



Equilibrium Asset Valuation and Real Estate's Price of Risk

Understanding how the capital market determines expected return risk premiums is essential for real estate investment analysis. This presentation explores equilibrium asset pricing models and their application to real estate investments.

Practical Uses for Asset Pricing Theory



Tactical Investment Decisions

Identify mispriced assets or asset classes for short to medium-term opportunities.



Strategic Investment Decisions

Develop long-term portfolio allocations based on risk factors priced in the market.

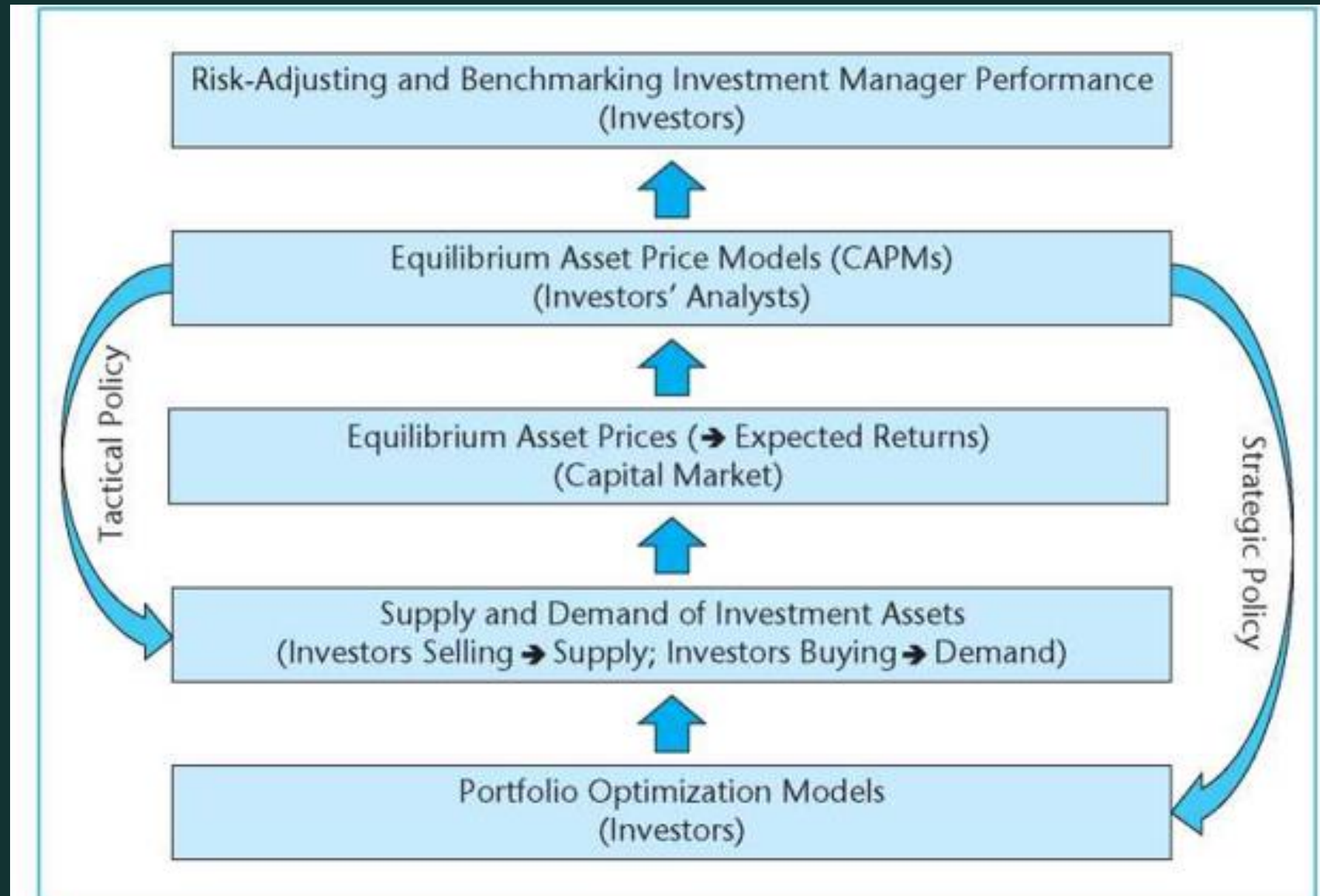


Performance Evaluation

Benchmark investment performance by adjusting returns for risk exposure.



Strategic and Tactical Investment Policy



The Nature of Asset Risk

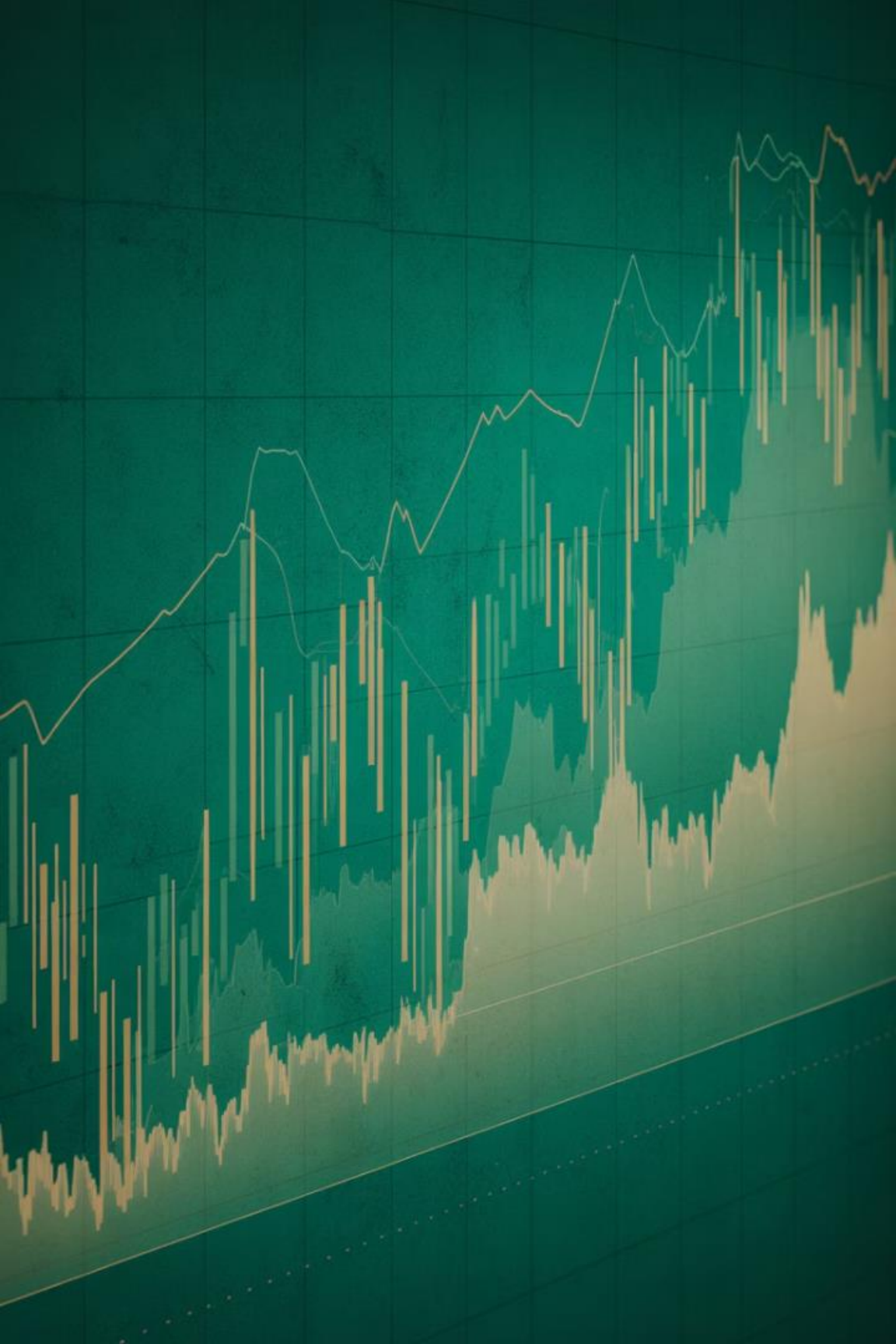
Cash Flow Risk

Changes in the space market affecting property rents, operating expenses, and capital improvements.

Evidence suggests investment return risk in real estate assets derives at least as much from changes in the asset market as from cash flow variations.

Asset Valuation Risk

Changes in the asset market affecting discount rates and required returns.



Shiller's Insight on Asset Price Volatility

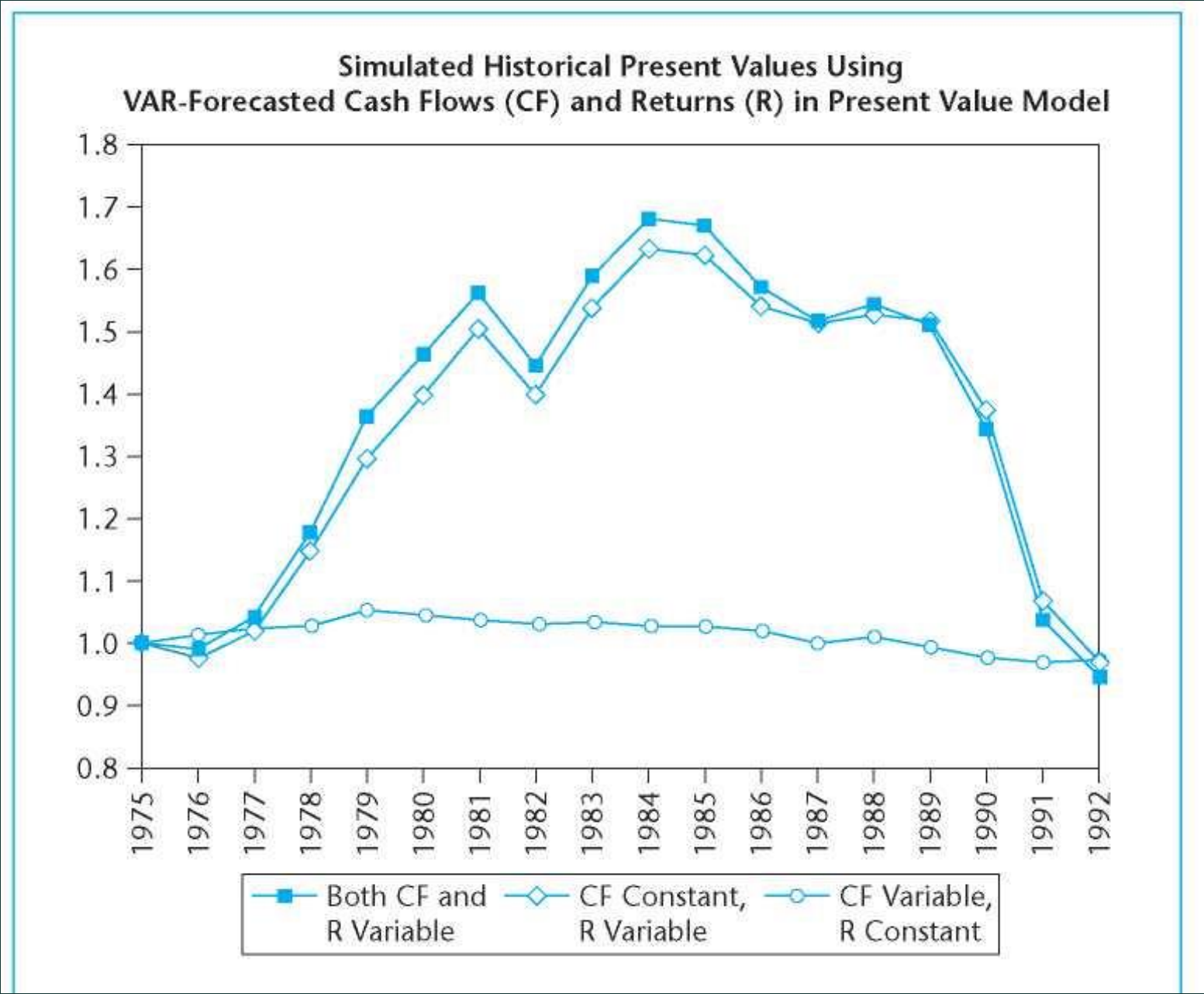
Do Stock Prices Move Too Much to Be Justified by Subsequent Changes in Dividends?

Robert Shiller's famous 1981 research showed that asset price volatility often exceeds what would be justified by changes in expected cash alone.

This suggests discount rate variation may cause as much volatility in real estate returns as property cash flow changes.

Cash Flow vs. Discount Rate Effects

The line with solid square markers is the history of real estate present values based on a DCF model in which changes in both the future cash flows and the future discount rate are forecasted and used in the valuation. This line closely tracks the actual market values of commercial property as represented by the NCREIF Index (unsmoothed). The similar line with diamond markers is the same DCF valuation model, only assuming a constant future cash-flow level from each period going forward but including the forecasted time-varying discount rate in the valuation. The nearly flat line at the bottom, which does not much resemble what actually happened to commercial property values, applies the DCF model with a constant discount rate, but using the forecasted cash flows. While there was substantial variation in real estate cash flows, much of this variation was mean-reverting and predictable. Hence, the cash flow forecast does not change much from one period to the next, resulting in little change in asset present value unless the discount rate changes.





From Portfolio Theory to the CAPM

Two-Fund Theorem

Investors with the same expectations should hold the same portfolio of risky assets, regardless of risk preferences.

Common Expectations

Efficient markets lead investors to converge on similar expectations, resulting in the market portfolio.

Covariance with Market

Only risk that matters is how an asset affects the market portfolio's risk, measured by covariance.

Asset Pricing

Expected returns reflect risk premiums proportional to an asset's covariance with the market.

The Capital Asset Pricing Model (CAPM)

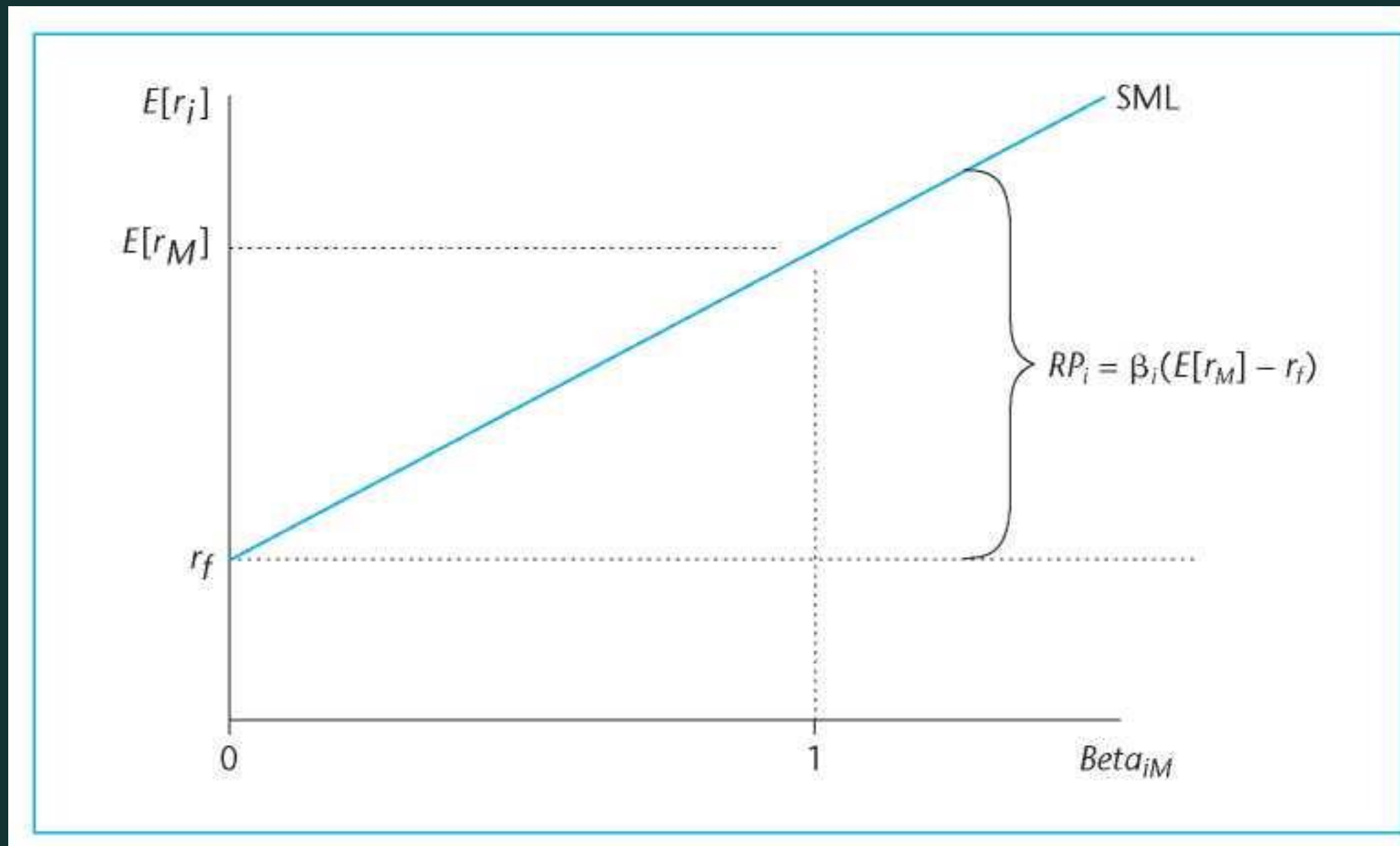
$$E[r_i] = r_f + \beta_i(E[r_M] - r_f)$$

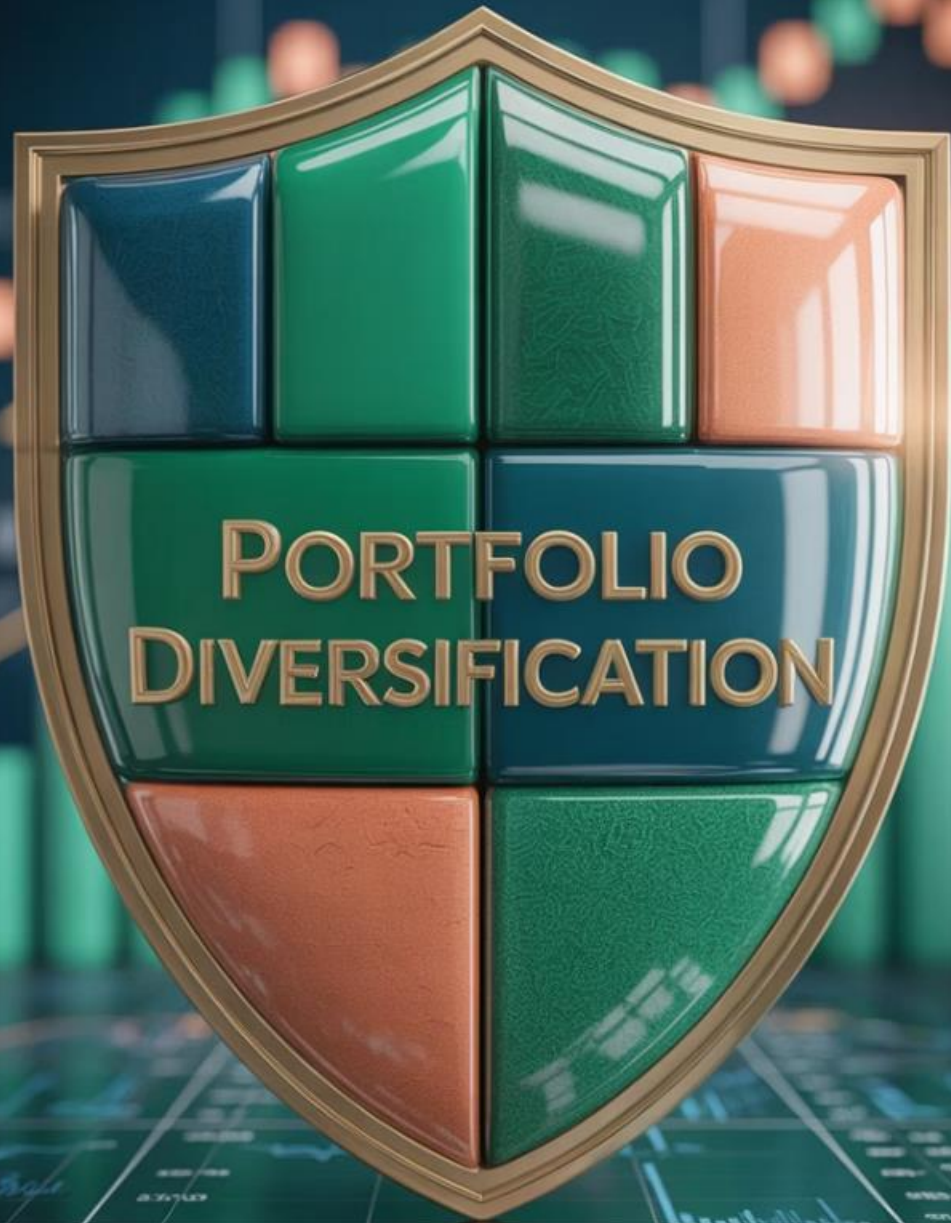
Where:

- $E[r_i]$ is the expected return on asset i
- r_f is the risk-free rate
- β_i is the asset's beta (systematic risk)
- $E[r_M] - r_f$ is the market risk premium

Beta measures how much an asset's returns move with the market, normalized by market variance.

The Security Market Line





The Main Point of the CAPM

Systematic Risk

Risk that cannot be diversified away, measured by beta. This risk is priced in the market with higher expected returns.

Specific Risk

Asset-specific risk that can be diversified away. The market does not compensate investors for taking this risk.

Diversification Strategy

Investors should diversify to eliminate specific risk, holding only systematic risk for which they are compensated.

Strengths and Weaknesses of the CAPM

Strengths

- Elegant, intuitive framework
- Provides key insight about non-pricing of diversifiable risk
- Widely used in practice
- Beta explains significant portion of returns

Weaknesses

- Based on simplified assumptions
- Doesn't fully explain cross-section of returns
- Other factors affect expected returns
- Market portfolio is theoretical and unobservable

Beyond the Basic CAPM

Empirical evidence shows beta alone doesn't explain all variation in expected returns. Additional factors include:



Size Effect

Smaller firms tend to outperform larger firms, even after adjusting for beta.



Value Effect

Firms with high book-to-market ratios tend to outperform growth stocks.



Momentum

Stocks that have performed well recently tend to continue outperforming.



Fama-French Three-Factor Model

$$E[r_i] = r_f + \beta_i(E[r_M] - r_f) + s_i \text{ SMB} + h_i \text{ HML}$$

Where:

- SMB = Small Minus Big (return premium of small stocks over large stocks)
- HML = High Minus Low (return premium of high book/market stocks over low book/market stocks)
- s_i and h_i = Factor sensitivities for asset i

This model explains much more of the variation in stock returns than the basic CAPM.

Applying CAPM to Real Estate: Two Contexts

Mixed-Asset Portfolio Level

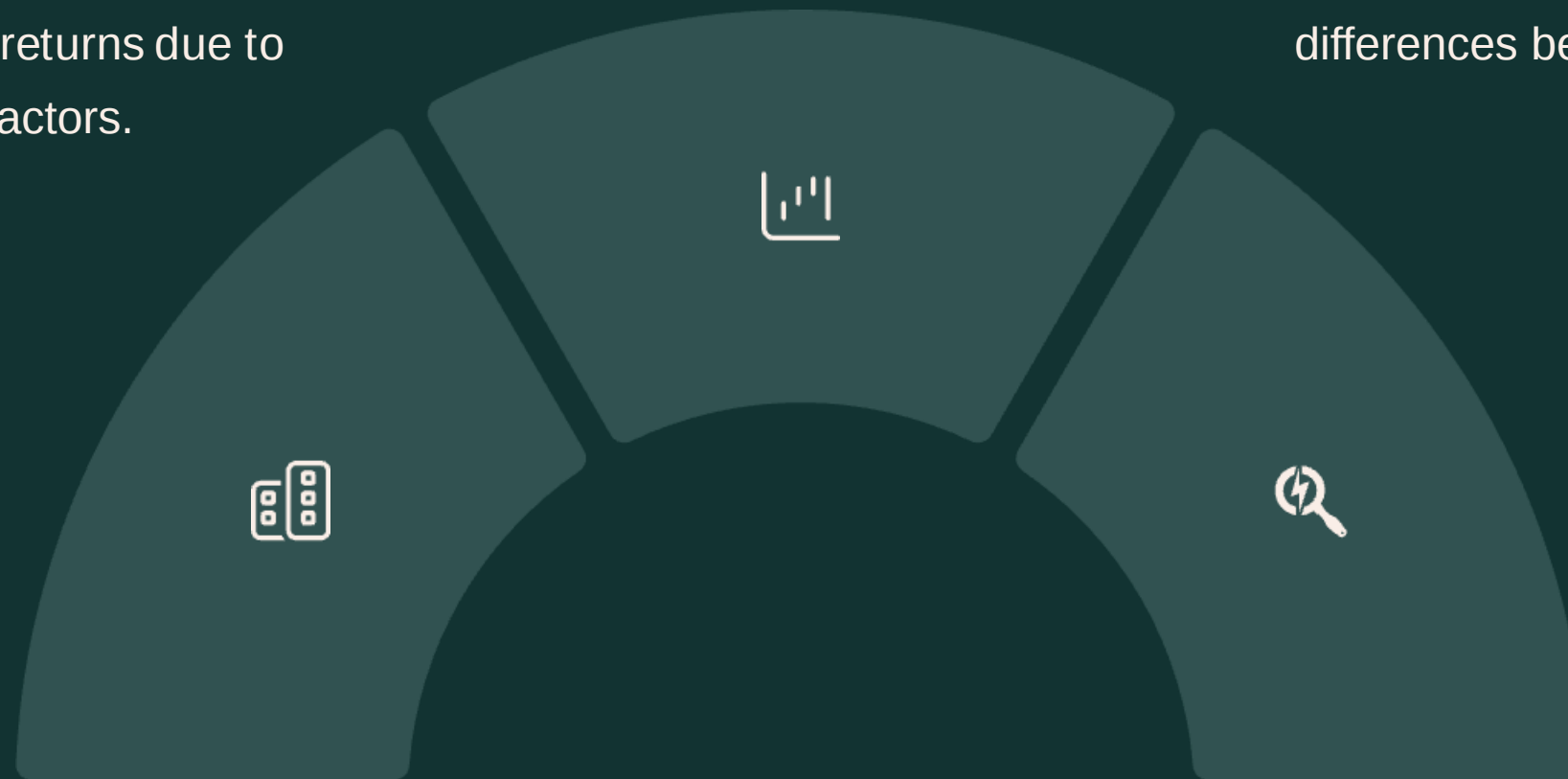
Applying CAPM across major asset classes (stocks, bonds, real estate) to determine broad allocations.

REITs Within Stock Market

REITs tend to be low-beta stocks but often command higher returns due to size and value factors.

Within Private Real Estate

Attempting to quantify risk and return differences between property types and locations.



Challenges in Applying CAPM to Private Real Estate



Market Portfolio Definition

Traditional CAPM uses stock market as proxy, but private real estate isn't included.



Appraisal-Based Returns

Traditional real estate indices use appraisals that lag and smooth actual market values.



Stale Valuations

Many properties in indices aren't reappraised every period, creating "stale" data.



Underestimated Covariance

These issues lead to underestimating covariance between real estate and other assets.



A Better Market Portfolio: National Wealth Portfolio

33%

Stocks

Equity securities
representing
ownership in
corporations

33%

Bonds

Fixed income
securities from
governments and
corporations

33%

Real Estate

Commercial and
investment properties

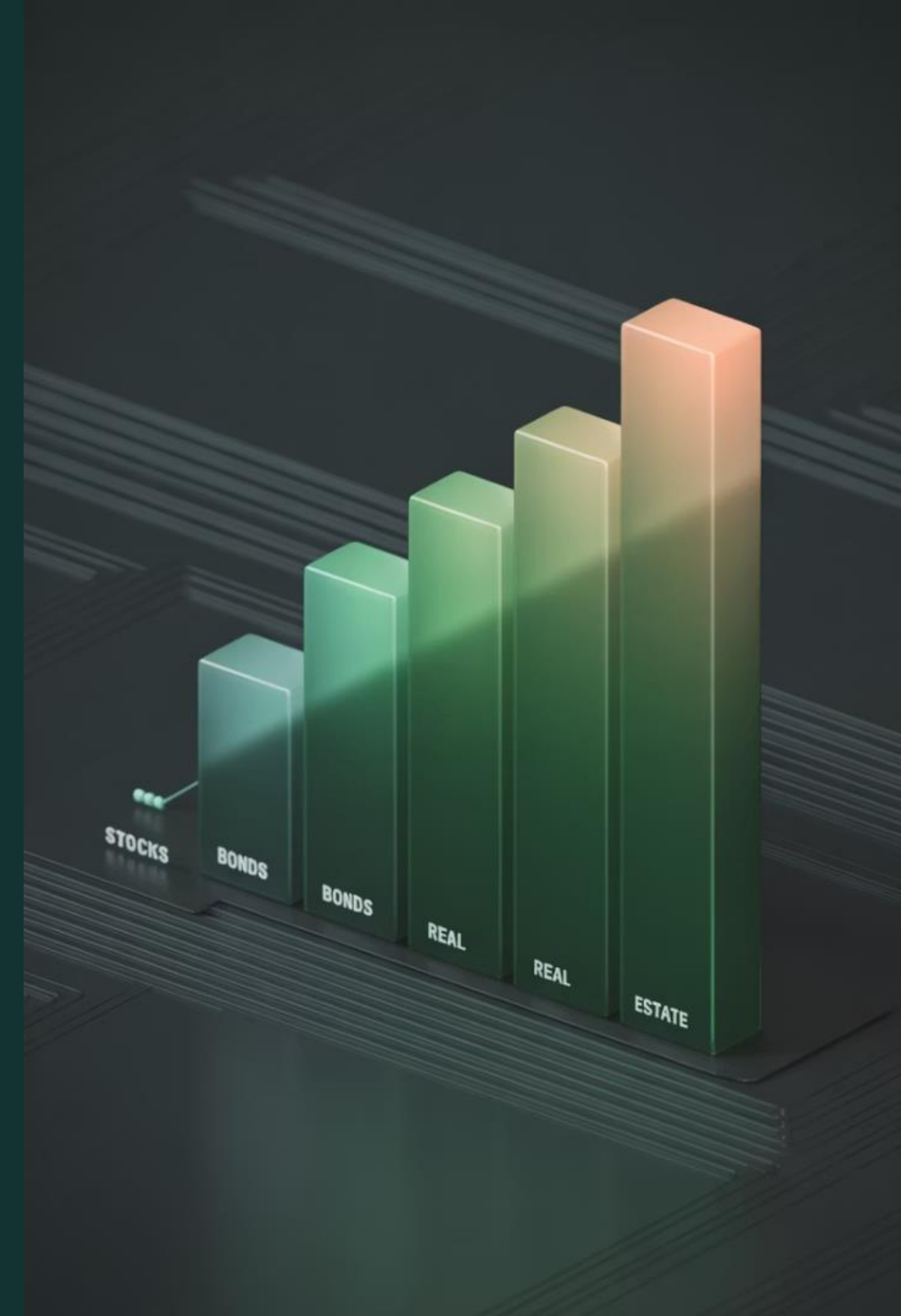
A National Wealth Portfolio (NWP) with equal allocations to stocks, bonds, and real estate better approximates the theoretical market portfolio.



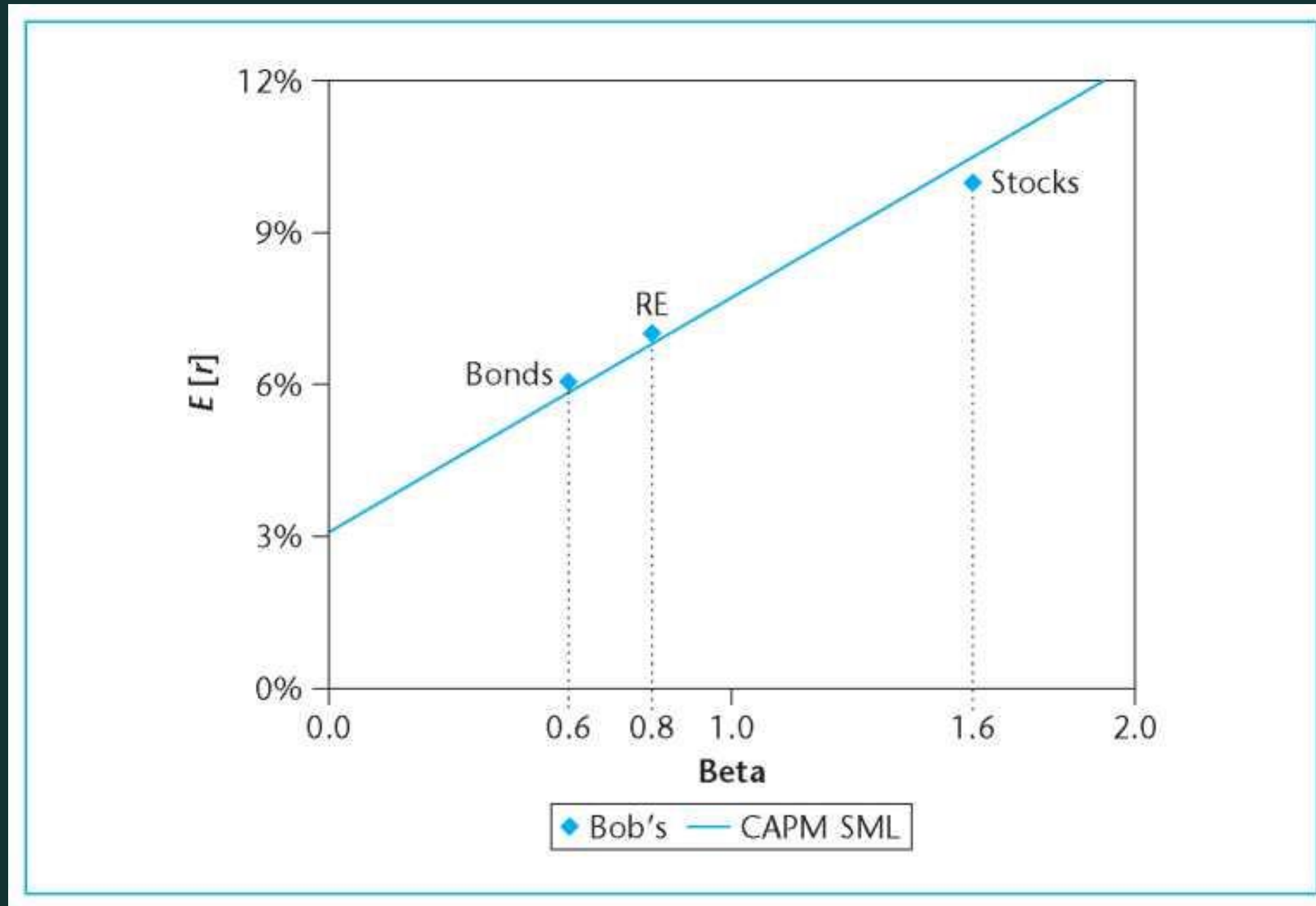
Asset Class Risk and Return Expectations

	Stocks	Bonds	Real Estate
Expected Return	10.00%	6.00%	7.00%
Volatility	15.00%	8.00%	10.00%
Beta to NWP	1.60	0.60	0.80

With a beta of 0.80 to the National Wealth Portfolio, real estate has half the risk of stocks (beta 1.60) and slightly more risk than bonds (beta 0.60).



CAPM Applied to Major Asset Classes



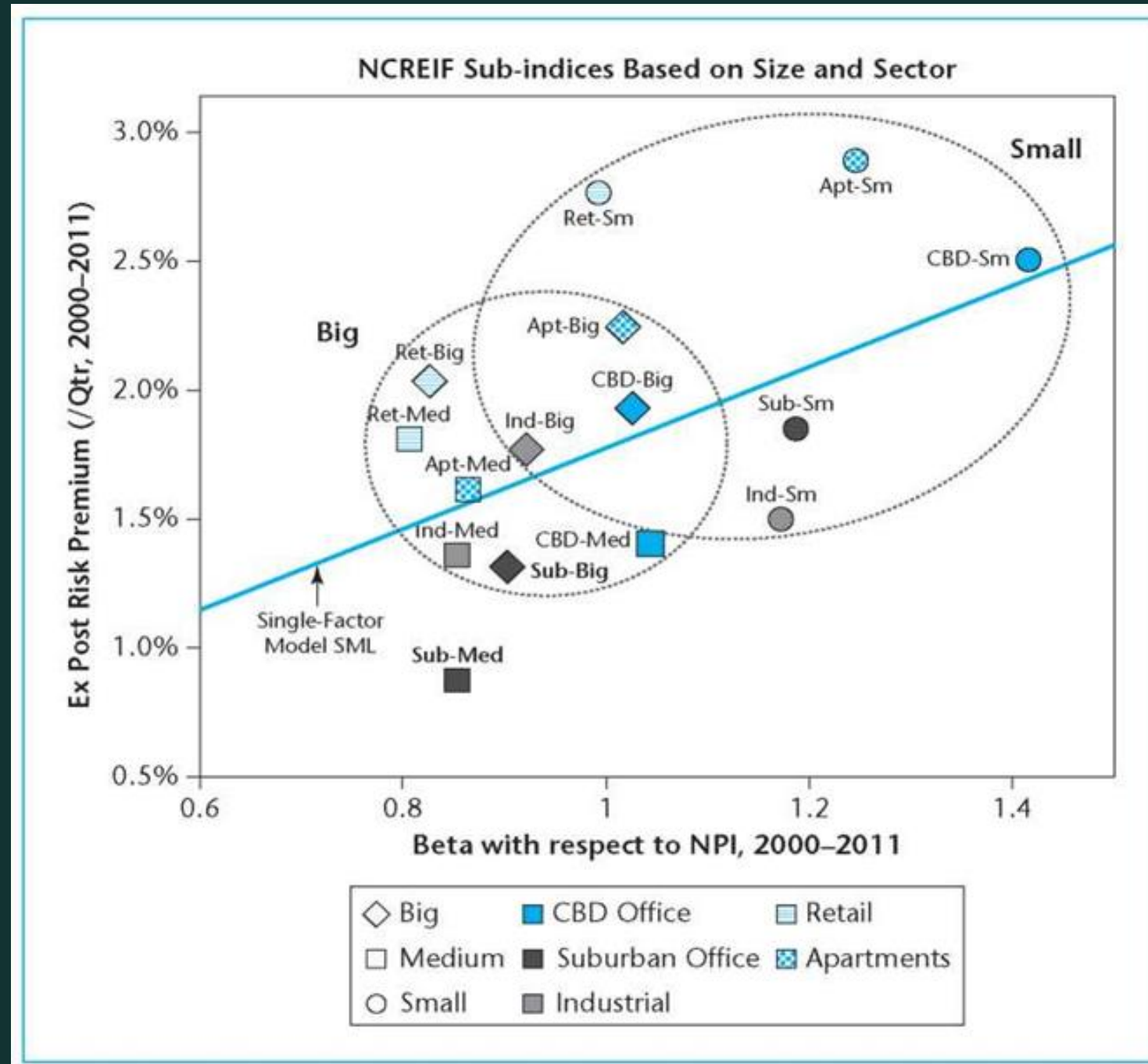
Risk and Return Within Real Estate Sectors



Applying CAPM within real estate sectors is more challenging. Property types include CBD office, suburban office, industrial, retail, and apartment properties of varying sizes.

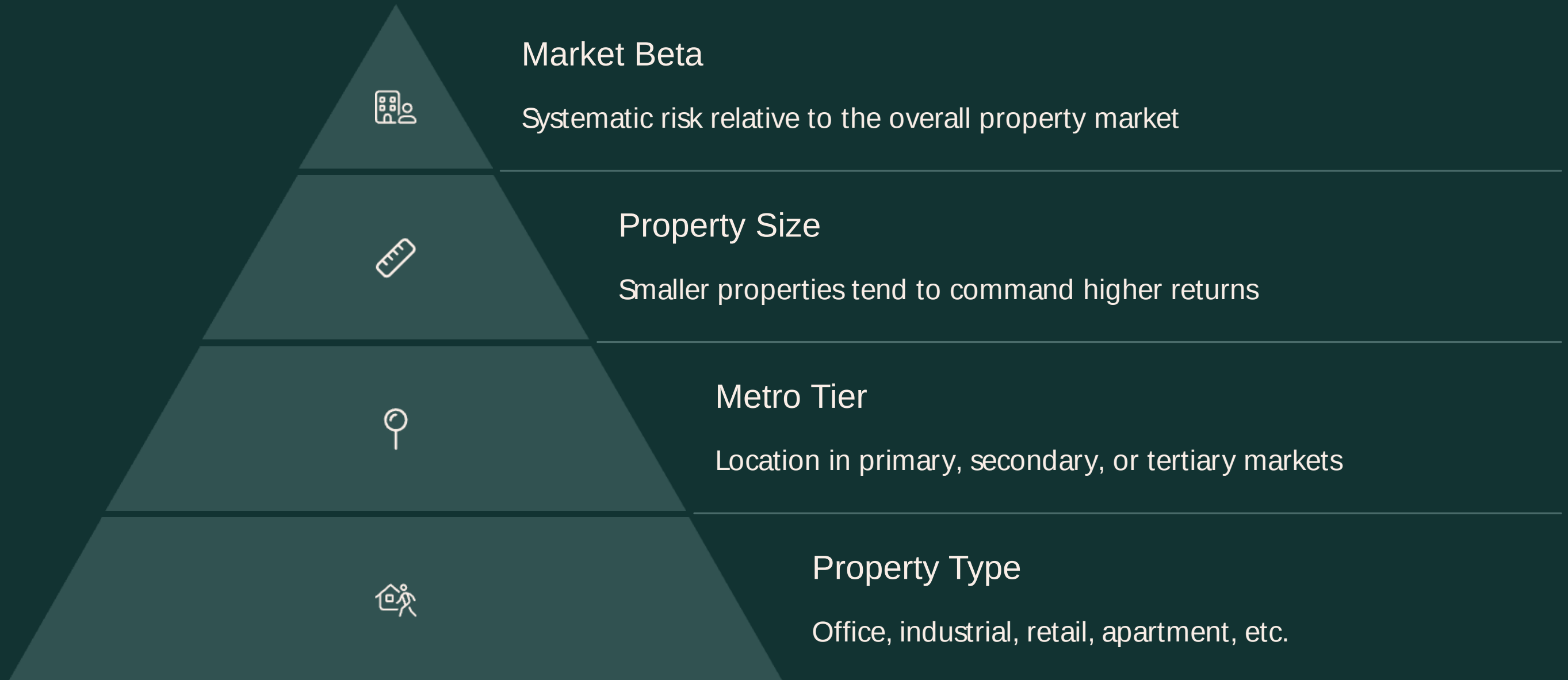
Risk and Return Within Real Estate Sectors

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Today we can add data centers, timber and self-storage and expect new asset classes to emerge over time.

Factors Affecting Returns Within Real Estate



Key Takeaways



CAPM Utility

The basic CAPM works reasonably well at the broad asset class level.



Real Estate Application

Requires proper market portfolio definition and data adjustment.



Within-Sector Challenges

Multiple factors beyond beta affect returns within real estate.



Small Property Premium

The most persistent return premium within private real estate is for smaller properties.