ANSWERS TO STUDY QUESTIONS

Chapter 9

9.1. The two major types of return measures are (a) periodic returns and (b) multiperiod returns. Periodic returns measure what the investment grows to within each single period of time, assuming that all cash flow (or asset valuation) occurs only at the beginning and end of the period of time. The multiperiod return gives a single inherently multiperiod return number for a relatively long-term period of time during which there can be cash flows into or out of the investment at intermediate points in time.

9.3. In real estate, period-by-period returns are more relevant at the macro-level and in examining portfolios of investments. Periodic returns also facilitate the measurement of the risk in investment performance by making possible the quantification of the variability of returns over time. They allow a comparison of how different asset classes tend to move either together or differently over time. Period-by-period returns are also more appropriate for evaluating or comparing the performance of investment managers who have no control over the timing of capital flow into or out of the investments they manage. This is because periodic returns and the time-weighted averages computed from them are insensitive to the timing of capital flows into or out of the investments whose returns are being measured. (This is not true of money-weighted returns.) On the other hand, the internal rate of return (IRR) is the classical measure of investment return at the micro-level of individual properties and development projects. For this purpose, the IRR has two great advantages. First, it does not require knowledge of market values of the investment asset at intermediate points in time. (This is in contrast to the periodic return, which cannot be computed without such intermediate asset value knowledge.) The other advantage of the IRR is just the opposite of that of the TWR regarding the effect of the timing of capital flow. Just as there are times when one does not want the return measure to be influenced by the timing of capital flow into or out of the investment, so there are times when one does want precisely this. In particular, a money-weighted, purely internal return measure such as the IRR will give a fairer and more complete picture of the performance of an investment manager who does have responsibility and control over the timing and amounts of cash flow into and out of the investment vehicle.

9.5. The investment offering a 10% expected return with a volatility of 10% is a better investment because the other is a more risky investment with 1.5 times the expected return but double the risk at 20% volatility.

9.7. The statement is the exact opposite of what a TWR measures. The time-weighted average return is independent of the magnitude of capital invested at each point in time. It is therefore not affected by the timing of capital flows into or out of the investment and thus inappropriate for investors who actively try to time the market when buying and selling properties.

9.9.

V0	$11,250,000
V1	$12,500,000
CF	$950,000
Inflation	0.0350
T-bond	0.0500
a. Nominal income return	0.0844
b. Nominal appreciation return	0.1111
c. Nominal total return	0.1956
d. Risk premium	0.1456
e. Real appreciation return	0.0735
f. Continuously compounded total	0.1786
g. Continuously compounded appreciation	0.1054

9.11. a. 0.0437 versus .0447 = 10 basis points per quarter or 40 basis points per year
b. 0.0079 Income return versus .0160
0.0368 Appreciation return versus .0287
Difference in appreciation return is 81 basis points/quarter = 324 basis points/year

9.13. Fund Data:

	Year				
	2004	2005	2006	2007	3-Year Total
Given Data:					
Unit value beginning of year		$100,000	$98,000	$112,000	
Unit value end of year		$98,000	$112,000	$118,000	
Income paid out per unit (end of year)		$5,000	$10,000	$7,000	
Calculated Data: Capital gain per unit		($2,000)	$14,000	$6,000	
Capital return		−2.00%	14.29%	5.36%	
Income return		5.00%	10.20%	6.25%	
a. Total period-by-period return (HPR)		3.00%	24.49%	11.61%	
1 + HPR		1.0300	1.2449	1.1161	
Compound (''chain-linked'') value (beginning of year):		1.0000	1.0300	1.2822	
Compound (''chain-linked'') value (end of year):		1.0300	1.2822	1.4311	
b. CREF time-weighted geometric mean return, 2005–2007:					12.69%
Investor's Actions and Cash Flow Results:					
Units of CREF held (beginning of year)		2.0	2.0	2.0	
Cash to investor from income distribution	$0	$10,000	$20,000	$14,000	
Units bought at end of year	2.0	0.0	0.0	0.0	
Cash from investor to purchase units	$200,000	$0	$0	$0	
Units sold at end of year		0.0	0.0	2.0	
Cash to investor from liquidation of units		$0	$0	$236,000	
Units held (end of year)	2.0	2.0	2.0	0.0	
Total net cash flow stream for Maxwell's IRR:	($200,000)	$10,000	$20,000	$250,000	
c. IRR for investor:					12.55%
d. The time-weighted geometric mean return.					

9.15. Periodic returns can be broken down a number of ways: income and growth (or appreciation) components, or as the sum of a risk-free rate plus a risk premium for example. Using the notation in the text,

$$\mathrm{E}[r] = y + g \quad \text{and} \quad \mathrm{E}[r] = r_f + RP$$

Since the value of the raw land is riskier than the value of the apartment building, then the risk premium to land exceeds the risk premium to the apartment investment, which implies that the expected total return on land investment exceeds that on apartment investment given that. That is,

$$\text{Given, } \mathrm{E}[r] = r_f + RP \text{ and } RP_{Land} > RP_{Apt} \text{ it must be that } \mathrm{E}[\mathrm{r}_{\mathrm{Land}}] > \mathrm{E}[\mathrm{r}_{\mathrm{Apt}}]$$

$$\begin{aligned} \mathrm{E}[r_{Land}] &= -1\% + g_{Land} & \mathrm{E}[r_{Apt}] &= 8\% + g_{Apt} \\ &= r_f + RP_{Land} & &= r_f + RP_{Apt} \end{aligned}$$

$$\mathrm{E}[\mathrm{r}_{\mathrm{Land}}] > \mathrm{E}[\mathrm{r}_{\mathrm{Apt}}] \rightarrow -1\% + g_{Land} > 8\% + g_{Apt} \rightarrow (g_{Land} - g_{Apt}) > 9\%$$