ANSWERS TO STUDY QUESTIONS

Chapter 14

14.1. The difference between the PBTCF and the EBTCF is the debt service payments (e.g., mortgage payment).

14.3. After-tax cash flow will exceed before-tax cash flow if there is a negative before-tax net taxable income in the property (accrual based), that is, if depreciation expenses plus interest expenses exceed the net operating income: $DE + IE > NOI$.

14.5. They are both correct: (EBTCF + principal + reserves − depreciation) = (NOI − interest − depreciation)

These are two alternative approaches to calculating taxable income. One starts with NOI, whereas the other starts with EBTCF, where EBTCF = PBTCF − DS = NOI − CI − DS. Given that only the interest portion of annual mortgage payments is deductible for tax purposes, we must add back the principal or amortization. Similarly, capital expenditures (or reserves for them) are not tax deductible "expenses," so we must add these back as well.

14.7. The value additivity principle is the idea that the value of the property must equal the sum of the values of all the (private sector) claims on the property's cash flows. In that sense, the adjusted present value (APV), which is defined as APV = NPV(Property) + NPV(Financing), views the real estate investment deal as a combination of the property purchase as if it were free of debt and the financing arrangement.

14.9. In general, this question is false, because it ignores the fact that debt financing is generally not a positive NPV transaction (recall value additivity and the APV decision rule of section 14.3.4). However, it is true that there can be some circumstances when borrowing could be a positive NPV transaction viewed from the *after-tax* perspective of the borrower. However, this is only the case for borrowers facing a marginal income tax rate in excess of the marginal income tax rate of the marginal investors in the debt markets (the marginal lenders, in effect). And even then, the positive NPV from the borrowing will be considerably less than the total gross NPV of the interest tax shields from the debt to the borrower. (See section 14.3.5.)

14.11. If income taxes were the only consideration, most profitable corporations would probably elect not to own most of their real estate, because their double-taxation places them at a disadvantage relative to the marginal investors in the property market. Thus, property prices that in equilibrium reflect zero NPV after-tax for the marginal investors in the property market would result in a negative NPV for the tax-disadvantaged corporations. They would probably lease most of their property (or engage in sale-leaseback transactions), so that the actual property ownership entity could be a more tax-favored (or at least a less tax-disadvantaged) type of organization or vehicle.

14.13. For nonresidential commercial properties, the rate is straight-line over a 39-year life, and the land value component is not depreciable. So, the annual depreciation expense (DE) is 500,000 × 0.7/39 = $8,974.

14.15.

EGI	1,500,000
− OE	450,000
= NOI	1,050,000 ÷ 8.4% = Estimated property value of $12,500,000
Depreciation Expense (DE) =	12,500,000 × 75% ÷ 39 yrs = $240,385
Income Tax Calculation:	
NOI	1,050,000
− interest	487,500 (=12,500,000 × 65% × 6%)
− DE	240,385
= Taxable Inc.	322,115
× Tax Rate	0.35
= Taxes	112,740
Cash Flow:	
NOI	1,050,000
− CI reserve	25,000
− DS	487,500
= EBTCF	537,500
− inc. taxes	112,740
= EATCF	$424,760

14.17. Annual depreciation expense = $300,000/27.5 = $10,909.

Annual tax savings due to depreciation expense = (0.39) × $10,909 = $4,255.

These savings will occur each year as regular cash inflows (due to income tax savings) at the end of each of the next five years. The after-tax borrowing rate is appropriate to apply as the opportunity cost of capital for these (virtually) riskless cash flows. (Note that they are based on the historical cost of the property, not its volatile current market value.) Thus, we have a level annuity in arrears, the PV of which is ($4,255/0.05)[1 − (1/1.05)5] = $18,422.

At the end of five years, there will be 5 × 10,909 = $54,545 accumulated depreciation in the book value of the property. If the property sells for at least the historical cost, then all of this accumulated depreciation will become part of the capital gain income from the sale of the property, taxable at the CGT rate of 28%. This will be a cash outflow at the end of year 5 equal to 0.28 × $54,545 = $15,273. The PV of this future single sum, discounted over five years at 5% per year is $15,273/1.055 = $11,967. Thus, the overall NPV of the depreciation tax shields (DTSs) in the five-year holding period ownership cycle is $18,422 − $11,967 = $6,455.

14.19. a. The NPV(Property) component of the APV would be zero from a market value perspective; however, the NPV(Financing) component would have a positive value due to the subsidized loan:

$$NPV = \$1{,}500{,}000 - \left(\sum_{n=1}^{7} \frac{\$90{,}000}{(1.07)^n} + \frac{\$1{,}500{,}000}{(1.07)^7}\right) = +\$80{,}839$$

Thus, the APV from a market value perspective is $80,839.

b. The NPV(Property) component of the APV is still zero even from the IV perspective because the subject investor is typical of the marginal investors in the property market (for whom MV = IV, by definition). However, on an after-tax (IV) basis, the value of the subsidized loan is:

$$NPV = \$1{,}500{,}000 - \left(\sum_{n=1}^{7} \frac{(1-0.35)(\$90{,}000)}{[1+(1-0.35)(0.07)]^n} + \frac{\$1{,}500{,}000}{[1+(1-0.35)(0.07)^7]}\right) = +\$57{,}349$$

Thus, the APV from an IV perspective is $57,349.