

Real Estate Finance & Investment

Prepared by Dr. Emad Zaher
Assistant Professor of Accounting

REA 631

Lecture (7) **Leverage, Capital Structure & Cost of Capital**



What We'll Cover Today

01

The Power of Leverage

What borrowing does to your returns — and your risk

02

Leveraged vs. Unleveraged

Side-by-side comparisons with real numbers

03

Cost of Capital Components

Kd, Ke, and WACC explained simply

04

Optimal Capital Structure

Finding the right debt-to-equity mix

05

Real-World Risks & Refinancing

Default, market risk, and exit strategies

06

Practice Questions Bank

20 solved MCQ and True / False questions

What Is Leverage?

Leverage means using borrowed money to buy an asset — controlling a large asset with a small equity investment.

Simple Definition

Buy an EGP 10M property with only EGP 3M of your own money — the bank funds the rest.

The Upside

Profit is earned on the full asset value, but you invested only a fraction — magnifying your return.

The Downside

Losses are magnified too — and you still owe the bank in full, regardless of performance.

Baum & Hartzell (2021): “Leverage amplifies both gains and losses — the most powerful tool in real estate finance, and the most dangerous if misused.”

Key Leverage Terminology

Term	Definition
LTV Ratio	Loan-to-Value = Debt ÷ Property Value
Equity	Your own cash invested in the deal
Debt Service	Monthly / annual principal + interest payments
DSCR	Net Operating Income ÷ Debt Service (must be > 1.0)
Cap Rate	NOI ÷ Property Value (unleveraged yield)
Cash-on-Cash	Annual Cash Flow ÷ Equity Invested

Quick Formula

**Equity = Property Value -
Loan Amount**

Example: EGP 10M property,
70% LTV

→ Loan = EGP 7M

→ Equity = EGP 3M

Understanding these terms is the foundation of every real-estate financing decision you will make in your career.

Positive vs. Negative Leverage

The relationship between the cap rate and the cost of debt decides whether leverage helps or hurts you.

POSITIVE LEVERAGE

Cap Rate (12%) > Cost of Debt (10%)

Borrowing boosts your equity return. Each borrowed pound earns more than it costs.

NEGATIVE LEVERAGE

Cap Rate (8%) < Cost of Debt (18%)

Borrowing drains your return. Each borrowed pound costs more than it earns — losses mount.

Golden Rule: If Cap Rate > Cost of Debt → leverage HELPS. If Cap Rate < Cost of Debt → leverage HURTS.

Example 1: Positive Leverage in Action

You buy a property for EGP 10,000,000 generating EGP 1,200,000 NOI per year (12% cap rate).

Metric	All-Cash (0% LTV)	70% LTV @ 10% Cost
Property Value	EGP 10,000,000	EGP 10,000,000
Your Equity	EGP 10,000,000	EGP 3,000,000
Loan Amount	—	EGP 7,000,000
NOI	EGP 1,200,000	EGP 1,200,000
Interest Payment	—	EGP 700,000
Cash to Equity	EGP 1,200,000	EGP 500,000
Cash-on-Cash Return	12.0%	16.7%

Leverage BOOSTED the return from 12% to 16.7% — because the cap rate (12%) exceeded the debt cost (10%).

Example 2: When Leverage HURTS

Egyptian market — a property with only an 8% cap rate, but the bank charges 18% interest (high-rate environment).

Metric	All-Cash	70% LTV @ 18%
Property Value	EGP 10,000,000	EGP 10,000,000
Your Equity	EGP 10,000,000	EGP 3,000,000
NOI (8% cap)	EGP 800,000	EGP 800,000
Interest (18% × 7M)	—	EGP 1,260,000
Cash to Equity	EGP 800,000	−EGP 460,000
Return	8.0%	NEGATIVE

⚠ This is what happened to many Egyptian investors when rates surged post-2022 — the debt cost exceeded the asset yield, producing real losses.

The Equity Multiple Explained

For every EGP 1 of equity invested, how many EGP did you get back?

$$\text{Equity Multiple} = \text{Total Cash Received} \div \text{Equity Invested}$$

Formula

Total Cash Received ÷ Equity
Invested

Example

Invest EGP 3M, receive EGP 6M
back

Multiple

2.0× — you doubled your money

Industry benchmark: a 2.0×–2.5× equity multiple over 5 years is considered strong in most markets. Leverage lifts the multiple — same profit ÷ smaller equity = bigger multiple.

Risks of High Leverage

Leverage is a double-edged sword. Three major risks every investor must understand:

1

Default Risk

If NOI falls and you can't cover debt service, the bank can foreclose. At 80% LTV, even a 10% income drop can cause default.

2

Refinancing Risk

When a loan matures you must refinance. If rates have risen or values dropped, you may not qualify for a new loan.

3

Market Risk

A drop in property value can wipe out your equity. At 80% LTV, a 20% price decline = 100% equity loss.

Real-World Case: 2008 Global Financial Crisis

Over-leverage was the primary cause of the 2008 real-estate collapse — still studied by every finance professional.

U.S. home prices fell

-33%

peak-to-trough (2006–2012)

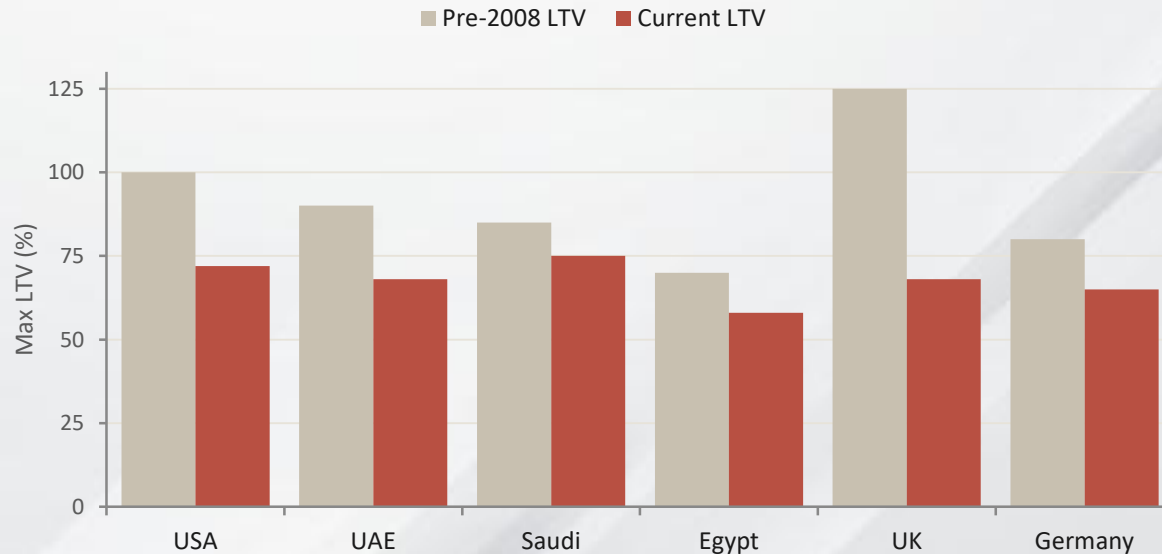
Source: S&P/Case-Shiller

What Went Wrong

- Investors with 90%+ LTV had razor-thin equity buffers.
- When prices slipped, their equity was wiped out before the market even bottomed.
- Maturing loans could not be refinanced as banks froze lending.
- Cross-collateralized portfolios spread one failure across many properties.

Global LTV Statistics: Then vs. Now

Markets worldwide tightened lending after 2008. Typical maximum LTV — pre-2008 vs today:



The Trend

Every market tightened.

Egypt is now the most conservative at 50–65% (CBE limits).

The pre-2008 excess of 100%+ loans has disappeared worldwide.

Sources: IMF Financial Stability Reports 2023; CBE Mortgage Finance Law; Saudi REDF 2024

Egyptian Real Estate Market: Leverage Context

Market Context

The Central Bank of Egypt (CBE) regulates maximum LTV ratios by property type. With interest rates exceeding 22–25% in 2024, many Egyptian developers rely more on buyer installments than on bank debt.

Saudi Arabia: Leverage & Mortgage Market

Saudi Market Facts (2024)

- Real Estate Development Fund (REDF) supports up to 80% LTV for nationals.
- Mortgage-to-GDP ratio grew from 2% (2015) to over 15% (2024).
- SAMA requires DSCR $\geq 1.25\times$ for commercial loans.
- Vision 2030 targets a 70% home-ownership rate — driving mortgage expansion.

+650%

mortgage market growth
in 7 years

SAR 100B (2017) → SAR 750B+
(2024)

Source: SAMA Annual Report 2024

Cost of Debt (Kd): The Price of Borrowing

The effective interest rate a borrower pays — after the tax benefit of deductible interest.

Variable	Value
Loan Interest Rate	16%
Tax Rate	22.5%
After-Tax Kd	$16\% \times (1 - 0.225) = 12.4\%$

$$\text{After-Tax Kd} = \text{Interest Rate} \times (1 - \text{Tax Rate})$$

Why Does Tax Matter?

Interest is tax-deductible in most jurisdictions — the government effectively subsidizes part of your borrowing cost.

Paying 16% interest but saving 22.5% tax on it = a true cost of only 12.4%.

This tax shield makes debt cheaper than it looks on the surface.

Cost of Equity (Ke): What Investors Demand

Equity investors take more risk than lenders — last to be paid, first to absorb losses — so they demand more.

Component	Rate
Risk-Free Rate (T-Bills)	~13% (Egypt 2024)
Real Estate Risk Premium	+5% to +8%
Illiquidity Premium	+2% to +3%
Typical Ke	18% – 25%

Regional Note

In Saudi Arabia, with lower inflation, Ke for real-estate equity typically ranges **12% – 18%**.

Source: Baum & Hartzell, 2021

Weighted Average Cost of Capital (WACC)

WACC blends the cost of equity and the cost of debt — weighted by how much of each finances the project.

1

Capital Weights

What share is equity? What share is debt?

2

After-Tax Costs

Apply the tax shield to the cost of debt

3

Compute WACC

Blend the weighted costs into one hurdle rate

WACC is the minimum return a project must earn to satisfy both lenders and equity investors. Any return below WACC destroys value.

WACC Formula — Step by Step

$$\text{WACC} = (E/V \times K_e) + (D/V \times K_d \times (1 - T))$$

Symbol	Meaning	Example
E/V	Equity as % of total value	40%
D/V	Debt as % of total value	60%
K _e	Cost of equity	18%
K _d	Cost of debt (pre-tax)	16%
T	Corporate tax rate	22.5%

Calculation: $\text{WACC} = (0.40 \times 18\%) + (0.60 \times 16\% \times 0.775) = 7.2\% + 7.44\% = 14.64\%$

Example 3: Full WACC Calculation

Mixed-use development in Cairo — 40% equity at 18% required return, 60% bank debt at 16%. Tax rate 22.5%.

Source	Weight	Cost	Weighted Cost
Equity	40%	18%	$40\% \times 18\% = 7.20\%$
Debt (pre-tax)	60%	16%	—
Tax Shield (22.5%)	—	—	$60\% \times 16\% \times 77.5\% = 7.44\%$
WACC	100%	—	14.64%

✓ Conclusion: the project must earn at least 14.64% to create value. Any IRR above 14.64% = value creation.

Optimal Capital Structure: The Balancing Act

There is no single perfect answer — the right debt-to-equity mix depends on four factors:

1

Cash-Flow Stability

Stable NOI can safely support more debt.

2

Interest Rate Environment

Low rates favour using more debt.

3

Investor Risk Appetite

How much volatility can you tolerate?

4

Lender Requirements

DSCR and LTV covenants set hard limits.

Baum & Hartzell (2021): the optimal structure minimizes WACC while preserving financial flexibility during downturns.

Debt Yield: The Lender's Safety Metric

Measures how safe a loan is from the lender's view — independent of interest rate or amortization.

$$\text{Debt Yield} = \text{NOI} \div \text{Loan Amount}$$

Debt Yield	Lender Assessment
> 10%	Strong — low risk
8% – 10%	Acceptable
< 8%	Risky — may decline

Practical Example

Property NOI: EGP
1,200,000

Loan Amount: EGP
8,000,000

Debt Yield = 15%

*Excellent — the lender's income is
1.5× what they need to cover risk.*

Debt Service Coverage Ratio (DSCR)

The single most important lender ratio — can the property's income cover its debt payments?

$$\text{DSCR} = \text{NOI} \div \text{Annual Debt Service}$$

DSCR	Interpretation
Below 1.0	Property cannot cover debt
1.0 – 1.2	Barely sufficient
1.25+	Lender minimum (typical)
1.5+	Comfortable buffer

Worked Example

NOI: EGP 1,500,000

Debt service: EGP
1,000,000

$$\text{DSCR} = 1.5\times$$

Comfortably above the 1.25× minimum — a healthy, financeable loan.

Refinancing Strategies Explained

Two ways to restructure an existing loan — for very different reasons:

Cash-Out Refinance

Refinance at a higher loan amount than the existing mortgage — pocket the difference as cash.
Used when the property has appreciated.

Example: Value rises EGP 10M → 14M. Refinance at 70% = EGP 9.8M new loan. Pay off EGP 7M → receive EGP 2.8M cash.

Rate-and-Term Refinance

Replace the loan with a new one at a lower rate or different term — no cash taken out. Used when market rates have fallen.

Example: Refinance from 20% to 15% on an EGP 7M loan → save EGP 350,000 per year in interest.

Why Did Over-Leverage Cause 2008 Failures?

1

Toxic Loan Products

Interest-only and negative-amortization loans hid the true debt burden from borrowers.

2

Asset Price Collapse

When prices fell 30–40%, highly leveraged owners had negative equity — owing more than the asset's worth.

3

Liquidity Freeze

Refinancing became impossible as banks stopped lending — trapping investors in maturing high-rate loans.

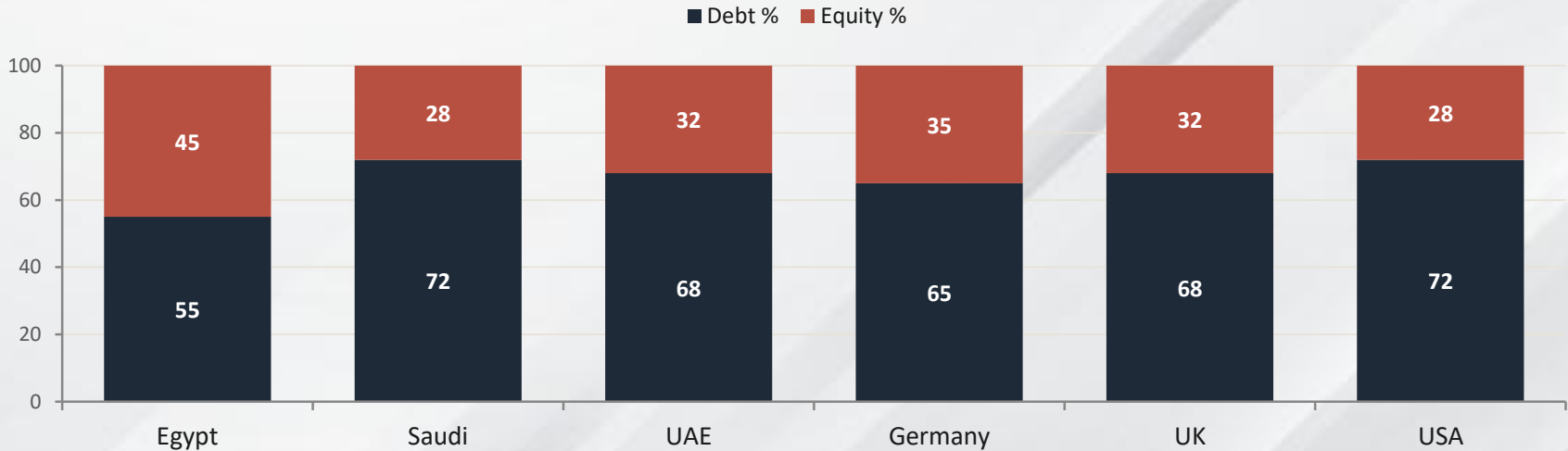
4

Systemic Contagion

Cross-collateralized portfolios meant one failure triggered cascading losses across whole portfolios.

Leverage Across Global Real Estate Markets

Typical debt vs. equity split by market (2024). Egypt shows the most conservative leverage globally.



Sources: IMF, CBRE, JLL Global Real Estate Reports 2024

Key Formulas Summary Card

Reference this summary during the exam and problem sets.

Formula	Expression	What It Measures
After-Tax Cost of Debt	$K_d \times (1 - \text{Tax Rate})$	True cost of borrowing
WACC	$(E/V \times K_e) + (D/V \times K_d \times (1-T))$	Blended capital cost
Cash-on-Cash	$\text{Annual Cash Flow} \div \text{Equity}$	Annual equity yield
Equity Multiple	$\text{Total Cash} \div \text{Equity Invested}$	Total return multiple
DSCR	$\text{NOI} \div \text{Annual Debt Service}$	Loan safety ratio
Debt Yield	$\text{NOI} \div \text{Loan Amount}$	Lender safety metric
LTV Ratio	$\text{Loan Amount} \div \text{Property Value}$	Leverage level
Positive Leverage Test	$\text{Cap Rate} > \text{Cost of Debt}$	Helps or hurts?

QUESTION BANK

20 Questions

Cost of Capital & Leverage Basics

Q1

MCQ

What does a Debt Yield of 15% indicate?

- A) The equity return is 15%
- B) $\text{NOI} \div \text{Loan} = 15\%$ — a strong safety margin for the lender**
- C) The property cap rate is 15%
- D) The tax rate is 15%

Q2

MCQ

Leverage is POSITIVE when:

- A) LTV is above 70%
- B) Cap rate equals cost of debt
- C) Cap rate exceeds cost of debt**
- D) NOI exceeds equity invested

WACC, Cost of Debt & DSCR

Q3

MCQ

60% equity ($K_e=20\%$), 40% debt ($K_d=15\%$, $\text{Tax}=22.5\%$). WACC?

- A) 17.5%
- B) 16.65%**
- C) 16.00%
- D) 15.40%

$$B. (0.6 \times 20\%) + (0.4 \times 15\% \times 0.775) = 12\% + 4.65\% = 16.65\%$$

Q4

MCQ

After-tax cost of debt at 16% with a 22.5% tax rate?

- A) 16.00%
- B) 12.40%**
- C) 13.60%
- D) 18.40%

$$B. K_d(\text{after-tax}) = 16\% \times (1 - 0.225) = 12.40\%$$

Q5

MCQ

A DSCR of 0.85 means:

- A) The property generates 85% more income than needed
- B) The property cannot cover its debt service**
- C) The LTV is 85%
- D) The cap rate is 0.85%

Equity Multiple, Collateral & Risk

Q6**MCQ**

Equity multiple of 2.5× on an EGP 4M investment means:

- A) Annual return is 25%
- B) Total cash received = EGP 10M**
- C) IRR is 2.5%
- D) You invested 2.5× the property value

B. $\text{Multiple} \times \text{Invested} = 2.5 \times \text{EGP } 4\text{M} = \text{EGP } 10\text{M received.}$

Q8**MCQ**

What is the primary risk of a 90% LTV investment?

- A) Low equity returns
- B) High WACC
- C) A small income drop or price decline can wipe out all equity**
- D) Over-estimation of the cap rate

Answer: C. With only a 10% equity buffer, a 10% price drop = 100% equity loss.

True / False Review

Q9**T / F**

"A cap rate of 10% with a debt cost of 12% creates positive leverage."

FALSE. Negative leverage — debt cost (12%) exceeds cap rate (10%). Borrowing REDUCES returns.

Q10**T / F**

"WACC increases as more cheap debt is added to the capital structure."

FALSE. Cheap debt LOWERS WACC up to the optimal point; beyond it, risk premiums push WACC back up.

Q11**T / F**

"A cash-out refinance lets an investor extract equity without selling."

TRUE. Refinancing at a higher loan amount returns cash while keeping ownership.

Q12**T / F**

"The cost of equity is always lower than the cost of debt."

FALSE. Equity bears more risk than debt, so $K_e > K_d$ — always.

Q13

T / F

“The 2008 crisis was partly caused by excessively LOW LTV ratios.”

FALSE. It was caused by excessively HIGH LTV (90–100%). Over-leverage drove catastrophic losses.

Q14

T / F

“DSCR of 1.3× means 30% more income than needed to cover debt.”

TRUE. $DSCR = NOI \div \text{Debt Service} = 1.3\times \rightarrow$ a 30% cushion above the minimum.

Q15

PROB

NOI = EGP 900,000. Loan = EGP 7,500,000. Debt Yield?

$900,000 \div 7,500,000 = 12\%$ — above the 10% threshold, acceptable to most lenders.

Q16

PROB

Property EGP 8M, 65% LTV. Debt service 600,000. NOI 750,000. DSCR?

$$\text{DSCR} = 750,000 \div 600,000 = 1.25\times \text{ — meets the typical } 1.25\times \text{ minimum.}$$

Q17

MCQ

Baum & Hartzell: the optimal capital structure is the one that:

- A) Maximizes total debt
 - B) Minimizes WACC while keeping flexibility
 - C) Uses only equity financing
 - D) Keeps LTV exactly at 50%
- B. Balances cost minimization with resilience during downturns.

Q18

PROB

40% equity @ $K_e = 18\%$, 60% debt @ $K_d = 16\%$, Tax = 22.5%. WACC?

$$(0.40 \times 18\%) + (0.60 \times 16\% \times 0.775) = 7.20\% + 7.44\% = 14.64\%$$

Q19

T / F

“In a rate-and-term refinance, the borrower receives cash proceeds.”

FALSE. Rate-and-term only changes rate or term. Only a cash-out refinance provides cash.

Q20

MCQ

Cap rate = 8%, borrowing cost = 18%. Leveraged vs. all-cash return:

- A) Higher
- B) Equal
- C) Lower
- D) Undefined

C. Negative leverage — borrowing at 18% to earn 8% destroys equity return.

Thank You