

Real Estate Finance & Investment

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REA 631

Lecture (6) **Property Valuation** *(Part II — Income Approach)*



Lecture Road Map

Seven building blocks that take you from raw rent to a defensible valuation.

1

Income Capitalization Approach

The investor's number-one tool

2

Net Operating Income (NOI)

Definition, formula & calculation

3

Capitalization Rate (Cap Rate)

Meaning, derivation & market data

4

Discounted Cash Flow (DCF)

10-year projections & terminal value

5

Direct Cap vs. DCF

When to use each method

6

Gross Rent Multiplier (GRM)

A quick screening tool

7

Q&A Bank

20 solved practice questions



SECTION 1

Income Capitalization Approach

01

The most important valuation method for real estate investors worldwide.



How much is a property worth based on the income it generates?

Ref: Baum & Hartzell (2021), Chapter 4 — Income Approach to Value

The Income Capitalization Approach



Core idea: a property's VALUE is determined by the INCOME it produces.



Used For

Commercial property: offices, retail, warehouses, apartment buildings, hotels.



Why Investors Love It

Directly links property value to cash flow — mirrors how investors think.



Global Standard

Used by valuers in Egypt, Saudi Arabia, UAE, the UK, USA and all major markets.



Two Main Methods

① Direct Capitalization ② Discounted Cash Flow (DCF).

The Direct Capitalization Formula

$$\text{Property Value} = \text{NOI} \div \text{Cap Rate}$$

Property Value (V)

What the property is worth today.

NOI

Net Operating Income — the annual profit after operating costs.

Cap Rate (R)

Capitalization Rate — the investor's required return.



Example: NOI = EGP 600,000 | Cap Rate = 10% → Value = $600,000 \div 0.10$ = **EGP 6,000,000**



SECTION 2

Net Operating Income (NOI)

02

Building NOI step-by-step from gross income to net income.



The annual income a property generates after all operating expenses — but BEFORE debt service and income taxes.

Calculating NOI – Step by Step

Potential Gross Income (PGI)

Total rent if 100% occupied all year

– Vacancy & Collection Loss

Typically 5–10% of PGI (empty units + bad debts)

+ Other Income

Parking, laundry, antenna, signage fees

= Effective Gross Income (EGI)

PGI – Vacancy + Other Income

– Operating Expenses

Management, insurance, maintenance, taxes

= NET OPERATING INCOME (NOI)

The bottom-line income for the investor

NOI Example – Cairo Office

Building NOI from scratch for a mid-size office in Mohandessin.

Item	Calculation	Amount (EGP)
Potential Gross Income (PGI)	$1,200 \text{ m}^2 \times \text{EGP } 800/\text{m}^2/\text{yr}$	960,000
Less: Vacancy (7%)	$960,000 \times 7\%$	(67,200)
Plus: Parking Income	$20 \text{ spaces} \times 500/\text{mo} \times 12$	120,000
= Effective Gross Income (EGI)		1,012,800
Less: Management Fees (5%)	$1,012,800 \times 5\%$	(50,640)
Less: Insurance & Property Tax	Fixed annual cost	(62,000)
Less: Maintenance & Utilities	Variable cost	(100,000)
= NET OPERATING INCOME (NOI)		800,160

Operating Expenses – Two Types



FIXED EXPENSES

Do NOT change with occupancy level

- ✓ Property taxes
- ✓ Building insurance premiums
- ✓ Security contracts
- ✓ Management fees (fixed portion)
- ✓ Ground rent / land lease



VARIABLE EXPENSES

Change with occupancy / usage

- ✓ Utilities (electricity, water, gas)
- ✓ Repairs & maintenance
- ✓ Cleaning & janitorial services
- ✓ Marketing & leasing commissions
- ✓ Management fees (variable %)



Never include: Mortgage payments, Depreciation, or Income taxes — these are NOT operating expenses.



SECTION 3

Capitalization Rate (Cap Rate)

The single most important number in commercial real estate.



How many cents of income does every EGP / SAR / USD of value generate per year?

Cap Rate = NOI ÷ Property Value

Understanding the Cap Rate

$$\text{Cap Rate} = \text{NOI} \div \text{Value} \quad \leftrightarrow \quad \text{Value} = \text{NOI} \div \text{Cap Rate} \quad \leftrightarrow \quad \text{NOI} = \text{Value} \times \text{Cap Rate}$$

↓ Low Cap Rate (5–7%)

Property is expensive relative to income. Typical for prime locations, stable tenants, low risk. E.g. prime Riyadh CBD office.

↑ High Cap Rate (11–14%)

Property is cheap relative to income. Typical for risky areas, short leases, older buildings. E.g. peripheral industrial Egypt.

↻ The Inverse Rule

↑ Cap Rate = ↓ Property Value (same NOI). ↓ Cap Rate = ↑ Property Value. The relationship is always inverse.

🧮 Quick Test

Building sells for EGP 5M, NOI = EGP 500K → Cap Rate = $500,000 \div 5,000,000 = 10\%$. A market benchmark!

Deriving the Cap Rate

Three main methods — always verify with market evidence.

01

Market Extraction

Most Reliable

Find 3–5 comparable sales nearby.

Cap Rate = $\text{NOI} \div \text{Sale Price}$ for each.

Average the results.

e.g. 9%, 9.5%, 10.5% → use 9.5–10%.

02

Band of Investment

Technical Method

Weighted average of two parts:

- Mortgage: $\text{Loan \%} \times \text{mortgage constant}$
 - Equity: $\text{Equity \%} \times \text{equity yield}$
- Used when financing is known.

03

Build-Up Method

Risk-Adjusted

Risk-free rate (T-Bills ~2.5%; Saudi ~5%)

+ Real-estate risk premium (2–4%)

+ Illiquidity premium (1–2%)

= Total cap rate. Use when no comps.

Worked Example 1 — Retail Shop



A retail shop generates EGP 600,000 NOI/year. Market cap rate for similar retail = 10%. What is its value?

1

Step 1: Identify the NOI

NOI = EGP 600,000 per year — in practice you'd build this from rental income minus expenses.

2

Step 2: Confirm the Cap Rate

Market Cap Rate = 10% = 0.10 — derived from comparable retail sales in the Mohandessin area.

3

Step 3: Apply the Formula

Value = NOI ÷ Cap Rate = 600,000 ÷ 0.10

ANSWER: Value = 600,000 ÷ 0.10 = **EGP 6,000,000**



SECTION 4

Discounted Cash Flow (DCF) Analysis

Capturing the full picture across a 10-year investment horizon.



What is the property worth TODAY, given all future income AND the sale price at the end of the holding period?

Ref: Baum & Hartzell (2021), Chapter 5 — DCF and NPV in Real Estate

DCF — The Time Value of Money



EGP 1,000 today is worth MORE than EGP 1,000 in five years. DCF adjusts future cash flows back to today's value.

Year 1
NOI₁

Year 2
NOI₂

Year 3
NOI₃

Year ...
...

Year 10
NOI₁₀ + Sale

↓ *Discount each cash flow at the investor's required rate*

Property Value (DCF) = Sum of ALL discounted NOIs + Discounted Terminal Value

$$PV = CF_1/(1+r)^1 + CF_2/(1+r)^2 + \dots + CF_{10}/(1+r)^{10} + \text{Terminal Value}/(1+r)^{10}$$

Choosing the DCF Discount Rate

The discount rate (r) is the investor's required total return — it must reflect ALL risks.



Risk-Free Rate

Egypt T-Bills ~25% · Saudi sukuk ~5% · US Treasury ~4.5%



Inflation Premium

Egypt: high inflation adds 2–4% · Gulf: 1–2%



Real Estate Risk

Illiquidity, management burden, lease risk adds 2–4%



Property-Specific Risk

Age, location, tenant quality adds 0–3%



Required Return (r)

Egypt prime office ~18–22% · Saudi ~9–12%

Direct Cap vs. DCF

DIRECT CAPITALIZATION

- ✓ Simple & fast
- ✓ Great for stable properties
- ✓ Market-based (uses comp sales)
- ✓ Best for retail strips & long-lease apartments
- ✗ Ignores year-by-year changes
- ✗ Poor when rents change dramatically

Use when NOI is stable and good comp sales exist.

DISCOUNTED CASH FLOW (DCF)

- ✓ Handles complex lease structures
- ✓ Models rent-free periods & steps
- ✓ Shows value year by year
- ✓ Best for development sites & office towers
- ✗ Needs many assumptions
- ✗ Sensitive to the discount rate

Use when rents or vacancies change over time.

Best practice: use BOTH methods and cross-check the results.



SECTION 5

Gross Rent Multiplier (GRM)

A quick screening tool — not a replacement for full valuation.



If GRM is too high, the property is expensive relative to its rent.

$GRM = \text{Property Price} \div \text{Annual Gross Rent}$

Gross Rent Multiplier (GRM)

$$\text{GRM} = \text{Property Price} \div \text{Annual Gross Rent}$$
$$\text{Estimated Value} = \text{Annual Gross Rent} \times \text{Typical GRM}$$

What it measures

How many years of gross rent equal the purchase price.
e.g. Price 2M, rent 200K/yr → GRM = 10 years.

Why it's useful

Takes 30 seconds. Great for comparing 20+ properties and eliminating overpriced ones fast.

Its limitations

Ignores vacancy, expenses, financing. Not a precise value
— always follow with NOI & cap rate.

Typical ranges

Egypt residential 10–15× · Egypt commercial 8–12× ·
Saudi 12–18× · Dubai 15–20× · US/UK prime 20–30×.

Example 4 — GRM Screening

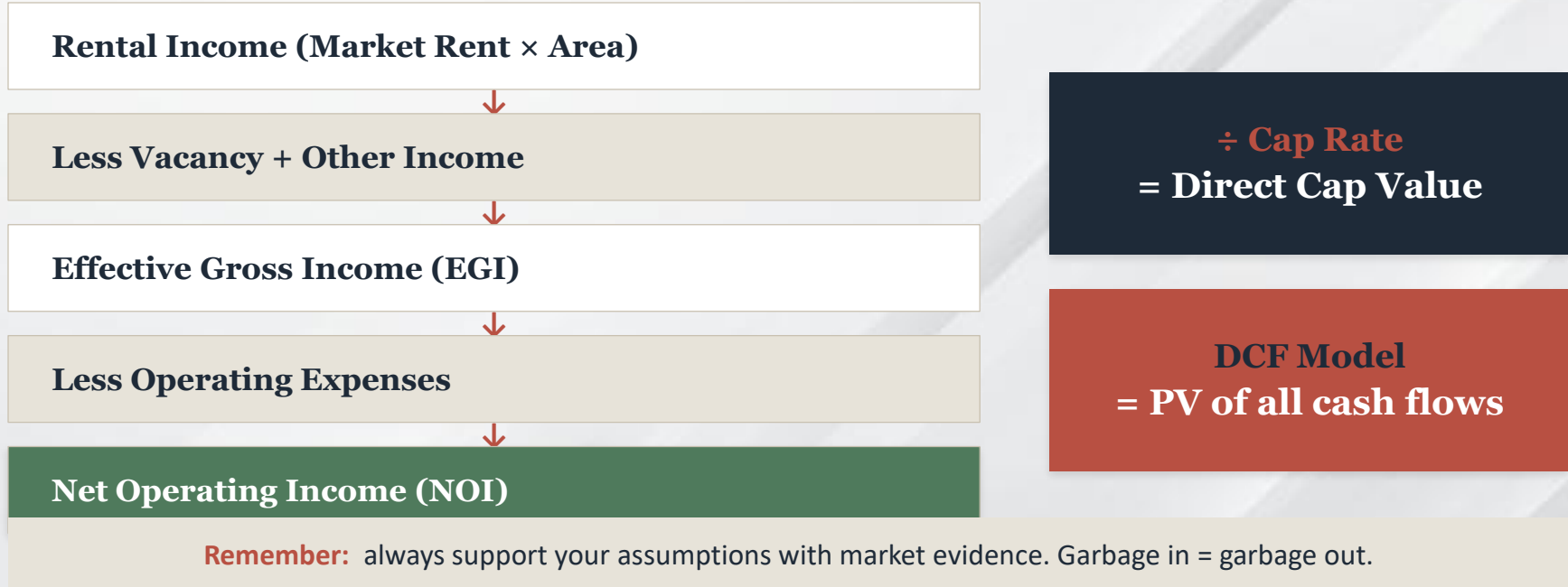
20 apartments in New Cairo, rent $\approx$ EGP 8,000/mo. Target GRM $\leq 12\times$.

Property	Price (EGP)	Annual Rent	GRM	Decision
Apt A	960,000	96,000	10.0 ✓	Shortlist — investigate further
Apt B	1,150,000	96,000	12.0 ✓	Borderline — review NOI
Apt C	1,400,000	96,000	14.6 ✗	Reject — overpriced
Apt D	800,000	96,000	8.3 ✓	Strong candidate! Check condition
Apt E	1,800,000	96,000	18.8 ✗	Reject — far too expensive
Apt F	1,080,000	96,000	11.3 ✓	Shortlist



Screen 20 properties in minutes — run a full DCF only on the shortlisted ones.

The Income Valuation Framework



Case Study — The Given Data



Mixed-Use Building — 6th of October City, Giza | 3 Retail Units + 12 Offices

Total GLA	1,800 m ²	Market Cap Rate	10%
Avg Rent (retail)	EGP 700/m ² /yr	Exit Cap Rate (yr 10)	11%
Avg Rent (office)	EGP 450/m ² /yr	NOI Growth Rate	4%/yr
Retail Area	600 m ²	Discount Rate	16%
Office Area	1,200 m ²	Selling Costs	2.5%
Vacancy Rate	8%	Investment Horizon	10 years
Operating Expenses	EGP 300,000/yr	Purchase Price	EGP 8,500,000

Task: ① Calculate NOI ② Apply Direct Cap ③ Build DCF ④ Compare both valuations

Case Study Solution — Step by Step

Item	Calculation	Amount (EGP)
Retail PGI	$600 \text{ m}^2 \times \text{EGP } 700$	420,000
Office PGI	$1,200 \text{ m}^2 \times \text{EGP } 450$	540,000
Total PGI	$420,000 + 540,000$	960,000
Less Vacancy (8%)	$960,000 \times 8\%$	(76,800)
Effective Gross Income		883,200
Less Operating Expenses	Fixed costs	(300,000)
NOI (Year 1)		583,200
Direct Cap Value	$583,200 \div 10\%$	5,832,000
DCF Value (approx)	PV of 10-yr CFs + Terminal	5,640,000
Purchase Price	Given	8,500,000

Conclusion: both methods put value BELOW the purchase price → the property is **OVERPRICED**.

Key Formulas

EGI

$\text{PGI} - \text{Vacancy \& Collection Loss} + \text{Other Income}$

NOI

$\text{EGI} - \text{Operating Expenses (excl. debt \& taxes)}$

Direct Cap Value

$\text{NOI} \div \text{Cap Rate}$

Cap Rate

$\text{NOI} \div \text{Property Value}$

GRM

$\text{Property Price} \div \text{Annual Gross Rent}$

Est. Value (GRM)

$\text{Annual Gross Rent} \times \text{Typical GRM}$

Terminal Value

$\text{NOI (Year } n+1) \div \text{Exit Cap Rate}$

DCF Value

$\sum [\text{NOI}_t \div (1+r)^t] + \text{TV} \div (1+r)^n$

Discount Factor

$1 \div (1 + r)^t$

Common Mistakes to Avoid

✗ Including mortgage payments in NOI

✓ NOI is calculated BEFORE debt service. Mortgage is a financing decision, not an operating cost.

✗ Using gross rent instead of NOI

✓ $\text{Value} = \text{NOI} \div \text{Cap Rate}$. Never use PGI or EGI directly — deduct vacancies AND expenses first.

✗ Forgetting vacancy in NOI

✓ Even a fully occupied building should include a vacancy allowance (5–10%) as a prudent buffer.

✗ Same entry & exit cap rate in DCF

✓ Exit cap is usually HIGHER (+0.5–1.5%) because the building is older at exit.

✗ Confusing discount rate with cap rate

✓ $\text{Cap Rate} = \text{NOI} \div \text{Value}$ (a snapshot). $\text{Discount Rate} = \text{required return over time}$. They differ!



Question Bank

19 Solved Practice Questions

Multiple Choice – Q1 & Q2

Q1

A property generates NOI of EGP 800,000. The cap rate is 8%. What is the property value?

- A) EGP 6,400,000
- B) EGP 8,000,000
- C) EGP 10,000,000**

✓ *Value = 800,000 ÷ 0.08 = EGP 10,000,000.*

Q2

Which of the following is NOT an operating expense for NOI?

- A) Property insurance
- B) Maintenance costs
- C) Mortgage payment**

✓ *Mortgage payment is a financing cost, not an operating expense.*

Multiple Choice – Q3 & Q4

Q3

If the cap rate INCREASES and NOI stays the same, the property value:

- A) Increases
- B) Decreases**
- C) Stays the same

✓ *Cap rate and value are inversely related.*

Q4

EGI is calculated as:

- A) $\text{PGI} + \text{Vacancy} + \text{Op. Exp.}$
- B) $\text{PGI} - \text{Vacancy} - \text{Op. Exp.}$
- C) $\text{PGI} - \text{Vacancy} + \text{Other Income}$**

✓ *$\text{EGI} = \text{PGI} - \text{Vacancy} - \text{Collection Loss} + \text{Other Income.}$*

Multiple Choice — Q5 & Q6

Q5

In DCF analysis, the 'Terminal Value' represents:

- A) The purchase price
- B) Year-1 NOI discounted
- C) Expected sale price at end of holding period**

✓ *It is the reversion value — the sale proceeds at the end of the holding period.*

Q6

Which method is BEST for a property with changing rents over time?

- A) Gross Rent Multiplier
- B) Direct Capitalization
- C) Discounted Cash Flow (DCF)**

✓ *DCF models year-by-year changes — ideal for complex lease structures.*

Multiple Choice – Q7 & Q8

Q7

Annual gross rent = EGP 500,000; sale price = EGP 6,000,000. What is the GRM?

- A) 8.3
- B) 10
- C) 12**

✓ $GRM = 6,000,000 \div 500,000 = 12.$

Multiple Choice — Q9 & Q10

Q8

When calculating NOI, mortgage (debt service) payments are:

- A) Deducted before arriving at NOI
- B) Not deducted — NOI is before debt service**
- C) Added back to NOI

✓ *NOI is calculated BEFORE deducting debt service (mortgage payments).*

Q9

Holding NOI constant, a lower cap rate results in:

- A) A higher property value**
- B) A lower property value
- C) No change in value

✓ *Value = NOI ÷ Cap Rate; a lower denominator gives a higher result.*

Multiple Choice — Q11 & Q12

Q10

In a DCF, the exit (terminal) cap rate is usually:

- A) Lower than the entry cap rate
- B) Equal to the entry cap rate
- C) Higher than the entry cap rate (+0.5–1.5%)**

✓ *The exit cap is usually higher — the building is older at exit.*

Q11

The Gross Rent Multiplier (GRM) is best described as:

- A) A detailed substitute for a full NOI analysis
- B) A quick screen ignoring vacancy, expenses & financing**
- C) The most accurate valuation method available

✓ *GRM is only a quick screen; it ignores vacancy, expenses, and financing.*

Multiple Choice – Q13 & Q14

Q12

Which formula correctly defines Effective Gross Income (EGI)?

- A) $\text{PGI} + \text{Vacancy} + \text{Other Income}$
- B) $\text{PGI} - \text{Vacancy \& Collection Loss} + \text{Other Income}$**
- C) $\text{PGI} - \text{Vacancy} - \text{Operating Expenses}$

✓ *EGI = PGI – Vacancy & Collection Loss + Other Income.*

Q13

DCF is generally preferred over Direct Capitalization when income is:

- A) Stable and unchanging
- B) Variable or changing over time**
- C) Always equal to zero

✓ *Direct Cap suits stable income; DCF is for variable/changing streams.*

Calculation MCQ – Q15 & Q16

Q14

Jeddah retail: PGI SAR 1,200,000; vacancy 6%; other income SAR 60,000; op. expenses SAR 380,000; cap rate 8.5%. Find the value.

A) SAR 9,506,000

B) SAR 13,976,000

C) SAR 14,118,000

✓ $EGI = 1,188,000$; $NOI = 808,000$; $Value = 808,000 \div 0.085 \approx SAR\ 9,506,000$.

Q15

New Cairo apartment rents EGP 8,500/mo; a similar unit sold for EGP 1,020,000. Using GRM, value a unit renting EGP 10,000/mo.

A) EGP 1,020,000

B) EGP 1,200,000

C) EGP 1,100,000

✓ $GRM = 1,020,000 \div 102,000 = 10$; $Value = (10,000 \times 12) \times 10 = EGP\ 1,200,000$.

Calculation MCQ – Q17 & Q18

Q16

NOI = EGP 750,000 (Year 1), growing 6%/yr. Exit cap in Year 10 = 10%; selling costs = 2%. Find the Year-10 (net) Terminal Value.

- A) EGP 11,099,000
- B) EGP 10,877,000**
- C) EGP 10,672,000

✓ Gross TV = 11,099,400; net of 2% selling costs ≈ EGP 10,877,000.

Q17

An investor pays EGP 5,000,000 for a property with NOI EGP 450,000. What cap rate is implied, vs. Cairo retail norms (9–11%)?

- A) 6% — well below market; overpriced
- B) 9% — low end of range; slight premium (fine for prime retail)**
- C) 11% — high end; priced at a discount

✓ $Cap = 450,000 \div 5,000,000 = 9\%$, the low end of the 9–11% range.

Calculation MCQ – Q19 & Q20

Q18

PGI EGP 2,000,000; vacancy 10%; parking EGP 80,000; management 5% of EGI; insurance EGP 50,000; maintenance EGP 120,000. Find NOI.

A) EGP 1,880,000

B) EGP 1,616,000

C) EGP 1,610,000

✓ $EGI = 1,880,000$; $Mgmt = 94,000$; $NOI = 1,880,000 - 264,000 = EGP\ 1,616,000$.

Q19

Using NOI = EGP 1,616,000 and a cap rate of 9.5%, find the Direct-Cap value vs. an asking price of EGP 18,000,000.

A) EGP 17,011,000 — below asking → overpriced; negotiate

B) EGP 18,000,000 — exactly fair value

C) EGP 21,270,000 — above asking; a bargain

✓ $Value = 1,616,000 \div 0.095 \approx EGP\ 17,011,000$; asking is ~989,000 higher.

Thank You