

# **Weighted Average Cost of Capital For an Apartment Real Estate Investment Trust**

**Presented by**

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# Weighted Average Cost of Capital for an Apartment REIT

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# Weighted Average Cost of Capital for an Apartment REIT

## Introduction

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The goal of this analysis is to determine the Weighted Average Cost of Capital for an apartment REIT.

The purpose is to give REIT managers a good approach to arriving at the true cost of capital (WACC) for benchmarking against future acquisitions (IRR).

# Weighted Average Cost of Capital for an Apartment REIT

## Introduction

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Using a standard corporate finance approach, the Weighted Average Cost of Capital (WACC) is calculated in four steps:

Step #1: Estimate Weighted Average Cost of Debt

Step #2: Estimate Cost of Equity Capital

Step #3: Calculate weights for total debt and equity as a percent of total capital structure

Step #4: Add Weighted Cost of Debt to Weighted Cost of Equity to arrive at Weighted Average Cost of Capital (WACC)

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Cost of Capital (COC):

- Over the long run, must sufficiently compensate debt and equity holders.
- Composite of capital cost from various funding sources making up capital structure.
- Minimum rate of return earned on new investment, as not to dilute shareholder interest.
- Can be used as a discount rate for NPV analysis.
- Used as benchmark, hurdle rate, when evaluating IRRs.
- As larger sums of capital raised, cost of debt and equity rise.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Weighted Average Cost of Capital:

- Weighted average cost of each new dollar of capital raised at the margin.

$$WACC_i = (w_E \times R_{Ei}) + (w_D \times R_{Di})$$

where,

- $WACC_i$  = Weighted average cost of capital for company i;
- $w_E$  = Weight of equity capital in company i's capital structure, equal to equity capital divided by total capital;
- $R_{Ei}$  = Cost of equity for company i;
- $w_D$  = Weight of debt capital in company i's capital structure. Equal to debt capital divided by total capital;

$R_{Di}$  = Cost of debt for company i;

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Cost of Retained Earnings:

- Rate of return stockholders require on the firm's common stock.
- Opportunity cost if earnings are retained.
- Should be competitive with alternative investments.
- If not competitive, paid out as dividends.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Equity Cost of Capital:

- Expected mean rate of return for firm's equity, dividends and capital gains or losses.
- Includes factor costs:
  - Flotation
  - Illiquidity
  - Information Asymmetries



# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Debt Cost of Capital:

- Return firm's creditors demand on new borrowing.
- Observed directly or indirectly in the market.
- Risk-free rate plus credit and duration spread premium.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Discounted Cash Flow Model (Single-Stage):

where,

$$R_i = \frac{D_i \times (1 + g_i)}{P_i} + g_i$$

$R_i$  = Cost of equity for company  $i$ ;

$D_i$  = Summation of prior twelve month's dividend per share for company  $i$ ;

$g_i$  = Expected constant earnings growth rate for company  $i$  per the ACE database; and,

$P_i$  = Most recent price per common share for company  $i$ .

Notes:

- 1) Assumes earnings grow at constant rate.
- 2) Cost of equity is sensitive and positively correlated to estimated growth rate.
- 3) Does not explicitly consider risk as does risk-premium and CAPM.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

### Capital Asset Pricing Model (OLS):

where,

$$k_i = R_f + (\beta_i \times ERP)$$

- ki = Expected Future cost of equity;
- Rf = Rate on risk-free asset; long-term government bond yield for March 31, 1997 (7.2%);
- bi = Levered beta of company i; and,
- ERP = Expected equity risk premium. Average of the risk-free rate minus the return on the market. Long-horizon version from Ibbotson Associates' Stocks, Bonds, Bills, and Inflation 1998 Yearbook (7.8%).

#### Notes:

- 1) Requires estimates of market risk premium and true beta coefficient.
- 2) Assumes that risk premium is linearly proportionate to the amount of risk taken.
- 3) Market price of risk is the expected risk premium multiplied by the beta, reflecting market risk.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

### Capital Asset Pricing Model (Three-Factor Fama-French):

where,

$$k_i = R_f + (b_i \times ERP) + (s_i \times SMBP) + (h_i \times HMLP)$$

$k_i$  = Cost of equity;

$R_f$  = Rate on risk-free asset; long-term government bond yield for March 31, 1997 (7.2%);

$b_i$  = Market coefficient in the Fama-French regression;

ERP = Expected equity risk premium. Long-horizon version from Ibbotson Associates' SBBI 1998 Yearbook (7.8%);

$s_i$  = Small-minus-big coefficient in the Fama-French regression;

SMBP = Expected small-minus-big risk premium, estimated as the difference between the historical average annual returns on the small-cap and large-cap portfolios, which is 3.70%;

$h_i$  = high-minus-low coefficient in the Fama-French regression; and,

HMLP = Expected high-minus-low risk premium, estimated as the difference between the historical average annual returns on the high market-to-book and low market-to-book portfolios, which is 5.04%.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### *Systematic Risk:*

- Unavoidable
- Derived from external, macroeconomic factors
- Systematic risk is rewarded with risk premium
- Size of risk premium proportionate to degree of comovement (beta) with market.

### *Unsystematic Risk:*

- Avoidable through diversification.
- Not rewarded with risk premium.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Levered Beta Coefficient:

- Measures systematic risk for equity shareholders.
- No adjustment for the debt financing.
- Incorporates business and financing risks born by equity shareholders.
- Measures stock's systematic risk, degree returns move with market.
- Expected or forecast value, not observable, use historical.
- Moves toward 1.0 as firm size increases.
- Use monthly return data against S&P 500 index for five years.
- Use Three Factor Fama-French beta to capture firm size affect.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### *Risk-Free Rate:*

- CAPM assumes presence of single risk-less asset.
- Obligations are default-free.
- Use 20-year T-bond yield as proxy for risk-free rate.
- Analysis considers upward shifts in yield curve due to:
  - Economic shocks
  - Restrictive monetary policy
  - Higher expected inflation

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### *Expected Equity Market Risk Premium:*

- Unobservable in market, estimated from ex post data.
- Difference between mean market return and mean return on risk-less security.
- Computed from annual 1926 to 1997, stationary.

### Discount Rate:

- Risk-free rate plus company-capital market risk premium.



# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Depreciation:

- First increment of internal funds used to finance investment.
- Opportunity cost of capital is WACC of existing capital structure.

### Weighting Methods:

- Future capital structure (Assets and Capital Markets)
- Methods:
  - Existing proportions of capital components.
  - Current proportions of market values of outstanding securities.
  - Proportions of target or optimal capital structure.

# Weighted Average Cost of Capital for an Apartment REIT

## Assumptions

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### Capital Budgeting:

- No significant budget constraint (capital rationing).
- Accept projects with positive NPVs.
- Project cost of capital is same as for existing assets with similar risk/return.
- Cost of capital is specific to investment, not investor.

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #1

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### Weighted Average Cost of Debt Financing (WACDF):

Where, 
$$WACDF = LTUDi (W_{LTUD}) + SDi (W_{SD}) + ULCi (W_{ULC})$$

$$7.0\% \sim 7.4\% = 7.5\% (44.7\%) + 7.7\% (41.1\%) + 6.4\% (14.2\%)$$

W = Weight of debt instrument as a percent of total debt financing.

LTUDi = Weighted average interest rate on L-T unsecured debt (credit).

SDi = Weighted average interest rate on secured debt (mortgages).

ULCi = Weighted average interest rate on unsecured lines of credit (bank).

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #2

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Cost of Equity Financing (CEF):

*Discounted Cash Flow (FFO) Method (DCF)*

Where, 
$$CEC_{DCF} = \text{Sum [PV (DFFOPS}(1+g)_{t+1} - \text{DFFOPS}_t)]/SP$$
$$14.3\% = [\$4.21]/\$29.45 \quad (\text{Range: } 12.8\% - 17.8\%)$$

SP = Target stock price (\$29.45)

g = Future FFO growth rate (10%)

DFFOP = SP \* FFO Yield in Base Year (7.1%)

L-T risk-free yield = 6.2%

Discount Rate = 8.1%

FFO Multiple = 14

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #2

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Risk-Primia Method (RP):

Where,  $ECCR_{L-T} = R_{f_{L-T}} + B [RP_{L-T}]$

$$14.0\% = 6.2\% + 1.0 (7.8\%) \quad (\text{Range: } 14.0\% - 16.3\%)$$

L-T 20 year risk-free yield = 6.2%

Historical risk premium = 7.8%

Beta Coef. = 100%

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #2

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Capital Asset Pricing Model (CAPM):

Where,  $ECCAPM_{L-T} = Rf_{L-T} + B_n [RP_{L-T}]$

$$8.1\% = 6.2\% + .24 (7.8\%) \quad (\text{Range: } 10.4\% - 12.4\%)$$

L-T 20 year risk-free yield = 6.2%

Historical risk premium = 7.8%

Apartment REIT Industry Market Cap Weighted Beta = 24%

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #3

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Capital Structure Weights (Existing/Target):

Where,  $100\% = (MC_E/TMC_{D+E}) + (MC_D/TMC_{D+E})$

$$100\% = 67\% + 33\%$$

$MC_D$  = Total market cap debt (\$660 million).

$MC_E$  = Total market cap equity (\$1.34 billion).

TMC = Total market cap debt and equity (\$2 billion).

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #4

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Weighted Average Cost of Capital:

*Discounted Cash Flow (FFO) Method (DCF)*

Where,  $WACC_{DCF} = [(wE) \times (Rei)] + [(wD) \times (Rdi)]$

$$12.0\% \sim 11.9\% = [(.67) \times (.143)] + [(.33) \times (.07)]$$

(Range: 9.8 - 14.2%)



# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #4

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*Risk-Primia Method (RP)*

Where,  $WACC_{RP} = [(wE) \times (Rei)] + [(wD) \times (Rdi)]$

$$12.0\% \sim 11.7\% = [(.67) \times (.14)] + [(.33) \times (.07)]$$

(Range: 11.6% - 13.2%)

# Weighted Average Cost of Capital for an Apartment REIT

## Methodology: Step #4

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*Capital Asset Pricing Model (CAPM)*

Where,  $WACC_{CAPM} = [(wE) \times (Rei)] + [(wD) \times (Rdi)]$

$$8.0\% \sim 7.7\% = [(.67) \times (.081)] + [(.33) \times (.07)]$$

(Range: 6.2% - 9.1%)

# Weighted Average Cost of Capital for an Apartment REIT

## Discussion of Results

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- Weighted average cost of capital calculations based on historical data:
  - Risk premiums
  - Betas
  - Current risk-free rates
- WACCs could be higher after taking into consideration:
  - Rising interest rates
  - Wider credit spreads
  - Higher returns on alternative capital market investments
  - Lower target stock price
  - Higher systematic risk

# Metro Area Apartment Cycles and their Trends

## CONCLUSIONS

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- Institutionalization, securitization and internationalization of real estate is placing new demands on management to learn the concept of cost of capital.
- Cost of capital is the most decisive factor in REIT performance and competition as opportunities for external growth diminish and individual deals make a smaller impact on total portfolio return.
- Institutional investors are demanding long run accretion, requiring IRRs in excess of WACC (Franchise Value).
- Better rated companies will utilize more debt in the future to further drive down the weighted average cost of capital.
- Cost of capital is only a criterion that should be examined with other data with respect to business decisions and not the sole criterion.