

RE 618 / Fin 618 – Real Estate Investment Analysis
Valuation Fundamentals – Practice Problems

Dr. Stanley D. Longhofer

- 1) Trent is considering investing in a commercial office building in east Wichita. The building has 120,000 square feet of gross leasable area. Of this, 35,000 square feet rent for \$17.50 per square foot (psf), 65,000 square feet rent for \$16.00 psf, while the remaining 20,000 square feet rent for \$15.25 psf. All leases in this building are gross leases. Currently, the average vacancy rate for similar office space in east Wichita is 12%. The asking price for this property is \$10 million.

Based on the prior owner's past tax returns, Trent has forecasted the following expenses for the property:

Depreciation allowances	205,000
Utilities	\$195,170
Maintenance	185,000
Management expenses	10% of EGI
Mortgage interest	220,000
Property insurance	135,000
Property taxes	260,000

- a) Write out the pro forma operating statement for this property. What is its expected net operating income?
- b) At what cap rate is the seller offering this property?
- c) Similar office buildings have recently been selling at an 8.50 percent cap rate. Based solely on a comparison of cap rates, does this appear to be a good investment at the current asking price? Explain.
- d) Provide two specific reasons why the cap rate may be a misleading indicator of a property's true value as an investment. That is, what factors might cause you to change your answer in part (c) above?
- e) If Trent were to buy this property at an 8.50 percent cap rate, what price would he pay?

- 2) Mr. Buyer is thinking of buying an apartment complex that is offered for sale by R.E. Sellers, Inc. The asking price is \$3.25 million. The following statement of income and expense is presented for Mr. Buyer's consideration.

The Valleyridge Apartments		
Prior Year's Operating Results		
Presented by Sellers, Inc., Brokers		
60 units, all two-bedroom apartments, \$675 per month		\$ 486,000
Laundry room and vending machines		<u>15,000</u>
Gross annual income		\$ 501,000
<i>Less Operating Expenses</i>		
Manager's salary	\$ 22,000	
Maintenance staff (one person, part-time)	11,500	
Landscape maintenance	2,800	
Property taxes	<u>23,500</u>	<u>59,800</u>
Net Operating Income		\$441,200

By checking the electric meters during an inspection tour of the property, Buyer determines the occupancy rate to be about 85%. He learns by talking to tenants that most have been offered inducements such as a month's free rent or special decorating allowances. A check with competing apartment houses reveals that similar apartment units rent for about \$625 per month and that vacancies average about 5%. Moreover, these other apartments have pools and recreation areas that make their units worth about \$25 per month more than those of Valleyridge, which has neither.

The tax assessor states that the apartments were reassessed 12 months ago, and that taxes in the coming year will be \$45,400.

Buyer learns that the resident manager at Valleyridge, in addition to a \$22,000 salary, gets a free apartment for her services. He also discovers other expenses: insurance will cost \$6.50 per \$1,000 of coverage, based on estimated replacement cost of \$2.2 million; workers' compensation (\$140 per year) must be paid to the state; utilities, incurred to light hallways and other common areas, cost about \$195 per month for similar properties; supplies and miscellaneous expenses typically run about 0.25% of effective gross income. Professional property management fees in the market are typically are about 5% of effective gross income.

- a) Calculate the cap rate on this property based on the selling price and the NOI figures provided by the seller's broker.
- b) Develop a pro forma operating statement for the coming year assuming that typically competent, professional management will allow the property to perform based on current market conditions. Based on this pro forma and the current asking price, determine the going-in capitalization rate. How does this compare to the cap rate based on the selling broker's pro forma? Explain why this difference exists.

- c) Forecast NOI for Valleyridge Apartments for years two through eight, incorporating the following assumptions:
- Potential gross rent and miscellaneous other income will grow at roughly the same rate as overall inflation, which is expected to be 3.0% per year.
 - Operating expenses other than management fees and property taxes will also grow at the same rate as overall inflation.
 - The market vacancy rate will remain constant over the forecast period.
 - Management fees as a percent of effective gross income will remain constant over the forecast period.
 - Property taxes are reassessed every other year, and are expected to increase by 10% with each revaluation; the next revaluation will affect taxes in year three.
- d) Mr. Buyer expects to hold the property for seven years. Calculate the expected reversion value (sale price of the property at the end of his holding period) assuming that he can sell the property using a 10.0% terminal cap rate, the current market cap rate for comparable sales of apartment properties that are seven years older than the subject. If Mr. Buyer has a 13.5% discount rate, what is the most he should be willing to pay for this property?
- e) Now calculate the reversion value and the current market value assuming that the property's value will grow by 3.5% off its current market value (not the asking price). What is your estimate of the property's current market value under this assumption? Assume that the appropriate discount rate is once again 13.5%.
- 3) Question 5, page 288 in the text. What is the relationship between a discount rate and a capitalization rate?
- 4) Question 12, page 288 in the text. What are some potential problems with using a "going-in" capitalization rate that is obtained from previous property sales transactions to value a property being offered for sale today?
- 5) A Class-B office building in Northeast Wichita has 125,000 square feet of gross leasable area. Current Class-B rents in the area are \$10 per square foot (psf), and the current market vacancy rate is 5 percent. Operating expenses for this building are expected to run at about 40 percent of *effective* gross income. The market cap rate for comparable properties is currently 8.50 percent.
- a) Lay out the pro forma operating statement for this property and calculate its net operating income.
 - b) If you purchase this building for \$8,000,000, what is your "going-in" cap rate?
 - c) Given that the current market cap rate for similar properties is 8.50 percent, does this appear to be a good investment at this price?
 - d) What circumstances might cause your answer to the previous question be different?
 - e) What is the indicated value of this property using the current market cap rate?

- 6) Problem 4, page 289 in the text: Ajax Investment Company is considering the purchase of land that could be developed into a Class A office project. At the present time, Ajax believes that the site could support a 300,000 rentable square foot project with average rents of \$20 per square foot and operating expenses equal to 40 percent of that amount. It also expects rents to grow at 3 percent indefinitely and believes that Ajax should earn a 12 percent return (r) on investment. The building would cost \$100 per square foot to build.
- What would the estimated property value *and* land value be under the above assumptions? (Hint: Calculate the building's value at cost; the land value is the residual.)
 - If rents are suddenly expected to *grow* at 4 percent indefinitely, what would the property value and land value be now? What percentage change in land value would this be relative to the land value in (a)?
 - If instead of (b), suppose growth in rents are expected to *fall* by 2 percent and rents will grow by only 1 percent because of excessive supply, what would land value be now? What percentage change would this be relative to the land value in (a)? (Hint: The wording in this question is confusing; simply assume that rents grow by 1 percent a year rather than by 3 percent.)
 - Suppose the land owner is asking \$7,000,000 for the land. *Under assumptions in part (a)* would this project be feasible?
 - If the land *must* be acquired for \$7,000,000, return to the assumptions in (a), how much of a change in the following would have to occur to make the project feasible? (Consider each item one at a time and hold all other variables constant.) (Hint: If the project is already feasible, by how much could the assumptions below change for the project to still be feasible?)
 - Expected return on investment (r)
 - Expected (g) or growth in cash flows
 - Building cost
 - Rents (initial base rents)
- 7) Problem 6, page 290 in the text: Athena Investment Company is considering the purchase of an office property. After a careful review of the market and leases that are in place, Athena believes that next year's cash flow will be \$100,000. It also believes that the cash flow will rise in the amount of \$5,000 each year for the foreseeable future. It plans to own the property for at least 10 years. Based on a review of property sales of properties that are *now* 10 years older than the subject property, Athena has determined that cap rates are in the range of 0.10. Athena believes that it should earn an *IRR* (required return) of at least 11 percent.
- What is the estimated value of this office property (assume a 0.10 terminal cap rate)?
 - What is the current, or going-in, cap rate for this property?

- c) What accounts for the difference between the cap rate in (b) and the 0.10 terminal cap rate?
- d) What assumptions are being made regarding future economic conditions when using current comparable sales to estimate terminal cap rates?
- 8) You are considering purchasing a commercial office building for \$2.4 million. The building's first-year expected pro forma looks as follows:

PGI	503,500
- V&C	<u>60,420</u>
EGI	443,080
- OE	<u>155,078</u>
NOI	288,002

- a) Calculate the cap rate for this property. If market cap rates for similar office properties are currently at 11 percent, is this property selling at a high, low, or typical price compared to the market? What would you pay for this property if it were to sell at an 11 percent cap rate? Explain briefly why the property might be fairly priced at a 12 percent cap rate even if other properties are selling at 11.
- b) Calculate the gross rent multiplier, the gross income multiplier, the net income multiplier, and the operating expense ratio for this property.
- c) Suppose that you can obtain 70 percent loan-to-value ratio financing on this property at 7.75 percent amortized over 30 years with monthly payments. Calculate the annual debt service on this loan. Also calculate the breakeven ratio, the debt coverage ratio, and the cash-on-cash return for this property.
- 9) Alquest Properties is analyzing a commercial office building with the following characteristics:
- The building has 35,000 square feet gross leasable area; 20,000 square feet of this space rents for \$24.00 psf, 10,000 square feet for \$25.00 psf, and 5,000 for \$28.00 psf.
 - The current market vacancy rate for comparable office space is 12 percent.
 - A typical operating expense ratio for comparable buildings is 55 percent.
 - The property can be purchased for \$3.828 million.
- a) Write out the pro forma operating statement for this property. What is the building's net operating income?
- b) At what cap rate is this property being offered?
- c) What price would Alquest pay if it purchased this property at a 9.50 percent cap rate?

- 10) Aramis Investments, LLC is considering the purchase of Eastgrove Apartments. Current rent rolls indicate the following for Eastgrove:

Unit Size	Number of Units	Monthly Rent	Number Occupied
1 BR	15	\$425	11
2 BR	50	\$575	47
3 BR	35	\$700	35

An analysis of the apartment market suggests that these rents are competitive and that market rents are expected to increase by 5 percent per year for the indefinite future. The average vacancy rate in the market is currently 10 percent.

In addition to rents, Eastgrove generated \$75,000 in income from vending, covered parking, and other miscellaneous sources. As with rents, this income is expected to increase by 5 percent per year indefinitely. This miscellaneous income is considered to be dependent on occupancy.

Operating expenses include \$145,000 in salaries and benefits for employees, \$125,000 in property taxes, and \$75,250 for repairs and maintenance. Operating expenses are expected to increase by 4 percent per year.

The asking price for this property is \$4.75 million.

- Write out an operating statement for this property based on its current situation. What is the implied vacancy rate? What is the cap rate for this property?
- What is the gross rent multiplier for this property?
- Create a forecasted first-year pro forma based on current market conditions. What is your cap rate based on this information?
- Suppose that market cap rates for similar apartment properties are running at 8.50%. Is this property a good buy at the current asking price? Explain.
- How much should you pay for the property in order to ensure an 8.50% cap rate?
- Why might the cap rate you calculated in part (c) be a misleading of the investment's true potential?

- _____ 1. You are considering purchasing an apartment complex that is expected to generate a net cash flow of \$300,000 per year forever into the future. If your current required return for investments of this type is 15 percent, what is the most you should pay for this property?
- \$300,000
 - \$2 million
 - \$3 million
 - \$45,000

- _____ 2. An alternative investment is a warehouse property that will generate a net cash flow of \$250,000 next year; this figure is expected to increase by 2 percent per year indefinitely. If you have the same required rate of return of 15 percent, what is the most you should pay for this property?
- A. \$1.923 million
 - B. \$2.5 million
 - C. \$1.667 million
 - D. \$37,500
- _____ 3. If you purchase the property at this price, what is your going-in cap rate?
- A. 2 percent
 - B. 17 percent
 - C. 13 percent
 - D. 15 percent
- _____ 4. You are considering purchasing an office building with 200,000 square feet of gross leasable area. Similar buildings in the area command rents of \$8 per square foot per year, and the current market vacancy rate is 15 percent. Operating expenses are expected to run about \$400,000 per year. What is this property's expected net operating income?
- A. \$1,600,000
 - B. \$1,360,000
 - C. \$400,000
 - D. \$960,000
- _____ 5. Real estate space markets are typically segmented by
- A. property type, geographic location, and use or quality within a type.
 - B. size, geographic location, and investor.
 - C. property type, geographic location, and investor.
 - D. geographic location, investor, and quality.
- _____ 6. Center Pointe Shopping Center's net operating income is expected to be \$1.8 million next year; this figure is expected to grow by 3 percent per year for the indefinite future. It can be purchased for \$15 million. What is its current cap rate?
- A. 3 percent
 - B. 9 percent
 - C. 12 percent
 - D. 15 percent

- _____ 7. North Pointe Shopping Center has a first-year expected net operating income of \$2.4 million; this figure is expected to remain constant forever into the future. Assuming that similar shopping centers are currently trading at an 8 percent cap rate, estimate North Pointe's current market value.
- A. \$192,000
 - B. \$2.4 million
 - C. \$30 million
 - D. \$24 million

- _____ 8. Consider a property that is expected to generate net operating income as follows:

Year	NOI
1	180,000
2	200,000
3	250,000
4	250,000
5	300,000

At the end of the fifth year you expect to sell this property for \$3 million. If your discount rate is 12 percent, what is the value of this property to you?

- A. \$2.529 million
 - B. \$3 million
 - C. \$2.737 million
 - D. \$2.833 million
- _____ 9. You are considering purchasing one of several apartment complexes. In analyzing these properties, you have determined that the current market vacancy rate for apartments is 10 percent, and that operating expenses will run about 45 percent of effective rental income (effective gross income). The first property you are considering has 75 units, each of which rents for \$550 per month. Potential rental income (potential gross income) for this complex is
- A. \$41,250.
 - B. \$49,500.
 - C. \$445,500.
 - D. \$495,000.
- _____ 10. The expected vacancy and collection allowance is
- A. \$4,125.
 - B. \$44,550.
 - C. \$49,500.
 - D. \$222,750.

- _____ 11. An alternative apartment complex is expected to generate potential gross rents of \$300,000. Effective rental income (effective gross income) for this property is
- A. \$135,000.
 - B. \$165,000.
 - C. \$270,000.
 - D. \$300,000.
- _____ 12. Net operating income for the second complex is
- A. \$121,500.
 - B. \$148,500.
 - C. \$165,000.
 - D. \$300,000.
 - E. gross income generated by the investment.
 - F. before-tax cash flow available to equity investors.
 - G. after-tax cash flow available to equity investors.
 - H. cash available to distribute to all of the investors.

Use the following pro forma to answer the next three questions.

Potential gross income	\$2,400,000
– Vacancy & collections	120,000
Effective gross income	2,280,000
– Operating expenses	798,000
Net operating income	1,482,000

This property has a market value of \$12.35 million.

- _____ 13. What vacancy allowance is used in this statement?
- A. 95.00%
 - B. 10.00%
 - C. 7.50%
 - D. 5.00%
- _____ 14. What is this property's cap rate?
- A. 8.33%
 - B. 10.00%
 - C. 12.00%
 - D. 36.11%
- _____ 15. What is the gross income multiplier for this property?
- A. 8.33
 - B. 5.42
 - C. 18.46
 - D. 12.00

- _____ 16. You are considering purchasing one of several office buildings. In analyzing these properties, you have determined that the current market vacancy rate for similar office buildings is 12 percent, and that operating expenses will run at about 35 percent of effective gross income. The first property you are considering has 150,000 square feet which rents at \$8.00 per square foot. Potential gross income for this building is
- A. \$150,000.
 - B. \$1.2 million.
 - C. \$14.4 million.
 - D. \$1.056 million.
- _____ 17. The expected vacancy and collection allowance is
- A. \$144,000.
 - B. \$18,000.
 - C. \$1.728 million.
 - D. \$126,720
- _____ 18. An alternative office building is expected to generate potential gross income of \$900,000. Effective gross income for this property is
- A. \$108,000.
 - B. \$792,000.
 - C. \$277,200.
 - D. \$514,800.
- _____ 19. Net operating income for the second building is
- A. \$108,000.
 - B. \$792,000.
 - C. \$277,200.
 - D. \$514,800.
- _____ 20. An investor is analyzing a shopping center that is expected to generate NOI of \$100,000 in each of the next six years. Comparable sales suggest that the terminal cap rate after five years (the holding period) will be 12%. If the appropriate discount rate is 15%, what is the value of this property?
- A. \$749,529
 - B. \$833,333
 - C. \$1 million
 - D. \$335,216
- _____ 21. Suppose in the question above that the property's value will increase by 3% per year based on its current market value. What is the current market value under this assumption?
- A. \$335,216
 - B. \$388,607
 - C. \$791,282
 - D. None of the above (show your answer & work)

Consider a property with the following pro forma operating statement:

	PGI	\$3,750,000
-	<u>V&C</u>	<u>300,000</u>
	EGI	3,450,000
-	<u>OE</u>	<u>1,207,500</u>
	NOI	\$2,242,500

This property can be purchased for \$16 million. Financing is available for this 80 percent of the purchase price over 15 years at 9.5 percent with annual debt service payments of \$1,603,929.

- _____ 22. The cap rate for this property is
- A. 7.135.
 - B. 0.234.
 - C. 0.140.
 - D. 4.267.
- _____ 23. The gross income multiplier for this property is
- A. 0.216.
 - B. 0.140.
 - C. 7.135.
 - D. 4.638.
- _____ 24. The operating expense ratio for this property is
- A. 2.857.
 - B. 0.322.
 - C. 0.539.
 - D. 0.350.
- _____ 25. The debt-coverage ratio for this property is
- A. 0.715.
 - B. 1.398.
 - C. 0.428.
 - D. 2.151.
- _____ 26. The breakeven ratio for this property is
- A. 0.350.
 - B. 1.254.
 - C. 0.815.
 - D. 0.750.
- _____ 27. The net income multiplier for this property is
- A. 7.135.
 - B. 0.216.
 - C. 4.638.
 - D. 4.267.

- _____ 28. The equity dividend rate (cash-on-cash return) for this property is
- A. 0.140.
 - B. 0.200.
 - C. 5.011.
 - D. 7.135.
- _____ 29. A warehouse property has a net operating income of \$100,000 per year. ACME Finance is offering financing at 6.75% over 15 years with monthly payments and a minimum debt-coverage ratio of 1.25. What is the largest loan that ACME will provide on this property based on this debt-coverage ratio?
- A. \$125,000
 - B. \$753,373
 - C. \$740,279
 - D. \$9.04 million
- _____ 30. Orin recently took out a new \$2.5 million mortgage at 7.00% interest amortized over 25 years with monthly payments. The first payment on this mortgage was on August 1st of this year. How much total interest will Orin pay during this calendar year.
- A. \$173,788
 - B. \$72,736
 - C. \$72,917
 - D. \$175,000
- _____ 31. How much total interest will Orin pay on this mortgage NEXT year?
- A. \$171,024
 - B. \$212,034
 - C. \$175,000
 - D. \$172,660
- _____ 32. Suppose you have an opportunity to purchase an office building at an 11 percent cap rate, and other office buildings in the market have been selling at a 9 percent cap rate. Which of the following statements is most true.
- A. This is may be a poor investment because the cap rate is too high.
 - B. This is may be a good investment because the price is low.
 - C. This is may be a poor investment because the price is too high.
 - D. Cap rates give us no information on which to evaluate the quality of the investment opportunity.
- _____ 33. True or False: Net operating income captures all of the information investors need to analyze potential investment projects.

_____ 34. True or False: Net operating income measures the total income available to be distributed to investors, regardless of how the property is financed or the tax situation of the investors.