

Graduate Certificate in Real Estate Finance (GCREF) course

Real Estate Investment Analysis using Excel

Sing Tien Foo
Department of Real Estate
22 August 2014

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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 (Net sale value)	=	PBTCF



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Potential Gross Income (*PGI*)

- Rental income assuming 100% occupancy
- Important issue: Contract rent or market rent?
 - Market rent is the most probable rent a property will command, if placed for lease on the open market
 - Contract rent is actual rent paid under the contractual agreement between landlord and tenants
- If a property is subject to long-term leases, contract rent will be used
 - Eg. sale-leaseback leases in some industrial properties



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Types of Leases

- Straight lease
 - “Level” lease payments
- Step-up or graduated lease
 - Rent increases on a predetermined schedule
- Indexed lease
 - Rent tied to an inflation index, such as Consumer Price Index, Union wage index, etc.
- Percentage lease
 - Rent includes percentage of tenant's sales



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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



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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



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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.)

$$\text{Value} = \$158,500,000 \times (1+0.01)^5 = \$166,585,093$$
 - Going out cap rate, k , and EOY6 NOI

$$\text{Value} = (\text{EOY6-NOI}) / k = \$12,305,161 / 7.4\% = \$166,285,959$$
- Cost of disposal = 1.5%
- Based on method 1, Terminal value at EOY 5 =

$$\$166,585,093 \times (1-0.015) = \$164,086,317$$



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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).
- $PI = PV(\text{inflows}) / PV(\text{outflows})$
- PI greater than 1 implies that expected return exceeds the discount rate.



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

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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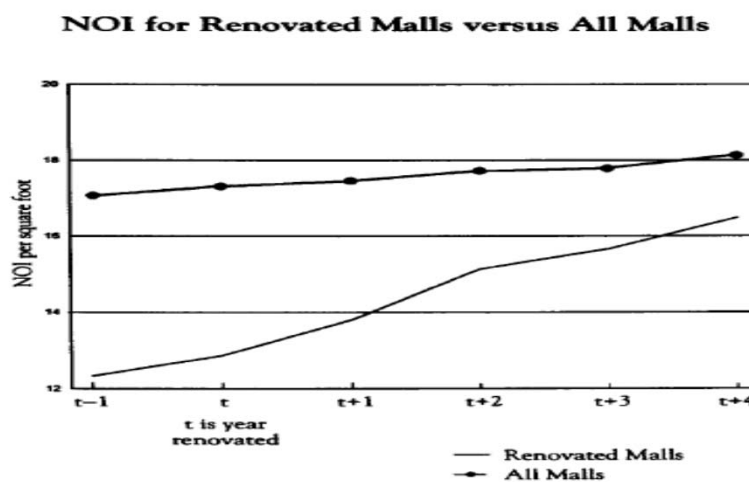
Capital Expenditures (CAPEX)

- 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



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:

EGI
- OE
- CAPX
= NOI

Below Line:

EGI
- OE
= 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):**

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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

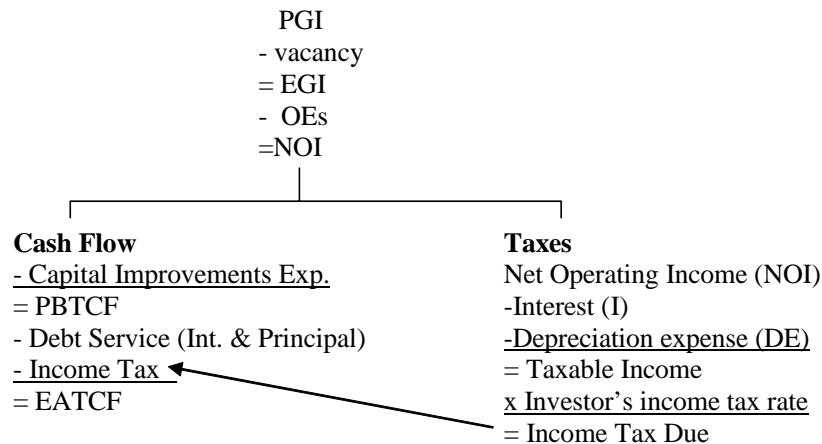
• **Reversion cash flow (disposal of asset):**

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



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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 = cost of debt; τ = 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

- Ling, D.C. and Archer, W.R. (2005), Real Estate Principles: A Value Approach, McGraw Hill
- Brueggeman, W.B. and Fisher, J.D. (2011), Real Estate Finance and Investments, 14th Edition, McGraw Hill

