## DCF Valuation Process

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    - Beta
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  - Terminal growth rate
  - Present value of terminal value
- Enterprise value/ Equity value
- Recap

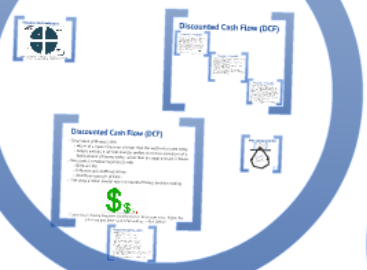
Things should be as simple as possible, but no simpler.
Albert Einstein

## DCF criticism. And, defense

- "DCF is difficult and subjective"
  - So, aren't others?
- "Many value drivers need to be combined to produce a DCF valuation"
  - Multiples also consider same factors
  - DCF focuses on all value drivers rather than combining these into one multiple

Markets can remain irrational longer than you can remain solvent.
~J M Keynes

## Valuation methodologies




## Relative Valuation

- Scale value to?
- Who are comparable companies?
- Best proxy for risk?
- Control for survival?
- Differences in equity claims and illiquidity?

## Valuation Resources

- http://pages.stern.nyu.edu/~adamodar/
- Valuation: Measuring and Managing the Value of Companies, Tom Copeland
- Corporate Valuation: Tools for Effective Appraisal & Decision Making, Bradford Cornell
- The Intelligent Investor, Benjamin Graham
- The Quest for Value, Stewart
- 110 Common Errors in Company Valuation – http://www.vern.com
- www.rbi.org.in
- Beta: www.nsekdia.com
- http://in.finance.yahoo.com/
- Company Financials, scrip prices, ratios - CAPITALINE 2000

## THANK YOU!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Q & A

# DCF Valuation: A Deep Dive

CA Pratik K. Singhi

LAKSHYA CONSULTING

**Agenda**

- DCF Methodology: Detail
- DCF Valuation: Finer Points
- Common Mistakes
- Caselets

# Agenda

- DCF Methodology: Detail
- DCF Valuation: Finer Points
- Common Mistakes
- Caselets

## Why Valuation

Plays key role in many allied areas of finance:

- portfolio management
- sell-offs
- acquisitions
- mergers
- joint ventures
- buy-backs
- corporate finance
- capital budgeting

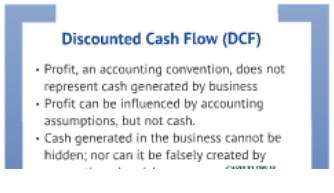
For every complex problem there is a simple solution that is wrong. --G B Shaw

# Valuation methodologies

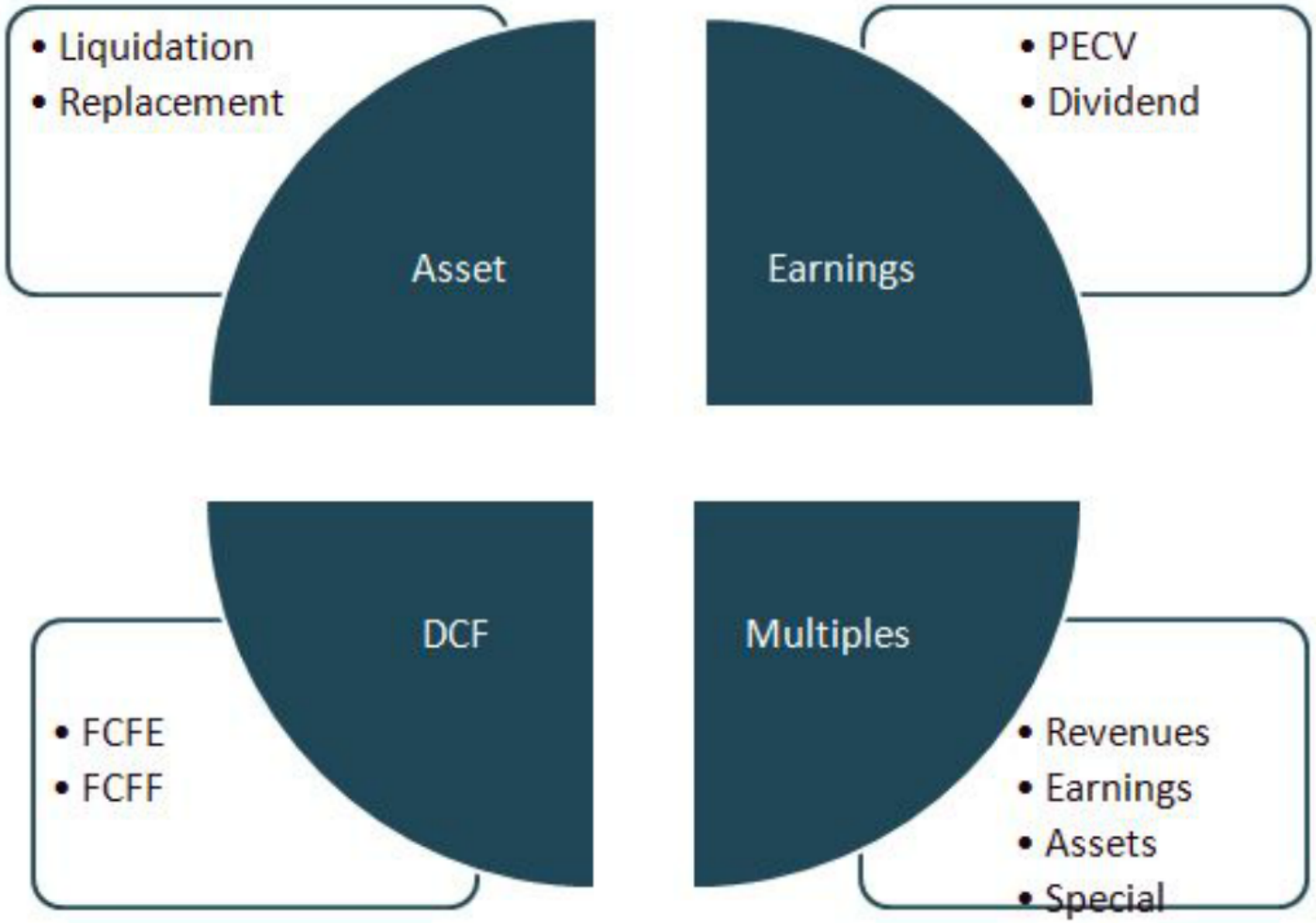
ogies

• PECV
• Dividend

## Discounted Cash Flow (DCF)



# Valuation Methodologies




Of two equivalent theories or explanations, all other things being equal, the simpler one is to be preferred. –-William Ockham

# Discounted Cash Flow (DCF)

### Discounted Cash Flow (DCF)

- Profit, an accounting convention, does not represent cash generated by business
- Profit can be influenced by accounting assumptions, but not cash.
- Cash generated in the business cannot be hidden; nor can it be falsely created by accounting gimmickry


Revenue is vanity, Profit is sanity, Cashflow is reality! --Warren Buffett

### Discounted Cash Flow (DCF)

- Been used in some form since money was first lent at interest in ancient times
- Following the stock market crash of 1929, DCF analysis gained popularity
- 1930: Irving Fisher in'Theory of Interest' talked about modern DCF method
- 1938: John Burr Williams in 'The Theory of Investment Value' formally expressed DCF method in modern economic terms

### Discounted Cash Flow (DCF)

- Foundation in Present Value (PV) rule
- Assumes CFs are the only source of value
- Value can be measured as PV of future CFs
- Most contemporary & universally applied
- International Good Practice Guidance (IGPG) encourages professional accountants in business to promote use of DCF analysis and NPV to evaluate investments

Paper profits on accrual accounting basis is of no more than secondary/tertiary importance for a start up. But cash is what keeps the doors open and pays the bills. -- Guy Kawasaki

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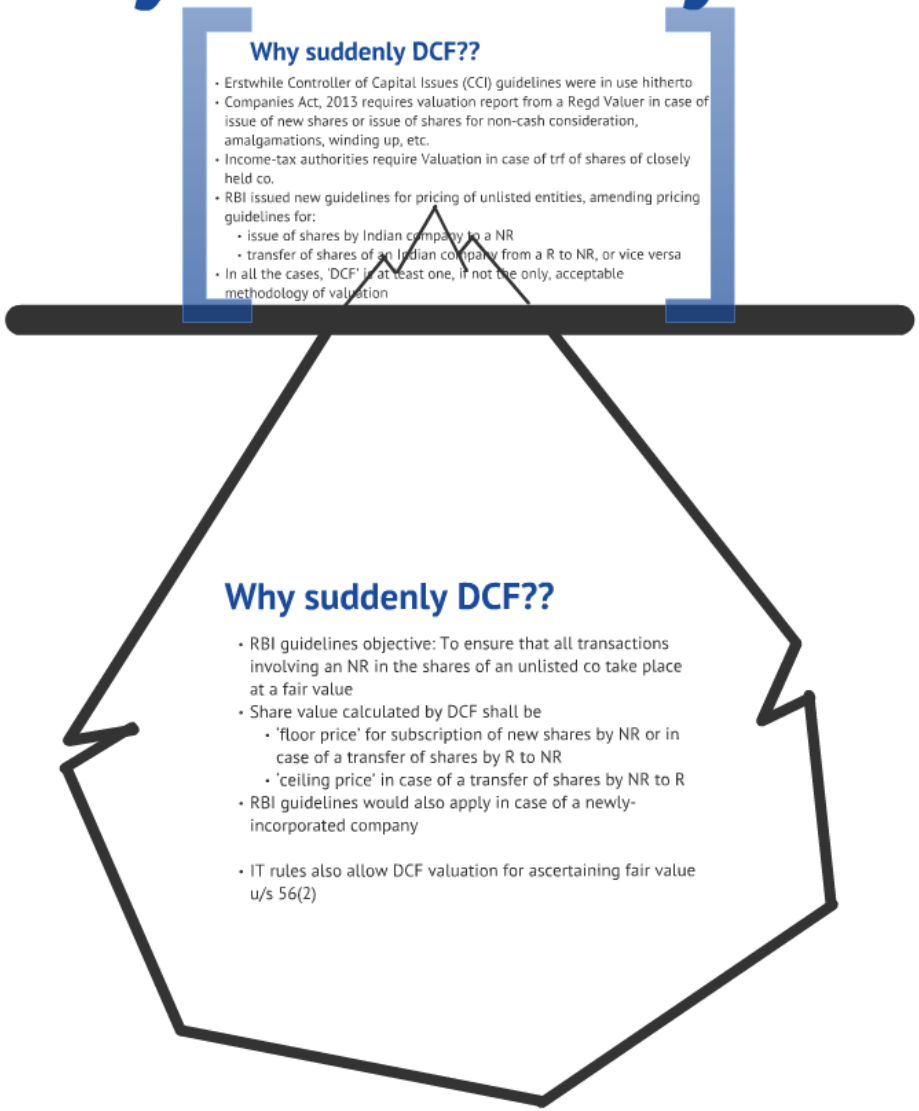
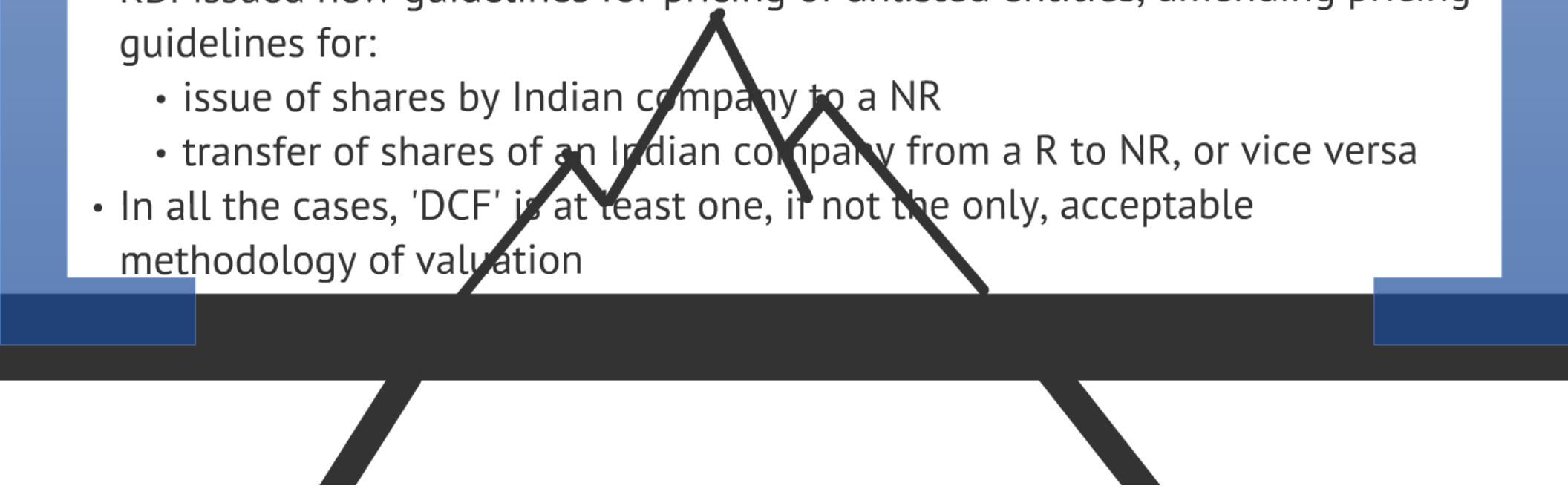
# Why suddenly DCF??



suddenly

# Why suddenly DCF??

- Erstwhile Controller of Capital Issues (CCI) guidelines were in use hitherto
- Companies Act, 2013 requires valuation report from a Regd Valuer in case of issue of new shares or issue of shares for non-cash consideration, amalgamations, winding up, etc.
- Income-tax authorities require Valuation in case of trf of shares of closely held co.
- RBI issued new guidelines for pricing of unlisted entities, amending pricing guidelines for:
  - issue of shares by Indian company to a NR
  - transfer of shares of an Indian company from a R to NR, or vice versa
- In all the cases, 'DCF' is at least one, if not the only, acceptable methodology of valuation



# Why suddenly DCF??

- RBI guidelines objective: To ensure that all transactions involving an NR in the shares of an unlisted co take place at a fair value
- Share value calculated by DCF shall be
  - 'floor price' for subscription of new shares by NR or in case of a transfer of shares by R to NR
  - 'ceiling price' in case of a transfer of shares by NR to R
- RBI guidelines would also apply in case of a newly-incorporated company

- IT rules also allow DCF valuation for ascertaining fair value u/s 56(2)

## But how is DCF currently being applied in practice?

# DCF Valuation Process

- Future projections
- Free cash flows (FCFs)
- Weighted average cost of capital (WACC)
  - Cost of debt
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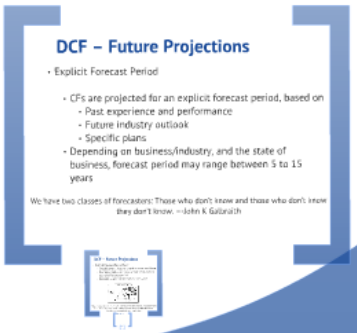



# E-I-C Analysis

## Economic Analysis


If you laid all economists in the world end to end, you still wouldn't reach a conclusion.

## Economic Analysis


An economist is an expert who will know tomorrow why the things he predicted yesterday didn't happen today.


"Due to recent economic conditions, picture worth has dropped to an all time low of 842 words."

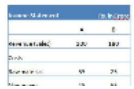
## Industry Analysis


We do not have, never have had, and never will have an opinion about where the stock market, interest rates or business activity will be a year from now. --Warren Buffett

## Company Analysis


Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted. --Albert Einstein

## Ratio Analysis



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# Company Analysis


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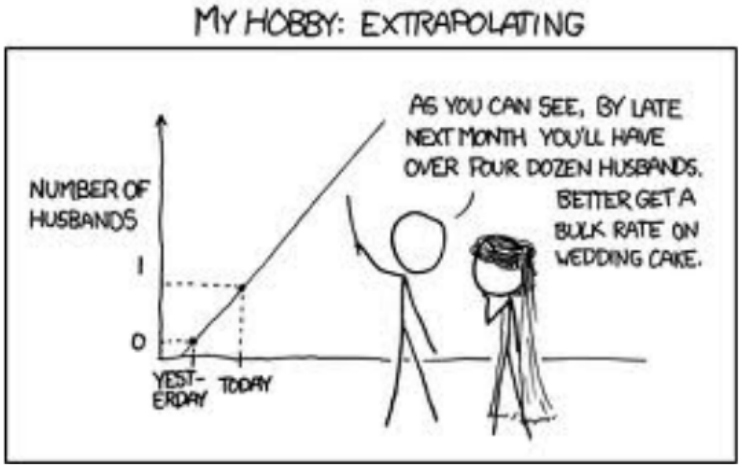
# DCF – Future Projections

- Explicit Forecast Period
  - CFs are projected for an explicit forecast period, based on
    - Past experience and performance
    - Future industry outlook
    - Specific plans
  - Depending on business/industry, and the state of business, forecast period may range between 5 to 15 years

We have two classes of forecasters: Those who don't know and those who don't know they don't know. –-John K Galbraith

# DCF – Future Projections

- Explicit Forecast Period Test?
  - Should cover at least one cycle of boom and doom
  - Business should attain steady state of operations by end of forecast period
  - Depending upon circumstances, 3-15 years




However good our futures research may be, we shall never be able to escape from the ultimate dilemma that all our knowledge is about the past, and all our decisions are about the future. --Ian Wilson

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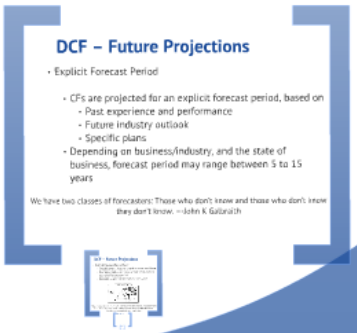


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# DCF – Free Cash Flows

- Free Cash Flows to Firm (FCFF)
  - Not the same as operating CF
  - Residual CF after meeting all cash operating expenditure, but prior to any payments to financing stakeholder
  - Net of working capital and capex needed to support future forecast FCF
  - Always post-tax
  - Cash available to all finance providers
  - = Debt cash flow + Equity cash flow

We'd rather be vaguely right than precisely wrong. --J M Keynes

# DCF – Free Cash Flows

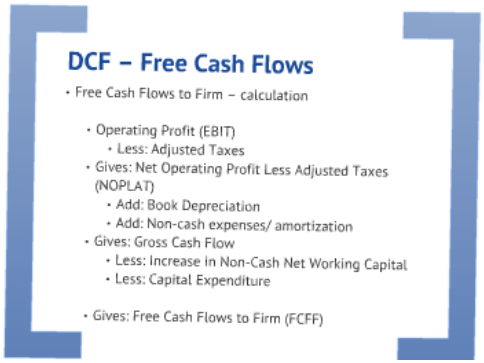
- Interest Exclusion Principle

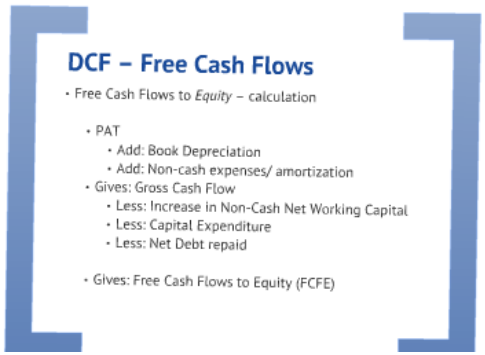
Business' perspective, not just equity owners'. Hence, firm's FCF (FCFF), rather than equity holders' FCF (FCFE)

Financing decisions to fund long term capital funding requirements are ignored

**Interest Exclusion Principle**

**Financing decisions reflected in WACC through D:E ratio**



# DCF – Free Cash Flows

- Free Cash Flows to Firm – calculation
  - Operating Profit (EBIT)
    - Less: Adjusted Taxes
  - Gives: Net Operating Profit Less Adjusted Taxes (NOPLAT)
    - Add: Book Depreciation
    - Add: Non-cash expenses/ amortization
  - Gives: Gross Cash Flow
    - Less: Increase in Non-Cash Net Working Capital
    - Less: Capital Expenditure
  - Gives: Free Cash Flows to Firm (FCFF)

# DCF – Free Cash Flows

- Free Cash Flows to *Equity* – calculation
  - PAT
    - Add: Book Depreciation
    - Add: Non-cash expenses/ amortization
  - Gives: Gross Cash Flow
    - Less: Increase in Non-Cash Net Working Capital
    - Less: Capital Expenditure
    - Less: Net Debt repaid
  - Gives: Free Cash Flows to Equity (FCFE)

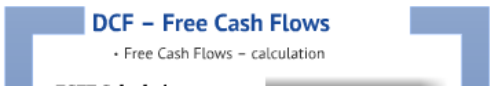
# DCF – Free Cash Flows calcn

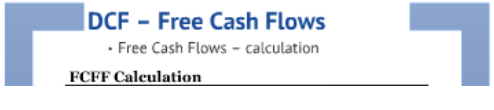
**Profitability Statement**

| Particulars | Yr1 | Yr2 | Yr3 |
|---|---|---|---|
| Revenues | 1,500 | 1,800 | 2,100 |
| CoGS | - 750 | - 900 | -1,050 |
| Cash SG&A | - 200 | - 210 | - 220 |
| Depreciation | - 100 | - 120 | - 130 |
| Operating Profit | 450 | 570 | 700 |
| Interest | - 100 | - 90 | - 80 |
| PBT | 350 | 480 | 620 |
| Taxes @ 40% | - 140 | - 192 | - 248 |
| PAT | 210 | 288 | 372 |
| Dividend | - 10 | - 88 | - 172 |
| Trf to Reserve | 200 | 200 | 200 |

**Balance Sheet**

| Particulars | Yr1 | Yr2 | Yr3 |
|---|---|---|---|
| Networth | 1,700 | 1,900 | 2,100 |
| Long-term loans | 1,400 | 1,520 | 1,650 |
| Funds Sourced | 3,100 | 3,420 | 3,750 |
| Net block of Assets | 2,700 | 2,900 | 3,100 |
| Investments | 100 | 100 | 100 |
| Cash Net Wkg Capital | 250 | 350 | 450 |
| Cash & Bank Balance | 50 | 70 | 100 |
| Funds Applied | 3,100 | 3,420 | 3,750 |
| | | | |



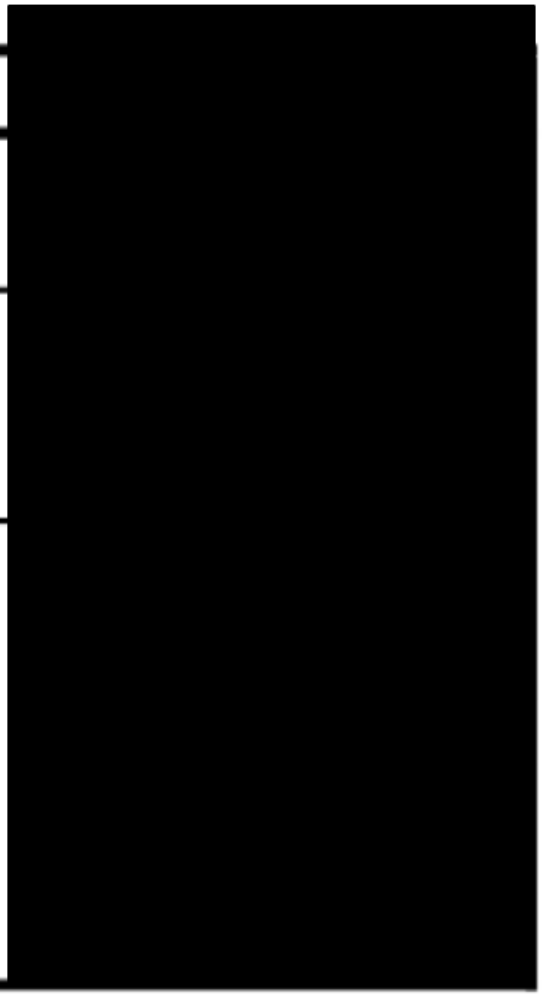



# DCF – Free Cash Flows

- Free Cash Flows – calculation

**FCFF Calculation**

| Particulars | Yr1 |
|---|---|
| Operating profit<br>Less: Adjusted taxes | |
| NOPLAT<br>Add: Depreciation<br>Add: Non-cash Expenses | |
| Gross Cash Flow<br><br>Less: Increase in W/C<br>Less: Capex<br><br>**Free Cash Flow to Firm** | |



# DCF – Free Cash Flows

- Free Cash Flows – calculation

**FCFF Calculation**

| Particulars | Yr1 | Yr2 | Yr3 |
|---|---|---|---|
| Operating profit | | 570 | 700 |
| Less: Adjusted taxes | | - 228 | - 280 |
| NOPLAT | | 342 | 420 |
| Add: Depreciation | | 120 | 130 |
| Add: Non-cash Expenses | | - | - |
| Gross Cash Flow | | 462 | 550 |
| Less: Increase in W/C | | - 100 | - 100 |
| Less: Capex | | - 320 | - 330 |
| **Free Cash Flow to Firm** | | **42** | **120** |

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# DCF – WACC

- Discounting Factor
  - Generally, WACC
  - WACC = [(Kd*D)+(Ke*E)] /(D+E)
  - where
    - Kd = post-tax cost of debt
    - Ke = cost of equity
    - D = market value of debt
    - E = market value of equity

# DCF – WACC

- Cost of Debt
  - Kd = Rd (1 – Tc)
  - where:
    - Kd = post-tax cost of debt
    - Rd = coupon rate of interest
    - Tc = effective rate of tax paid by firm
  - E.g., if a firm borrows debt at interest rate of 12% and lies in 30% effective tax bracket, its Kd is
    - 8.4%. since 12% (1-30%) = 8.4%

# DCF – WACC

- Cost of Equity – CAPM
  - Ke = Rf + **(β)** * (Rm – Rf)
  - where:
    - Ke = cost of equity
    - Rf = risk-free rate of return
    - **(β)** = risk factor of the cash-flows
    - Rm = rate of return on a diversified portfolio (SE benchmark index)
  - E.g., if the Rf is 6% and the Rm is 10%, the Ke of a firm with beta of 2 is
    - 14%. since 6% + 2 (10% - 6%) = 14%

# DCF – WACC issues

- Cost of Equity – risk premium
  - As seen below for US stock markets, depends heavily on choice of
    - index
    - period of observation

| Average returns during period | Stocks | T-Bills | T-Bonds | MRP (T-Bills) | MRP (T-Bonds) |
|---|---|---|---|---|---|
| 1928-1953 | 6.49% | 1.02% | 2.92% | 5.47% | 3.57% |
| 1928-1999 | 10.76% | 3.87% | 4.79% | 6.89% | 5.96% |
| 1928-2002 | 9.62% | 3.89% | 5.09% | 5.73% | 4.53% |
| 1962-2002 | 9.90% | 5.99% | 7.14% | 3.90% | 2.76% |
| **1992-2002** | **9.09%** | **4.40%** | **8.14%** | **4.69%** | **0.95%** |

# DCF – WACC


- Beta **(β)**
  - Measures volatility of firm's stock price relative to that of given market index
  - Statistically, beta is relationship b/w
    - covariance of selected stock with well-diversified market portfolio and
    - the variance of that portfolio
  - **(β)** = Covariance of asset with Market/ Variance of the market

Uncertainty is not a result of ignorance or the partiality of human knowledge, but is a characteristic of the world itself. --M Taylor

# DCF – WACC

- Beta **(ß)**
  - Symbolic representation of riskiness of the underlying cash flows, vis-à-vis those of a well diversified portfolio
  - Directly proportionate to firm's sensitivity to market conditions
  - E.g., if benchmark index moves up by 5% and simultaneously scrip moves:
    - Increase by 7%, its beta is 1.4
    - Decrease by 9%, its beta is -1.8

# DCF – WACC

- Beta **(β)**
- In case of calculations based on stock market data
  - Un-levered industry/segment average beta is considered
  - Bu = Blv / [1+ (D:E)*(1-t)]

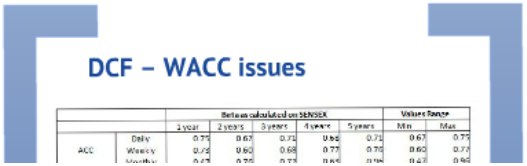
$$\beta_u = \beta_{lv} \;/\; [1+ (D:E)*(1-t)]$$

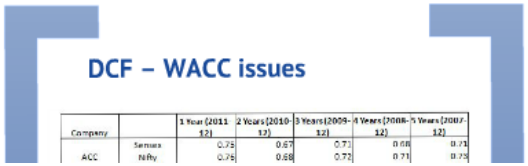
  - Re-levered to target company's target D:E ratio
    - many formulae provided by various authors/ practitioners

$$\beta_{rlv} = \beta_u * [1+ (D_t:E_t)*(1-t)]$$

# DCF – WACC

- Beta is a highly sensitive value driver
- To be chosen/calculated carefully.  Varies with choice of:
  - market index (for e.g., Sensex, Nifty, BSE 200, NSE 100, etc.)
  - time period covered by underlying observational data points (one year, two years, five years, etc.)
  - return interval (daily, weekly, monthly, bi-monthly, quarterly, semi-annually, annually, etc.)



# DCF – WACC issues

| | | Beta as calculated on SENSEX | | | | | Values Range | |
|---|---|---|---|---|---|---|---|---|
| | | 1 year | 2 years | 3 years | 4 years | 5 years | Min | Max |
| ACC | Daily | 0.75 | 0.67 | 0.71 | 0.68 | 0.71 | 0.67 | 0.75 |
| | Weekly | 0.73 | 0.60 | 0.68 | 0.77 | 0.76 | 0.60 | 0.77 |
| | Monthly | 0.47 | 0.76 | 0.72 | 0.63 | 0.96 | 0.47 | 0.96 |
| Balrampur Chinni | Daily | 0.98 | 1.05 | 0.93 | 0.90 | 0.99 | 0.90 | 1.05 |
| | Weekly | 1.06 | 1.12 | 0.95 | 1.09 | 1.01 | 0.95 | 1.12 |
| | Monthly | 2.65 | 1.98 | 1.24 | 1.44 | 1.67 | 1.24 | 2.65 |
| Bhel | Daily | 1.11 | 0.99 | 0.99 | 0.98 | 1.00 | 0.98 | 1.11 |
| | Weekly | 0.92 | 0.95 | 0.92 | 0.94 | 1.02 | 0.92 | 1.02 |
| | Monthly | 0.96 | 0.80 | 0.85 | 0.82 | 0.81 | 0.80 | 0.96 |
| Grasim | Daily | 0.66 | 0.59 | 0.65 | 0.66 | 0.69 | 0.59 | 0.69 |
| | Weekly | 0.76 | 0.63 | 0.72 | 0.72 | 0.75 | 0.63 | 0.76 |
| | Monthly | 0.33 | 0.60 | 0.70 | 0.79 | 1.46 | 0.33 | 1.46 |
| Maruti | Daily | 0.67 | 0.72 | 0.71 | 0.70 | 0.70 | 0.67 | 0.72 |
| | Weekly | 0.69 | 0.78 | 0.74 | 0.76 | 0.74 | 0.69 | 0.78 |
| | Monthly | 1.52 | 1.27 | 1.11 | 0.75 | 0.96 | 0.75 | 1.52 |
| WIPRO | Daily | 0.83 | 0.79 | 0.82 | 0.88 | 0.85 | 0.79 | 0.88 |
| | Weekly | 0.80 | 0.66 | 0.67 | 0.81 | 0.77 | 0.66 | 0.81 |
| | Monthly | 0.49 | 0.55 | 0.82 | 0.80 | 0.78 | 0.49 | 0.82 |

# DCF – WACC issues

| Company | | 1 Year (2011-12) | 2 Years (2010-12) | 3 Years (2009-12) | 4 Years (2008-12) | 5 Years (2007-12) |
|---|---|---|---|---|---|---|
| ACC | Sensex | 0.75 | 0.67 | 0.71 | 0.68 | 0.71 |
| | Nifty | 0.76 | 0.68 | 0.72 | 0.71 | 0.73 |
| | CNX 500 | 0.80 | 0.74 | 0.78 | 0.77 | 0.78 |
| Balrampur Chinni | Sensex | 0.98 | 1.05 | 0.93 | 0.90 | 0.99 |
| | Nifty | 0.99 | 1.06 | 0.94 | 0.93 | 1.02 |
| | CNX 500 | 1.14 | 1.22 | 1.08 | 1.06 | 1.15 |
| Bhel | Sensex | 1.11 | 0.99 | 0.99 | 0.98 | 1.00 |
| | Nifty | 1.12 | 0.98 | 0.98 | 1.00 | 1.01 |
| | CNX 500 | 1.23 | 1.08 | 1.04 | 1.06 | 1.05 |
| Grasim | Sensex | 0.66 | 0.59 | 0.65 | 0.66 | 0.69 |
| | Nifty | 0.66 | 0.59 | 0.65 | 0.69 | 0.71 |
| | CNX 500 | 0.70 | 0.65 | 0.69 | 0.73 | 0.74 |
| Maruti | Sensex | 0.67 | 0.72 | 0.71 | 0.70 | 0.70 |
| | Nifty | 0.69 | 0.73 | 0.71 | 0.72 | 0.70 |
| | CNX 500 | 0.74 | 0.79 | 0.75 | 0.76 | 0.73 |
| Wipro | Sensex | 0.83 | 0.79 | 0.82 | 0.88 | 0.85 |
| | Nifty | 0.81 | 0.78 | 0.80 | 0.89 | 0.84 |
| | CNX 500 | 0.83 | 0.79 | 0.79 | 0.90 | 0.83 |

# WACC

| Calculation of Discounting Factor | | |
|---|---|---|
| Risk-free rate of return | 6.87% | |
| Market Risk Premium | 5.00% | |
| Beta | 2.00 | |
| Cost of Equity | | 16.87% |
| Rate of Interest | 13.50% | |
| Tax rate | 33.99% | |
| Cost of Debt | | 8.91% |
| Debt: total capital | 20.00% | |
| **WACC** | | **15.28%** |

# DCF Valuation Process

- Future projections
- Free cash flows (FCFs)
- Weighted average cost of capital (WACC)
  - Cost of debt
  - Cost of equity
    - Risk-free rate of return
    - Market risk premium
    - Beta
- Terminal value
- Enterprise value/ Equity value
- Recap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- Terminal value
  - Terminal growth rate
  - Present value of terminal value
- Enterprise value/ Equity value
- Recap

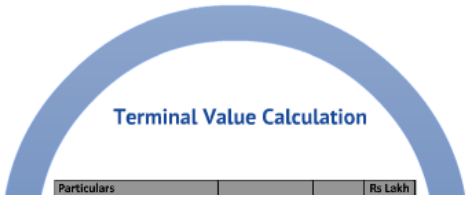
# DCF – Terminal Value

- Terminal Value
  - Business, as a going concern, is assumed to be carrying on operations in perpetuity, i.e., infinity
  - TV is firm's value at end of explicit forecast period
  - TV captures firm's value for operations beyond explicit forecast period

Do not count your chicken before they stop breeding. --Aesopeus

# DCF – Terminal Value

- Terminal Value
  - FCFF(n+1)/ (WACC – g)
  - where:
    - FCFF(n+1) = FCFF in year after explicit forecast period
    - g = steady state growth rate of FCF till infinity
  - E.g., if FCFF for last forecast year is 1000, WACC is 18% and terminal growth rate is 3%, the TV is
    - 6867, being 1000*1.03 / (0.18-0.03)




# Terminal Value Calculation

| Particulars | | | Rs Lakh |
|---|---|---|---|
| Final Year FCF | A | | 5,046 |
| Terminal Growth Rate | B | 2.50% | |
| WACC | C | 15.28% | |
| Terminal Value | D=A*(1+B)/(C-B) | | 40,480 |
| PV Factor | E | 0.28 | |
| **Terminal Value in PV terms** | **D*E** | | **11,259** |

# DCF – Terminal Value

- Terminal Value
  - Perpetuity formula does not work where g ⩾ WACC
  - BUT this is impossible - g exceeding r in perpetuity implies the business eventually would be larger than the whole economy!!

# DCF Valuation Process

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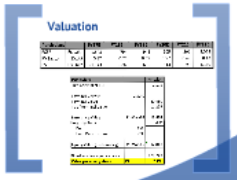

# DCF – Enterprise/Equity Value

- Enterprise Value
  - PV of FCFs during forecast period
  - Add: PV of terminal value
  - Add: Cash & Bank
  - Add: Market value of Investments


- Equity Value
  - Enterprise value
  - Less: Debt

# Valuation

| Particulars | | FY17E | FY18E | FY19E | FY20E | FY21E | FY22E |
|---|---|---|---|---|---|---|---|
| FCFF | Rs Lakh | -1,548 | -794 | -943 | -905 | 201 | 3,074 |
| PV factor | 15.3% | 0.87 | 0.75 | 0.65 | 0.57 | 0.49 | 0.43 |
| PV | Rs Lakh | -1,343 | -597 | -616 | -513 | 99 | 1,310 |

| Particulars | | Rs Lakh |
|---|---|---|
| Sum of PV of all FCFF | | 2,575 |
| Terminal Growth | 2.50% | |
| Terminal Value | | 40,480 |
| PV of terminal Value | | 11,259 |
| **Enterprise Value** | **31-Mar-16** | **13,834** |
| Less: Net Debt | | -966 |
| Debt | 939 | |
| Less: Cash on Hand | -27 | |
| **Equity Value (post-money)** | **31-Mar-16** | **12,868** |
| No of existing equity shares | | 178,743 |
| **Value per equity share** | INR | **7,199** |

# DCF Valuation Process

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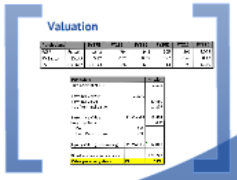

# DCF Valuation Process

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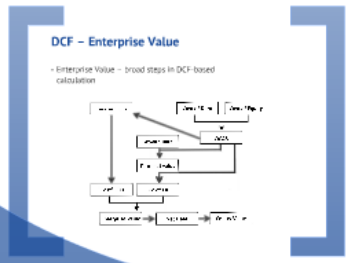
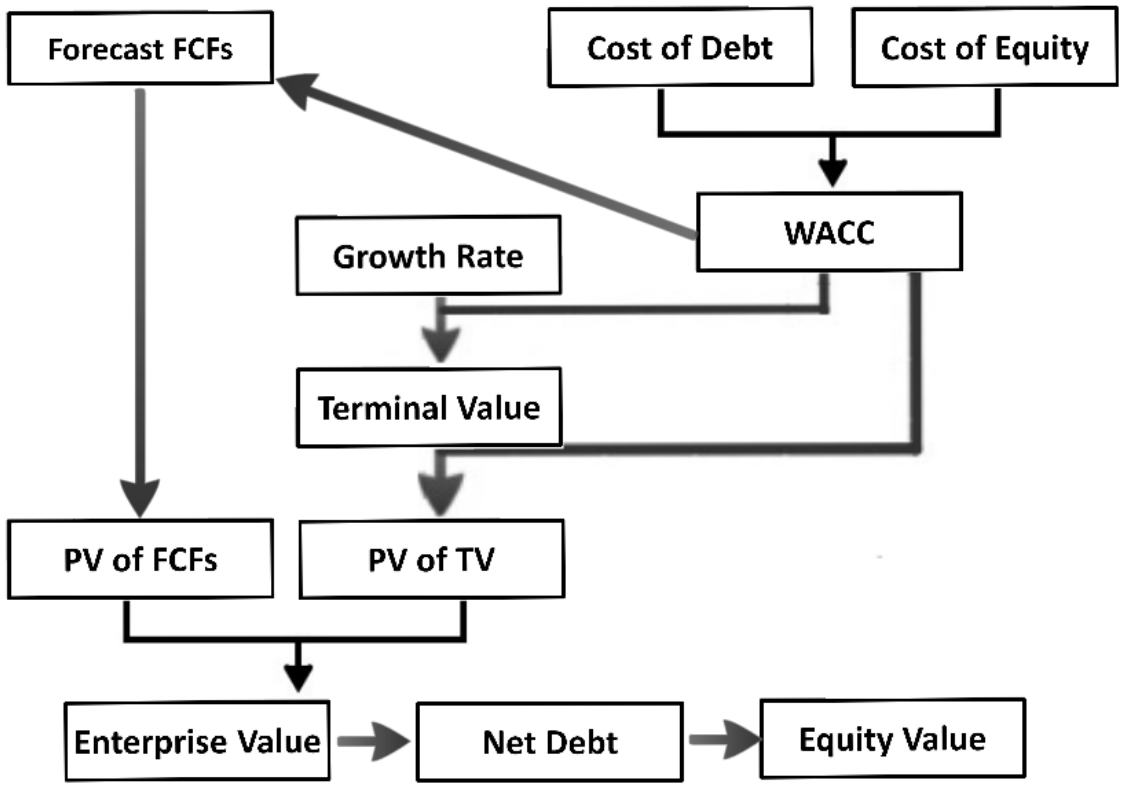



# DCF – Enterprise Value

- Enterprise Value – broad steps in DCF-based calculation



# A tool is only as good as you put it to!!

# DCF criticism. And, defense

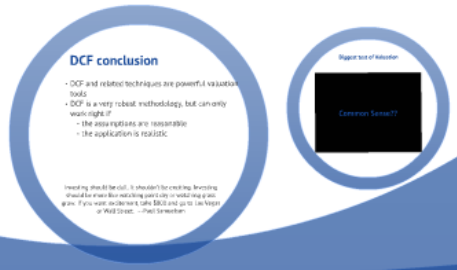
- "DCF is difficult and subjective"
  - So, aren't others?
- "Many value drivers need to be combined to produce a DCF valuation"
  - Multiples also consider same factors
  - DCF focuses on all value drivers rather than combining these into one multiple

Markets can remain irrational longer than you can remain solvent.
--J M Keynes

# DCF criticism. And, defense

- "DCF requires WACC and nobody seems to have a clue of what it is"
  - Differences in required return is a key factor in valuation
- "DCF is very sensitive to long term growth assumptions"
  - So are multiples. The problem is mitigated by using zero value adding long term growth assumptions

Take every gain without remorse for missed profits.
--Joseph de la Vega

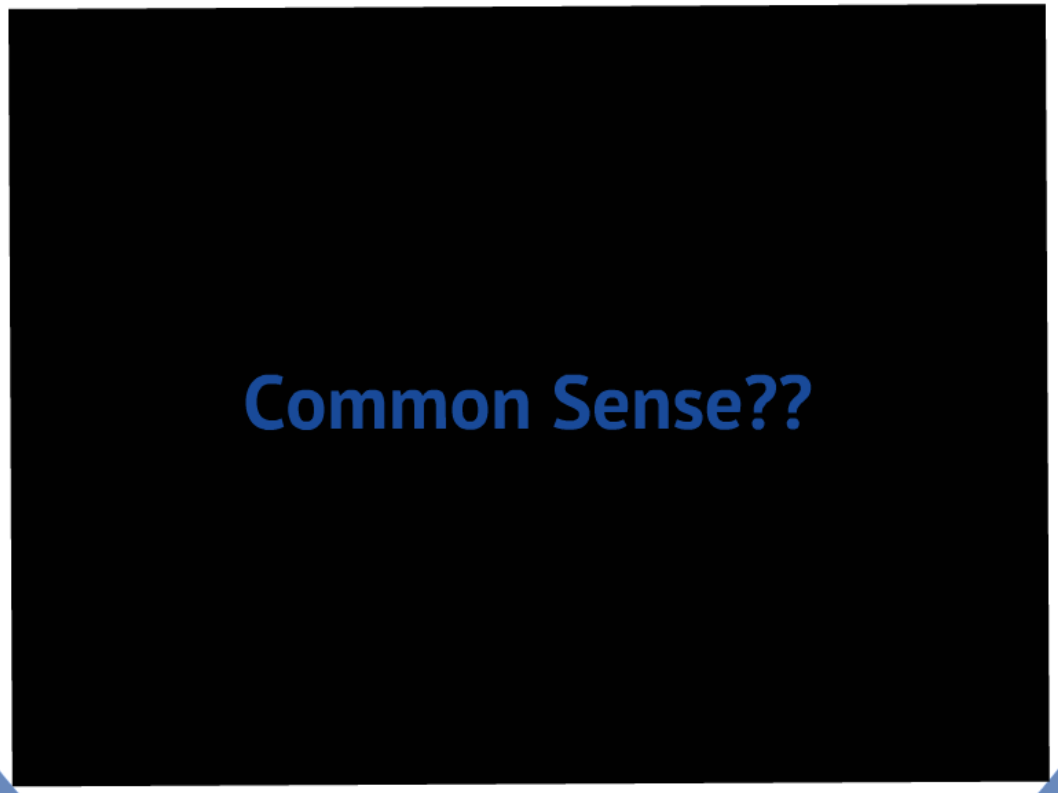


# DCF conclusion

- DCF and related techniques are powerful valuation tools
- DCF is a very robust methodology, but can only work right if
  - the assumptions are reasonable
  - the application is realistic

Investing should be dull. It shouldn't be exciting. Investing should be more like watching paint dry or watching grass grow. If you want excitement, take $800 and go to Las Vegas or Wall Street. --Paul Samuelson

## Biggest test of Valuation



# Valuation Resources

- http://pages.stern.nyu.edu/~adamodar/
- Valuation Concepts, Tom Copeland
- Corporate Valuation: Tools for Effective Appraisal & Decision Making, Bradford Cornell
- The Intelligent Investor, Benjamin Graham
- The Quest for Value, Stewart
- 110 Common Errors in Company Valuation – http://www.ssrn.com
- www.rbi.org.in
- Beta: www.nseindia.com
- http://in.finance.yahoo.com/
- Company financials, scrip prices, ratios - CAPITALINE 2000

# THANK YOU!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