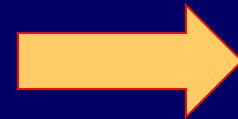




# ESTIMATING DISCOUNT RATES, GROWTH RATES, AND CASH FLOWS

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# Cost of Equity

- Start with cost of equity and then shift to the complications in computation due to (a) betas (b) country risk premium (c) estimating risk free rate of return (d) cost of equity for a unlisted entity etc.

## ■ The Capital Asset Pricing Model

- Cost of Equity =  $R_f + \text{Equity Beta} (E(R_m) - R_f)$
- Beta is equal to  $[\text{Covariance of asset with market portfolio}] / [\text{Variance of the market portfolio}]$
- Beta's can be very different based on the data used for computation.
- Beta's are also adjusted for statistical errors.
- 360D T-bill rate is 6.99% and 10-year T-bond rate is 7.63%
- Suggested adjustments:
- Risk free rate of return = Local Government Bond Rate – Default Spread

# Cost of Equity

- The risk premium is generally computed using historical data (can be done using survey premiums)
- Prefer using longer time-span data, geometric returns, t-bonds
- Ibbotson Associates provides relevant data
- Country risk premium is dependant on:
  - Variance in the underlying economy
  - Political risk
  - Structure of the market
- Country risk premiums:
- Equity risk premium = Base premium for mature equity market + Country premium

# Cost of Equity

- Country premium can be computed:
  - Country default bond spreads
  - Relative standard deviations
  - Default spread plus relative standard deviation
- Implied equity risk premiums
  - Use the current level of the market
  - Use the expected dividend yield on the index for the next period
  - Use the expected growth rate in the earnings and dividends in the long-term
- Emerging markets (i.e., most Asian markets) usually carry a premium of 6-7% over the Government bond rate.
- Illustration using Wockhardt

# Cost of Equity

Estimating betas using regressions:

- Length of the estimation period
- Length of the return interval
- Choice of the market index to use
- Likelihood of estimation errors & adjustments

Determinants of Beta

- Type of business
- Degree of operating leverage
- Degree of financial leverage
- Financial Leverage  $B_L = B_U(1 + (1 - t)(D/E))$
- Other approaches to estimating betas:
  - Using comparable firms
  - Using fundamental factors

# Cost of Equity

- Using comparable firms
  - For say, a firm with multiple divisions (or any other enterprise) should opt for the following steps:
    - Identify the businesses that make up the firm
    - Estimate the average betas of other publicly traded firms: Comparable firms → beta estimation → Unlever last → Use simple averaging approach → Adjustment for Cash
    - Take a weighted average of unlevered beta of the businesses the firm operates in (i.e., estimate market values or use revenues or operating income as weights)
    - Calculate the current debt to equity ratio
    - Estimate the levered beta of the firm

# Cost of Equity

## Using fundamental factors


- Accounting betas (based on volatility in earnings data)
- Identifying quantifiable factors and then regressing:
  - $\text{Beta} = 0.9832 + 0.08 \text{ CV in operating income} - 0.126 \text{ Dividend yield} + \text{debt/equity ratio} + 0.034 \text{ Growth in earnings per share} - 0.00001 \text{ Total assets}$
  - Using in conjunction with historical betas
  - The Arbitrage Pricing Model
- Dividend Growth Model
- Other issues: (a) small firm premiums (b) privately and closely held businesses
- Illustration on Wockhardt and Dhandapani Finance
- Do the above for your firm

# Weighted Average Cost of Capital

- Calculating the cost of debt
  - The current level of interest rates
  - The default risk of the company
  - The tax advantage associated with debt
  - After cost of debt = pretax cost of debt  $(1 - \text{taxrate})$
- Cost of preferred stock
- Include the cost of special features (say, convertibles)
- Calculating the weights
  - We need to measure the cost of issuing securities
  - Lenders do lend on the basis of market value



# Categorizing Cash Flows

- Categorizing cash flows
  - $FCFE = \text{Net Income} - (\text{Capex} - \text{Depreciation}) - \Delta \text{Non-Cash Working Capital} + (\text{New debt raised} - \text{Debt repaid})$
  - $FCFF = \text{Operating Income} (1 - \text{Tax rate}) - (\text{Capex} - \text{Depreciation}) - \Delta \text{Non-Cash Working Capital}$
- Let us compute these numbers of Wockhardt 
- Earnings:
  - Importance of updating earnings
  - Correcting misclassification
    - Capital expenses treated as operating expenses
    - For example, research ... restate earnings and also restate the book value

# Restating Earnings Numbers

## Capitalizing R&D Expenses

- Adjusted book value = book value of equity + value of the research asset
- Adjusted operating income = operating income + R&D expenses – amortization of research asset
- Adjusted net income = net income + R&D expenses – amortization of research asset
- Adjustment for Financing Expenses
  - Adjusted debt = debt + present value of lease commitments
  - Adjusted operating income = operating income + operating lease expenses – depreciation on leased asset

# In search of True Earnings?

- Techniques for managing earnings
  - Planning income or expenses ahead (especially investments and asset sales)
  - Revenue recognition
    - Book revenues early
    - Capitalize operating expenses
    - Write offs & using reserves
- Extraordinary, recurring, and unusual items
  - One-time expenses or income that is truly one time
  - Expenses and income that do not occur every year but seem to recur at regular intervals
  - Items that recur every year that change signs – positive in some years and negative in others

# Tax Effect!

Effective Tax Rate	FY 2006	FY2005	FY2004	FY 2003	FY 2002
Bharti	12.5%	22.9%	15.4%	-0.1%	-4.9%
Dhandapani Finance	37.2%	33.7%	36.6%	30.3%	
Hexaware Tech	9.7%	12.0%	4.2%	8.1%	
Jaiprakash Associates	17.8%	39.9%	38.0%	67.3%	
Moser Baer	-25.6%	4.2%	1.3%	-0.4%	
Punjab National Bank	0.0%	0.0%	37.8%	0.0%	29.7%
South Asian Petrochemicals	2.8%	0.0%			
Wockhardt	12.7%	14.8%	10.7%	9.4%	

# Tax Effect

- Effective versus marginal tax rate

- Reasons for difference – (a) following difference accounting standards (b) use tax credits (c) defer taxes to future periods (d) tiered tax structure

## Marginal tax rates for multinationals

- Use weighted average of marginal tax rates
  - Use marginal tax rate of the country in which the firm is incorporated
  - Use different marginal tax rate for each country
- Effects of tax rate on value
    - If the same tax rate is to be applied for every period then the safer choice is the marginal tax rate
    - But, what should be the marginal tax rate taken?

# Tax effect for a firm in losses!

In such scenarios, during the years when the losses shelter income ... the tax rate would be zero for both

- Computation of after tax operating income
- Cost of capital

So, you can think of having the following columns for computing cash flows:

- Year; Revenues; Operating Income; Net Operating Losses at the end of the year; Taxable Income; Taxes; Tax Rate;
- Tax benefits, tax subsidies and tax credits by tax authorities (windmill, backward area, etc.)
- Tax books and reporting books and its complications

# Net Capital Expenditure

## Three issues

- Firms often do capital spending in chunks
  - Can do smoothing
  - Firms with limited information can use the industry averages for capex (depending on size)
  - Go for Net Capex as a percent of EBIT
- Accounting definition of capex does not include R&D, and similar spending
- Acquisitions are not classified as capex by accountants

# Cash Flows to Equity

- Cash Flows to Equity for a Levered Firm at a desired Leverage
  - $FCFE = \text{Net Income} - (1 - \delta) (\text{Capex} - \text{Depreciation}) - (1 - \delta) \Delta \text{ Working Capital Needs}$
- Net Income and Accounting Standards
  - China's requirement of statutory reserve
  - Japan's regulation of not taking out any money



# Cash Flows to the Firm

- Approach 1: Cumulate the cash flows to different claim holders
- Approach 2: Operating Income  $(1 - \text{tax rate}) + \text{Depreciation} - \text{Capital Spending} - \Delta \text{Working Capital Needs}$
- We prefer approach 2 for its ease

# Inflation, Cash Flows, and Value

- Nominal cash flows do incorporate expected inflation
- Most books do make a small mention of the influence of inflation and relevant formulas
- Real discount rate = Nominal discount rate – Expected inflation
- The discounting rule:
  - Real cash flows ~ Real discounting rates
  - Nominal cash flows ~ Nominal discounting rates
  - Cash Flows to Equity ~ Cost of Equity
  - Cash Flows to Firm ~ Cost of Capital

# Personal Taxes and Cash Flows

The effect of personal taxes depends on:

- What portion, if any, of the cash flows on an asset are taxable?
- What rate will be cash flows be taxed at?
- When the tax has to be paid?
- Cash flows adjusted for personal taxes have to be discounted at discount rates also adjusted for personal taxes
  - After tax cost of equity =  $D_p (1 - t_o) + \Omega (1 - t_{cg})$
  - Cost of debt = Interest rates  $(1 - t_o)(1 - t)$
  - Which investors' tax rates are reflected in the markets?

# Cash Flows and Asset Life

- Most valuations are done over a finite time horizon
  - For finite life assets, we use salvage value
  - For infinite life assets, we use terminal value
  - In a infinite life asset, capex is needed not only to maintain existing assets but also for future growth
  - In a finite life asset, working capital would be liquidated at the end of asset's life time

# Historical Growth Rates

- Using average growth rates from the past
  - Arithmetic average and Geometric average
  - Estimation Period
  - Per share versus total earnings
  - Linear and Log Linear models,  $\text{Ln}(\text{EPS}_t) = a + bt$
  - Time series models (using quarterly earnings)
- Dealing with Negative numbers
  - % change in EPS =  $(\text{EPS}_t - \text{EPS}_{t-1}) / \text{Max}(\text{EPS}_t, \text{EPS}_{t-1})$
- Value of past growth in predicting future growth depends on issues such as – variability in growth rates; size of the firm; cyclical in the economy; change in fundamentals; quality of earnings



# Analysts' Forecast of Earnings

- They ought to perform extensive analysis
  - Firm-specific information that has been made public since the last earnings report
  - Macroeconomic information that may impact future growth
  - Information revealed by competitors on future prospects
  - Private information about the firm
  - Public information other than earnings
- Accuracy of Forecasts
  - Short-term forecasts
  - Long-term forecasts
  - Analyst forecasts and stock prices

# Analysts' Forecast of Earnings

- How much of importance do we give to analyst forecasts in estimating future growth
  - Amount of recent firm specific information
  - Number of analysts following the stock
  - Extent of disagreement between analysts
  - Quality of analysts following the stock
- IBES and Zacks aggregate and summarize data

# Determinants of Earnings Growth

- Retention ratio and return on equity
  - $NI_t = (\text{Book value of equity}_{t-1} + \text{Retained earnings}_{t-1}) \times ROE_t$
  - Let us try this out on Wockhardt
- ROE and Leverage 
  - ROE and Leverage
  - $ROE = ROCE + D/E(ROCE - i(1-t))$
  - Where,  $ROCE = (\text{Net Income} + \text{Interest} (1 - \text{tax rate}))/\text{BV of total assets}$
  - Alternative,  $g = b(ROCE + D/E(ROCE - i(1 - t)))$  
- Using this, one can evaluate implications of, a) restructuring assets/projects; b) changing capital structure; c) changing dividend policy



# Growth Estimation Issues

## ROCE, Profit Margin and Asset Turnover

- ROCE = Preinterest profit margin X Asset turnover
- Expected growth in net income = (equity reinvestment rate) X (return on equity)

## Product line analysis

## Estimation of inputs

- Current versus projected values
- Emphasis on book value
- Level of details ~ noise created
- Consistency of inputs with firm type
- Weighting different estimates of growth
- Smoothing future growth
- Management estimates

# Factors Determining Weights

- Historical
  - How much history is available  $m$
  - How variable are past earnings  $l$
  - How cyclical is the firm  $l$
  - Has the firm made any fundamental change (business or leverage)  $n$
  - Has the firms size changed much over time  $n$
- Analysts
  - How much firm specific information come out since the last earnings report  $l$
  - How many analysts follow the stock  $m$
  - How much agreement is there between analysts  $m$
  - How good are the analysts  $g$

# Other Issues

## Fundamental

- How much change has there been in firm fundamentals  $m$
- How well can the inputs to the model be estimated  $g$

## Other Issues

- What is the firms competitive advantage (for earning abnormal returns)?
- How permanent is this going to be?

Wockhardt	FY2005		
Net Income	257		
Capex	156		
Depreciation	43		
Change in Non Cash Working Capital	115	282	168
New Debt Raised - Debt Repaid	15		
FCFE	45		

Wockhardt	FY2005		
Operating Income (1- tax rate)	277	tax rate	14%
Capex	156		
Depreciation	43		
Change in Non Cash Working Capital	115		
FCFF	49		

## Woekhardt

Arithmetic

35.3%

20.1%

50.1%

35.7%

Geometric

34.3%

EPS

4

3

2

1

47.04

39.29

39.28

28.97

Arithmetic

18.4%

19.7%

0.0%

35.6%

Geometric

17.3%

Wockhardt	2005	2004	2003	2002
BV of equity	149.33	113.13	127.43	95.60
EPS	47.04	39.29	39.28	28.97
DPS	11.42	11.32	8.47	6.90
Payout Ratio	24%	29%	22%	24%
Retention Ratio	76%	71%	78%	76%
ROE	31.5%	34.7%	30.8%	30.3%
Growth Rate	23.9%	24.7%	24.2%	23.1%

**FOR FUTURE HINTS, YOU CAN TRY AND LOOK AT THE MARGINAL RETURN ON EQUITY (TAKING TEMPORAL FACTORS INTO ACCOUNT)**

<b>Wockhardt</b>	<b>2005</b>	<b>2004</b>	<b>2003</b>	<b>2002</b>
BV of equity	149.33	113.13	127.43	95.60
EPS	47.04	39.29	39.28	28.97
DPS	11.42	11.32	8.47	6.90
Payout Ratio	24%	29%	22%	24%
Growth Rate	23.9%	24.7%	24.2%	23.1%
D/E Ratio	1.11	1.45	0.71	0.14
Interest Cover Ratio	12.27	13.54	457.26	14.01
Interest Expense (approx.)	8.0%	8.0%	8.0%	8.5%
Tax Rate	12.7%	14.8%	10.7%	9.4%
ROA	13.0%	12.0%	12.8%	19.1%
Growth Rate				