

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Nuclear Engineering

22.812 Nuclear Energy Economics and Policy Analysis (S '02)

Problem Set #4

Due Date: March 11, 2002

1. State income taxes are an allowable deduction for the purposes of computing federal taxable income. However, the converse is not always true. In class we derived an expression for the composite (federal and state) income tax rate for the case when federal income taxes are not deductible in computing state taxes. Show that when federal income taxes are deductible, the composite tax rate, τ , is given by

$$\tau = \frac{(\tau_F + \tau_S - 2\tau_F\tau_S)}{1 - \tau_F\tau_S}$$

where τ_F = federal income tax rate and τ_S = state income tax rate.

2. In class we discussed the problem in the classnote, "An Illustration of the Use of Depreciation", for the case in which the owner of the pizza delivery business took out a loan of \$4000 to purchase the car. In this problem, assume that the owner again takes out a \$4000 loan at a 10% interest rate, but that this time the debt is repaid in 4 equal annual installments, and that the SYD depreciation method is used to determine income taxes. Compare the net cash flows of the business in this case with those computed in class.
3. Consider a corporation for which the marginal income tax rate is 50%. Five years ago the firm acquired a property at a cost of \$100,000. The property was originally estimated to have a life of 10 years and zero net salvage. Tax law requires that the 'gain on disposal' for this property be taxed as ordinary income.
 - a. Suppose the property is sold today for \$58,000. Find the tax on 'gain on disposal' if the depreciation method used was straight-line.
 - b. Repeat for the case of SYD.

- c. Since the tax on 'gain on disposal' was higher when the SYD method is used, does this mean that the method is less advisable for such circumstances?
4. A firm has an office copying/scanning/fax machine that was accidentally damaged. The machine was purchased a year ago for \$600. The expected operating life was 6 years, and a straight-line tax depreciation scheme was used. The firm is told by the copying machine salesman that the damaged machine will cost \$200 to repair. Alternatively, the salesman offers to buy back the machine for \$100 and to make available a replacement at annual rental rate of \$300. The salesman presents the following cost comparison for the current year and recommends on the basis of this that the firm adopt the rental option.

<u>Cost of Owning</u>		<u>Cost of Renting</u>	
Depreciation	\$100	Rental cost	\$300
Repairs	\$200	Less trade-in value	-\$100
Property taxes and insurance	\$25		
TOTAL	<u>\$325</u>		<u>\$200</u>

Do you think this is an appropriate way for the firm to look at the two options? Should the firm retain ownership of the machine, or trade it in for a rental? (Assume that property tax and insurance are treated as deductible expenses for the purposes of computing income taxes, and that the firm's discount rate is 10%.)

5. An entrepreneur negotiated a 5-year \$100,000 loan from his bank. The loan schedule called for equal annual payments at a rate of 9%/yr. Two years later, the bank offered to refinance the loan at 8%/yr. The refinancing would cover the balance of the original loan, and the loan term would be 3 years. Though no penalty would be incurred for paying off the first loan early, the bank would charge the entrepreneur an 'origination fee' of three 'points' (i.e., 3 percent of the loan amount) for the refinancing, payable at the beginning of the new loan term. The tax code does not permit the origination fee to be treated as an expense for tax purposes. The entrepreneur's marginal tax rate is 30%.

(a) What is the amount of the second loan?

(b) Should the entrepreneur accept the bank's offer to refinance? Explain your answer.

6. (P&SB, problem 4.5) An asset costing \$40,000 was installed in 1989 and depreciated using MACRS percentages for the 5-year property class. In 1991 the asset was sold. Calculate the net cash flow after taxes resulting from the sale of the asset. The company is a large, stable, profitable corporation with a marginal tax rate of 34%. The selling price of the asset was (a) \$25,000; (b) \$10,000.