Preliminaries

Corporate Finance

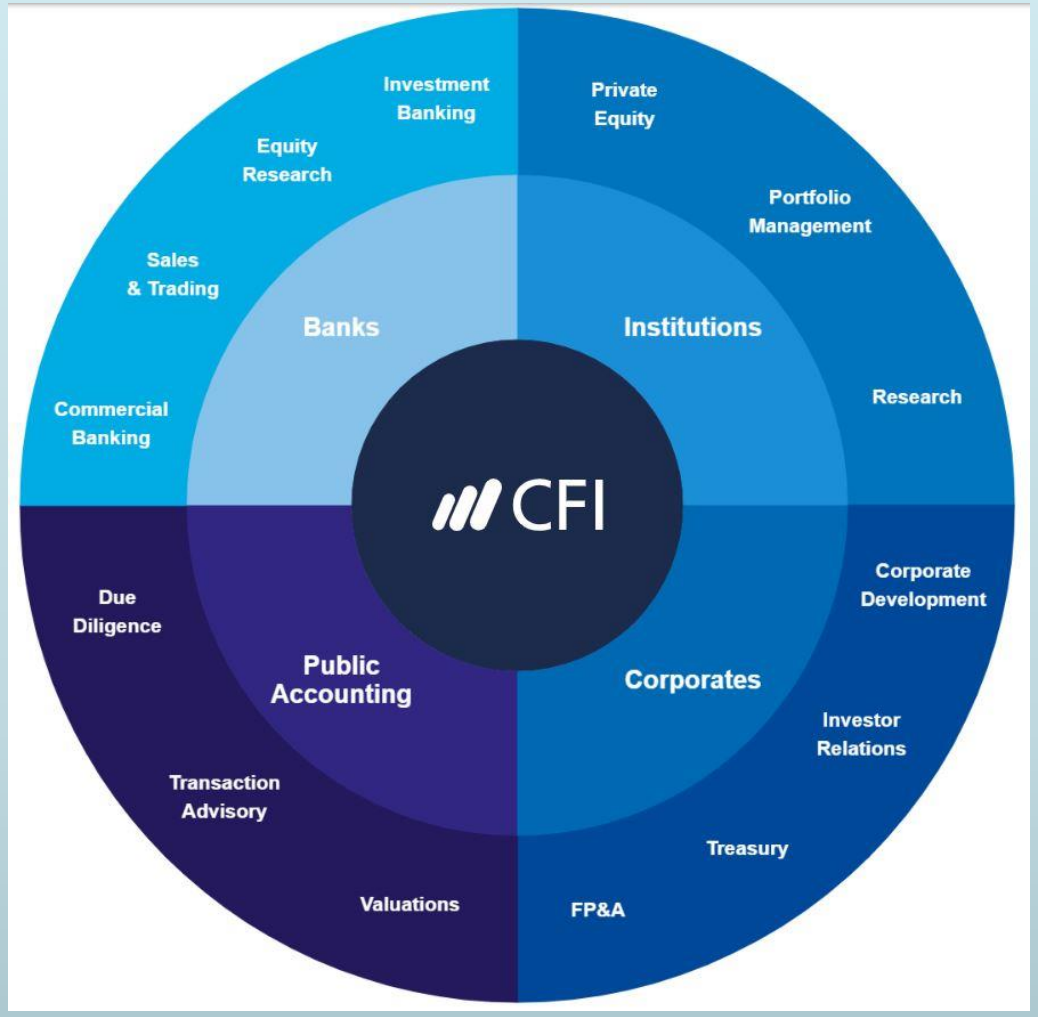
Corporate finance

- 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

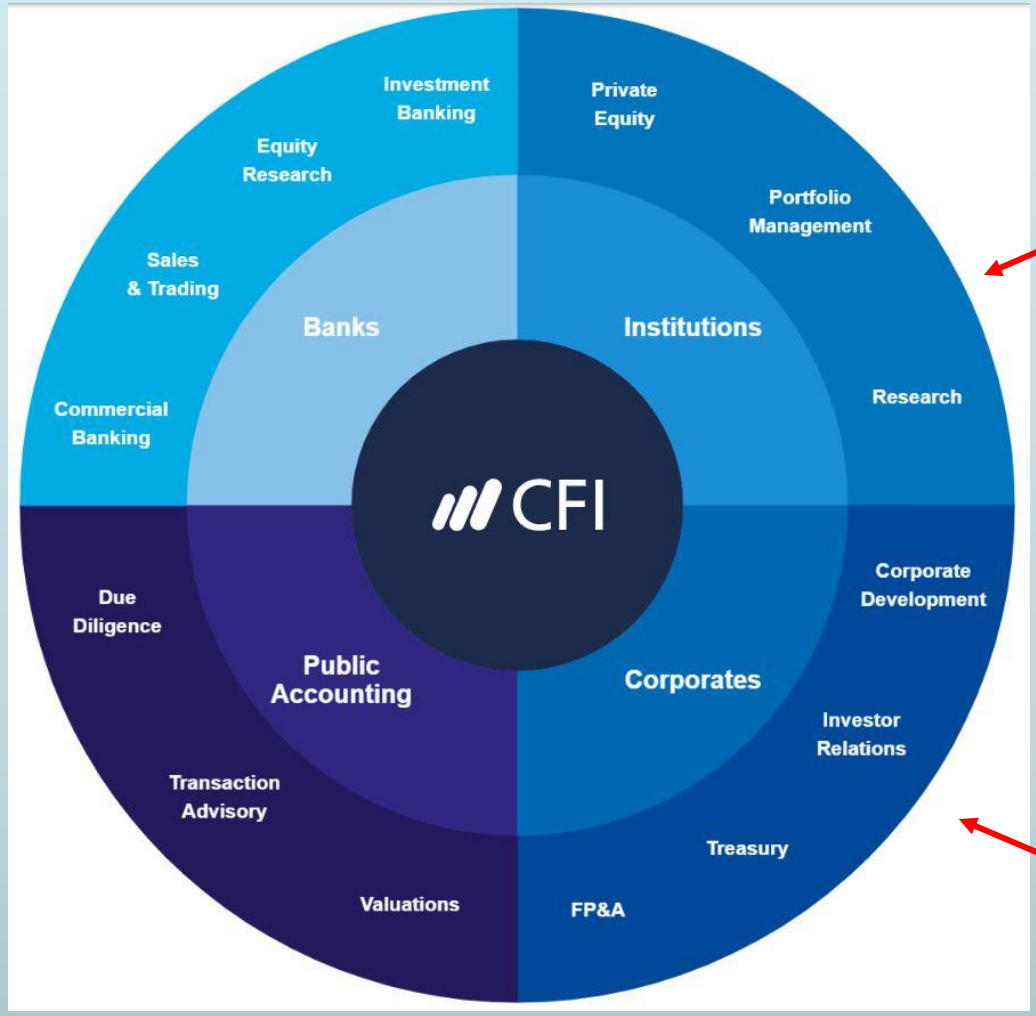


- Source: corporatefinanceinstitute.com (careers map)

Finance by functional area

"Sell side"

"Buy side"



"Issuers"

Source: corporatefinanceinstitute.com

The blurry line between Treasury and FP&A

Treasury	Financial Planning & Analysis
1. Cash and liquidity management 2. Working capital management 3. Long-term funding: ▪ Lender relationships ▪ Credit-rating management ▪ Capital structure management 4. Financial risk management (FX, r, …) 5. Payout policy	1. Maintain and monitor financial statements 2. Maintain and monitor financial performance metrics (KPIs and ratios) 3. Financial budgeting, forecasting, and stress testing 4. Variance analysis 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, $\$100M$ 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
- Assume not other costs (floatation, overlap…)
- Should it exercise the option?

The algebra

- 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

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)

  = Operating income – Operating expenses

  ≈ Net income
  + Interest
  + Taxes
  + Depreciation and amortization

- Free cash flows to the firm (FCFF) from operations =
  EBITDA – Investment (I) – 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…

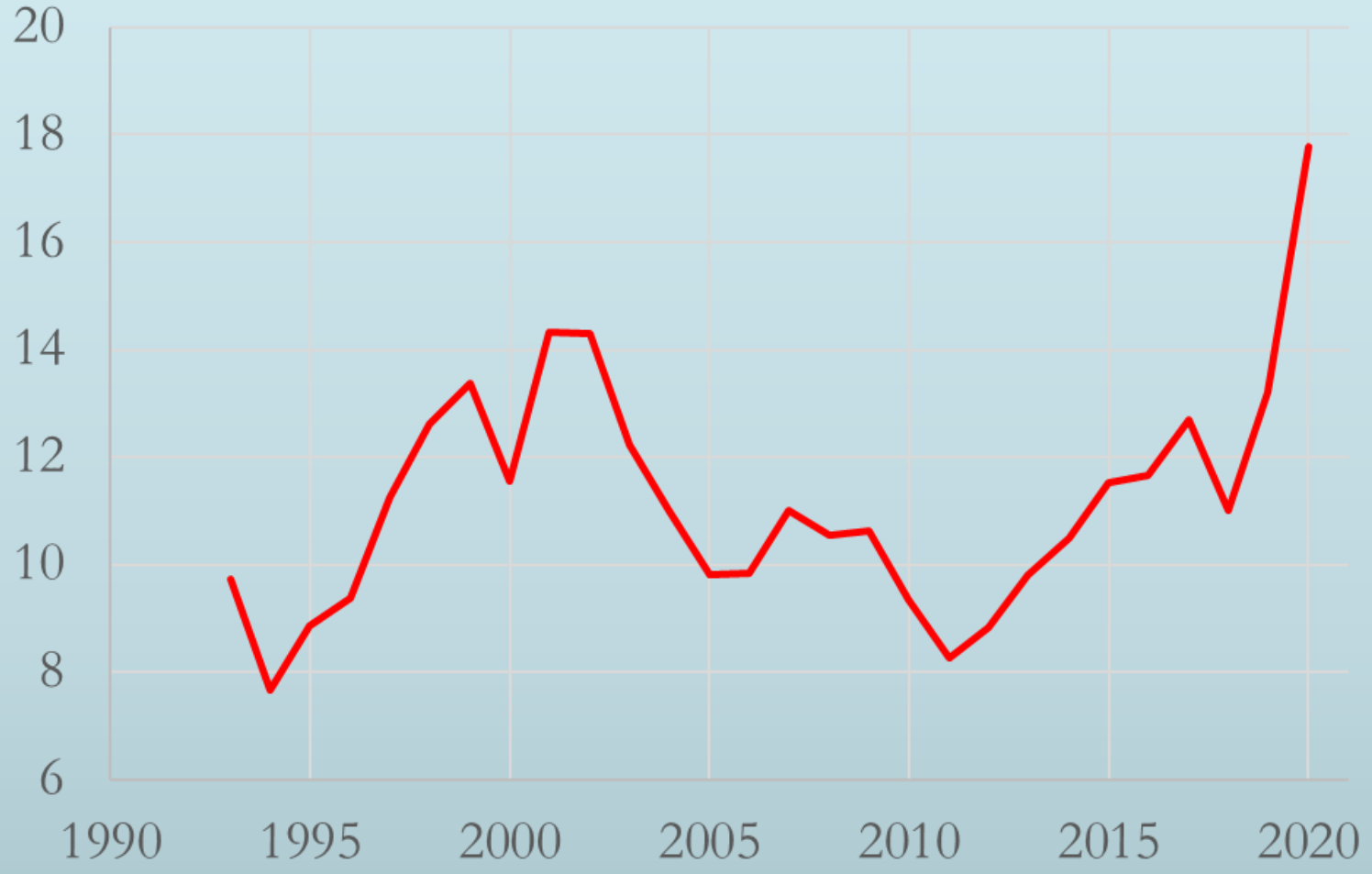
Company X should trade at a higher EBITDA multiple than company Y if:

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

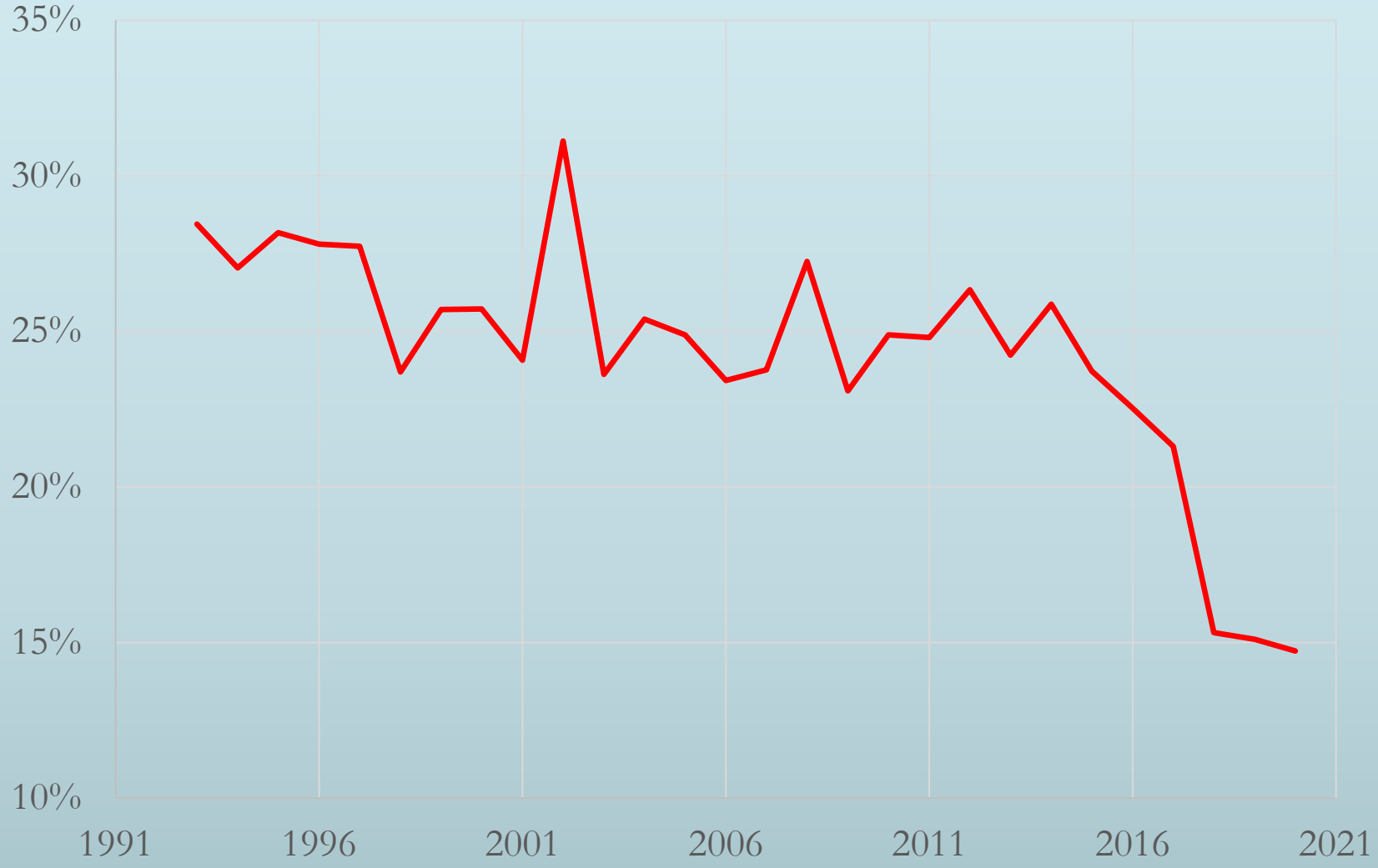
$\left(\frac{EV_0}{EBITDA_0} \text{ for all } S\&P500 \text{ firms, } 1993 - 2020\right)$



Source: Capital IQ, my calculations

Recent history of effective tax rates

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

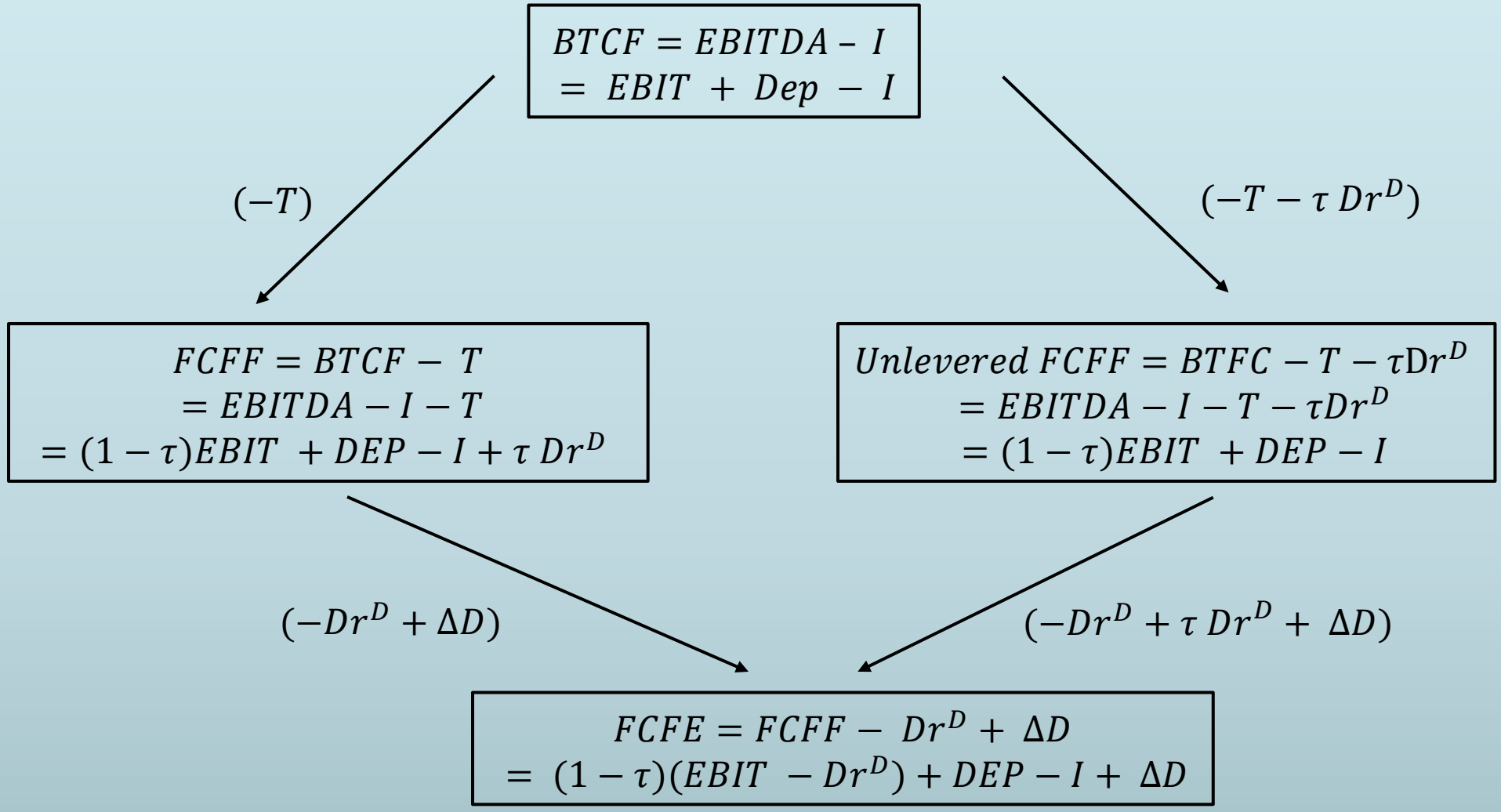


- Source: Capital IQ, my calculations

EBIT vs EBITDA

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

Cash flow road map



- *Notes: τ is the tax rate on EBIT, $T = \tau(EBITDA - Dr^D - Dep)$ are the resulting taxes, while ΔD is net borrowing*

Application 1: financial leverage and risk

- Assuming $\tau = \Delta \mathrm{D} = 0, FCFE = FCFF - Dr^D$
- It follows that the *elasticity of FCFE with respect to FCFF* is:

$$\frac{\left(\Delta FCFE / FCFE\right)}{\left(\Delta FCFF / FCFF\right)} = \frac{\Delta FCFF}{FCFF - Dr^D} \times \frac{FCFF}{\Delta FCFF} = \frac{FCFF}{FCFF - Dr^D}$$

- Because Dr^D is independent of $FCFF$, the higher Dr^D is, the more variation in $FCFF$ has to be absorbed by $FCFE$
- Cash-flows to equity are riskier than cash-flows to debt, and the higher the debt the higher the difference

Application 2: operating leverage and risk

- By the same logic, $EBIT = Sales(1 - v) - FC$, where $v = \frac{VC}{Sales}$ is the ratio of variable costs to sales, while FC is fixed cost
- It follows that the *elasticity of EBIT with respect to FC* is:

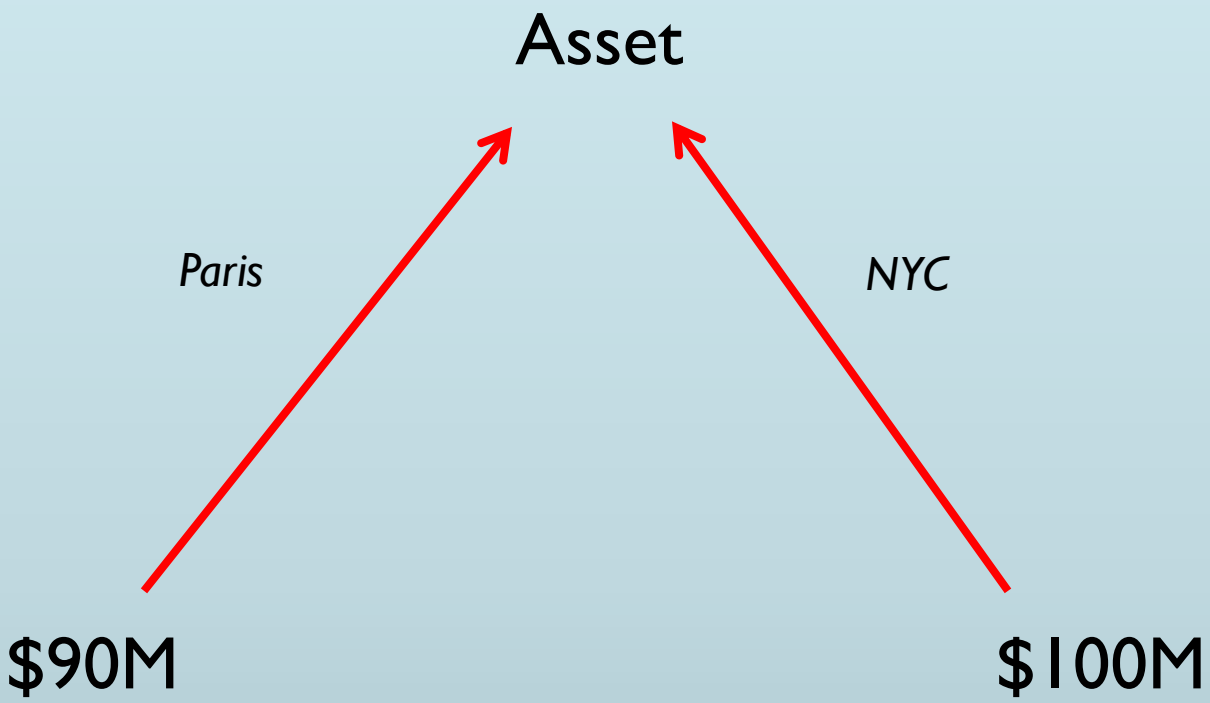
$$\frac{\left(\Delta EBIT / EBIT\right)}{\left(\Delta Sales / Sales\right)} = \frac{\Delta Sales(1 - v)}{Sales(1 - v) - FC} \times \frac{Sales}{\Delta Sales} = \frac{Sales(1 - v)}{Sales(1 - v) - FC}$$

- This key ratio is called *DOL (the degree of operating leverage)*
- The higher fixed costs are, the more volatile the profits, holding revenue volatility the same

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



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 expected 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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