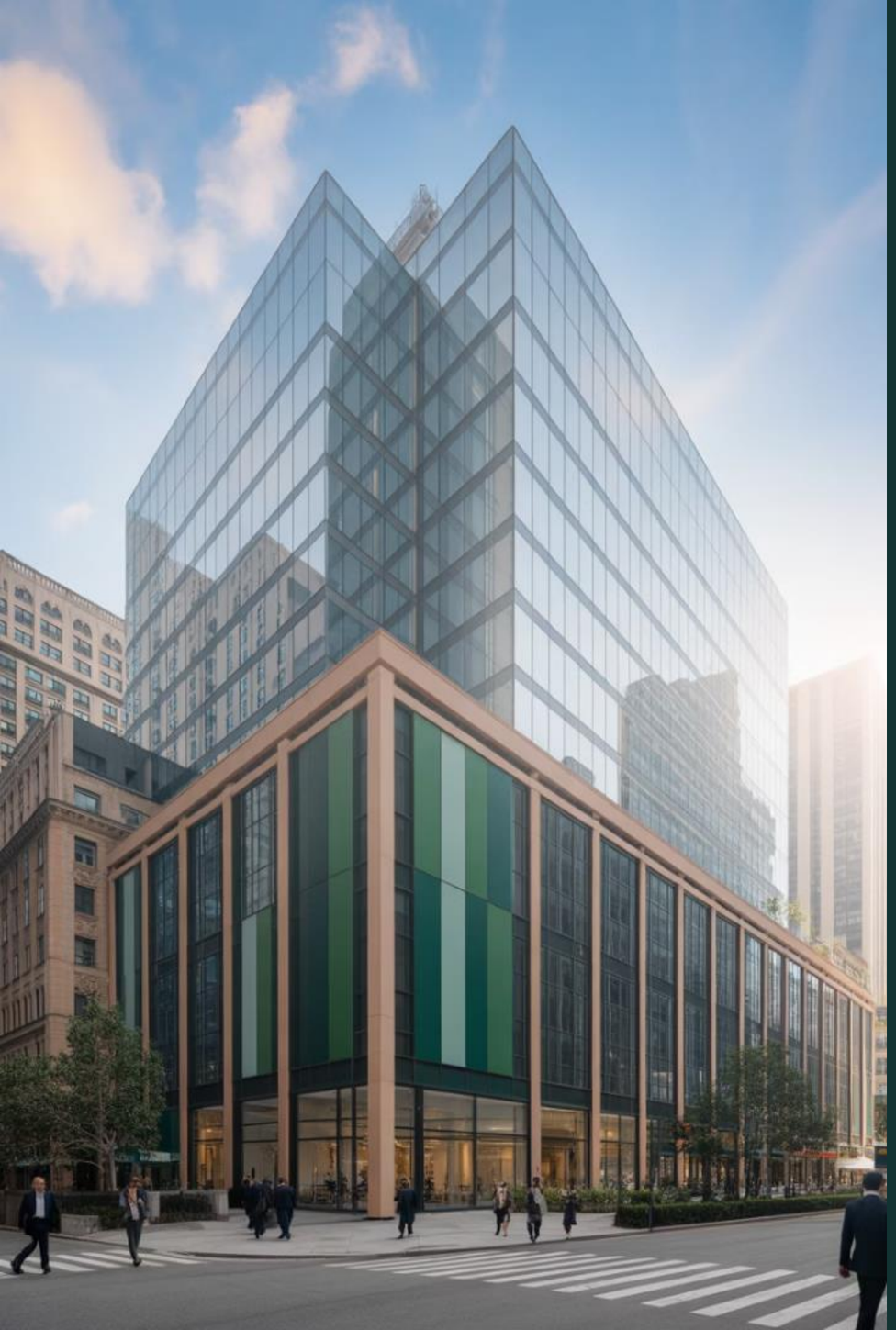


Micro-Level Valuation of Real Estate: DCF & NPV

At the micro-level of real estate investment, the primary question is: How much is the asset worth? Each side in a potential deal will be to "do the deal" at some price. We'll explore how to determine that using three fundamental economic principles: opportunity cost, market equilibrium, and wealth maximization.

The Link Between Returns and Property Values

Inverse Relationship

The prices investors pay for properties determine their expected returns. Future cash flow is independent of today's purchase price.

Market Factors

Future rents are determined by supply and demand in the space market, not by your purchase price.

Avoiding Bubbles

The "Greater Fool Theory" leads to disconnection between asset prices and cash flow potential, creating price bubbles.

The Discounted Cash Flow Model

Forecast Expected Future Cash Flows

Predict the net cash flows the property will generate over time.

Ascertain Required Total Return

Determine the appropriate discount rate based on risk and opportunity cost.

Discount Cash Flows to Present Value

Apply the discount rate to convert future cash flows to present value.

DCF Formula and Application

The DCF formula calculates property value by summing all discounted future cash flows:

$$V = \frac{E_0[CF_1]}{(1 + E_0[r])^1} + \frac{E_0[CF_2]}{(1 + E_0[r])^2} + \ldots + \frac{E_0[CF_T]}{(1 + E_0[r])^T}$$

Cash Flows (CF)

Net cash flow generated by the property in each period.

Discount Rate (r)

Expected average multiperiod total return, the opportunity cost of capital.

Terminal Period (T)

Final period including terminal value from property sale.

Numerical Example: Office Building Valuation

Year	2024	2025	2026	2027	2028	2029
Cash Flow	$1,000,000	$1,000,000	$1,000,000	$1,500,000	$1,500,000	$16,000,000

With an 8% discount rate, this property's estimated market value is $15,098,000. At this price, the buyer gets an expected 8% return. A lower price would yield a higher return for the buyer but be unfair to the seller.

Single Blended Discount Rate

Different Risk Levels

In theory, cash flows with different risk levels should be discounted at different rates. Contractual lease payments have lower risk than future market rents.

Intralease vs. Interlease

Intralease discount rate applies to contractual cash flows. Interlease rate applies to future leases and reflecting higher risk.

Practical Simplification

In practice, a single blended rate is typically used for all cash flows, especially for properties with multiple leases expiring at different times.

Cash Flow Growth Rate Simplification

Constant Growth Rate

Using a single growth parameter (g) simplifies forecasting.

Risk Adjustment

Uncertainty in cash flows is captured by the discount rate, not the forecast.

Formula Application

$E_0[CF_t] = CF_0(1+E_0[g])^t$

Long-Run Average

Cash flows fluctuate short-term but tend to revert to long-run averages.

Real Estate as a Perpetual Investment

Long-Lived Assets

Real estate is extremely long-lived. Buildings may be demolished, but land remains and new structures are built. Even cities destroyed in war are typically rebuilt.

Commercial real estate in central urban areas has proven remarkably durable throughout history.

The mathematical impact of distant cash flows diminishes significantly in present value calculations. Cash flows beyond beyond 60 years contribute minimally to current value.

Terminal Value and Gordon Growth Model

Terminal Value Concept

The expected sales price of the property at the end of the holding period.

Gordon Growth Model

$V = CF_1/(r-g)$

Note that the going in cap rate is approximately equal to the total yield less the growth rate of the income flow.

Direct Capitalization

Dividing first year's cash flow by the cap rate (r-g).

The Gordon Growth Model provides an elegant formula for valuing a perpetual cash flow stream. A property with higher initial cash flow, higher growth rate, or lower discount rate will be more valuable.

Cap Rate vs. Discount Rate

8%	2%	6%
Discount Rate	Growth Rate	Cap Rate
Total return including growth	Expected annual increase	Discount rate minus growth

In real estate practice, the cap rate is not the same as the discount rate. The cap rate equals the discount rate minus the long-run expected growth rate (r-g). This represents the current cash yield of the property.

Multiperiod Analysis Horizon

Choosing Terminal Period

The final period in analysis is typically 5, 7, or 10 years, modeled as if the property would be sold then.

No Commitment Required

The property need not actually be sold at that time; it's simply the horizon for analysis.

Value Independence

Changing the final period doesn't impact the current value of the investment.

Appraisal Terminology

Direct capitalization often corresponds to the "market method" while multiperiod DCF corresponds to the "income method."

Terminology Clarification

Opportunity Cost of Capital (OCC)

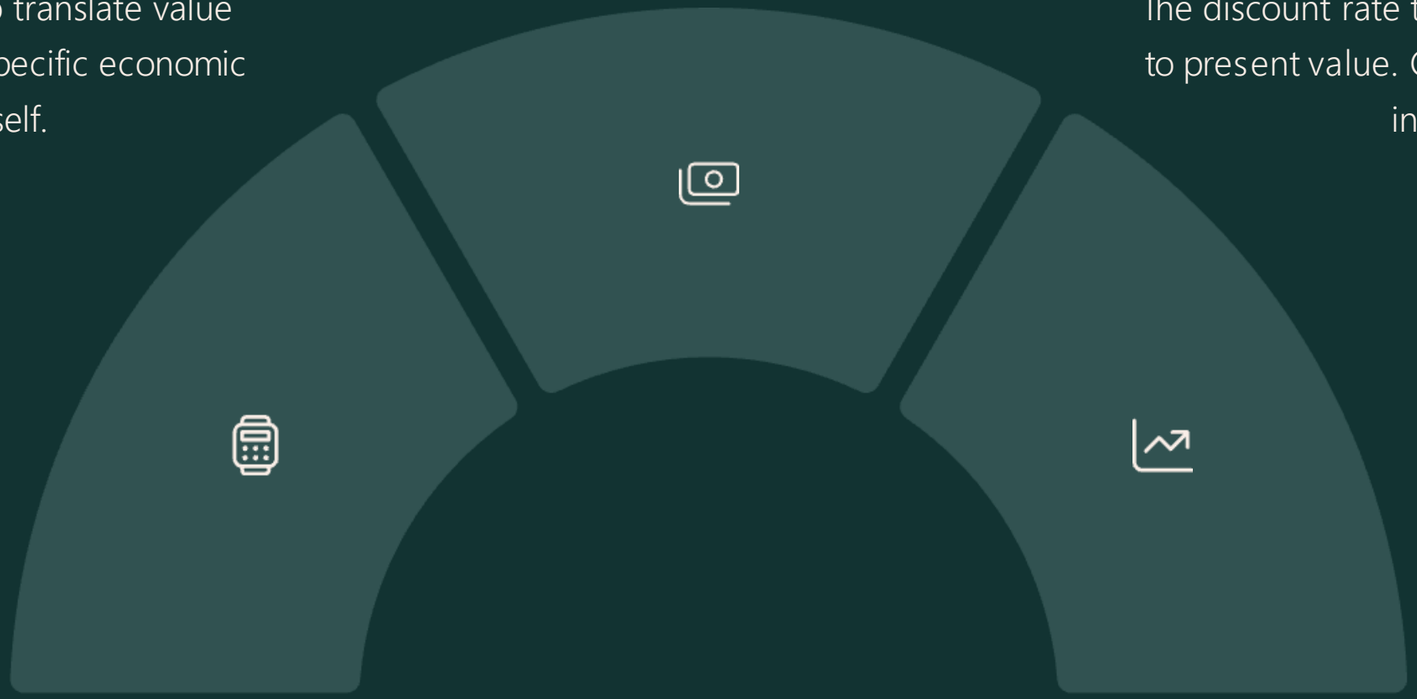
Expected return in the market for similar risk investments. Gives economic meaning to the discount rate.

Discount Rate

A mechanical term used to translate value amounts across time. No specific economic meaning by itself.

Internal Rate of Return (IRR)

The discount rate that equates future cash flows to present value. Can be used ex-ante ("going-in") or ex-post.



In a DCF valuation, the discount rate, OCC, and going-in IRR will all be the same if the present value equals the market value of the property.

The NPV Investment Decision Rule

Rule Components

1. Maximize NPV across all mutually exclusive alternatives.

2. Never choose an alternative with NPV < 0.

Wealth Maximization

The NPV rule is based directly the fundamental wealth maximization principle. Any other rule leaves money on the table.

Formula Application

If buying: NPV = V - P

If selling: NPV = P - V

Where V is property value and P is price.

Zero NPV Deals Are Acceptable

Normal Profit Included

Zero NPV doesn't mean zero profit. The discount rate includes the normal expected return.

Market Equilibrium

In well-functioning markets, most deals will have approximately zero NPV from a market value perspective.

Buyer-Seller Balance

For both buyer and seller to benefit, the NPV must be zero for both sides.

Choosing Among Zero-NPV Investments

Investment Value vs. Market Value

A property may have higher value to a specific investor due to unique abilities or synergies with other properties.

This creates positive NPV from the investor's perspective even when market value NPV is zero.

Other Considerations

- Portfolio diversification objectives
- Expertise in specific markets
- Target investment amounts
- Preferred business relationships
- Information quality differences

Hurdle Rate Decision Rule

Maximize IRR Difference

Choose projects with highest spread between expected IRR and required return.

Minimum Threshold

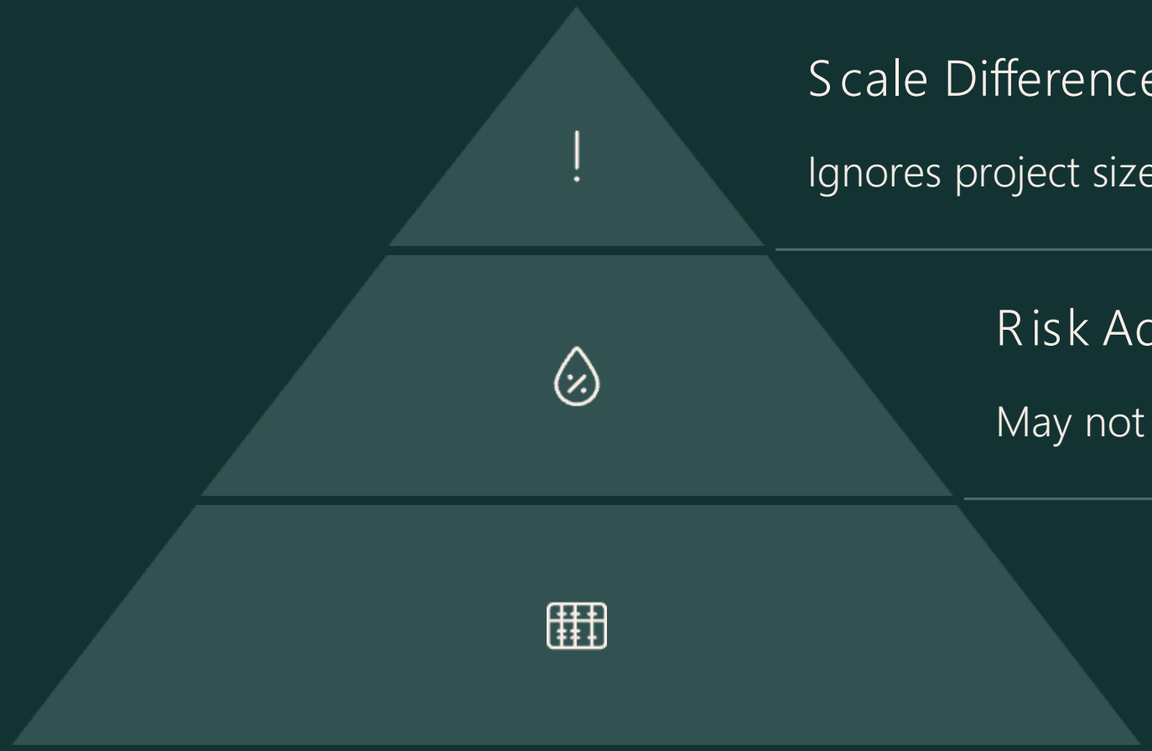
Never do deals with expected IRR less than required return.

Equivalent to NPV

Typically gives same results as NPV rule when applied properly.

The hurdle rate is the minimum acceptable rate of return for an investment, equivalent to the opportunity cost of capital including risk premium.

Potential Issues with Hurdle Rate Rule



Scale Differences

Ignores project size when comparing alternatives

Risk Adjustment

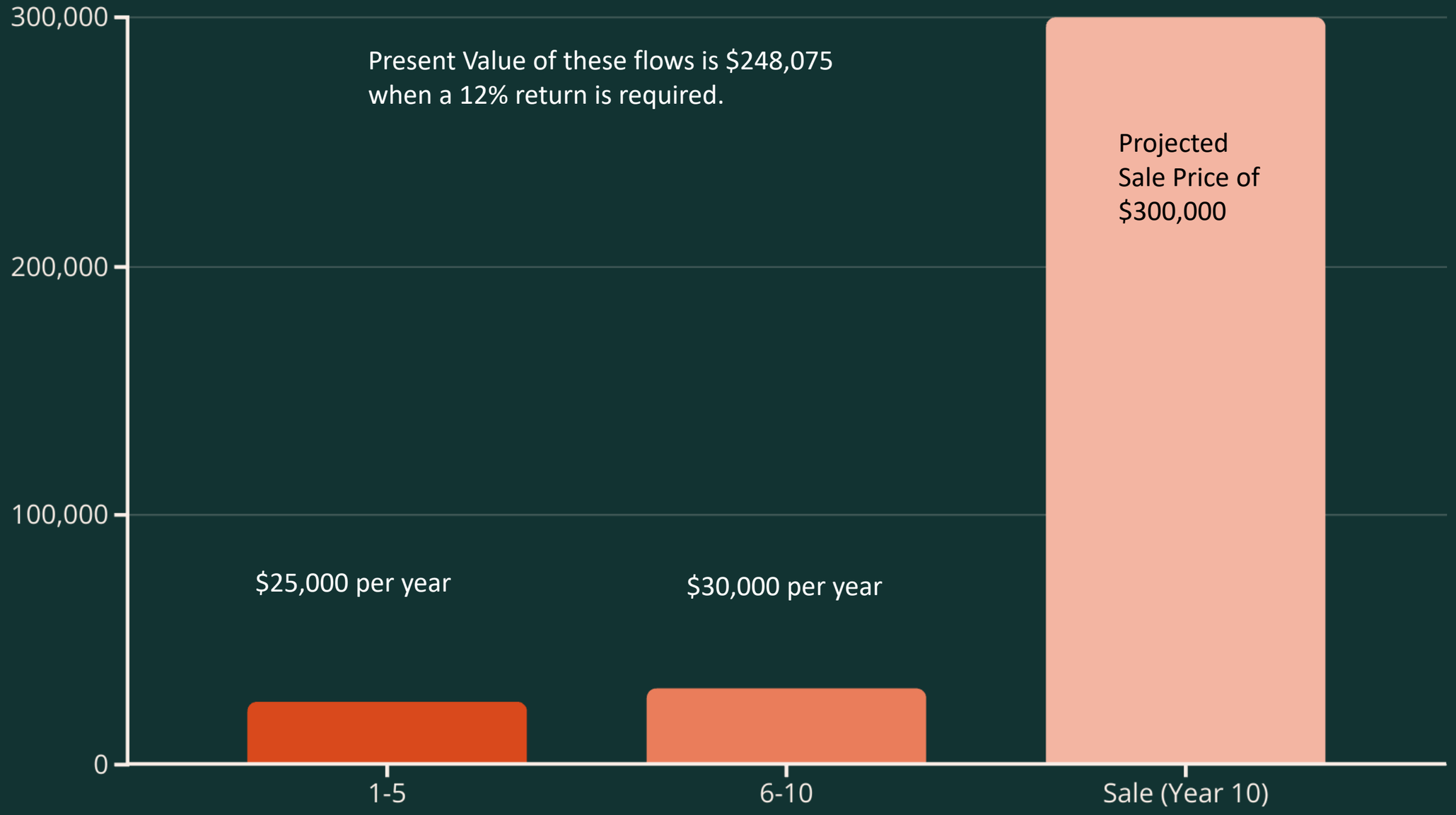
May not properly account for different risk levels

Mathematical Issues

IRR can be indeterminate in some cash flow patterns

Example: Project A ($15M investment, 15% IRR) creates more wealth than Project B ($5M investment, 20% IRR) despite percentage return. NPV of Project A is $2.5M versus $1.67M for Project B.

Numerical Example: Summit Heights Plaza with a $260,000 purchase price.

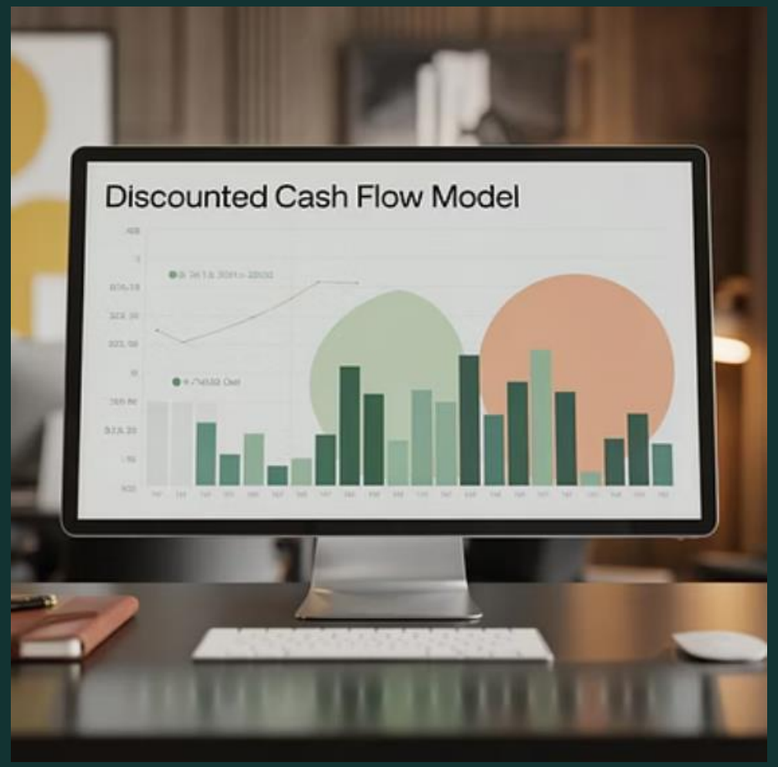


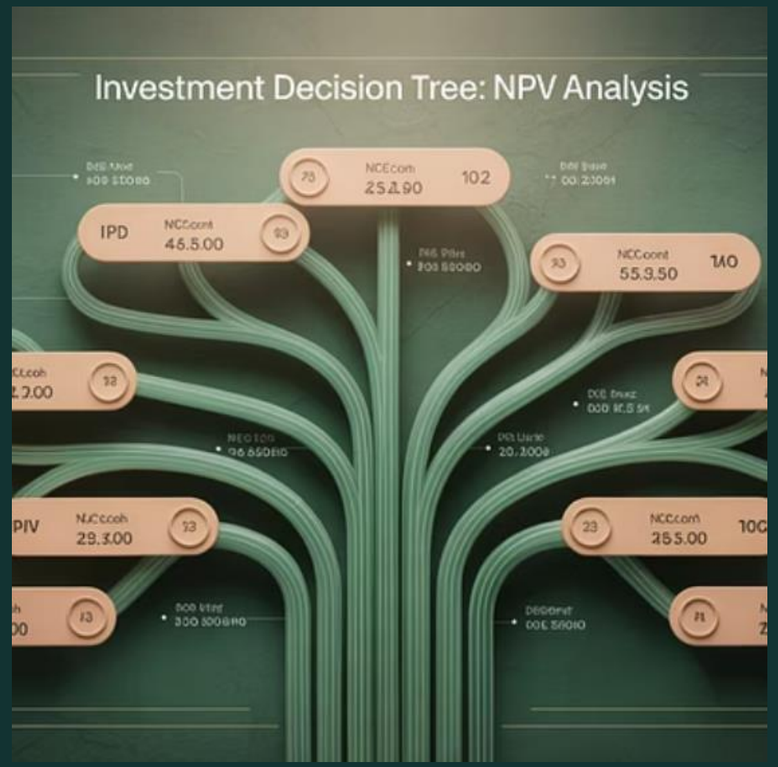
Sensitivity Analysis

6.36%	2.65%	11.24%
Discount Rate Impact	Growth Rate Impact	Actual IRR
Value increase when rate drops from 12% to 11%	Value increase with 25% vs. 20% growth after year 5	At $260,000 purchase price

Small changes in key assumptions can significantly impact property valuation. A one percentage point decrease in discount rate increases value by 6.36%, while higher cash flow growth increases value by 2.65%.

Key Takeaways





Value-Return Relationship

Property prices determine expected returns because future cash flows are independent of purchase price.

DCF Fundamentals

Forecast cash flows, determine rate, apply Gordon Growth Model for terminal value.

Decision Rules

Use NPV or hurdle rate rules to maximize wealth, remembering that zero-NPV deals are acceptable.