Applied Corporate Finance

Aswath Damodaran

www.damodaran.com

www.stern.nyu.edu/~adamodar/New_Home_Page/triumdesc.htm
What is corporate finance?

- Every decision that a business makes has financial implications, and any decision which affects the finances of a business is a corporate finance decision.
- Defined broadly, everything that a business does fits under the rubric of corporate finance.
First Principles

Corporate Finance: The Big Picture

The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.
The return should reflect the magnitude and the timing of the cashflows as well as all side effects.
The optimal mix of debt and equity maximizes firm value.
The right kind of debt matches the tenor of your assets.
How much cash you can return depends upon current & potential investment opportunities.
How you choose to return cash to the owners will depend whether they prefer dividends or buybacks.

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
In traditional corporate finance, the objective in decision making is to **maximize the value of the firm**.

A narrower objective is to **maximize stockholder wealth**. When the stock is traded and markets are viewed to be efficient, the objective is to **maximize the stock price**.
The Classical Objective Function

**STOCKHOLDERS**
- Maximize stockholder wealth
- Hire & fire managers
  - Board
  - Annual Meeting

**BONDHOLDERS**
- Lend Money
- Protect bondholder interests

**Managers**
- Reveal information honestly and on time
- Markets are efficient and assess effect on value

**SOCiETY**
- No Social Costs
- Costs can be traced to firm

**FINANCIAL MARKETS**
- Managerial Costs can be traced to firm
- Markets are efficient and assess effect on value
What can go wrong?

STOCKHOLDERS
Managers put their interests above stockholders
Have little control over managers

BONDHOLDERS
Bondholders can get ripped off
Lend Money

Managers
Delay bad news or provide misleading information

SOCIETY
Some costs cannot be traced to firm
Markets make mistakes and can over react

FINANCIAL MARKETS
Significant Social Costs
Who’s on Board? The Disney Experience - 1997

Reveta F. Bowers 1,5
Head of School
Center for Early Education

Roy E. Disney 3
Vice Chairman
The Walt Disney Company

Michael D. Eisner 3
Chairman and Chief Executive Officer
The Walt Disney Company

Stanley F. Gold 4,5
President and Chief Executive Officer
Shawrock Holdings, Inc.

Sanford M. Livack
Senior Executive Vice President and Chief of Corporate Operations
The Walt Disney Company

Ignacio E. Loyzaga, Jr. 1,2,4
Editor-in-Chief, LA OPINION

George J. Mitchell 5
Special Counsel
Verner, Lipfert, Bernard, Mcpherson and Head

Thomas S. Murphy
Former Chairman
Capital Cities/ABC, Inc.

Richard A. Nunis
Chairman
Walt Disney Attractions

Leo J. O’Donovan, S.J. 1
President
Georgetown University

Michael S. Ovitz 3
President
The Walt Disney Company

Sidney Poitier 2,4
Chief Executive Officer
Ventron-Ösiris Productions

Irwin E. Russell 2,4
Attorney at Law

Robert A.M. Stern
Senior Partner
Stern

E. Cardon Walker 1
Former Chairman and Chief Executive Officer
The Walt Disney Company

Raymond L. Watson 1,2,3
Vice Chairman
The Irvine Company

Gary L. Wilson 5
Co-Chairman
Northwest Airlines Corporation

1 Member of Audit Review Committee
2 Member of Compensation Committee
3 Member of Executive Committee
4 Member of Executive Performance Plan Committee
5 Member of Nominating Committee
So, what next? When the cat is idle, the mice will play ....

When managers do not fear stockholders, they will often put their interests over stockholder interests

- **Greenmail**: The (managers of) target of a hostile takeover buy out the potential acquirer's existing stake, at a price much greater than the price paid by the raider, in return for the signing of a 'standstill' agreement.

- **Golden Parachutes**: Provisions in employment contracts, that allows for the payment of a lump-sum or cash flows over a period, if managers covered by these contracts lose their jobs in a takeover.

- **Poison Pills**: A security, the rights or cashflows on which are triggered by an outside event, generally a hostile takeover, is called a poison pill.

- **Shark Repellents**: Anti-takeover amendments are also aimed at dissuading hostile takeovers, but differ on one very important count. They require the assent of stockholders to be instituted.

- **Overpaying on takeovers**: Acquisitions often are driven by management interests rather than stockholder interests.
Application Test: Who owns/runs your firm?

Look at: Bloomberg printout **HDS** for your firm

- Who are the top stockholders in your firm?
- What are the potential conflicts of interests that you see emerging from this stockholding structure?

Diagram:

- **Government**
- **Outside stockholders**
  - Size of holding
  - Active or Passive?
  - Short or Long term?
- **Employees**
- **Managers**
  - Length of tenure
  - Links to insiders
- **Lenders**
- **Inside stockholders**
  - % of stock held
  - Voting and non-voting shares
  - Control structure
Case 1: Splintering of Stockholders
Disney’s top stockholders in 2003
Case 2: Voting versus Non-voting Shares: Aracruz

- Aracruz Cellulose, like most Brazilian companies, had multiple classes of shares.
  - The common shares had all of the voting rights and were held by incumbent management, lenders to the company and the Brazilian government.
  - Outside investors held the non-voting shares, which were called preferred shares, and had no say in the election of the board of directors. At the end of 2002,

- Aracruz was managed by a board of seven directors, composed primarily of representatives of those who own the common (voting) shares, and an executive board, composed of three managers of the company.
Case 3: Cross and Pyramid Holdings
Tata Chemical’s top stockholders in 2008
Things change. Disney’s top stockholders in 2009
When traditional corporate financial theory breaks down, the solution is:

- To choose a different mechanism for corporate governance, i.e., assign the responsibility for monitoring managers to someone other than stockholders.
- To choose a different objective for the firm.
- To maximize stock price, but reduce the potential for conflict and breakdown:
  - Making managers (decision makers) and employees into stockholders
  - Protect lenders from expropriation
  - By providing information honestly and promptly to financial markets
  - Minimize social costs
I. An Alternative Corporate Governance System

- Germany and Japan developed a different mechanism for corporate governance, based upon corporate cross holdings.
  - In Germany, the banks form the core of this system.
  - In Japan, it is the keiretsus.
  - Other Asian countries have modeled their system after Japan, with family companies forming the core of the new corporate families.

- At their best, the most efficient firms in the group work at bringing the less efficient firms up to par. They provide a corporate welfare system that makes for a more stable corporate structure.

- At their worst, the least efficient and poorly run firms in the group pull down the most efficient and best run firms down. The nature of the cross holdings makes it very difficult for outsiders (including investors in these firms) to figure out how well or badly the group is doing.
II. Choose a Different Objective Function

- Firms can always focus on a different objective function. Examples would include:
  - maximizing earnings
  - maximizing revenues
  - maximizing firm size
  - maximizing market share
  - maximizing EVA

- The key thing to remember is that these are intermediate objective functions.
  - To the degree that they are correlated with the long term health and value of the company, they work well.
  - To the degree that they do not, the firm can end up with a disaster
III. A Market Based Solution

**STOCKHOLDERS**

1. More activist investors
2. Hostile takeovers

Managers of poorly run firms are put on notice.

Protect themselves

**BONDHOLDERS**

1. Covenants
2. New Types

Corporate Good Citizen Constraints

Managers

1. More laws
2. Investor/Customer Backlash

Firms are punished for misleading markets

Investors and analysts become more skeptical

**FINANCIAL MARKETS**

**SOCIETY**
A Market Solution: Eisner’s exit… and a new age dawns?
Disney’s board in 2008

<table>
<thead>
<tr>
<th>Board Members</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>John E. Pepper, Jr.</td>
<td>Retired Chairman and CEO, Procter &amp; Gamble Co.</td>
</tr>
<tr>
<td>(Chairman)</td>
<td></td>
</tr>
<tr>
<td>Susan E. Arnold</td>
<td>President, Global Business Units, Procter &amp; Gamble Co.</td>
</tr>
<tr>
<td>John E. Bryson</td>
<td>Retired Chairman and CEO, Edison International</td>
</tr>
<tr>
<td>John S. Chen</td>
<td>Chairman, CEO &amp; President, Sybase, Inc.</td>
</tr>
<tr>
<td>Judith L. Estrin</td>
<td>CEO, JLabs, LLC.</td>
</tr>
<tr>
<td>Robert A. Iger</td>
<td>CEO, Disney</td>
</tr>
<tr>
<td>Steven P. Jobs</td>
<td>CEO, Apple</td>
</tr>
<tr>
<td>Fred Langhammer</td>
<td>Chairman, Global Affairs, The Estee Lauder Companies</td>
</tr>
<tr>
<td>Aylwin B. Lewis</td>
<td>President and CEO, Potbelly Sandwich Works</td>
</tr>
<tr>
<td>Monica Lozano</td>
<td>Publisher and CEO, La Opinion</td>
</tr>
<tr>
<td>Robert W. Matschullat</td>
<td>Retired Vice Chairman and CFO, The Seagram Co.</td>
</tr>
<tr>
<td>Orin C. Smith</td>
<td>Retired President and CEO, Starbucks Corporation</td>
</tr>
</tbody>
</table>
The Investment Principle: Risk and Return Models

“You cannot swing upon a rope that is attached only to your own belt.”
First Principles
The notion of a benchmark

- Since financial resources are finite, there is a hurdle that projects have to cross before being deemed acceptable.
- This hurdle will be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:
  \[ \text{Hurdle rate} = \text{Riskless Rate} + \text{Risk Premium} \]
- The two basic questions that every risk and return model in finance tries to answer are:
  - How do you measure risk?
  - How do you translate this risk measure into a risk premium?
What is Risk?

- Risk, in traditional terms, is viewed as a ‘negative’. Webster’s dictionary, for instance, defines risk as “exposing to danger or hazard”. The Chinese symbols for risk, reproduced below, give a much better description of risk.

危機

- The first symbol is the symbol for “danger”, while the second is the symbol for “opportunity”, making risk a mix of danger and opportunity. You cannot have one, without the other.
Alternatives to the CAPM

Step 1: Defining Risk

The risk in an investment can be measured by the variance in actual returns around an expected return.

- Riskless Investment
- Low Risk Investment
- High Risk Investment

Step 2: Differentiating between Rewarded and Unrewarded Risk

Risk that is specific to investment (Firm Specific)
- Can be diversified away in a diversified portfolio
  1. each investment is a small proportion of portfolio
  2. risk averages out across investments in portfolio

Risk that affects all investments (Market Risk)
- Cannot be diversified away since most assets are affected by it.

The marginal investor is assumed to hold a “diversified” portfolio. Thus, only market risk will be rewarded and priced.

Step 3: Measuring Market Risk

<table>
<thead>
<tr>
<th>The CAPM</th>
<th>The APM</th>
<th>Multi-Factor Models</th>
<th>Proxy Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this market portfolio Market Risk = Risk added by any investment to the market portfolio:</td>
<td>If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. Market Risk = Risk exposures of any asset to market factors</td>
<td>Since market risk affects most or all investments, it must come from macro economic factors. Market Risk = Risk exposures of any asset to macro economic factors.</td>
<td>In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. Market Risk = Captured by the Proxy Variable(s)</td>
</tr>
<tr>
<td>Beta of asset relative to Market portfolio (from a regression)</td>
<td>Betas of asset relative to unspecified market factors (from a factor analysis)</td>
<td>Betas of assets relative to specified macroeconomic factors (from a regression)</td>
<td>Equation relating returns to proxy variables (from a regression)</td>
</tr>
</tbody>
</table>
Limitations of the CAPM

1. The model makes unrealistic assumptions
2. The parameters of the model cannot be estimated precisely
   - Definition of a market index
   - Firm may have changed during the 'estimation' period'
3. The model does not work well
   - If the model is right, there should be
     a linear relationship between returns and betas
     the only variable that should explain returns is betas
   - The reality is that
     the relationship between betas and returns is weak
     Other variables (size, price/book value) seem to explain differences in returns better.
Why the CAPM persists…

- The CAPM, notwithstanding its many critics and limitations, has survived as the default model for risk in equity valuation and corporate finance. The alternative models that have been presented as better models (APM, Multifactor model..) have made inroads in performance evaluation but not in prospective analysis because:
  - The alternative models (which are richer) do a much better job than the CAPM in explaining past return, but their effectiveness drops off when it comes to estimating expected future returns (because the models tend to shift and change).
  - The alternative models are more complicated and require more information than the CAPM.
  - For most companies, the expected returns you get with the the alternative models is not different enough to be worth the extra trouble of estimating four additional betas.
Looking at Disney’s top stockholders in 2009 (again)
## Cross and Pyramid Holdings

Tata Chemical’s top stockholders in 2008

<table>
<thead>
<tr>
<th>Holder Name</th>
<th>Portfolio Name</th>
<th>Source</th>
<th>Amt Held</th>
<th>% Out</th>
<th>Latest Chg</th>
<th>File Ct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) TATA Sons Ltd</td>
<td>n/a</td>
<td>Co File</td>
<td>30,552,523</td>
<td>14.26</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>2) Life Insurance Corp G</td>
<td>n/a</td>
<td>Co File</td>
<td>27,837,925</td>
<td>11.71</td>
<td>6,655,922</td>
<td>12/31/08</td>
</tr>
<tr>
<td>3) TATA Investment Corp</td>
<td>n/a</td>
<td>Co File</td>
<td>10,000,001</td>
<td>6.80</td>
<td>-393,000</td>
<td>12/31/08</td>
</tr>
<tr>
<td>4) TATA Tea Ltd</td>
<td>n/a</td>
<td>Co File</td>
<td>15,265,522</td>
<td>6.54</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>5) New India Assurance G</td>
<td>n/a</td>
<td>Co File</td>
<td>5,000,855</td>
<td>2.58</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>6) Hindustan Lever Ltd</td>
<td>n/a</td>
<td>Co File</td>
<td>5,032,000</td>
<td>2.14</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>7) General Insurance Co</td>
<td>n/a</td>
<td>Co File</td>
<td>4,996,252</td>
<td>2.12</td>
<td>5,000</td>
<td>12/31/08</td>
</tr>
<tr>
<td>8) United India Insurance</td>
<td>n/a</td>
<td>Co File</td>
<td>2,668,047</td>
<td>1.13</td>
<td>20,000</td>
<td>12/31/08</td>
</tr>
<tr>
<td>9) National Insurance G</td>
<td>n/a</td>
<td>Co File</td>
<td>2,373,302</td>
<td>1.01</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>10) Templeton Asset Mgmt Templeton India Eq</td>
<td>MF-IND</td>
<td>2,336,937</td>
<td>1.01</td>
<td>163,937</td>
<td>3/31/09</td>
<td></td>
</tr>
<tr>
<td>11) Templeton Asset Mgmt Franklin India Flex</td>
<td>MF-IND</td>
<td>1,500,761</td>
<td>0.64</td>
<td>0</td>
<td>3/31/09</td>
<td></td>
</tr>
<tr>
<td>12) SBI Funds Management SBI Magnus Sector</td>
<td>MF-IND</td>
<td>1,473,929</td>
<td>0.63</td>
<td>155,222</td>
<td>3/31/09</td>
<td></td>
</tr>
<tr>
<td>13) MSCI Investment Manager MSCI Inv (I)-South</td>
<td>UT-UK</td>
<td>1,451,251</td>
<td>0.62</td>
<td>-303,000</td>
<td>12/31/08</td>
<td></td>
</tr>
<tr>
<td>14) Pratik Investments Ltd</td>
<td>n/a</td>
<td>Co File</td>
<td>1,269,329</td>
<td>0.58</td>
<td>0</td>
<td>12/31/08</td>
</tr>
<tr>
<td>15) Templeton Management (Templeton Emerging)</td>
<td>MF-CAN</td>
<td>1,078,000</td>
<td>0.46</td>
<td>539,000</td>
<td>12/31/08</td>
<td></td>
</tr>
<tr>
<td>16) Templeton Asset Mgmt Templeton India G</td>
<td>MF-IND</td>
<td>1,094,045</td>
<td>0.45</td>
<td>554,045</td>
<td>3/31/09</td>
<td></td>
</tr>
<tr>
<td>17) Birula Sun Life Asset Mgmt Birula Sun Life Spec</td>
<td>MF-IND</td>
<td>1,050,000</td>
<td>0.45</td>
<td>0</td>
<td>2/28/09</td>
<td></td>
</tr>
</tbody>
</table>

[Image of stockholder chart]
Application Test: Who is the marginal investor in your firm?

You can get information on insider and institutional holdings in your firm from:
http://finance.yahoo.com/
Enter your company’s symbol and choose profile.

Looking at the breakdown of stockholders in your firm, consider whether the marginal investor is
a) An institutional investor
b) An individual investor
c) An insider
The capital asset pricing model yields the following expected return:

$$\text{Expected Return} = \text{Riskfree Rate} + \text{Beta} \times (\text{Expected Return on the Market Portfolio} - \text{Riskfree Rate})$$

To use the model we need three inputs:

(a) The current risk-free rate
(b) The expected market risk premium (the premium expected for investing in risky assets (market portfolio) over the riskless asset)
(c) The beta of the asset being analyzed.
The Riskfree Rate and Time Horizon

- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, i.e., to have an actual return be equal to the expected return, two conditions have to be met –
  - There has to be no default risk, which generally implies that the security has to be issued by the government. Note, however, that not all governments can be viewed as default free.
  - There can be no uncertainty about reinvestment rates, which implies that it is a zero coupon security with the same maturity as the cash flow being analyzed.
- Theoretically, this translates into using different riskfree rates for each cash flow - the 1 year zero coupon rate for the cash flow in year 1, the 2-year zero coupon rate for the cash flow in year 2 ...
- Practically speaking, if there is substantial uncertainty about expected cash flows, the present value effect of using time varying riskfree rates is small enough that it may not be worth it.
The Bottom Line on Riskfree Rates

- Using a long term government rate (even on a coupon bond) as the riskfree rate on all of the cash flows in a long term analysis will yield a close approximation of the true value. For short term analysis, it is entirely appropriate to use a short term government security rate as the riskfree rate.

- The riskfree rate that you use in an analysis should be in the same currency that your cashflows are estimated in.
  - In other words, if your cashflows are in U.S. dollars, your riskfree rate has to be in U.S. dollars as well.
  - If your cash flows are in Euros, your riskfree rate should be a Euro riskfree rate.

- The conventional practice of estimating riskfree rates is to use the government bond rate, with the government being the one that is in control of issuing that currency. In US dollars, this has translated into using the US treasury rate as the riskfree rate. In May 2009, for instance, the ten-year US treasury bond rate was 3.5%.
What is the Euro riskfree rate?

![Government Bond Rates in Euros](chart)

The chart shows government bond rates in Euros for various countries, comparing 2-year and 10-year rates. The rates vary significantly across countries, indicating differences in risk perceptions and economic conditions.
What if there is no default-free entity?

If the government is perceived to have default risk, the government bond rate will have a default spread component in it and not be riskfree. There are three choices we have, when this is the case.

- Adjust the local currency government borrowing rate for default risk to get a riskless local currency rate.
  - In May 2009, the Indian government rupee bond rate was 7%. the local currency rating from Moody’s was Ba2 and the default spread for a Ba2 rated country bond was 3%. 
    Riskfree rate in Rupees $= 7\% - 3\% = 4\%$
  - In May 2009, the Brazilian government $R$ bond rate was 11% and the local currency rating was Ba1, with a default spread of 2.5%.
    Riskfree rate in $R = 11\% - 2.5\% = 8.5\%$

- Do the analysis in an alternate currency, where getting the riskfree rate is easier. With Aracruz in 2009, we could chose to do the analysis in US dollars (rather than estimate a riskfree rate in R$). The riskfree rate is then the US treasury bond rate.

- Do your analysis in real terms, in which case the riskfree rate has to be a real riskfree rate. The inflation-indexed treasury rate is a measure of a real riskfree rate.
Measurement of the risk premium

- The risk premium is the premium that investors demand for investing in an average risk investment, relative to the riskfree rate.
- As a general proposition, this premium should be
  - greater than zero
  - increase with the risk aversion of the investors in that market
  - increase with the riskiness of the “average” risk investment
What is your risk premium?

Assume that stocks are the only risky assets and that you are offered two investment options:

- a riskless investment (say a Government Security), on which you can make 5%
- a mutual fund of all stocks, on which the returns are uncertain

How much of an expected return would you demand to shift your money from the riskless asset to the mutual fund?

a) Less than 5%
b) Between 5 - 7%
c) Between 7 - 9%
d) Between 9 - 11%
e) Between 11 - 13%
f) More than 13%

Check your premium against the survey premium on my web site.
Risk Premiums do change..

Go back to the previous example. Assume now that you are making the same choice but that you are making it in the aftermath of a stock market crash (it has dropped 25% in the last month). Would you change your answer?

a) I would demand a larger premium
b) I would demand a smaller premium
c) I would demand the same premium
Estimating Risk Premiums in Practice

- Survey investors on their desired risk premiums and use the average premium from these surveys.
- Assume that the actual premium delivered over long time periods is equal to the expected premium - i.e., use historical data
- Estimate the implied premium in today’s asset prices.
A. The Survey Approach

Surveying all investors in a market place is impractical.

However, you can survey a few individuals and use these results. In practice, this translates into surveys of the following:

<table>
<thead>
<tr>
<th>Group Surveyed</th>
<th>Survey done by</th>
<th>Estimated ERP</th>
<th>When?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Investors</td>
<td>Securities Industries Assn</td>
<td>8.30%</td>
<td>2004</td>
</tr>
<tr>
<td>Institutional Investors</td>
<td>Merril Lynch</td>
<td>3.80%</td>
<td>2009</td>
</tr>
<tr>
<td>CFOs</td>
<td>Graham &amp; Harvey</td>
<td>4.30%</td>
<td>2009</td>
</tr>
<tr>
<td>Academics</td>
<td>Fernandez</td>
<td>5.70%</td>
<td>2009</td>
</tr>
</tbody>
</table>

The limitations of this approach are:
- there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
- The survey results are extremely volatile
- they tend to be short term; even the longest surveys do not go beyond one year.
B. The Historical Risk Premium
Evidence from the United States

<table>
<thead>
<tr>
<th></th>
<th>Arithmetic Average</th>
<th>Geometric Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stocks - T. Bills</td>
<td>Stocks - T. Bonds</td>
</tr>
<tr>
<td>1928-2010</td>
<td>7.62%</td>
<td>6.03%</td>
</tr>
<tr>
<td></td>
<td>2.25%</td>
<td>2.38%</td>
</tr>
<tr>
<td>1961-2010</td>
<td>5.83%</td>
<td>4.13%</td>
</tr>
<tr>
<td></td>
<td>2.42%</td>
<td>2.69%</td>
</tr>
<tr>
<td>2001-2010</td>
<td>1.37%</td>
<td>-2.26%</td>
</tr>
<tr>
<td></td>
<td>6.73%</td>
<td>9.00%</td>
</tr>
</tbody>
</table>

What is the right premium?

- Go back as far as you can. Otherwise, the standard error in the estimate will be large.

\[
\text{Std Error in estimate} = \frac{\text{Annualized Std deviation in Stock prices}}{\sqrt{\text{Number of years of historical data}}}
\]

- Be consistent in your use of a riskfree rate.
- Use arithmetic premiums for one-year estimates of costs of equity and geometric premiums for estimates of long term costs of equity.
What about historical premiums for other markets?

- Historical data for markets outside the United States is available for much shorter time periods. The problem is even greater in emerging markets.
- The historical premiums that emerge from this data reflects this data problem and there is much greater error associated with the estimates of the premiums.
One solution: Look at a country’s bond rating and default spreads as a start

Ratings agencies assign ratings to countries that reflect their assessment of the default risk of these countries. These ratings reflect the political and economic stability of these countries and thus provide a useful measure of country risk.

- In May 2009, the local currency rating, from Moody’s, for Brazil was Ba1. In May 2009, Brazil had dollar denominated 10-year Bonds, trading at an interest rate of 6%. The US treasury bond rate that day was 3.5%, yielding a default spread of 2.50% for Brazil.

- India has a rating of Ba2 from Moody’s but has no dollar denominated bonds. The typical default spread for Ba2 rated sovereign bonds is 3%.

Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. This would yield a risk premium of 6.38% for Brazil and 6.88% for India, if we use 3.88% as the premium for the US.
Beyond the default spread

- While default risk spreads and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.

**Risk Premium for Brazil in early 2009**
- Standard Deviation in Bovespa (Equity) = 34%
- Standard Deviation in Brazil $ denominated Bond = 21.5%
- Default spread on $ denominated Bond = 2.5%
- Country Risk Premium (CRP) for Brazil = 2.5% \((34%/21.5\%)\) = 3.95%
- Total Risk Premium for Brazil = US risk premium (in ‘09) + CRP for Brazil = 3.88% + 3.95% = 7.83%

**Risk Premium for India in May 2009**
- Standard Deviation in Sensex (Equity) = 32%
- Standard Deviation in Indian government bond = 21.3%
- Default spread based upon rating= 3%
- Country Risk Premium for India = 3% \((32%/21.3\%)\) = 4.51%
- Total Risk Premium for India = US risk premium (in ‘09) + CRP for India = 3.88% + 4.51% = 8.39%

The implied premium in January 2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Market value of index</th>
<th>Dividends</th>
<th>Buybacks</th>
<th>Cash to equity</th>
<th>Dividend yield</th>
<th>Buyback yield</th>
<th>Total yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1148.09</td>
<td>15.74</td>
<td>14.34</td>
<td>30.08</td>
<td>1.37%</td>
<td>1.25%</td>
<td>2.62%</td>
</tr>
<tr>
<td>2002</td>
<td>879.82</td>
<td>15.96</td>
<td>13.87</td>
<td>29.83</td>
<td>1.81%</td>
<td>1.58%</td>
<td>3.39%</td>
</tr>
<tr>
<td>2003</td>
<td>1111.91</td>
<td>17.88</td>
<td>13.70</td>
<td>31.58</td>
<td>1.61%</td>
<td>1.23%</td>
<td>2.84%</td>
</tr>
<tr>
<td>2004</td>
<td>1211.92</td>
<td>19.01</td>
<td>21.59</td>
<td>40.60</td>
<td>1.57%</td>
<td>1.78%</td>
<td>3.35%</td>
</tr>
<tr>
<td>2005</td>
<td>1248.29</td>
<td>22.34</td>
<td>38.82</td>
<td>61.17</td>
<td>1.79%</td>
<td>3.11%</td>
<td>4.90%</td>
</tr>
<tr>
<td>2006</td>
<td>1418.30</td>
<td>25.04</td>
<td>48.12</td>
<td>73.16</td>
<td>1.77%</td>
<td>3.39%</td>
<td>5.16%</td>
</tr>
<tr>
<td>2007</td>
<td>1468.36</td>
<td>28.14</td>
<td>67.22</td>
<td>95.36</td>
<td>1.92%</td>
<td>4.58%</td>
<td>6.49%</td>
</tr>
<tr>
<td>2008</td>
<td>903.25</td>
<td>28.47</td>
<td>40.25</td>
<td>68.72</td>
<td>3.15%</td>
<td>4.61%</td>
<td>7.77%</td>
</tr>
<tr>
<td>Normalized</td>
<td>903.25</td>
<td>28.47</td>
<td>24.11</td>
<td>52.584</td>
<td>3.15%</td>
<td>2.67%</td>
<td>5.82%</td>
</tr>
</tbody>
</table>

In 2008, the actual cash returned to stockholders was 68.72. However, there was a 41% dropoff in buybacks in Q4. We reduced the total buybacks for the year by that amount.

Analysts expect earnings to grow 4% a year for the next 5 years. We will assume that dividends & buybacks will keep pace.

Last year’s cashflow (52.58) growing at 4% a year

After year 5, we will assume that earnings on the index will grow at 2.21%, the same rate as the entire economy (= riskfree rate).

\[
903.25 = \frac{54.69}{(1 + r)} + \frac{56.87}{(1 + r)^2} + \frac{59.15}{(1 + r)^3} + \frac{61.52}{(1 + r)^4} + \frac{63.98}{(1 + r)^5} + \frac{63.98(1.0221)}{(r - 0.0221)(1 + r)^5}
\]

January 1, 2009
S&P 500 is at 903.25
Adjusted Dividends & Buybacks for 2008 = 52.58

Expected Return on Stocks (1/1/09) = 8.64%
Equity Risk Premium = 8.64% - 2.21% = 6.43%
The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

Graph: Implied Equity Risk Premium - 9/12-12/31/08

- S&P 500
- Implied Premium

Average Implied ERP: 1960-2007 4.40%
The bottom line on Equity Risk Premiums in early 2009

- **Mature Markets**: In May 2009, the number that we chose to use as the equity risk premium for all mature markets was 6%. While lower than the implied premium at the start of the year 6.43%, it is still much higher than the historical risk premium of 3.88%. It reflected our beliefs then that while the crisis was abating, it would leave a longer term impact on risk premiums.

- For emerging markets, we will use the melded default spread approach (where default spreads are scaled up to reflect additional equity risk) to come up with the additional risk premium.
  - ERP for Brazil = Mature market premium + CRP for Brazil = 6% + 3.95% = 9.95%
  - ERP for India = Mature market premium + CRP for India = 6% + 4.51% = 10.51%
An Updated Equity Risk Premium:

By January 1, 2011, the worst of the crisis seemed to be behind us. Fears of a depression had receded and banks looked like they were struggling back to a more stable setting. Default spreads started to drop and risk was no longer front and center in pricing.

In 2010, the actual cash returned to stockholders was 53.96. That was up about 30% from 2009 levels.

Analysts expect earnings to grow 13% in 2011, 8% in 2012, 6% in 2013 and 4% thereafter, resulting in a compounded annual growth rate of 6.95% over the next 5 years. We will assume that dividends & buybacks will grow 6.95% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 3.29%, the same rate as the entire economy (= riskfree rate).

\[
\begin{align*}
\text{Expected Return on Stocks (1/1/11)} &= 8.49\% \\
\text{T.Bond rate on 1/1/11} &= 3.29\% \\
\text{Equity Risk Premium} &= 8.03\% - 3.29\% = 5.20\%
\end{align*}
\]

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo!
Finance, Zacks
Implied Premiums in the US: 1960-2010

Implied Premium for US Equity Market

Year


Implied Premium
Application Test: Estimating a Market Risk Premium

In early 2011, the implied equity risk premium in the US was 5.20% and the historical risk premium was 4.31%. Which would you use as your equity risk premium?

a) The historical risk premium (4.31%)
b) The current implied equity risk premium (4.74%)
c) Something else!

What would you use for another developed market (say Germany or France)?

a) The historical risk premium for that market
b) The risk premium for the United States

c) The risk premium for the United States + Country Risk premium
The standard procedure for estimating betas is to regress stock returns ($R_j$) against market returns ($R_m$) -

$$R_j = a + b R_m$$

- where $a$ is the intercept and $b$ is the slope of the regression.

The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

The $R^2$ of the regression provides an estimate of the proportion of the risk (variance) of a firm that can be attributed to market risk. The balance $(1 - R^2)$ can be attributed to firm specific risk.
The intercept of the regression provides a simple measure of performance during the period of the regression, relative to the capital asset pricing model. 

\[ R_j = R_f + b (R_m - R_f) \]

\[ = R_f (1-b) + b R_m \] ........... Capital Asset Pricing Model

\[ R_j = a + b R_m \] ........... Regression Equation

If

\[ a > R_f (1-b) \] .... Stock did better than expected during regression period

\[ a = R_f (1-b) \] .... Stock did as well as expected during regression period

\[ a < R_f (1-b) \] .... Stock did worse than expected during regression period

The difference between the intercept and \( R_f (1-b) \) is *Jensen's alpha*. If it is positive, your stock did perform better than expected during the period of the regression.
Setting up for the Estimation

- Decide on an estimation period
  - Services use periods ranging from 2 to 5 years for the regression
  - Longer estimation period provides more data, but firms change.
  - Shorter periods can be affected more easily by significant firm-specific event that occurred during the period (Example: ITT for 1995-1997)

- Decide on a return interval - daily, weekly, monthly
  - Shorter intervals yield more observations, but suffer from more noise.
  - Noise is created by stocks not trading and biases all betas towards one.

- Estimate returns (including dividends) on stock
  - Return = (Price_{End} - Price_{Beginning} + Dividends_{Period}) / Price_{Beginning}
  - Included dividends only in ex-dividend month

- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.
Choosing the Parameters: Disney

- Period used: 5 years
- Return Interval = Monthly
- Market Index: S&P 500 Index.

For instance, to calculate returns on Disney in December 2004,
- Price for Disney at end of November 2004 = $26.52
- Price for Disney at end of December 2004 = $27.43
- Dividends during month = $0.237 (It was an ex-dividend month)
- Return = ($27.43 - $26.52 + $0.237)/$26.52 = 4.33%

To estimate returns on the index in the same month
- Index level at end of November 2004 = 1173.92
- Index level at end of December 2004 = 1211.92
- Dividends on index in December 2004 = 1.831
- Return = (1211.92 – 1173.92 + 1.831)/1173.92 = 3.25%
Disney’s Historical Beta

Figure 4.3: Disney versus S&P 500: 2004-2008

\[
\text{Returns}_{\text{Disney}} = 0.47\% + 0.95 \times \text{Returns}_{\text{S & P 500}} \quad (R \text{ squared} = 41\%) \\
(0.16)
\]
Analyzing Disney’s Performance

- Intercept = 0.47%
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 2004 and 2008
    - Average Annualized T.Bill rate = 3.27%
    - Monthly Riskfree Rate = 0.272% (=3.27%/12)
    - Riskfree Rate (1-Beta) = 0.272% (1-0.95) = 0.01%

- The Comparison is then between
  - Intercept versus Riskfree Rate (1 - Beta)
    - 0.47% versus 0.01%
  - Jensen’s Alpha = 0.47% -0.01% = 0.46%

- Disney did 0.46% better than expected, per month, between 2004 and 2008.
  - Annualized, Disney’s annual excess return = (1.0046)^12-1= 5.62%

- This positive Jensen’s alpha is a sign of good management at the firm.
  a) True
  b) False
Estimating Disney’s Beta

- Slope of the Regression of 0.95 is the beta
- Regression parameters are always estimated with error. The error is captured in the standard error of the beta estimate, which in the case of Disney is 0.16.
- Assume that I asked you what Disney’s true beta is, after this regression.
  - What is your best point estimate?
  - What range would you give me, with 67% confidence?
  - What range would you give me, with 95% confidence?
The Dirty Secret of “Standard Error”

Distribution of Standard Errors: Beta Estimates for U.S. stocks

Number of Firms

Standard Error in Beta Estimate

<.10  .10 - .20  .20 - .30  .30 - .40  .40 - .50  .50 - .75  > .75
Breaking down Disney’s Risk

- R Squared = 41%
- This implies that
  - 41% of the risk at Disney comes from market sources
  - 59%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded
Beta Estimation: Using a Service (Bloomberg)
Estimating Expected Returns for Disney in May 2009

- Inputs to the expected return calculation
  - Disney’s Beta = 0.95
  - Riskfree Rate = 3.50% (U.S. ten-year T.Bond rate in May 2009)
  - Risk Premium = 6% (Based on updated implied premium at the start of 2009)

- Expected Return = Riskfree Rate + Beta (Risk Premium)
  = 3.50% + 0.95 (6.00%) = 9.2%
As a potential investor in Disney, what does this expected return of 9.2% tell you?

a) This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,

b) This is the return that I need to make on Disney in the long term to break even on my investment in the stock

c) Both

Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 12.5% a year for the next 5 years. Based upon the expected return of 9.2%, you would

a) Buy the stock

b) Sell the stock
How managers use this expected return

- Managers at Disney
  - need to make at least 9.2% as a return for their equity investors to break even.
  - this is the hurdle rate for projects, when the investment is analyzed from an equity standpoint
- In other words, Disney’s cost of equity is 9.2%.
- What is the cost of not delivering this cost of equity?
Application Test: Analyzing the Risk Regression

Using your Bloomberg risk and return print out, answer the following questions:

- How well or badly did your stock do, relative to the market, during the period of the regression?
  \[ \text{Intercept} - \left( \frac{\text{Riskfree Rate}}{n} \right) (1 - \text{Beta}) = \text{Jensen’s Alpha} \]
  where \( n \) is the number of return periods in a year (12 if monthly; 52 if weekly)

- What proportion of the risk in your stock is attributable to the market? What proportion is firm-specific?

- What is the historical estimate of beta for your stock? What is the range on this estimate with 67% probability? With 95% probability?

- Based upon this beta, what is your estimate of the required return on this stock?
  \[ \text{Riskless Rate} + \text{Beta} \times \text{Risk Premium} \]
You are advising a very risky software firm on the right cost of equity to use in project analysis. You estimate a beta of 3.0 for the firm and come up with a cost of equity of 21.5%. The CFO of the firm is concerned about the high cost of equity and wants to know whether there is anything he can do to lower his beta.

How do you bring your beta down?

Should you focus your attention on bringing your beta down?

a) Yes
b) No
Regression Diagnostics for Tata Chemicals

Jensen’s α
= -0.44% - 5%/12 (1-1.18) = -0.37%
Annualized = (1-.0037)\(^{12}\)-1 = -4.29%

Expected Return (in Rupees)
= Riskfree Rate + Beta × Risk premium
= 4% + 1.18 (6%+4.51%) = 19.40%

Beta = 1.18
67% range
1.04-1.32
56% market risk
44% firm specific
Beta Estimation and Index Choice: Deutsche Bank
Deutsche Bank: Alternate views of Risk

<table>
<thead>
<tr>
<th></th>
<th>DAX</th>
<th>FTSE Euro 300</th>
<th>MSCI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>-1.63%</td>
<td>-1.05%</td>
<td>-0.48%</td>
</tr>
<tr>
<td>Beta</td>
<td>1.40</td>
<td>1.52</td>
<td>1.99</td>
</tr>
<tr>
<td>Std Error of beta</td>
<td>0.14</td>
<td>0.19</td>
<td>0.21</td>
</tr>
<tr>
<td>$R^2$</td>
<td>62%</td>
<td>54%</td>
<td>50%</td>
</tr>
</tbody>
</table>
Beta: Exploring Fundamentals

- Beta > 2
  - Bulgari: 2.45

- Beta between 1 and 2
  - Qwest Communications: 1.85
  - Microsoft: 1.25
  - GE: 1.15

- Beta < 1
  - Exxon Mobil: 0.70
  - Altria (Philip Morris): 0.60

- Beta < 0
  - Harmony Gold Mining: -0.15
Determinant 1: Product Type

- **Industry Effects**: The beta value for a firm depends upon the sensitivity of the demand for its products and services and of its costs to macroeconomic factors that affect the overall market.
  - Cyclical companies have higher betas than non-cyclical firms
  - Firms which sell more discretionary products will have higher betas than firms that sell less discretionary products
Determinant 2: Operating Leverage Effects

- Operating leverage refers to the proportion of the total costs of the firm that are fixed.
- Other things remaining equal, higher operating leverage results in greater earnings variability which in turn results in higher betas.
Measures of Operating Leverage

$$\text{Fixed Costs Measure} = \frac{\text{Fixed Costs}}{\text{Variable Costs}}$$

- This measures the relationship between fixed and variable costs. The higher the proportion, the higher the operating leverage.

$$\text{EBIT Variability Measure} = \frac{\% \text{ Change in EBIT}}{\% \text{ Change in Revenues}}$$

- This measures how quickly the earnings before interest and taxes changes as revenue changes. The higher this number, the greater the operating leverage.
Disney’s Operating Leverage: 1987-2008

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Sales</th>
<th>% Change in Sales</th>
<th>EBIT</th>
<th>% Change in EBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>$2,877</td>
<td></td>
<td>$756</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>$3,438</td>
<td>19.50%</td>
<td>$848</td>
<td>12.17%</td>
</tr>
<tr>
<td>1989</td>
<td>$4,594</td>
<td>33.62%</td>
<td>$1,177</td>
<td>38.80%</td>
</tr>
<tr>
<td>1990</td>
<td>$5,844</td>
<td>27.21%</td>
<td>$1,368</td>
<td>16.23%</td>
</tr>
<tr>
<td>1991</td>
<td>$6,182</td>
<td>5.78%</td>
<td>$1,124</td>
<td>-17.84%</td>
</tr>
<tr>
<td>1992</td>
<td>$7,504</td>
<td>21.38%</td>
<td>$1,287</td>
<td>14.50%</td>
</tr>
<tr>
<td>1993</td>
<td>$8,529</td>
<td>13.66%</td>
<td>$1,560</td>
<td>21.21%</td>
</tr>
<tr>
<td>1994</td>
<td>$10,055</td>
<td>17.89%</td>
<td>$1,804</td>
<td>15.64%</td>
</tr>
<tr>
<td>1995</td>
<td>$12,112</td>
<td>20.46%</td>
<td>$2,262</td>
<td>25.39%</td>
</tr>
<tr>
<td>1996</td>
<td>$18,739</td>
<td>54.71%</td>
<td>$3,024</td>
<td>33.69%</td>
</tr>
<tr>
<td>1997</td>
<td>$22,473</td>
<td>19.93%</td>
<td>$3,945</td>
<td>30.46%</td>
</tr>
<tr>
<td>1998</td>
<td>$22,976</td>
<td>2.24%</td>
<td>$3,843</td>
<td>-2.59%</td>
</tr>
<tr>
<td>1999</td>
<td>$23,435</td>
<td>2.00%</td>
<td>$3,580</td>
<td>-6.84%</td>
</tr>
<tr>
<td>2000</td>
<td>$25,418</td>
<td>8.46%</td>
<td>$2,525</td>
<td>-29.47%</td>
</tr>
<tr>
<td>2001</td>
<td>$25,172</td>
<td>-0.97%</td>
<td>$2,832</td>
<td>12.16%</td>
</tr>
<tr>
<td>2002</td>
<td>$25,329</td>
<td>0.62%</td>
<td>$2,384</td>
<td>-15.82%</td>
</tr>
<tr>
<td>2003</td>
<td>$27,061</td>
<td>6.84%</td>
<td>$2,713</td>
<td>13.80%</td>
</tr>
<tr>
<td>2004</td>
<td>$30,752</td>
<td>13.64%</td>
<td>$4,048</td>
<td>49.21%</td>
</tr>
<tr>
<td>2005</td>
<td>$31,944</td>
<td>3.88%</td>
<td>$4,107</td>
<td>1.46%</td>
</tr>
<tr>
<td>2006</td>
<td>$33,747</td>
<td>5.64%</td>
<td>$5,355</td>
<td>30.39%</td>
</tr>
<tr>
<td>2007</td>
<td>$35,510</td>
<td>5.22%</td>
<td>$6,829</td>
<td>27.53%</td>
</tr>
<tr>
<td>2008</td>
<td>$37,843</td>
<td>6.57%</td>
<td>$7,404</td>
<td>8.42%</td>
</tr>
</tbody>
</table>

Average: 87-08 13.73% 13.26%
Average: 96-08 9.91% 11.72%

Disney’s operating leverage 13.26% / 13.73% = 0.97
Industry average = 1.15
Determinant 3: Financial Leverage

- As firms borrow, they create fixed costs (interest payments) that make their earnings to equity investors more volatile.
- This increased earnings volatility which increases the equity beta.
- The beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

\[ \beta_L = \beta_u (1 + ((1-t)D/E)) \]

where

- \( \beta_L \) = Levered or Equity Beta
- \( \beta_u \) = Unlevered or Asset Beta
- \( D/E \) = Market value Debt to equity ratio
- \( t \) = Marginal tax rate

Earlier, we estimated the beta for Disney from a regression. Was that beta a levered or unlevered beta?

- a) Levered
- b) Unlevered
Effects of leverage on betas: Disney

- The regression beta for Disney is 0.95. This beta is a levered beta (because it is based on stock prices, which reflect leverage) and the leverage implicit in the beta estimate is the average market debt equity ratio during the period of the regression (2004 to 2008).
- The average debt equity ratio during this period was 24.64%.
- The unlevered beta for Disney can then be estimated (using a marginal tax rate of 38%)
  \[
  \text{Current Beta} / (1 + (1 - \text{tax rate}) \times \text{Average Debt/Equity})
  \]
  \[
  = 0.95 / (1 + (1 - 0.38)(0.2464)) = 0.8241
  \]
### Disney: Beta and Leverage

<table>
<thead>
<tr>
<th>Debt to Capital</th>
<th>Debt/Equity Ratio</th>
<th>Beta</th>
<th>Effect of Leverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00%</td>
<td>0.00%</td>
<td>0.82</td>
<td>0.00</td>
</tr>
<tr>
<td>10.00%</td>
<td>11.11%</td>
<td>0.88</td>
<td>0.06</td>
</tr>
<tr>
<td>20.00%</td>
<td>25.00%</td>
<td>0.95</td>
<td>0.13</td>
</tr>
<tr>
<td>30.00%</td>
<td>42.86%</td>
<td>1.04</td>
<td>0.22</td>
</tr>
<tr>
<td>40.00%</td>
<td>66.67%</td>
<td>1.16</td>
<td>0.34</td>
</tr>
<tr>
<td>50.00%</td>
<td>100.00%</td>
<td>1.34</td>
<td>0.51</td>
</tr>
<tr>
<td>60.00%</td>
<td>150.00%</td>
<td>1.59</td>
<td>0.77</td>
</tr>
<tr>
<td>70.00%</td>
<td>233.33%</td>
<td>2.02</td>
<td>1.19</td>
</tr>
<tr>
<td>80.00%</td>
<td>400.00%</td>
<td>2.87</td>
<td>2.04</td>
</tr>
<tr>
<td>90.00%</td>
<td>900.00%</td>
<td>5.42</td>
<td>4.60</td>
</tr>
</tbody>
</table>
Betas are weighted Averages

- The beta of a portfolio is always the market-value weighted average of the betas of the individual investments in that portfolio.

Thus,

- the beta of a mutual fund is the weighted average of the betas of the stocks and other investment in that portfolio
- the beta of a firm after a merger is the market-value weighted average of the betas of the companies involved in the merger.
Bottom-up versus Top-down Beta

- The top-down beta for a firm comes from a regression.
- The bottom up beta can be estimated by doing the following:
  - Find out the businesses that a firm operates in.
  - Find the unlevered betas of other firms in these businesses.
  - Take a weighted (by sales or operating income) average of these unlevered betas.
  - Lever up using the firm’s debt/equity ratio.
- The bottom up beta is a better estimate than the top down beta for the following reasons:
  - The standard error of the beta estimate will be much lower.
  - The betas can reflect the current (and even expected future) mix of businesses that the firm is in rather than the historical mix.
## Disney’s business breakdown

<table>
<thead>
<tr>
<th>Business</th>
<th>Comparable firms</th>
<th>Number of firms</th>
<th>Median levered beta</th>
<th>Median D/E</th>
<th>Unlevered beta</th>
<th>Median Cash/Firm Value</th>
<th>Unlevered beta corrected for cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>Radio and TV broadcasting companies -US</td>
<td>19</td>
<td>0.83</td>
<td>38.71%</td>
<td>0.6735</td>
<td>4.54%</td>
<td>0.6735/(1-.0454) = 0.7056</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>Theme park &amp; Resort companies - Global</td>
<td>26</td>
<td>0.80</td>
<td>65.10%</td>
<td>0.5753</td>
<td>1.64%</td>
<td>0.5849</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>Movie companies - US</td>
<td>19</td>
<td>1.57</td>
<td>53.89%</td>
<td>1.1864</td>
<td>8.93%</td>
<td>1.3027</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>Toy companies - US</td>
<td>12</td>
<td>0.83</td>
<td>27.21%</td>
<td>0.7092</td>
<td>33.66%</td>
<td>1.0690</td>
</tr>
</tbody>
</table>
A closer look at the process…

Studio Entertainment Betas

<table>
<thead>
<tr>
<th>Short Name</th>
<th>Mkt Cap</th>
<th>Total Debt</th>
<th>D/E</th>
<th>Beta</th>
<th>Cash</th>
<th>Cash/Firm value</th>
<th>Enterprise Value</th>
<th>Revenues</th>
<th>EV/sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>RED ROCK PICTURE</td>
<td>$621,902</td>
<td>$100,000</td>
<td>16.08%</td>
<td>1.62</td>
<td>$2,436</td>
<td>0.34%</td>
<td>$719,466</td>
<td>$600,000</td>
<td>1.20</td>
</tr>
<tr>
<td>TIX CORP</td>
<td>$53,988,460</td>
<td>$129,000</td>
<td>0.24%</td>
<td>1.59</td>
<td>$9,192,000</td>
<td>16.99%</td>
<td>$44,925,460</td>
<td>$66,552,000</td>
<td>0.68</td>
</tr>
<tr>
<td>TM MEDIA GROUP I</td>
<td>$224</td>
<td>$265</td>
<td>118.52%</td>
<td>0.90</td>
<td>$10</td>
<td>2.05%</td>
<td>$479</td>
<td>$1,250</td>
<td>0.38</td>
</tr>
<tr>
<td>CAMELOT ENTERTAIN</td>
<td>$815,505</td>
<td>$464,329</td>
<td>56.94%</td>
<td>0.85</td>
<td>$126</td>
<td>0.01%</td>
<td>$1,279,708</td>
<td>$750,000</td>
<td>1.71</td>
</tr>
<tr>
<td>AMER VANTAGE COS</td>
<td>$5,385,361</td>
<td>$523,000</td>
<td>9.71%</td>
<td>1.25</td>
<td>$5,353,000</td>
<td>90.60%</td>
<td>$555,361</td>
<td>$331,000</td>
<td>1.77</td>
</tr>
<tr>
<td>VALCOM INC</td>
<td>$1,126,042</td>
<td>$1,114,673</td>
<td>98.99%</td>
<td>1.63</td>
<td>$34,224</td>
<td>1.53%</td>
<td>$2,206,491</td>
<td>$689,521</td>
<td>3.20</td>
</tr>
<tr>
<td>ODYSSEY PICTURES</td>
<td>$6,963,004</td>
<td>$1,419,200</td>
<td>20.38%</td>
<td>2.24</td>
<td>$0</td>
<td>0.00%</td>
<td>$8,382,204</td>
<td>$4,279,035</td>
<td>1.96</td>
</tr>
<tr>
<td>LEONIDAS FILMS I</td>
<td>$2,342,000</td>
<td>$1,873,000</td>
<td>79.97%</td>
<td>0.57</td>
<td>$1,730,000</td>
<td>41.04%</td>
<td>$2,485,000</td>
<td>$1,077,000</td>
<td>2.31</td>
</tr>
<tr>
<td>BRILLIANT DIGITA</td>
<td>$11,304,810</td>
<td>$2,162,000</td>
<td>19.12%</td>
<td>1.36</td>
<td>$433,000</td>
<td>3.22%</td>
<td>$13,033,810</td>
<td>$5,970,000</td>
<td>2.18</td>
</tr>
<tr>
<td>METRO GLOBAL MED</td>
<td>$11,725</td>
<td>$40,679</td>
<td>346.93%</td>
<td>2.93</td>
<td>$4,514</td>
<td>8.61%</td>
<td>$47,890</td>
<td>$244,654</td>
<td>0.20</td>
</tr>
<tr>
<td>FAMILY ROOM ENT</td>
<td>$265,104</td>
<td>$77,491</td>
<td>29.23%</td>
<td>0.90</td>
<td>$31,655</td>
<td>9.24%</td>
<td>$310,940</td>
<td>$348,850</td>
<td>0.89</td>
</tr>
<tr>
<td>POINT.360</td>
<td>$13,292,890</td>
<td>$9,420,000</td>
<td>70.86%</td>
<td>1.30</td>
<td>$7,047,000</td>
<td>31.03%</td>
<td>$15,665,890</td>
<td>$45,913,000</td>
<td>0.34</td>
</tr>
<tr>
<td>IMAGE ENTERTAIN</td>
<td>$22,511,390</td>
<td>$32,394,002</td>
<td>143.90%</td>
<td>0.90</td>
<td>$780,000</td>
<td>1.42%</td>
<td>$54,125,392</td>
<td>$130,086,000</td>
<td>0.42</td>
</tr>
<tr>
<td>UNAPIX ENTERTAIN</td>
<td>$22,640</td>
<td>$39,196</td>
<td>173.13%</td>
<td>1.86</td>
<td>$0</td>
<td>0.00%</td>
<td>$61,836</td>
<td>$377,290</td>
<td>0.16</td>
</tr>
<tr>
<td>PEACH ARCH ENTER</td>
<td>$2,631,945</td>
<td>$605,205</td>
<td>22.99%</td>
<td>1.55</td>
<td>$1,753,328</td>
<td>54.16%</td>
<td>$1,483,821</td>
<td>$7,113,049</td>
<td>0.21</td>
</tr>
<tr>
<td>DREAMWORKS ANI-A</td>
<td>$2,367,548,000</td>
<td>$70,059,000</td>
<td>2.96%</td>
<td>1.90</td>
<td>$260,630,000</td>
<td>10.69%</td>
<td>$2,176,977,000</td>
<td>$755,660,976</td>
<td>2.88</td>
</tr>
<tr>
<td>KUSHNER-LOCKE CO</td>
<td>$13,981</td>
<td>$88,725</td>
<td>634.63%</td>
<td>2.99</td>
<td>$72,900</td>
<td>70.98%</td>
<td>$29,806</td>
<td>$198,670</td>
<td>0.15</td>
</tr>
<tr>
<td>LIONS GATE</td>
<td>$628,954,800</td>
<td>$319,717,984</td>
<td>50.83%</td>
<td>2.36</td>
<td>$130,713,000</td>
<td>13.78%</td>
<td>$817,959,784</td>
<td>$1,514,749,024</td>
<td>0.54</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.78</td>
</tr>
</tbody>
</table>
Disney’s bottom up beta

- Estimate the bottom up unlevered beta for Disney’s operating assets.

<table>
<thead>
<tr>
<th>Business</th>
<th>Revenues in 2008</th>
<th>EV/Sales</th>
<th>Estimated Value</th>
<th>Firm Value Proportion</th>
<th>Unlevered beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>$16,116</td>
<td>2.13</td>
<td>$34,327.78</td>
<td>58.92%</td>
<td>0.7056</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>$11,504</td>
<td>1.51</td>
<td>$17,408.14</td>
<td>29.88%</td>
<td>0.5849</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>$7,348</td>
<td>0.78</td>
<td>$5,754.86</td>
<td>9.88%</td>
<td>1.3027</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>$2,875</td>
<td>0.27</td>
<td>$768.20</td>
<td>1.32%</td>
<td>1.0690</td>
</tr>
<tr>
<td>Disney</td>
<td>$37,843</td>
<td></td>
<td>$58,258.99</td>
<td>100.00%</td>
<td>0.7333</td>
</tr>
</tbody>
</table>

Step 1: Start with Disney’s revenues by business.

Step 2: Estimate the value as a multiple of revenues by looking at what the market value of publicly traded firms in each business is, relative to revenues.

\[
\text{EV/Sales} = \frac{\text{Mkt Equity} + \text{Debt} - \text{Cash}}{\text{Revenues}}
\]

Step 3: Multiply the revenues in step 1 by the industry average multiple in step 2.

- Disney has a cash balance of $3,795 million. If we wanted a beta for all of Disney’s assets (and not just the operating assets), we would compute a weighted average:

\[
\text{Beta for Disney's assets} = 0.7333 \times \left( \frac{58,259}{58,259 + 3,795} \right) + 0 \times \left( \frac{3,795}{58,259 + 3,795} \right) = 0.6885
\]
Disney’s Cost of Equity

Step 1: Allocate debt across businesses

<table>
<thead>
<tr>
<th>Business</th>
<th>Start with this(1)</th>
<th>From comparable firms(2)</th>
<th>Estimated debt</th>
<th>As % (3)</th>
<th>Adjust to Disney’s debt (3)*16,682</th>
<th>EV - Allocated Debt</th>
<th>Allocated Debt/ Estimated Equity</th>
<th>D/E Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>$34,328</td>
<td>38.71%</td>
<td>$9,581</td>
<td>51.44%</td>
<td>$8,582</td>
<td>$25,746</td>
<td>33.33%</td>
<td></td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>$17,408</td>
<td>65.10%</td>
<td>$6,864</td>
<td>36.86%</td>
<td>$6,148</td>
<td>$11,260</td>
<td>54.61%</td>
<td></td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>$5,755</td>
<td>53.89%</td>
<td>$2,015</td>
<td>10.82%</td>
<td>$1,805</td>
<td>$3,950</td>
<td>45.70%</td>
<td></td>
</tr>
<tr>
<td>Consumer Products</td>
<td>$768</td>
<td>27.21%</td>
<td>$164</td>
<td>0.88%</td>
<td>$147</td>
<td>$621</td>
<td>23.70%</td>
<td></td>
</tr>
<tr>
<td>Media Networks</td>
<td>$34,328</td>
<td>38.71%</td>
<td>$18,624</td>
<td>100.00%</td>
<td>$16,682</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Step 2: Compute levered betas and costs of equity for Disney’s operating businesses.

<table>
<thead>
<tr>
<th>Business</th>
<th>Unlevered Beta</th>
<th>D/E Ratio</th>
<th>Levered Beta</th>
<th>Cost of Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>0.7056</td>
<td>33.33%</td>
<td>0.8514</td>
<td>8.61%</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>0.5849</td>
<td>54.61%</td>
<td>0.7829</td>
<td>8.20%</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>1.3027</td>
<td>45.70%</td>
<td>1.6718</td>
<td>13.53%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>1.0690</td>
<td>23.70%</td>
<td>1.2261</td>
<td>10.86%</td>
</tr>
<tr>
<td>Disney</td>
<td>0.7333</td>
<td>36.91%</td>
<td>0.9011</td>
<td>8.91%</td>
</tr>
</tbody>
</table>

Step 2a: Compute the cost of equity for all of Disney’s assets:

Equity Beta_{Disney as company} = 0.6885 \ (1 + (1 - 0.38)(0.3691)) = 0.8460

Riskfree Rate = 3.5%
Risk Premium = 6%
Assume now that you are the CFO of Disney. The head of the movie business has come to you with a new big budget movie that he would like you to fund. He claims that his analysis of the movie indicates that it will generate a return on equity of 12%. Would you fund it?

a) Yes. It is higher than the cost of equity for Disney as a company

b) No. It is lower than the cost of equity for the movie business.

What are the broader implications of your choice?
Estimating Aracruz’ s Bottom Up Beta

The beta for emerging market paper and pulp companies of 1.01 was used as the unlevered beta for Aracruz.

When computing the levered beta for Aracruz’ s paper and pulp business, we used the gross debt outstanding of 9,805 million BR and the market value of equity of 8907 million BR, in conjunction with the marginal tax rate of 34% for Brazil:

- **Gross Debt to Equity ratio = Debt/Equity = 9805/8907 = 110.08%**
- **Levered Beta for Aracruz Paper business = 1.01 \cdot (1+(1-.34)(1.1008)) = 1.74**

### Bottom up Betas for Paper & Pulp

<table>
<thead>
<tr>
<th></th>
<th>Number of firms</th>
<th>Median Beta</th>
<th>Median D/E</th>
<th>Median Unlevered Beta</th>
<th>Cash/Value</th>
<th>Unlevered Beta Corrected for Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emerging Markets</td>
<td>46</td>
<td>1.03</td>
<td>4.47%</td>
<td>1.00</td>
<td>0.74%</td>
<td>1.01</td>
</tr>
<tr>
<td>US</td>
<td>13</td>
<td>1.16</td>
<td>92.29%</td>
<td>0.75</td>
<td>2.87%</td>
<td>0.77</td>
</tr>
<tr>
<td>Global</td>
<td>111</td>
<td>0.91</td>
<td>9.82%</td>
<td>0.86</td>
<td>1.24%</td>
<td>0.87</td>
</tr>
</tbody>
</table>
Aracruz: Cost of Equity Calculation

- We will use a risk premium of 9.95% in computing the cost of equity, composed of the mature market equity risk premium (6%) and the Brazil country risk premium of 3.95% (estimated earlier).
- U.S. $ Cost of Equity
  \[
  \text{Cost of Equity} = 10\text{-yr T.Bond rate} + \text{Beta} \times \text{Risk Premium} \\
  = 3.5\% + 1.74 \times (9.95\%) = 20.82\%
  \]
- To convert to a Nominal $R Cost of Equity
  \[
  \text{Cost of Equity} = \left(1 + \frac{\$ \text{ Cost of Equity}}{1 + \text{Inflation Rate}_{\text{US}}} \right) \left(1 + \text{Inflation Rate}_{\text{Brazil}}\right) - 1
  \]
  \[
  = 1.2082 \times \frac{1.07}{1.02} - 1 = .2675 \text{ or } 26.75\%
  \]
  (Alternatively, you could just replace the riskfree rate with a nominal $R riskfree rate, but you would then be keeping risk premiums which were computed in dollar terms fixed while moving to a higher inflation currency)
The bottom up beta for Tata Chemicals

### Unlevered betas for Tata Chemical’s Businesses

<table>
<thead>
<tr>
<th>Business (# of comparables)</th>
<th>Revenues (millions)</th>
<th>EV/Sales (from comparable firms)</th>
<th>Estimated Value (millions)</th>
<th>Weights</th>
<th>Unlevered Beta</th>
<th>D/E Ratio</th>
<th>Levered Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers (105)</td>
<td>INR 2,506</td>
<td>1.28</td>
<td>INR 3,208</td>
<td>62.18%</td>
<td>0.72</td>
<td>51.56%</td>
<td>0.965</td>
</tr>
<tr>
<td>Chemicals (31)</td>
<td>INR 1,586</td>
<td>1.23</td>
<td>INR 1,951</td>
<td>37.82%</td>
<td>0.68</td>
<td>51.56%</td>
<td>0.911</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td></td>
<td></td>
<td>INR 5,158</td>
<td>0.70</td>
<td></td>
<td></td>
<td>0.945</td>
</tr>
</tbody>
</table>

### Cost of Equity

**Rupee Riskfree rate = 4%; Indian ERP = 6% + 4.51%**

<table>
<thead>
<tr>
<th>Business</th>
<th>Beta</th>
<th>Cost of equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers</td>
<td>0.965</td>
<td>4% + 0.965 (10.51%) = 14.14%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>0.911</td>
<td>4% + 0.911 (10.51%) = 13.58%</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>0.945</td>
<td>4% + 0.945 (10.51%) = 13.93%</td>
</tr>
</tbody>
</table>
Estimating Betas for Non-Traded Assets

- The conventional approaches of estimating betas from regressions do not work for assets that are not traded. There are no stock prices or historical returns that can be used to compute regression betas.
- There are two ways in which betas can be estimated for non-traded assets
  - Using comparable firms
  - Using accounting earnings
Using comparable firms to estimate beta for Bookscape

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Industry Name</th>
<th>Beta</th>
<th>D/E Ratio</th>
<th>Unlevered Beta</th>
<th>Cash/Firm Value</th>
<th>Unlevered beta corrected for cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Courier Corp.</td>
<td>Publishing</td>
<td>0.98</td>
<td>12.33%</td>
<td>0.91</td>
<td>0.46%</td>
<td>0.92</td>
</tr>
<tr>
<td>Educational Devel.</td>
<td>Publishing</td>
<td>0.57</td>
<td>0.00%</td>
<td>0.57</td>
<td>15.38%</td>
<td>0.67</td>
</tr>
<tr>
<td>McGraw-Hill Ryerson Ltd.</td>
<td>Publishing</td>
<td>0.26</td>
<td>0.00%</td>
<td>0.26</td>
<td>46.97%</td>
<td>0.49</td>
</tr>
<tr>
<td>Meredith Corp.</td>
<td>Publishing</td>
<td>1.37</td>
<td>66.85%</td>
<td>0.98</td>
<td>3.11%</td>
<td>1.01</td>
</tr>
<tr>
<td>PressTek Inc.</td>
<td>Publishing</td>
<td>1.68</td>
<td>41.09%</td>
<td>1.35</td>
<td>10.83%</td>
<td>1.51</td>
</tr>
<tr>
<td>PRIMEDIA Inc</td>
<td>Publishing</td>
<td>1.65</td>
<td>340.84%</td>
<td>0.54</td>
<td>9.20%</td>
<td>0.60</td>
</tr>
<tr>
<td>Scholastic Corp.</td>
<td>Publishing</td>
<td>1.13</td>
<td>84.49%</td>
<td>0.75</td>
<td>13.36%</td>
<td>0.87</td>
</tr>
<tr>
<td>Torstar 'B'</td>
<td>Publishing</td>
<td>0.48</td>
<td>54.21%</td>
<td>0.36</td>
<td>4.93%</td>
<td>0.38</td>
</tr>
<tr>
<td>Wiley (John) &amp; Sons</td>
<td>Publishing</td>
<td>1.03</td>
<td>52.73%</td>
<td>0.78</td>
<td>1.93%</td>
<td>0.80</td>
</tr>
<tr>
<td>Barnes &amp; Noble</td>
<td>Retail (Special Lines)</td>
<td>1.34</td>
<td>0.00%</td>
<td>1.34</td>
<td>48.46%</td>
<td>2.60</td>
</tr>
<tr>
<td>Books-A-Million</td>
<td>Retail (Special Lines)</td>
<td>1.98</td>
<td>97.49%</td>
<td>1.25</td>
<td>7.90%</td>
<td>1.36</td>
</tr>
<tr>
<td>Borders Group</td>
<td>Retail (Special Lines)</td>
<td>2.44</td>
<td>240.87%</td>
<td>1.00</td>
<td>7.78%</td>
<td>1.08</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td></td>
<td><strong>1.235</strong></td>
<td><strong>53.47%</strong></td>
<td><strong>0.94</strong></td>
<td><strong>8.55%</strong></td>
<td><strong>1.02</strong></td>
</tr>
</tbody>
</table>
Estimating Bookscape Levered Beta and Cost of Equity

- Because the debt/equity ratios used in computing levered betas are market debt equity ratios, and the only debt equity ratio we can compute for Bookscape is a book value debt equity ratio, we have assumed that Bookscape is close to the book industry median market debt to equity ratio of 53.47 percent.

- Using a marginal tax rate of 40 percent for Bookscape, we get a levered beta of 1.35.

  Levered beta for Bookscape = 1.02 [1 + (1 – 0.40) (0.5347)] = 1.35

- Using a riskfree rate of 3.5% (US treasury bond rate) and an equity risk premium of 6%:

  Cost of Equity = 3.5% + 1.35 (6%) = 11.60%
Is Beta an Adequate Measure of Risk for a Private Firm?

- Beta measures the risk added on to a diversified portfolio. The owners of most private firms are not diversified. Therefore, using beta to arrive at a cost of equity for a private firm will
  a) Under estimate the cost of equity for the private firm
  b) Over estimate the cost of equity for the private firm
  c) Could under or over estimate the cost of equity for the private firm
Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.
  
  Total Beta = Market Beta / Correlation of the sector with the market

- In the Bookscape example, where the market beta is 1.35 and the average R-squared of the comparable publicly traded firms is 21.58%; the correlation with the market is 46.45%.

\[
\frac{\text{Market Beta}}{\sqrt{\text{R squared}}} = \frac{1.35}{.4645} = 2.91
\]

- Total Cost of Equity = 3.5% + 2.91 (6%) = 20.94%
Application Test: Estimating a Bottom-up Beta

- Based upon the business or businesses that your firm is in right now, and its current financial leverage, estimate the bottom-up unlevered beta for your firm.

- *Data Source:* You can get a listing of unlevered betas by industry on my website by going to updated data.
From Cost of Equity to Cost of Capital

- The cost of capital is a composite cost to the firm of raising financing to fund its projects.
- In addition to equity, firms can raise capital from debt.
What is debt?

- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.

- As a consequence, debt should include
  - Any interest-bearing liability, whether short term or long term.
  - Any lease obligation, whether operating or capital.
Estimating the Cost of Debt

- If the firm has bonds outstanding, and the bonds are traded, the yield to maturity on a long-term, straight (no special features) bond can be used as the interest rate.
- If the firm is rated, use the rating and a typical default spread on bonds with that rating to estimate the cost of debt.
- If the firm is not rated,
  - and it has recently borrowed long term from a bank, use the interest rate on the borrowing or
  - estimate a synthetic rating for the company, and use the synthetic rating to arrive at a default spread and a cost of debt
- The cost of debt has to be estimated in the same currency as the cost of equity and the cash flows in the valuation.
Estimating Synthetic Ratings

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, we can use just the interest coverage ratio:
  
  \[
  \text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Expenses}}
  \]

- For the four non-financial service companies, we obtain the following:

<table>
<thead>
<tr>
<th>Company</th>
<th>Operating income</th>
<th>Interest Expense</th>
<th>Interest coverage ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney</td>
<td>$6,819</td>
<td>$821</td>
<td>8.31</td>
</tr>
<tr>
<td>Aracruz</td>
<td>R$ 574</td>
<td>R$ 155</td>
<td>3.70</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>INR 6,263</td>
<td>INR 1,215</td>
<td>5.15</td>
</tr>
<tr>
<td>Bookscape</td>
<td>$3,575</td>
<td>$575</td>
<td>6.22</td>
</tr>
</tbody>
</table>
Interest Coverage Ratios, Ratings and Default Spreads - Early 2009

<table>
<thead>
<tr>
<th>Interest Coverage Ratio: Small market cap (&lt;$5 billion)</th>
<th>Interest Coverage Ratio: Large market cap (&gt;US $ 5 billion)</th>
<th>Rating</th>
<th>Typical Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 12.5</td>
<td>&gt; 8.5</td>
<td>AAA</td>
<td>1.25%</td>
</tr>
<tr>
<td>9.50–12.5</td>
<td>6.5–8.5</td>
<td>AA</td>
<td>1.75%</td>
</tr>
<tr>
<td>7.50–9.50</td>
<td>5.5–6.5</td>
<td>A+</td>
<td>2.25%</td>
</tr>
<tr>
<td>6.00–7.50</td>
<td>4.25–5.5</td>
<td>A</td>
<td>2.50%</td>
</tr>
<tr>
<td>4.50–6.00</td>
<td>3–4.25</td>
<td>A−</td>
<td>3.00%</td>
</tr>
<tr>
<td>4.00–4.50</td>
<td>2.5–3.0</td>
<td>BBB</td>
<td>3.50%</td>
</tr>
<tr>
<td>3.50–4.00</td>
<td>2.25–2.5</td>
<td>BB+</td>
<td>4.25%</td>
</tr>
<tr>
<td>3.00–3.50</td>
<td>2.0–2.25</td>
<td>BB</td>
<td>5.00%</td>
</tr>
<tr>
<td>2.50–3.00</td>
<td>1.75–2.0</td>
<td>B+</td>
<td>6.00%</td>
</tr>
<tr>
<td>2.00–2.50</td>
<td>1.5–1.75</td>
<td>B</td>
<td>7.25%</td>
</tr>
<tr>
<td>1.50–2.00</td>
<td>1.25–1.5</td>
<td>B−</td>
<td>8.50%</td>
</tr>
<tr>
<td>1.25–1.50</td>
<td>0.8–1.25</td>
<td>CCC</td>
<td>10.00%</td>
</tr>
<tr>
<td>0.80–1.25</td>
<td>0.65–0.8</td>
<td>CC</td>
<td>12.00%</td>
</tr>
<tr>
<td>0.50–0.80</td>
<td>0.2–0.65</td>
<td>C</td>
<td>15.00%</td>
</tr>
<tr>
<td>&lt; 0.65</td>
<td>&lt; 0.2</td>
<td>D</td>
<td>20.00%</td>
</tr>
</tbody>
</table>

Disney, Market Cap > $ 5 billion: 8.31 → AA
Aracruz: Market Cap < $5 billion: 3.70 → BB+
Tata: Market Cap < $5 billion: 5.15 → A-
Bookscape: Market Cap <$5 billion: 6.22 → A
Synthetic versus Actual Ratings: Disney and Aracruz

- Disney and Aracruz are rated companies and their actual ratings are different from the synthetic rating.
- Disney’s synthetic rating is AA, whereas its actual rating is A. The difference can be attributed to any of the following:
  - Synthetic ratings reflect only the interest coverage ratio whereas actual ratings incorporate all of the other ratios and qualitative factors
  - Synthetic ratings do not allow for sector-wide biases in ratings
  - Synthetic rating was based on 2008 operating income whereas actual rating reflects normalized earnings
- Aracruz’s synthetic rating is BB+, but the actual rating for dollar debt is BB. The biggest factor behind the difference is the presence of country risk but the derivatives losses at the firm in 2008 may also be playing a role.
- Deutsche Bank had an A+ rating. We will not try to estimate a synthetic rating for the bank. Defining interest expenses on debt for a bank is difficult…
Estimating Cost of Debt

For Bookscape, we will use the synthetic rating (A) to estimate the cost of debt:
- Default Spread based upon A rating = 2.50%
- Pre-tax cost of debt = Riskfree Rate + Default Spread = 3.5% + 2.50% = 6.00%
- After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 6.00% (1-.40) = 3.60%

For the three publicly traded firms that are rated in our sample, we will use the actual bond ratings to estimate the costs of debt:

<table>
<thead>
<tr>
<th>Company</th>
<th>S&amp;P Rating</th>
<th>Risk-Free Rate</th>
<th>Default Spread</th>
<th>Cost of Debt</th>
<th>Tax Rate</th>
<th>After-Tax Cost of Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney</td>
<td>A</td>
<td>3.50% (US $)</td>
<td>2.50%</td>
<td>6.00%</td>
<td>38%</td>
<td>3.72%</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>A+</td>
<td>3.60% (Euros)</td>
<td>2.25%</td>
<td>5.85%</td>
<td>29.50%</td>
<td>4.12%</td>
</tr>
<tr>
<td>Aracruz</td>
<td>BB</td>
<td>3.50% (US $)</td>
<td>5%</td>
<td>8.50%</td>
<td>34%</td>
<td>5.61%</td>
</tr>
</tbody>
</table>

For Tata Chemicals, we will use the synthetic rating of A-, but we also consider the fact that India faces default risk (and a spread of 3%).
- Pre-tax cost of debt = Riskfree Rate(Rs) + Country Spread + Company spread = 4% + 3% + 3% = 10%
- After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 10% (1-.34) = 6.6%
Default looms larger... And spreads widen... The effect of the market crisis – January 2008 to January 2009
### Updated Default Spreads

<table>
<thead>
<tr>
<th>Rating</th>
<th>Default Spread: Over 10-year riskfree rate in January 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>0.50%</td>
</tr>
<tr>
<td>AA</td>
<td>0.65%</td>
</tr>
<tr>
<td>A+</td>
<td>0.85%</td>
</tr>
<tr>
<td>A</td>
<td>1.00%</td>
</tr>
<tr>
<td>A-</td>
<td>1.10%</td>
</tr>
<tr>
<td>BBB</td>
<td>1.60%</td>
</tr>
<tr>
<td>BB</td>
<td>3.35%</td>
</tr>
<tr>
<td>B+</td>
<td>3.75%</td>
</tr>
<tr>
<td>B</td>
<td>5.00%</td>
</tr>
<tr>
<td>B-</td>
<td>5.25%</td>
</tr>
<tr>
<td>CCC</td>
<td>8.00%</td>
</tr>
<tr>
<td>CC</td>
<td>10.00%</td>
</tr>
<tr>
<td>C</td>
<td>12.00%</td>
</tr>
<tr>
<td>D</td>
<td>15.00%</td>
</tr>
</tbody>
</table>
Application Test: Estimating a Cost of Debt

Based upon your firm’s current earnings before interest and taxes, its interest expenses, estimate

- An interest coverage ratio for your firm
- A synthetic rating for your firm (use the tables from prior pages)
- A pre-tax cost of debt for your firm
- An after-tax cost of debt for your firm
Weights for Cost of Capital Calculation

- The weights used in the cost of capital computation should be market values.
- There are three specious arguments used against market value
  - *Book value is more reliable than market value because it is not as volatile:* While it is true that book value does not change as much as market value, this is more a reflection of weakness than strength
  - *Using book value rather than market value is a more conservative approach to estimating debt ratios:* For most companies, using book values will yield a lower cost of capital than using market value weights.
  - *Since accounting returns are computed based upon book value, consistency requires the use of book value in computing cost of capital:* While it may seem consistent to use book values for both accounting return and cost of capital calculations, it does not make economic sense.
- In practical terms, estimating the market value of equity should be easy for a publicly traded firm, but some or all of the debt at most companies is not traded. As a consequence, most practitioners use the book value of debt as a proxy for the market value of debt.
Disney: From book value to market value for interest bearing debt…

- In Disney’s 2008 financial statements, the debt due over time was footnoted.

<table>
<thead>
<tr>
<th>Due in</th>
<th>Maturity</th>
<th>Amount due</th>
<th>% due</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
<td>$3,513</td>
<td>24.33%</td>
</tr>
<tr>
<td>2010</td>
<td>2</td>
<td>$1,074</td>
<td>7.44%</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>$1,205</td>
<td>8.35%</td>
</tr>
<tr>
<td>2012</td>
<td>4</td>
<td>$1,479</td>
<td>10.24%</td>
</tr>
<tr>
<td>2013</td>
<td>5</td>
<td>$1,842</td>
<td>12.76%</td>
</tr>
<tr>
<td>Thereafter</td>
<td>10</td>
<td>$5,324</td>
<td>36.88%</td>
</tr>
<tr>
<td>Weighted Average</td>
<td>5.38 years</td>
<td>$14,437</td>
<td></td>
</tr>
</tbody>
</table>

No maturity was given for debt due after 5 years. I assumed 10 years.

- Disney’s total debt due, in book value terms, on the balance sheet is $16,003 million and the total interest expense for the year was $728 million. Assuming that the maturity that we computed above still holds and using 6% as the pre-tax cost of debt:

\[
\text{Estimated MV of Disney Debt} = 728 \left( \frac{1}{(1.06)^{5.38}} \right) + \frac{16,003}{(1.06)^{5.38}} = 14,962 \text{ million}
\]
Operating Leases at Disney

- The “debt value” of operating leases is the present value of the lease payments, at a rate that reflects their risk, usually the pre-tax cost of debt.
- The pre-tax cost of debt at Disney is 6%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Commitment</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$392.00</td>
<td>$369.81</td>
</tr>
<tr>
<td>2</td>
<td>$351.00</td>
<td>$312.39</td>
</tr>
<tr>
<td>3</td>
<td>$305.00</td>
<td>$256.08</td>
</tr>
<tr>
<td>4</td>
<td>$265.00</td>
<td>$209.90</td>
</tr>
<tr>
<td>5</td>
<td>$198.00</td>
<td>$147.96</td>
</tr>
<tr>
<td>Year 6 &amp; 7</td>
<td>$309.50</td>
<td>$424.02</td>
</tr>
<tr>
<td>Debt Value of leases =</td>
<td></td>
<td>$1,720.17</td>
</tr>
</tbody>
</table>

Disney reported $619 million in commitments after year 5. Given that their average commitment over the first 5 years of $302 million, we assumed two years @ $309.5 million each.

Debt outstanding at Disney

= MV of Interest bearing Debt + PV of Operating Leases

= $14,962 + $1,720 = $16,682 million
Application Test: Estimating Market Value

- Estimate the
  - Market value of equity at your firm and Book Value of equity
  - Market value of debt and book value of debt (If you cannot find the average maturity of your debt, use 3 years): Remember to capitalize the value of operating leases and add them on to both the book value and the market value of debt.

- Estimate the
  - Weights for equity and debt based upon market value
  - Weights for equity and debt based upon book value
Current Cost of Capital: Disney

**Equity**
- Cost of Equity = Riskfree rate + Beta * Risk Premium  
  \[ = 3.5\% + 0.9011 \times (6\%) = 8.91\% \]
- Market Value of Equity = $45.193 Billion
- Equity/(Debt+Equity) = 73.04%

**Debt**
- After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)  
  \[ = (3.5\% + 2.5\%) \times (1-.38) = 3.72\% \]
- Market Value of Debt = $16.682 Billion
- Debt/(Debt + Equity) = 26.96%

**Cost of Capital**  
\[ = 8.91\% \times (0.7304) + 3.72\% \times (0.2696) = 7.51\% \]

\[
\frac{45.193}{45.193 + 16.682}
\]
## Divisional Costs of Capital: Disney and Tata Chemicals

### Disney

<table>
<thead>
<tr>
<th>Business</th>
<th>Cost of Equity</th>
<th>After-tax cost of debt</th>
<th>E/(D+E)</th>
<th>D/(D+E)</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>8.61%</td>
<td>3.72%</td>
<td>75.00%</td>
<td>25.00%</td>
<td>7.39%</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>8.20%</td>
<td>3.72%</td>
<td>64.68%</td>
<td>35.32%</td>
<td>6.62%</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>13.53%</td>
<td>3.72%</td>
<td>68.64%</td>
<td>31.36%</td>
<td>10.45%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>10.86%</td>
<td>3.72%</td>
<td>80.84%</td>
<td>19.16%</td>
<td>9.49%</td>
</tr>
<tr>
<td>Disney</td>
<td>8.91%</td>
<td>3.72%</td>
<td>73.04%</td>
<td>26.96%</td>
<td>7.51%</td>
</tr>
</tbody>
</table>

### Tata Chemicals

<table>
<thead>
<tr>
<th>Business</th>
<th>Cost of equity</th>
<th>Pre-tax cost of debt</th>
<th>After-tax cost of debt</th>
<th>D/(D+E)</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers</td>
<td>14.14%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.58%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>13.58%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.21%</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>13.93%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.44%</td>
</tr>
</tbody>
</table>

### Aracruz

\[
\frac{1.1284}{1.07} - 1 = 18.37\% \\
\frac{1.1284}{1.02} - 1 = 10.63\%
\]

<table>
<thead>
<tr>
<th>Cost of equity</th>
<th>Pre-tax Cost of debt</th>
<th>After-tax cost of debt</th>
<th>D/(D+E)</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>US dollars</td>
<td>20.82%</td>
<td>8.50%</td>
<td>5.61%</td>
<td>52.47%</td>
</tr>
<tr>
<td>Nominal $R</td>
<td>26.75%</td>
<td>13.82%</td>
<td>10.79%</td>
<td>52.47%</td>
</tr>
<tr>
<td>Real</td>
<td>18.45%</td>
<td>6.37%</td>
<td>3.54%</td>
<td>52.47%</td>
</tr>
</tbody>
</table>
Application Test: Estimating Cost of Capital

- Using the bottom-up unlevered beta that you computed for your firm, and the values of debt and equity you have estimated for your firm, estimate a bottom-up levered beta and cost of equity for your firm.

- Based upon the costs of equity and debt that you have estimated, and the weights for each, estimate the cost of capital for your firm.

- How different would your cost of capital have been, if you used book value weights?
Choosing a Hurdle Rate

- Either the cost of equity or the cost of capital can be used as a hurdle rate, depending upon whether the returns measured are to equity investors or to all claimholders on the firm (capital).
- If returns are measured to equity investors, the appropriate hurdle rate is the cost of equity.
- If returns are measured to capital (or the firm), the appropriate hurdle rate is the cost of capital.
Back to First Principles

Chapters 3 & 4: Risk, Financing Mix and Hurdle Rates

- The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.
- The return should reflect the magnitude and the timing of the cashflows as well as all side effects.
- The optimal mix of debt and equity maximizes firm value.
- The right kind of debt matches the tenor of your assets.
- How much cash you can return depends upon current & potential investment opportunities.
- How you choose to return cash to the owners will depend whether they prefer dividends or buybacks.

The Investment Decision: Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

The Financing Decision: Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

The Dividend Decision: If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
Measuring Investment Returns

“Show me the money”

from *Jerry Maguire*
First Principles

Chapters 5 & 6: Measuring Returns on Investments

- **The hurdle rate** should reflect the *riskiness* of the investment and the *mix of debt and equity* used to fund it.
- **The return** should reflect the *magnitude* and the *timing of the cashflows* as well as *all side effects*.
- **The optimal mix of debt and equity** maximizes firm value.
- **The right kind of debt** matches the *tenor of your assets*.
- **How much cash you can return** depends upon current & potential investment opportunities.
- **How you choose to return cash to the owners will depend whether they prefer dividends or buybacks**.

---

- **The Investment Decision**: Invest in assets that earn a return greater than the minimum acceptable hurdle rate.
- **The Financing Decision**: Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.
- **The Dividend Decision**: If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
Measures of return: earnings versus cash flows

- Principles Governing Accounting Earnings Measurement
  - **Accrual Accounting**: Show revenues when products and services are sold or provided, not when they are paid for. Show expenses associated with these revenues rather than cash expenses.
  - **Operating versus Capital Expenditures**: Only expenses associated with creating revenues in the current period should be treated as operating expenses. Expenses that create benefits over several periods are written off over multiple periods (as depreciation or amortization).

- To get from accounting earnings to cash flows:
  - you have to add back non-cash expenses (like depreciation)
  - you have to subtract out cash outflows which are not expensed (such as capital expenditures)
  - you have to make accrual revenues and expenses into cash revenues and expenses (by considering changes in working capital).
Measuring Returns Right: The Basic Principles

- Use cash flows rather than earnings. You cannot spend earnings.
- Use “incremental” cash flows relating to the investment decision, i.e., cashflows that occur as a consequence of the decision, rather than total cash flows.
- Use “time weighted” returns, i.e., value cash flows that occur earlier more than cash flows that occur later.

Earnings versus Cash Flows: A Disney Theme Park

- The theme parks to be built near Rio, modeled on Euro Disney in Paris and Disney World in Orlando.
- The complex will include a “Magic Kingdom” to be constructed, beginning immediately, and becoming operational at the beginning of the second year, and a second theme park modeled on Epcot Center at Orlando to be constructed in the second and third year and becoming operational at the beginning of the fourth year.
- The earnings and cash flows are estimated in nominal U.S. Dollars.
Key Assumptions on Start Up and Construction

- Disney has already spent $0.5 Billion researching the proposal and getting the necessary licenses for the park; none of this investment can be recovered if the park is not built. This expenditure has been capitalized and will be depreciated straight line over ten years to a salvage value of zero.

- Disney will face substantial construction costs, if it chooses to build the theme parks.
  - The cost of constructing Magic Kingdom will be $3 billion, with $2 billion to be spent right now, and $1 Billion to be spent one year from now.
  - The cost of constructing Epcot II will be $1.5 billion, with $1 billion to be spent at the end of the second year and $0.5 billion at the end of the third year.
  - These investments will be depreciated based upon a depreciation schedule in the tax code, where depreciation will be different each year.
Step 1: Estimate Accounting Earnings on Project

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magic Kingdom - Revenues</td>
<td>$0</td>
<td>$1,000</td>
<td>$1,400</td>
<td>$1,700</td>
<td>$2,000</td>
<td>$2,200</td>
<td>$2,420</td>
<td>$2,662</td>
<td>$2,928</td>
<td>$2,987</td>
<td></td>
</tr>
<tr>
<td>Epcot Rio - Revenues</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$300</td>
<td>$500</td>
<td>$550</td>
<td>$605</td>
<td>$666</td>
<td>$732</td>
<td>$747</td>
<td></td>
</tr>
<tr>
<td>Resort &amp; Properties - Revenues</td>
<td>$0</td>
<td>$250</td>
<td>$350</td>
<td>$500</td>
<td>$625</td>
<td>$688</td>
<td>$756</td>
<td>$832</td>
<td>$915</td>
<td>$933</td>
<td></td>
</tr>
<tr>
<td><strong>Total Revenues</strong></td>
<td><strong>$1,250</strong></td>
<td><strong>$1,750</strong></td>
<td><strong>$2,500</strong></td>
<td><strong>$3,125</strong></td>
<td><strong>$3,438</strong></td>
<td><strong>$3,781</strong></td>
<td><strong>$4,159</strong></td>
<td><strong>$4,575</strong></td>
<td><strong>$4,667</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magic Kingdom – Direct Expenses</td>
<td>$0</td>
<td>$600</td>
<td>$840</td>
<td>$1,020</td>
<td>$1,200</td>
<td>$1,320</td>
<td>$1,452</td>
<td>$1,597</td>
<td>$1,757</td>
<td>$1,792</td>
<td></td>
</tr>
<tr>
<td>Epcot Rio – Direct Expenses</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$180</td>
<td>$300</td>
<td>$330</td>
<td>$363</td>
<td>$399</td>
<td>$439</td>
<td>$448</td>
<td></td>
</tr>
<tr>
<td>Resort &amp; Property – Direct Expenses</td>
<td>$0</td>
<td>$188</td>
<td>$263</td>
<td>$375</td>
<td>$469</td>
<td>$516</td>
<td>$567</td>
<td>$624</td>
<td>$686</td>
<td>$700</td>
<td></td>
</tr>
<tr>
<td><strong>Total Direct Expenses</strong></td>
<td><strong>$788</strong></td>
<td><strong>$1,103</strong></td>
<td><strong>$1,575</strong></td>
<td><strong>$1,969</strong></td>
<td><strong>$2,166</strong></td>
<td><strong>$2,382</strong></td>
<td><strong>$2,620</strong></td>
<td><strong>$2,882</strong></td>
<td><strong>$2,940</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation &amp; Amortization</td>
<td>$50</td>
<td>$425</td>
<td>$469</td>
<td>$444</td>
<td>$372</td>
<td>$367</td>
<td>$364</td>
<td>$364</td>
<td>$366</td>
<td>$368</td>
<td></td>
</tr>
<tr>
<td>Allocated G&amp;A Costs</td>
<td>$0</td>
<td>$188</td>
<td>$263</td>
<td>$375</td>
<td>$469</td>
<td>$516</td>
<td>$567</td>
<td>$624</td>
<td>$686</td>
<td>$700</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Income</strong></td>
<td><strong>($50)</strong></td>
<td><strong>($150)</strong></td>
<td><strong>($84)</strong></td>
<td><strong>$106</strong></td>
<td><strong>$315</strong></td>
<td><strong>$389</strong></td>
<td><strong>$467</strong></td>
<td><strong>$551</strong></td>
<td><strong>$641</strong></td>
<td><strong>$658</strong></td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td>($19)</td>
<td>($57)</td>
<td>($32)</td>
<td>$40</td>
<td>$120</td>
<td>$148</td>
<td>$178</td>
<td>$209</td>
<td>$244</td>
<td>$250</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Income after Taxes</strong></td>
<td><strong>($31)</strong></td>
<td><strong>($93)</strong></td>
<td><strong>($52)</strong></td>
<td><strong>$66</strong></td>
<td><strong>$196</strong></td>
<td><strong>$241</strong></td>
<td><strong>$290</strong></td>
<td><strong>$341</strong></td>
<td><strong>$397</strong></td>
<td><strong>$408</strong></td>
<td></td>
</tr>
</tbody>
</table>

Direct expenses: 60% of revenues for theme parks, 75% of revenues for resort properties
Allocated G&A: Company G&A allocated to project, based on projected revenues. Two thirds of expense is fixed, rest is variable.
Taxes: Based on marginal tax rate of 38%
And the Accounting View of Return

<table>
<thead>
<tr>
<th>Year</th>
<th>After-tax Operating Income</th>
<th>Pre-project investment</th>
<th>Fixed assets</th>
<th>Working capital</th>
<th>Total Capital</th>
<th>Average BV of Capital</th>
<th>ROC (a)</th>
<th>ROC (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td>$500</td>
<td>$2,000</td>
<td>$0</td>
<td>$2,500</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>1</td>
<td>-$31</td>
<td>$450</td>
<td>$3,000</td>
<td>$0</td>
<td>$3,450</td>
<td>$2,975</td>
<td>-1.04%</td>
<td>-1.24%</td>
</tr>
<tr>
<td>2</td>
<td>-$93</td>
<td>$400</td>
<td>$3,813</td>
<td>$63</td>
<td>$4,275</td>
<td>$3,863</td>
<td>-2.41%</td>
<td>-2.70%</td>
</tr>
<tr>
<td>3</td>
<td>-$52</td>
<td>$350</td>
<td>$4,145</td>
<td>$88</td>
<td>$4,582</td>
<td>$4,429</td>
<td>-1.18%</td>
<td>-1.22%</td>
</tr>
<tr>
<td>4</td>
<td>$66</td>
<td>$300</td>
<td>$4,027</td>
<td>$125</td>
<td>$4,452</td>
<td>$4,517</td>
<td>1.46%</td>
<td>1.44%</td>
</tr>
<tr>
<td>5</td>
<td>$196</td>
<td>$250</td>
<td>$3,962</td>
<td>$156</td>
<td>$4,368</td>
<td>$4,410</td>
<td>4.43%</td>
<td>4.39%</td>
</tr>
<tr>
<td>6</td>
<td>$241</td>
<td>$200</td>
<td>$3,931</td>
<td>$172</td>
<td>$4,302</td>
<td>$4,335</td>
<td>5.57%</td>
<td>5.52%</td>
</tr>
<tr>
<td>7</td>
<td>$290</td>
<td>$150</td>
<td>$3,931</td>
<td>$189</td>
<td>$4,270</td>
<td>$4,286</td>
<td>6.76%</td>
<td>6.74%</td>
</tr>
<tr>
<td>8</td>
<td>$341</td>
<td>$100</td>
<td>$3,946</td>
<td>$208</td>
<td>$4,254</td>
<td>$4,262</td>
<td>8.01%</td>
<td>8.00%</td>
</tr>
<tr>
<td>9</td>
<td>$397</td>
<td>$50</td>
<td>$3,978</td>
<td>$229</td>
<td>$4,257</td>
<td>$4,255</td>
<td>9.34%</td>
<td>9.34%</td>
</tr>
<tr>
<td>10</td>
<td>$408</td>
<td>$0</td>
<td>$4,010</td>
<td>$233</td>
<td>$4,243</td>
<td>$4,250</td>
<td>9.61%</td>
<td>9.59%</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.05%</td>
<td>3.99%</td>
<td></td>
</tr>
</tbody>
</table>

(a) Based upon book capital at the start of each year
(b) Based upon average book capital over the year
The computed return on capital on this investment is about 4%. To make a judgment on whether this is a sufficient return, we need to compare this return to a “hurdle rate”. Which of the following is the right hurdle rate? Why or why not?

- The riskfree rate of 3.5% (T. Bond rate)
- The cost of equity for Disney as a company (8.91%)
- The cost of equity for Disney theme parks (8.20%)
- The cost of capital for Disney as a company (7.51%)
- The cost of capital for Disney theme parks (6.62%)
- None of the above
Should there be a risk premium for foreign projects?

- The exchange rate risk should be diversifiable risk (and hence should not command a premium) if
  - the company has projects in a large number of countries (or)
  - the investors in the company are globally diversified.
  For Disney, this risk should not affect the cost of capital used. Consequently, we would not adjust the cost of capital for Disney’s investments in other mature markets (Germany, UK, France)

- The same diversification argument can also be applied against some political risk, which would mean that it too should not affect the discount rate.
  However, there are aspects of political risk especially in emerging markets that will be difficult to diversify and may affect the cash flows, by reducing the expected life or cash flows on the project.
  For Disney, this is the risk that we are incorporating into the cost of capital when it invests in Brazil (or any other emerging market)
Estimating a hurdle rate for Rio Disney

- We did estimate a cost of capital of 6.62% for the Disney theme park business, using a bottom-up levered beta of 0.7829 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- The only concern we would have with using this cost of equity for this project is that it may not adequately reflect the additional risk associated with the theme park being in an emerging market (Brazil).

  Country risk premium for Brazil = 2.50% (34/21.5) = 3.95%
  Cost of Equity in US$= 3.5% + 0.7829 (6%+3.95%) = 11.29%

  We multiplied the default spread for Brazil (2.50%) by the relative volatility of Brazil’s equity index to the Brazilian government bond. (34%/21.5%)

- Using this estimate of the cost of equity, Disney’s theme park debt ratio of 35.32% and its after-tax cost of debt of 3.72% (see chapter 4), we can estimate the cost of capital for the project:

  Cost of Capital in US$ = 11.29% (0.6468) + 3.72% (0.3532) = 8.62%
Do not invest in this park. The return on capital of 4.05% is lower than the cost of capital for theme parks of 8.62%; This would suggest that the project should not be taken.

Given that we have computed the average over an arbitrary period of 10 years, while the theme park itself would have a life greater than 10 years, would you feel comfortable with this conclusion?

a) Yes
b) No
A Tangent: From New to Existing Investments: ROC for the entire firm

How “good” are the existing investments of the firm?

Measuring ROC for existing investments..

<table>
<thead>
<tr>
<th>Company</th>
<th>EBIT (1-t)</th>
<th>BV of Debt</th>
<th>BV of Equity</th>
<th>Cash</th>
<th>BV of Capital</th>
<th>Return on Capital</th>
<th>Cost of Capital</th>
<th>ROC - Cost of Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney</td>
<td>$4,359</td>
<td>$16,892</td>
<td>$30,753</td>
<td>$3,670</td>
<td>$43,975</td>
<td>9.91%</td>
<td>7.51%</td>
<td>2.40%</td>
</tr>
<tr>
<td>Aracruz</td>
<td>R$ 379</td>
<td>R$ 3,090</td>
<td>R$ 5,361</td>
<td>R$ 22</td>
<td>R$ 8,430</td>
<td>4.49%</td>
<td>10.63%</td>
<td>-6.14%</td>
</tr>
<tr>
<td>Bookscape</td>
<td>$2.15</td>
<td>$9.59</td>
<td>$6.00</td>
<td>$0.40</td>
<td>$15.59</td>
<td>13.76%</td>
<td>14.90%</td>
<td>-1.14%</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>INR 4,134</td>
<td>INR 12,614</td>
<td>INR 23,928</td>
<td>INR 725</td>
<td>INR 36,542</td>
<td>11.31%</td>
<td>11.44%</td>
<td>-0.12%</td>
</tr>
</tbody>
</table>
The key to value is earning excess returns. Over time, there have been attempts to restate this obvious fact in new and different ways. For instance, Economic Value Added (EVA) developed a wide following in the 1990s:

\[ \text{EVA} = (\text{ROC} - \text{Cost of Capital}) \times (\text{Book Value of Capital Invested}) \]

The excess returns for the four firms can be restated as follows:

<table>
<thead>
<tr>
<th>Company</th>
<th>ROC - Cost of Capital</th>
<th>BV of Capital</th>
<th>EVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney</td>
<td>2.40%</td>
<td>$43,975</td>
<td>$1,057</td>
</tr>
<tr>
<td>Aracruz</td>
<td>-6.14%</td>
<td>R$ 8,430</td>
<td>-R$ 517</td>
</tr>
<tr>
<td>Bookscape</td>
<td>-1.14%</td>
<td>$15.59</td>
<td>-$0.18</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>NMF</td>
<td>NMF</td>
<td>NMF</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>-0.12%</td>
<td>INR 36,542</td>
<td>-INR 45</td>
</tr>
</tbody>
</table>
Application Test: Assessing Investment Quality

- For the most recent period for which you have data, compute the after-tax return on capital earned by your firm, where after-tax return on capital is computed to be:

  \[ \text{After-tax ROC} = \frac{\text{EBIT} \times (1-\text{tax rate})}{(\text{BV of debt} + \text{BV of Equity-Cash})_{\text{previous year}}} \]

- For the most recent period for which you have data, compute the return spread earned by your firm:

  \[ \text{Return Spread} = \text{After-tax ROC} - \text{Cost of Capital} \]

- For the most recent period, compute the EVA earned by your firm:

  \[ \text{EVA} = \text{Return Spread} \times ((\text{BV of debt} + \text{BV of Equity-Cash})_{\text{previous year}}) \]
The cash flow view of this project..

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income</td>
<td>-$50</td>
<td>-$150</td>
<td>-$84</td>
<td>$106</td>
<td>$315</td>
<td>$389</td>
<td>$467</td>
<td>$551</td>
<td>$641</td>
<td>$658</td>
<td></td>
</tr>
<tr>
<td>Taxes</td>
<td>-$19</td>
<td>-$57</td>
<td>-$32</td>
<td>$40</td>
<td>$120</td>
<td>$148</td>
<td>$178</td>
<td>$209</td>
<td>$244</td>
<td>$250</td>
<td></td>
</tr>
<tr>
<td>Operating Income after Taxes</td>
<td>-$31</td>
<td>-$93</td>
<td>-$52</td>
<td>$66</td>
<td>$196</td>
<td>$241</td>
<td>$290</td>
<td>$341</td>
<td>$397</td>
<td>$408</td>
<td></td>
</tr>
<tr>
<td>+ Depreciation &amp; Amortization</td>
<td>$50</td>
<td>$425</td>
<td>$469</td>
<td>$444</td>
<td>$372</td>
<td>$367</td>
<td>$364</td>
<td>$364</td>
<td>$366</td>
<td>$368</td>
<td></td>
</tr>
<tr>
<td>- Capital Expenditures</td>
<td>$2,500</td>
<td>$1,000</td>
<td>$1,188</td>
<td>$752</td>
<td>$276</td>
<td>$258</td>
<td>$285</td>
<td>$314</td>
<td>$330</td>
<td>$347</td>
<td>$350</td>
</tr>
<tr>
<td>- Change in Working Capital</td>
<td>$0</td>
<td>$0</td>
<td>$63</td>
<td>$25</td>
<td>$38</td>
<td>$31</td>
<td>$16</td>
<td>$17</td>
<td>$19</td>
<td>$21</td>
<td>$5</td>
</tr>
<tr>
<td>Cash flow to Firm</td>
<td>-$2,500</td>
<td>-$981</td>
<td>-$918</td>
<td>-$360</td>
<td>$196</td>
<td>$279</td>
<td>$307</td>
<td>$323</td>
<td>$357</td>
<td>$395</td>
<td>$422</td>
</tr>
</tbody>
</table>

To get from income to cash flow, we:

● added back all non-cash charges such as depreciation. Tax benefits:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>$50</td>
<td>$425</td>
<td>$469</td>
<td>$444</td>
<td>$372</td>
<td>$367</td>
<td>$364</td>
<td>$364</td>
<td>$366</td>
<td>$368</td>
</tr>
<tr>
<td>Depreciation * t</td>
<td>$19</td>
<td>$162</td>
<td>$178</td>
<td>$169</td>
<td>$141</td>
<td>$139</td>
<td>$138</td>
<td>$138</td>
<td>$139</td>
<td>$140</td>
</tr>
</tbody>
</table>

● subtracted out the capital expenditures
● subtracted out the change in non-cash working capital
The incremental cash flows on the project

$500 million has already been spent & $50 million in depreciation will exist anyway.

2/3rd of allocated G&A is fixed.
Add back this amount (1-t)
Tax rate = 38%

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income</td>
<td>-$50</td>
<td>-$150</td>
<td>-$84</td>
<td>$106</td>
<td>$315</td>
<td>$389</td>
<td>$467</td>
<td>$551</td>
<td>$641</td>
<td>$658</td>
<td></td>
</tr>
<tr>
<td>Operating Income after Taxes</td>
<td>-$31</td>
<td>-$93</td>
<td>-$52</td>
<td>-$66</td>
<td>-$196</td>
<td>-$241</td>
<td>-$290</td>
<td>-$341</td>
<td>-$397</td>
<td>-$408</td>
<td></td>
</tr>
<tr>
<td>+ Depreciation &amp; Amortization</td>
<td>$50</td>
<td>$425</td>
<td>$469</td>
<td>$444</td>
<td>$372</td>
<td>$367</td>
<td>$364</td>
<td>$364</td>
<td>$366</td>
<td>$368</td>
<td></td>
</tr>
<tr>
<td>- Capital Expenditures</td>
<td>$2,500</td>
<td>$1,000</td>
<td>$1,188</td>
<td>$752</td>
<td>$276</td>
<td>$258</td>
<td>$285</td>
<td>$314</td>
<td>$330</td>
<td>$347</td>
<td>$350</td>
</tr>
<tr>
<td>- Change in Working Capital</td>
<td>$0</td>
<td>$0</td>
<td>$63</td>
<td>$25</td>
<td>$38</td>
<td>$31</td>
<td>$16</td>
<td>$17</td>
<td>$19</td>
<td>$21</td>
<td>$5</td>
</tr>
<tr>
<td>Cash flow to Firm</td>
<td>-$2,500</td>
<td>-$981</td>
<td>-$918</td>
<td>-$360</td>
<td>$196</td>
<td>$279</td>
<td>$307</td>
<td>$323</td>
<td>$357</td>
<td>$395</td>
<td>$422</td>
</tr>
<tr>
<td>+ Pre-Project Investment</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pre-project Deprec * t</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
<td>$19</td>
</tr>
<tr>
<td>+ Fixed G&amp;A (1-t)</td>
<td>$0</td>
<td>$78</td>
<td>$109</td>
<td>$155</td>
<td>$194</td>
<td>$213</td>
<td>$234</td>
<td>$258</td>
<td>$284</td>
<td>$289</td>
<td></td>
</tr>
<tr>
<td>Incremental Cash flow to Firm</td>
<td>-$2,000</td>
<td>-$1,000</td>
<td>-$859</td>
<td>-$270</td>
<td>$332</td>
<td>$454</td>
<td>$501</td>
<td>$538</td>
<td>$596</td>
<td>$660</td>
<td>$692</td>
</tr>
</tbody>
</table>
To Time-Weighted Cash Flows

- Incremental cash flows in the earlier years are worth more than incremental cash flows in later years.
- In fact, cash flows across time cannot be added up. They have to be brought to the same point in time before aggregation.
- This process of moving cash flows through time is
  - discounting, when future cash flows are brought to the present
  - compounding, when present cash flows are taken to the future
## Present Value Mechanics

<table>
<thead>
<tr>
<th>Cash Flow Type</th>
<th>Discounting Formula</th>
<th>Compounding Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Simple CF</td>
<td>( \frac{CF_n}{(1+r)^n} )</td>
<td>( CF_0 (1+r)^n )</td>
</tr>
<tr>
<td>2. Annuity</td>
<td>[ A \left[ \frac{1 - \frac{1}{(1+r)^n}}{r} \right] ]</td>
<td>[ A \left[ \frac{(1+r)^n - 1}{r} \right] ]</td>
</tr>
<tr>
<td>3. Growing Annuity</td>
<td>[ A(1+g) \left[ \frac{1 - \frac{(1+g)^n}{(1+r)^n}}{r - g} \right] ]</td>
<td></td>
</tr>
<tr>
<td>4. Perpetuity</td>
<td>( \frac{A}{r} )</td>
<td></td>
</tr>
<tr>
<td>5. Growing Perpetuity</td>
<td>Expected Cashflow next year/(r-g)</td>
<td></td>
</tr>
</tbody>
</table>
Discounted cash flow measures of return

- **Net Present Value (NPV):** The net present value is the sum of the present values of all cash flows from the project (including initial investment).

  \[ NPV = \text{Sum of the present values of all cash flows on the project, including the initial investment, with the cash flows being discounted at the appropriate hurdle rate (cost of capital, if cash flow is cash flow to the firm, and cost of equity, if cash flow is to equity investors)} \]
  
  - Decision Rule: Accept if NPV > 0

- **Internal Rate of Return (IRR):** The internal rate of return is the discount rate that sets the net present value equal to zero. It is the percentage rate of return, based upon incremental time-weighted cash flows.

  - Decision Rule: Accept if IRR > hurdle rate
Closure on Cash Flows

In a project with a finite and short life, you would need to compute a **salvage value**, which is the expected proceeds from selling all of the investment in the project at the end of the project life. It is usually set equal to book value of fixed assets and working capital.

In a project with an infinite or very long life, we compute cash flows for a reasonable period, and then compute a **terminal value** for this project, which is the present value of all cash flows that occur after the estimation period ends.

Assuming the project lasts forever, and that cash flows after year 10 grow 2% (the inflation rate) forever, the present value at the end of year 10 of cash flows after that can be written as:

- Terminal Value in year 10 = $\frac{CF \text{ in year 11}}{(\text{Cost of Capital} - \text{Growth Rate})}$
  
  $= 692 \times (1.02) / (.0862 - .02) = \$10,669 \text{ million}$
Which yields a NPV of..

Discounted at Rio Disney cost of capital of 8.62%

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Cashflow</th>
<th>Terminal Value</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$2,000</td>
<td></td>
<td>-$2,000</td>
</tr>
<tr>
<td>1</td>
<td>-$1,000</td>
<td></td>
<td>-$921</td>
</tr>
<tr>
<td>2</td>
<td>-$860</td>
<td></td>
<td>-$729</td>
</tr>
<tr>
<td>3</td>
<td>-$270</td>
<td></td>
<td>-$211</td>
</tr>
<tr>
<td>4</td>
<td>$332</td>
<td></td>
<td>$239</td>
</tr>
<tr>
<td>5</td>
<td>$453</td>
<td></td>
<td>$300</td>
</tr>
<tr>
<td>6</td>
<td>$502</td>
<td></td>
<td>$305</td>
</tr>
<tr>
<td>7</td>
<td>$538</td>
<td></td>
<td>$302</td>
</tr>
<tr>
<td>8</td>
<td>$596</td>
<td></td>
<td>$307</td>
</tr>
<tr>
<td>9</td>
<td>$660</td>
<td></td>
<td>$313</td>
</tr>
<tr>
<td>10</td>
<td>$692</td>
<td>$10,669</td>
<td>$4,970</td>
</tr>
</tbody>
</table>

Net Present Value = $2,877
Which makes the argument that..

- **The project should be accepted.** The positive net present value suggests that the project will add value to the firm, and earn a return in excess of the cost of capital.
- By taking the project, Disney will increase its value as a firm by $2,877 million.
The IRR of this project

Figure 5.5: NPV Profile for Disney Theme Park
The IRR suggests..

- **The project is a good one.** Using time-weighted, incremental cash flows, this project provides a return of 12.35%. This is greater than the cost of capital of 8.62%.
- The IRR and the NPV will yield similar results most of the time, though there are differences between the two approaches that may cause project rankings to vary depending upon the approach used. They can yield different results, especially why comparing across projects because
  - A project can have only one NPV, whereas it can have more than one IRR.
  - The NPV is a dollar surplus value, whereas the IRR is a percentage measure of return. The NPV is therefore likely to be larger for “large scale” projects, while the IRR is higher for “small-scale” projects.
  - The NPV assumes that intermediate cash flows get reinvested at the “hurdle rate”, which is based upon what you can make on investments of comparable risk, while the IRR assumes that intermediate cash flows get reinvested at the “IRR”.
Does the currency matter?

The analysis was done in dollars. Would the conclusions have been any different if we had done the analysis in Brazilian Reais?

a) Yes
b) No
### Disney Theme Park: $R$ NPV

Discount at $R$ cost of capital
\[
= (1.0862) \times (1.07/1.02) - 1 = 13.94\%
\]

Expected Exchange Rate
\[
= \text{Exchange Rate today} \times (1.07/1.02)^t
\]

<table>
<thead>
<tr>
<th>Year</th>
<th>Cashflow ($)</th>
<th>R$/$</th>
<th>Cashflow (R$)</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$ 2,000.00</td>
<td>R$ 2.04</td>
<td>-R$ 4,080.00</td>
<td>-R$ 4,080.00</td>
</tr>
<tr>
<td>1</td>
<td>-$ 1,000.00</td>
<td>R$ 2.14</td>
<td>-R$ 2,140.00</td>
<td>-R$ 1,878.14</td>
</tr>
<tr>
<td>2</td>
<td>-$ 859.50</td>
<td>R$ 2.24</td>
<td>-R$ 1,929.49</td>
<td>-R$ 1,486.19</td>
</tr>
<tr>
<td>3</td>
<td>-$ 270.06</td>
<td>R$ 2.35</td>
<td>-R$ 635.98</td>
<td>-R$ 429.92</td>
</tr>
<tr>
<td>4</td>
<td>$ 332.50</td>
<td>R$ 2.47</td>
<td>R$ 821.40</td>
<td>R$ 487.32</td>
</tr>
<tr>
<td>5</td>
<td>$ 453.46</td>
<td>R$ 2.59</td>
<td>R$ 1,175.12</td>
<td>R$ 611.87</td>
</tr>
<tr>
<td>6</td>
<td>$ 501.55</td>
<td>R$ 2.72</td>
<td>R$ 1,363.46</td>
<td>R$ 623.06</td>
</tr>
<tr>
<td>7</td>
<td>$ 538.06</td>
<td>R$ 2.85</td>
<td>R$ 1,534.43</td>
<td>R$ 615.39</td>
</tr>
<tr>
<td>8</td>
<td>$ 595.64</td>
<td>R$ 2.99</td>
<td>R$ 1,781.89</td>
<td>R$ 627.19</td>
</tr>
<tr>
<td>9</td>
<td>$ 659.64</td>
<td>R$ 3.14</td>
<td>R$ 2,070.10</td>
<td>R$ 639.48</td>
</tr>
<tr>
<td>10</td>
<td>$ 11,360.86</td>
<td>R$ 3.29</td>
<td>R$ 37,400.49</td>
<td>R$ 10,139.72</td>
</tr>
</tbody>
</table>

NPV = R$ 5,870/2.04 = $ 2,877 Million

NPV is equal to NPV in dollar terms
Uncertainty in Project Analysis: What can we do?

- Based on our expected cash flows and the estimated cost of capital, the proposed theme park looks like a very good investment for Disney. Which of the following may affect your assessment of value?
  a) Revenues may be over estimated (crowds may be smaller and spend less)
  b) Actual costs may be higher than estimated costs
  c) Tax rates may go up
  d) Interest rates may rise
  e) Risk premiums and default spreads may increase
  f) All of the above

- How would you respond to this uncertainty?
  a) Will wait for the uncertainty to be resolved
  b) Will not take the investment
  c) Ignore it.
  d) Other
One simplistic (but effective) solution: See how quickly you can get your money back...

- If your biggest fear is losing the billions that you invested in the project, one simple measure that you can compute is the number of years it will take you to get your money back.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
<th>Cumulated CF</th>
<th>PV of Cash Flow</th>
<th>Cumulated DCF</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-$2,000</td>
<td>-$2,000</td>
<td>-$2,000</td>
<td>-$2,000</td>
</tr>
<tr>
<td>1</td>
<td>-$1,000</td>
<td>-$3,000</td>
<td>-$921</td>
<td>-$2,921</td>
</tr>
<tr>
<td>2</td>
<td>-$860</td>
<td>-$3,860</td>
<td>-$729</td>
<td>-$3,649</td>
</tr>
<tr>
<td>3</td>
<td>-$270</td>
<td>-$4,130</td>
<td>-$211</td>
<td>-$3,860</td>
</tr>
<tr>
<td>4</td>
<td>$332</td>
<td>-$3,797</td>
<td>$239</td>
<td>-$3,621</td>
</tr>
<tr>
<td>5</td>
<td>$453</td>
<td>-$3,344</td>
<td>$300</td>
<td>-$3,321</td>
</tr>
<tr>
<td>6</td>
<td>$502</td>
<td>-$2,842</td>
<td>$305</td>
<td>-$3,016</td>
</tr>
<tr>
<td>7</td>
<td>$538</td>
<td>-$2,304</td>
<td>$302</td>
<td>-$2,714</td>
</tr>
<tr>
<td>8</td>
<td>$596</td>
<td>-$1,708</td>
<td>$307</td>
<td>-$2,407</td>
</tr>
<tr>
<td>9</td>
<td>$660</td>
<td>-$1,049</td>
<td>$313</td>
<td>-$2,093</td>
</tr>
<tr>
<td>10</td>
<td>$692</td>
<td>-$357</td>
<td>$303</td>
<td>-$1,790</td>
</tr>
<tr>
<td>11</td>
<td>$706</td>
<td>$350</td>
<td>$284</td>
<td>-$1,506</td>
</tr>
<tr>
<td>12</td>
<td>$720</td>
<td>$1,070</td>
<td>$267</td>
<td>-$1,239</td>
</tr>
<tr>
<td>13</td>
<td>$735</td>
<td>$1,804</td>
<td>$251</td>
<td>-$988</td>
</tr>
<tr>
<td>14</td>
<td>$749</td>
<td>$2,554</td>
<td>$236</td>
<td>-$753</td>
</tr>
<tr>
<td>15</td>
<td>$764</td>
<td>$3,318</td>
<td>$221</td>
<td>-$531</td>
</tr>
<tr>
<td>16</td>
<td>$780</td>
<td>$4,097</td>
<td>$208</td>
<td>-$324</td>
</tr>
<tr>
<td>17</td>
<td>$795</td>
<td>$4,892</td>
<td>$195</td>
<td>-$129</td>
</tr>
<tr>
<td>18</td>
<td>$811</td>
<td>$5,703</td>
<td>$183</td>
<td>$55</td>
</tr>
<tr>
<td>19</td>
<td>$827</td>
<td>$6,531</td>
<td>$172</td>
<td>$227</td>
</tr>
<tr>
<td>20</td>
<td>$844</td>
<td>$7,374</td>
<td>$162</td>
<td>$388</td>
</tr>
</tbody>
</table>

Payback = 10.5 years

Discounted Payback = 17.7 years
A slightly more sophisticated approach: Sensitivity Analysis and What-if Questions…

The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.

One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier to do over time, there are caveats that we would offer.

Caveat 1: When analyzing the effects of changing a variable, we often hold all else constant. In the real world, variables move together.

Caveat 2: The objective in sensitivity analysis is that we make better decisions, not churn out more tables and numbers.

Corollary 1: Less is more. Not everything is worth varying…

Corollary 2: A picture is worth a thousand numbers (and tables).
And here is a really good picture…
The final step up: Incorporate probabilistic estimates. Rather than expected values.

Actual Revenues as % of Forecasted Revenues (Base case = 100%)

Equity Risk Premium (Base Case = 6% (US)+ 3.95% (Brazil) = 9.95%
The resulting simulation…

NPV ranges from -$4 billion to +$14 billion. NPV is negative 12% of the time.

Average = $2.95 billion
Median = $2.73 billion
A final thought: Side Costs and Benefits

Most projects considered by any business create side costs and benefits for that business.

- The side costs include the costs created by the use of resources that the business already owns (opportunity costs) and lost revenues for other projects that the firm may have.
- The benefits that may not be captured in the traditional capital budgeting analysis include project synergies (where cash flow benefits may accrue to other projects) and options embedded in projects (including the options to delay, expand or abandon a project).

The returns on a project should incorporate these costs and benefits.
First Principles

Chapters 5 & 6: Measuring Returns on Investments

The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The return should reflect the magnitude and the timing of the cashflows as well as all side effects.

The optimal mix of debt and equity maximizes firm value.

The right kind of debt matches the tenor of your assets.

How much cash you can return depends upon current & potential investment opportunities.

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks.

The Investment Decision: Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

The Financing Decision: Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

The Dividend Decision: If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
Capital Structure: The Choices and the Trade off

“Neither a borrower nor a lender be”

Someone who obviously hated this part of corporate finance
First Principles

Chapters 7 & 8: Financing Choices and an Optimal Mix

- The **hurdle rate** should reflect the **riskiness** of the investment and the mix of debt and equity used to fund it.
- The **return** should reflect the **magnitude** and the **timing** of the cashflows as well as all side **effects**.
- The **optimal mix of debt and equity** maximizes **firm value**.
- The **right kind of debt** matches the **tenor** of your **assets**.
- How much **cash** you can return depends upon current & potential investment **opportunities**.
- How you **choose** to return cash to the owners will depend whether they prefer **dividends** or **buybacks**.

**The Investment Decision**
Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

**The Financing Decision**
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

**The Dividend Decision**
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
The simplest measure of how much debt and equity a firm is using currently is to look at the proportion of debt in the total financing. This ratio is called the debt to capital ratio:

Debt to Capital Ratio = Debt / (Debt + Equity)

In general, this ratio should be computed using market values for both debt and equity, and include all debt.
Assessing the existing financing choices: Disney, Aracruz and Tata Chemicals

<table>
<thead>
<tr>
<th></th>
<th>Disney</th>
<th>Aracruz</th>
<th>Tata Chemicals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt due</td>
<td>$13.27 billion</td>
<td>R$ 24.20 billion</td>
<td>Rs 42.22 billion</td>
</tr>
<tr>
<td><strong>Loans vs Bonds</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maturity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leases</strong></td>
<td>Has operating leases with a debt value of $1.46 billion (see chapter 4)</td>
<td>No stated lease commitments</td>
<td>Small lease commitments.</td>
</tr>
<tr>
<td><strong>Fixed vs Floating</strong></td>
<td>76% Fixed Rate</td>
<td>100% Fixed Rate</td>
<td>100% Fixed Rate</td>
</tr>
<tr>
<td></td>
<td>24% Floating Rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Currency</strong></td>
<td>90% US dollar</td>
<td>100% R$</td>
<td>97% Rupees</td>
</tr>
<tr>
<td></td>
<td>10% Japanese Yen</td>
<td></td>
<td>3% US dollar</td>
</tr>
<tr>
<td><strong>Other</strong></td>
<td>43% of bonds are callable</td>
<td>Small portion of debt is convertible</td>
<td>Bank debt is term loans</td>
</tr>
<tr>
<td></td>
<td>10% of bonds are putable</td>
<td>Bank debt is term loans</td>
<td></td>
</tr>
</tbody>
</table>
Financing Choices across the life cycle

<table>
<thead>
<tr>
<th>Stage</th>
<th>Revenues/ Earnings</th>
<th>External funding needs</th>
<th>Internal financing</th>
<th>External Financing</th>
<th>Growth stage</th>
<th>Financing Transitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start-up</td>
<td>Stage 1</td>
<td>High, but constrained by infrastructure</td>
<td>High, relative to firm value.</td>
<td>Moderate, relative to firm value.</td>
<td>Declining, as a percent of firm value</td>
<td>Low, as projects dry up.</td>
</tr>
<tr>
<td>Rapid Expansion</td>
<td>Stage 2</td>
<td>High, relative to firm value.</td>
<td>Moderate, relative to firm value.</td>
<td>Common stock, Warrants, Convertibles</td>
<td>High, relative to funding needs</td>
<td>More than funding needs</td>
</tr>
<tr>
<td>High Growth</td>
<td>Stage 3</td>
<td>Moderate, relative to firm value.</td>
<td>Low, relative to funding needs</td>
<td>Debt</td>
<td>High, relative to funding needs</td>
<td>More than funding needs</td>
</tr>
<tr>
<td>Mature Growth</td>
<td>Stage 4</td>
<td>Low, relative to funding needs</td>
<td>Low, as projects dry up.</td>
<td>Debt</td>
<td>High, relative to funding needs</td>
<td>More than funding needs</td>
</tr>
<tr>
<td>Decline</td>
<td>Stage 5</td>
<td>Low, as projects dry up.</td>
<td>Low, as projects dry up.</td>
<td>Debt</td>
<td>High, relative to funding needs</td>
<td>More than funding needs</td>
</tr>
</tbody>
</table>

External funding needs:
- High, but constrained by infrastructure
- High, relative to firm value
- Moderate, relative to firm value
- Declining, as a percent of firm value
- Low, as projects dry up

Internal financing:
- Negative or low
- Low, relative to funding needs
- High, relative to funding needs
- More than funding needs

External Financing:
- Owner’s Equity
- Bank Debt
- Venture Capital
- Common Stock
- Warrants
- Convertibles
- Debt
- Repurchase stock
- Retire debt

Growth stage:
- Stage 1: Start-up
- Stage 2: Rapid Expansion
- Stage 3: High Growth
- Stage 4: Mature Growth
- Stage 5: Decline

Financing Transitions:
- Accessing private equity
- Initial Public offering
- Seasoned equity issue
- Bond issues
# Debt: Summarizing the trade off

<table>
<thead>
<tr>
<th>Advantages of Debt</th>
<th>Disadvantages of debt</th>
</tr>
</thead>
</table>
| **1. Tax Benefit:** Interest expenses on debt are tax deductible but cash flows to equity are generally not.  
*Implication: The higher the marginal tax rate, the greater the benefits of debt.* | **1. Expected Bankruptcy Cost:** The expected cost of going bankrupt is a product of the probability of going bankrupt and the cost of going bankrupt. The latter includes both direct and indirect costs. The probability of going bankrupt will be higher in businesses with more volatile earnings and the cost of bankruptcy will also vary across businesses.  
*Implication:*  
1. Firms with more stable earnings should borrow more, for any given level of earnings.  
2. Firms with lower bankruptcy costs should borrow more, for any given level of earnings.* |
| **2. Added Discipline:** Borrowing money may force managers to think about the consequences of the investment decisions a little more carefully and reduce bad investments.  
*Implication: As the separation between managers and stockholders increases, the benefits to using debt will go up.* | **2. Agency Costs:** Actions that benefit equity investors may hurt lenders. The greater the potential for this conflict of interest, the greater the cost borne by the borrower (as higher interest rates or more covenants).  
*Implication: Firms where lenders can monitor/control how their money is being used should be able to borrow more than firms where this is difficult to do.* |
| **3. Loss of flexibility:** Using up available debt capacity today will mean that you cannot draw on it in the future. This loss of flexibility can be disastrous if funds are needed and access to capital is shut off.  
*Implication:*  
1. Firms that can forecast future funding needs better should be able to borrow more.  
2. Firms with better access to capital markets should be more willing to borrow more today. * |
Application Test: Would you expect your firm to gain or lose from using a lot of debt?

Considering, for your firm,
- The potential tax benefits of borrowing
- The benefits of using debt as a disciplinary mechanism
- The potential for expected bankruptcy costs
- The potential for agency costs
- The need for financial flexibility

Would you expect your firm to have a high debt ratio or a low debt ratio?

Does the firm’s current debt ratio meet your expectations?
A Hypothetical Scenario

(a) There are no taxes
(b) Managers have stockholder interests at heart and do what’s best for stockholders.
(c) No firm ever goes bankrupt
(d) Equity investors are honest with lenders; there is no subterfuge or attempt to find loopholes in loan agreements.
(e) Firms know their future financing needs with certainty

What happens to the trade off between debt and equity? How much should a firm borrow?
The Miller-Modigliani Theorem

- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- In this world,
  - Leverage is irrelevant. A firm's value will be determined by its project cash flows.
  - The cost of capital of the firm will not change with leverage. As a firm increases its leverage, the cost of equity will increase just enough to offset any gains to the leverage.
Pathways to the Optimal

- **The Cost of Capital Approach:** The optimal debt ratio is the one that minimizes the cost of capital for a firm.
- **The Sector Approach:** The optimal debt ratio is the one that brings the firm closest to its peer group in terms of financing mix.
I. The Cost of Capital Approach

- 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.
### Applying Cost of Capital Approach: The Textbook Example

The expected cash flow to the firm next year can be calculated as follows:

\[
\text{Expected Cash flow to firm next year} = \frac{200(1.03)}{(\text{Cost of capital} - g)}
\]

Where:
- \(200\) is the cash flow figure.
- \(1.03\) is the growth rate.
- \(\text{Cost of capital}\) is the weighted average cost of capital.
- \(g\) is the growth rate of the cash flows.

The table below illustrates the expected cash flow to the firm next year for different D/(D+E) ratios, along with the cost of capital and firm value:

<table>
<thead>
<tr>
<th>D/(D+E)</th>
<th>Cost of Equity</th>
<th>After-tax Cost of Debt</th>
<th>Cost of Capital</th>
<th>Firm Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10.50%</td>
<td>4.80%</td>
<td>10.50%</td>
<td>$2,747</td>
</tr>
<tr>
<td>10%</td>
<td>11.00%</td>
<td>5.10%</td>
<td>10.41%</td>
<td>$2,780</td>
</tr>
<tr>
<td>20%</td>
<td>11.60%</td>
<td>5.40%</td>
<td>10.36%</td>
<td>$2,799</td>
</tr>
<tr>
<td>30%</td>
<td>12.30%</td>
<td>5.52%</td>
<td>10.27%</td>
<td>$2,835</td>
</tr>
<tr>
<td>40%</td>
<td>13.10%</td>
<td>5.70%</td>
<td>10.14%</td>
<td>$2,885</td>
</tr>
<tr>
<td>50%</td>
<td>14.50%</td>
<td>6.10%</td>
<td>10.30%</td>
<td>$2,822</td>
</tr>
<tr>
<td>60%</td>
<td>15.00%</td>
<td>7.20%</td>
<td>10.32%</td>
<td>$2,814</td>
</tr>
<tr>
<td>70%</td>
<td>16.10%</td>
<td>8.10%</td>
<td>10.50%</td>
<td>$2,747</td>
</tr>
<tr>
<td>80%</td>
<td>17.20%</td>
<td>9.00%</td>
<td>10.64%</td>
<td>$2,696</td>
</tr>
<tr>
<td>90%</td>
<td>18.40%</td>
<td>10.20%</td>
<td>11.02%</td>
<td>$2,569</td>
</tr>
<tr>
<td>100%</td>
<td>19.70%</td>
<td>11.40%</td>
<td>11.40%</td>
<td>$2,452</td>
</tr>
</tbody>
</table>
The U-shaped Cost of Capital Graph…

Figure 8.2: Cost of Capital and Firm Value
The beta for Disney’s stock in May 2009 was 0.9011. The T. bond rate at that time was 3.5%. Using an estimated equity risk premium of 6%, we estimated the cost of equity for Disney to be 8.91%:

\[
\text{Cost of Equity} = 3.5\% + 0.9011(6\%) = 8.91\%
\]

Disney’s bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 6%. Using a marginal tax rate of 38%, the after-tax cost of debt for Disney is 3.72%.

\[
\text{After-Tax Cost of Debt} = 6.00\% (1 - 0.38) = 3.72\%
\]

The cost of capital was calculated using these costs and the weights based on market values of equity (45,193) and debt (16,682):

\[
\text{Cost of capital} = \frac{8.91\%}{(16,682 + 45,193)} \cdot \frac{45,193}{16,682 + 45,193} + \frac{3.72\%}{(16,682 + 45,193)} \cdot \frac{16,682}{16,682 + 45,193} = 7.51\%
\]
Mechanics of Cost of Capital Estimation

1. Estimate the Cost of Equity at different levels of debt:
   - Equity will become riskier -> Beta will increase -> Cost of Equity will increase.
   - Estimation will use levered beta calculation

2. Estimate the Cost of Debt at different levels of debt:
   - Default risk will go up and bond ratings will go down as debt goes up -> Cost of Debt will increase.
   - To estimating bond ratings, we will use the interest coverage ratio (EBIT/Interest expense)

3. Estimate the Cost of Capital at different levels of debt

4. Calculate the effect on Firm Value and Stock Price.
Laying the groundwork:
1. Estimate the unlevered beta for the firm

- To get to the unlevered beta, we can start with the levered beta (0.9011) and work back to an unlevered beta:
  \[
  \text{Unlevered beta} = \frac{\text{Levered Beta}}{1 + (1 - t) \frac{\text{Debt}}{\text{Equity}}} = \frac{0.9011}{1 + (1 - .38) \frac{16,682}{45,193}} = 0.7333
  \]

- Alternatively, we can back to the source and estimate it from the betas of the businesses.

<table>
<thead>
<tr>
<th>Business</th>
<th>Revenues in 2008</th>
<th>EV/Sales</th>
<th>Estimated Value</th>
<th>Firm Value Proportion</th>
<th>Unlevered beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Media Networks</td>
<td>$16,116</td>
<td>2.13</td>
<td>$34,327.78</td>
<td>58.92%</td>
<td>0.7056</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>$11,504</td>
<td>1.51</td>
<td>$17,408.14</td>
<td>29.88%</td>
<td>0.5849</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>$7,348</td>
<td>0.78</td>
<td>$5,754.86</td>
<td>9.88%</td>
<td>1.3027</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>$2,875</td>
<td>0.27</td>
<td>$768.20</td>
<td>1.32%</td>
<td>1.0690</td>
</tr>
<tr>
<td>Disney</td>
<td>$37,843</td>
<td></td>
<td>$58,258.99</td>
<td>100.00%</td>
<td>0.7333</td>
</tr>
</tbody>
</table>
2. Get Disney’s current financials…

<table>
<thead>
<tr>
<th></th>
<th>Last fiscal year</th>
<th>Trailing 12 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td>$37,843</td>
<td>$36,990</td>
</tr>
<tr>
<td>EBITDA</td>
<td>$8,986</td>
<td>$8,319</td>
</tr>
<tr>
<td>Depreciation &amp; Amortization</td>
<td>$1,582</td>
<td>$1,593</td>
</tr>
<tr>
<td>EBIT</td>
<td>$7,404</td>
<td>$6,726</td>
</tr>
<tr>
<td>Interest Expenses</td>
<td>$712</td>
<td>$728</td>
</tr>
<tr>
<td>EBITDA (adjusted for leases)</td>
<td>$9,989</td>
<td>$8,422</td>
</tr>
<tr>
<td>EBIT (adjusted for leases)</td>
<td>$7,708</td>
<td>$6,829</td>
</tr>
<tr>
<td>Interest Expenses (adjusted for leases)</td>
<td>$815</td>
<td>$831</td>
</tr>
</tbody>
</table>
I. Cost of Equity

Levered Beta = 0.7333 \times (1 + (1-\text{tax rate}) \times (\text{D/E}))

Cost of equity = 3.5\% + \text{Levered beta} \times 6\%
Estimating Cost of Debt

Start with the current market value of the firm = 45,193 + $16,682 = $61,875 million

<table>
<thead>
<tr>
<th></th>
<th>0.00%</th>
<th>10.00%</th>
<th>Debt to capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/(D+E)</td>
<td>0.00%</td>
<td></td>
<td>11.11%</td>
</tr>
<tr>
<td>D/E</td>
<td>0.00%</td>
<td>11.11%</td>
<td>D/E = 10/90 = .1111</td>
</tr>
<tr>
<td>$ Debt</td>
<td>$0</td>
<td>$6,188</td>
<td>10% of $61,875</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$8,422</th>
<th>$8,422</th>
<th>Same as 0% debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBITDA</td>
<td>$8,422</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>$1,593</td>
<td>$1,593</td>
<td>Same as 0% debt</td>
</tr>
<tr>
<td>EBIT</td>
<td>$6,829</td>
<td>$6,829</td>
<td>Same as 0% debt</td>
</tr>
<tr>
<td>Interest</td>
<td>$0</td>
<td>$294</td>
<td>Pre-tax cost of debt * $ Debt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>23.24</th>
<th>EBIT/ Interest Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-tax Int. cov</td>
<td>∞</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely Rating</td>
<td>AAA</td>
<td>AAA</td>
<td>From Ratings table</td>
</tr>
<tr>
<td>Pre-tax cost of debt</td>
<td>4.75%</td>
<td>4.75%</td>
<td>Riskless Rate + Spread</td>
</tr>
</tbody>
</table>

Aswath Damodaran
The Ratings Table

<table>
<thead>
<tr>
<th>Interest Coverage Ratio</th>
<th>Rating</th>
<th>Typical Default Spread</th>
<th>Pre-tax cost of debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;8.5</td>
<td>AAA</td>
<td>1.25%</td>
<td>4.75%</td>
</tr>
<tr>
<td>6.5-8.5</td>
<td>AA</td>
<td>1.75%</td>
<td>5.25%</td>
</tr>
<tr>
<td>5.5-6.5</td>
<td>A+</td>
<td>2.25%</td>
<td>5.75%</td>
</tr>
<tr>
<td>4.25-5.5</td>
<td>A</td>
<td>2.50%</td>
<td>6.00%</td>
</tr>
<tr>
<td>3-4.25</td>
<td>A−</td>
<td>3.00%</td>
<td>6.50%</td>
</tr>
<tr>
<td>2.5-3.0</td>
<td>BBB</td>
<td>3.50%</td>
<td>7.00%</td>
</tr>
<tr>
<td>2.25-2.5</td>
<td>BB+</td>
<td>4.25%</td>
<td>7.75%</td>
</tr>
<tr>
<td>2.0-2.25</td>
<td>BB</td>
<td>5.00%</td>
<td>8.50%</td>
</tr>
<tr>
<td>1.75-2.0</td>
<td>B+</td>
<td>6.00%</td>
<td>9.50%</td>
</tr>
<tr>
<td>1.5-1.75</td>
<td>B</td>
<td>7.25%</td>
<td>10.75%</td>
</tr>
<tr>
<td>1.25-1.5</td>
<td>B−</td>
<td>8.50%</td>
<td>12.00%</td>
</tr>
<tr>
<td>0.8-1.25</td>
<td>CCC</td>
<td>10.00%</td>
<td>13.50%</td>
</tr>
<tr>
<td>0.65-0.8</td>
<td>CC</td>
<td>12.00%</td>
<td>15.50%</td>
</tr>
<tr>
<td>0.2-0.65</td>
<td>C</td>
<td>15.00%</td>
<td>18.50%</td>
</tr>
<tr>
<td>&lt;0.2</td>
<td>D</td>
<td>20.00%</td>
<td>23.50%</td>
</tr>
</tbody>
</table>

T.Bond rate in early 2009 = 3.5%
A Test: Can you do the 30% level?

<table>
<thead>
<tr>
<th></th>
<th>10.00%</th>
<th>20.00%</th>
<th>30%</th>
</tr>
</thead>
<tbody>
<tr>
<td>D/(D + E)</td>
<td>10.00%</td>
<td>20.00%</td>
<td>30%</td>
</tr>
<tr>
<td>D/E</td>
<td>11.11%</td>
<td>25.00%</td>
<td></td>
</tr>
<tr>
<td>$ Debt</td>
<td>$6,188</td>
<td>$12,375</td>
<td></td>
</tr>
<tr>
<td>EBITDA</td>
<td>$8,422</td>
<td>$8,422</td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>$1,593</td>
<td>$1,593</td>
<td></td>
</tr>
<tr>
<td>EBIT</td>
<td>$6,829</td>
<td>$6,829</td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>$294</td>
<td>$588</td>
<td></td>
</tr>
<tr>
<td>Pretax int. cov</td>
<td>23.24</td>
<td>11.62</td>
<td></td>
</tr>
<tr>
<td>Likely rating</td>
<td>AAA</td>
<td>AAA</td>
<td></td>
</tr>
<tr>
<td>Pretax cost of debt</td>
<td>4.75%</td>
<td>4.75%</td>
<td></td>
</tr>
</tbody>
</table>
## Bond Ratings, Cost of Debt and Debt Ratios

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>$ Debt</th>
<th>Interest Expense</th>
<th>Interest coverage ratio</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>After-tax cost of debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$0</td>
<td>$0</td>
<td>∞</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
</tr>
<tr>
<td>10%</td>
<td>$6,188</td>
<td>$294</td>
<td>23.24</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
</tr>
<tr>
<td>20%</td>
<td>$12,375</td>
<td>$588</td>
<td>11.62</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
</tr>
<tr>
<td>30%</td>
<td>$18,563</td>
<td>$975</td>
<td>7.01</td>
<td>AA</td>
<td>5.25%</td>
<td>38.00%</td>
<td>3.26%</td>
</tr>
<tr>
<td>40%</td>
<td>$24,750</td>
<td>$1,485</td>
<td>4.60</td>
<td>A</td>
<td>6.00%</td>
<td>38.00%</td>
<td>3.72%</td>
</tr>
<tr>
<td>50%</td>
<td>$30,938</td>
<td>$2,011</td>
<td>3.40</td>
<td>A-</td>
<td>6.50%</td>
<td>38.00%</td>
<td>4.03%</td>
</tr>
<tr>
<td>60%</td>
<td>$37,125</td>
<td>$2,599</td>
<td>2.63</td>
<td>BBB</td>
<td>7.00%</td>
<td>38.00%</td>
<td>4.34%</td>
</tr>
<tr>
<td>70%</td>
<td>$43,313</td>
<td>$5,198</td>
<td>1.31</td>
<td>B-</td>
<td>12.00%</td>
<td>38.00%</td>
<td>7.44%</td>
</tr>
<tr>
<td>80%</td>
<td>$49,500</td>
<td>$6,683</td>
<td>1.02</td>
<td>CCC</td>
<td>13.50%</td>
<td>38.00%</td>
<td>8.37%</td>
</tr>
<tr>
<td>90%</td>
<td>$55,688</td>
<td>$7,518</td>
<td>0.91</td>
<td>CCC</td>
<td>13.50%</td>
<td>34.52%</td>
<td>8.84%</td>
</tr>
</tbody>
</table>
You need taxable income for interest to provide a tax savings. Note that the EBIT at Disney is $6,829 million. As long as interest expenses are less than $6,829 million, interest expenses remain fully tax-deductible and earn the 38% tax benefit. At an 80% debt ratio, the interest expenses are $6,683 million and the tax benefit is therefore 38% of this amount.

At a 90% debt ratio, however, the interest expenses balloon to $7,518 million, which is greater than the EBIT of $6,829 million. We consider the tax benefit on the interest expenses up to this amount:

\[
\text{Maximum Tax Benefit} = \text{EBIT} \times \text{Marginal Tax Rate} = 6,829 \text{ million} \times 0.38 = 2,595 \text{ million}
\]

Adjusted Marginal Tax Rate = Maximum Tax Benefit/Interest Expenses = $2,595/$7,518 = 34.52%
Disney’s cost of capital schedule...

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Cost of Debt (after-tax)</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.73</td>
<td>7.90%</td>
<td>2.95%</td>
<td>7.90%</td>
</tr>
<tr>
<td>10%</td>
<td>0.78</td>
<td>8.20%</td>
<td>2.95%</td>
<td>7.68%</td>
</tr>
<tr>
<td>20%</td>
<td>0.85</td>
<td>8.58%</td>
<td>2.95%</td>
<td>7.45%</td>
</tr>
<tr>
<td>30%</td>
<td>0.93</td>
<td>9.07%</td>
<td>3.26%</td>
<td>7.32%</td>
</tr>
<tr>
<td>40%</td>
<td>1.04</td>
<td>9.72%</td>
<td>3.72%</td>
<td>7.32%</td>
</tr>
<tr>
<td>50%</td>
<td>1.19</td>
<td>10.63%</td>
<td>4.03%</td>
<td>7.33%</td>
</tr>
<tr>
<td>60%</td>
<td>1.42</td>
<td>11.99%</td>
<td>4.34%</td>
<td>7.40%</td>
</tr>
<tr>
<td>70%</td>
<td>1.79</td>
<td>14.26%</td>
<td>7.44%</td>
<td>9.49%</td>
</tr>
<tr>
<td>80%</td>
<td>2.55</td>
<td>18.81%</td>
<td>8.37%</td>
<td>10.46%</td>
</tr>
<tr>
<td>90%</td>
<td>5.05</td>
<td>33.83%</td>
<td>8.84%</td>
<td>11.34%</td>
</tr>
</tbody>
</table>
Disney: Cost of Capital Chart

Figure 8.3: Costs of Debt, Equity and Capital - Disney
Disney: Cost of Capital Chart: 1997
The cost of capital approach suggests that Disney should do the following...

- Disney currently has $16.68 billion in debt. The optimal dollar debt (at 40%) is roughly $24.75 billion. Disney has excess debt capacity of $8.07 billion.
- To move to its optimal and gain the increase in value, Disney should borrow $8 billion and buy back stock.
- Given the magnitude of this decision, you should expect to answer three questions:
  - Why should we do it?
  - What if something goes wrong?
  - What if we don’t want (or cannot) buy back stock and want to make investments with the additional debt capacity?
1. Why should we do it?
Effect on Firm Value – Full Valuation Approach

- Step 1: Estimate the cash flows to Disney as a firm
  \[ \text{EBIT} (1 - \text{Tax Rate}) = 6829 (1 - 0.38) = 4,234 \]
  + Depreciation and amortization = 1,593
  – Capital expenditures = 1,628
  – Change in noncash working capital = 0
  Free cash flow to the firm = $4,199

- Step 2: Back out the implied growth rate in the current market value
  \[ \text{Value of firm} = \frac{\text{FCFF}_0 (1 + g)}{(\text{Cost of Capital} - g)} = \frac{4,199(1 + g)}{(.0751 - g)} \]
  Growth rate = (Firm Value * Cost of Capital – CF to Firm)/(Firm Value + CF to Firm)
  = (61,875* 0.0751 – 4199)/(61,875 + 4,199) = 0.0068 or 0.68%

- Step 3: Revalue the firm with the new cost of capital
  \[ \text{Firm value} = \frac{\text{FCFF}_0 (1 + g)}{(\text{Cost of Capital} - g)} = \frac{4,199(1 + g)}{(.0732 - 0.0068)} = $63,665 \text{ million} \]

The firm value increases by $1,790 million (63,665 – 61,875 = 1,790)
In this approach, we start with the current market value and isolate the effect of changing the capital structure on the cash flow and the resulting value.

Firm Value before the change = 45,193 + $16,682 = $61,875 million

WACC\textsubscript{b} = 7.51%  
Annual Cost = 61,875 * 0.0751 = $4,646.82 million

WACC\textsubscript{a} = 7.32%  
Annual Cost = 61,875 * 0.0732 = $4,529.68 million

Δ WACC = 0.19%  
Change in Annual Cost = $117.14 million

If we assume a perpetual growth of 0.68% in firm value over time,

Increase in firm value = \frac{\text{Annual Savings next year}}{(\text{Cost of Capital} - g)} = \frac{$117.14}{(0.0732 - 0.0068)} = $1,763 million

- The total number of shares outstanding before the buyback is 1856.732 million.

Change in Stock Price = $1,763/1856.732 = $0.95 per share
Let us suppose that the CFO of Disney approached you about buying back stock. He wants to know the maximum price that he should be willing to pay on the stock buyback. (The current price is $24.34 and there are 1856.732 million shares outstanding).

If we assume that investors are rational, i.e., that the investor who sell their shares back want the same share of firm value increase as those who remain:

- Increase in Value per Share = $1,763/1856.732 = $0.95
- New Stock Price = $24.34 + $0.95 = $25.29

Buying shares back $25.29 will leave you as a stockholder indifferent between selling and not selling.

What would happen to the stock price after the buyback if you were able to buy stock back at $24.34?
2. What if something goes wrong?  
The Downside Risk

- Doing What-if analysis on Operating Income
  - A. Statistical Approach
    - Standard Deviation In Past Operating Income
    - Standard Deviation In Earnings (If Operating Income Is Unavailable)
    - Reduce Base Case By One Standard Deviation (Or More)
  - B. “Economic Scenario” Approach
    - Look At What Happened To Operating Income During The Last Recession. (How Much Did It Drop In % Terms?)
    - Reduce Current Operating Income By Same Magnitude

- Constraint on Bond Ratings
Disney’s Operating Income: History

<table>
<thead>
<tr>
<th>Year</th>
<th>EBIT</th>
<th>% Change in EBIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1987</td>
<td>756</td>
<td>-</td>
</tr>
<tr>
<td>1988</td>
<td>848</td>
<td>12.17%</td>
</tr>
<tr>
<td>1989</td>
<td>1177</td>
<td>38.80%</td>
</tr>
<tr>
<td>1990</td>
<td>1368</td>
<td>16.23%</td>
</tr>
<tr>
<td>1991</td>
<td>1124</td>
<td>-17.84%</td>
</tr>
<tr>
<td>1992</td>
<td>1287</td>
<td>14.50%</td>
</tr>
<tr>
<td>1993</td>
<td>1560</td>
<td>21.21%</td>
</tr>
<tr>
<td>1994</td>
<td>1804</td>
<td>15.64%</td>
</tr>
<tr>
<td>1995</td>
<td>2262</td>
<td>25.39%</td>
</tr>
<tr>
<td>1996</td>
<td>3024</td>
<td>33.69%</td>
</tr>
<tr>
<td>1997</td>
<td>3945</td>
<td>30.46%</td>
</tr>
<tr>
<td>1998</td>
<td>3843</td>
<td>-2.59%</td>
</tr>
<tr>
<td>1999</td>
<td>3580</td>
<td>-6.84%</td>
</tr>
<tr>
<td>2000</td>
<td>2525</td>
<td>-29.47%</td>
</tr>
<tr>
<td>2001</td>
<td>2832</td>
<td>12.16%</td>
</tr>
<tr>
<td>2002</td>
<td>2384</td>
<td>-15.82%</td>
</tr>
<tr>
<td>2003</td>
<td>2713</td>
<td>13.80%</td>
</tr>
<tr>
<td>2004</td>
<td>$4,048</td>
<td>49.21%</td>
</tr>
<tr>
<td>2005</td>
<td>$4,107</td>
<td>1.46%</td>
</tr>
<tr>
<td>2006</td>
<td>$5,355</td>
<td>30.39%</td>
</tr>
<tr>
<td>2007</td>
<td>$6,829</td>
<td>27.53%</td>
</tr>
<tr>
<td>2008</td>
<td>$7,404</td>
<td>8.42%</td>
</tr>
</tbody>
</table>
Disney: Safety Buffers?

Recession Decline in Operating Income

- 2002: Drop of 15.82%
- 1991: Drop of 22.00%
- 1981-82: Increased
- Worst Year: Drop of 29.47%

- The standard deviation in past operating income is about 20%.

<table>
<thead>
<tr>
<th>EBITDA drops by</th>
<th>EBITDA</th>
<th>Optimal Debt ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$8,319</td>
<td>40%</td>
</tr>
<tr>
<td>5%</td>
<td>$7,903</td>
<td>40%</td>
</tr>
<tr>
<td>10%</td>
<td>$7,487</td>
<td>40%</td>
</tr>
<tr>
<td>15%</td>
<td>$7,071</td>
<td>40%</td>
</tr>
<tr>
<td>20%</td>
<td>$6,655</td>
<td>30%</td>
</tr>
</tbody>
</table>
Constraints on Ratings

- Management often specifies a 'desired Rating' below which they do not want to fall.
- The rating constraint is driven by three factors
  - it is one way of protecting against downside risk in operating income (so do not do both)
  - a drop in ratings might affect operating income
  - there is an ego factor associated with high ratings
- Caveat: Every Rating Constraint Has A Cost.
  - Provide Management With A Clear Estimate Of How Much The Rating Constraint Costs By Calculating The Value Of The Firm Without The Rating Constraint And Comparing To The Value Of The Firm With The Rating Constraint.
Ratings Constraints for Disney

- At its optimal debt ratio of 40%, Disney has an estimated rating of A.
- If managers insisted on a AA rating, the optimal debt ratio for Disney is then 30% and the cost of the ratings constraint is fairly small:
  \[ \text{Cost of AA Rating Constraint} = \text{Value at 40\% Debt} - \text{Value at 30\% Debt} \]
  \[ = \$63,651 - \$63,596 = \$55 \text{ million} \]
- If managers insisted on a AAA rating, the optimal debt ratio would drop to 20% and the cost of the ratings constraint would rise:
  \[ \text{Cost of AAA rating constraint} = \text{Value at 40\% Debt} - \text{Value at 20\% Debt} \]
  \[ = \$63,651 - \$62,371 = \$1,280 \text{ million} \]
3. What if you do not buy back stock..

- The optimal debt ratio is ultimately a function of the underlying riskiness of the business in which you operate and your tax rate.
- Will the optimal be different if you invested in projects instead of buying back stock?
  - No. As long as the projects financed are in the same business mix that the company has always been in and your tax rate does not change significantly.
  - Yes, if the projects are in entirely different types of businesses or if the tax rate is significantly different.
Extension to a family group company: Tata Chemical’s Optimal Capital Structure

Actual

<table>
<thead>
<tr>
<th>Business</th>
<th>Cost of equity</th>
<th>Pre-tax cost of debt</th>
<th>After-tax cost of debt</th>
<th>D/(D+E)</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fertilizers</td>
<td>14.14%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.58%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>13.58%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.21%</td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>13.93%</td>
<td>10.0%</td>
<td>6.60%</td>
<td>34.02%</td>
<td>11.44%</td>
</tr>
</tbody>
</table>

Optimal

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>Cost of Debt (after-tax)</th>
<th>WACC</th>
<th>Firm Value (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0.70</td>
<td>11.39%</td>
<td>AAA</td>
<td>8.25%</td>
<td>33.99%</td>
<td>5.45%</td>
<td>11.39%</td>
<td>Rs 79,626</td>
</tr>
<tr>
<td>10%</td>
<td>0.75</td>
<td>11.93%</td>
<td>A+</td>
<td>9.25%</td>
<td>33.99%</td>
<td>6.11%</td>
<td>11.35%</td>
<td>Rs 80,084</td>
</tr>
<tr>
<td>20%</td>
<td>0.82</td>
<td>12.61%</td>
<td>BB</td>
<td>12.00%</td>
<td>33.99%</td>
<td>7.92%</td>
<td>11.67%</td>
<td>Rs 76,586</td>
</tr>
<tr>
<td>30%</td>
<td>0.90</td>
<td>13.48%</td>
<td>B-</td>
<td>15.50%</td>
<td>33.99%</td>
<td>10.23%</td>
<td>12.51%</td>
<td>Rs 68,768</td>
</tr>
<tr>
<td>40%</td>
<td>1.01</td>
<td>14.64%</td>
<td>CC</td>
<td>19.00%</td>
<td>33.99%</td>
<td>12.54%</td>
<td>13.80%</td>
<td>Rs 59,257</td>
</tr>
<tr>
<td>50%</td>
<td>1.23</td>
<td>16.98%</td>
<td>C</td>
<td>22.00%</td>
<td>33.99%</td>
<td>16.63%</td>
<td>16.80%</td>
<td>Rs 44,637</td>
</tr>
<tr>
<td>60%</td>
<td>1.58</td>
<td>20.64%</td>
<td>D</td>
<td>27.00%</td>
<td>16.59%</td>
<td>22.52%</td>
<td>21.77%</td>
<td>Rs 31,272</td>
</tr>
<tr>
<td>70%</td>
<td>2.11</td>
<td>26.19%</td>
<td>D</td>
<td>27.00%</td>
<td>14.22%</td>
<td>23.16%</td>
<td>24.07%</td>
<td>Rs 27,325</td>
</tr>
<tr>
<td>80%</td>
<td>3.17</td>
<td>37.28%</td>
<td>D</td>
<td>27.00%</td>
<td>12.44%</td>
<td>23.64%</td>
<td>26.37%</td>
<td>Rs 24,189</td>
</tr>
<tr>
<td>90%</td>
<td>6.33</td>
<td>70.56%</td>
<td>D</td>
<td>27.00%</td>
<td>11.06%</td>
<td>24.01%</td>
<td>28.67%</td>
<td>Rs 21,638</td>
</tr>
</tbody>
</table>

Tata Chemical looks like it is over levered (34% actual versus 10% optimal), but it is tough to tell without looking at the rest of the group.
Extension to a firm with volatile earnings: Aracruz’ s Optimal Debt Ratio

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>Cost of Debt (after-tax)</th>
<th>WACC</th>
<th>Firm Value (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>1.01</td>
<td>13.52%</td>
<td>AAA</td>
<td>7.25%</td>
<td>34.00%</td>
<td>4.79%</td>
<td>13.52%</td>
<td>R$ 17,424</td>
</tr>
<tr>
<td>10%</td>
<td>1.08</td>
<td>14.26%</td>
<td>A-</td>
<td>9.00%</td>
<td>34.00%</td>
<td>5.94%</td>
<td>13.42%</td>
<td>R$ 17,600</td>
</tr>
<tr>
<td>20%</td>
<td>1.17</td>
<td>15.17%</td>
<td>B-</td>
<td>14.50%</td>
<td>34.00%</td>
<td>9.57%</td>
<td>14.05%</td>
<td>R$ 16,511</td>
</tr>
<tr>
<td>30%</td>
<td>1.29</td>
<td>16.36%</td>
<td>CC</td>
<td>18.00%</td>
<td>33.83%</td>
<td>11.91%</td>
<td>15.03%</td>
<td>R$ 15,062</td>
</tr>
<tr>
<td>40%</td>
<td>1.53</td>
<td>18.75%</td>
<td>C</td>
<td>21.00%</td>
<td>21.75%</td>
<td>16.43%</td>
<td>17.82%</td>
<td>R$ 11,994</td>
</tr>
<tr>
<td>50%</td>
<td>1.87</td>
<td>22.13%</td>
<td>D</td>
<td>26.00%</td>
<td>14.05%</td>
<td>22.35%</td>
<td>22.24%</td>
<td>R$ 9,012</td>
</tr>
<tr>
<td>60%</td>
<td>2.34</td>
<td>26.79%</td>
<td>D</td>
<td>26.00%</td>
<td>11.71%</td>
<td>22.95%</td>
<td>24.49%</td>
<td>R$ 7,975</td>
</tr>
<tr>
<td>70%</td>
<td>3.12</td>
<td>34.55%</td>
<td>D</td>
<td>26.00%</td>
<td>10.04%</td>
<td>23.39%</td>
<td>26.74%</td>
<td>R$ 7,140</td>
</tr>
<tr>
<td>80%</td>
<td>4.68</td>
<td>50.08%</td>
<td>D</td>
<td>26.00%</td>
<td>8.78%</td>
<td>23.72%</td>
<td>28.99%</td>
<td>R$ 6,452</td>
</tr>
<tr>
<td>90%</td>
<td>9.36</td>
<td>96.66%</td>
<td>D</td>
<td>26.00%</td>
<td>7.81%</td>
<td>23.97%</td>
<td>31.24%</td>
<td>R$ 5,875</td>
</tr>
</tbody>
</table>

Applied Aracruz’ s average pretax operating margin between 2004 and 2008 to be 27.24% to 2008 revenues of $R 3,697 million to get a normalized operating income of R$ 1,007 million.
Extension to a private business
Optimal Debt Ratio for Bookscape

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Beta</th>
<th>Cost of Equity</th>
<th>Bond Rating</th>
<th>Interest rate on debt</th>
<th>Tax Rate</th>
<th>Cost of Debt (after-tax)</th>
<th>Cost of capital</th>
<th>Firm Value (G)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>1.98</td>
<td>15.38%</td>
<td>AAA</td>
<td>4.75%</td>
<td>40.00%</td>
<td>2.85%</td>
<td>15.38%</td>
<td>$20,701.79</td>
</tr>
<tr>
<td>10%</td>
<td>2.11</td>
<td>16.18%</td>
<td>AAA</td>
<td>4.75%</td>
<td>40.00%</td>
<td>2.85%</td>
<td>14.84%</td>
<td>$21,728.94</td>
</tr>
<tr>
<td>20%</td>
<td>2.28</td>
<td>17.17%</td>
<td>AAA</td>
<td>4.75%</td>
<td>40.00%</td>
<td>2.85%</td>
<td>14.30%</td>
<td>$22,858.84</td>
</tr>
<tr>
<td>30%</td>
<td>2.49</td>
<td>18.44%</td>
<td>A</td>
<td>6.00%</td>
<td>40.00%</td>
<td>3.60%</td>
<td>13.99%</td>
<td>$23,572.02</td>
</tr>
<tr>
<td>40%</td>
<td>2.77</td>
<td>20.14%</td>
<td>A-</td>
<td>6.50%</td>
<td>40.00%</td>
<td>3.90%</td>
<td>13.64%</td>
<td>$24,403.93</td>
</tr>
<tr>
<td>50%</td>
<td>3.17</td>
<td>22.51%</td>
<td>BB</td>
<td>8.50%</td>
<td>40.00%</td>
<td>5.10%</td>
<td>13.81%</td>
<td>$24,000.23</td>
</tr>
<tr>
<td>60%</td>
<td>3.76</td>
<td>26.08%</td>
<td>B</td>
<td>10.75%</td>
<td>40.00%</td>
<td>6.45%</td>
<td>14.30%</td>
<td>$22,861.61</td>
</tr>
<tr>
<td>70%</td>
<td>4.75</td>
<td>32.02%</td>
<td>B-</td>
<td>12.00%</td>
<td>40.00%</td>
<td>7.20%</td>
<td>14.65%</td>
<td>$22,128.00</td>
</tr>
<tr>
<td>80%</td>
<td>6.73</td>
<td>43.90%</td>
<td>CC</td>
<td>15.50%</td>
<td>40.00%</td>
<td>9.30%</td>
<td>16.22%</td>
<td>$19,282.19</td>
</tr>
<tr>
<td>90%</td>
<td>13.20</td>
<td>82.73%</td>
<td>CC</td>
<td>15.50%</td>
<td>37.03%</td>
<td>9.76%</td>
<td>17.06%</td>
<td>$18,039.01</td>
</tr>
</tbody>
</table>

Estimated Market Value of Equity (in ‘000s) = Net Income for Bookscape *
Average PE for Publicly Traded Book Retailers = 1,500 * 10 = $15,000
Capital Structure for a bank: An Alternative Approach

- Banks are governed by regulatory capital ratios, where capital is defined as book equity and stated as a percent of assets or loans.
- Consider a bank with $100 million in loans outstanding and a book value of equity of $6 million. Furthermore, assume that the regulatory requirement is that equity capital be maintained at 5% of loans outstanding. Finally, assume that this bank wants to increase its loan base by $50 million to $150 million and to augment its equity capital ratio to 7% of loans outstanding.

\[
\begin{align*}
\text{Loans outstanding after Expansion} & = \$150 \text{ million} \\
\text{Equity after expansion} & = 7\% \text{ of } \$150 = \$10.5 \text{ million} \\
\text{Existing Equity} & = \$6.0 \text{ million} \\
\text{New Equity needed} & = \$4.5 \text{ million}
\end{align*}
\]

- Deutsche Bank: In October 2008, it raised its Tier 1 Capital Ratio to 10%, well above the Basel 1 regulatory requirement of 6%. At the end of the first quarter of 2009, it reported a Tier 1 capital ratio of 10.2%. If the capital ratio had dropped below 10%, the firm would have had to raise fresh equity.
Determinants of the Optimal Debt Ratio:

1. The marginal tax rate

The primary benefit of debt is a tax benefit. The higher the marginal tax rate, the greater the benefit to borrowing:

<table>
<thead>
<tr>
<th>Tax Rate</th>
<th>Disney</th>
<th>Aracruz</th>
<th>Tata Chemicals</th>
<th>Bookscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>10%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>20%</td>
<td>20%</td>
<td>0%</td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td>30%</td>
<td>30%</td>
<td>10%</td>
<td>0%</td>
<td>40%</td>
</tr>
<tr>
<td>40%</td>
<td>50%</td>
<td>10%</td>
<td>10%</td>
<td>40%</td>
</tr>
<tr>
<td>50%</td>
<td>60%</td>
<td>20%</td>
<td>20%</td>
<td>50%</td>
</tr>
</tbody>
</table>
2. Pre-tax Cash flow Return

- Firms that have more in operating income and cash flows, relative to firm value (in market terms), should have higher optimal debt ratios. We can measure operating income with EBIT and operating cash flow with EBITDA.
  \[
  \text{Cash flow potential} = \frac{\text{EBITDA}}{\text{Market value of equity} + \text{Debt}}
  \]
- Disney, for example, has operating income of $6,829 million, which is 11% of the market value of the firm of $61,875 million in the base case, and an optimal debt ratio of 40%. Increasing the operating income to 15% of the firm value will increase the optimal debt ratio to 60%.
- In general, growth firms will have lower cash flows, as a percent of firm value, and lower optimal debt ratios.
3. Operating Risk

- Firms that face more risk or uncertainty in their operations (and more variable operating income as a consequence) will have lower optimal debt ratios than firms that have more predictable operations.

- Operating risk enters the cost of capital approach in two places:
  - Unlevered beta: Firms that face more operating risk will tend to have higher unlevered betas. As they borrow, debt will magnify this already large risk and push up costs of equity much more steeply.
  - Bond ratings: For any given level of operating income, firms that face more risk in operations will have lower ratings. The ratings are based upon normalized income.
4. The only macro determinant: Equity vs Debt Risk Premiums
Application Test: Your firm’s optimal financing mix

- Using the optimal capital structure spreadsheet provided:
  - Estimate the optimal debt ratio for your firm
  - Estimate the new cost of capital at the optimal
  - Estimate the effect of the change in the cost of capital on firm value
  - Estimate the effect on the stock price
- In terms of the mechanics, what would you need to do to get to the optimal immediately?
Another Approach to the Optimal: Relative Analysis

- The “safest” place for any firm to be is close to the industry average
- Subjective adjustments can be made to these averages to arrive at the right debt ratio.
  - Higher tax rates -> Higher debt ratios (Tax benefits)
  - Lower insider ownership -> Higher debt ratios (Greater discipline)
  - More stable income -> Higher debt ratios (Lower bankruptcy costs)
  - More intangible assets -> Lower debt ratios (More agency problems)
Comparing to industry averages

<table>
<thead>
<tr>
<th>Company</th>
<th>Book Debt Ratio</th>
<th>Market Debt Ratio</th>
<th>Comparable group</th>
<th>Book Debt Ratio</th>
<th>Median</th>
<th>Average</th>
<th>Market Debt Ratio</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disney</td>
<td>32.89%</td>
<td>26.96%</td>
<td>US Entertainment companies</td>
<td>47.76%</td>
<td>43.59%</td>
<td>36.90%</td>
<td>37.83%</td>
<td></td>
</tr>
<tr>
<td>Aracruz</td>
<td>91.01%</td>
<td>52.47%</td>
<td>Emerging Market Paper companies</td>
<td>38.11%</td>
<td>40.74%</td>
<td>33.75%</td>
<td>34.22%</td>
<td></td>
</tr>
<tr>
<td>Tata Chemicals</td>
<td>42.95%</td>
<td>34.02%</td>
<td>Emerging Market chemical companies</td>
<td>33.88%</td>
<td>34.76%</td>
<td>25.56%</td>
<td>21.34%</td>
<td></td>
</tr>
</tbody>
</table>
Now that we have an optimal.. And an actual.. What next?

- At the end of the analysis of financing mix (using whatever tool or tools you choose to use), you can come to one of three conclusions:
  - The firm has the right financing mix
  - It has too little debt (it is under levered)
  - It has too much debt (it is over levered)

- The next step in the process is
  - Deciding how much quickly or gradually the firm should move to its optimal
  - Assuming that it does, the right kind of financing to use in making this adjustment
A Framework for Getting to the Optimal Debt Ratio

Is the actual debt ratio greater than or lesser than the optimal debt ratio?

- Actual > Optimal
  - Overlevered
    - Is the firm under bankruptcy threat?
      - Yes
        - Reduce Debt quickly
          1. Equity for Debt swap
          2. Sell Assets; use cash to pay off debt
          3. Renegotiate with lenders
      - No
        - Does the firm have good projects?
          1. ROE > Cost of Equity
          2. ROC > Cost of Capital
            - Yes
              - Take good projects with new equity or with retained earnings.
            - No
              - 1. Pay off debt with retained earnings.
              2. Reduce or eliminate dividends
              3. Issue new equity and pay off debt.

- Actual < Optimal
  - Underlevered
    - Is the firm a takeover target?
      - Yes
        - Increase leverage quickly
          1. Debt/Equity swaps
          2. Borrow money and buy shares.
      - No
        - Does the firm have good projects?
          1. ROE > Cost of Equity
          2. ROC > Cost of Capital
            - Yes
              - Take good projects with debt.
            - No
              - Do your stockholders like dividends?
                - Yes
                  - Pay Dividends
                - No
                  - Buy back stock
Disney: Applying the Framework

Is the actual debt ratio greater than or lesser than the optimal debt ratio?

- Actual > Optimal
  - Overlevered
  - Is the firm under bankruptcy threat?
    - Yes
      - Reduce Debt quickly
        1. Equity for Debt swap
        2. Sell Assets; use cash to pay off debt
        3. Renegotiate with lenders
    - No
      - Does the firm have good projects?
        ROE > Cost of Equity
        ROC > Cost of Capital
        - Yes
          - Take good projects with new equity or with retained earnings.
        - No
          - No
            - No
              - Yes
                - Pay Dividends
              - No
                - Buy back stock

- Actual < Optimal
  - Actual (26%) < Optimal (40%)
  - Is the firm a takeover target?
    - Yes
      - No. Large mkt cap & positive Jensen’s α
        - Increase leverage quickly
          1. Debt/Equity swaps
          2. Borrow money & buy shares.
        - Does the firm have good projects?
          ROE > Cost of Equity
          ROC > Cost of Capital
          - Yes
            - ROC > Cost of capital
              - Take good projects With debt.
          - No
            - Do your stockholders like dividends?
              - Yes
                - Pay Dividends
              - No
                - Buy back stock
        - No
          - Yes
            - ROC > Cost of capital
              - Take good projects With debt.
          - No
            - Do your stockholders like dividends?
              - Yes
                - Pay Dividends
              - No
                - Buy back stock
Application Test: Getting to the Optimal

Based upon your analysis of both the firm’s capital structure and investment record, what path would you map out for the firm?

- Immediate change in leverage
- Gradual change in leverage
- No change in leverage

Would you recommend that the firm change its financing mix by

- Paying off debt/Buying back equity
- Take projects with equity/debt
Designing Debt: The Fundamental Principle

- The objective in designing debt is to make the cash flows on debt match up as closely as possible with the cash flows that the firm makes on its assets.
- By doing so, we reduce our risk of default, increase debt capacity and increase firm value.

Unmatched Debt

Matched Debt
Design the perfect financing instrument

The perfect financing instrument will
- Have all of the tax advantages of debt
- While preserving the flexibility offered by equity

### Define Debt Characteristics

<table>
<thead>
<tr>
<th>Duration/Maturity</th>
<th>Currency Mix</th>
<th>Fixed vs. Floating Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>* More floating rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- if CF move with inflation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- with greater uncertainty on future</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Effect of Inflation</th>
<th>Uncertainty about Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growth Patterns</td>
<td></td>
</tr>
<tr>
<td>Cyclicality &amp; Other Effects</td>
<td></td>
</tr>
</tbody>
</table>

### Commodity Bonds
- Catastrophe Notes

Design debt to have cash flows that match up to cash flows on the assets financed.
Ensuring that you have not crossed the line drawn by the tax code

- All of this design work is lost, however, if the security that you have designed does not deliver the tax benefits.
- In addition, there may be a trade off between mismatching debt and getting greater tax benefits.
While keeping equity research analysts, ratings agencies and regulators applauding

- Ratings agencies want companies to issue equity, since it makes them safer. Equity research analysts want them not to issue equity because it dilutes earnings per share. Regulatory authorities want to ensure that you meet their requirements in terms of capital ratios (usually book value). Financing that leaves all three groups happy is nirvana.

<table>
<thead>
<tr>
<th>Consider ratings agency &amp; analyst concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analyst Concerns</strong></td>
</tr>
<tr>
<td>- Effect on EPS</td>
</tr>
<tr>
<td>- Value relative to comparables</td>
</tr>
<tr>
<td><strong>Ratings Agency</strong></td>
</tr>
<tr>
<td>- Effect on Ratios</td>
</tr>
<tr>
<td>- Ratios relative to comparables</td>
</tr>
<tr>
<td><strong>Regulatory Concerns</strong></td>
</tr>
<tr>
<td>- Measures used</td>
</tr>
</tbody>
</table>

Can securities be designed that can make these different entities happy?
Debt or Equity: The Strange Case of Trust Preferred

- Trust preferred stock has
  - A fixed dividend payment, specified at the time of the issue
  - That is tax deductible
  - And failing to make the payment can cause ? (Can it cause default?)

- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy, ratings agencies have started giving firms only partial equity credit for trust preferred.

- Assuming that trust preferred stock gets treated as equity by ratings agencies, which of the following firms is the most appropriate firm to be issuing it?
  - A firm that is under levered, but has a rating constraint that would be violated if it moved to its optimal
  - A firm that is over levered that is unable to issue debt because of the rating agency concerns.
Soothe bondholder fears

There are some firms that face skepticism from bondholders when they go out to raise debt, because

- Of their past history of defaults or other actions
- They are small firms without any borrowing history

Bondholders tend to demand much higher interest rates from these firms to reflect these concerns.
And do not lock in market mistakes that work against you

- Ratings agencies can sometimes under rate a firm, and markets can under price a firm’s stock or bonds. If this occurs, firms should not lock in these mistakes by issuing securities for the long term. In particular,
  - Issuing equity or equity based products (including convertibles), when equity is under priced transfers wealth from existing stockholders to the new stockholders
  - Issuing long term debt when a firm is under rated locks in rates at levels that are far too high, given the firm’s default risk.

- What is the solution
  - If you need to use equity?
  - If you need to use debt?
## Designing Disney’s Debt

<table>
<thead>
<tr>
<th>Business</th>
<th>Project Cash Flow Characteristics</th>
<th>Type of Financing</th>
</tr>
</thead>
</table>
| Studio entertainment | Movie projects are likely to  
1. Be short-term  
2. Have cash outflows primarily in dollars (because Disney makes most of its movies in the U.S.), but cash inflows could have a substantial foreign currency component (because of overseas revenues)  
3. Have net cash flows that are heavily driven by whether the movie is a hit, which is often difficult to predict | Debt should be  
1. Short-term  
2. Primarily dollar debt  
3. If possible, tied to the success of movies (Lion King or Mulan bonds) |
| Media networks   | Projects are likely to be  
1. Short-term  
2. Primarily in dollars, though foreign component is growing  
3. Driven by advertising revenues and show success (Nielsen ratings) | Debt should be  
1. Short-term  
2. Primarily dollar debt  
3. If possible, linked to network ratings |
| Park resorts      | Projects are likely to be  
1. Very long-term  
2. Primarily in dollars, but a significant proportion of revenues come from foreign tourists, who are likely to stay away if the dollar strengthens  
3. Affected by success of studio entertainment and media networks divisions | Debt should be  
1. Long-term  
2. Mix of currencies, based on tourist makeup |
| Consumer products | Projects are likely to be short- to medium-term and linked to the success of the movie division; most of Disney’s product offerings are derived from their movie productions | Debt should be  
1. Medium-term  
2. Dollar debt |
Recommendations for Disney

- The debt issued should be long term and should have duration of about 5 years.
- A significant portion of the debt should be floating rate debt, reflecting Disney’s capacity to pass inflation through to its customers and the fact that operating income tends to increase as interest rates go up.
- Given Disney’s sensitivity to a stronger dollar, a portion of the debt should be in foreign currencies. The specific currency used and the magnitude of the foreign currency debt should reflect where Disney makes its revenues. Based upon 2008 numbers at least, this would indicate that about 20% of the debt should be in Euros and about 10% of the debt in Japanese Yen reflecting Disney’s larger exposures in Europe and Asia. As its broadcasting businesses expand into Latin America, it may want to consider using either Mexican Peso or Brazilian Real debt as well.
Analyzing Disney’s Current Debt

- Disney has $16 billion in debt with a face-value weighted average maturity of 5.38 years. Allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney’s debt is of the right maturity.
- Of the debt, about 10% is yen denominated debt but the rest is in US dollars. Based on our analysis, we would suggest that Disney increase its proportion of debt in other currencies to about 20% in Euros and about 5% in Chinese Yuan.
- Disney has no convertible debt and about 24% of its debt is floating rate debt, which is appropriate given its status as a mature company with significant pricing power. In fact, we would argue for increasing the floating rate portion of the debt to about 40%.
Adjusting Debt at Disney

- It can swap some of its existing fixed rate, dollar debt for floating rate, foreign currency debt. Given Disney’s standing in financial markets and its large market capitalization, this should not be difficult to do.
- If Disney is planning new debt issues, either to get to a higher debt ratio or to fund new investments, it can use primarily floating rate, foreign currency debt to fund these new investments. Although it may be mismatching the funding on these investments, its debt matching will become better at the company level.
Application Test: Choosing your Financing Type

Based upon the business that your firm is in, and the typical investments that it makes, what kind of financing would you expect your firm to use in terms of:

- Duration (long term or short term)
- Currency
- Fixed or Floating rate
- Straight or Convertible
Returning Cash to the Owners: Dividend Policy

“Companies don’t have cash. They hold cash for their stockholders.”
First Principles

Chapter 10: Dividend Policy

The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The return should reflect the magnitude and the timing of the cashflows as well as all side effects.

The optimal mix of debt and equity maximizes firm value.

The right kind of debt matches the tenor of your assets.

How much cash you can return depends upon current & potential investment opportunities.

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks.

The Investment Decision: Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

The Financing Decision: Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

The Dividend Decision: If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
I. Dividends are sticky
II. Dividends tend to follow earnings
III. Are affected by tax laws…
IV. More and more firms are buying back stock, rather than pay dividends...

Stock Buybacks and Dividends: Aggregate for US Firms - 1989-2010
V. And there are differences across countries…
Measures of Dividend Policy

- **Dividend Payout = Dividends/ Net Income**
  - Measures the percentage of earnings that the company pays in dividends
  - If the net income is negative, the payout ratio cannot be computed.

- **Dividend Yield = Dividends per share/ Stock price**
  - Measures the return that an investor can make from dividends alone
  - Becomes part of the expected return on the investment.
Dividend Payout Ratios

Dividend Payout Ratios: US firms in January 2011
Dividend Yields

Dividend Yield: US firms in January 2011
Figure 10.7: Life Cycle Analysis of Dividend Policy

<table>
<thead>
<tr>
<th>External funding needs</th>
<th>High, but constrained by infrastructure</th>
<th>High, relative to firm value.</th>
<th>Moderates, relative to firm value.</th>
<th>Low, as projects dry up.</th>
<th>Low, as projects dry up.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal financing</td>
<td>Negative or low</td>
<td>Negative or low</td>
<td>Low, relative to funding needs</td>
<td>High, relative to funding needs</td>
<td>More than funding needs</td>
</tr>
<tr>
<td>Capacity to pay dividends</td>
<td>None</td>
<td>None</td>
<td>Very low</td>
<td>Increasing</td>
<td>High</td>
</tr>
</tbody>
</table>
| Growth stage           | Stage 1 Start-up                       | Stage 2 Rapid Expansion       | Stage 3 High Growth               | Stage 4 Mature Growth    | Stage 5 Decline         | Years
# Dividend Policy: Disney, Tata, Aracruz and Deutsche Bank

<table>
<thead>
<tr>
<th></th>
<th>Disney</th>
<th>Aracruz</th>
<th>Tata Chemicals</th>
<th>Deutsche Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dividends per share</td>
<td>$0.35</td>
<td>$0.35</td>
<td>R$ 0.43</td>
<td>0.33</td>
</tr>
<tr>
<td>Earnings per share</td>
<td>$2.25</td>
<td>$2.28</td>
<td>R$ 1.01</td>
<td>4.09</td>
</tr>
<tr>
<td>Stock price at end of year</td>
<td>$32.28</td>
<td>$22.69</td>
<td>15.97</td>
<td>3.98</td>
</tr>
<tr>
<td>Dividend Yield</td>
<td>1.08%</td>
<td>1.54%</td>
<td>2.69%</td>
<td>8.19%</td>
</tr>
<tr>
<td>Dividend Payout</td>
<td>15.56%</td>
<td>15.35%</td>
<td>42.43%</td>
<td>-7.97%</td>
</tr>
</tbody>
</table>
Three Schools Of Thought On Dividends

1. If
   - (a) there are no tax disadvantages associated with dividends
   - (b) companies can issue stock, at no cost, to raise equity, whenever needed
   - **Dividends do not matter, and dividend policy does not affect value.**

2. If dividends create a tax disadvantage for investors (relative to capital gains)
   - **Dividends are bad, and increasing dividends will reduce value**

3. If stockholders like dividends or dividends operate as a signal of future prospects,
   - **Dividends are good, and increasing dividends will increase value**
The balanced viewpoint

- If a company has excess cash, and few good investment opportunities (NPV>0), returning money to stockholders (dividends or stock repurchases) is good.
- If a company does not have excess cash, and/or has several good investment opportunities (NPV>0), returning money to stockholders (dividends or stock repurchases) is bad.
Assessing Dividend Policy

- Approach 1: The Cash/Trust Nexus
  - Assess how much cash a firm has available to pay in dividends, relative what it returns to stockholders. Evaluate whether you can trust the managers of the company as custodians of your cash.

- Approach 2: Peer Group Analysis
  - Pick a dividend policy for your company that makes it comparable to other firms in its peer group.
I. The Cash/Trust Assessment

- Step 1: How much could the company have paid out during the period under question?
- Step 2: How much did the company actually pay out during the period in question?
- Step 3: How much do I trust the management of this company with excess cash?
  - How well did they make investments during the period in question?
  - How well has my stock performed during the period in question?
How much has the company returned to stockholders?

- As firms increasing use stock buybacks, we have to measure cash returned to stockholders as not only dividends but also buybacks.
- For instance, for the four companies we are analyzing the cash returned looked as follows.

<table>
<thead>
<tr>
<th></th>
<th>Disney</th>
<th>Aracruz</th>
<th>Tata Chemicals</th>
<th>Deutsche Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year</td>
<td>Dividends</td>
<td>Buybacks</td>
<td>Dividends</td>
<td>Buybacks</td>
</tr>
<tr>
<td>2004</td>
<td>$430</td>
<td>$335</td>
<td>$74</td>
<td>$0</td>
</tr>
<tr>
<td>2005</td>
<td>$490</td>
<td>$2,420</td>
<td>$109</td>
<td>$0</td>
</tr>
<tr>
<td>2006</td>
<td>$519</td>
<td>$6,898</td>
<td>$199</td>
<td>$0</td>
</tr>
<tr>
<td>2007</td>
<td>$637</td>
<td>$6,923</td>
<td>$139</td>
<td>$0</td>
</tr>
<tr>
<td>2008</td>
<td>$664</td>
<td>$4,453</td>
<td>$252</td>
<td>$0</td>
</tr>
</tbody>
</table>
A Measure of How Much a Company Could have Afforded to Pay out: FCFE

- The Free Cashflow to Equity (FCFE) is a measure of how much cash is left in the business after non-equity claimholders (debt and preferred stock) have been paid, and after any reinvestment needed to sustain the firm’s assets and future growth.

Net Income

+ Depreciation & Amortization

= Cash flows from Operations to Equity Investors

- Preferred Dividends

- Capital Expenditures

- Working Capital Needs

- Principal Repayments

+ Proceeds from New Debt Issues

= Free Cash flow to Equity
## Disney’s FCFE

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Capital Expenditures</th>
<th>Depreciation</th>
<th>Chg in WC</th>
<th>Change in Net Debt</th>
<th>FCFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>$1,300</td>
<td>$6,113</td>
<td>$3,779</td>
<td>-$363</td>
<td>$176</td>
<td>-$495</td>
</tr>
<tr>
<td>2000</td>
<td>$920</td>
<td>$1,091</td>
<td>$2,195</td>
<td>-$1,184</td>
<td>$2,118</td>
<td>$5,326</td>
</tr>
<tr>
<td>2001</td>
<td>-$158</td>
<td>$2,015</td>
<td>$1,754</td>
<td>$244</td>
<td>-$77</td>
<td>-$740</td>
</tr>
<tr>
<td>2002</td>
<td>$1,236</td>
<td>$3,176</td>
<td>$1,042</td>
<td>$27</td>
<td>-$1,892</td>
<td>-$2,817</td>
</tr>
<tr>
<td>2003</td>
<td>$1,267</td>
<td>$1,034</td>
<td>$1,077</td>
<td>-$264</td>
<td>$1,145</td>
<td>$2,719</td>
</tr>
<tr>
<td>2004</td>
<td>$2,345</td>
<td>$1,484</td>
<td>$1,210</td>
<td>$51</td>
<td>$2,203</td>
<td>$4,223</td>
</tr>
<tr>
<td>2005</td>
<td>$2,533</td>
<td>$1,691</td>
<td>$1,339</td>
<td>$270</td>
<td>$699</td>
<td>$2,610</td>
</tr>
<tr>
<td>2006</td>
<td>$3,374</td>
<td>$1,300</td>
<td>$1,437</td>
<td>-$136</td>
<td>-$941</td>
<td>$2,706</td>
</tr>
<tr>
<td>2007</td>
<td>$4,687</td>
<td>$627</td>
<td>$1,491</td>
<td>$45</td>
<td>-$2,696</td>
<td>$2,810</td>
</tr>
<tr>
<td>2008</td>
<td>$4,427</td>
<td>$2,162</td>
<td>$1,582</td>
<td>$485</td>
<td>-$528</td>
<td>$2,834</td>
</tr>
<tr>
<td>Aggregate</td>
<td>$21,931</td>
<td>$20,693</td>
<td>$16,906</td>
<td>-$825</td>
<td>$207</td>
<td>$19,176</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$21</td>
</tr>
</tbody>
</table>
Estimating FCFE when Leverage is Stable

Net Income
- (1 - δ) (Capital Expenditures - Depreciation)
- (1 - δ) Working Capital Needs
= Free Cash flow to Equity

δ = Debt/Capital Ratio

For this firm,
- Proceeds from new debt issues = Principal Repayments + δ (Capital Expenditures - Depreciation + Working Capital Needs)
An Example: FCFE Calculation

Consider the following inputs for Microsoft in 1996. In 1996, Microsoft’s FCFE was:

- Net Income = $2,176 Million
- Capital Expenditures = $494 Million
- Depreciation = $480 Million
- Increase in Non-Cash Working Capital = $35 Million
- Debt Ratio = 0%

\[
\text{FCFE} = \text{Net Income} - (\text{Cap ex} - \text{Depr}) (1-\text{DR}) - \text{Chg WC} (!-\text{DR})
\]

\[
= 2,176 - (494 - 480) (1-0) - 35 (1-0)
\]

\[
= 2,127 \text{ Million}
\]

By this estimation, Microsoft could have paid $2,127 Million in dividends/stock buybacks in 1996. They paid no dividends and bought back no stock. Where will the $2,127 million show up in Microsoft’s balance sheet?
FCFE for a Bank?

- We redefine reinvestment as investment in regulatory capital.
  \[ \text{FCFE}_{\text{Bank}} = \text{Net Income} - \text{Increase in Regulatory Capital (Book Equity)} \]
- Consider a bank with $10 billion in loans outstanding and book equity of $750 million. If it maintains its capital ratio of 7.5%, intends to grow its loan base by 10% (to $11 and expects to generate $150 million in net income:
  \[ \text{FCFE} = \$150 \text{ million} - (11,000-10,000) \times .075 = \$75 \text{ million} \]
Dividends versus FCFE: U.S.

![Bar chart showing dividends versus FCFE for US firms in 2008.](image)
The Consequences of Failing to pay FCFE

Chrysler: FCFE, Dividends and Cash Balance

Year
Cash Flow
Cash Balance

($500) $0 $500 $1,000 $1,500 $2,000 $2,500 $3,000 $4,000 $5,000 $6,000 $7,000 $8,000 $9,000

- Free CF to Equity
- Cash to Stockholders
- Cumulated Cash
Application Test: Estimating your firm’s FCFE

In General,

Net Income + Depreciation & Amortization - Capital Expenditures - Change in Non-Cash Working Capital - Preferred Dividend - Principal Repaid + New Debt Issued

= FCFE

Compare to

Dividends (Common) - Common Dividend
+ Stock Buybacks - Decrease in Capital Stock + Increase in Capital Stock

If cash flow statement used

Net Income + Depreciation & Amortization + Capital Expenditures + Changes in Non-cash WC + Preferred Dividend + Increase in LT Borrowing + Decrease in LT Borrowing + Change in ST Borrowing

= FCFE
A Practical Framework for Analyzing Dividend Policy

How much did the firm pay out? How much could it have afforded to pay out?

\[ \text{What it could have paid out} = \text{Net Income} - (\text{Cap Ex} - \text{Depr} \cdot n)(1-\text{DR}) - \text{Chg Working Capital (1-DR)} \]
\[ = \text{FCFE} \]

\[ \text{What it actually paid out} = \text{Dividends} + \text{Equity Repurchase} \]

- \[ \text{FCFE} > \text{Dividends} \] Firm pays out too little
- \[ \text{FCFE} < \text{Dividends} \] Firm pays out too much

Do you trust managers in the company with your cash?
Look at past project choice:
Compare ROE to Cost of Equity
ROC to WACC

What investment opportunities does the firm have?
Look at past project choice:
Compare ROE to Cost of Equity
ROC to WACC

- Firm has history of good project choice and good projects in the future
  - Give managers the flexibility to keep cash and set dividends
- Firm has history of poor project choice
  - Force managers to justify holding cash or return cash to stockholders
- Firm has good projects
  - Firm should cut dividends and reinvest more
- Firm has poor projects
  - Firm should deal with its investment problem first and then cut dividends
## A Dividend Matrix

<table>
<thead>
<tr>
<th>Cash Surplus + Poor Projects</th>
<th>Cash Surplus + Good Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant pressure to pay out more to stockholders as dividends or stock buybacks</td>
<td>Maximum flexibility in setting dividend policy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cash Deficit + Poor Projects</th>
<th>Cash Deficit + Good Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut out dividends but real problem is in investment policy.</td>
<td>Reduce cash payout, if any, to stockholders</td>
</tr>
</tbody>
</table>
Case 1: Disney in 2003

- **FCFE versus Dividends**
  - Between 1994 & 2003, Disney generated $969 million in FCFE each year.
  - Between 1994 & 2003, Disney paid out $639 million in dividends and stock buybacks each year.

- **Cash Balance**
  - Disney had a cash balance in excess of $4 billion at the end of 2003.

- **Performance measures**
  - Between 1994 and 2003, Disney has generated a return on equity, on its projects, about 2% less than the cost of equity, on average each year.
  - Between 1994 and 2003, Disney’s stock has delivered about 3% less than the cost of equity, on average each year.
  - The underperformance has been primarily post 1996 (after the Capital Cities acquisition).
Can you trust Disney’s management?

- Given Disney’s track record between 1994 and 2003, if you were a Disney stockholder, would you be comfortable with Disney’s dividend policy?
  - Yes
  - No
- Does the fact that the company is run by Michael Eisner, the CEO for the last 10 years and the initiator of the Cap Cities acquisition have an effect on your decision.
  - Yes
  - No
Following up: Disney in 2009

- Between 2004 and 2008, Disney made significant changes:
  - It replaced its CEO, Michael Eisner, with a new CEO, Bob Iger, who at least on the surface seemed to be more receptive to stockholder concerns.
  - It’s stock price performance improved (positive Jensen’s alpha)
  - It’s project choice improved (ROC moved from being well below cost of capital to above)
- The firm also shifted from cash returned < FCFE to cash returned > FCFE and avoided making large acquisitions.
- If you were a stockholder in 2009 and Iger made a plea to retain cash in Disney to pursue investment opportunities, would you be more receptive?
  a) Yes
  b) No
Case 2: Aracruz Celulose - Assessment of dividends paid in 2003

- FCFE versus Dividends
  - Between 1999 and 2003, Aracruz generated $37 million in FCFE each year.
  - Between 1999 and 2003, Aracruz paid out $80 million in dividends and stock buybacks each year.

- Performance measures
  - Between 1999 and 2003, Aracruz has generated a return on equity, on its projects, about 1.5% more than the cost of equity, on average each year.
  - Between 1999 and 2003, Aracruz’ stock has delivered about 2% more than the cost of equity, on average each year.
Aracruz: Its your call..

Aracruz’ s managers have asked you for permission to cut dividends (to more manageable levels). Are you likely to go along?

☐ Yes
☐ No

The reasons for Aracruz’ s dividend problem lie in it’ s equity structure. Like most Brazilian companies, Aracruz has two classes of shares - common shares with voting rights and preferred shares without voting rights. However, Aracruz has committed to paying out 35% of its earnings as dividends to the preferred stockholders. If they fail to meet this threshold, the preferred shares get voting rights. If you own the preferred shares, would your answer to the question above change?

☐ Yes
☐ No
Aracruz: Ready to reassess?

In 2008, Aracruz had a catastrophic year, with losses in excess of a billion. The reason for the losses, though, was speculation on the part of the company’s managers on currency derivatives. The FCFE in 2008 was -$1.226 billion but the company still had to pay out $448 million in dividends. As owners of the non-voting, dividend receiving shares, would you reassess your unwillingness to accept dividend cuts now?

a) Yes
b) No

<table>
<thead>
<tr>
<th>Summary of calculations</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free CF to Equity</td>
<td>$571.10</td>
<td>$1,382.29</td>
<td>$3,764.00</td>
<td>($612.50)</td>
</tr>
<tr>
<td>Dividends</td>
<td>$1,496.30</td>
<td>$448.77</td>
<td>$2,112.00</td>
<td>$831.00</td>
</tr>
<tr>
<td>Dividends+Repurchases</td>
<td>$1,496.30</td>
<td>$448.77</td>
<td>$2,112.00</td>
<td>$831.00</td>
</tr>
<tr>
<td>Dividend Payout Ratio</td>
<td>84.77%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Paid as % of FCFE</td>
<td>262.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE - Required return</td>
<td>-1.67%</td>
<td>11.49%</td>
<td>20.90%</td>
<td>-21.59%</td>
</tr>
</tbody>
</table>
BP: Just Desserts!

B.P.'s Shares Plummet After Dividend Is Slashed

By MATTHEW L. WALD

British Petroleum said yesterday that it would cut its dividend by 15 percent for the first time in the company's history in order to reduce debt. The cut was equivalent to a charge of $1.6 billion for the second quarter, and it was made by the company's board of directors.

The move came five weeks after Robert B. Harris, B.P.'s chairman, resigned under pressure from the company's outside directors.

 Analysts anticipated a dividend cut by the oil company, the world's third largest, but the size announced was at the low end of their expectations. In response, shares of the company's American depositary receipts, each of which represents 11 shares of the London-based company, dropped $3.12, or 7.5 percent, to $40.19, the lowest closing level ever on the New York Stock Exchange, with 5.06 million shares traded.

The Royal Dutch/Shell group also reported a disappointing quarter yesterday, with earnings on a reduced, restated basis—excluding gains or losses on inventory holdings—of $146 million, down 52 percent.

Quick Recovery Seems Unlikely

Adding to the gloom at B.P., the new oil price forecast by Standard A. O. Smith, and the prospects for a quick recovery are bleak. European trade is expected to be particularly difficult, particularly for the downstream oil and chemical businesses, with growth prospects for the whole equipment manufacturing sector, one analyst said in a statement. Downstream oil is an industry term for refining and marketing operations, as distinct from oil production.

Downstream margins in the United States have fallen sharply this year, and he predicted, when clean air rules take effect and gasoline must be reformulated to reduce pollution, "In Europe, recovery will depend upon seasonal heating oil demand," Mr. Simon said.

With oil markets, he predicted, would remain balanced unless France restored full oil rights to the company. The company said it was well positioned to take advantage of any increase in oil prices, but the company's oil production in the United States is declining, B.P. is the largest producer in Alaska.

The market for petrochemicals in Europe remains weak.

B.P.'s second quarter profits, before one-time transactions, declined to $173 million from $139 million, valuing inventories on a replacement-cost basis. James J. March, an analyst at Standard & Poor's, estimated that after exceptional items, B.P. would record a profit of $1.4 billion to $1.6 billion.

Analysts attributed B.P.'s problems to the company's acquisition of Amoco last year and its heavy capital expenditures. Summing up the company's recent history, Frank P. Ream, president of Prudential Securities Research, said, "Cash flow, interest expenses, raw, and profits have gone to hell."

Mr. March, who worked for Standard Oil of Ohio and then B.P. after B.P. acquired Sohio, said, "I am feeling a lot of pain. Every time we were going on to $35 and $36, then it is in terms of $20. Every time we are the same as the industry average, we are the same as the industry average."

He said, the company has been spending enough to replace 125 percent in 100 percent of its annual production, which is not a successful strategy if prices do not rise.

In addition, he said, the company had been spending twice as much on its refining and marketing operations as it was recording in depreciation.

Another analyst, at a large stock brokerage house, who spoke on the condition of anonymity, said, "They took all the old Sohio stations and turned them into modern B.P. stations; they took all the B.P. stations and turned them into ultramodern stations."

The analyst said that while some of the cuts were obvious, some came as a surprise.
## Managing changes in dividend policy

<table>
<thead>
<tr>
<th>Category</th>
<th>Prior Quarter</th>
<th>Announcement Period</th>
<th>Quarter After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simultaneous announcement of earnings decline/loss ($N = 176$)</td>
<td>−7.23%</td>
<td>−8.17%</td>
<td>+1.80%</td>
</tr>
<tr>
<td>Prior announcement of earnings decline or loss ($N = 208$)</td>
<td>−7.58%</td>
<td>−5.52%</td>
<td>+1.07%</td>
</tr>
<tr>
<td>Simultaneous announcement of investment or growth opportunities ($N = 16$)</td>
<td>−7.69%</td>
<td>−5.16%</td>
<td>+8.79%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Summary of calculations</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free CF to Equity</td>
<td>($34.20)</td>
<td>$109.74</td>
<td>$96.89</td>
<td>($242.17)</td>
</tr>
<tr>
<td>Dividends</td>
<td>$40.87</td>
<td>$32.79</td>
<td>$101.36</td>
<td>$5.97</td>
</tr>
<tr>
<td>Dividends+Repurchases</td>
<td>$40.87</td>
<td>$32.79</td>
<td>$101.36</td>
<td>$5.97</td>
</tr>
<tr>
<td>Dividend Payout Ratio</td>
<td>18.59%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Paid as % of FCFE</td>
<td>-119.52%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE - Required return</td>
<td>1.69%</td>
<td>19.07%</td>
<td>29.26%</td>
<td>-19.84%</td>
</tr>
</tbody>
</table>
High growth firms are sometimes advised to initiate dividends because it increases the potential stockholder base for the company (since there are some investors - like pension funds - that cannot buy stocks that do not pay dividends) and, by extension, the stock price. Do you agree with this argument?

- Yes
- No

Why?

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Free CF to Equity</td>
<td>INR 2,258</td>
<td>INR 6,557</td>
<td>INR 11,176</td>
<td>(INR 7,141)</td>
</tr>
<tr>
<td>Dividends</td>
<td>INR 1,592</td>
<td>INR 290</td>
<td>INR 2,010</td>
<td>INR 1,307</td>
</tr>
<tr>
<td>Dividends+Repurchases</td>
<td>INR 1,592</td>
<td>INR 290</td>
<td>INR 2,010</td>
<td>INR 1,307</td>
</tr>
<tr>
<td>Dividend Payout Ratio</td>
<td>25.65%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Paid as % of FCFE</td>
<td>70.50%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE</td>
<td>17.34%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Return on Stock</td>
<td>17.97%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required Return</td>
<td>19.89%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROE - Required return</td>
<td>-2.55%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Actual - Required Return</td>
<td>-1.91%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Much of the cash held back was invested in other Tata companies.
Summing up…

**Quality of projects taken: ROE versus Cost of Equity**

<table>
<thead>
<tr>
<th>Poor projects</th>
<th>Good projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intel</strong></td>
<td><strong>Apple</strong></td>
</tr>
<tr>
<td><em>Cash Surplus + Poor Projects</em></td>
<td><em>Cash Surplus + Good Projects</em></td>
</tr>
<tr>
<td>Significant pressure to pay out more to stockholders as dividends or stock buybacks</td>
<td>Maximum flexibility in setting dividend policy</td>
</tr>
<tr>
<td><strong>Tata Chemicals</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Cash Deficit + Poor Projects</strong></td>
<td><strong>Cash Deficit + Good Projects</strong></td>
</tr>
<tr>
<td>Cut out dividends but real problem is in investment policy.</td>
<td>Reduce cash payout, if any, to stockholders</td>
</tr>
</tbody>
</table>

**Dividends paid out relative to FCFE**

- Cash Surplus
- Cash Deficit
Application Test: Assessing your firm’s dividend policy

- Compare your firm’s dividends to its FCFE, looking at the last 5 years of information.

- Based upon your earlier analysis of your firm’s project choices, would you encourage the firm to return more cash or less cash to its owners?

- If you would encourage it to return more cash, what form should it take (dividends versus stock buybacks)?
II. The Peer Group Approach - Disney

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Market Cap</th>
<th>Payout Ratio</th>
<th>Dividend Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Astral Media Inc. 'A'</td>
<td>$1,221.70</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>CBS Corp. 'B'</td>
<td>$5,103.70</td>
<td>53.52%</td>
<td>14.22%</td>
</tr>
<tr>
<td>Central European Media Enterps</td>
<td>$827.70</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Corus Entertainment Inc</td>
<td>$806.50</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>CTC Media Inc</td>
<td>$715.10</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Discovery Communications Inc</td>
<td>$3,860.60</td>
<td>NA</td>
<td>0.00%</td>
</tr>
<tr>
<td>Disney (Walt)</td>
<td>$41,114.70</td>
<td>17.11%</td>
<td>1.67%</td>
</tr>
<tr>
<td>DreamWorks Animation</td>
<td>$2,074.30</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>Hearst-Argyle Television Inc</td>
<td>$589.10</td>
<td>40.59%</td>
<td>4.46%</td>
</tr>
<tr>
<td>IAC/InterActiveCorp</td>
<td>$2,215.30</td>
<td>NA</td>
<td>0.00%</td>
</tr>
<tr>
<td>Lions Gate Entertainment Corp</td>
<td>$705.60</td>
<td>NA</td>
<td>0.00%</td>
</tr>
<tr>
<td>News Corp.</td>
<td>$23,245.30</td>
<td>9.07%</td>
<td>1.35%</td>
</tr>
<tr>
<td>Regal Entertainment Group</td>
<td>$1,447.60</td>
<td>176.09%</td>
<td>12.70%</td>
</tr>
<tr>
<td>Scripps Networks</td>
<td>$3,422.30</td>
<td>NA</td>
<td>0.00%</td>
</tr>
<tr>
<td>Time Warner</td>
<td>$34,112.40</td>
<td>22.17%</td>
<td>2.63%</td>
</tr>
<tr>
<td>Viacom Inc. 'B'</td>
<td>$10,669.30</td>
<td>0.00%</td>
<td>0.00%</td>
</tr>
<tr>
<td>World Wrestling Ent.</td>
<td>$749.50</td>
<td>198.45%</td>
<td>13.79%</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td>39.77%</td>
<td>2.99%</td>
</tr>
</tbody>
</table>
Valuation

Cynic: A person who knows the price of everything but the value of nothing.

Oscar Wilde
First Principles

Chapter 12: Value and Corporate Decisions

The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The return should reflect the magnitude and the timing of the cashflows as well as all side effects.

The optimal mix of debt and equity maximizes firm value.

The right kind of debt matches the tenor of your assets.

How much cash you can return depends upon current & potential investment opportunities.

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks.

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)
Three 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.

- **Contingent claim valuation**: When the cash flows on an asset are contingent on an external event, the value can be estimated using option pricing models.
Discounted Cashflow Valuation: Basis for Approach

Value of an asset = \sum_{t=1}^{n} \frac{\text{Expected Cash flow in period } t}{(1+r)^t}

where,

- \( n \) = Life of the asset
- \( r \) = Discount rate reflecting the riskiness of the estimated cashflows
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.

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

where,
- \( \text{CF to Equity}_t \) = Expected Cashflow to Equity in period \( t \)
- \( k_e \) = 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.
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.

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

where,

- \( \text{CF to Firm}_t = \) Expected Cashflow to Firm in period \( t \)
- \( \text{WACC} = \) Weighted Average Cost of Capital
Choosing a Cash Flow to Discount

- When you cannot estimate the free cash flows to equity or the firm, the only cash flow that you can discount is dividends. For financial service firms, it is difficult to estimate free cash flows. For Deutsche Bank, we will be discounting dividends.

- If a firm’s debt ratio is not expected to change over time, the free cash flows to equity can be discounted to yield the value of equity. For Aracruz, we will discount free cash flows to equity.

- If a firm’s debt ratio might change over time, free cash flows to equity become cumbersome to estimate. Here, we would discount free cash flows to the firm. For Disney, we will discount the free cash flow to the firm.
The Ingredients that determine value.

Cashflows can be
a. After debt payments to equity
   - Dividends
   - Free Cashflow to Equity
b. Before debt payments to firm
   - Free Cashflow to Firm

Growth rate can be
a. In Equity Earnings
   - Net Income
   - Earnings per share
b. In Operating Earnings

Firm is in stable growth which it can sustain forever

Expected Cashflows during extraordinary growth phase

Discount the cashflows and terminal value to the present

Present value is
a. Value of equity, if cashflows to equity discounted at cost of equity
b. Value of operating assets of the firm, if cashflows to firm discounted at the cost of capital

Discount Rate can be
a. Cost of equity, if cashflows are equity cashflows
b. Cost of capital, if cashflows are to the firm
I. Estimating Cash Flows

Cash Flow used

Free Cash flow to Firm
- EBIT (1 - tax rate)
- (Cap Ex - Depreciation)
- Change in Working Capital

Cash flow to equity

Dividends
Augmented Dividends
Dividends + Stock Buybacks

Free Cash flow to Equity
(Potential Dividend)
- Net Income
- (Cap Ex - Depreciation)
- Change in Working Capital
- (Debt issued - Debt repaid)
Estimating FCFE: Tata Chemicals

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Cap Ex</th>
<th>Depreciation</th>
<th>Change in WC</th>
<th>Change in Debt</th>
<th>Equity Reinvestment</th>
<th>Equity Reinvestment Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-04</td>
<td>$3,418</td>
<td>$357</td>
<td>$1,442</td>
<td>-$557</td>
<td>-$2,771</td>
<td>$1,129</td>
<td>33.04%</td>
</tr>
<tr>
<td>2004-05</td>
<td>$4,550</td>
<td>$692</td>
<td>$1,377</td>
<td>-$493</td>
<td>$5,448</td>
<td>-$6,626</td>
<td>-145.64%</td>
</tr>
<tr>
<td>2005-06</td>
<td>$5,156</td>
<td>$11,730</td>
<td>$1,389</td>
<td>$2,823</td>
<td>$867</td>
<td>$12,297</td>
<td>238.51%</td>
</tr>
<tr>
<td>2006-07</td>
<td>$6,338</td>
<td>$1,196</td>
<td>$1,504</td>
<td>-$1,662</td>
<td>-$4,411</td>
<td>$2,442</td>
<td>38.53%</td>
</tr>
<tr>
<td>2007-08</td>
<td>$11,571</td>
<td>$28,956</td>
<td>$1,488</td>
<td>$88</td>
<td>$17,054</td>
<td>$10,502</td>
<td>90.76%</td>
</tr>
<tr>
<td>Aggregate</td>
<td>$31,033</td>
<td>$42,930</td>
<td>$7,199</td>
<td>$200</td>
<td>$16,187</td>
<td>$19,744</td>
<td>63.62%</td>
</tr>
</tbody>
</table>
Estimating FCFF: Disney

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2008 normalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>$7,030</td>
<td>$7,030</td>
</tr>
<tr>
<td>EBIT (`1-t)</td>
<td>$4,359</td>
<td>$4,359</td>
</tr>
<tr>
<td>+ Depreciation</td>
<td>$1,839</td>
<td>$1,839</td>
</tr>
<tr>
<td>- Cap Ex</td>
<td>$2,752</td>
<td>$3,939</td>
</tr>
<tr>
<td>- Change in WC</td>
<td>$241</td>
<td>$241</td>
</tr>
<tr>
<td>FCFF</td>
<td>$3,205</td>
<td>$2,018</td>
</tr>
<tr>
<td>Reinvestment</td>
<td>$1,154</td>
<td>$2,341</td>
</tr>
<tr>
<td>Reinvestment Rate</td>
<td>26.48%</td>
<td>53.71%</td>
</tr>
</tbody>
</table>
II. Discount Rates

- **Critical ingredient** in discounted cashflow 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.
Cost of Equity: Tata Chemicals

- We will be valuing Tata Chemicals in rupee terms. (That is a choice. Any company can be valued in any currency).
- Earlier, we estimated a beta for equity of 0.945 for Tata Chemical’s operating assets. With a nominal rupee risk-free rate of 4 percent and an equity risk premium of 10.51% for India (also estimated in Chapter 4), we arrive at a cost of equity of 13.93%.

\[
\text{Cost of Equity} = 4\% + 0.945 (10.51\%) = 13.93\%
\]
Current Cost of Capital: Disney

- The beta for Disney’s stock in May 2009 was 0.9011. The T. bond rate at that time was 3.5%. Using an estimated equity risk premium of 6%, we estimated the cost of equity for Disney to be 8.91%:
  \[
  \text{Cost of Equity} = 3.5\% + 0.9011(6\%) = 8.91\%
  \]
- Disney’s bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 6%. Using a marginal tax rate of 38%, the after-tax cost of debt for Disney is 3.72%.
  \[
  \text{After-Tax Cost of Debt} = 6.00\% (1 - 0.38) = 3.72\%
  \]
- The cost of capital was calculated using these costs and the weights based on market values of equity (45,193) and debt (16,682):
  \[
  \text{Cost of capital} = \frac{8.91\%}{16,682 + 45,193} \cdot \frac{45,193}{16,682 + 45,193} + 3.72\% \cdot \frac{16,682}{16,682 + 45,193} = 7.51\%
  \]
But costs of equity and capital can and should change over time…

<table>
<thead>
<tr>
<th>Year</th>
<th>Beta</th>
<th>Cost of equity</th>
<th>Cost of debt</th>
<th>Debt Ratio</th>
<th>Cost of capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.90</td>
<td>8.91%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.52%</td>
</tr>
<tr>
<td>2</td>
<td>0.90</td>
<td>8.91%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.52%</td>
</tr>
<tr>
<td>3</td>
<td>0.90</td>
<td>8.91%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.52%</td>
</tr>
<tr>
<td>4</td>
<td>0.90</td>
<td>8.91%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.52%</td>
</tr>
<tr>
<td>5</td>
<td>0.90</td>
<td>8.91%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.52%</td>
</tr>
<tr>
<td>6</td>
<td>0.92</td>
<td>9.03%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.61%</td>
</tr>
<tr>
<td>7</td>
<td>0.94</td>
<td>9.14%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.69%</td>
</tr>
<tr>
<td>8</td>
<td>0.96</td>
<td>9.26%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.78%</td>
</tr>
<tr>
<td>9</td>
<td>0.98</td>
<td>9.38%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.87%</td>
</tr>
<tr>
<td>10</td>
<td>1.00</td>
<td>9.50%</td>
<td>3.72%</td>
<td>26.73%</td>
<td>7.95%</td>
</tr>
</tbody>
</table>
III. Expected Growth

- Net Income
  - Retention Ratio = 1 - Dividends/Net Income
  - Return on Equity = Net Income/Book Value of Equity

- Operating Income
  - Reinvestment Rate = (Net Cap Ex + Chg in WC)/EBIT(1-t)
  - Return on Capital = EBIT(1-t)/Book Value of Capital
Estimating growth in Net Income: Tata Chemicals

Normalized Equity Reinvestment Rate = \( \frac{\text{Equity Reinvestment}_{\text{Total 2004-08}}}{\text{Net Income}_{\text{Total 2004-08}}} \) = \( \frac{19,744}{31,033} \) = 63.62%

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Cap Ex</th>
<th>Depreciation</th>
<th>Change in WC</th>
<th>Change in Debt</th>
<th>Equity Reinvestment</th>
<th>Equity Reinvestment Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003-04</td>
<td>INR 3,418</td>
<td>INR 357</td>
<td>INR 1,442</td>
<td>-INR 557</td>
<td>-INR 2,771</td>
<td>INR 1,129</td>
<td>33.04%</td>
</tr>
<tr>
<td>2004-05</td>
<td>INR 4,550</td>
<td>INR 692</td>
<td>INR 1,377</td>
<td>-INR 493</td>
<td>INR 5,448</td>
<td>-INR 6,626</td>
<td>-145.64%</td>
</tr>
<tr>
<td>2005-06</td>
<td>INR 5,156</td>
<td>INR 11,730</td>
<td>INR 1,389</td>
<td>INR 2,823</td>
<td>INR 867</td>
<td>INR 12,297</td>
<td>238.51%</td>
</tr>
<tr>
<td>2006-07</td>
<td>INR 6,338</td>
<td>INR 1,196</td>
<td>INR 1,504</td>
<td>-INR 1,662</td>
<td>-INR 4,411</td>
<td>INR 2,442</td>
<td>38.53%</td>
</tr>
<tr>
<td>2007-08</td>
<td>INR 11,571</td>
<td>INR 28,956</td>
<td>INR 1,488</td>
<td>INR 88</td>
<td>INR 17,054</td>
<td>INR 10,502</td>
<td>90.76%</td>
</tr>
<tr>
<td>Aggregate</td>
<td>INR 31,033</td>
<td>INR 42,930</td>
<td>INR 7,199</td>
<td>INR 200</td>
<td>INR 16,187</td>
<td>INR 19,744</td>
<td>63.62%</td>
</tr>
</tbody>
</table>

Normalized Equity Reinvestment Rate = \( \frac{\text{BV of Equity}_{\text{Total 2004-08}}}{\text{Net Income}_{\text{Total 2004-08}}} \) = \( \frac{31,033}{178,992} \) = 17.34%

Expected Growth in Net Income = 63.62% * 17.34% = 11.03%
Estimating Growth in EBIT: Disney

- We begin by estimating the reinvestment rate and return on capital for Disney in 2008 using the numbers from the latest financial statements. We converted operating leases into debt and adjusted the operating income and capital expenditure accordingly.

  Reinvestment Rate_{2008} = \frac{(2,752 - 1,839 + 241)}{7,030 (1 -.38)} = 26.48\%

- We include $516 million in acquisitions made during 2008 in capital expenditures, but this is a volatile item. Disney does not make large acquisitions every year, but it does so infrequently - $ 7.5 billion to buy Pixar in 2006 and $ 11.5 billion to buy Capital Cities in 1996. Averaging out acquisitions from 1994-2008, we estimate an average annual value of $1,761 million for acquisitions over this period:

  Reinvestment Rate_{Normalized} = \frac{(3,939 - 1,839 + 241)}{7,030 (1 -.38)} = 53.72\%

- We compute the return on capital, using operating income in 2008 and capital invested at the start of 2008 (end of 2007):

  Return on Capital_{2008} = \frac{EBIT (1-t)}{(BV \text{ of Equity} + BV \text{ of Debt} - Cash)} = \frac{7,030 (1 -.38)}{(30,753 + 16,892 - 3,670)} = 9.91\%

- If Disney maintains its 2008 reinvestment rate and return on capital for the next few years, its growth rate will be only 2.35 percent.

  Expected Growth Rate from Existing Fundamentals = 53.72\% \times 9.91\% = 5.32\%
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:

\[
    \text{Value} = \sum_{t=1}^{N} \frac{\text{CF}_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}
\]

When a firm’s cash flows grow at a “constant” rate forever, the present value of those cash flows can be written as:

\[
    \text{Value} = \frac{\text{Expected Cash Flow Next Period}}{(r - g)}
\]

where,

\[
    r = \text{Discount rate (Cost of Equity or Cost of Capital)}
\]

\[
    g = \text{Expected growth rate forever.}
\]

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)
Respect the cap: The growth rate forever is assumed to be 3%. This is set lower than the riskfree rate (3.5%).

Stable period excess returns: The return on capital for Disney will drop from its high growth period level of 9.91% to a stable growth return of 9%. This is still higher than the cost of capital of 7.95% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year.

Reinvest to grow: The expected growth rate in stable growth will be 3%. In conjunction with the return on capital of 9%, this yields a stable period reinvestment rate of 33.33%:

Reinvestment Rate = Growth Rate / Return on Capital = 3% / 9% = 33.33%

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 = 3.5% + 6% = 9.5%

The debt ratio for Disney will stay at 26.73%. Since we assume that the cost of debt remains unchanged at 6%, this will result in a cost of capital of 7.95%

Cost of capital = 9.5% (.733) + 6% (1-.38) (.267) = 7.95%
V. From firm value to equity value per share

<table>
<thead>
<tr>
<th>Approach used</th>
<th>To get to equity value per share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discount dividends per share at the cost of equity</td>
<td>Present value is value of equity per share</td>
</tr>
<tr>
<td>Discount aggregate FCFE at the cost of equity</td>
<td>Present value is value of aggregate equity. Subtract the value of equity options given to managers and divide by number of shares.</td>
</tr>
<tr>
<td>Discount aggregate FCFF at the cost of capital</td>
<td>$PV = \text{Value of operating assets} + \text{Cash &amp; Near Cash investments} + \text{Value of minority cross holdings} - \text{Debt outstanding}$ $= \text{Value of equity} - \text{Value of equity options}$ $= \text{Value of equity in common stock} / \text{Number of shares}$</td>
</tr>
</tbody>
</table>
Valuing Tata Chemicals in early 2009: The high growth period

- We used the normalized return on equity of 17.34% (see earlier table) and the current book value of equity (Rs 35,717 million) to estimate net income:

  Normalized Net Income = 35,717 * 0.1734 = Rs 6,193 million

  (We removed interest income from cash to arrive at the normalized return on equity)

- We use the average equity reinvestment rate of 63.62 percent and the normalized return on equity of 17.34% to estimate growth:

  Expected Growth in Net Income = 0.6362 * 0.1734 = 11.03%

- We assume that the current cost of equity (see earlier page) of 13.93% will hold for the next 5 years.

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>Sum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income</td>
<td>Rs 6,876</td>
<td>Rs 7,634</td>
<td>Rs 8,476</td>
<td>Rs 9,411</td>
<td>Rs 10,449</td>
<td></td>
</tr>
<tr>
<td>Equity Reinvestment Rate</td>
<td>63.62%</td>
<td>63.62%</td>
<td>63.62%</td>
<td>63.62%</td>
<td>63.62%</td>
<td></td>
</tr>
<tr>
<td>FCFE</td>
<td>Rs 2,501</td>
<td>Rs 2,777</td>
<td>Rs 3,084</td>
<td>Rs 3,423</td>
<td>Rs 3,801</td>
<td></td>
</tr>
<tr>
<td>Cost of Equity</td>
<td>13.93%</td>
<td>13.93%</td>
<td>13.93%</td>
<td>13.93%</td>
<td>13.93%</td>
<td></td>
</tr>
<tr>
<td>Present Value</td>
<td>Rs 2,195</td>
<td>Rs 2,160</td>
<td>Rs 2,085</td>
<td>Rs 2,032</td>
<td>Rs 1,980</td>
<td>Rs 10,433</td>
</tr>
</tbody>
</table>
Stable growth and value….

- After year five, we will assume that the beta will increase to 1 and that the equity risk premium will decline to 7.5 percent (we assumed India country risk would drop). The resulting cost of equity is 11.5 percent.

  Cost of Equity in Stable Growth = 4% + 1(7.5%) = 11.5%

- We will assume that the growth in net income will drop to 4% and that the return on equity will rise to 11.5% (which is also the cost of equity).

  Equity Reinvestment Rate\sub{Stable Growth} = 4%/11.5% = 34.78%

  FCFE in Year 6 = 10,449(1.04)(1 – 0.3478) = Rs 7,087 million

  Terminal Value of Equity = 7,087/(0.115 – 0.04) = Rs 94,497 million

  Value of equity = PV of FCFE during high growth + PV of terminal value + Cash

  = 10,433 + 94,497/1.1393^5 +1,759 = Rs 61,423 million

  Dividing by 235.17 million shares yields a value of equity per share of Rs 261, about 20% higher than the stock price of Rs 222 per share.
## Disney: Inputs to Valuation

<table>
<thead>
<tr>
<th></th>
<th><em>High Growth Phase</em></th>
<th><em>Transition Phase</em></th>
<th><em>Stable Growth Phase</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of Period</td>
<td>5 years</td>
<td>5 years</td>
<td>Forever after 10 years</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>38%</td>
<td>38%</td>
<td>38%</td>
</tr>
<tr>
<td>Return on Capital</td>
<td>9.91%</td>
<td>Declines linearly to 9%</td>
<td>Stable ROC of 9%</td>
</tr>
<tr>
<td>Reinvestment Rate (Net Cap Ex + Working Capital Investments/EBIT)</td>
<td>53.72% (based on normalized acquisition costs)</td>
<td>Declines to 33.33% as ROC and growth rates drop: Reinvestment Rate = g/ROC</td>
<td>33.33% of after-tax operating income, estimated from stable growth rate of 3% and return on capital of 9%. Reinvestment rate = 3/9=33.33%</td>
</tr>
<tr>
<td>Expected Growth Rate in EBIT</td>
<td>ROC * Reinvestment Rate = 9.91%*53.72% = 5.32%</td>
<td>Linear decline to Stable Growth Rate of 3%</td>
<td>3%</td>
</tr>
<tr>
<td>Debt/Capital Ratio</td>
<td>26.7%</td>
<td>Stays unchanged</td>
<td>Stays unchanged</td>
</tr>
<tr>
<td>Risk Parameters</td>
<td>Beta = 0.9033, k_e = 8.91%% Pre-tax Cost of Debt = 6% Cost of capital = 7.52%</td>
<td>Beta changes linearly to 1.00; Cost of debt stays at 6% Cost of capital goes to 7.95%</td>
<td>Beta = 1.00; k_e = 9.5% Cost of debt stays at 6% Cost of capital = 7.95%</td>
</tr>
</tbody>
</table>
Disney - Status Quo in 2009

**Current Cashflow to Firm**

EBIT(1-t) = 7030(1-.38) = 4,359
- Nt OpX = 2,101
- Chg WC = 241
- FCFF = 2,017
Reinvestment Rate = 2342/4359 = 53.72%
Return on capital = 9.91%

**Expected Growth in EBIT (1-t)**

0.5372 * 0.0991 = 0.0532
5.32%

**Stable Growth**

g = 3%; Beta = 1.00;
Cost of capital = 7.95%
ROC = 9%;
Reinvestment Rate = 3/9 = 33.33%

**Terminal Value**

10 = 4704/(0.0795-.03) = 94,928

**Cost of Capital (WACC)**

= 8.91% (0.73) + 3.72% (0.27) = 7.52%

**Cost of Equity**

8.91%

**Cost of Debt**

(3.5% + 2.5%)(1-.38) = 3.72%
Based on actual A rating

**Weights**

E = 73% D = 27%

On June 1, 2009, Disney was trading at $24.34 /share
 Strategic investments determine length of growth period

The Investment Decision
Invest in projects that earn a return greater than a minimum acceptable hurdle rate.

The Dividend Decision
If you cannot find investments that earn more than the hurdle rate, return the cash to the owners of the business.

The Financing Decision
Choose a financing mix that minimizes the hurdle rate and matches your financing to your assets.

Investment decision affects risk of assets being financed and financing decision affects hom.
Ways of changing value...

- Cashflows from existing assets: Cashflows before debt payments, but after taxes and reinvestment to maintain existing assets.
- Growth from new investments: Growth created by making new investments; function of amount and quality of investments.
- Efficiency Growth: Growth generated by using existing assets better.
- Expected Growth during high growth period.
- Length of the high growth period: Since value creating growth requires excess returns, this is a function of magnitude of competitive advantages and sustainability of competitive advantages.
- Cost of capital to apply to discounting cashflows: Determined by operating risk of the company, default risk of the company, and mix of debt and equity used in financing.

Questions:
- Are you investing optimally for future growth?
- How well do you manage your existing investments/assets?
- Are you building on your competitive advantages?
- Are you using the right amount and kind of debt for your firm?
- Is there scope for more efficient utilization of existing assets?
- Stable growth firm, with no or very limited excess returns.
Disney - Restructured

**Current Cashflow to Firm**
- EBIT(1-t) = 7030(1-.38) = 4,359
- Nt Cpx= 2,101
- Chg WC 241
- FCFF 2,017
Reinvestment Rate = 2342/4359 = 53.72%
Return on capital = 9.91%

**Reinvestment Rate**
- Expected Growth in EBIT (1-t)
  - 0.5372 * 0.12 = 0.0645
  - 6.45%

**Stable Growth**
- g = 3%; Beta = 1.00;
- Cost of capital = 7.19%
- ROC = 9%;
- Reinvestment Rate = 3/9 = 33.33%

**Terminal Value**
- $5067 / (0.0719 - 0.03) = $120,982

**Cost of Capital (WACC)**
- 0.974% (0.60) + 0.372% (0.40) = 7.33%

**Riskfree Rate**
- Riskfree rate = 3.5%

**Beta**
- 1.04

**Risk Premium**
- 6%

**Unlevered Beta for Sectors**
- 0.7333

**D/E**
- 66.67%

On June 1, 2009, Disney was trading at $24.34/share
First Principles

Corporate Finance: The Big Picture

- **The hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

- **The return** should reflect the magnitude and the timing of the cashflows as well as all side effects.

- The **optimal mix** of debt and equity maximizes firm value.

- The **right kind** of debt matches the tenor of your assets.

- How much **cash** you can return depends upon current & potential investment opportunities.

- How you **choose** to return cash to the owners will depend whether they prefer dividends or buybacks.

**The Investment Decision**
Invest in assets that earn a return greater than the minimum acceptable hurdle rate.

**The Financing Decision**
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations.

**The Dividend Decision**
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business.

Maximize the value of the business (firm)