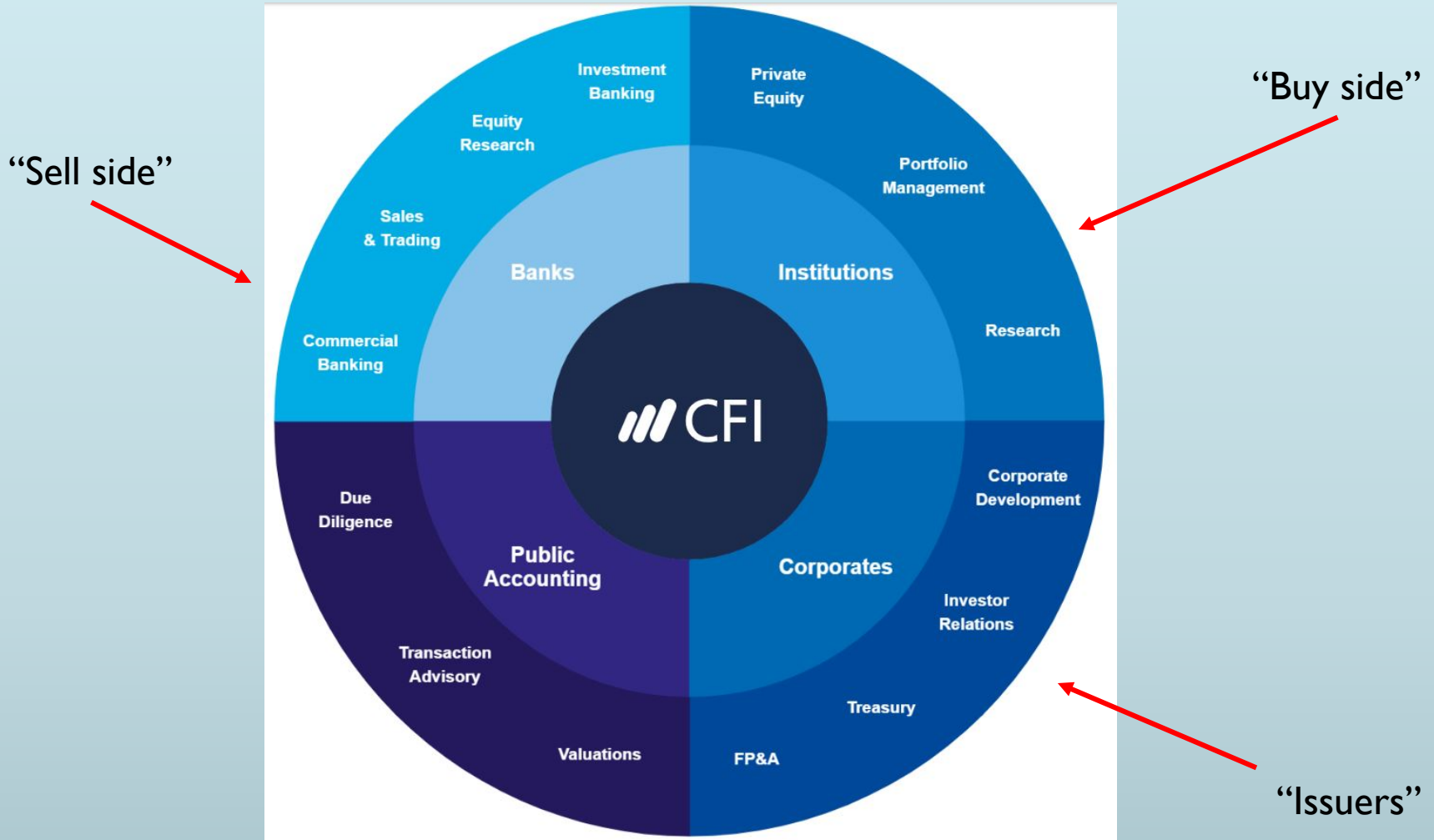# Preliminaries

Corporate Finance

# Corporate finance

- 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/payout policy?
  4. How should it manage its short-term liquidity needs? (*working capital/cash management*)
  5. …

- The premise: the corporation (=its management) should act to maximize the market value of shareholder equity

# Finance by functional area
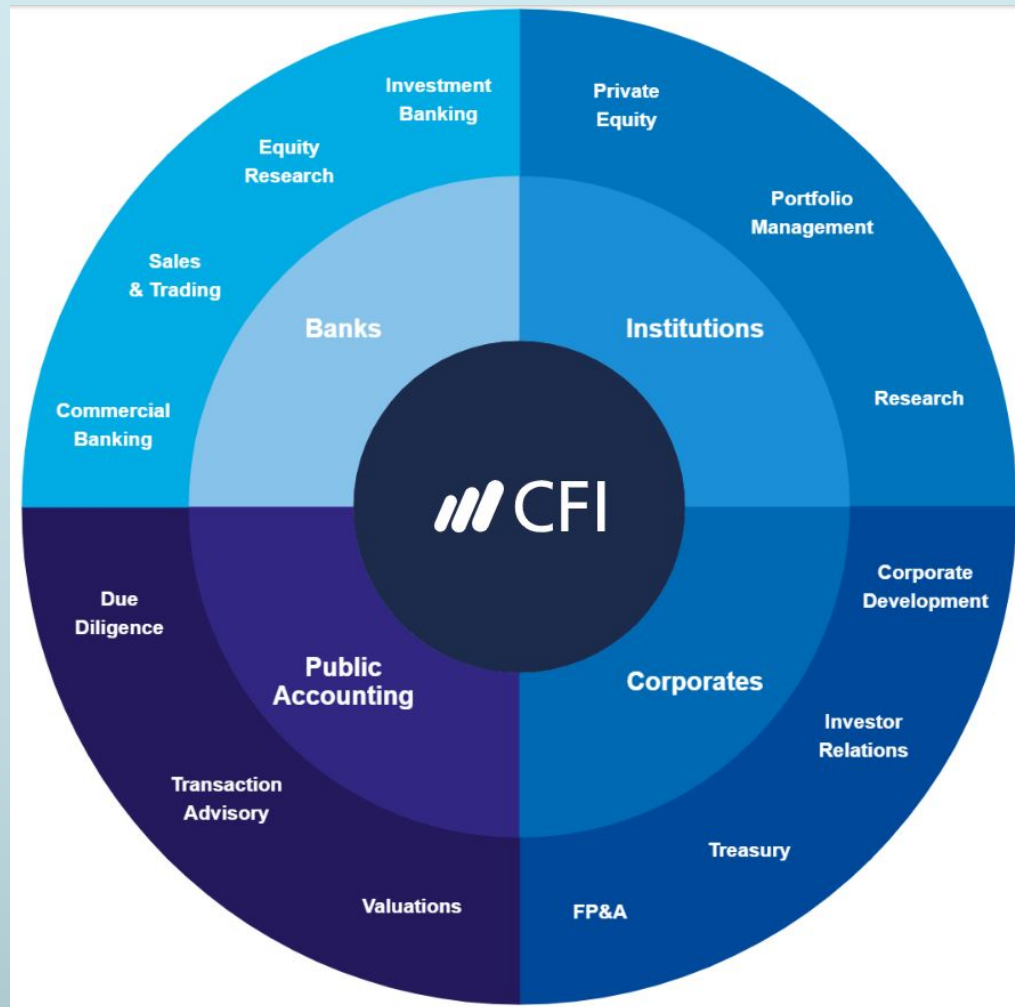
# Finance by functional area

# The blurry line between Treasury and FP&A

| Treasury | Financial Planning & Analysis |
|---|---|
| 1. Cash and liquidity management | 1. Maintain and monitor financial statements |
| 2. Working capital management | 2. Maintain and monitor financial performance metrics (KPIs and ratios) |
| 3. Long-term funding:<br>   ▪ Lender relationships<br>   ▪ Credit-rating management<br>   ▪ Capital structure management | 3. Financial budgeting, forecasting, and stress testing |
| 4. Financial risk management (FX, r, …) | 4. Variance analysis |
| 5. Payout policy | 5. Ad-hoc reporting, scenario analysis, and research to support and inform financial decisions (capital budgeting, e.g.) |

# Warm-up example

- An untaxed corporation has the option to prepay (*call*) a bond with 5 years to maturity, $100 M$ in remaining principal, a 10% yearly rate, fixed and yearly 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
- Assume not other costs (floatation, overlap…)
- Should it exercise the option?

# The algebra

- Current payment is $26,379,748.08
- New payment would be $25,709,245.70, for a yearly saving of $670,502.38
- Appropriate discount rate for the corresponding string of cash flows is 9% (Why?)
- Gross value of refi: $2,608,020.44
- 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

# Deeper option considerations

- 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

# Corporation

- 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:* specific claim against the cash flows associated with all or some of these assets

- *Equity:* a residual claim to the corporation's cash flows that carries control rights

# Assets: three key taxonomies

- *Assets in place*: assets in which the corporation has already invested
- *Growth opportunities*: options to invest at a later date which the corporation controls

Assets in place can be classified in two ways:

- *Current assets*: assets 'expected' to convert to cash within a year
- *Fixed real assets*: real assets purchased for long-term use (buildings, equipment…)
- *Fixed financial assets*: investment in external securities and assets held for sale expected to be held more than one year
- *Fixed intangible assets*: trademarks, patents…

- *Operating assets*: assets currently generating operating cash-flows
- *Non-operating assets*: other assets (excess cash, undeveloped land, construction projects, financial assets…)

# Assets: valuation

- *Book value*: the recorded value of the asset (≈ original cost minus depreciation/amortization and impairment)

- *Market value*: the price the asset would sell for in the market place

- Can be very, very different from one another

- Why?

# Liabilities and equity: three key taxonomies

- *Current liability*: fully due within a year
- *Long-term liability*: not fully due within a year

- *Current operating liability*: current liability that results from operations
- *Other liabilities and equity* are all other claims:
    - *Debt:* a contract that stipulates a specific financial obligation but does not carry ownership or control rights
    - *Common Equity*: a residual claim to the corporation cash flows that carries ownership and control rights
    - *Hybrids*: claims with both debt and equity features, such as preferred equity and debt contracts 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)

# Cash-flow rights vs. control rights

- Common equity is sometimes 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 tough Mark Zuckerberg only holds around 15% of outstanding shares, he controls the company

# What is a public corporation? (take 1)

- 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)

*"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

# Liabilities and equity: valuation

- *Book value*: the recorded value of the claim (= the remaining balance of a loan, e.g.)

- *Market value*: the price the claim would sell for in the market place

- Can be very, very different from one another

- Why?

# The fundamental identities

- 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

- 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:      $MV(D + H)$
  3. Subtract line 2 from line 1:      $MV(E) = V - MV(D + H)$

- Two main approaches:
  1. $V$=Multiple of current profits or sales + value of non operating assets
  2. $V$= PV(cash flows associated with operating assets and growth opportunities) + value of non operating assets

# EBITDA and free cash flows

- EBITDA from operations (EBITDA henceforth, but only for short)

$$= \text{Operating income} - \text{Operating expenses}$$

$$\approx \text{Net income}$$
$$+ \text{Interest}$$
$$+ \text{Taxes}$$
$$+ \text{Depreciation and amortization}$$

- Free cash flows to the firm (FCFF) from operations =
$$\text{EBITDA} - \text{Investment } (I) - \text{Taxes } (T)$$

- $I$ is investment in long-term operating assets and working capital ("McKinsey convention")

- MV(operating assets and growth opportunities)=PV(FCFF), at the appropriate discount rate

# EBITDA caveats

- For valuation purposes, we really want "core" EBITDA, the EBITDA generated by the corporations' core operations

- So really, we should say and use OIBDA (*Operating income before depreciation and amortization)*

- Or, better yet, *adjusted* or *normalized* EBITDA

- We will adopt the standard short-cut and say EBITDA for OIBDA

# Standard valuation approach

- "Company X should trade at a *forward EBITDA multiple* of 10"

- Translation:      $Enterprise\ value = 10\ \times\ E(EBITDA_1)$

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

$$EV = MV(Debt) + MV(Hybrids) + MV(Equity)$$
$$-Excess\ Cash\ - MV(Other\ nonoperating\ Assets)$$

- EV is the market value of operating assets and growth opportunities

- Knowing EV we just need to add the value of cash and non-ops, subtract the value of debt and non-common equity and we are done

- But where do people pull EBITDA multiples from?

# Timing and discounting conventions (1)

- We will treat time as a discrete object: $t = 1, 2, \ldots$

- Date $t = 0$ stands for today

- A period is the gap between two dates

- Date $t$ stands for $t$ periods (days, weeks, quarters, years, …) from now

# Timing and discounting conventions (2)

- $EV_0$ is enterprise value today

- $EBITDA_1$ is $EBITDA$ one period from now, an object know as *forward EBITDA*

- $EBITDA_0$ is the $EBITDA$ we just received, aka *trailing EBITDA*

- $FCFF_t$, say, comes **at the end** of $t$ periods hence gets discounted by $(1 + r)^t$ where $r$ is the appropriate discount rate

- We will discuss more realistic discounting conventions in chapter 3

# DCF approach

$EV_0 = MV(operating\ assets\ and\ growth\ opportunities) =$

$$\sum_{t=1}^{\infty} \frac{E(FCFF_t)}{(1+r)^t}$$

where $r$ is the return stakeholders are requiring from this type of corporation and $FCFF$ is cash-flows from operations.

Recall that from basic finance principles:

$$r = r_F + premium$$

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

# The holy trinity of valuation

- Assume that expected EBITDA and other cash flows all grow for ever at a constant rate $g$

- Then
$$r = y + g$$

where
$$y = \frac{E(FCFF_1)}{EV_0}$$

is the *current yield* to investors given today's *enterprise value.*

# Fundamentals of EBITDA multiples

- 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

$$y \;=\; \frac{FCFF_1}{EV_0} = r - g$$

$$\Downarrow$$

$$\frac{EBITDA_1 - I_1 - T_1}{EV_0} = r - g$$

$$\Downarrow$$

$$\frac{EBITDA_1}{EV_0} = r + \frac{I_1}{EV_0} + \frac{T_1}{EV_0} - g$$

**Notes**:

1. *I'm dropping expectation operators to keep notation down.*
2. *As for trailing multiples, $FCFF_1 = FCCF_0\,(1 + g)$, so by the same logic and as long as $g$ is not too large:*
   $$\frac{EBITDA_0}{EV_0} = \frac{r}{1+g} + \frac{I_0}{EV_0} + \frac{T_0}{EV_0} - \frac{g}{1+g} \approx r + \frac{I_0}{EV_0} + \frac{T_0}{EV_0} - g.$$

# In plain English…

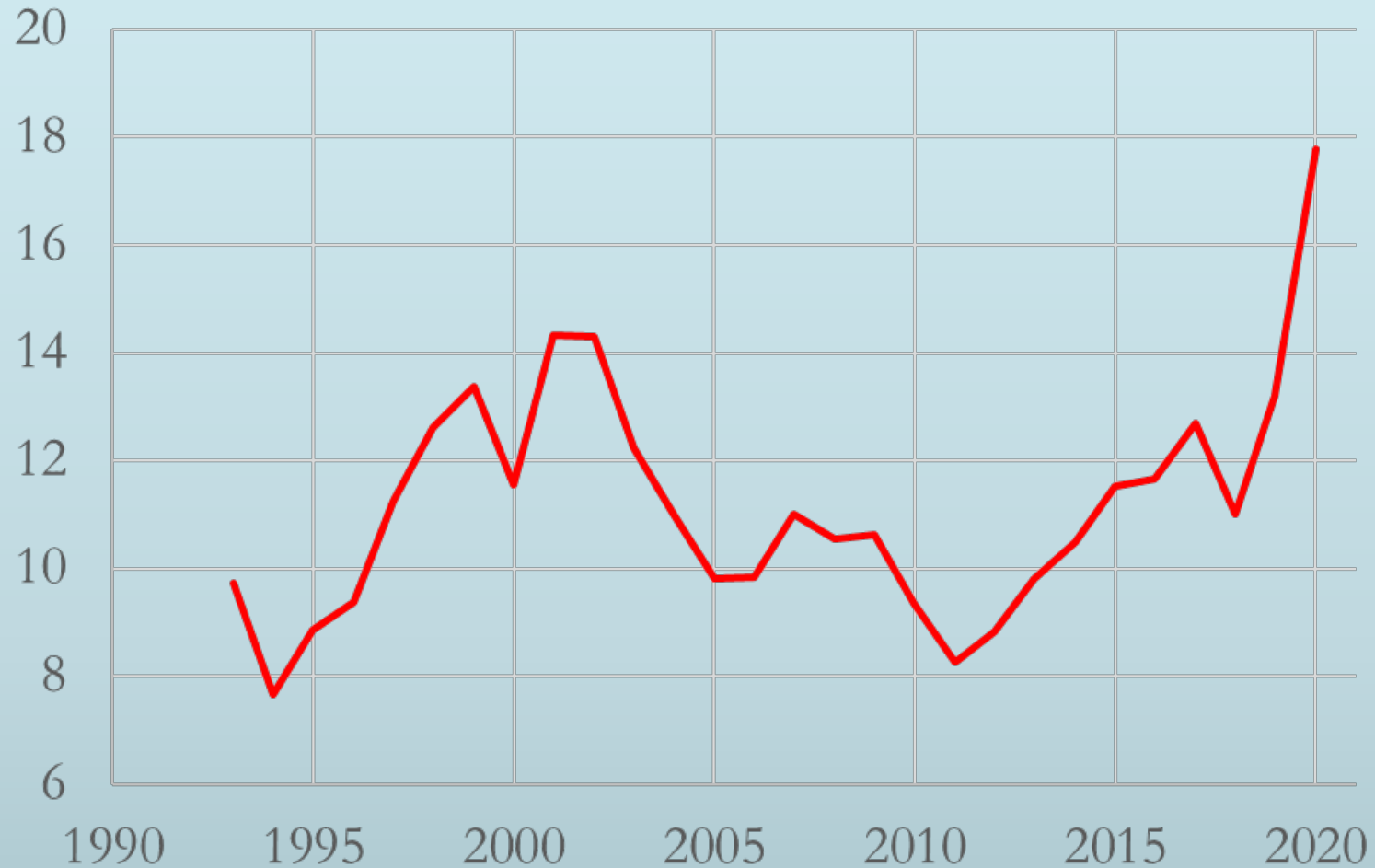Company $X$ should trade at a higher EBITDA multiple than company $Y$ if:

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

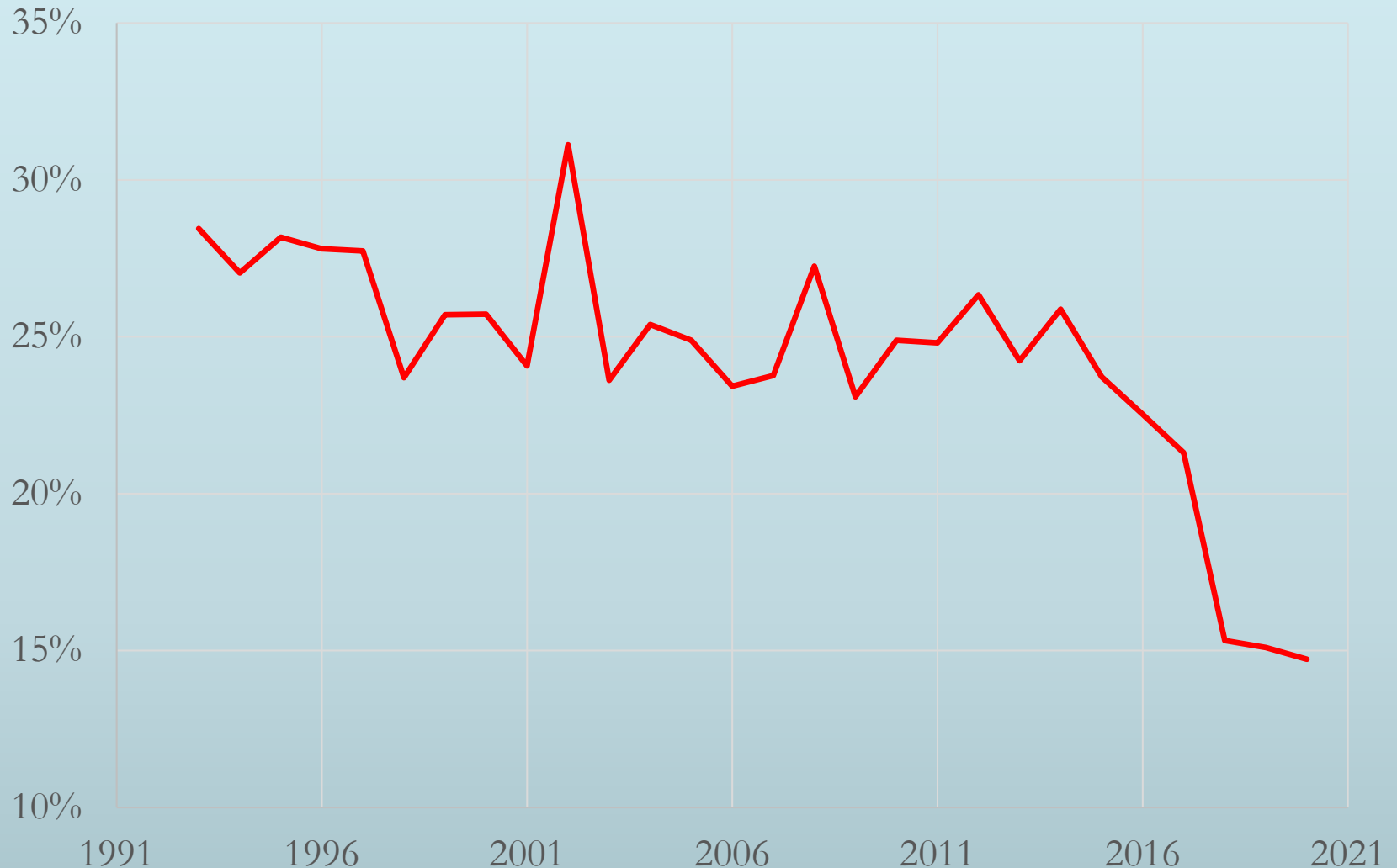There is nothing else.

# Recent history of EBITDA multiples

$$\left( \frac{EV_0}{EBITDA_0} \text{ for all } S\&P500 \text{ firms}, 1993 - 2020 \right)$$



Source: Capital IQ, my calculations

# Recent history of effective tax rates

$$\left(\frac{T_0}{EBIT_0} \text{ for all } S\&P500 \text{ firms}, 1993 - 2020\right)$$



Source: Capital IQ, my calculations

# EBIT vs EBITDA

- $EBIT = EBITDA - Depreciation\ and\ Amortization$

- Taxable income from operations for the unlevered firm

# Cash flow road map

BTCF    $=$ EBITDA $-$ I
        $=$ EBIT $+$ Dep $-$ I

$(-T)$

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

FCFF    $=$ BTCF$-$ T
        $=$ EBITDA-I-T
        $=(1-\tau)$EBIT $+$DEP-I$+\tau\ Dr^D$

Unlevered FCFF    $=$ BTFC-T-$\tau Dr^D$
                  $=$ EBITDA-I-T-$\tau Dr^D$
                  $=(1-\tau)$EBIT $+$DEP-I

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

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

FCFE    $=$ FCFF$-$ $Dr^D+\Delta D$
        $=(1-\tau)$(EBIT $-Dr^D$)$+$DEP-I$+\Delta D$

▶ *Notes:T$= \tau$(EBITDA-D$r^D$-Dep) while $\Delta D$ is net borrowing*

# Fundamentals of capital budgeting

- 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

Asset

*Paris*

*NYC*

$90M

$100M
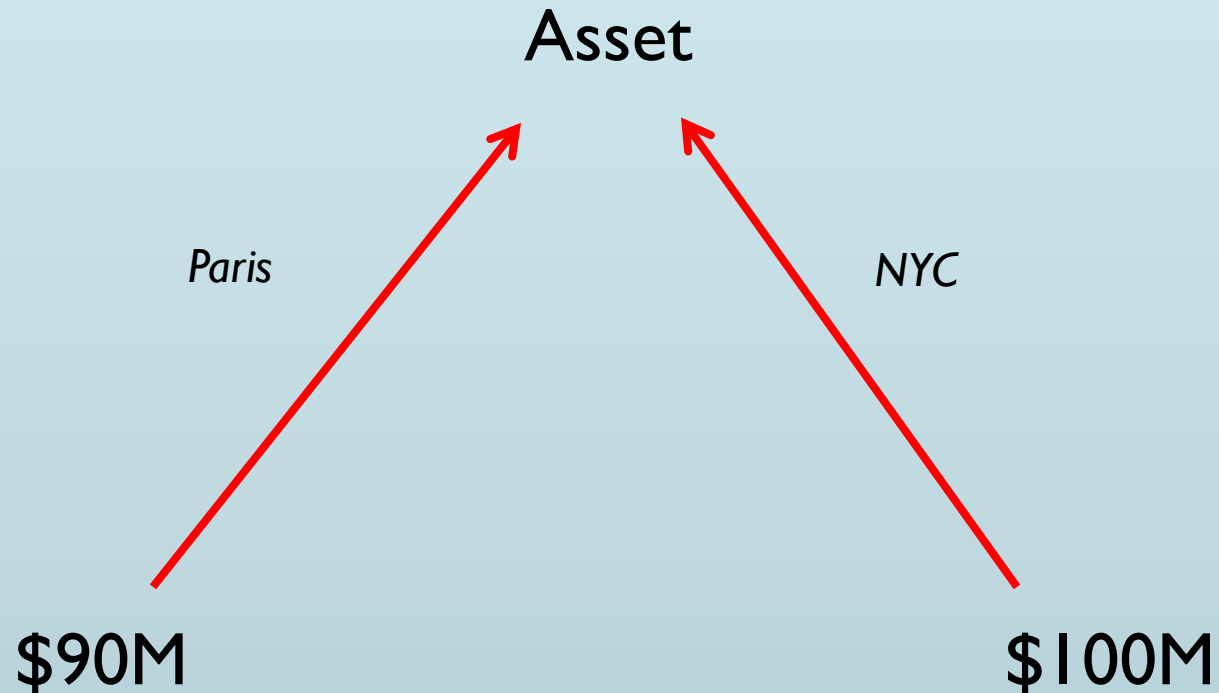
# Opportunity cost of capital

- 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

- 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 (*assuming we are not getting below-market financing*)

- So, buy if:

   cost of asset – debt financing < PV(cash flows to equity)

- But what return do equity holders require?
- That's a traditional asset pricing question

# Canonical (MM) example

- 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 perpetuity with face value $\$300M$

- Debt-holders require $r^D = 5\%$

- Equity-holders require $\mathrm{E}(r^E) = 10\%$

- Investment is $\$20M$ each period, as is depreciation

- The company pays $\tau = 30\%$ in income taxes

- What is the project worth?

# WACC

Under strong assumptions, this is equivalent to buying if:

PV(unlevered FCFF) > 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:

$$WACC = \frac{MV(D)r^D(1-t) + MV(H)r^H + MV(E)r^E}{MV(D) + MV(H) + MV(E)}$$

where $r^D, r^H, r^E$ are the expectation of debt, hybrid, and equity investors and $t$ is the tax rate a corporation pays on its EBIT

# Bottom line

- Invest if PV(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 <u>expected</u> cash flows
  2. Measure the opportunity cost of capital

# Fundamentals of capital structure management

- 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

- REITs are corporations that are exempt from corporate taxation as long as:
    1. The 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

- 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

- 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

# Capital structure matters:
## Evidence from LBOs

- LBOs are acquisition financed with a lot of debt

- Why would the heavy use of debt create value? If it did, why isn't incumbent management doing it?

- At least two stories:
  1. LBO acquirers may have better access to debt markets than the stand-alone corporation
  2. Debt reduces the free cash-flow problem

# Finance as a body of knowledge
## (The pantheon of Finance)

1. **Modigliani-Miller Theorem: (MM)**
*Capital structure would not matter if markets were perfect*

2. **The Fundamental Theorem of Finance (FTF)**
*If there is no arbitrage, all assets can be priced as if investors were risk-neutral*

3. **Capital Asset Pricing Model (CAPM)**
*Only systematic risk matters*

4. **Black-Scholes**
*How to price derivatives using the FTF*

5. **Arbitrage Pricing Theory (APT)**
*How to prices assets using common factors*

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