


CHAPTER 13

RISK ANALYSIS

Risk Preferences

- Risk - Averse behavior
- Risk - Neutral behavior
- Risk - Loving behavior



Classical economic theory teaches us that everyone is risk-averse, however, some are more so than others.

Types of Risk

- Business
- Financial
- Liquidity
- Inflation
- Interest Rate
- Management
- Legislative
- Environmental
- Other

Risk Management

- Three primary tools may be employed by investors to minimize their exposure to risk:
 - Avoidance and **identification of risk** through **due diligence**
 - Financial tools such as **insurance, hedging, and option contracts**
 - **Diversification** (either into other product types or different locations)

Benchmarking Risk

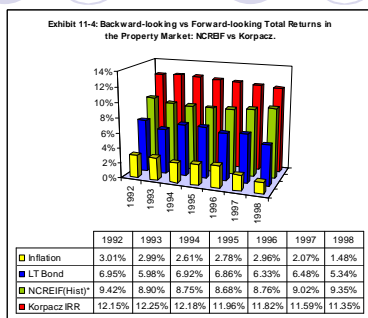
- Nature of alternative real estate investments
- Other investments that are available to the investor
- Respective returns that those alternatives are expected to yield
- Risk variation between the investment being considered relative to alternative investments available
- Typical index benchmarks include:
 - DJIA, S&P500, Russell 2000, NAREIT

Historical Return, Risk, and Risk Premiums

Asset Class	Total Return	Volatility	Risk Premium
T-Bills	6.80%	2.66%	NA
G-Bonds	10.20%	11.80%	3.40% <small>*Mostly duration Risk</small>
Real Estate	10.22%	9.92%	3.42%
S&P 500	14.68%	16.21%	7.88%

Source: NCREIF, Ibbotson Assoc.

Backward-Looking vs. Forward-Looking Total Returns in the Property Market



Source: Geltner & Miller

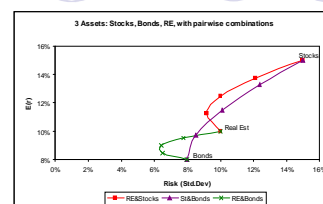
Portfolio Risk Measurements

- Risk or “Volatility”
 - Standard Deviation
- Alpha α : Portfolio managers performance
- Correlation Coefficient
- Sharpe Ratio
- Beta β : Industry specific risk
- Indifference Curves: investor preference

Portfolio Risk

- Diversifiable Risk:
 - (unsystematic risk) can be eliminated by holding assets that are less than perfectly correlated.
 - Risk associated with investing in a Coal mining company
- Non-diversifiable Risk:
 - (systematic, or market risk) is the risk remaining in a fully-diversified portfolio.
 - No diversifiable risk within the S&P 500

Real Estate Portfolios



Source: Geltner & Miller

- Real Estate as an asset class tends to be **positively correlated** with other major asset classes like stocks and bonds when viewed in short frequencies (annually)
- This makes real estate in general appear to be a “good” diversifier within a portfolio

Optimal Portfolio Decisions

- Investors base their investment decisions on its contribution to the portfolio’s risk / variance and return.
- Efficient investments \uparrow the portfolio’s expected return without adding risk.
- Efficient investments \downarrow the portfolio’s risk for a given expected return.

Leverage & Risk in Return

- If leverage \square the future return on equity, then it will also \square the risk in that equity
- When debt is riskless, the risk in the equity return is directly proportional to the leverage ratio (LR)
 - In the real world this never happens
 - Long-term debt is not riskless
 - Long-term bonds can have a periodic return volatility as high as unleveraged property equity

Other Real Estate Risk

- Lease Rollover Risk
 - Renewal probability
- Market Leasing Assumptions
 - Market Rent
 - Months Vacant
 - Leasing Commissions
 - Tenant Improvements

Real Estate & Macro Principles

- Consumer confidence
- Lender sentiment
- Over-development
- National Real Estate Indexes:
 - S&P 500 Homebuilding Index
 - National Real Estate Index
 - Seiders Homebuilder Report

National Real Estate Averages & Decision Making



- Utilizing a **national average** to base your real estate investment decision on is equivalent to using the DJIA average to pick a single stock.

Quantifying Risk

- Sensitivity Analysis – “micro” level
 - Market rents lower
 - Vacancy rates higher, etc.
 - How sensitive is return to change in an assumption
- Scenario analysis – “macro” level
 - Pessimistic, most likely, optimistic
 - E.g., rents lower and vacancy higher for pessimistic scenario
 - Calculate return or other measure for each scenario

Accounting for Risk

- The investor’s required rate of return is $E(R_j)$
 - $E(R_j) = R_f + RP_j$
 - Where R_f is the risk free rate and RP_j is a premium for bearing risk.

Accounting for Risk

Two steps:

- 1: Establish a “base case”
- 2: Sensitivity analysis

Weighted Average Cost of Capital

WACC: Often used to quantify the effect of leverage on equity risk and return

- $r_p = (LTV)r_d + (1-LTV)r_e$
 - (r_e) is the return on the underlying property free and clear
 - (r_d) is the return to the debt on the property
 - (r_e) is the return on the levered equity in the property
 - (LTV) is loan-to-value ratio

WACC Continued

- Corporate finance texts define WACC on an after-corporate income tax basis. However in real estate applications there is no double taxation.
 - Real estate investments are made directly without a (taxable) corporate ownership layer (e.g.) partnership, LLC, etc.)
 - The investment is being made by a corporation that is exempt from corporate-level income tax, like a REIT

WACC and Risk

- The WACC formula is applicable to any additive component of total return including risk premiums:

$$RP_e = RP_d + LR(RP_e - RP_d)$$

- Equity Risk Premium = Debt Risk Premium + Leverage Ratio x (The difference between the property and debt risk premium)

- Risk in the equity investment will be directly proportional to the equity risk premium if both the property and debt are obtained at prevailing market prices

Measuring Project- Specific Risk

<u>State of the Economy</u>	<u>Probability</u>	<u>Return</u>
Deep Recession	0.05	3.0%
Mild Recession	0.20	5.5%
Average Economy	0.50	7.0%
Mild Boom	0.20	8.5%
<u>Strong Boom</u>	<u>0.05</u>	<u>11.0%</u>
Expected Return		7.0%