



# Preliminaries



Corporate Finance

# Corporate finance

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- Corporate finance studies the set of financial decisions corporations must make:
  1. What long term investments should a corporation make? (*capital budgeting*)
  2. How should it finance itself? (*optimal capital structure*)
  3. What should be its dividend policy?
  4. How should it manage its short-term liquidity needs? (*working capital management*)
  5. ...
- The premise: the corporation (=its management) should act to maximize the market value of shareholder equity



# Warm-up example

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- A corporation has the option to prepay (*call*) a bond with 5 years to maturity, \$100M in remaining principal, a 10% yearly rate, fixed and monthly payments
- It can replace it with a 5 year bond with the same payment structure but a 9% yearly rate
- It believes rates will fall no further
- Prepayment penalties are 2% of outstanding principal
- Should it exercise the option?



# The algebra

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- Current payment is \$2,124,704.47
  - New payment would be \$2,075,835.52, for a monthly saving of \$48,869.95
  - Appropriate discount rate for the corresponding string of cash flows is 9% (Why?)
  - Gross value of refi: \$2,354,182.11
  - This exceeds prepay costs, *the call option is in the money*, so yes, exercise...
  - ... as long as you are confident in your belief that rates will fall no further
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# Deeper option considerations

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- Exercising the option kills the option
  - If rates fall to, say, 8.5% in two months, the gap between 9% and 8.5% will not suffice to cover prepay costs, so you'll be stuck at 9%
  - Had you waited to exercise, you would be able to lower your rate to 8.5%
  - What is the value of waiting to exercise an option that is already in the money?
  - We will also learn how to answer tough questions like that
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# Corporation

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- A legal entity (separate and distinct from its owners) that owns *assets* and issues *liabilities*
- Asset: store of value over which property rights can be well defined
- Liability: claim against the cash flows associated with all or some of these assets



# Assets: three key taxonomies

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- *Assets in place*: assets in which the corporation has already invested
- *Growth opportunities*: options to invest at a later date which the corporation controls
  
- *Fixed or long-term assets*: assets purchased for long-term use in operations (buildings, equipment...)
- *Current assets*: assets 'expected' to convert to cash within a year
- *Financial assets*: investment in external securities
- *Intangible assets*: trademarks, patents...
  
- *Operating assets*: assets currently generating operating cash-flows
- *Non-operating assets*: other assets (excess cash, land, construction projects, financial assets...)



# Assets: valuation

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- *Book value*: the cost at which an asset is acquired
- *Market value*: the price the asset would sell for in the market place
- Can be very, very different from one another
- Why?





# Liabilities: three key taxonomies

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- *Current liability*: fully due within a year
  - *Long-term liability*: not fully due within a year
  
  - *Debt*: a contract that stipulates a specific financial obligation but does not carry ownership or control rights
  - *Equity*: a residual claim to the corporation cash flows that carries ownership and control rights
  - *Hybrids*: claims with both debt and equity features, typically a debt contract with conversion features
  
  - *Private claims*: traded in private markets (restricted and opaque)
  - *Public claims*: traded in public markets (much less restricted and much more transparent)
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# Cash-flow rights vs. control rights

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- Equity is often divided into different classes (A, B, ...)
- Typically, all classes get equal distributions. They have the same **cash flow rights**
- But **voting/control rights** can differ greatly across shareholders
- Example: At Facebook, class A shares have one vote per share, class B shares have 10 votes per share
- Even though Mark Zuckerberg only holds around 15% of outstanding shares, he controls the company



# What is a public corporation? (take 1)

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- A *public corporation* or *publicly traded corporation* is a corporation whose common equity trades in public markets
- Public corporations can and do issue private claims
- Private corporations can and do issue public claims
- Public does **not** mean *listed* on a public exchange



# What is a public corporation? (take 2)

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*“In general, we use the term to refer to a company that has public reporting obligations. Companies are subject to public reporting requirements if they:*

- 1. Sell securities in a public offering (such as an initial public offering, or IPO);*
- 2. Allow their investor base to reach a certain size, which triggers public reporting obligations; OR*
- 3. Voluntarily register with us.”*

From Investors.gov, i.e. the SEC

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# Liabilities: valuation

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- *Book value*: the face value of the obligation (= the size of the loan, e.g.)
- *Market value*: the price the liability would sell for in the market place
- Can be very, very different from one another
- Why?



# The fundamental identities

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- Book value of Assets = Book value of Liabilities  
+ Book value of Equity
  
- Market value of Assets = Market value of Liabilities  
+ Market value of Equity



# Valuation: a primer

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- What is the market value of a corporation's equity?
- Three broad steps:
  1. Calculate the market value of assets  $V$ , for short
  2. Calculate the market value of liabilities  $MV(D)$
  3. Subtract line 2 from line 1  $MV(E) = V - MV(D)$
- Two main approaches:
  1.  $V =$  Multiple of current profits or sales + value of non operating assets
  2.  $V =$  PV(cash flows associated with assets) + value of non operating assets



# EBITDA and free cash flows

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- EBITDA  $\approx$  Operating income – Operating expenses
  - = Net income
  - + Interest
  - + Taxes
  - + Depreciation and amortization
- Free cash flows to the firm (FCFF) = EBITDA – Investment (I) – Taxes (T)
- $MV(\text{Operating assets}) = PV(\text{FCFF})$ , at the appropriate discount rate





# Standard valuation approach

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- “Company X should trade at a *forward EBITDA multiple* of 10”
- Translation:  $Enterprise\ value = 10 \times EBITDA_1$

where  $EBITDA_1$  is the net operating income the company is projected to generate over the next year while

$$Enterprise\ value = V - Cash\ and\ financial\ investments$$

- Knowing EV we just need to add the value of cash and investments, subtract the value of debt and we are done
- But where do people pull EBITDA multiples from?



# DCF approach

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$$MV(\text{operating assets}) = \sum_{t=1}^{\infty} \frac{FCFF_t}{(1+r)^t}$$

where  $r$  is the return stakeholders are requiring from this type of corporation

Recall that from basic finance principles:

$$r = r_F + \text{premium}$$

where the premium is compensation investors require for taking on more risk or less liquidity

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# The holy trinity of valuation

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- Assume that
  1. EBITDA and cash flows grow at a constant rate  $g$
  2. All assets are operating, so that  $V = EV = MV$  (operating assets)

- Then 
$$r = y + g$$

where 
$$y = \frac{FCFF_1}{V}$$

is the *current yield* to investors

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# Fundamentals of EBITDA multiples

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- Company  $X$  is trading at 10 times EBITDA while company  $Y$  is trading at 15 times EBITDA
- What could explain/justify this difference?
- Exactly 4 acceptable types of answers to this common question



# Fundamentals of EBITDA multiples

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$$y = \frac{FCFF_1}{V} = r - g$$

⇓

$$\frac{EBITDA_1 - I_1 - T_1}{V} = r - g$$

⇓

$$\frac{EBITDA_1}{V} = r + \frac{I_1}{V} + \frac{T_1}{V} - g$$



## In plain English...

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Company  $X$  should trade at a higher EBITDA multiple than company  $Y$  if:

1. It is safer or more liquid (lower  $r$ , more generally)
2. Its cash-flows are expected to grow faster
3. It has lower investment needs
4. Its tax burden is lower

There is nothing else.

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# EBIT vs EBITDA

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- $EBIT = EBITDA - \text{Depreciation and Amortization}$
- Taxable income from operations for the unlevered firm



# Cash flow road map

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$$\begin{aligned} \text{BTCF} &= \text{EBITDA} - I \\ &= \text{EBIT} + \text{Dep} - I \end{aligned}$$

$(-T)$

$(-T - \tau Dr^D)$

$$\begin{aligned} \text{FCFF} &= \text{BTCF} - T \\ &= \text{EBITDA} - I - T \\ &= (1 - \tau)\text{EBIT} + \text{DEP} - I + \tau Dr^D \end{aligned}$$

$$\begin{aligned} \text{Unlevered FCFF} &= \text{BTCF} - T - \tau Dr^D \\ &= \text{EBITDA} - I - T - \tau Dr^D \\ &= (1 - \tau)\text{EBIT} + \text{DEP} - I \end{aligned}$$

$(-Dr^D)$

$(-Dr^D + \tau Dr^D)$

$$\begin{aligned} \text{FCFE} &= \text{FCFF} - Dr^D \\ &= (1 - \tau)(\text{EBIT} - Dr^D) + \text{DEP} - I \end{aligned}$$





# Fundamentals of capital budgeting

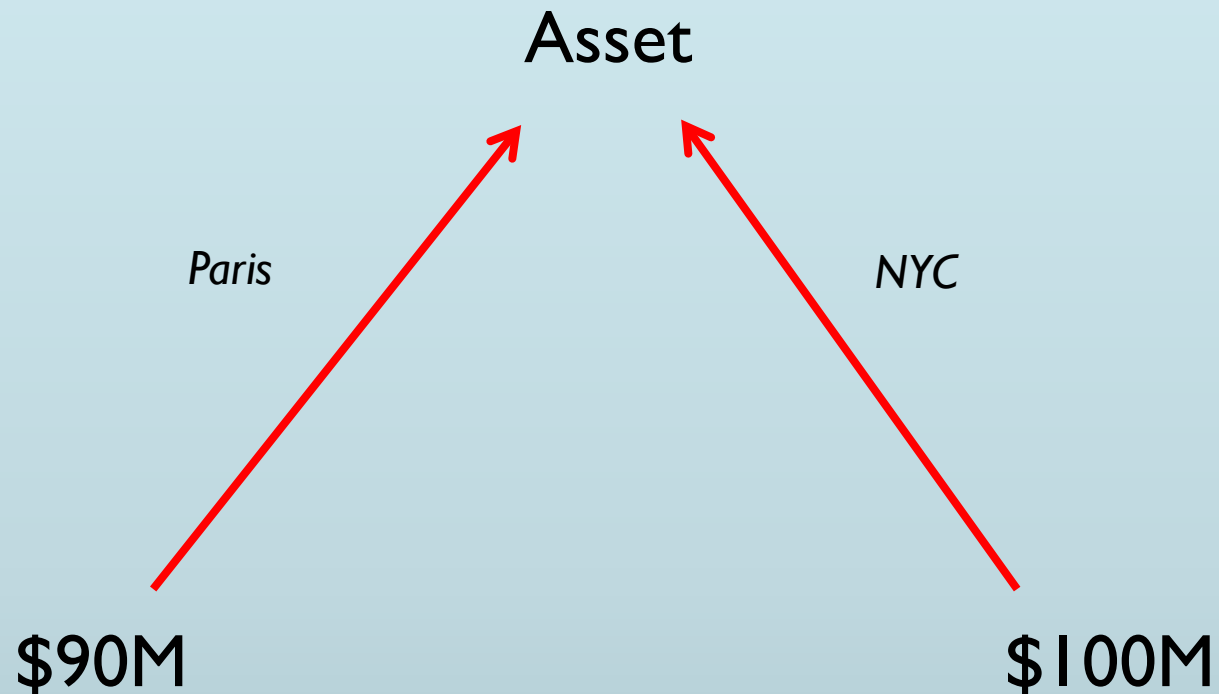
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- Should a company buy (or sell) a particular asset? Should it invest in (or divest) a particular investment project?
- When markets function well, trivially, a company creates value for its stakeholders by investing if it can purchase an asset at a cost no higher than its market value
- Arbitrage principle: “similar” assets should be priced in such a way that they earn similar returns
- Otherwise...



# Arbitrage opportunities

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# Opportunity cost of capital

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- Investing in a given asset is foregoing the opportunity to invest in other assets with similar properties
- Investor should be compensated for foregoing that opportunity
- Asset under consideration, therefore, should yield at least the same return as other similar assets



# Capital budgeting in practice

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- How much should a corporation be willing to pay for a particular project?
- Value of the asset = Value cash flows to debt-holders + Value of cash flows to equity
- We know what return (YTM) debt-holders require and what they are willing to pay for their piece of the action

- So, buy if:

$$\text{cost of asset} - \text{debt financing} < \text{PV}(\text{cash flows to equity})$$

- But what return do equity holders require?
  - That's a traditional asset pricing question
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# Canonical (MM) example

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- Consider a project whose EBIT, each period and for ever, is either  $\$80M$  or  $\$100M$  with equal probability
- The project is financed with interest-only debt worth  $\$50M$  in perpetuity
- Debt-holders require  $r^D = 5\%$
- Equity-holders require  $r^E = 10\%$
- Investment is  $\$20M$  each period, as is depreciation
- The company pays  $\tau = 30\%$  in income taxes
- What is the project worth?



# WACC

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Under strong assumptions, this is equivalent to buying if:

$$PV(\text{unlevered FCFF}) > \text{cost}$$

using the weighted average of all stakeholder's expected returns as discount rate, a discount rate known as the **W**eighted **A**verage **C**ost of **C**apital



# Bottom line

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- Invest if  $PV(\text{cash flows})$  at opportunity cost of capital exceeds investment cost
- Equivalently, invest if  $NPV$  of investment is non-negative
- This breaks down capital budgeting in practice into two subtasks:
  1. Forecast expected cash flows
  2. Measure the opportunity cost of capital



# Fundamentals of capital structure management

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- Holding its portfolio of assets fixed, can a corporation create value simply by changing the way it finances itself?
- In pure and perfect markets, no
- But we do not live in a world of pure and perfect markets:
  1. Debt has tax advantages
  2. Bankruptcy or even the risk of bankruptcy destroys value
  3. Managers' objectives are not fully aligned with the corporation's (*agency costs*)
  4. Certain security types seem "special" and in short supply (markets are *incomplete*)





# Leverage mechanics: the case of M-Reits

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- REITs are corporations that are exempt from corporate taxation as long as:
  1. They invest mostly in real estate assets
  2. They distribute most of their net income each quarter
  3. They have a diffuse shareholder base
  4. ...
- Mortgage REITs invest in mortgages and mortgage-backed securities
- Their dividend yield oscillates between 10 and 20 percent a year (!)
- How? Massive leverage



# Capital structure matters: Evidence from asset-backed securitization

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- Securitization = pooling + tranching
- What purpose does pure repackaging serve?
- Caters to the needs of heterogeneous investors by creating securities with different risk and return characteristics
- Completes the markets
- A machine to create safe securities backed by assets that are not...
- ... at a time mere global appetite for AAA seems insatiable (the saving glut)
- Tranching makes profitable (positive NPV) investments that would not be profitable otherwise



# Finance matters

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- The explosion of securitization (insatiable appetite for AAA) led to a deterioration of lending standards...
- ... which, once residential housing values turned south, fueled a century mark global crisis

