

RE 614 – Real Estate Appraisal

Fall 2004

Final Exam – Solutions

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MW 5:35-6:50

1) Cindy recently entered into a ground lease on land owned by Peter. The present value of the rent from this ground lease is \$250,000. Cindy develops an office building on the property that costs \$2.2 million to construct. Based on the market rent this building will command, the total market value of the property is \$2.4 million.

a) What is the total value of Peter's interest in this property? What type of interest does he hold?

Peter has a \$250,000 leased fee interest.

b) What is the total value of Cindy's interests? Indicate the value of each specific interest Cindy holds.

Leasehold interest in the land	– \$50,000
Fee interest in the building	<u>2,200,000</u>
Total value of interests	\$2,150,000

c) How is the property's total value divided between the land and the building?

Land value	\$ 200,000
Building value	<u>2,200,000</u>
Total value of property	\$2,400,000

d) Suppose now that market rents rise so that the total property value is \$3 million. What is the new value of the following interests? How has the value of these interests changed?

- Building value

The total building value is still \$2.2 million.

- Total land value

The land value has risen to \$800,000, because it is the residual.

- Leased fee interest

This is still worth \$250,000, because the rents on the ground lease have not changed.

- Leasehold interest

This is now \$550,000, the difference between the land value and the value of the leased fee interest. This is because the ground lease payments do not change.

- Total of all interests owned by Peter
Peter's interest is still worth \$250,000.
- Total of all interests owned by Cindy
Cindy's interest is now worth \$2.75 million; \$2.2 million for the building and her \$550,000 leasehold interest in the land.

2) Greg is appraising a commercial office building. The building has 55,000 square feet of gross leasable area. Of this, 25,000 square feet rent for \$12.50 per square foot (psf) while the remaining 30,000 square feet rent for \$11.00 psf. All leases in this building are gross leases. Currently, the average vacancy rate for similar office space 12%.

Based on historical values from the property, annual operating expenses are expected to be as follows:

Depreciation	\$51,282
Utilities	88,115
Maintenance	35,300
Management expenses	5% of EGI
Property insurance	45,155
Mortgage interest	152,658
Property taxes	29,320

Based on an analysis of comparable properties in the market, Greg has determined the following market multipliers and ratios

Potential gross income multiplier	5.00
Effective gross income multiplier	5.75
Cap rate	0.09
Operating expense ratio	0.50

b) Write out the pro forma operating statement for this property. What is its expected net operating income?

Potential gross income		
25,000 @ 12.50	\$312,500	
30,000 @ 11.00	330,000	642,500
Less: Vacancy & collection		(77,100)
Effective gross income		565,400
Operating expenses		
Utilities	88,115	
Maintenance	35,300	
Management expenses	28,270	
Property insurance	45,155	
Property taxes	29,320	(226,160)
Net operating income		\$339,240

- c) Estimate this property's market value using the potential gross income multiplier.

$$V = \text{PGI} \times \text{PGIM} = \$642,500 \times 5.00 = \$3,212,500$$

- d) Estimate this property's market value using the effective gross income multiplier.

$$V = \text{EGI} \times \text{EGIM} = \$565,400 \times 5.75 = \$3,251,050$$

- e) Estimate this property's market value using the capitalization rate.

$$V = \text{NOI} \div R = \$339,240 \div 0.09 = \$3,769,333$$

- f) Which of the above value estimates do you believe is the most reliable for the subject property? Explain your reasoning.

The subject property has a 40 percent operating expense ratio, whereas the typical property in the market has operating expenses that run at 50 percent of effective gross income. As a result, the cap rate likely provides the most reliable measure of value.

- g) Based on these calculations, what is your best estimate of the property's market value?

Something close to the cap rate estimate will be the best choice.

- 3) A property is expected to have first-year NOI of \$345,000. Using a 15 percent discount rate and a 10-year holding period, estimate the value under the following assumptions:

- a) NOI will be level but the property value will increase by 3 percent per year over the expected holding period.

First, note that the total appreciation over the holding period is $\Delta = 1.03^{10} - 1 = 0.3439$. Second, we can calculate the sinking fund factor as $P/Y = 1, N = 10, I = 15, PV = 0, FV = -1 \Rightarrow \text{PMT} = 0.04925$.

Thus, we can calculate the yield capitalization rate as

$$\begin{aligned} R_0 &= Y_0 - \Delta / S_{\bar{n}} \\ &= 0.15 - 0.3439 \times 0.04925 \\ &= 0.1331. \end{aligned}$$

The estimated value of the property is therefore $\$345,000 / 0.1331 = \$2,592,036$, or approximately \$2.6 million.

- b) NOI and the property value will both increase by 3 percent per year over the expected holding period.

In this case, the property is simply a growing perpetuity. The estimated value is therefore $\text{NOI}_1 / (r - g) = \$345,000 / (0.15 - 0.03) = \$2,875,000$, or approximately \$2.9 million.

- c) Explain briefly why you get different estimates of value with these two assumptions.

In the second case, income is growing each year. As a result, there are larger cash flows received during the expected holding period, not just at the time of sale. These added cash flows result in a higher estimated value for the property.

- 4) Consider the following information on a subject property and three comparables:

<u>Characteristic</u>	<u>Subject</u>	<u>Comp 1</u>	<u>Comp 2</u>	<u>Comp 3</u>
Sale price		\$105,000	\$115,000	\$122,000
Condition		Similar	Similar	Similar
Location		Similar	Similar	Similar
Age	15 years	22 years	12 years	8 years
Design	Ranch	Ranch	Ranch	Bi-level
Time since sale		6 months	9 months	10 days
Living area (sf)	2,200	2,100	2,350	2,400
Bedrooms	4	4	4	4
Baths	2	2	2½	2½
Construction	Brick	Brick	Wood	Brick
Air conditioning	Yes	No	Yes	Yes
Garage	1-car	1-car	1-car	2-car
Financing	Market	Market	Special rate	Market
Lot size (sf)	23,000	similar	similar	similar

Based on prior analysis, you have determined the following adjustments for certain property attributes of interest:

Square feet of living area	\$30 per square foot
Bedrooms	\$3,200 per bedroom
Bathrooms	\$1,400 per full bath \$600 per half bath
Wood frame exterior compared to brick	(\$4,500)
Aluminum siding compared to brick	(\$4,000)
Air conditioning	\$2,500
Garage (per car)	\$2,000
Bi-level design compared to ranch	(\$1,500)
Time since sale	5% per year
Age of house	(\$400) per year

In addition, you have calculated the effect of the special-rate financing on Comparable #2 as being worth \$2,000 compared to market-rate financing.

Based on this information, estimate the final adjusted sale price of each comparable property. What is your estimate of the subject's market value?

Use the following adjustment grid for the comparables:

<u>Characteristic</u>	<u>Comp 1</u>	<u>Comp 2</u>	<u>Comp 3</u>
Sale price	\$105,000	\$115,000	\$122,000
Financing		<u>- 2,000</u>	
Normal sale price	<u>\$105,000</u>	<u>\$113,000</u>	<u>\$122,000</u>
Time since sale	<u>+ 2,593</u>	<u>+ 4,212</u>	
Market adjusted normal sale price	<u>\$107,593</u>	<u>\$117,212</u>	<u>\$122,000</u>
Age	+ 2,800	- 1,200	- 2,800
Design			+ 1,500
Living area (sf)	+ 3,000	- 4,500	- 6,000
Baths		- 600	- 600
Construction		+ 4,500	
Air conditioning	+ 2,500		
Garage			<u>- 2,000</u>
Final adjusted sale price	<u>\$115,893</u>	<u>\$115,412</u>	<u>112,100</u>

The range of value estimates is between \$112,000 and \$116,000. My best estimate would be \$115,000, rounded.

- 5) Marcia is conducting an appraisal of a 120,000 square foot industrial property that is 10 years old. Based on standard cost guides, she estimates the reproduction cost new of the property to be \$30 per square foot. Using the sales comparison approach, she has also estimated the value of the land for this parcel to be \$300,000.

Marcia has collected the following information on comparable properties in the market:

	<u>Comp. 1</u>	<u>Comp. 2</u>
Selling price	\$5.7 million	\$2.1 million
Land value	\$200,000	\$250,000
Reproduction cost new	\$7 million	\$3 million
Age	8 years	15 years

Use market extraction to estimate annual depreciation in this market and then use this depreciation rate to estimate the value of the subject property using the cost approach.

Begin by estimating accrued depreciation for each of the comparables, and use this figure to determine the annual depreciation rate:

	<u>Comp. 1</u>	<u>Comp. 2</u>
Reproduction cost	\$7,000,000	\$3,000,000
+ Land value	200,000	250,000
- Sale price	<u>5,700,000</u>	<u>2,100,000</u>
Accrued depreciation	\$1,500,000	\$1,150,000
Depreciation percent	21.43%	38.33%
÷ Age	8 years	15 years
Annual depreciation	2.68%	2.56%

Based on this, the annual depreciation rate is approximately 2.62% (the average of the two comparable figures).

Now estimate the value of the subject using the cost approach.

Building size	120,000 sf
× Cost per square foot	<u>\$30.00</u>
Reproduction cost new	\$3,600,000
Annual depreciation rate	0.0262
× Age of property	10 years
× Reproduction cost	<u>\$3,600,000</u>
Total accrued depreciation	\$943,000
Reproduction cost new	\$3,600,000
– Accrued depreciation	943,000
+ Land value	<u>300,000</u>
Estimated value using cost approach	\$2,957,000

6) Name and briefly explain each of the different categories of depreciation that are estimated in the breakdown method. For each, give an example of that type of depreciation.

- Physical deterioration
 - Curable (deferred maintenance)
 - Incurable
 - Short-lived items
 - Long-lived items
- Functional obsolescence
 - Curable
 - Deficiencies
 - Defects
 - Superadequacies
 - Incurable
 - Deficiencies
 - Defects
 - Superadequacies
- External obsolescence
 - Locational
 - Economic