Graduate Certificate in Real Estate Finance (GCREF) course

# Real Estate Investment Analysis using Excel

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# Lecture Outline

- Investing in real estate
- Cash flow pro-forma
- Investment rule – decision criteria
- Case study
- Real Estate Investment Risks
- Summary
- http://www.rst.nus.edu.sg/staff/singtienfoo/

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# Real Estate Investment Analysis

- Motivations for property purchase
- Owner occupation versus investment
- Reasons for owner occupation:
  - Pride of ownership
  - Form of wealth
  - Consumption of housing services w/o rent
- Perspectives change when purchase is for investment purposes:
  - Generate net income
  - Capital gains
  - Diversification
  - Preferential tax benefits

Key difference is income and capital gains

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# Two Investment Objectives:

1) **GROWTH** (SAVINGS) - **RELATIVELY LONG-TERM HORIZON** (NO IMMEDIATE NEED);

2) **INCOME** (CURRENT CASH FLOW) -- **SHORT-TERM & ON-GOING NEED FOR CASH.**

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# Operating Cash Flows

- ◆ Property level unlevered cash flows
  - ◆ Gross Rent or Potential Gross Income
  - ◆ Effective Gross Income
  - ◆ Operating Expenses
  - ◆ Net Operating Income or NOI
  - ◆ Capital Expenditure
- ◆ Leverage Effects
  - ◆ Debt Service

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# Property level cash flow pro-forma (unleveraged)

- *Operating cash flows (all years):*

| | | |
|---|---|---|
| Potential Gross Income | = | PGI |
| Less Vacancy Allowance | = | - v |
| + Other Income (eg, parking, laundry) | = | +OI |
| Effective Gross Income | = | EGI |
| - Operating Expenses | = | - OE |
| Net Operating Income | = | NOI |

- *Reversion cash flow (disposal of asset):*

| | | |
|---|---|---|
| Property Value at time of sale | = | V |
| - Selling Expenses (eg, broker) | = | - SE |
| Property-level Before-tax Cash Flow | = | PBTCF |
| (Net sale value) | | |

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## Effective Gross Income

- Vacancy and collection loss
  - Historical experience
  - Competing properties in the market
  - "Natural vacancy" rate
    - Vacancy rate that is expected in a stable or equilibrium market
- Miscellaneous income
  - Car-parking collection
  - Signage and advertising space
  - vending machines
  - Rentals for Clubhouse / Promotional Space

## Operating Expenses

- Ordinary and regular expenditures necessary to keep a property functioning competitively
- *Fixed* expenses that do not vary with occupancy.
  - insurance,
  - property taxes
- *Variable* expenses that vary with occupancy.
  - Utilities
  - Maintenance and supplies
  - Service contracts

# Case 1: Acquisition of an office building

Business Times - 03 Feb 2005

## CCT to buy HSBC building in Collyer Quay for $158m

*It is expected to issue new units to help fund deal*

By ANDREA TAN

CAPITACOMMERCIAL Trust has signed a deal to buy HSBC Building in Collyer Quay for $158.5 million, marking its first purchase since listing in May.

CCT's purchase confirmed an earlier BT report. At $158.5 million for the 999-year leasehold building, this works out to $790 per square foot of nett lettable area.

It is expected to generate an annualised property yield of 5.1 per cent for the financial year ending Dec 31, 2005.

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# Feasibility of investing in the Office building

Case facts:
- Net floor area= 200,633 sq ft
- Purchase price = 158.5million
- Current market rent = $8.0 psf/month
- Rental growth rate = 3% p.a.
- Rents are reviewed every 3 years
- Service charges = $1.5 psm/month (grow at 1% p.a)
- Property tax rate = 10% of gross rent
- Terminal value at EOY 5 based on 1% p.a. price growth
- Cost of disposal = 1.5%
- Expected discount rate is 7%
- Assume investor uses 100% equity

Construct a cash flow proforma

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# Steps in DCF analysis

- Projecting Cash Flows
  - Net Operating Income (NOI)
  - Terminal Value of Property
  - Cash flows can be cash inflows or cash outflows
  - Convention:
    - Cash inflows are positive cash flows (+)
    - Cash outflows are negative cash flows (-)
- Investment Measures/Investment Rules
  - Holding Period
  - Discount Rate

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# Projection of NOI

Cash Flow Pro-forma:

| Year | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Equity outlay | -$158,500,000 | | | | | |
| Potential Gross Rental Income (PGRI) | | $19,260,768 | $19,260,768 | $19,260,768 | $19,453,376 | $19,453,376 |
| Other Operating Income | | | | | | |
| Less Vacancy | | $3,852,154 | $3,852,154 | $3,852,154 | $3,890,675 | $3,890,675 |
| Effective Gross Rental Income (EGRI) | | $15,408,614 | $15,408,614 | $15,408,614 | $15,562,701 | $15,562,701 |
| Operating Expenses/ Service Charges | | $2,889,115 | $2,889,115 | $2,889,115 | $2,889,115 | $2,889,115 |
| Property Tax | | $1,540,861 | $1,540,861 | $1,540,861 | $1,556,270 | $1,556,270 |
| Net Operating Income (NOI) | | $10,978,638 | $10,978,638 | $10,978,638 | $11,117,315 | $11,117,315 |

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# Estimating Terminal Value

- Holding Period= 5 years
- How do determine terminal/reversionary value?
- 2 methods:
  - A simple compounded growth at a constant rate (say 1% p.a.)
    - Value = $158,500,000 x $(1+0.01)^5$ = $166,585,093
  - Going out cap rate, k, and EOY6 NOI
    - Value = (EOY6-NOI) / k = $12,305,161/7.4% = $166,285,959
- Cost of disposal = 1.5%
- Based on method 1, Terminal value at EOY 5 = $166,585,093 * (1-0.015) = $164,086,317

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# Estimating PV of cash flows

Discounting factor = 7%

| Year | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Before tax equity cash flow (net): | -$158,500,000 | $11,123,094 | $11,086,980 | $11,050,505 | $12,379,949 | $176,429,058 |
| Present value factor | 1.000 | 0.935 | 0.873 | 0.816 | 0.763 | 0.713 |
| PV of equity cash flow: | -$158,500,000 | $10,395,415 | $9,683,797 | $9,020,503 | $9,444,604 | $125,791,480 |

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# Net Present Value (NPV)

- **Net Present Value** (NPV) is the discounted cash flows less the initial investment cost ($I_0$)

$$NPV = \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} - I_0$$

   Where $CF_t$= cash flow at time t;  r = total discount rate; and T= holding period

- If I is spread over two periods, say $I_0$ at t=0 and $I_1$ at t=1, then

$$NPV = \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} - I_0 - \frac{I_1}{1+r}$$

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# Profitability Index

- Profitability Index (PI) is the ratio of the present value of cash inflows to the initial equity invested (present value of cash outflows).

- PI = PV(inflows)/PV(outflows)

- PI greater than 1 implies that expected return exceeds the discount rate.

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# Internal Rate of Return (IRR)

- The ***Internal Rate of Return*** (IRR) is the rate of return required to make the present values of future cash flows equal to the cost of the investment.

$$I = \sum_{t=1}^{T} \frac{CF_t}{(1+IRR)^t}$$

T= holding period

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# Investment Rules

- Investment measures:
    - Net Present Value (NPV)
    - Profitability Index (PI)
    - Internal Rate of Return (IRR)
- If you decide whether to invest or not, then the rule is very simple
- Invest if
    - NPV > 0
    - PI > 1
    - IRR > r

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# Capital Expenditures (*CAPEX*)

- Expenditures that materially increase value of a structure or prolong its life:
  - Roof replacement
  - Additions and alterations
  - HVAC Replacement
  - Resurfacing of parking areas
  - Tenant improvements
- Estimating CAPEX:
  - *Sinking fund:* An amount invested annually that compounds to the needed CAPEX in a future year.
  - *Straight-line*: For an expenditure n years away, an amount equal to the needed CAPEX divided by n.
  - *Actual expenditures*: The actual amount expected in each year of the expected holding period

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# Effects of capex on NOI



**NOI for Renovated Malls versus All Malls**
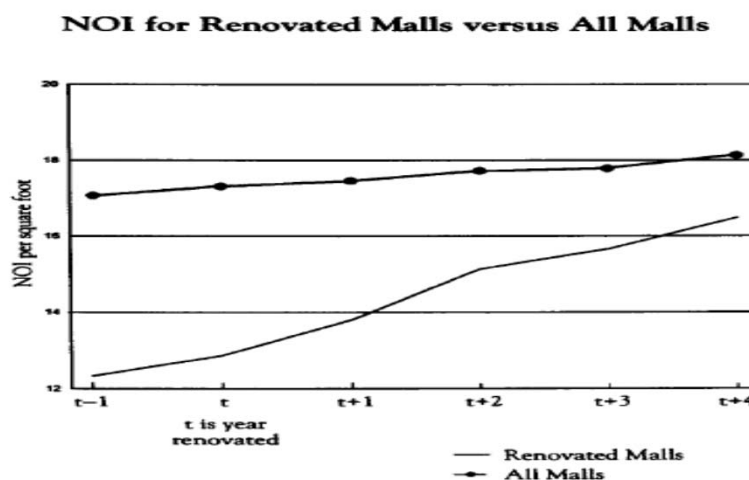
Source: Fisher (1995), Real Estate Finance

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# Derivation of NOI (revisited)

- ***Operating cash flows (all years):***

| | | |
|---|---|---|
| Potential Gross Income | = | PGI |
| - Vacancy Allowance | = | - v |
| + Other Income (eg, parking, laundry) | = | +OI |
| Effective Gross Income | = | EGI |
| - Operating Expenses | = | - OE |
| Net Operating Income | = | NOI |
| - Capital Expenditures | = | - C |
| Property-level Before-tax Cash Flow | = | PBTCF |

- ***Reversion cash flow (disposal of asset):***

| | | |
|---|---|---|
| Property Value at time of sale | = | V |
| - Selling Expenses (eg, broker) | = | - SE |
| Property-level Before-tax Cash Flow (Net sale value) | = | PBTCF |

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# Net Operating Income (NOI) and Capital Expenditure (Capex)

- Capex
  - Reserve for replacements
  - Tenant improvement
  - Leasing commissions
- Above-line or below-line approach

| **Above Line:** | **Below Line:** |
|---|---|
| EGI | EGI |
| - OE | - OE |
| - CAPX | = NOI |
| = NOI | - CAPX |
| | = Net Cash Flow |

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## Asset Enhancement Initiatives (AEI)
## Case 2: The Extension of IMM Building

- CAPITAMALL Trust (CMT) acquired the IMM Building in Jurong for $264.5 million in 2003
- IMM completed a major revamp in Dec 2007 by building a three-storey annexed block on the ground level open-air carpark
- The first floor of the new block will consist of retail space while the parking space will be moved to the upper floors.

- **CMT expects IMM purchase to raise returns.**
- By Vladimir Guevarra.
- 14 May 2003
- Straits Times



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# Some background facts of IMM AEIs

- Major asset enhancement works at IMM were completed on schedule in December 2007.
- A new two-storey retail extension block with over 20,000 sq ft of retail space was created
- Following the successful revamp, average rental at IMM increased 34.3%, from S$7.99 per sq ft to S$10.73 per sq ft per month
- An incremental rental revenue of S$13.3 million per annum.
- Based on a capital expenditure of S$92.5 million, the entire scope of work contributed to an incremental NPI of S$10.0 million per annum and achieved an ungeared ROI of 10.8%.
- Estimate the investment return of the AEIs

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# Property details & some assumptions (hypothetical)

|  | As in 2003 | Major AEI in 2007 |
|---|---|---|
| Net Lettable Area (retail) | 877,252.0 sq ft | Additional 20,000 sqf |
| Number of Tenants | 510 | About 600 |
| Car Park Spaces | 1300 | 1300 |
| Title | 30 years Leasehold term wef 23 January 1999 | No change |
| Acquisition Price (2003 | S$264.5 million |  |
| Capex (2007) |  | $92.5million |
| Occupancy | 76.7% | 85% |
| Effective Gross Rental Income | S$45.0 million | Incremental = $13.3million |
| Operating Expenses (including property tax) | $23.0 million | Incremental = $3.3 million |
| Rental growth rate | 2% | 2% |

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# Leverage

- Definition: Benefits accrued to an investor who borrows money at a rate of interest lower than the expected rate of return on total funds invested in a property
- The term "levered" or "leveraged" refers to the ability of an investor to increase the returns on equity through the use of debt
- Leverage ratio (LR):

$$LR = \frac{V}{E} = \frac{V}{V - D} = \frac{1}{1 - L/V}$$

Where V = asset value, E = equity value, D = debt value, L/V = Loan to value ratio

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## "Leverage is a double edge sword!"

| | Unlevered Investment | | | Levered Investment | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Property Value | $1,000,000 | | | $1,000,000 | | | $1,000,000 | | |
| LTV | 0.00 | | | 60% | | | 40% | | |
| | **Equity** | | | **Equity** | | | **Debt** | | |
| Initial outlays | $1,000,000 | | | $400,000 | | | $600,000 | | |
| | Optimistic | Pessimistic | Range | Optimistic | Pessimistic | Range | Optimistic | Pessimistic | Range |
| Net Cash Inflows | $100,000 | $40,000 | $60,000 | $52,000 | ($8,000) | $60,000 | $48,000 | $48,000 | $0 |
| Ending Value | $1,050,000 | $990,000 | $60,000 | $450,000 | $390,000 | $60,000 | $600,000 | $600,000 | $0 |
| Income returns / Cost of debt | 10% | 4% | 6% | 13% | -2% | 15% | 8% | 8% | 0% |
| Capital appreciation | 5% | -1% | 6% | 13% | -3% | 15% | 0% | 0% | 0% |
| Total returns | 15% | 3% | 12% | 26% | -5% | 30% | 8% | 8% | 0% |

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## Property level cash flow pro-forma (leveraged)

- **Operating cash flows (all years):**

  | | | |
  |---|---|---|
  | Potential Gross Income | = | PGI |
  | Less Vacancy Allowance | = | - v |
  | + Other Income (eg, parking, laundry) | = | +OI |
  | Effective Gross Income | = | EGI |
  | - Operating Expenses | = | - OE |
  | Net Operating Income | = | NOI |
  | - Capital Improvement Expenditures | = | - C |
  | - Debt Service | = | -DS |
  | Property-level Before-tax Cash Flow | = | PBTCF |

- **Reversion cash flow (disposal of asset):**

  | | | |
  |---|---|---|
  | Property Value at time of sale | = | V |
  | - Selling Expenses  (eg, broker) | = | - SE |
  | Property Before-tax Cash Flow (Net sale value) | = PBTCF | |

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# Equity after-tax cash flows

PGI
- vacancy
= EGI
- OEs
=NOI

**Cash Flow**
- Capital Improvements Exp.
= PBTCF
- Debt Service (Int. & Principal)
- Income Tax
= EATCF

**Taxes**
Net Operating Income (NOI)
-Interest (I)
-Depreciation expense (DE)
= Taxable Income
x Investor's income tax rate
= Income Tax Due

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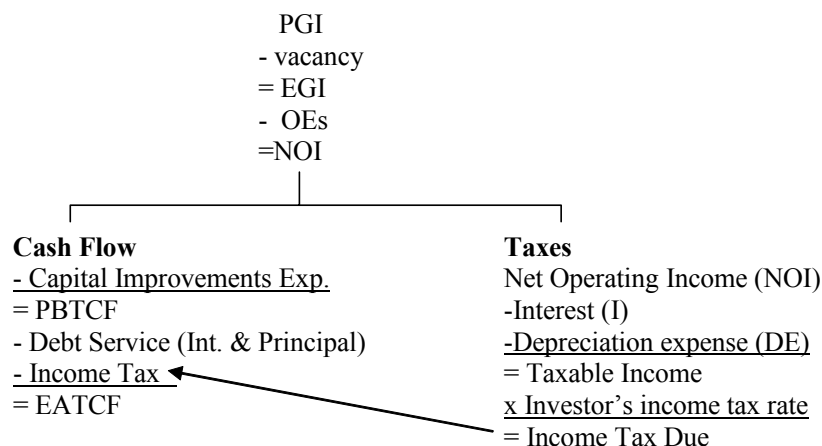
# Funding acquisition with debt
# Case 3: acquisition of HSBC building

- Using 40% debt
- At fixed rate of 4% interest rate (monthly compounding)
- Loan term of 20 years
- Corporate tax 17% (for non-REIT institutions)
- Project the property-level after-tax equity cash flows

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# Net Present Value using WACC

- To find the value of the project, discount the unlevered cash flows at the weighted average cost of capital (WACC):

$$NPV = \sum_{t=1}^{N} \frac{UCF_t}{(1 + r_{WACC})^t} - I_0$$

Where

- $UCF_t$ = unlevered cash flow before debt at time t
- $I_0$ = initial cash outlay
- $r_{WACC}$ = weighted average cost of capital = (L/V) $r_d$ + (1- L/V) $r_e$
- L/V = Loan to value ratio
- $r_d$ = cost of debt
- $r_e$ = equity investor's return
- N = number of investment periods

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# Determining WACC

- WACC formula is dependent on the capital structure at the firm level, not at the project level
- Let $r_e$ = levered equity return; $r_d$ =c ost of debt; $\tau$ = corporate tax rate;
- Total Capital V = E (equity) + D (Debt)

$$r_{WACC} = \frac{D}{E + D} r_d (1 - \tau) + \frac{E}{E + D} r_e$$

- For a firm with a capital structure of D/V = 0.4  E/V = 0.6, and $r_e$ = 10% and $r_d$ = 4% and $\tau$ = 17%

$$r_{WACC} = 0.4 \times 4\% \times (1 - 17\%) + 0.6 \times 10\% = 7.328\%$$

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## Avoiding Pitfalls in DCF applications

- "GIGO" – Garbage in garbage out
- Common mistakes
  - Rental / income growth assumption is too high
  - Capital improvement and going-out cap rate projections are too low
  - Discount rate is too high
- Errors are hidden in the DCF model, which may create false expectation for investors in the long-run
- Consequences of the mistakes
  - Unrealistic expectations
  - Long-run undermining credibility of DCF methodology

> · *Read the "fine print".*
> · *Look for "hidden assumptions".*
> · *Check realism of assumptions.*

Thank you

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## References

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