Chapter 18
Investment Decisions: Ratios

Decision Making in Real Estate Centers Around Valuation

- For many investors, however, market value is not the whole story
- In fact, most RE decisions are made with an investment motive

Chapter Overview

- Chapter introduces framework for making single-asset RE investment decisions
- Focus is on a set of widely used ratios & multipliers
- These measures are relatively easy to calculate, but may not explicitly consider cash flows beyond 1st year of the analysis
- Many investors also perform multi-year discounted cash flow (DCF) analyses, discussed in Chapter 19, and include these ratio’s each year

A Word of Caution

- This chapter & the next focuses on quantitative decision tools
- Although quantitative tools are widely used, their usefulness is limited by the quality of the cash flow assumption used by the analyst.
- In short, the “garbage in, garbage out” maxim apples to real estate investing

Why Investment Value Differs from Market Value

- Investors have different required yields
- Different risk assessment
- Different opportunity cost of equity
- Different expectations:
  - Future rental rates
  - Vacancies
  - Expenses
  Difference of Opinion Video
Centre Point Office Building: Review of Assumptions

- Total acquisition price: $1,056,000.
- Property consists of eight office suites, three on the first floor and five on the second.
- Contract rents: two suites at $1,300 per month, one at $3,000 per month, and five at $1,560 per month.
- Annual market rent increases: 3% per year.
- Vacancy and collection losses: 10% per year.
- Operating expenses: 40% of effective gross income each year.
- Capital expenditures: 5% of effective gross income each year.
- Expected holding period: 5 years.

1st Step in Investment Analysis: Estimating NOI Over Next 12 Months

<table>
<thead>
<tr>
<th>Description</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Gross Income (PGI)</td>
<td>$180,000</td>
</tr>
<tr>
<td>Vacancy &amp; Collection Loss (VC)</td>
<td>18,000</td>
</tr>
<tr>
<td>Effective Gross Income (EGI)</td>
<td>$162,000</td>
</tr>
<tr>
<td>Operating Expenses (OE)</td>
<td>64,800</td>
</tr>
<tr>
<td>Capital Expenditures (CAPX)</td>
<td>8,100</td>
</tr>
<tr>
<td>Net Operating Income (NOI)</td>
<td>89,100</td>
</tr>
</tbody>
</table>

How Are Capital Expenditures Treated in the Pro Forma? (It Depends)

Appraisal Terminology

- PGI - VC = EGI - OE - CAPX Reserve = NOI

Investment Terminology

- PGI - VC = EGI - OE - CAPX = Net cash flow

For consistency, we will assume an 'above-line treatment' throughout the book.

Maintenance vs. Capital Expenditures

- Operating expenses:
  - Keep property operating & competitive
  - Do not increase value or extend useful life
  - Examples: Minor roof repairs, air conditioner servicing

- Capital Expenditures:
  - Increases market value of property
  - Examples: Roof replacement, air-conditioner replacement

More on Net Operating Income

- NOI: $s that flow out of the property
- NOI is the property's expected "dividend"
- Projected stream of NOI is the fundamental determinant of value
- NOI must be sufficient to:
  - Service the mortgage debt
  - Provide investor with an acceptable return on equity
A Mortgage Review

Interest Due

- Interest Due is the mirror image of interest earned.
- In Principles of Finance you learned that interest earned is:
  - Interest rate \times \text{Amount Deposited}
- Interest due is:
  - Interest rate \times \text{Amount Borrowed}

Periodic Interest Rate

- The periodic interest rate is the APR divided by the periods per year.
- For mortgages, the period is usually one month.
- The monthly interest rate charged can then be computed as:
  - \frac{\text{APR} \%/1200}{(\text{that's because there are 12 months in a year, and percent means per 100})}

Interest Due Example

- You borrowed $250,000 last month at 6.375%. How much interest is due now?
  - $250,000 \times \frac{6.375}{1200} = 1328.13$
  - If you make a payment more than 1328.13, you will be "amortizing" your loan.
  - If you make a payment less than 1,328.13 you will have negative amortization, or more pleasantly called, positive accrual.

Example Bullet (IO) Loan

- Some commercial mortgages are interest only, which means each month you must pay the interest due. Your principal balance stays the same over time. These are often called bullet loans.
- What is your monthly interest payment on a 5.375% bullet loan for an $18,000,000 loan?
  - $18,000,000 \times \frac{5.375}{1200} = 80,625$
  - What is your balance after 5 years?

Application of payments to loan balances

- Your loan contract will specify the use of payments on your loan. Typically money will first be used to make up any arrears in payments or any penalties you have incurred.
- If you are paying according to schedule, your payment will first be applied to interest due.
- Any amount of your payment that exceeds the interest due will be used to amortize (pay down) the principal.
Amortization Example

- For the previous Interest Due example, say you made of payment of $1500.
- First the 1328.13 interest would be subtracted from your payment and the remaining amount ($1500 – 1328.13 = 171.88) would be used to pay down the principal. Your new principal amount would be
  - $250,000.00 – 171.88 = 249,828.12

Loan Amortization

- If your loan payment and interest rate are constant, your calculator can do the amortization calculations for you.
- If you loan payment changes every month, and if the interest rate changes every month, you will need to do a month by month amortization of the loan which allows for these changes.

Calculator hints

- Clear the calculator before new problems (Use the C ALL)
- Make sure:
  - The desired number of decimal places are displayed
    - Set using DISP followed by entering a digit
  - You have the correct payments (periods) per year
    - Set by typing a number then press P/YR
  - Check by holding down C ALL

Calculator hints (continued)

BEGIN indicator is not displayed, unless you are told this problem has beginning of period cash flows

- Set using BEG/END

If you have a comma where you should have a decimal point (European notation) then toggle to decimal by:

- Toggle using J,

Notation when using Calculator

- P/YR = 12 (indicate the periods per year)
- PMT(PV=-270,000, I/Yr = 6, N=180) = 2278.41
- Order of inputs does not matter
- Negative sign for PV indicates a cash outflow
- N = number of periods
- I/YR = stated annual interest rate
- The last button one pushes is what you want to solve for: in this case PMT.

Amortization function on Calculator

- One sets up the Amortization table in the calculator by entering the starting period and pressing the INPUT key, and then entering the ending period and pressing the AMORT key.
- Press the = key to cycle through the principal paid, the interest paid, and the ending balance.
Amortization Example

- For the previous example, how much interest will be paid in the second year?
- First solve for the monthly payment
  \[ \text{PMT}(PV=-270,000, I/Yr = 6, N=180) = 2278.41 \]
- Then:
  \[ 13 \text{ INPUT} \]
  \[ 24 \text{ AMORT} \]
  \[ \text{Press the} = \text{ sign twice to get the interest payment of 15,182.12} \]

Points

- Mortgages are often charged points, which are an upfront fee (the interest payment is an ongoing fee).
- One point is 1% of the loan amount
- The points allow the lender to recoup the initial cost of making the loan, and perhaps lock in an immediate profit on the loan
- What the borrower receives is sometimes called the net loan proceeds
- The buyer needs additional up front funds to cover the points (as well as many other costs associated with transacting real estate)

Points example

- Say one buys a 100,000 building and gets an 80,000 loan with two points. The buyer will need to provide a 20,000 down payment, plus $1600 in points for a total of 21600. The buyer will also need funds for additional closing costs.
- Net loan proceeds = Loan Amount * (1 - p)
- Where p is the points as a decimal fraction
- Net Loan Proceeds = 80,000 * (1 - 0.02) = 78,400
- Remember – The loan payment and future balances are based on the 80,000 note amount and not on the 78,400 net loan proceeds

Yield to lender

- The lender earns a combination of the upfront points plus the month to month interest payments. The yield to lender is the IRR of the combination of these. Consider a $20,000,000 building for which a lender will provide you with a loan of 75% LTV (loan to value) with a 25-year amortization with a 5 year due date (i.e. has a balloon payment of balance at that date). The interest rate is 5% and the you must pay 1 points upfront.
- What are the net loan proceeds?
- What is mortgage payment?
- What is the balance at month 60?
- What is the yield to the lender?

Cost to borrower

- Borrowers often have to pay fees that the lender requires but the money does not go to the lender. These are costs to the borrower that do not result in an increased return to the lender.
- The lender requires that the borrower deliver a title lenders title insurance policy, a current survey, and pay and escrow company for fees to close and record this loan. The total cost of these requirements is $95,500, none of which is paid to the lender.
- What is the cost to the borrower for this loan?

Back to the Textbook
Borrowing (Leveraging)

- Why do investors borrow?
  - Limited financial resources/wealth
  - Leverage amplifies equity returns (& risk)
  - Also permits more portfolio diversification
  - May create tax advantages

- Cash flow effect of borrowing:
  - Net operating income
  - Debt service
  - Before-tax cash flow (BTCF)

Debt Financing for Centre Point

- Terms: (Recall building cost is $1,056,000)
  - 75% loan, 30 years, 6.5% I/YR, up-front fees of 3%
  - Note Amount = 0.75*885,000 = 663,750
  - Net loan proceeds:
    - $792,000 – (0.03 * 792,000)
    - $792,000 – $23,760
    - $768,240
  - Initial equity = $1,056,000 - $768,240 = $287,760
  - Payment: $5,005.98 or $60,072 per year
    (P/Yr=12): PMT(N=360, I/YR=6.5, PV=-792000) = 5005.98
  - What is loan balance after 5 years?

Centre Point: Estimated Before-Tax Cash Flow (BTCF)

- Net operating income $89,100
- Debt service (12*Monthly PMT) 60,072
- Before-tax cash flow (BTCF) $29,028

Evaluating Cash Flow Estimates

- Are income & expenses items appropriate?
  - Include only income & expenses that relate directly to income producing ability of property
  - Have trends for each item been carefully considered?
    - Should not just extrapolate recent trends
    - Importance of rental rate growth & vacancy assumptions

Partnerships, Limited Liability Co., Etc.

- Centre Point Pro forma displays expected total CFs available for distribution to equity investors
- When using partnerships & limited liability companies, all CFs & income tax consequences "flow through" to individual investors
- Thus, further analysis is usually required to determine expected CFs & returns earned by various investors
  - complicated unless all distribution are based on investors’ pro rata share of contributed equity

Traditional Single-Year Investment Criteria

- Profitability ratios
  - Capitalization rate
  - Equity dividend rate
- Multipliers
  - Net income multiplier
  - Effective gross income multiplier (EGIM)
- Financial risk ratios
  - Operating expense ratio
  - Loan-to-value ratio (LTV)
  - Debt coverage ratio (DCR)
  - Debt Yield Ratio (DYR)
  - Breakeven Occupancy (BEO)

The Mullet Ratio

\( R_1 = \frac{\text{EBITDA}}{\text{EBITDA} + \text{Interest}} \)
Profitability Ratios: Capitalization Rate

- Capitalization rate (going-in)
  \[ R = \frac{\text{NOI}}{\text{Acquisition price}} \]
- Centre Point example:
  \[ R = \frac{\$89,100}{\$1,056,000} = 0.0844, \text{ or } 8.44\% \]

\( R \) is return on funds supplied by both equity investor(s) and lender; as such, it measures overall income producing ability of property.

Is 8.44\% an acceptable overall cap rate?

- Question can only be answered by comparisons with cap rates on similar properties
- Investors should rely on cap rate information abstracted from comparable transactions in the local market
- However, regularly published surveys also provide useful information on cap rate trends

Example: Real Estate Research Corporation Cap Rate Survey

- Cap rates vary inversely with quality (i.e., “class”)
- Cap rates vary by property type risk

Cap Rates by Property Type Since 1996

Profitability Ratios: Equity Dividend Rate

- Equity dividend rate (EDR):
  \[ EDR = \frac{\text{Before-tax cash flow}}{\text{Equity investment}} \]
- Centre Point example:
  \[ EDR = \frac{\$29,028}{\$287,760} = 0.1009, \text{ or } 10.1\% \]

Residual cash flow return to equity investment

Commonly called “cash-on-cash” return

Common reference point for smaller investments

Effective Gross Income Multiplier

- Effective gross income multiplier (EGIM):
  \[ EGIM = \frac{\text{Acquisition price}}{\text{Effective gross income}} \]
- Centre Point Example:
  \[ EGIM = \frac{\$1,056,000}{\$162,000} = 6.52 \]

Caution:
- Use only among properties with similar operating expenses and CAPX
### Financial Risk Ratios: Operating Expense Ratio

- **Operating expense ratio:** 
  \[ OER = \frac{\text{Operating expenses (Include CAPEX)}}{\text{Effective gross income}} \]
- **Centre Point example:** 
  \[ OER = \frac{\$72,900}{\$162,000} = 0.45 \text{ or } 45\% \]
- Seasoned analysts watch deviations from normal

**Note:** Operating expenses, as used here, includes CAPEX, the approach we will use.

### Financial Risk Ratios: Loan-to-Value Ratio

- **Loan-to-value ratio (LTV):** 
  \[ LTV = \frac{\text{Mortgage Balance}}{\text{Acquisition Price}} \]
- **Centre Point example:** 
  \[ LTV = \frac{\$792,000}{\$1,056,000} = 0.75 \text{ or } 75\% \]
- Lenders generally want LTV to be no greater than 75–80% of acquisition price

### Financial Risk Ratios: Debt Coverage Ratio

- **Debt coverage ratio (DCR):** 
  \[ DCR = \frac{\text{Net Operating Income}}{\text{Debt Service}} \]
- **Centre Point example:** 
  \[ DCR = \frac{\$89,100}{\$60,072} = 1.48 \]
- Primary risk assessment ratio used by lenders
- Indicates amount of "cash flow cushion" above that needed to pay debt service

### Financial Risk Ratios: Debt Yield Ratio

- **Debt yield ratio (DYR):** 
  \[ DYR = \frac{\text{Net operating income}}{\text{Loan amount}} \]
- **Centre Point example:** 
  \[ DYR = \frac{\$89,100}{\$792,000} = 0.1125 \text{ or } 11.25\% \]
- Primary risk assessment ratio used by lenders who are originating loans that will be package together and used as collateral for the issuance of a CMBS

### Financial Risk Ratios: Breakeven Occupancy Ratio

- **Break Even Occupancy Ratio** 
  \[ BEO = \frac{\text{Operating Expense + Debt Service}}{\text{Gross Potential Income}} \]
- **Centre Point example:** 
  \[ BEO = \frac{\$72,900 + 60,072}{\$180,000} = 74\% \]
- A risk assessment ratio used by lenders
- Indicates how low occupancy can be and still have enough cash flow to meet expenses plus the debt service.

### Pros and Cons of Ratios & Multipliers

**Pros**
- Quick & easy to compute
- Intuitive
- Facilitates comparison with similar properties

**Cons**
- No clear benchmarks for acceptable range
- Only a partial view of performance
Example 18-1: 1st Year Projections

<table>
<thead>
<tr>
<th>Item</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential gross income (PGI)</td>
<td>$340,000</td>
</tr>
<tr>
<td>- Vacancy &amp; collection loss (VC)</td>
<td>51,000</td>
</tr>
<tr>
<td>= Effective gross income (EGI)</td>
<td>289,000</td>
</tr>
<tr>
<td>- Operating expenses (OE)</td>
<td>115,600</td>
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<tr>
<td>- Capital expenditures (CAPX)</td>
<td>14,450</td>
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<tr>
<td>= Net operating income (NOI)</td>
<td>158,950</td>
</tr>
<tr>
<td>- Debt service (DS)</td>
<td>125,630</td>
</tr>
<tr>
<td>= Before-tax cash flow (BTCF)</td>
<td>$33,320</td>
</tr>
</tbody>
</table>

Example 18-1: 1st Year Ratios

**Going in cap rate:**

\[ R_i = \frac{NOI}{Acquisition\ Price} = \frac{158,950}{1,975,000} = 0.080 \text{ or } 8.0\% \]

**Equity dividend rate:** (or **Cash on Cash**)

\[ EDR = \frac{Before-Tax\ Cash\ Flow}{Equity\ Investment} = \frac{33,320}{523,375} = 0.063 \text{ or } 6.3\% \]

**Effective gross income multiplier:**

\[ EGIM = \frac{Effective\ Gross\ Income}{Allowable\ Debt} = \frac{1,975,000}{33,320} = 60.3 \]

**Operating expense ratio:**

\[ OER = \frac{Operating\ Expenses}{Effective\ Gross\ Income} = \frac{130,050}{289,000} = 0.45 \text{ or } 45\% \]

**Debt coverage ratio:**

\[ DCR = \frac{Net\ Operating\ Income}{Debt\ Service} = \frac{158,950}{125,630} = 1.27 \]

**Breakeven Occupancy Ratio:**

\[ BEO = \frac{Operating\ Expense\ +\ DebtService}{Potential\ Great\ Income} = \frac{130,050 + 125,630}{340,000} = 75\% \]