Real Estate Investment Analysis Formulas

Income and Expense Statement

Income
Potential Gross Income (PG1)	$_____
Less: Vacancy and Bad Debt Allowance	_____
Equals: Effective Gross Income (EGI)	$_____
Operating Expenses	
Exclude: Depreciation	
Mortgage Payments	
Non-Operating Expenses. E.G Directors Salaries	
Capital Expenditures	$_____
Net Operating Income (NO1)	_____
Less: Debt Service (P + I)	_____
Cash Flow Before Tax (CFBT)	_____
Less: Income Taxes	_____
Equals Cash Flow After Tax (CFAT)	$_____

Financial Measures:

Potential Gross Income Multiplier (PGIM)
Also called Potential Gross Rent Multiplier (PGRM)

$$PGIM = \frac{Market\ Value}{Potential\ Gross\ Income} \qquad or \qquad Market\ Value = Potential\ Gross\ Income \times PGIM$$

$$MV = EGI \times EGIM$$

$$= \frac{MV}{PGI}$$

Effective gross Income Multiplier (EGIM)
Also called Effective Gross Rent Multiplier (EGRM)

$$EGIM = \frac{Market\ Value}{Effective\ Gross\ Income} \qquad or \qquad Market\ Value = Effective\ Gross\ Income \times EGIM$$

$$MV = EGI \times EGIM$$

$$= \frac{MV}{PGI}$$

Net Income Multiplier (NIM)

$$NIM = \frac{Market\ Value}{Net\ Operating\ Income} \qquad or \qquad Market\ Value = Net\ Operating\ Income \times Net\ Income\ Multiplier$$

$$MV = NOI \times NIM$$

$$= \frac{MV}{NOI}$$

Capitalization Rate (Cap Rate)
Also called Broker's Yield

$$Cap\ Rate(\%) = \frac{Net\ Operating\ Income \times 100}{Market\ Value} \qquad or \qquad Market\ Value = \frac{Operating\ Income \times 100}{Cap\ Rate\ (\%)}$$

$$= \frac{NOI \times 100}{MV} \qquad\qquad MV = \frac{NOI \times 100}{Cap\ Rate\ (\%)}$$

Return on Equity (ROE)

Also called: Equity Dividend Rat e(EDR)
Cash on Cash Return

$$ROE(\%) = \frac{(Net\ Operating\ Income - Debt\ Service) \times 100}{Equity}$$

Where: Equity = Market Value – Mortgage

Debt Service = Principal & Interest Payment   or $MV = \frac{(NOI-DS) \times 100}{ROE\ (\%)} + Mortgage$

$$ROE\ (\%) = \frac{Cash\ Flow\ Before\ Tax \times 100}{Equity}$$

$$ROE\ (\%) = \frac{(NOI - DS) \times 100}{(MV - Mtge.)}$$

Default Ratio (Break-even) (%)

Using Potential Gross Income   Using Effective Gross Income

$$= \frac{(Operating\ Expenses + Debt\ Service) \times 100}{Potential\ Gross\ Income}$$ $$= \frac{(Operating\ Expenses + Debt\ Service) \times 100}{Effective\ Gross\ Income}$$

Financing Measures.

Debt Service Ratio (DSR)   ## Loan to Value Ratio (%)

$$= \frac{Net\ Operating\ Income}{Debt\ Service}$$ $$= \frac{Loan\ Amount \times 100}{Market\ Value}$$

Rental Apartment Building Measures.

1. Price Per Suite
2. Price Per Sq. Foot (Using Suite Areas)
3. Rents Per Sq. Foot per month
4. Operating Costs
   a. Operating Costs Per Suite Per Year
   b. Operating Cost per Sq. Foot per Year
5. Operating Expense Ratio (OER) = $\frac{Operating\ Expense \times 100}{Effective\ Gross\ Income}$

Home Financing:

Gross Debt Service Ratio = $\frac{(Principal + Interest + Taxes)}{Gross\ Family\ Income}$

Lenders often modify the basic Gross Debt Service Ratio Formula.

Modified Gross Debt Service Ratio = $\frac{(Principal + Interest + Taxes + Heat + \%\ of\ Maintenance}{Gross\ Family\ Income}$

Total Gross Debt Service Ratio = $\frac{(Principal + Interest + Taxes + Other\ Debt\ Payments)}{Gross\ Family\ Income}$

Commercial Real Estate Sample Calculations

The following examples illustrate how to use the real estate formulas. In Example No.1 the information is obtained for the property and the financial measures calculated. In Example No. 2 the financial measures such as the Cap Rate are obtained for comparable sales and are used to calculate the Market Value for the subject property.

Example No 1.

Sale Price (Market Value)	$3,165,000
Potential Gross Income:	$306,000
Vacancy & Bad Debt Allowance:	4.5%
Operating Expenses	$58,000
Mortgage	$2,056,000
Mortgage Payment (P+i)	$180,538
Number of Suites	30
Total Rentable Area	24,000 Square feet

Note: All figures are annual

Calculate: Potential Gross Income Multiplier (PGIM)
Effective Gross Income Multiplier (EGIM)
Net Income Multiplier (NIM)
Capitalization Rate (Cap Rate)
Return on Equity (ROE)
Default Ratio (Break even) based on:
Potential Gross Income
Effective Gross Income
Debt Service Ratio (DSR)
Loan to Value Ratio
Price per Suite
Price per Square Foot
Rent per Square Foot per Month
Operating Cost per Suite per Year
Operating Cost per Square Foot per Year
Operating Expense Ratio (OER) based on:
Potential Gross Income
Effective Gross Income

1. Construct an Annual Income and Expense Statement

Potential Gross Income	$306,000
Less Vacancy & Bad Debt Allowance (4.5%)	13,770
Effective Gross Income	$292,230
Operating Expenses	58,000
Net Operating Income	$234,230
Less; Debt Service (P+i)	180,538
Cash Flow Before Tax	$ 53,692

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2. Calculate the Financial Measures

Potential Gross Income Multiplier (PGIM):

$$PGIM = \underline{MV} \qquad = \quad \underline{3,165,000}$$
$$\qquad\qquad PGI \qquad\qquad 306,000$$

$$= \quad 10.34$$

Effective Gross Income Multiplier (EGIM):

$$EGIM = \underline{MV} \qquad = \quad \underline{3,165,000}$$
$$\qquad\qquad EGI \qquad\qquad 292,230$$

$$= \quad 10.83$$

Net Income Multiplier (NIM):

$$NIM = \underline{MV} \qquad = \quad \underline{3,165,000}$$
$$\qquad\qquad NOI \qquad\qquad 234,230$$

$$= \quad 13.51$$

Capitalization Rate (Cap Rate):

$$Cap\ Rate = \underline{NOI} \qquad = \quad \underline{234,230 \times 100}$$
$$\qquad\qquad MV \qquad\qquad 3,165,000$$

$$= \quad 7.40\%$$

Return on Equity (ROE):

$$ROE = \underline{(NOI - DS) \times 100} \qquad = \quad \underline{Cash\ Flow\ Before\ Tax \times 100}$$
$$\qquad\qquad EGI \qquad\qquad\qquad\qquad Equity$$

$$= \quad \underline{53,692 \times 100}$$
$$\qquad (3,165,000 - 2,056,000)$$

$$= \quad 4.84\%$$

Default Ratio (Breakeven):

Based on Potential Gross Income:

$$Default\ Ratio = \underline{(Operating\ Expenses + Debt\ Service) \times 100}$$
$$\qquad\qquad\qquad\qquad\qquad Potential\ Gross\ Income$$

$$= \quad \underline{(58,000 + 180,538) \times 100}$$
$$\qquad\qquad 306,000$$

$$= 77.95\%$$

Default Ratio (Breakeven) cont.

Based on Effective Gross Income:

$$\text{Default Ratio} = \frac{(\text{Operating Expenses} + \text{Debt Service}) \times 100}{\text{Effective Gross Income}}$$

$$= \frac{(58,000 + 180,538) \times 100}{292,230}$$

$$= 81.63\%$$

Debt Service Ratio (DSR) $= \dfrac{\text{Net Operating Income}}{\text{Debt Service}}$

$$= \frac{234,230}{180,538}$$

$$= 1.30$$

Loan to Value Ratio % $= \dfrac{\text{Loan Amount} \times 100}{\text{Market Value}}$

$$= \frac{2,056,000 \times 100}{3,165,000}$$

$$= 64.96\%$$

Price Per Suite $= \dfrac{3,165,000}{30}$

$$= \$105,500$$

Price per Square foot $= \dfrac{3,165,000}{24,000}$

$$= \$131.88$$

Rent Per Sq. Foot per Mo. $= \dfrac{306,000}{24,000 \times 12}$

$$= \$1.06$$

Operating Costs Per Suite Per Year

$$= \frac{58,000}{30}$$

$$= \$1,933$$

Operating Cost per Square foot per year

$$= \frac{58,000}{24,000}$$

$$= \$2.42$$

Operating Expense Ratio (OER)

Based on Potential Gross Income:

$$= \frac{\text{Operating Expenses} \times 100}{\text{Potential Gross Income}}$$

$$= \frac{58,000 \times 100}{306,000}$$

$$= 18.95\%$$

Based on Effective Gross Income:

$$= \frac{\text{Operating Expenses} \times 100}{\text{Effective Gross Income}}$$

$$= \frac{58,000 \times 100}{292,230}$$

$$= 19.85\%$$

Summary.

Potential Gross Income Multiplier (EGIM):	10.83
Potential Gross Income Multiplier (EGIM):	10.83
Net Income Multiplier (NIM):	13.51
Capitalization Rate (Cap Rate)	7.40%
Return on Equity (ROE)	4.84%
Default Ratio (Break even) based on:	
Potential Gross Income	77.95%
Effective Gross Income	81.63%
Debt Service Ratio (DSR)	1.30
Loan to Value Ratio	64.96%
Price per Suite	$105,000
Price per Square Foot	$131.88
Rent per Square foot per month	$1.06
Operating Cost per Suite per Year	$1,933
Operating Cost per Square Foot per Year	$2.42
Operating Expense Ratio (OER) based on:	
Potential Gross Income	18.96%
Effective Gross Income	19.85%

Example No 2.

Potential Gross Income:	$244,800
Vacancy & Bad Debt Allowance:	5.0%
Operating Expenses	$49,300
Mortgage	$1,685,000
Mortgage Payment (P+i)	$147,500
Number of Suites	24
Total Rentable Area	18,720 Square feet

Note: All figures are annual

Calculate the Market Value using the following financial measures

> Effective Gross Income Multiplier (EGIM): 9.30
> Net Income Multiplier (NIM): 12.50
> Capitalization Rate (Cap Rate): 8.00%
> Return on Equity (ROE): 5.57%

1. Start by constructing the Annual Income and Expense Statement

Potential Gross Income	$244,800
Less Vacancy & Bad Debt Allowance (5.0%)	12,240
Effective Gross Income	$232,560
Operating Expenses	49,300
Net Operating Income	$183,260
Less; Debt Service (P+i)	147,500
Cash Flow Before Tax	$ 35,760

2. Calculate the Market Value based on the:

Effective Gross Income Multiplier (EGIM):

$$MV = \text{Effective Gross Income x EGIM}$$

$$= 232,560 \text{ x } 9.30$$

$$= \$2,162,808$$

Net Income Multiplier (NIM):

$$MV = \text{Net Operating x NIM}$$

$$= 183,260 \text{ x } 12.50$$

$$= \$2,290,750$$

Capitalization Rate (Cap Rate):

$$MV = \frac{\text{Net Operating Income x 100}}{\text{Cap Rate}}$$

$$= \frac{183{,}260 \text{ x } 100}{8.0}$$

$$= \$2{,}290{,}750$$

Return on Equity (ROE):

$$MV = \frac{(\text{NOI - DS}) \text{ x } 100}{\text{ROE}} + \text{Mortgage}$$

$$= \frac{(183{,}260 - 147{,}500)}{5.57} + 1{,}685{,}000$$

$$= \quad \$2{,}327{,}011$$