected salvage value. The proposed system is classified as a five-year property under the MACRS depreciation system. A group of computer consultants needs to be hired to develop various customized software packages to run on the system. Software development costs will be \$20,000 and can be expensed during the first tax year. The new system will eliminate two clerks, whose combined annual payroll expenses are \$52,000. Additional annual expenses to run this computerized system are expected to be \$12,000. Borrowing is not considered an option for this investment, nor is a tax credit available for the system. The firm's expected marginal tax rate over the next six years will be 35%. The firm's interest rate is 13%.

Suppose that 50% of the initial investment of \$200,000 will be borrowed from a local bank at an interest rate of 11% over five years (to be paid off in five equal annual payments). Compute the after-tax cash flow.

8. A construction company is considering acquiring a new earthmover. The purchase price is \$100,000, and an additional \$25,000 is required to modify the equipment for special use by the company. The equipment falls into the MACRS seven-year classification (the tax life), and it will be sold after five years (the project life) for

\$50,000. The purchase of the earthmover will have no effect on revenues, but the machine is expected to save the firm \$60,000 per year in before-tax operating costs, mainly labor. The firm's marginal tax rate is 40%. Assume that the initial investment is to be financed by a bank loan at an interest rate of 10%, payable annually. Determine the after-tax cash flows by using the generalized cash flow approach and the worth of the investment for this project if the firm's MARR is known to be 12%.

9. Air South, a leading regional airline that is now carrying 54% of all the passengers that pass through the Southeast, is considering adding a new long-range aircraft to its fleet. The aircraft being considered for purchase is the McDonnell Douglas DC-9-532 "Funjet," which is quoted at \$60 million per unit. McDonnell Douglas requires a 10% down payment at the time of delivery, and the balance is to be paid over a 10-year period at an interest rate of 12% compounded annually. The actual payment schedule calls for only interest payments over the 10-year period, with the original principal amount to be paid off at the end of the 10th year. Air South expects to generate \$35 million per year by adding this aircraft to its current fleet, but also estimates an operating and maintenance cost of \$20 million per year. The aircraft is expected to have a 15-year service life with a salvage value of 15% of the original purchase price. If the aircraft is bought, it will be depreciated by the 7-year MACRS property classifications. The firm's combined federal and state marginal tax rate is 38%, and its required minimum attractive rate of return is 18%.

(a) Use the generalized cash flow approach to determine the cash flow associated with the debt financing.

(b) Is this project acceptable?

10. The headquarters building owned by a rapidly growing company is not large enough for the company's current needs. A search for larger quarters revealed two new alternatives that would provide sufficient room, enough parking, and the desired appearance and location. The company now has three options:

- **Option 1.** Lease the new quarters for \$144,000 per year.
- **Option 2.** Purchase the new quarters for \$800,000, including a \$150,000 cost for land.
- **Option 3.** Remodel the current headquarters building.

It is believed that land values will not decrease over the ownership period, but the value of all structures will decline to 10% of the purchase price in 30 years. Annual property tax payments are expected to be 5% of the purchase price. The present headquarters building is already paid for and is now valued at \$300,000. The land it is on is appraised at \$60,000. The structure can be remodeled at a cost of \$300,000 to make it comparable to other alternatives. However, the remodeling will occupy part of the existing parking lot. An adjacent, privately owned parking lot can be leased for 30 years under an agreement that the first year's rental of \$9,000 will increase by \$500 each year. The annual property taxes on the remodeled property will again be 5% of the present valuation, plus the cost of remodeling. The new quarters are expected to have a service life of 30 years, and the desired rate of return on investments is 12%. Assume that the firm's marginal tax rate is 40% and that the new building and remodeled structure will be depreciated under MACRS, using a real-property recovery period of 39 years. If the annual upkeep costs are the same for all three alternatives, which one is preferable?