ANSWERS TO STUDY QUESTIONS

Chapter 10

10.1. The ex ante return on an investment is inversely related to the price paid for the asset.

10.3. A higher discount rate should be applied to more risky cash flows, because such cash flows effectively have a higher cost of capital in the asset markets.

10.5. The statement is incorrect because as such, cap rates are caused by market value, rather than themselves causing value. It is more accurate to think of the longer-term total return perspective represented by DCF as causing the property value.

10.7. Cap rate ≈ r − g

10.9. There are two problems with this statement. First, thinking that it is ok can lead investors to develop false expectations about returns. The discount rate is the multi-period expected total return on the investment. If it is unrealistically high, investors are living in a fairy tale world in which they think they are going to get higher returns than they actually will, on average. This could cause investors to make incorrect allocations of capital between alternative types of investments, or to make financing decisions that do not have the effect they think they will. A second problem is that such a valuation may be "right" only in the sense that it seems consistent with the current property market, as indicated by observed transaction price cap rates. If the market is currently overvalued, this GIGO-based way of using DCF will not protect from investing at the wrong time because it wouldn't give an appropriate check against the possibility of an over-heated market that is likely to suffer a correction.

10.11. Zero-NPV deals are not zero-profit deals, in the sense that, if the discount rate accurately reflects the opportunity cost of capital, it includes the necessary expected return on the investment. This return is the normal amount of "profit" that would be required for an investment of this nature. Zero NPV simply means that there is not supernormal profit expected.

10.13. First, note that it is possible for NPV to be substantially positive for a given investor for a given deal when evaluated from that investor's personal investment value perspective, even when the assets are priced fairly at market value such that the NPV of the deal is zero from a market value perspective. The second way investors may rationally decide among alternatives that have equal (zero) NPVs is if they have other objectives and constraints besides maximizing NPV (e.g., portfolio allocation objectives).

10.15.

	0	1	2	3	4	5	6	7	8	9	10
Net. Operating CF		25	25	25	25	25	30	30	30	30	30
Net Sale Proceeds											300
Net Cash Flow		25	25	25	25	25	30	30	30	30	330

PV@12% = 248.07

$$V_0 = \sum_{t=1}^{5} 25{,}000/(1.12)^t + \sum_{t=6}^{10} 30{,}000/(1.12)^t + 300{,}000/(1.12)^{10} = \$248{,}075$$

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HP-IDB calculator steps:

$0 \rightarrow CF_0$
$25{,}000 \rightarrow CF_1, 5 \rightarrow N_1$
$30{,}000 \rightarrow CF_2, 4 \rightarrow N_2$
$330{,}000 \rightarrow CF_3$
$12 \rightarrow I/YR$
$NPV \rightarrow 248{,}075$

10.17. \$263,853. (Same as 10.13, only 11 $\rightarrow$ *I/YR*.) This is a 6.36% increase in value (263,853/ 248,075 = 1.0636) from a one-point change in discount rate.

10.19. The value of any asset is the PV of expected future cash flows (operating and reversion/sale). In this case, we have

$$V = \frac{150}{(1.15)} + \frac{150}{(1.15)^2} + \cdots + \frac{150 + 2 * V}{(1.15)^{10}} = 150 * PVIFA(10yrs, 15\%) + \frac{2 * V}{(1.15)^{10}}$$

This looks strange because the sale price is a function of the current value, which is what you are trying to find. You can solve this for V as follows (use the annuity keys to solve for the PV of 150 for 10 yrs @15%)

$$V\left(1 - \frac{2}{(1.15)^{10}}\right) = 150 * PVIFA(10yrs, 15\%)$$

$$V * 0.50563 = 752.815 \Rightarrow V = \frac{752.815}{0.50563} = \$1{,}488.86$$

Given the constant, perpetual NOI, the tendency is to calculate

$$V = \frac{NOI}{cap\ rate} = \frac{150}{.15} = \$1\ m$$

which means that the expected sale price in 10 years in \$2 m.

This does not work though. Why? If you were to purchase a property today that has expected NOI of \$150,000 per year, an expected sale price of \$2 m in year 10, then assuming a 15% discount rate you should be willing to

$$V = \frac{150}{(1.15)} + \frac{150}{(1.15)^2} + \cdots + \frac{150 + 2000}{(1.15)^{10}} = 150 * PVIFA(10yrs, 15\%) + \frac{2000}{(1.15)^{10}} = \$1{,}247$$

which does not equal \$1 m.

Essentially what is going on is you cannot use the perpetuity formula (NOI/k) because the discount rate is not assumed to be constant forever; or the ratio of property value to current income (i.e., cap rate) is expected to change.

10.21.

$$25{,}000{,}000 = \frac{2{,}700{,}000}{(IRR - 0.03)} \Rightarrow IRR = 13.8\%$$

10.23. a. 13%
b. 11%
c. 2% (200 basis points) likely disappointment

10.25. GIM = \$10 million/\$2 million = 5
Cap rate = \$1 million/\$10 million = 10%

*10.27.

a. Overall total IRR = 7.77%		
b. Initial yield component (= (6)IRR)	=	8.00%
c. CF growth component* (= (8)IRR − (6)IRR)	=	0.19%
d. Yield change component** (= (10)IRR − (6)IRR)	=	−0.41%
e. Interaction effect ((3)IRR − sum(components))	=	−0.01%

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