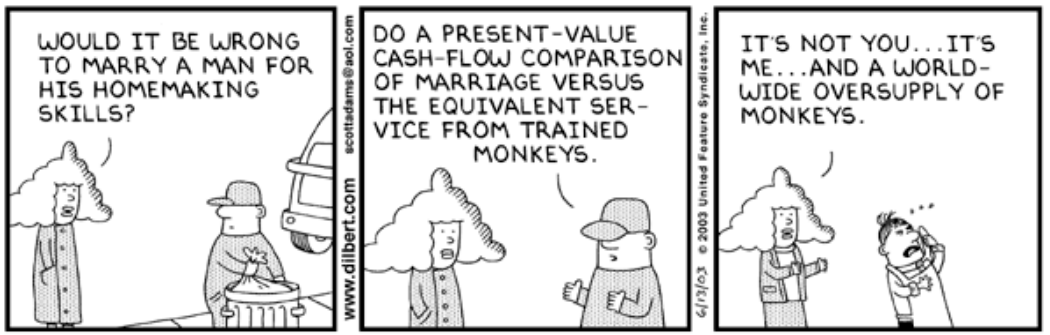
Evaluating Risk in Property Feasibility Studies

A component of the research project into:

The Functional Performance of Commercial Buildings

Evaluating RISK

- **All property projects are risky**
- **To maximise profits, risk must be:**
  - **Identified**
  - **Quantified**
  - **Managed**



Today's Program

2.00 – 3.30 pm: Cash Flow model accuracy

Short tutorial

Key variables and the market

Basic risk measurement

3.30 – 3.45 pm: Tea break

3.45 – 5.00 pm: Scenario analysis

Short tutorial

Simulation exercise

Triple bottom line assessment

Investment Worth

Standard Measure of Rate of Return:

$$= \frac{\text{END PERIOD} - \text{BEGINNING PERIOD} + \text{CASH FLOW}}{\text{BEGINNING PERIOD}} \times 100$$

- This is the approach used for property investment and development studies but sometimes we simplify the exercise.

1. **Simple (Static) Exercise:**
   Calculation of worth or profit in a single time period - this is the yield or direct capitalisation approach

2. **Full (Cash flow) Exercise:**
   Examining the cash flow over time – this is the Discounted cash flow (DCF) approach.

Property Cash Flow Models

These models:

- show the anticipated cash flow (both income stream and capital change) over a specified time period
- are used to determine either

1. **Present Value** (or net present value)
   i.e. the worth today

2. **Internal Rate of Return**
   i.e. the total annual return achieved on funds during the time period specified.

Property Cash Flow Spreadsheets

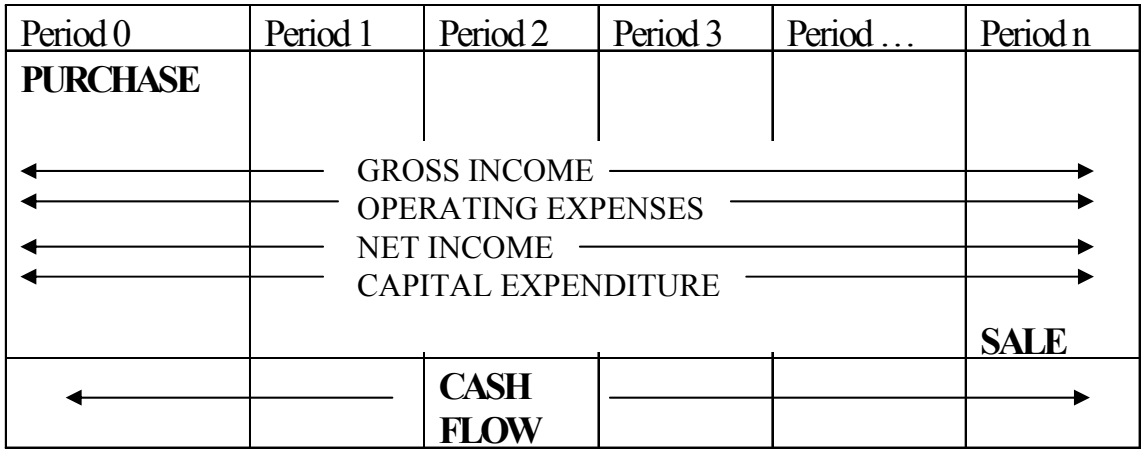
STRUCTURE: OUTCOME – NPV (or PV)

Known:

Net income estimate over time

Future selling price estimate

Required total rate of return (discount rate)



Compute: Net Present Value (Present Value)

N.B. May include or exclude a present value figure

Assumptions: Outcome NPV (or PV)

1. Length of study
2. Time interval
3. All net income figures over time
4. Any capital items (input or expense)
5. All sale figures
6. Required rate of return (target rate)

Property Cash Flow Spreadsheets

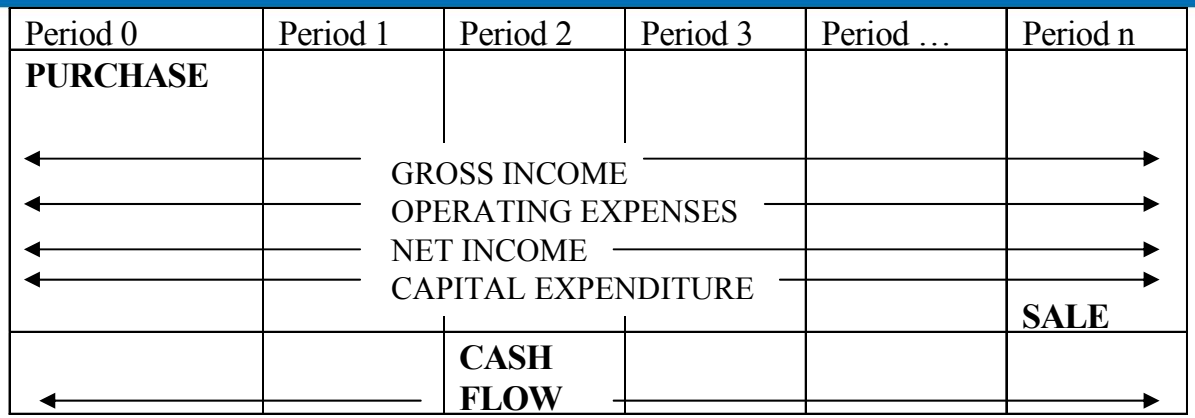
STRUCTURE: OUTCOME - IRR

Known:

Present value (purchase price or value)

Net income estimate over time

Future selling price estimate



Compute IRR

IRR is the rate of return that makes the future cash flows equal to the present cash flow.

Assumptions: Outcome NPV (or PV)

1. Length of study (3, 5 or 10 years…)
2. Time interval (monthly, annual…)
3. All purchase/present value figures, including costs.
4. Net income figures over time including starting and finishing dates and escalation rates of income and expense
5. Any capital expenditure or inputs.
6. All sale/terminal value figures, including costs.

Tutorial - Incorporating Loan Finance in a DCF exercise

- ***Study the layout of this Property Investment case flow study and insert the additional headings required in the left-hand column to assess the Internal Rate of Return <u>on Equity</u>.***

- ***Will the IRR on Equity be greater or lesser than the IRR on Total Capital (10.51%)?***

Diagram for NPV computation

Year is the time interval
t1…tn is the length of study
tn+1 is the extra year

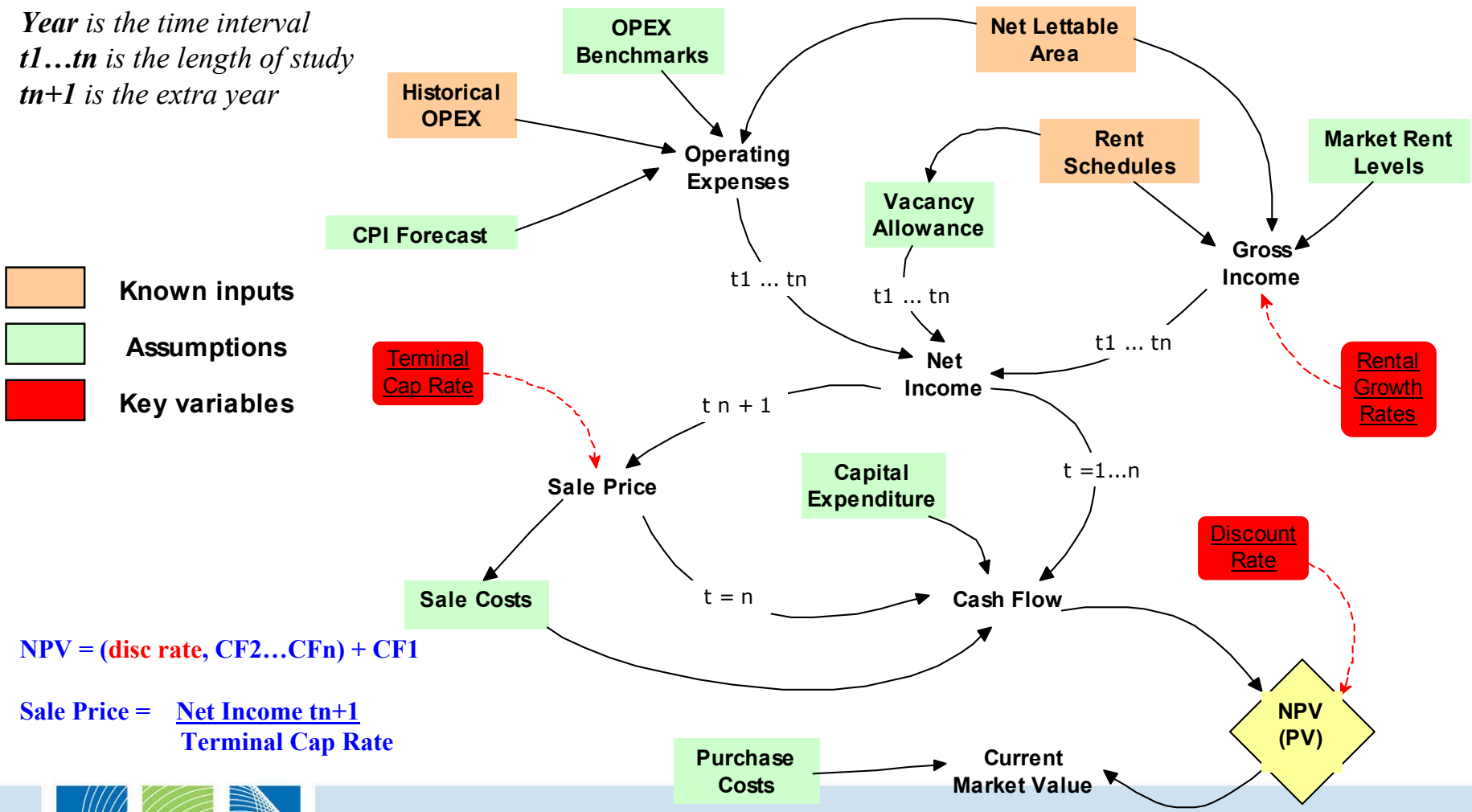
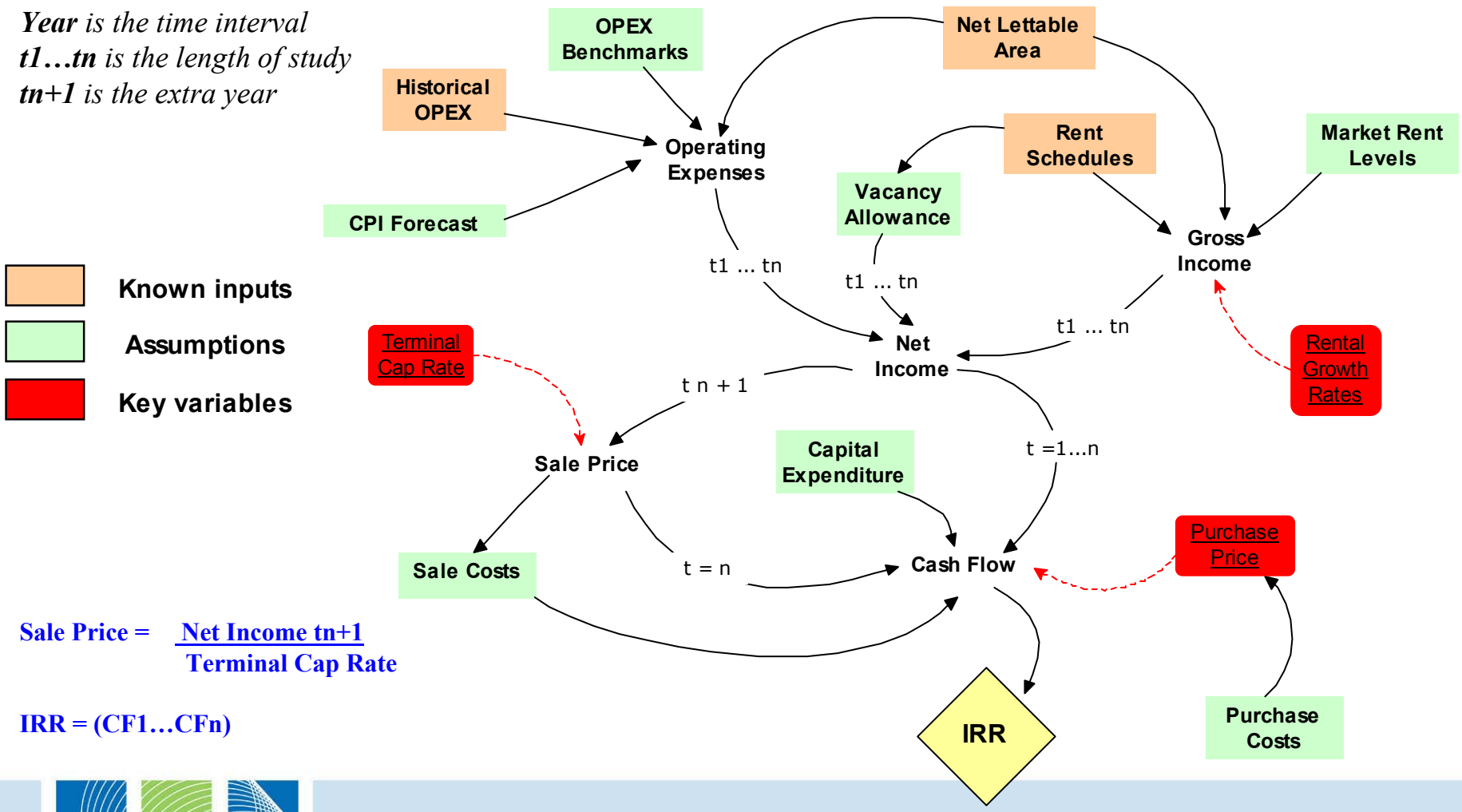


Diagram for IRR computation

Year is the time interval
t1…tn is the length of study
tn+1 is the extra year



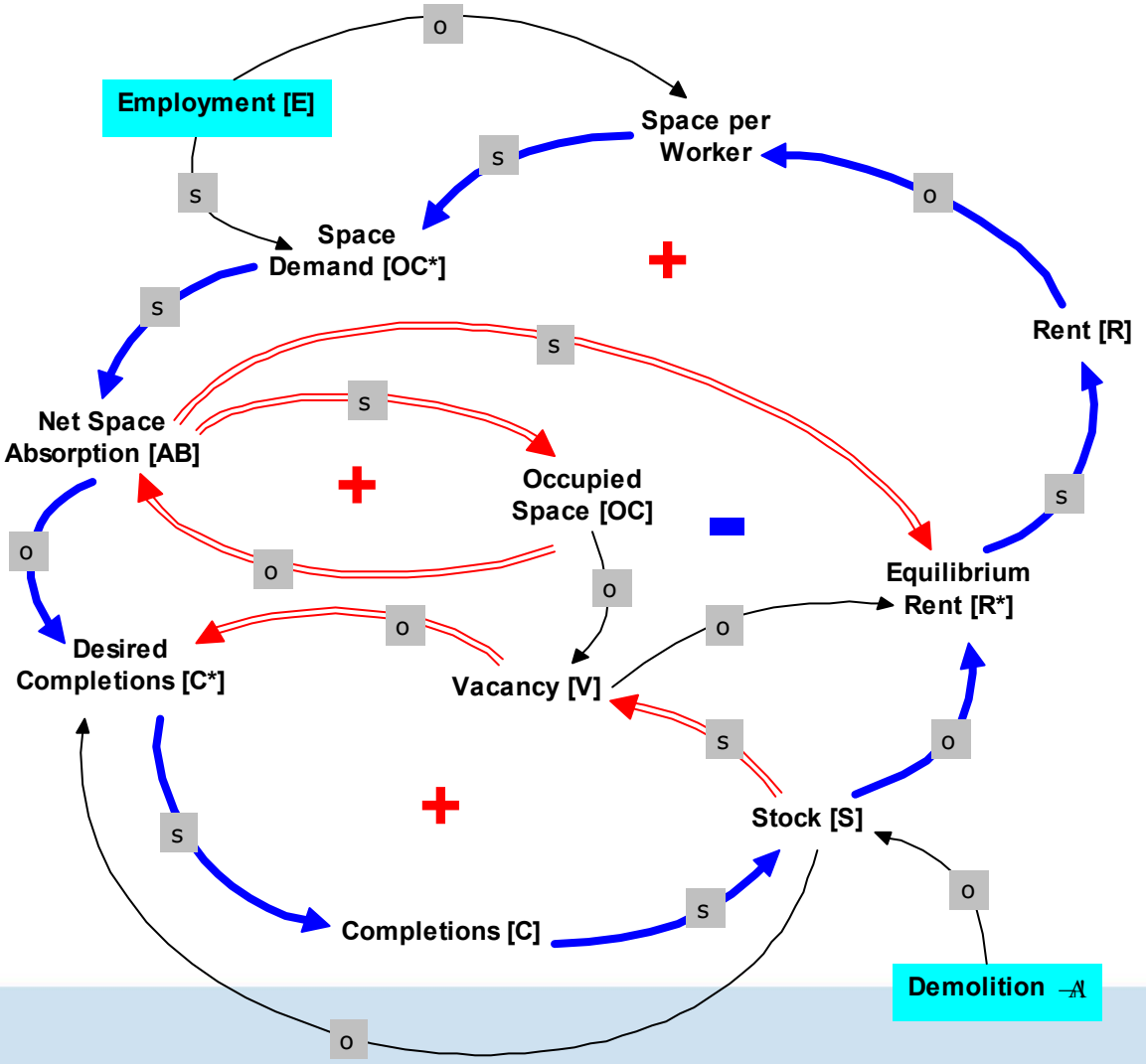
Sale Price = Net Income tn+1 / Terminal Cap Rate

IRR = (CF1…CFn)

Rental Growth Rates

Negative Feedback: a discrepancy induces corrective action to return the system to a target state (Equilibrium Rent).

Positive Feedback: growth leads to faster growth or decrease accelerates a collapse (space per worker).



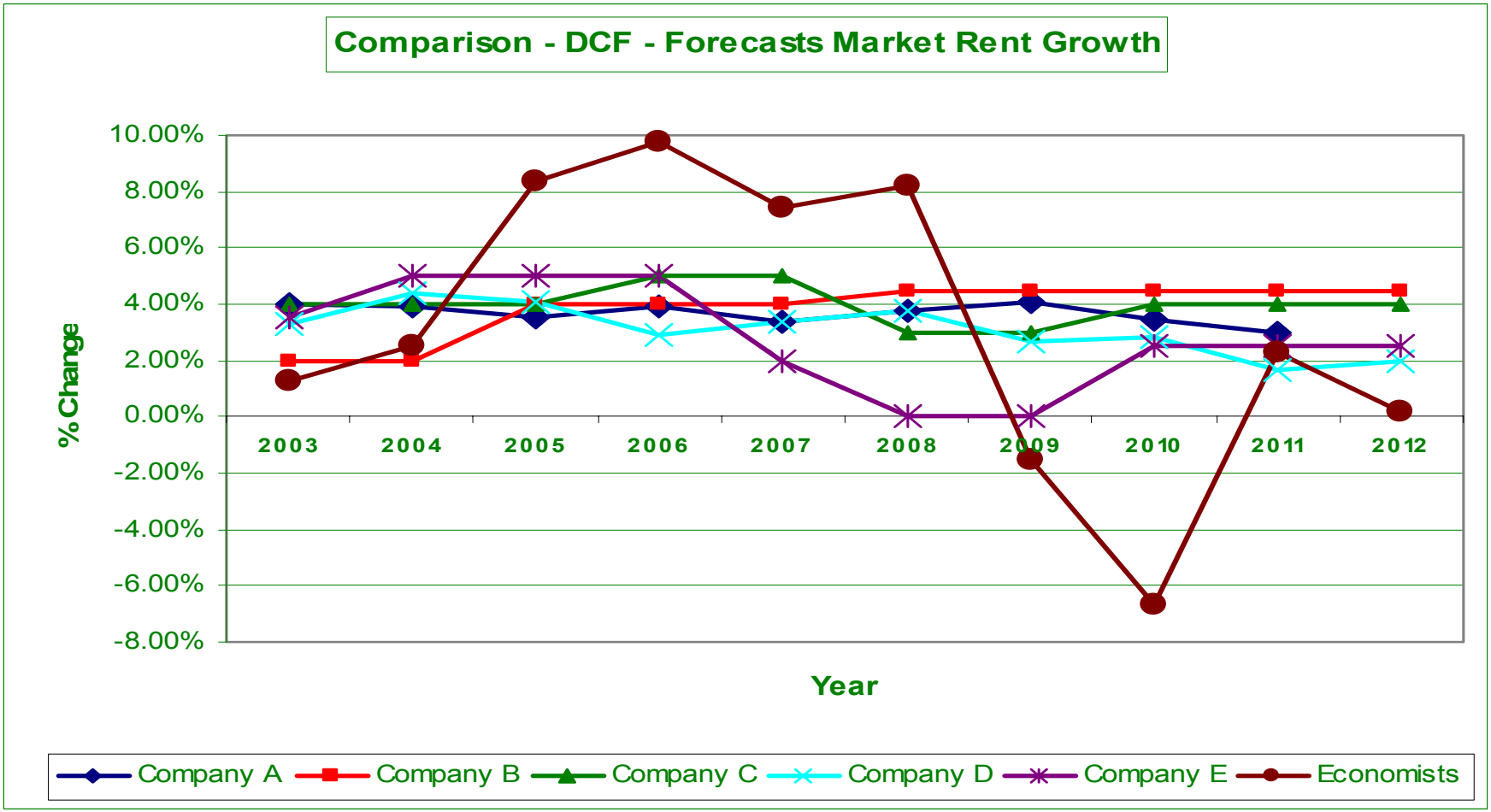
System Dynamics Concepts

System Dynamics theories, as developed by Forrester (1961) and enhanced by Coyle (1977), offer the opportunity to model complex interrelationships and to observe their dynamic behavior over time.

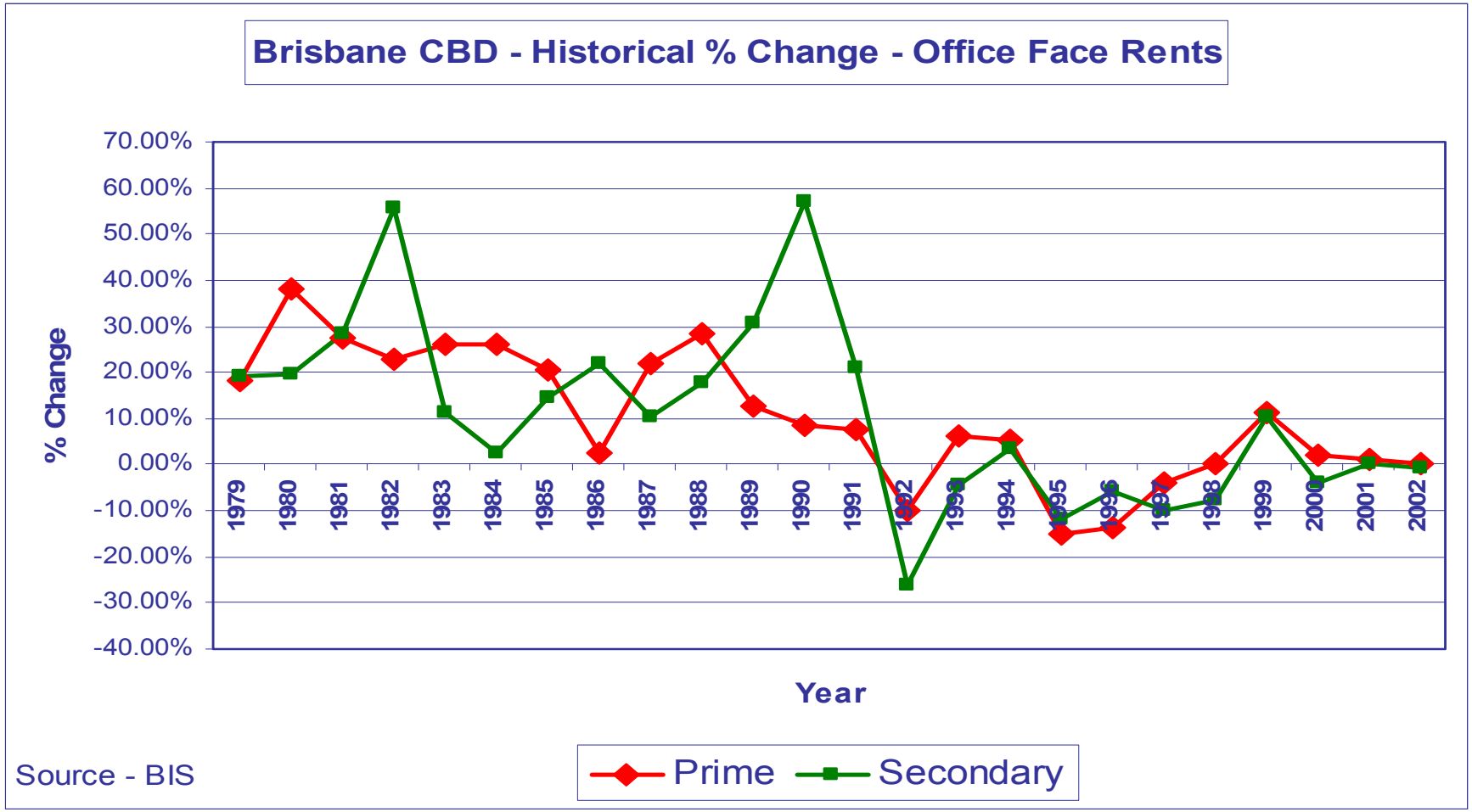
The use of dynamic models:

- **Provide** more reliable forecasts of short to mid-term trends than statistical models – time-series models and regression models.
- **Provide** a means of understanding the causes of industry behaviour.
- **Allow** the determination of reasonable scenarios as inputs to decisions and policies.

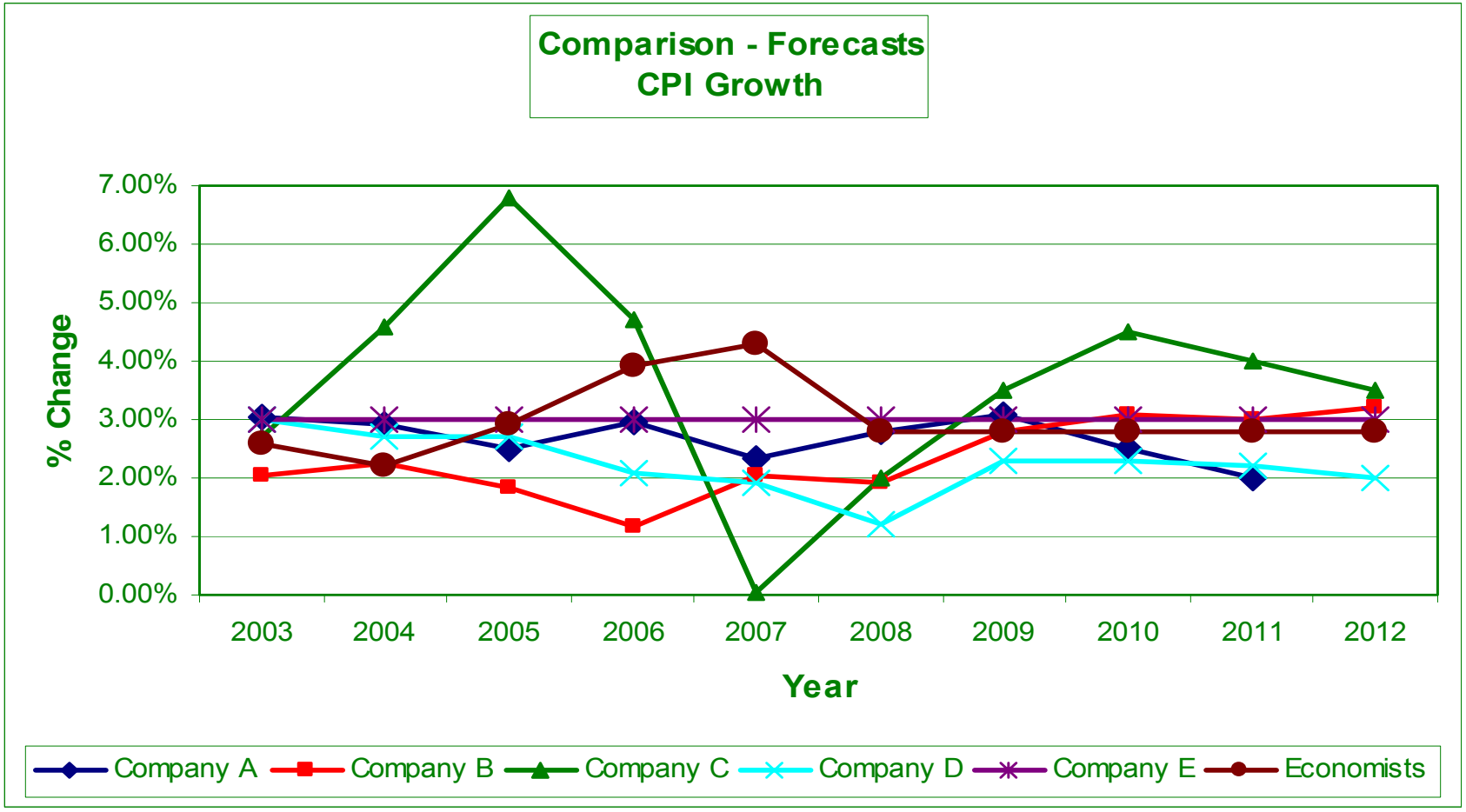
Property Professional – DCF Market Rent Forecasts



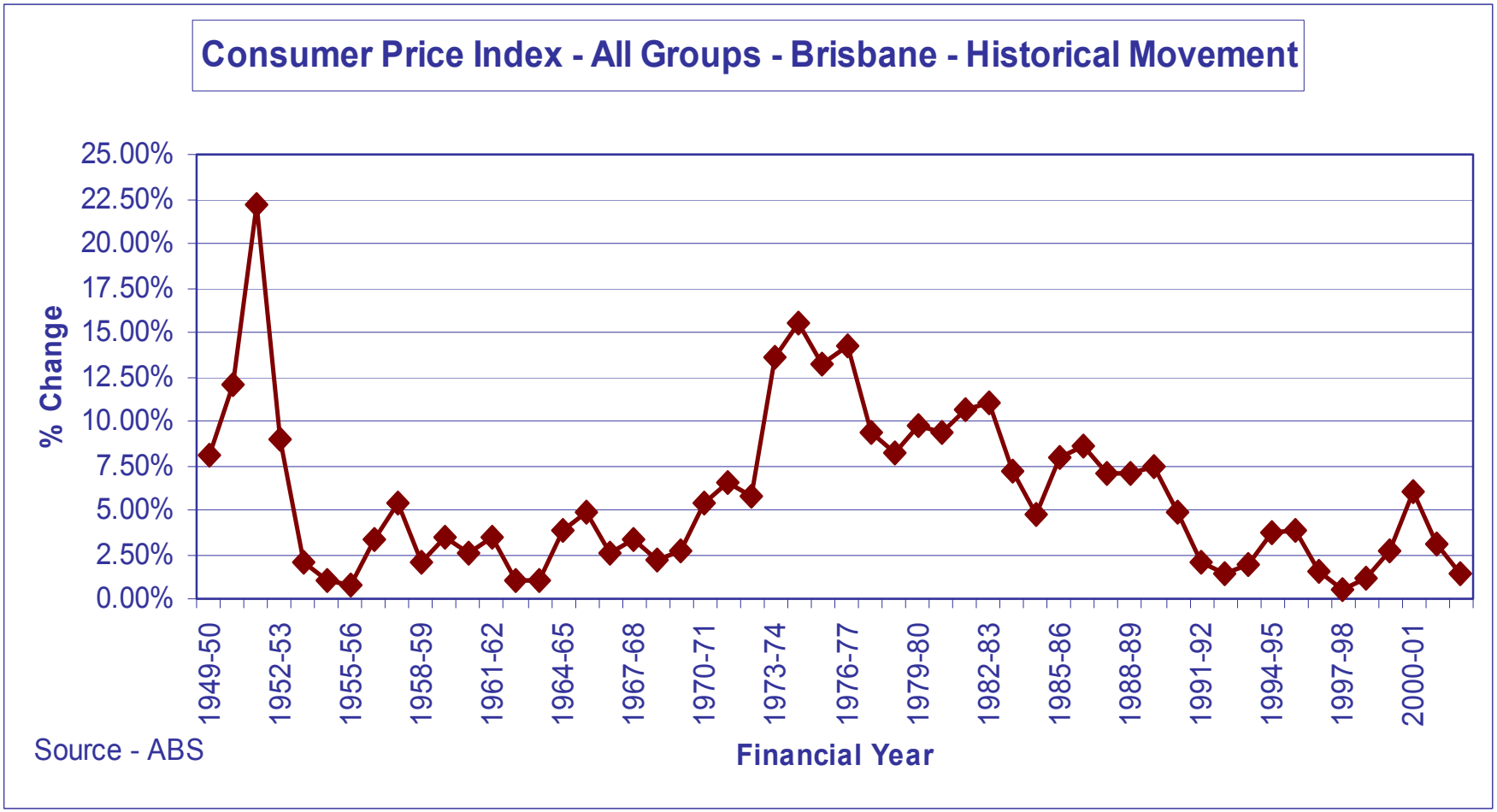
Brisbane CBD – Historical % Change – Face Rents



Property Professional – Inflation Forecasts

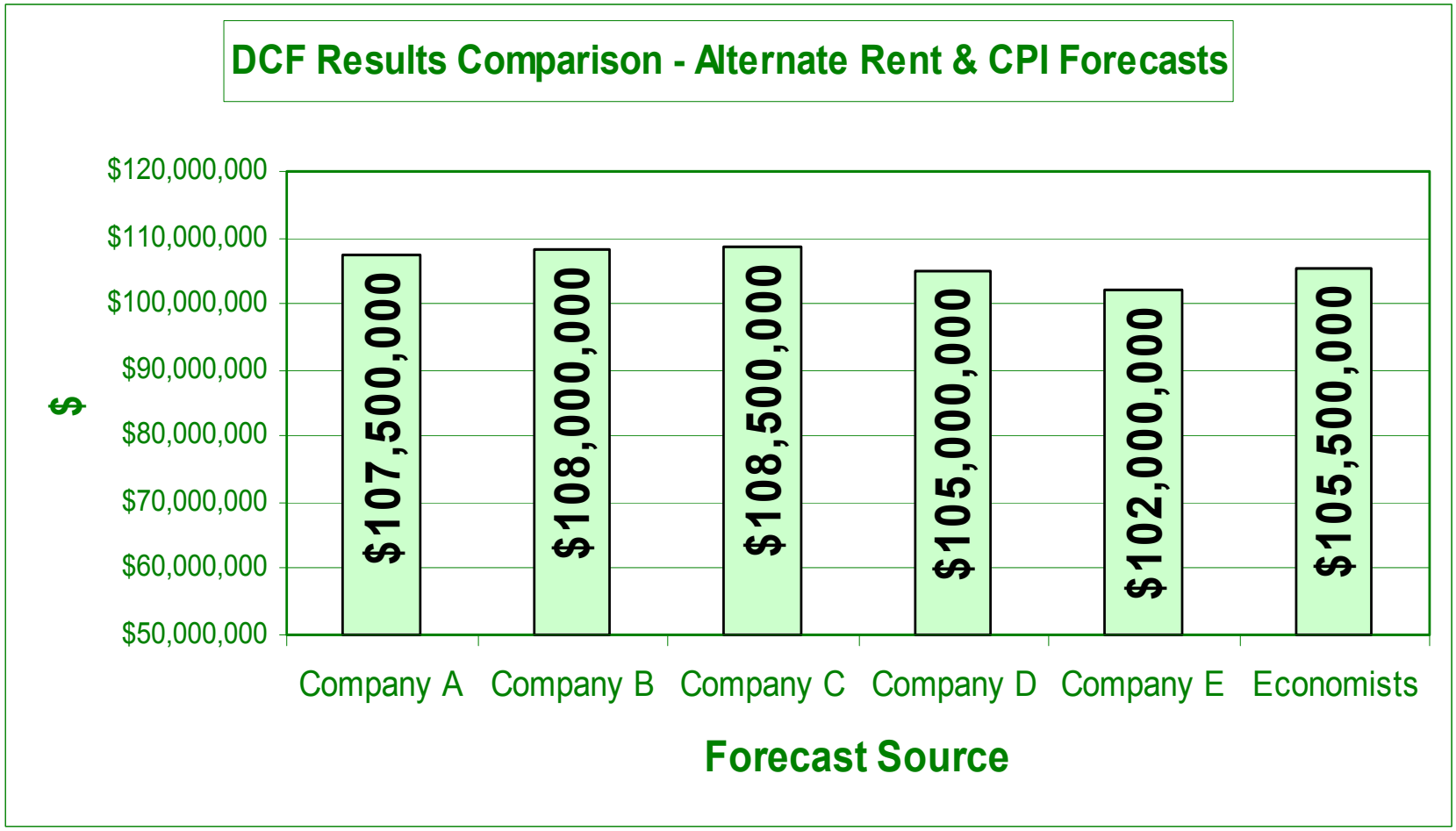


Brisbane – Historical Inflation - % Change

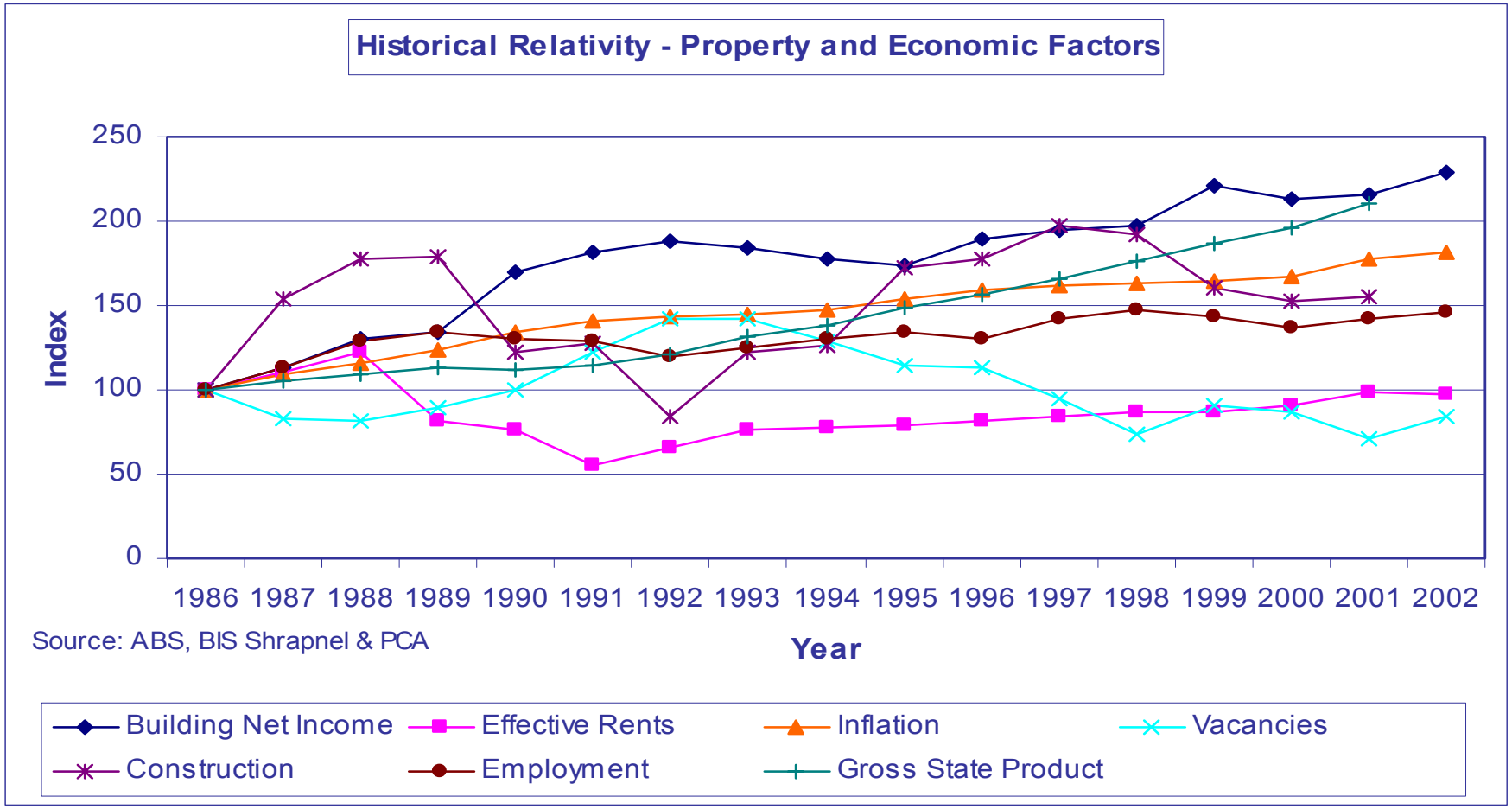


CRC Construction Innovation
BUILDING OUR FUTURE

DCF Results Comparison – Alternate Rent & CPI Forecasts



Economic Factors & Property Variables



Correlations – Economic Factors & Property Variables

	Net Income	*Effect Rents*	*CPI*	*Vacancies*	*Construction*	*Employment*	*GSP*
Net Income	**1.00**						
Effect Rents	**-0.43**	**1.00**					
CPI	**0.96**	**-0.33**	**1.00**				
Vacancies	**0.07**	**-0.69**	**-0.04**	**1.00**			
Construction	**0.16**	**0.35**	**0.34**	**-0.62**	**1.00**		
Employment	**0.76**	**-0.16**	**0.81**	**-0.35**	**0.66**	**1.00**	
GSP	**0.83**	**0.03**	**0.91**	**-0.36**	**0.42**	**0.75**	**1**

Research – Property Market Forecast Models

- Numerous models developed by US and UK Researchers
- Models being tested with Brisbane CBD data
- Issue with data availability
- Optimum model to provide basis for forecasting module in DCF software
- Aim to generate forecasts for rents, vacancy rates, construction activity, yields & discount rates

Property Market Forecast Example Equations

Net Space Absorption

$$AB_t = \tau_1[\alpha_0 + E_t[\alpha_1 + \alpha_2 \frac{(E_t - E_{t-1})}{Et} - \alpha_3 R_t]] - \tau_1 OC_{t-1}$$

E = office based employment

R = office rent

OC = occupied space

Property Market Forecast Example Equations

Rent

$$R_t = \mu_3(\mu_0 - \mu_1 V_{t-1} + \mu_2 \frac{AB_{t-1}}{S_{t-1}}) - \mu_3 R_{t-1}$$

V = vacancy

AB = net absorption

S = stock of space

R = rent

Property Market Forecast Example Equations

Construction – Space Supply

$$C_t = \tau_2 (\beta_0 + \beta_1 S_{t-8} + \beta_2 S_{t-8} V_{t-8} + \beta_3 AB_{t-8}) + (1 - \tau_2) C_{t-1}$$

S = stock of space

V = vacancy

AB = net absorption

C = construction

Risk Identification

What are the crucial inputs of the study?

- For investment studies:
  - What will the future rents be?
  - What will the property sell for?
  - What are the likely capital costs?
- For development studies:
  - What are the likely timings for approvals?
  - What will the selling price/s be?
  - What will the development costs be?
  - Other issues…

Property Investment Crucial Variables
in Cash Flow Study

- **Rent Escalation Rates**
- **Discount Rate**
- **Terminal Capitalisation Rate**
- **Loan Interest Rates**
- **Purchase Price**

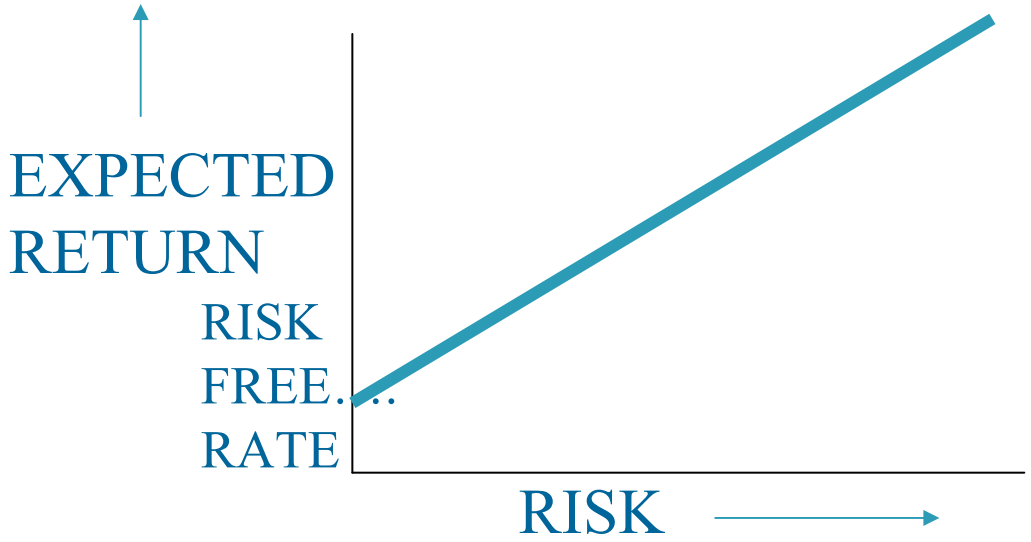
In certain circumstances

RISK

- Is described as the uncertainty surrounding the consequences of actions or decisions.
- Definition:

  "The probability of not receiving what is expected"
- PROBABILITY is often described as a deviation from the expected outcomes.
- In financial terms the reward for committing funds is the RETURN and the uncertainty of receiving the expected return is the RISK.

Risk and Return Trade-Off



- **A higher return must be offered to attract investor's funds to riskier investments.**
- **Risk and expected returns must be balanced in investment decisions.**

Types of Risk

Total investment risk is typically classified as systematic and unsystematic risk.

- Systematic risk – involves pervasive factors that effect all assets, it is unavoidable uncontrollable risk, e.g. inflation, interest rates, market cycles, political events, etc.

- Unsystematic risk - risk that is unique to the asset in question e.g. location, tenancy risk, financial risk, liquidity of asset, etc.

Total Risk = Systematic Risk + Unsystematic Risk

Basic Measures of Return and Risk

- RETURN measure is expected or mean return
- RISK measure is the standard deviation from the mean return

The standard deviation is the measure of dispersion from expected figure (large standard deviation means high risk, while low standard deviation means low risk)

Combined Risk/Return Measures

1. **COEFFICIENT OF VARIATION (CV)**

   CV = std dev / mean

   This is a ratio of the risk to expected return; it can be expressed as a percentage.

2. **SHARPE INDEX**

   = (Mean rate of return – risk free rate of return) / std dev of return

   This is risk adjusted real rate of return

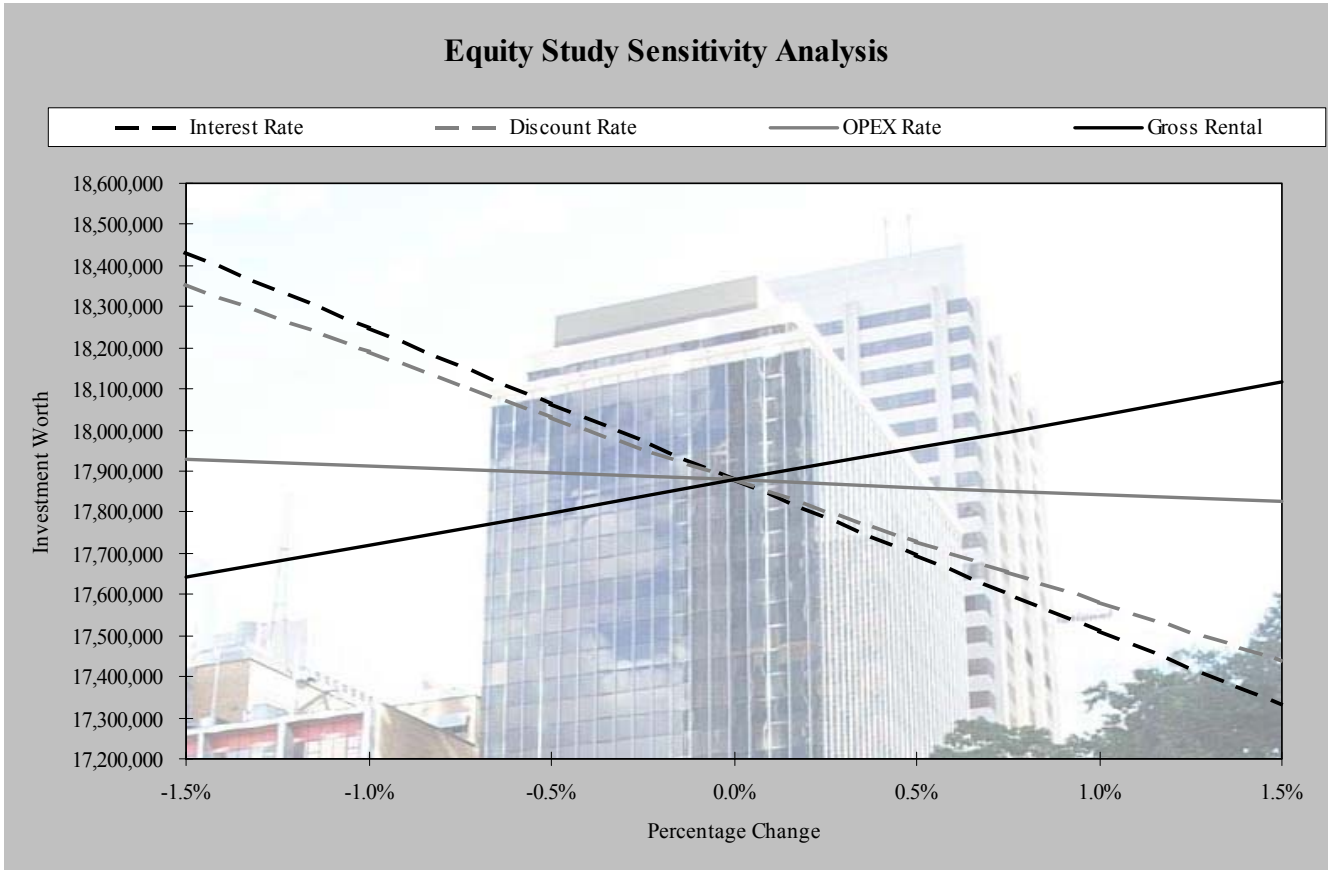
Sensitivity Analysis

Sensitivity Analysis : quantifies risk by a process of assigning different values to the inputs considered uncertain in a cash flow model, and then measuring their relative impact on important output variables such as NPV, PV, IRR

Case Study Example

Spider diagram

Used to measures the output change for a realistic change in that variable alone.
This method does not take into account the correlation that might exist between the variables, but it is acceptable to determine the degree of sensitivity.



Tutorial on Sensitivity Analysis

- ***What should you look at to determine the impact of the key variables on the final output?***
- ***Which one is the variable that has the strongest impact on the figure?***
- ***Which one has the lowest impact?***

Scenario Analysis

Scenario Analysis : similar to sensitivity analysis but here the input variable values are grouped together at values assigned for different scenarios (e.g. boom, normal, and recession) and then the relative impact of the grouped changes is assessed.

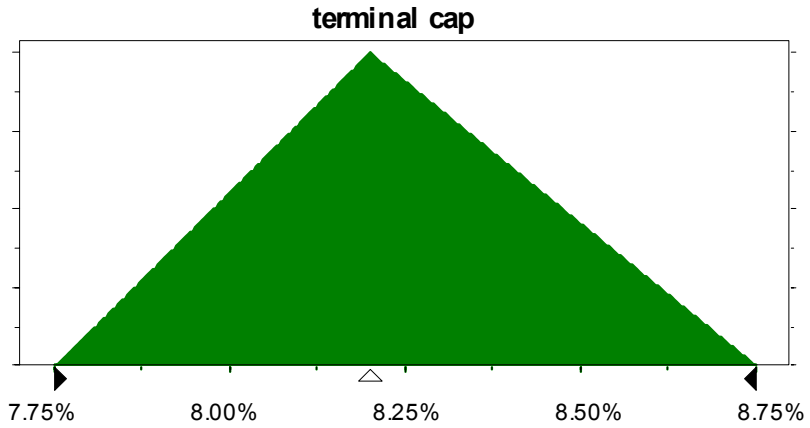
Output is most likely, best and worst case scenarios.

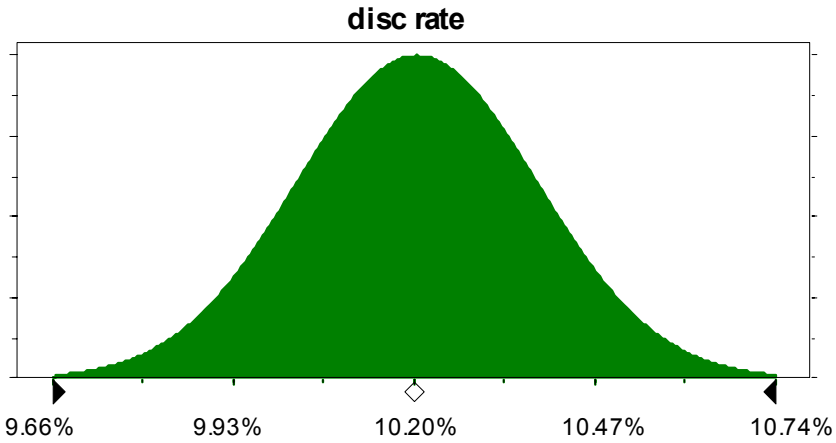
Simulation Analysis

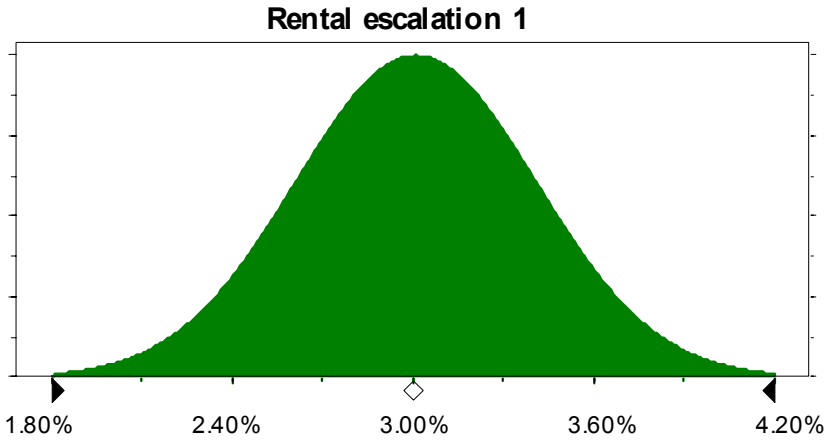
Simulation Analysis :

The probability distributions are estimated for each uncertain variable in a cash flow model and the possible combinations of all values for each factor are then simulated to determine the range of possible outcomes and the probability of each outcome.

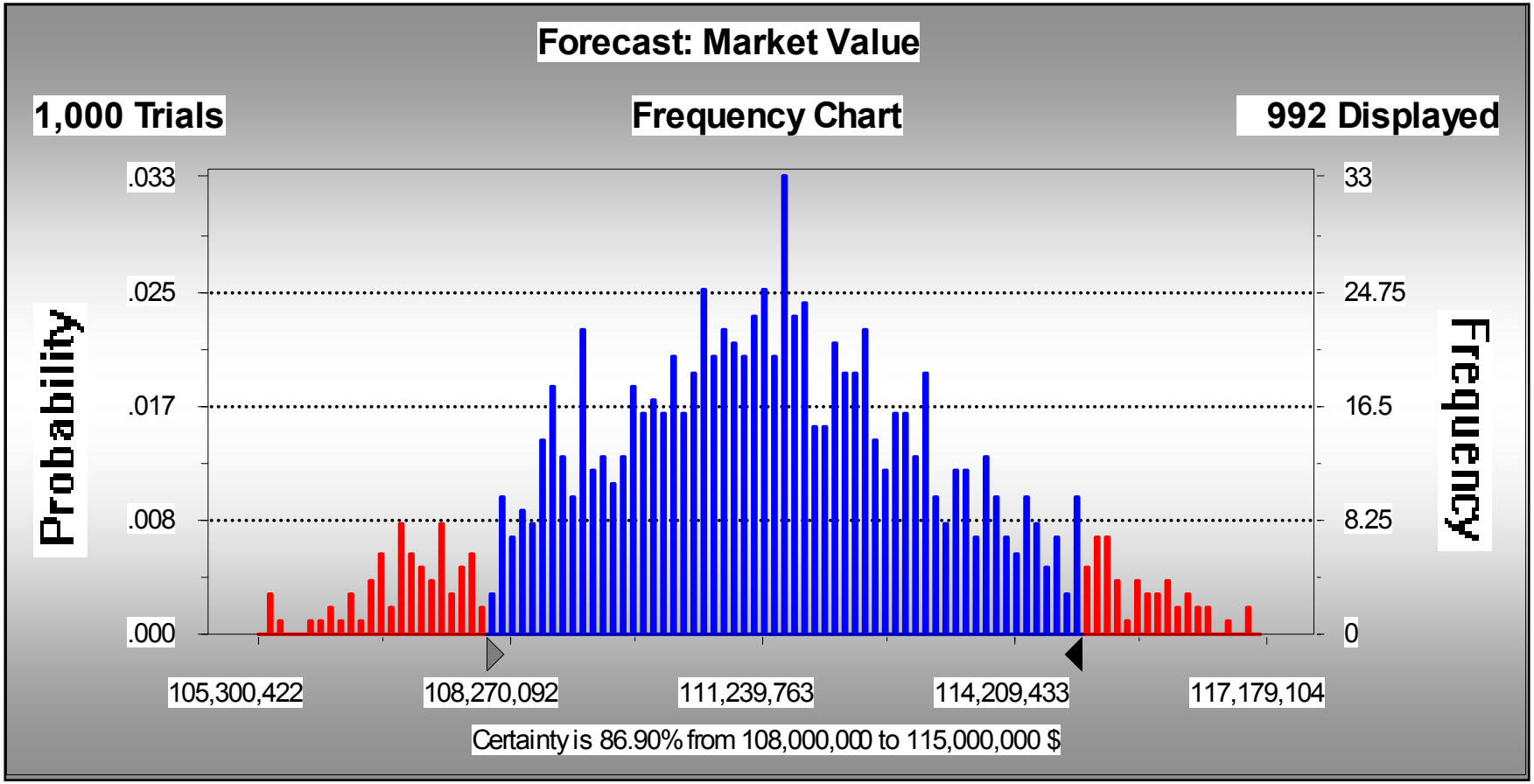
Case Study: Simulation Exercise







Simulation Exercise Diagram



Risk Management Processes

Avoiding Risk

1. Study property cycle - enter and exit at correct time.
2. Selection property type (less risky).
3. Prime location selection.
4. Structure of financing - no loan finance.
5. Quality tenants on secure leases.

Transferring Risk

1. Insurance policies
2. 'Limited' Company.
3. No personal guarantees given.
4. Good default clauses (easy, quick return of asset).
5. Obtaining guarantees from lessee/buyer.
6. Sharing interest in property.

Minimising Risk

1. Reducing loan finance or interest burden.
2. Lower purchase price, deferred payments.
3. Rational diversification.
4. Good accounting controls and reporting systems.
5. Careful investment feasibility study.
6. Improved project and property management.
7. Improved tenants - 'pre-let' situation.
8. Prime location.
9. Quality building.

Financial Performance Measures

- **Most probable return** (or value/price)
- **The 'standard deviation' risk measure**
  (or range of possible results)
- **Most sensitive input variables**
- **What-if results**
- **Financial ratios**
  - **Loan interest: net income**
  - **Loan amount: value**
- **Benchmark comparisons**
  (to internal or external benchmarks)

Triple Bottom Line (TBL)

A valuer's working definition – *the comprehensive qualitative and/or quantitative assessment of social and environmental factors of a given entity, complimentary to purely economic considerations.*

Major principles – Legitimacy; appeal to common sense; longer-term focus (inter-generational equity); workplace equity; moral high ground.

Why value TBL – Reflect changes in the market (attitudes dictating demand & supply); important variables obscured by traditional economic approaches; sounder future value projections.

Major problems – Entity 'greenwashing'; disclosure; difficult to quantify.

Solutions – Avoid 'messy' contingency valuations using an integrative, flexible approach (use $ + stars); pay particular attention to entities at the margins.

Social Metrics

… Developed from Global Reporting Initiative to suit case study

Working conditions

- *Disclosure of health and safety records*
- *Level of training and awareness optimizing the use of building features*
- *Provision and monitoring of equal opportunity features/amenities*
- *Provision, if any, of facilities/amenities/lobby space/furniture for the public*

Society impacts

- *Management of stakeholder interests/impacts in local precinct*
- *Nature of tenant and naming rights businesses*
- *Insurance cover for workers, maintenance crews, and the general public*

Transparency

- *Disclosure of management details, including staff, structure, salaries, contract agreements, audits*

Human Rights

- *Details regarding human rights training for security personnel, ect. (if any)*

Environmental Indicators

… Selected from green building codes

- *Impact of materials used (LCA Design or similar software)*
- *Energy consumption (savings, efficiency, alternatives, ect.)*
- *Energy consumption footprint (plan - total life cycle)*
- *Water consumption (recycling, capture, wastewater)*
- *Emissions (greenhouse, ozone, particulates ect.)*
- *Wastes and effluents (recycling and/or removal)*
- *Transport for workers and visitors (public transport, carpooling)*
- *Non-compliance with environmental regulations*
- *Quality of built environment (worker satisfaction, aesthetics ect.)*


Questions ???
Evaluating Risk in Property
Feasibility Studies