Valuation Principles and Practice

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Two approaches to valuation

- Intrinsic valuation: The value of an asset is a function of its fundamentals – cash flows, growth and risk. In general, discounted cash flow models are used to estimate intrinsic value.

- Relative valuation: The value of an asset is estimated based upon what investors are paying for similar assets. In general, this takes the form of value or price multiples and comparing firms within the same business.

One tool for estimating intrinsic value: Discounted Cash Flow Valuation

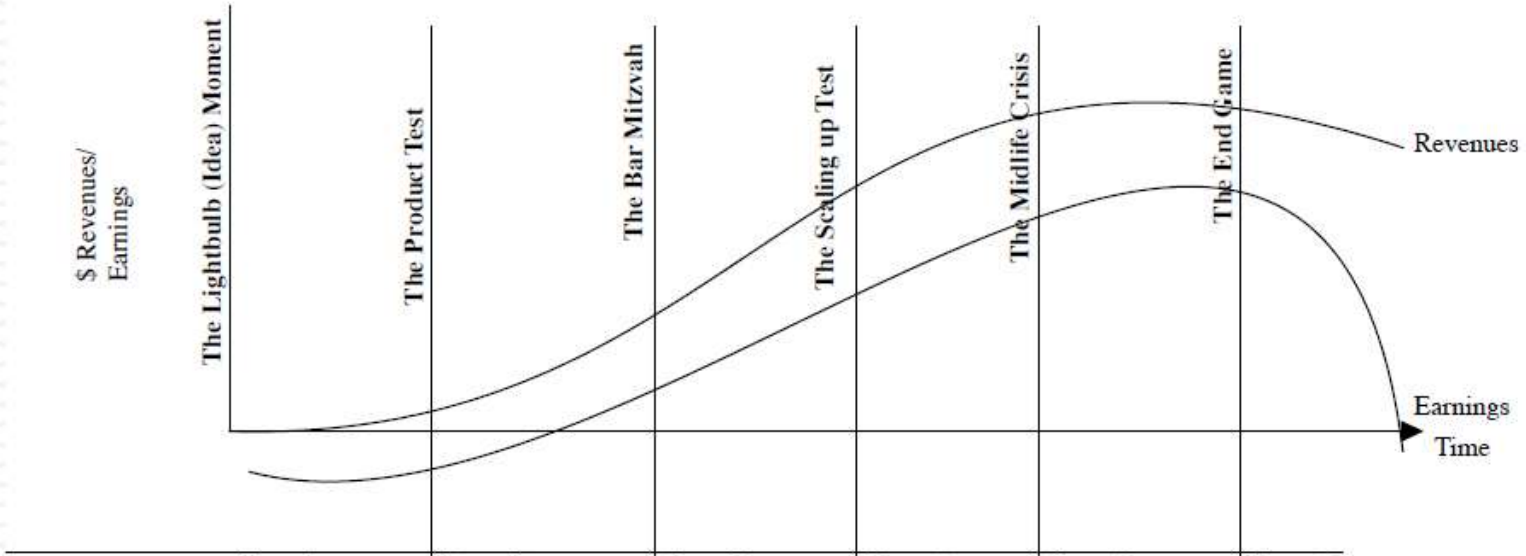
- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

$$\text{Value of firm} = \sum_{t=1}^{t=\infty} \frac{CF\ to\ firm}{(1+WACC)^t}$$

Where

WACC =Weighted Average Cost of Capital

A familiar graph



Growth stage	Stage 1 Start-up	Stage 2 Young Growth	Stage 3: High Growth	Stage 4 Mature Growth	Stage 5 Mature Stable	Stage 6 Decline
Description	Have an idea for a business that meets an unmet need in the market.	Create a business model that converts ideas into potential revenues & earnings	Build the business, converting potential into revenues.	Grow your business, shifting from losses to profits	Defend your business from new competitors & find new markets	Scale down your business as market shrinks.

One tool for estimating intrinsic value: Discounted Cash Flow Valuation

Value of growth
The future cash flows will reflect expectations of how quickly earnings will grow in the future (as a positive) and how much the company will have to reinvest to generate that growth (as a negative). The net effect will determine the value of growth.
Expected Cash Flow in year t = E(CF) = Expected Earnings in year t - Reinvestment needed for growth

Cash flows from existing assets
The base earnings will reflect the earnings power of the existing assets of the firm, net of taxes and any reinvestment needed to sustain the base earnings.

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots\ldots + \frac{E(CF_n)}{(1+r)^n}$$

Steady state
The value of growth comes from the capacity to generate excess returns. The length of your growth period comes from the strength & sustainability of your competitive advantages.

Risk in the Cash flows
The risk in the investment is captured in the discount rate as a beta in the cost of equity and the default spread in the cost of debt.

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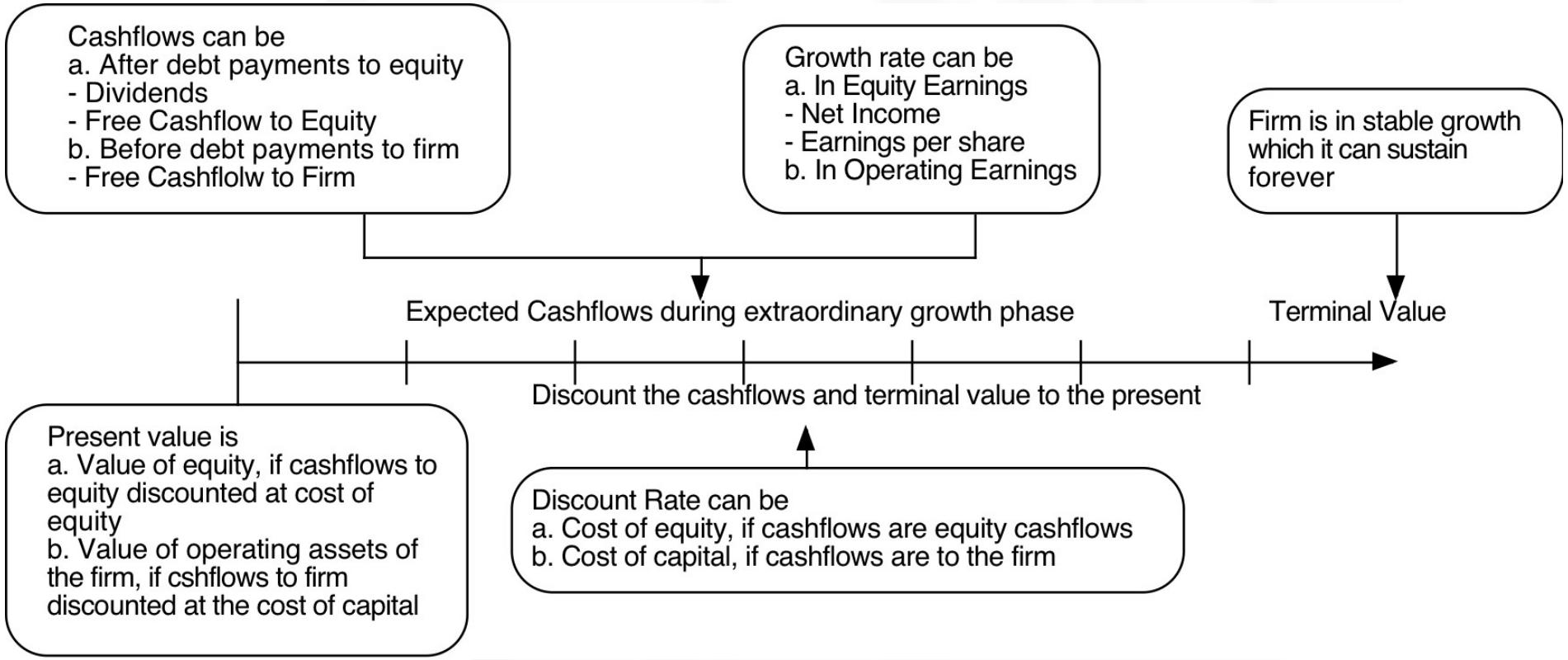
The Ingredients that determine value.



Firm Valuation

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

CF to Firm_t = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

Equity Valuation

- The value of equity is obtained by discounting expected cashflows to equity, i.e., the residual cashflows after meeting all expenses, tax obligations and interest and principal payments, at the cost of equity, i.e., the rate of return required by equity investors in the firm.

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \frac{\text{CF to Equity}_t}{(1+k_e)^t}$$

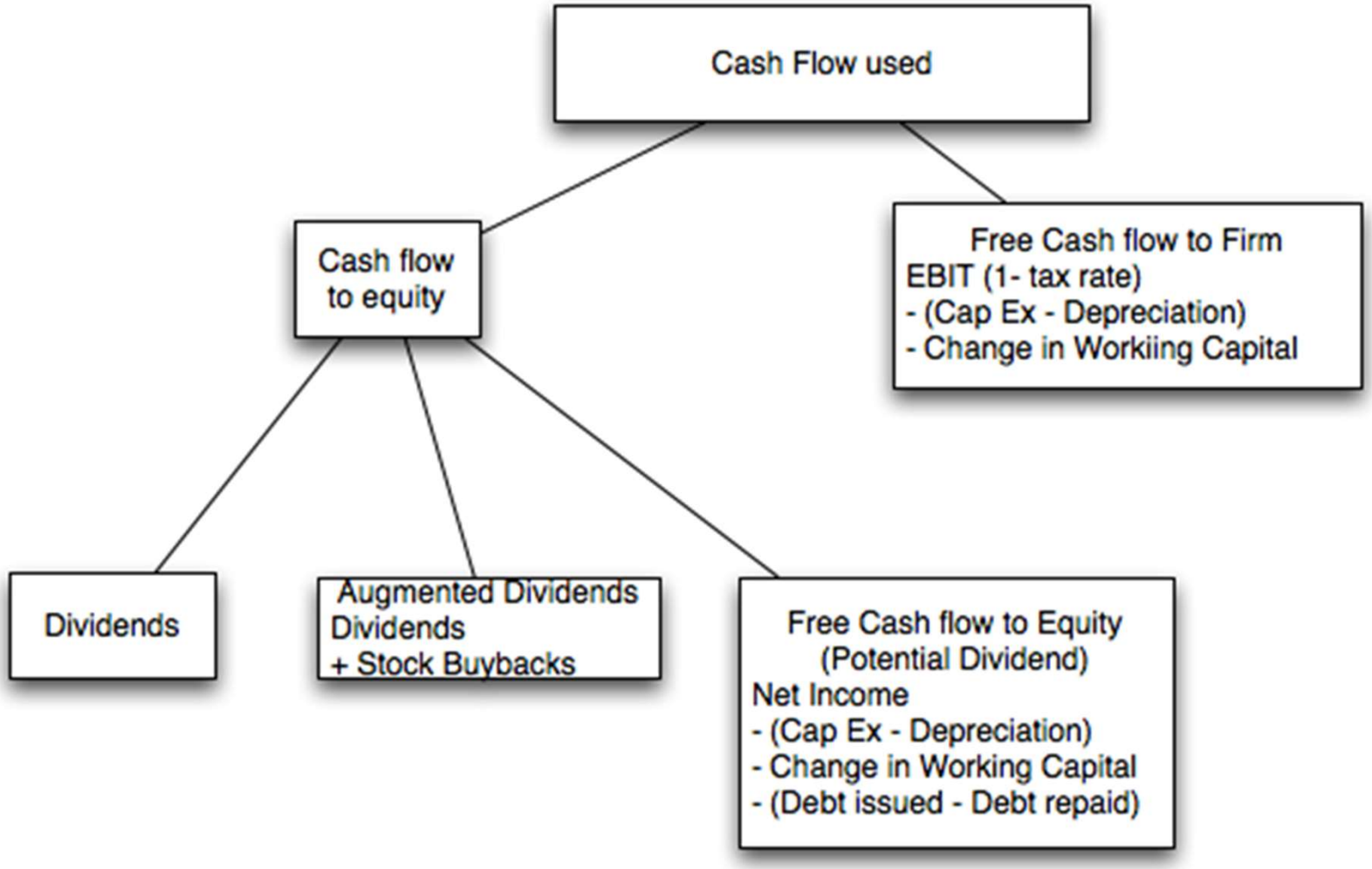
where,

CF to Equity $_t$ = Expected Cashflow to Equity in period t

ke = Cost of Equity

- The dividend discount model is a specialized case of equity valuation, and the value of a stock is the present value of expected future dividends.

I. Estimating Cash Flows



Estimating FCFF: Disney

- In the fiscal year ended September 2013, Disney reported the following:
  - Operating income (adjusted for leases) = $10,032 million
  - Effective tax rate = 31.02%
  - Capital Expenditures (including acquisitions) = $5,239 million
  - Depreciation & Amortization = $2,192 million
  - Change in non-cash working capital = $103 million
- The free cash flow to the firm can be computed as follows:

After-tax Operating Income	= 10,032 (1 -.3102)	= $6,920
- Net Cap Expenditures	= $5,239 - $2,192	= $3,629
- Change in Working Capital	=	=$103
= Free Cashflow to Firm (FCFF)	=	= $3,188

- The reinvestment and reinvestment rate are as follows:
  - Reinvestment = $3,629 + $103 = $3,732 million
  - Reinvestment Rate = $3,732/ $6,920 = 53.93%

II. Discount Rates

- Critical ingredient in discounted cash flow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.
- At an intuitive level, the discount rate used should be consistent with both the riskiness and the type of cashflow being discounted.
- The cost of equity is the rate at which we discount cash flows to equity (dividends or free cash flows to equity). The cost of capital is the rate at which we discount free cash flows to the firm.

Current Cost of Capital: Disney

- The beta for Disney's stock in November 2013 was 1.0013. The T. bond rate at that time was 2.75%. Using an estimated equity risk premium of 5.76%, we estimated the cost of equity for Disney to be 8.52%:

  Cost of Equity = 2.75% + 1.0013(5.76%) = 8.52%
- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 3.75%. Using a marginal tax rate of 36.1, the after-tax cost of debt for Disney is 2.40%.

  After-Tax Cost of Debt = 3.75% (1 – 0.361) = 2.40%
- The cost of capital was calculated using these costs and the weights based on market values of equity (121,878) and debt (15.961):

  Cost of capital =

$$8.52\% \frac{121{,}878}{(15{,}961+121{,}878)} + 2.40\% \frac{15{,}961}{(15{,}961+121{,}878)} = 7.81\%$$

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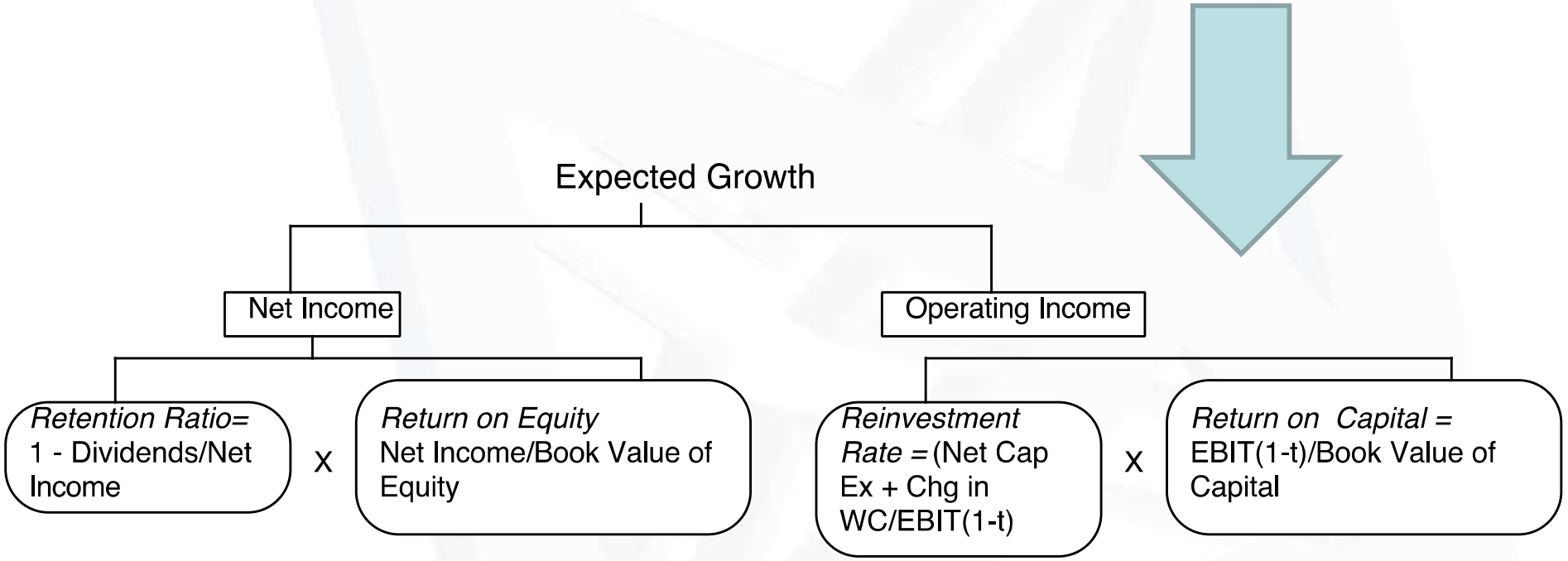
III. Expected Growth



Estimating Growth in EBIT: Disney

- We started with the reinvestment rate that we computed from the 2013 financial statements:

  Reinvestment rate = $\frac{(3{,}629 + 103)}{10{,}032\ (1\text{-}.3102)} = 53.93\%$

  We computed the reinvestment rate in prior years to ensure that the 2013 values were not unusual or outliers.

- We compute the return on capital, using operating income in 2013 and capital invested at the start of the year:

Return on Capital$_{2013}$ = $\frac{\text{EBIT (1-t)}}{\text{(BV of Equity+ BV of Debt - Cash)}} = \frac{10{,}032\ (1\text{-}.361)}{(41{,}958 + 16{,}328 - 3{,}387)} = 12.61\%$

Disney's return on capital has improved gradually over the last decade and has levelled off in the last two years.

- If Disney maintains its 2013 reinvestment rate and return on capital for the next five years, its growth rate will be 6.80 percent:

  Expected Growth Rate from Existing Fundamentals
  = REINVESTMENT RATE X ROC
  = 53.93% * 12.61% = 6.8%

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When everything is in flux: Changing growth and margins

- The elegant connection between reinvestment and growth in operating income breaks down, when you have a company in transition, where margins are changing over time.
- If that is the case, you have to estimate cash flows in three steps:
  - Forecast revenue growth and revenues in future years, taking into account market potential and competition.
  - Forecast a “target” margin in the future and a pathway from current margins to the target.
  - Estimate reinvestment from revenues, using a sales to capital ratio (measuring the dollars of revenues you get from each dollar of investment).

IV. Getting Closure in Valuation

- Since we cannot estimate cash flows forever, we estimate cash flows for a "growth period" and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

- When a firm's cash flows grow at a "constant" rate forever, the present value of those cash flows can be written as:

  Value = Expected Cash Flow Next Period / (r - g)

  where,

  r = Discount rate (Cost of Equity or Cost of Capital)

  g = Expected growth rate forever.

- This "constant" growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.

Getting to stable growth…

- A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:
  - there is no high growth, in which case the firm is already in stable growth
  - there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
  - there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)
- The assumption of how long high growth will continue will depend upon several factors including:
  - the size of the firm (larger firm -> shorter high growth periods)
  - current growth rate (if high -> longer high growth period)
  - barriers to entry and differential advantages (if high -> longer growth period)

Choosing a Growth Period: Examples

	Disney	*Vale*	*Tata Motors*	*Baidu*
Firm size/market size	Firm is one of the largest players in the entertainment and theme park business, but the businesses are being redefined and are expanding.	The company is one of the largest mining companies in the world, and the overall market is constrained by limits on resource availability.	Firm has a large market share of Indian (domestic) market, but it is small by global standards. Growth is coming from Jaguar division in emerging markets.	Company is in a growing sector (online search) in a growing market (China).
Current excess returns	Firm is earning more than its cost of capital.	Returns on capital are largely a function of commodity prices. Have generally exceeded the cost of capital.	Firm has a return on capital that is higher than the cost of capital.	Firm earns significant excess returns.
Competitive advantages	Has some of the most recognized brand names in the world. Its movie business now houses Marvel superheros, Pixar animated characters & Star Wars.	Cost advantages because of access to low-cost iron ore reserves in Brazil.	Has wide distribution/service network in India but competitive advantages are fading there.Competitive advantages in India are fading but Landrover/Jaguar has strong brand name value, giving Tata pricing power and growth potential.	Early entry into & knowledge of the Chinese market, coupled with government-imposed barriers to entry on outsiders.
Length of high-growth period	Ten years, entirely because of its strong competitive advantages/	None, though with normalized earnings and moderate excess returns.	Five years, with much of the growth coming from outside India.	Ten years, with strong excess returns.

Estimating Stable Period Inputs after a high growth period: Disney

- Respect the cap: The growth rate forever is assumed to be 2.5. This is set lower than the riskfree rate (2.75%).
- Stable period excess returns: The return on capital for Disney will drop from its high growth period level of 12.61% to a stable growth return of 10%. This is still higher than the cost of capital of 7.29% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year.
- Reinvest to grow: Based on the expected growth rate in perpetuity (2.5%) and expected return on capital forever after year 10 of 10%, we compute a stable period reinvestment rate of 25%:
  - Reinvestment Rate = Growth Rate / Return on Capital = 2.5% /10% = 25%
- Adjust risk and cost of capital: The beta for the stock will drop to one, reflecting Disney's status as a mature company.

Cost of Equity = Riskfree Rate + Beta * Risk Premium = 2.75% + 5.76% = 8.51%

We assume that the debt ratio for Disney will rise to 20%. Since we assume that the cost of debt remains unchanged at 3.75%, this will result in a cost of capital of

Cost of capital = 8.51% (.80) + 3.75% (1-.361) (.20) = 7.29%

V. From firm value to equity value per share

Approach used	To get to equity value per share
Discount dividends per share at the cost of equity	Present value is value of equity per share
Discount aggregate FCFE at the cost of equity	Present value is value of aggregate equity. Subtract the value of equity options given to managers and divide by number of shares.
Discount aggregate FCFF at the cost of capital	PV = Value of operating assets + Cash & Near Cash investments + Value of minority cross holdings -Debt outstanding = Value of equity -Value of equity options =Value of equity in common stock / Number of shares

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Disney: Inputs to Valuation

	High Growth Phase	*Transition Phase*	*Stable Growth Phase*
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)	31.02% (Effective) 36.1% (Marginal)
Return on Capital	12.61%	Declines linearly to 10%	Stable ROC of 10%
Reinvestment Rate	53.93% (based on normalized acquisition costs)	Declines gradually to 25% as ROC and growth rates drop:	25% of after-tax operating income. Reinvestment rate = g/ ROC = 2.5/10=25%
Expected Growth Rate in EBIT	ROC * Reinvestment Rate = 0.1261*.5393 = .068 or 6.8%	Linear decline to Stable Growth Rate of 2.5%	2.5%
Debt/Capital Ratio	11.5%	Rises linearly to 20.0%	20%
Risk Parameters	Beta = 1.0013, k_e = 8.52%% Pre-tax Cost of Debt = 3.75% Cost of capital = 7.81%	Beta changes to 1.00; Cost of debt stays at 3.75% Cost of capital declines gradually to 7.29%	Beta = 1.00; k_e = 8.51% Cost of debt stays at 3.75% Cost of capital = 7.29%

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Disney: Valuation

Year	Expected growth rate	EBIT	Effective tax rate	EBIT (1-t)	Reinvestment rate	Reinvestment	FCFF
2014	6.80%	$10,714	31.02%	$7,391	53.93%	$3,985	$3,405
2015	6.80%	$11,442	31.02%	$7,893	53.93%	$4,256	$3,637
2016	6.80%	$12,221	31.02%	$8,430	53.93%	$4,546	$3,884
2017	6.80%	$13,052	31.02%	$9,003	53.93%	$4,855	$4,148
2018	6.80%	$13,939	31.02%	$9,615	53.93%	$5,185	$4,430
2019	5.94%	$14,767	31.02%	$10,187	48.14%	$4,904	$5,283
2020	5.08%	$15,517	31.02%	$10,704	42.36%	$4,534	$6,170
2021	4.22%	$16,172	31.02%	$11,156	36.57%	$4,080	$7,076
2022	3.36%	$16,715	31.02%	$11,531	30.79%	$3,550	$7,981
2023	2.50%	$17,133	31.02%	$11,819	25.00%	$2,955	$8,864

Disney: Present value of FCFF

Year	FCFF	Cost of capital	Cumulated Cost of capital	PV of cash flow
2014	$3,405	7.81%	1.0781	$3,158
2015	$3,637	7.81%	1.1624	$3,129
2016	$3,884	7.81%	1.2532	$3,099
2017	$4,148	7.81%	1.3511	$3,070
2018	$4,430	7.81%	1.4567	$3,041
2019	$5,283	7.71%	1.5690	$3,367
2020	$6,170	7.60%	1.6883	$3,655
2021	$7,076	7.50%	1.8149	$3,899
2022	$7,981	7.39%	1.9491	$4,095
2023	$8,864	7.29%	2.0912	$4,239
Aggregate				$34,751

Please, notice that, e.g., for 2021:

$$\text{PV of Cash Flow in 2013} = \frac{7{,}076}{(1.0781)^5(1.0771)(1.0760)(1.0750)} = \$3{,}899 \text{ million}$$

Disney: Terminal value and value of the firm

To compute the terminal value:
Value = Expected Cash Flow Next Period / (r - g)

$$FCFF_{11} = EBIT_{10}(1-t)\,(1+g_n)(1-\text{Reinvestment Rate}_{\text{Stable Growth}})$$
$$= 11{,}819\,(1.025)(1-0.25) = \$9{,}086 \text{ million}$$
$$\text{Terminal Value} = FCFF_{11}/(\text{Cost of Capital}_{\text{Stable Growth}} - g)$$
$$= 9{,}086/\,(0.0729 - 0.025) = \$189{,}738 \text{ million}$$

PV of cash flows during the high growth phase	= $ 34,751
PV of Terminal Value = $\frac{\$189{,}738}{(1.0781)^5(1.0771)(1.076)(1.075)(1.0739)(1.0729)}$	= $ 90,733
+ Cash and Marketable Securities	= $ 3,931
+ Nonoperating Assets (Holdings in Other Companies)	= $ 2,849
Value of the Firm	= $132,264

Value of Equity in Common Stock

= Value of Firm – Debt – Minority interests– Equity Options

= $132,264 – $15,961 - $2,721 – $869 = $112,713

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Disney: Terminal value and value of the firm

Value of Equity in Common Stock

= Value of Firm – Debt – Minority interests– Equity Options

= $132,264 – $15,961 - $2,721 – $869 = $112,713

Dividing by the number of shares outstanding (1800 million), we arrive at a value per share of $62.62, about 10% below the market price of $67.71 at the time of this valuation.

What does this 10% change tell us about?

Value enhancement?

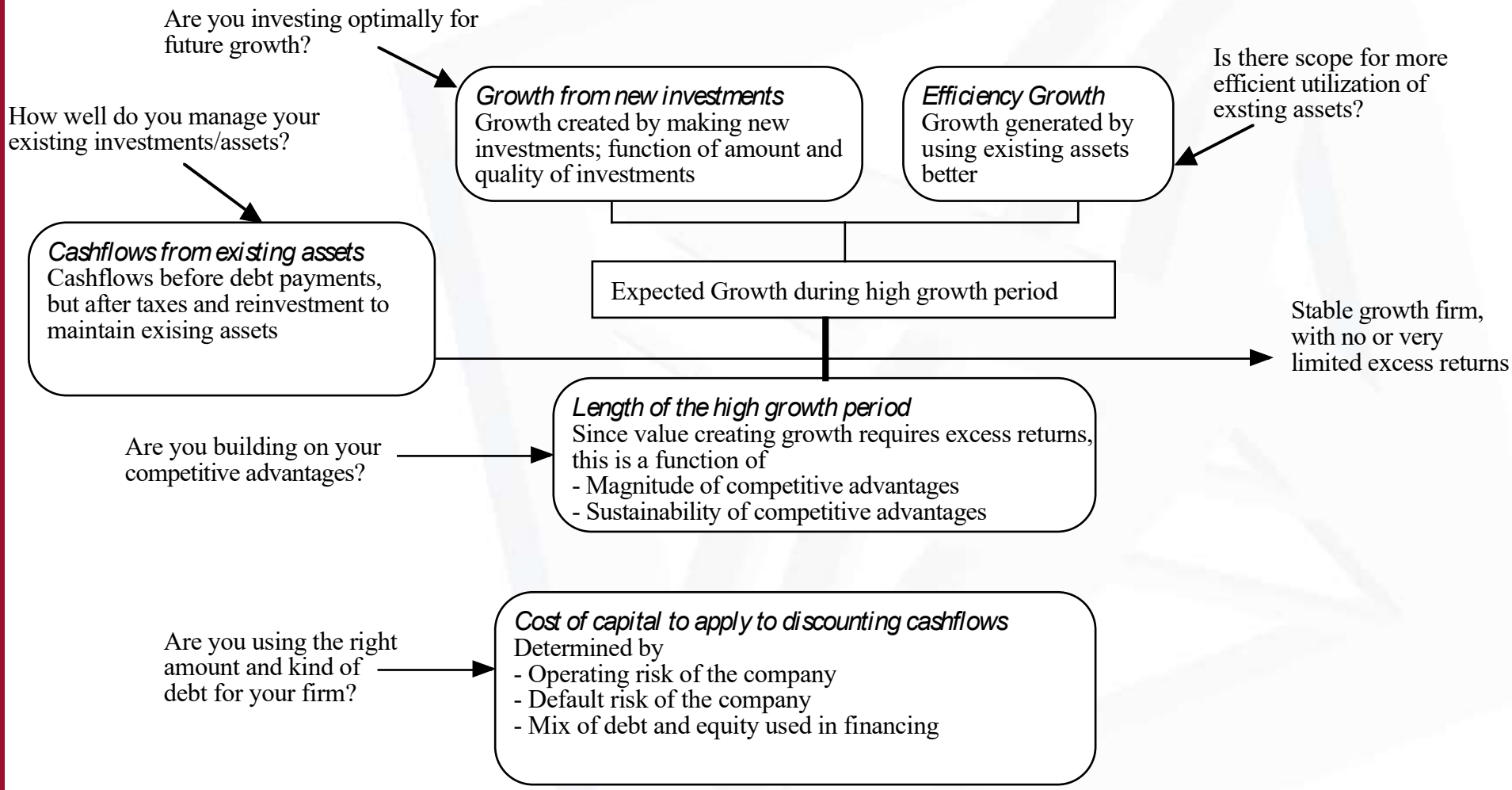
Summing up, the value of a firm depends on:

- Cash-flows from existing investments
- Expected growth rate
- Length of time before stable-growth
- Cost of Capital

Therefore, to *enhance* the value of a firm, we have to change one or more of these input:

- Increase cash flows from existing assets
- Increase the growth rate during the high-growth period
- Increase the length of the high-growth period
- Reduce the cost of capital

Ways of changing value…



Disney: Value enhancement

We have already discussed the optimal debt/equity mix for Disney (40%)

If we re-do the exercise assuming that Disney will be able to reach, at a certain point before year 10, the optimal leverage, we *probably* would obtain a higher value per share

Why probably?

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