Applied Corporate Finance

Aswath Damodaran

www.damodaran.com

For material specific to this package, go to

www.stern.nyu.edu/~adamodar/New_Home_Page/triumdesc.html
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

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.

- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.

- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.

Objective: Maximize the Value of the Firm
The Objective in Decision Making

- 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.
- All other goals of the firm are intermediate ones leading to firm value maximization, or operate as constraints on firm value maximization.
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

FINANCIAL MARKETS
- Markets are efficient and assess effect on value

SOCIETY
- Costs can be traced to firm
- No Social Costs

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SOCIETY
- Costs can be traced to firm
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What can go wrong?

**STOCKHOLDERS**

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

**BONDHOLDERS**

- Lend Money
- Bondholders can get ripped off

**MANAGERS**

- Delay bad news or provide misleading information

**FINANCIAL MARKETS**

**SOCIETY**

- Significant Social Costs
- Some costs cannot be traced to firm
- Markets make mistakes and can over react
Who’s on Board? The Disney Experience - 1997

Reyna F. Bowen 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 P. Gold 4, 5
President and Chief Executive Officer
Shamrock Holdings, Inc.

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

Ignacio R. Lozano, Jr. 1, 2, 4
Editor-in-Chief, LA OPINION

George J. Mitchell 5
Special Counsel
Verner, Liipfert, Benesi, McPherson
and Hand

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

Richard A. Nunis
Chairman
Walt Disney Attractions

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

Michael S. Ovitz 3
President
The Walt Disney Company

Sidney Poitier 2, 4
Chief Executive Officer
Vestron-Cedart Productions

Irwin R. Russell 2, 4
Attorney at Law

Robert A. M. Stern
Senior Partner
Proskauer Rose

R. Carlon 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 6
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
Application Test: Who owns/runs your firm?

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

- Looking at the top 15 stockholders in your firm, are top managers in your firm also large stockholders in the firm?
- Is there any evidence that the top stockholders in the firm play an active role in managing the firm?
Disney’s top stockholders in 2003

<table>
<thead>
<tr>
<th>Holder name</th>
<th>Portfolio Name</th>
<th>Source</th>
<th>Held</th>
<th>Outstd</th>
<th>Change Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBARCLAYS GLOBAL</td>
<td>BARCLAYS BANK PLC</td>
<td>13F</td>
<td>83.63M</td>
<td>4.095</td>
<td>1,750M</td>
</tr>
<tr>
<td>2CITIGROUP INC</td>
<td>CITIGROUP INCORPORAT</td>
<td>13F</td>
<td>62.85M</td>
<td>3.078</td>
<td>4.811M</td>
</tr>
<tr>
<td>FIDELITY MANAGEMENT</td>
<td>FIDELITY MANAGEMENT</td>
<td>13F</td>
<td>56.12M</td>
<td>2.748</td>
<td>5.992M</td>
</tr>
<tr>
<td>STATE STREET</td>
<td>STATE STREET CORPORA</td>
<td>13F</td>
<td>54.83M</td>
<td>2.675</td>
<td>2.239M</td>
</tr>
<tr>
<td>SOUTHEASTERN ASST</td>
<td>SOUTHEASTERN ASSET M</td>
<td>13F</td>
<td>47.33M</td>
<td>2.318</td>
<td>14.604M</td>
</tr>
<tr>
<td>ING FARM M AUTO</td>
<td>ING FARM MUTUAL AU</td>
<td>13F</td>
<td>41.99M</td>
<td>2.054</td>
<td>120.599M</td>
</tr>
<tr>
<td>VANGUARD GROUP</td>
<td>VANGUARD GROUP INC</td>
<td>13F</td>
<td>34.72M</td>
<td>1.700</td>
<td>-63.839M</td>
</tr>
<tr>
<td>INMILLON BANK A N</td>
<td>INMILLON BANK CORP</td>
<td>13F</td>
<td>32.69M</td>
<td>1.601</td>
<td>957.498M</td>
</tr>
<tr>
<td>PUTNAM INVEST</td>
<td>PUTNAM INVESTMENT MA</td>
<td>13F</td>
<td>28.15M</td>
<td>1.379</td>
<td>-11.486M</td>
</tr>
<tr>
<td>LORD ABBOTT &amp; CO</td>
<td>LORD ABBOTT &amp; CO</td>
<td>13F</td>
<td>24.54M</td>
<td>1.202</td>
<td>5.385M</td>
</tr>
<tr>
<td>MONTAG CALDWELL</td>
<td>MONTAG &amp; CALDWELL IN</td>
<td>13F</td>
<td>24.46M</td>
<td>1.198</td>
<td>-11.373M</td>
</tr>
<tr>
<td>DEUTSCHE BANK AK</td>
<td>DEUTSCHE BANK AG</td>
<td>13F</td>
<td>23.23M</td>
<td>1.130</td>
<td>-5.002M</td>
</tr>
<tr>
<td>MORGAN STANLEY</td>
<td>MORGAN STANLEY</td>
<td>13F</td>
<td>19.65M</td>
<td>0.962</td>
<td>3.482M</td>
</tr>
<tr>
<td>HAPCE T ROWE</td>
<td>HAPCE T ROWE PRICE ASSOCIA</td>
<td>13F</td>
<td>19.13M</td>
<td>0.937</td>
<td>2.925M</td>
</tr>
<tr>
<td>ROY EDWARD DISNE</td>
<td>n/a</td>
<td>13F</td>
<td>17.59M</td>
<td>0.859</td>
<td>-128.710M</td>
</tr>
<tr>
<td>ALLIANCE CAPITAL CORP</td>
<td>ALLIANCE CAPITAL CORP</td>
<td>13F</td>
<td>14.20M</td>
<td>0.699</td>
<td>69.353M</td>
</tr>
<tr>
<td>JP MORGAN CHASE &amp; CO</td>
<td>JP MORGAN CHASE &amp; CO</td>
<td>13F</td>
<td>14.20M</td>
<td>0.696</td>
<td>462.791M</td>
</tr>
</tbody>
</table>

Sub-totals for current page: 599.159M 23.340

* Money market directory info available. Select portfolio, then hit IPO000.
When traditional corporate financial theory breaks down, the solution is:

- To choose a different mechanism for corporate governance
- 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
  - By providing information honestly and promptly to financial markets
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 its very difficult for outsiders (including investors in these firms) to figure out how well or badly the group is doing.
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
Maximize Stock Price, subject to ..

- The strength of the stock price maximization objective function is its internal self correction mechanism. Excesses on any of the linkages lead, if unregulated, to counter actions which reduce or eliminate these excesses.

- In the context of our discussion,
  - managers taking advantage of stockholders has lead to a much more active market for corporate control.
  - stockholders taking advantage of bondholders has lead to bondholders protecting themselves at the time of the issue.
  - firms revealing incorrect or delayed information to markets has lead to markets becoming more “skeptical” and “punitive”
  - firms creating social costs has lead to more regulations, as well as investor and customer backlashes.
The Stockholder Backlash

- Institutional investors such as Calpers and the Lens Funds have become much more active in monitoring companies that they invest in and demanding changes in the way in which business is done.
- Individuals like Michael Price specialize in taking large positions in companies which they feel need to change their ways (Chase, Dow Jones, Readers’ Digest) and push for change.
- At annual meetings, stockholders have taken to expressing their displeasure with incumbent management by voting against their compensation contracts or their board of directors.
In response, boards are becoming more independent...

- **Boards have become smaller over time.** The median size of a board of directors has decreased from 16 to 20 in the 1970s to between 9 and 11 in 1998. The smaller boards are less unwieldy and more effective than the larger boards.
- **There are fewer insiders on the board.** In contrast to the 6 or more insiders that many boards had in the 1970s, only two directors in most boards in 1998 were insiders.
- **Directors are increasingly compensated with stock and options in the company, instead of cash.** In 1973, only 4% of directors received compensation in the form of stock or options, whereas 78% did so in 1998.
- **More directors are identified and selected by a nominating committee rather than being chosen by the CEO of the firm.** In 1998, 75% of boards had nominating committees; the comparable statistic in 1973 was 2%.
## Disney’s Board in 2003

<table>
<thead>
<tr>
<th>Board Members</th>
<th>Occupation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reveta Bowers</td>
<td>Head of school for the Center for Early Education,</td>
</tr>
<tr>
<td>John Bryson</td>
<td>CEO and Chairman of Con Edison</td>
</tr>
<tr>
<td>Roy Disney</td>
<td>Head of Disney Animation</td>
</tr>
<tr>
<td>Michael Eisner</td>
<td>CEO of Disney</td>
</tr>
<tr>
<td>Judith Estrin</td>
<td>CEO of Packet Design (an internet company)</td>
</tr>
<tr>
<td>Stanley Gold</td>
<td>CEO of Shamrock Holdings</td>
</tr>
<tr>
<td>Robert Iger</td>
<td>Chief Operating Officer, Disney</td>
</tr>
<tr>
<td>Monica Lozano</td>
<td>Chief Operation Officer, La Opinion (Spanish newspaper)</td>
</tr>
<tr>
<td>George Mitchell</td>
<td>Chairman of law firm (Verner, Liipfert, et al.)</td>
</tr>
<tr>
<td>Thomas S. Murphy</td>
<td>Ex-CEO, Capital Cities ABC</td>
</tr>
<tr>
<td>Leo O’Donovan</td>
<td>Professor of Theology, Georgetown University</td>
</tr>
<tr>
<td>Sidney Poitier</td>
<td>Actor, Writer and Director</td>
</tr>
<tr>
<td>Robert A.M. Stern</td>
<td>Senior Partner of Robert A.M. Stern Architects of New York</td>
</tr>
<tr>
<td>Andrea L. Van de Kamp</td>
<td>Chairman of Sotheby's West Coast</td>
</tr>
<tr>
<td>Raymond L. Watson</td>
<td>Chairman of Irvine Company (a real estate corporation)</td>
</tr>
<tr>
<td>Gary L. Wilson</td>
<td>Chairman of the board, Northwest Airlines.</td>
</tr>
</tbody>
</table>
The Counter Reaction

**STOCKHOLDERS**

1. More activist investors
2. Hostile takeovers

Managers of poorly run firms are put on notice.

**BONDHOLDERS**

1. Covenants
2. New Types

Protect themselves

**Managers**

Firms are punished for misleading markets

**CORPORATE GOOD CITIZEN CONSTRAINTS**

1. More laws
2. Investor/Customer Backlash

**FINANCIAL MARKETS**

Investors and analysts become more skeptical

**SOCIETY**
Picking the Right Projects: Investment Analysis

“Let us watch well our beginnings, and results will manage themselves”

Alexander Clark
First Principles

- Invest in projects that yield a return greater than the **minimum acceptable hurdle rate**.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.

- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.

- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.
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.
Risk and Return Models in Finance…

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 1: Defining Risk**

**Risk that is specific to investment (Firm Specific)**

- Can be diversified away in a diversified portfolio
- Each investment is a small proportion of portfolio
- Risk averages out across investments in portfolio

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

**Step 2: Differentiating between Rewarded and Unrewarded Risk**

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

**The CAPM**

- 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**: 

- Market Risk = Risk exposures of any asset to market factors

**The APM**

- 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 macroeconomic factors.**

**Multi-Factor Models**

- Since market risk affects most or all investments, it must come from macroeconomic factors.

**Market Risk = Risk exposures of any asset to macroeconomic factors.**

**Proxy Models**

- 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)**

**Beta of asset relative to Market portfolio (from a regression)**

- Beta of asset relative to unspecified market factors (from a factor analysis)

**Equation relating returns to proxy variables (from a regression)**

**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. <strong>Market Risk = Risk added by any investment to the market portfolio</strong>: Market Risk = Risk exposures of any asset to market factors.</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. <strong>Market Risk = Risk exposures of any asset to macroeconomic factors.</strong></td>
<td>Since market risk affects most or all investments, it must come from macroeconomic factors. <strong>Market Risk = Risk exposures of any asset to macroeconomic factors.</strong></td>
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</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>
Who are Disney’s marginal investors?
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 alternative models is not different enough to be worth the extra trouble of estimating four additional betas.
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:

\[
\text{Expected Return} = \text{Riskfree Rate} + \beta \times (\text{Expected Return on the Market Portfolio} - \text{Riskfree Rate})
\]

To use the model we need three inputs:

1. The current risk-free rate
2. The expected market risk premium (the premium expected for investing in risky assets (market portfolio) over the riskless asset)
3. 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.
Riskfree Rate in Practice

- The riskfree rate is the rate on a zero coupon government bond matching the time horizon of 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.
Measurement of the risk premium

- The risk premium is the premium that investors demand for investing in an average risk investment, relative to the risk-free 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 Aversion and Risk Premiums

- If this were the capital market line, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the magnitude of wealth that each investor has. Thus, Warren Buffet’s risk aversion counts more towards determining the “equilibrium” premium than yours’ and mine.
- As investors become more risk averse, you would expect the “equilibrium” premium to increase.
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.
The Survey Approach

- Surveying all investors in a market place is impractical.
- However, you can survey a few investors (especially the larger investors) and use these results. In practice, this translates into surveys of money managers’ expectations of expected returns on stocks over the next year.
- The limitations of this approach are:
  - there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
  - they are extremely volatile
  - they tend to be short term; even the longest surveys do not go beyond one year
The Historical Premium Approach

- This is the default approach used by most to arrive at the premium to use in the model.
- In most cases, this approach does the following:
  - It defines a time period for the estimation (1926-Present, 1962-Present,...)
  - It calculates average returns on a stock index during the period
    - It calculates average returns on a riskless security over the period
    - It calculates the difference between the two
    - And uses it as a premium looking forward
- The limitations of this approach are:
  - It assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
  - It assumes that the riskiness of the “risky” portfolio (stock index) has not changed in a systematic way across time.
Historical Average Premiums for the United States

<table>
<thead>
<tr>
<th>Historical Period</th>
<th>Arithmetic average</th>
<th>Geometric Average</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stocks - T.Bills</td>
<td>Stocks - T.Bills</td>
</tr>
<tr>
<td>1928-2006</td>
<td>7.87%</td>
<td>6.01%</td>
</tr>
<tr>
<td>1966-2006</td>
<td>5.57%</td>
<td>4.34%</td>
</tr>
<tr>
<td>1996-2006</td>
<td>6.91%</td>
<td>5.42%</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.
- Be consistent
  \[
  \text{Std Error in estimate} = \frac{\text{Annualized Std deviation in Stock prices}}{\sqrt{\text{Number of years of historical data}}}
  \]
- Use arithmetic premiums for one-year estimates of costs of equity and geometric premiums for estimates of long term costs of equity.

Data Source: Check out the returns by year and estimate your own historical premiums by going to updated data on my web site.
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 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 such as S&P and Moody’s 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 January 2005, for instance, Brazil had a country rating of B1.

- If a country issues bonds denominated in a different currency (say dollars or euros), you can also see how the bond market views the risk in that country. In January 2005, Brazil had dollar denominated C-Bonds, trading at an interest rate of 7.73%. The US treasury bond rate that day was 4.22%, yielding a default spread of 3.51% for Brazil.

- Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. Using this approach would yield a risk premium of 8.31% for Brazil, if we use 4.8% as the premium for the US.
Beyond the default spread

- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads. If we can compute how much more risky the equity market is, relative to the bond market, we could use this information. For example,
  - Standard Deviation in Bovespa (Equity) = 25.09%
  - Standard Deviation in Brazil C-Bond = 15.12%
  - Default spread on C-Bond = 3.51%
  - Country Risk Premium for Brazil = 3.51% \times \frac{25.09\%}{15.12\%} = 5.82\%

- Note that this is on top of the premium you estimate for a mature market. Thus, if you assume that the risk premium in the US is 4.8%, the risk premium for Brazil would be 10.62%. 
An alternate view of ERP: Watch what I pay, not what I say.

- You can back out an equity risk premium from stock prices:

<table>
<thead>
<tr>
<th>Year</th>
<th>Dividends</th>
<th>Buybacks</th>
<th>Yield</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>$36.27</td>
<td>$32.75</td>
<td>2.62%</td>
</tr>
<tr>
<td>2002</td>
<td>$39.22</td>
<td>$30.62</td>
<td>3.39%</td>
</tr>
<tr>
<td>2003</td>
<td>$46.76</td>
<td>$38.53</td>
<td>2.84%</td>
</tr>
<tr>
<td>2004</td>
<td>$49.68</td>
<td>$66.42</td>
<td>3.35%</td>
</tr>
<tr>
<td>2005</td>
<td>$54.83</td>
<td>$104.28</td>
<td>4.90%</td>
</tr>
<tr>
<td>2006</td>
<td>$54.78</td>
<td>$109.81</td>
<td>5.39%</td>
</tr>
</tbody>
</table>

Average yield between 2001-2006 = 3.75%

Between 2001 and 2006, dividends and stock buybacks averaged 3.75% of the index each year.

Analysts expect earnings (53.16) to grow 6% a year for the next 5 years.

56.35  59.73  63.32  67.12  71.14

January 1, 2007
S&P 500 is at 1418.3
3.75% of 1418.3 = 53.16

After year 5, we will assume that earnings on the index will grow at 4.7%, the same rate as the entire economy.
Solving for the implied premium...

- If we know what investors paid for equities at the beginning of 2007 and we can estimate the expected cash flows from equities, we can solve for the rate of return that they expect to make (IRR):

\[
1418.3 = \frac{56.35}{(1 + r)} + \frac{59.73}{(1 + r)^2} + \frac{63.32}{(1 + r)^3} + \frac{67.12}{(1 + r)^4} + \frac{71.14}{(1 + r)^5} + \frac{71.14(1.047)}{(r - 0.047)(1 + r)^5}
\]

- Expected Return on Stocks = 8.86%
- Implied Equity Risk Premium = Expected Return on Stocks - T.Bond Rate
  =8.86% - 4.70% = 4.16%
Implied Premiums in the US

![Graph showing implied premiums for US equity market over time]
Application Test: A Market Risk Premium

Based upon our discussion of historical risk premiums so far, the risk premium looking forward should be:

a) About 7.9%, which is what the arithmetic average premium has been since 1928, for stocks over T.Bills
b) About 4.9%, which is the geometric average premium since 1928, for stocks over T.Bonds
c) About 4%, which is the implied premium in the stock market today
Estimating Beta

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.
Estimating Performance

The intercept of the regression provides a simple measure of performance during the period of the regression, relative to the capital asset pricing model.

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

\[ = R_f (1-b) + b R_m \]

\[ R_j = a + b R_m \]

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.
Firm Specific and Market Risk

- 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.
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 1999,
  - Price for Disney at end of November 1999 = $27.88
  - Price for Disney at end of December 1999 = $29.25
  - Dividends during month = $0.21 (It was an ex-dividend month)
  - Return =\(\frac{(29.25 - 27.88 + 0.21)}{27.88} = 5.69\%\)

To estimate returns on the index in the same month
  - Index level (including dividends) at end of November 1999 = 1388.91
  - Index level (including dividends) at end of December 1999 = 1469.25
  - Return =\(\frac{(1469.25 - 1388.91)}{1388.91} = 5.78\%\)
Disney’s Historical Beta

Figure 4.3: Disney versus S&P 500: 1999 - 2003
Using monthly returns from 1999 to 2003, we ran a regression of returns on Disney stock against the S&P 500. The output is below:

\[
\text{Returns}_{\text{Disney}} = 0.0467\% + 1.01 \times \text{Returns}_{\text{S & P 500}} \quad (R \text{ squared}= 29\%)
\]

\[(0.20)\]
Analyzing Disney’s Performance

- **Intercept = 0.0467%**
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 1999 and 2003,
    - Monthly Riskfree Rate = 0.313% (based upon average T.Bill rate: 99-03)
    - Riskfree Rate (1-Beta) = 0.313% (1-1.01) = -0.0032%

- The Comparison is then between
  - Intercept versus Riskfree Rate (1 - Beta)
  - 0.0467% versus 0.313%(1-1.01)=-0.0032%
    - Jensen’s Alpha = 0.0467% -(-0.0032%) = 0.05%

- Disney did 0.05% better than expected, per month, between 1999 and 2003.
  - Annualized, Disney’s annual excess return = (1.0005)^12-1= 0.60%
A positive Jensen’s alpha… Who is responsible?

Disney has a positive Jensen’s alpha of 0.60% a year between 1999 and 2003. This can be viewed as a sign that management in the firm did a good job, managing the firm during the period.

a) True
b) False
Estimating Disney’s Beta

- Slope of the Regression of 1.01 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 0.20.
- 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
```

Aswath Damodaran
Breaking down Disney’s Risk

- R Squared = 29%
- This implies that:
  - 29% of the risk at Disney comes from market sources
  - 71%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded
You are a diversified investor trying to decide whether you should invest in Disney or Amgen. They both have betas of 1.01, but Disney has an R Squared of 29% while Amgen’s R squared of only 14.5%. Which one would you invest in?

a) Amgen, because it has the lower R squared
b) Disney, because it has the higher R squared
c) You would be indifferent

Would your answer be different if you were an undiversified investor?
Beta Estimation: Using a Service (Bloomberg)

HISTORICAL BETA
Number of points may be insufficient for an accurate beta.

DIS: US Equity
Relative Index: SPX

Period: Monthly
Range: 1/29/99 to 12/31/03
Market: Trade

ADJ BETA: 1.01
RAW BETA: 1.01
Alpha (Intercept): -0.03
R^2 (Correlation): 0.29
Std Dev of Error: 7.95
Std Error of Beta: 0.21
Number of Points: 59

ADJ BETA = (0.67) * RAW BETA + (0.33) * 1.0

The Walt Disney Co.
S&P 500 INDEX
*Identifies latest observation
Estimating Expected Returns for Disney in September 2004

- Inputs to the expected return calculation
  - Disney’s Beta = 1.01
  - Riskfree Rate = 4.00% (U.S. ten-year T.Bond rate)
  - Risk Premium = 4.82% (Approximate historical premium: 1928-2003)
- Expected Return = Riskfree Rate + Beta (Risk Premium)
  = 4.00% + 1.01(4.82%) = 8.87%
Use to a Potential Investor in Disney

As a potential investor in Disney, what does this expected return of 8.87% 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 8.87%, you would

a) Buy the stock

b) Sell the stock
How managers use this expected return

- Managers at Disney
  - need to make at least 8.87% 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 8.87%.
- 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? (You can assume an annualized riskfree rate of 4.8% during the regression period)

  \[ \text{Intercept} - \left( \frac{4.8\%}{n} \right) (1 - \text{Beta}) = \text{Jensen’s Alpha} \]

  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 18.46%. 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
<table>
<thead>
<tr>
<th>Beta</th>
<th>Company</th>
<th>Beta Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 1</td>
<td>Real Networks</td>
<td>3.24</td>
</tr>
<tr>
<td></td>
<td>Qwest Communications</td>
<td>2.60</td>
</tr>
<tr>
<td>= 1</td>
<td>Microsoft</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>General Electric</td>
<td>1.10</td>
</tr>
<tr>
<td></td>
<td>Enron</td>
<td>0.95</td>
</tr>
<tr>
<td>&lt; 1</td>
<td>Philip Morris</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Exxon Mobil</td>
<td>0.40</td>
</tr>
<tr>
<td>= 0</td>
<td>Harmony Gold Mining</td>
<td>-0.10</td>
</tr>
</tbody>
</table>
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

Fixed Costs Measure = Fixed Costs / Variable Costs
- This measures the relationship between fixed and variable costs. The higher the proportion, the higher the operating leverage.

EBIT Variability Measure = % Change in EBIT / % 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: 1987-2003

<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>2877</td>
<td></td>
<td>756</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>3438</td>
<td>19.50%</td>
<td>848</td>
<td>12.17%</td>
</tr>
<tr>
<td>1989</td>
<td>4594</td>
<td>33.62%</td>
<td>1177</td>
<td>38.80%</td>
</tr>
<tr>
<td>1990</td>
<td>5844</td>
<td>27.21%</td>
<td>1368</td>
<td>16.23%</td>
</tr>
<tr>
<td>1991</td>
<td>6182</td>
<td>5.78%</td>
<td>1124</td>
<td>-17.84%</td>
</tr>
<tr>
<td>1992</td>
<td>7504</td>
<td>21.38%</td>
<td>1287</td>
<td>14.50%</td>
</tr>
<tr>
<td>1993</td>
<td>8529</td>
<td>13.66%</td>
<td>1560</td>
<td>21.21%</td>
</tr>
<tr>
<td>1994</td>
<td>10055</td>
<td>17.89%</td>
<td>1804</td>
<td>15.64%</td>
</tr>
<tr>
<td>1995</td>
<td>12112</td>
<td>20.46%</td>
<td>2262</td>
<td>25.39%</td>
</tr>
<tr>
<td>1996</td>
<td>18739</td>
<td>54.71%</td>
<td>3024</td>
<td>33.69%</td>
</tr>
<tr>
<td>1997</td>
<td>22473</td>
<td>19.93%</td>
<td>3945</td>
<td>30.46%</td>
</tr>
<tr>
<td>1998</td>
<td>22976</td>
<td>2.24%</td>
<td>3843</td>
<td>-2.59%</td>
</tr>
<tr>
<td>1999</td>
<td>23435</td>
<td>2.00%</td>
<td>3580</td>
<td>-6.84%</td>
</tr>
<tr>
<td>2000</td>
<td>25418</td>
<td>8.46%</td>
<td>2525</td>
<td>-29.47%</td>
</tr>
<tr>
<td>2001</td>
<td>25172</td>
<td>-0.97%</td>
<td>2832</td>
<td>12.16%</td>
</tr>
<tr>
<td>2002</td>
<td>25329</td>
<td>0.62%</td>
<td>2384</td>
<td>-15.82%</td>
</tr>
<tr>
<td>2003</td>
<td>27061</td>
<td>6.84%</td>
<td>2713</td>
<td>13.80%</td>
</tr>
<tr>
<td>1987-2003</td>
<td></td>
<td>15.83%</td>
<td></td>
<td>10.09%</td>
</tr>
<tr>
<td>1996-2003</td>
<td></td>
<td>11.73%</td>
<td></td>
<td>4.42%</td>
</tr>
</tbody>
</table>
Reading Disney’s Operating Leverage

- Operating Leverage = % Change in EBIT / % Change in Sales
  = 10.09% / 15.83% = 0.64
- This is lower than the operating leverage for other entertainment firms, which we computed to be 1.12. This would suggest that Disney has lower fixed costs than its competitors.
- The acquisition of Capital Cities by Disney in 1996 may be skewing the operating leverage. Looking at the changes since then:
  Operating Leverage_{1996-03} = 4.42%/11.73% = 0.38
  Looks like Disney’s operating leverage has decreased since 1996.
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
Equity Betas and Leverage

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 Beta
- \( t \) = Corporate marginal tax rate
- \( D \) = Market Value of Debt
- \( E \) = Market Value of Equity
Effects of leverage on betas: Disney

- The regression beta for Disney is 1.01. 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 (1999 to 2003).
- The average debt equity ratio during this period was 27.5%.
- The unlevered beta for Disney can then be estimated (using a marginal tax rate of 37.3%)
  \[
  \text{Unlevered Beta} = \frac{\text{Current Beta}}{1 + (1 - \text{tax rate}) (\text{Average Debt/Equity})}
  \]
  \[
  = \frac{1.01}{1 + (1 - 0.373) (0.275)} = 0.8615
  \]
## 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>0.86</td>
<td>0.00</td>
</tr>
<tr>
<td>10.00%</td>
<td>11.11%</td>
<td>0.92</td>
<td>0.06</td>
</tr>
<tr>
<td>20.00%</td>
<td>25.00%</td>
<td>1.00</td>
<td>0.14</td>
</tr>
<tr>
<td>30.00%</td>
<td>42.86%</td>
<td>1.09</td>
<td>0.23</td>
</tr>
<tr>
<td>40.00%</td>
<td>66.67%</td>
<td>1.22</td>
<td>0.36</td>
</tr>
<tr>
<td>50.00%</td>
<td>100.00%</td>
<td>1.40</td>
<td>0.54</td>
</tr>
<tr>
<td>60.00%</td>
<td>150.00%</td>
<td>1.67</td>
<td>0.81</td>
</tr>
<tr>
<td>70.00%</td>
<td>233.33%</td>
<td>2.12</td>
<td>1.26</td>
</tr>
<tr>
<td>80.00%</td>
<td>400.00%</td>
<td>3.02</td>
<td>2.16</td>
</tr>
<tr>
<td>90.00%</td>
<td>900.00%</td>
<td>5.72</td>
<td>4.86</td>
</tr>
</tbody>
</table>
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 will give you a better estimate of the true beta when
  - the standard error of the beta from the regression is high (and) the beta for a firm is very different from the average for the business
  - the firm has reorganized or restructured itself substantially during the period of the regression
  - when a firm is not traded
## Disney’s business breakdown

<table>
<thead>
<tr>
<th>Business</th>
<th>Comparable firms</th>
<th>Number of firm</th>
<th>Average levered beta</th>
<th>Median D/E</th>
<th>Unlevered beta</th>
<th>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</td>
<td>24</td>
<td>1.22</td>
<td>20.45%</td>
<td>1.0768</td>
<td>0.75%</td>
<td>1.0850</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>Theme park &amp; Entertainment firms</td>
<td>9</td>
<td>1.58</td>
<td>120.76%</td>
<td>0.8853</td>
<td>2.77%</td>
<td>0.9105</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>Movie companies</td>
<td>11</td>
<td>1.16</td>
<td>27.96%</td>
<td>0.9824</td>
<td>14.08%</td>
<td>1.1435</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>Toy and apparel retailers; Entertainment software</td>
<td>77</td>
<td>1.06</td>
<td>9.18%</td>
<td>0.9981</td>
<td>12.08%</td>
<td>1.1353</td>
</tr>
</tbody>
</table>

Unlevered Beta

\[
(1 - \text{Cash/Firm Value})
\]
Disney’s bottom up beta

\[
EV/Sales = \frac{(\text{Market Value of Equity + Debt - Cash})}{\text{Sales}}
\]

from comparable firms

<table>
<thead>
<tr>
<th>Business</th>
<th>Disney’s Revenues</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>$10,941</td>
<td>3.41</td>
<td>$37,278.62</td>
<td>49.25%</td>
<td>1.0850</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>$6,412</td>
<td>2.37</td>
<td>$15,208.37</td>
<td>20.09%</td>
<td>0.9105</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>$7,364</td>
<td>2.63</td>
<td>$19,390.14</td>
<td>25.62%</td>
<td>1.1435</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>$2,344</td>
<td>1.63</td>
<td>$3,814.38</td>
<td>5.04%</td>
<td>1.1353</td>
</tr>
<tr>
<td>Disney</td>
<td>$27,061</td>
<td></td>
<td>$75,691.51</td>
<td>100.00%</td>
<td>1.0674</td>
</tr>
</tbody>
</table>
## Disney’s Cost of Equity

<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>1.0850</td>
<td>26.62%</td>
<td>1.2661</td>
<td>10.10%</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>0.9105</td>
<td>26.62%</td>
<td>1.0625</td>
<td>9.12%</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>1.1435</td>
<td>26.62%</td>
<td>1.3344</td>
<td>10.43%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>1.1353</td>
<td>26.62%</td>
<td>1.3248</td>
<td>10.39%</td>
</tr>
<tr>
<td>Disney</td>
<td>1.0674</td>
<td>26.62%</td>
<td>1.2456</td>
<td>10.00%</td>
</tr>
</tbody>
</table>
Discussion Issue

If you were the chief financial officer of Disney, what cost of equity would you use in capital budgeting in the different divisions?

a) The cost of equity for Disney as a company
b) The cost of equity for each of Disney’s divisions?
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 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

Assume that you are trying to estimate the beta for a independent bookstore in New York City.

<table>
<thead>
<tr>
<th>Firm</th>
<th>Beta</th>
<th>Debt</th>
<th>Equity</th>
<th>Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books-A-Million</td>
<td>0.532</td>
<td>$45</td>
<td>$45</td>
<td>$5</td>
</tr>
<tr>
<td>Borders Group</td>
<td>0.844</td>
<td>$182</td>
<td>$1,430</td>
<td>$269</td>
</tr>
<tr>
<td>Barnes &amp; Noble</td>
<td>0.885</td>
<td>$300</td>
<td>$1,606</td>
<td>$268</td>
</tr>
<tr>
<td>Courier Corp</td>
<td>0.815</td>
<td>$1</td>
<td>$285</td>
<td>$6</td>
</tr>
<tr>
<td>Info Holdings</td>
<td>0.883</td>
<td>$2</td>
<td>$371</td>
<td>$54</td>
</tr>
<tr>
<td>John Wiley &amp;Son</td>
<td>0.636</td>
<td>$235</td>
<td>$1,662</td>
<td>$33</td>
</tr>
<tr>
<td>Scholastic Corp</td>
<td>0.744</td>
<td>$549</td>
<td>$1,063</td>
<td>$11</td>
</tr>
<tr>
<td>Sector</td>
<td>0.7627</td>
<td>$1,314</td>
<td>$6,462</td>
<td>$645</td>
</tr>
</tbody>
</table>

Unlevered Beta = 0.7627/(1+(1-.35)(1314/6462)) = 0.6737
Corrected for Cash = 0.6737 / (1 – 645/(1314+6462)) = 0.7346
Estimating Bookscape Levered Beta and Cost of Equity

- Since the debt/equity ratios used 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 industry average debt to equity ratio of 20.33%.
- Using a marginal tax rate of 40% (based upon personal income tax rates) for Bookscape, we get a levered beta of 0.82.
  \[
  \text{Levered beta for Bookscape} = 0.7346 (1 + (1 - 0.40) (0.2033)) = 0.82
  \]
- Using a riskfree rate of 4% (US treasury bond rate) and a historical risk premium of 4.82%:
  \[
  \text{Cost of Equity} = 4\% + 0.82 \times (4.82\%) = 7.95\%
  \]
Is Beta an Adequate Measure of Risk for a Private Firm?

The owners of most private firms are not diversified. Beta measures the risk added on to a diversified portfolio. 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
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 0.82 and the average R-squared of the comparable publicly traded firms is 16%,

\[
\frac{\text{Market Beta}}{\sqrt{\text{R squared}}} = \frac{0.82}{\sqrt{0.16}} = 2.06
\]

• Total Cost of Equity = 4% + 2.06 (4.82%) = 13.93%
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 web site by going to updated data.
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, the rating can be estimated from the interest coverage ratio
  \[
  \text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Expenses}}
  \]

- For a firm, which has earnings before interest and taxes of $3,500 million and interest expenses of $700 million
  \[
  \text{Interest Coverage Ratio} = \frac{3,500}{700} = 5.00
  \]

- In 2003, Bookscape had operating income of $2 million after interest expenses of 500,000. The resulting interest coverage ratio is 4.00.
  - Interest coverage ratio = \[
  \frac{2,000,000}{500,000} = 4.00
  \]
# Interest Coverage Ratios, Ratings and Default Spreads: Small Companies

<table>
<thead>
<tr>
<th>Interest Coverage Ratio</th>
<th>Rating</th>
<th>Typical default spread</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 12.5</td>
<td>AAA</td>
<td>0.35%</td>
</tr>
<tr>
<td>9.50 - 12.50</td>
<td>AA</td>
<td>0.50%</td>
</tr>
<tr>
<td>7.50 – 9.50</td>
<td>A+</td>
<td>0.70%</td>
</tr>
<tr>
<td>6.00 – 7.50</td>
<td>A</td>
<td>0.85%</td>
</tr>
<tr>
<td>4.50 – 6.00</td>
<td>A-</td>
<td>1.00%</td>
</tr>
<tr>
<td>4.00 – 4.50</td>
<td>BBB</td>
<td>1.50%</td>
</tr>
<tr>
<td>3.50 - 4.00</td>
<td>BB+</td>
<td>2.00%</td>
</tr>
<tr>
<td>3.00 – 3.50</td>
<td>BB</td>
<td>2.50%</td>
</tr>
<tr>
<td>2.50 – 3.00</td>
<td>B+</td>
<td>3.25%</td>
</tr>
<tr>
<td>2.00 - 2.50</td>
<td>B</td>
<td>4.00%</td>
</tr>
<tr>
<td>1.50 – 2.00</td>
<td>B-</td>
<td>6.00%</td>
</tr>
<tr>
<td>1.25 – 1.50</td>
<td>CCC</td>
<td>8.00%</td>
</tr>
<tr>
<td>0.80 – 1.25</td>
<td>CC</td>
<td>10.00%</td>
</tr>
<tr>
<td>0.50 – 0.80</td>
<td>C</td>
<td>12.00%</td>
</tr>
<tr>
<td>&lt; 0.65</td>
<td>D</td>
<td>20.00%</td>
</tr>
</tbody>
</table>
Synthetic Rating and Cost of Debt for Bookscape

- Rating based on interest coverage ratio = BBB
- Default Spread based upon rating = 1.50%
- Pre-tax cost of debt = Riskfree Rate + Default Spread = 4% + 1.50% = 5.50%
- After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 5.50% (1-.40) = 3.30%
Estimating Cost of Debt with rated companies

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

<table>
<thead>
<tr>
<th>S&amp;P Rating</th>
<th>Riskfree 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>BBB+</td>
<td>4% ($)</td>
<td>1.25%</td>
<td>5.25%</td>
<td>37.3%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.29%</td>
</tr>
<tr>
<td>Deutsche Bank</td>
<td>AA-</td>
<td>4.05% (Eu)</td>
<td>1.00%</td>
<td>5.05%</td>
<td>38%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.13%</td>
</tr>
<tr>
<td>Aracruz</td>
<td>B+</td>
<td>4% ($)</td>
<td>3.25%</td>
<td>7.25%</td>
<td>34%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.79%</td>
</tr>
</tbody>
</table>

- We computed the synthetic ratings for Disney and Aracruz using the interest coverage ratios:
  - Disney: Coverage ratio = 2,805/758 = 3.70  Synthetic rating = A-
  - Aracruz: Coverage ratio = 888/339 = 2.62  Synthetic rating = BBB
  - Disney’s synthetic rating is close to its actual rating. Aracruz has two ratings – one for its local currency borrowings of BBB- and one for its dollar borrowings of B+. 
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 interest coverage table)
- 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.
Estimating Market Value Weights

- Market Value of Equity should include the following:
  - Market Value of Shares outstanding
  - Market Value of Warrants outstanding
  - Market Value of Conversion Option in Convertible Bonds

- Market Value of Debt is more difficult to estimate because few firms have only publicly traded debt. There are two solutions:
  - Assume book value of debt is equal to market value
  - Estimate the market value of debt from the book value
  - For Disney, with book value of 13,100 million, interest expenses of $666 million, a current cost of borrowing of 5.25% and an weighted average maturity of 11.53 years.

\[
\text{Estimated MV of Disney Debt} = 666 \left[ \frac{1}{(1.0525)^{11.53}} - \frac{1}{(1.0525)^{11.53}} \right] + \frac{13,100}{(1.0525)^{11.53}} = $12,915 \text{ million}
\]
Converting Operating Leases to Debt

- The “debt value” of operating leases is the present value of the lease payments, at a rate that reflects their risk.
- In general, this rate will be close to or equal to the rate at which the company can borrow.
### Operating Leases at Disney

- The pre-tax cost of debt at Disney is 5.25%.

<table>
<thead>
<tr>
<th>Year</th>
<th>Commitment</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$271.00</td>
<td>$257.48</td>
</tr>
<tr>
<td>2</td>
<td>$242.00</td>
<td>$218.46</td>
</tr>
<tr>
<td>3</td>
<td>$221.00</td>
<td>$189.55</td>
</tr>
<tr>
<td>4</td>
<td>$208.00</td>
<td>$169.50</td>
</tr>
<tr>
<td>5</td>
<td>$275.00</td>
<td>$212.92</td>
</tr>
<tr>
<td>6–9</td>
<td>$258.25</td>
<td>$704.93</td>
</tr>
</tbody>
</table>

Debt Value of leases = \$1,752.85

- Debt outstanding at Disney = \$12,915 + \$1,753 = \$14,668 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
    \[= 4\% + 1.25 \times (4.82\%) = 10.00\%\]
  - Market Value of Equity = $55.101 Billion
  - Equity/(Debt+Equity) = 79%

- **Debt**
  - After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)
    \[= (4\% + 1.25\%) \times (1-0.373) = 3.29\%\]
  - Market Value of Debt = $14.668 Billion
  - Debt/(Debt+Equity) = 21%

- **Cost of Capital** = 10.00%(.79)+3.29%(.21) = 8.59%

\[
\frac{55.101}{55.101+14.668}
\]
## Disney’s Divisional Costs of Capital

<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>10.10%</td>
<td>3.29%</td>
<td>78.98%</td>
<td>21.02%</td>
<td>8.67%</td>
</tr>
<tr>
<td>Parks and Resorts</td>
<td>9.12%</td>
<td>3.29%</td>
<td>78.98%</td>
<td>21.02%</td>
<td>7.90%</td>
</tr>
<tr>
<td>Studio Entertainment</td>
<td>10.43%</td>
<td>3.29%</td>
<td>78.98%</td>
<td>21.02%</td>
<td>8.93%</td>
</tr>
<tr>
<td>Consumer Products</td>
<td>10.39%</td>
<td>3.29%</td>
<td>78.98%</td>
<td>21.02%</td>
<td>8.89%</td>
</tr>
<tr>
<td><strong>Disney</strong></td>
<td><strong>10.00%</strong></td>
<td><strong>3.29%</strong></td>
<td><strong>78.98%</strong></td>
<td><strong>21.02%</strong></td>
<td><strong>8.59%</strong></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

- Invest in projects that yield a return greater than the **minimum acceptable hurdle rate**.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.

- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.

- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.
Measuring Investment Returns

“Show me the money”

Jerry Maguire
First Principles

- Invest in projects that yield a **return** greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - **Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.**

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- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.
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 Bangkok, modeled on Euro Disney in Paris, 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 fifth year.
- The earnings and cash flows are estimated in nominal U.S. Dollars.
# Earnings on Project

<table>
<thead>
<tr>
<th></th>
<th>Now (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><strong>Magic Kingdom</strong></td>
<td></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>
</tr>
<tr>
<td><strong>Second Theme Park</strong></td>
<td></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><strong>Resort &amp; Properties</strong></td>
<td></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>
</tr>
<tr>
<td><strong>Total Revenues</strong></td>
<td></td>
<td></td>
<td>$1,250</td>
<td>$1,750</td>
<td>$2,500</td>
<td>$3,125</td>
<td>$3,438</td>
<td>$3,781</td>
<td>$4,159</td>
<td>$4,575</td>
<td>$4,667</td>
</tr>
<tr>
<td><strong>Magic Kingdom: Operating Expenses</strong></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><strong>Epcot II: Operating Expenses</strong></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><strong>Resort &amp; Properties: Operating Expenses</strong></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>Depreciation &amp; Amortization</strong></td>
<td>$0</td>
<td>$537</td>
<td>$508</td>
<td>$430</td>
<td>$359</td>
<td>$357</td>
<td>$358</td>
<td>$361</td>
<td>$366</td>
<td>$369</td>
<td></td>
</tr>
<tr>
<td><strong>Allocated G&amp;A Costs</strong></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>$0</td>
<td>-$262</td>
<td>-$123</td>
<td>$120</td>
<td>$329</td>
<td>$399</td>
<td>$473</td>
<td>$554</td>
<td>$641</td>
<td>$657</td>
<td></td>
</tr>
<tr>
<td><strong>Taxes</strong></td>
<td>$0</td>
<td>-$98</td>
<td>-$46</td>
<td>$45</td>
<td>$123</td>
<td>$149</td>
<td>$177</td>
<td>$206</td>
<td>$239</td>
<td>$245</td>
<td></td>
</tr>
<tr>
<td><strong>Operating Income after Taxes</strong></td>
<td></td>
<td>-$164</td>
<td>-$77</td>
<td>$75</td>
<td>$206</td>
<td>$250</td>
<td>$297</td>
<td>$347</td>
<td>$402</td>
<td>$412</td>
<td></td>
</tr>
</tbody>
</table>
And the Accounting View of Return

<table>
<thead>
<tr>
<th>Year</th>
<th>After-tax Operating Income</th>
<th>BV of Capital: Beginning</th>
<th>BV of Capital: Ending</th>
<th>Average BV of Capital</th>
<th>ROC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$0</td>
<td>$2,500</td>
<td>$3,500</td>
<td>$3,000</td>
<td>NA</td>
</tr>
<tr>
<td>2</td>
<td>-$165</td>
<td>$3,500</td>
<td>$4,294</td>
<td>$3,897</td>
<td>-4.22%</td>
</tr>
<tr>
<td>3</td>
<td>-$77</td>
<td>$4,294</td>
<td>$4,616</td>
<td>$4,455</td>
<td>-1.73%</td>
</tr>
<tr>
<td>4</td>
<td>$75</td>
<td>$4,616</td>
<td>$4,524</td>
<td>$4,570</td>
<td>1.65%</td>
</tr>
<tr>
<td>5</td>
<td>$206</td>
<td>$4,524</td>
<td>$4,484</td>
<td>$4,504</td>
<td>4.58%</td>
</tr>
<tr>
<td>6</td>
<td>$251</td>
<td>$4,484</td>
<td>$4,464</td>
<td>$4,474</td>
<td>5.60%</td>
</tr>
<tr>
<td>7</td>
<td>$297</td>
<td>$4,464</td>
<td>$4,481</td>
<td>$4,472</td>
<td>6.64%</td>
</tr>
<tr>
<td>8</td>
<td>$347</td>
<td>$4,481</td>
<td>$4,518</td>
<td>$4,499</td>
<td>7.72%</td>
</tr>
<tr>
<td>9</td>
<td>$402</td>
<td>$4,518</td>
<td>$4,575</td>
<td>$4,547</td>
<td>8.83%</td>
</tr>
<tr>
<td>10</td>
<td>$412</td>
<td>$4,575</td>
<td>$4,617</td>
<td>$4,596</td>
<td>8.97%</td>
</tr>
<tr>
<td></td>
<td>$175</td>
<td></td>
<td>$4,301</td>
<td></td>
<td>4.23%</td>
</tr>
</tbody>
</table>
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 political risk, which would mean that it too should not affect the discount rate. It may, however, 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 Thailand (or any other emerging market).
We did estimate a cost of equity of 9.12% for the Disney theme park business in the last chapter, using a bottom-up levered beta of 1.0625 for the business. This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market. To counter this risk, we compute the cost of equity for the theme park using a risk premium that includes a country risk premium for Thailand:

- The rating for Thailand is Baa1 and the default spread for the country bond is 1.50%. Multiplying this by the relative volatility of 2.2 of the equity market in Thailand (standard deviation of equity/standard deviation of country bond) yields a country risk premium of 3.3%.
  - Cost of Equity in US $ = 4% + 1.0625 (4.82% + 3.30%) = 12.63%
  - Cost of Capital in US $ = 12.63% (.7898) + 3.29% (.2102) = 10.66%
Would lead us to conclude that...

- Do not invest in this park. The **return on capital of 4.23%** is lower than the **cost of capital for theme parks of 10.66%**; 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
From Project to Firm Return on Capital: Disney in 2003

- Just as a comparison of project return on capital to the cost of capital yields a measure of whether the project is acceptable, a comparison can be made at the firm level, to judge whether the existing projects of the firm are adding or destroying value.

- Disney, in 2003, had earnings before interest and taxes of $2,713 million, had a book value of equity of $23,879 million and a book value of debt of 14,130 million. With a tax rate of 37.3%, we get

  Return on Capital = \( \frac{2713(1-.373)}{23879+14130} \) = 4.48%

  Cost of Capital for Disney = 8.59%

  Excess Return = 4.48% - 8.59% = -4.11%

- This can be converted into a dollar figure by multiplying by the capital invested, in which case it is called economic value added

  EVA = (0.0448 - 0.0859) (23879 + 14130) = - $1,562 million
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:
  \[
  \text{After-tax ROC} = \frac{\text{EBIT} \times (1-\text{tax rate})}{(\text{BV of debt} + \text{BV of Equity})_{\text{previous year}}}
  \]

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

To get from income to cash flow, we
- added back all non-cash charges such as depreciation
- subtracted out the capital expenditures
- subtracted out the change in non-cash working capital

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Income after Taxes</td>
<td></td>
<td></td>
<td>-$165</td>
<td>-$77</td>
<td>$75</td>
<td>$206</td>
<td>$251</td>
</tr>
<tr>
<td>+ Depreciation &amp; Amortization</td>
<td>$537</td>
<td>$508</td>
<td>$430</td>
<td>$359</td>
<td>$357</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Capital Expenditures</td>
<td>$2,500</td>
<td>$1,000</td>
<td>$1,269</td>
<td>$805</td>
<td>$301</td>
<td>$287</td>
<td>$321</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>
</tr>
<tr>
<td>Cashflow to Firm</td>
<td>-$2,500</td>
<td>-$1,000</td>
<td>-$960</td>
<td>-$399</td>
<td>$166</td>
<td>$247</td>
<td>$271</td>
</tr>
</tbody>
</table>
The incremental cash flows on the project

$500 million has already been spent

<table>
<thead>
<tr>
<th></th>
<th>Now (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 after Taxes</td>
<td></td>
<td>$-165</td>
<td>$-77</td>
<td>$75</td>
<td>$206</td>
<td>$251</td>
<td>$297</td>
<td>$347</td>
<td>$402</td>
<td>$412</td>
<td></td>
</tr>
<tr>
<td>+ Depreciation &amp; Amortization</td>
<td></td>
<td></td>
<td>$537</td>
<td>$508</td>
<td>$430</td>
<td>$359</td>
<td>$357</td>
<td>$358</td>
<td>$361</td>
<td>$366</td>
<td>$369</td>
</tr>
<tr>
<td>- Capital Expenditures</td>
<td></td>
<td>$2,500</td>
<td>$1,000</td>
<td>$1,269</td>
<td>$805</td>
<td>$301</td>
<td>$287</td>
<td>$321</td>
<td>$358</td>
<td>$379</td>
<td>$403</td>
</tr>
<tr>
<td>- Change in Working Capital</td>
<td></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>
</tr>
<tr>
<td>+ Non-incremental Allocated Expense (1-t)</td>
<td></td>
<td>$0</td>
<td>$78</td>
<td>$110</td>
<td>$157</td>
<td>$196</td>
<td>$216</td>
<td>$237</td>
<td>$261</td>
<td>$287</td>
<td>$293</td>
</tr>
<tr>
<td>+ Sunk Costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>500</td>
</tr>
<tr>
<td>Cashflow to Firm</td>
<td></td>
<td>$-2,000</td>
<td>$-1,000</td>
<td>$-880</td>
<td>$-289</td>
<td>$324</td>
<td>$443</td>
<td>$486</td>
<td>$517</td>
<td>$571</td>
<td>$631</td>
</tr>
</tbody>
</table>

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

To get from cash flow to incremental cash flows, we
- Taken out of the sunk costs from the initial investment
- Added back the non-incremental allocated costs (in after-tax terms)
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
- The discounting and compounding is done at a discount rate that will reflect
  - Expected inflation: Higher Inflation -> Higher Discount Rates
  - Expected real rate: Higher real rate -> Higher Discount rate
  - Expected uncertainty: Higher uncertainty -> Higher Discount Rate
# 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>$CF_n / (1+r)^n$</td>
<td>$CF_0 (1+r)^n$</td>
</tr>
<tr>
<td>2. Annuity</td>
<td>$A \left[ 1 - \frac{1}{(1+r)^n} \right] \frac{1}{r}$</td>
<td>$A \left[ \frac{(1+r)^n - 1}{r} \right]$</td>
</tr>
<tr>
<td>3. Growing Annuity</td>
<td>$A(1+g) \left[ 1 - \frac{(1+g)^n}{(1+r)^n} \right] \frac{1}{r - g}$</td>
<td></td>
</tr>
<tr>
<td>4. Perpetuity</td>
<td>$A/r$</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).
  \[ \text{NPV} = \text{Sum of the present values of all cash flows on the project, including the initial investment, with the cash flows being discounted at the appropriate hurdle rate (cost of capital, if cash flow is cash flow to the firm, and cost of equity, if cash flow is to equity investors)} \]
  - 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 = CF in year 11/(Cost of Capital - Growth Rate)
  
  \[
  = 663 \times (1.02) / (.1066 -.02) = 7,810 \text{ million}
  \]
Which yields a NPV of..

<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>-$904</td>
</tr>
<tr>
<td>2</td>
<td>-$880</td>
<td></td>
<td>-$719</td>
</tr>
<tr>
<td>3</td>
<td>-$289</td>
<td></td>
<td>-$213</td>
</tr>
<tr>
<td>4</td>
<td>$324</td>
<td></td>
<td>$216</td>
</tr>
<tr>
<td>5</td>
<td>$443</td>
<td></td>
<td>$267</td>
</tr>
<tr>
<td>6</td>
<td>$486</td>
<td></td>
<td>$265</td>
</tr>
<tr>
<td>7</td>
<td>$517</td>
<td></td>
<td>$254</td>
</tr>
<tr>
<td>8</td>
<td>$571</td>
<td></td>
<td>$254</td>
</tr>
<tr>
<td>9</td>
<td>$631</td>
<td></td>
<td>$254</td>
</tr>
<tr>
<td>10</td>
<td>$663</td>
<td>$7,810</td>
<td>$3,076</td>
</tr>
</tbody>
</table>

$749
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 $749 million.
The IRR of this project

Figure 5.5: NPV Profile for Disney Theme Park

Discount Rate vs. Net Present Value (NPV)

Internal Rate of Return

$3,000.00

$2,000.00

$1,000.00

$0.00

$1,000.00

$2,000.00

$3,000.00

$4,000.00

8% 9% 10% 11% 12% 13% 14% 15% 16% 17% 18% 19% 20% 21% 22% 23% 24% 25% 26% 27% 28% 29% 30%

Discount Rate

NPV

Internal Rate of Return
The IRR suggests..

- **The project is a good one.** Using time-weighted, incremental cash flows, this project provides a return of 11.97%. This is greater than the cost of capital of 10.66%.
- 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.
Currency Choices and NPV

- The analysis was done in dollars. Would the conclusions have been any different if we had done the analysis in Thai Baht?
  a) Yes
  b) No
Disney Theme Park: Thai Baht NPV

NPV = 31,542 Bt/42.09 Bt = $ 749 Million

NPV is equal to NPV in dollar terms

<table>
<thead>
<tr>
<th>Year</th>
<th>Cashflow ($)</th>
<th>Bt/$</th>
<th>Cashflow (Bt)</th>
<th>Present Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-2000</td>
<td>42.09</td>
<td>-84180</td>
<td>-84180</td>
</tr>
<tr>
<td>1</td>
<td>-1000</td>
<td>45.39</td>
<td>-45391</td>
<td>-38034</td>
</tr>
<tr>
<td>2</td>
<td>-880</td>
<td>48.95</td>
<td>-43075</td>
<td>-30243</td>
</tr>
<tr>
<td>3</td>
<td>-289</td>
<td>52.79</td>
<td>-15262</td>
<td>-8979</td>
</tr>
<tr>
<td>4</td>
<td>324</td>
<td>56.93</td>
<td>18420</td>
<td>9080</td>
</tr>
<tr>
<td>5</td>
<td>443</td>
<td>61.40</td>
<td>27172</td>
<td>11223</td>
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<tr>
<td>6</td>
<td>486</td>
<td>66.21</td>
<td>32187</td>
<td>11140</td>
</tr>
<tr>
<td>7</td>
<td>517</td>
<td>71.40</td>
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<td>10707</td>
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<tr>
<td>8</td>
<td>571</td>
<td>77.01</td>
<td>43979</td>
<td>10687</td>
</tr>
<tr>
<td>9</td>
<td>631</td>
<td>83.04</td>
<td>52412</td>
<td>10671</td>
</tr>
<tr>
<td>10</td>
<td>8474</td>
<td>89.56</td>
<td>758886</td>
<td>129470</td>
</tr>
</tbody>
</table>

Bt/$ in year 1 = 42.09 (1.10/1.02) = 45.39

Inflation rate in Thailand = 10%
Inflation rate in US = 2%
The Role of Sensitivity Analysis

- Our conclusions on a project are clearly conditioned on a large number of assumptions about revenues, costs and other variables over very long time periods.
- To the degree that these assumptions are wrong, our conclusions can also be wrong.
- One way to gain confidence in the conclusions is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions.
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

- Invest in projects that yield a **return** greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.

- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.

- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.
Finding the Right Financing Mix: The Capital Structure Decision
First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt).
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.

Objective: Maximize the Value of the Firm
Financing Choices across the life cycle

<table>
<thead>
<tr>
<th>$ Revenues/Earnings</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenues</td>
<td></td>
</tr>
<tr>
<td>Earnings</td>
<td></td>
</tr>
</tbody>
</table>

**External funding needs**
- Stage 1: Start-up
  - High, but constrained by infrastructure
- Stage 2: Rapid Expansion
  - High, relative to firm value.
- Stage 3: High Growth
  - Moderate, relative to firm value.
- Stage 4: Mature Growth
  - Declining, as a percent of firm value.
- Stage 5: Decline
  - Low, as projects dry up.

**Internal financing**
- Stage 1: Start-up
  - Negative or low
- Stage 2: Rapid Expansion
  - Negative or low
- Stage 3: High Growth
  - Low, relative to funding needs
- Stage 4: Mature Growth
  - High, relative to funding needs
- Stage 5: Decline
  - More than funding needs

**External Financing**
- Stage 1: Start-up
  - Owner’s Equity, Bank Debt
- Stage 2: Rapid Expansion
  - Venture Capital, Common Stock
  - Warrants, Convertibles
- Stage 3: High Growth
  - Common stock, Debt
- Stage 4: Mature Growth
  - Debt
- Stage 5: Decline
  - Retire debt, Repurchase stock

**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
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)

Debt includes all interest bearing liabilities, short term as well as long term.

Equity can be defined either in accounting terms (as book value of equity) or in market value terms (based upon the current price). The resulting debt ratios can be very different.
Debt: Summarizing the Trade Off

<table>
<thead>
<tr>
<th>Advantages of Borrowing</th>
<th>Disadvantages of Borrowing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher tax rates --&gt; Higher tax benefit</td>
<td>Higher business risk --&gt; Higher Cost</td>
</tr>
<tr>
<td>2. <em>Added Discipline:</em></td>
<td>2. <em>Agency Cost:</em></td>
</tr>
<tr>
<td>Greater the separation between managers</td>
<td>Greater the separation between stockholders &amp; lenders --&gt; Higher Cost</td>
</tr>
<tr>
<td>and stockholders --&gt; Greater the benefit</td>
<td>3. <em>Loss of Future Financing Flexibility:</em></td>
</tr>
<tr>
<td></td>
<td>Greater the uncertainty about future financing needs --&gt; Higher Cost</td>
</tr>
</tbody>
</table>
A Hypothetical Scenario

Assume you operate in an environment, where
(a) there are no taxes
(b) there is no separation between stockholders and managers.
(c) there is no default risk
(d) there is no separation between stockholders and bondholders
(e) firms know their future financing needs
The Miller-Modigliani Theorem

- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- The value of a firm is independent of its debt ratio.
Implications of MM Theorem

- 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

<table>
<thead>
<tr>
<th>D/(D+E)</th>
<th>ke</th>
<th>kd</th>
<th>After-tax Cost of Debt</th>
<th>WACC</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10.50%</td>
<td>8%</td>
<td>4.80%</td>
<td>10.50%</td>
</tr>
<tr>
<td>10%</td>
<td>11%</td>
<td>8.50%</td>
<td>5.10%</td>
<td>10.41%</td>
</tr>
<tr>
<td>20%</td>
<td>11.60%</td>
<td>9.00%</td>
<td>5.40%</td>
<td>10.36%</td>
</tr>
<tr>
<td>30%</td>
<td>12.30%</td>
<td>9.00%</td>
<td>5.40%</td>
<td>10.23%</td>
</tr>
<tr>
<td>40%</td>
<td>13.10%</td>
<td>9.50%</td>
<td>5.70%</td>
<td>10.14%</td>
</tr>
<tr>
<td>50%</td>
<td>14%</td>
<td>10.50%</td>
<td>6.30%</td>
<td>10.15%</td>
</tr>
<tr>
<td>60%</td>
<td>15%</td>
<td>12%</td>
<td>7.20%</td>
<td>10.32%</td>
</tr>
<tr>
<td>70%</td>
<td>16.10%</td>
<td>13.50%</td>
<td>8.10%</td>
<td>10.50%</td>
</tr>
<tr>
<td>80%</td>
<td>17.20%</td>
<td>15%</td>
<td>9.00%</td>
<td>10.64%</td>
</tr>
<tr>
<td>90%</td>
<td>18.40%</td>
<td>17%</td>
<td>10.20%</td>
<td>11.02%</td>
</tr>
<tr>
<td>100%</td>
<td>19.70%</td>
<td>19%</td>
<td>11.40%</td>
<td>11.40%</td>
</tr>
</tbody>
</table>
WACC and Debt Ratios

Weighted Average Cost of Capital and Debt Ratios

- WACC vs Debt Ratio graph
- Debt Ratio: 0% to 100%
- WACC: 9.40% to 11.40%

Aswath Damodaran

143
Current Cost of Capital: Disney

**Equity**
- Cost of Equity = Riskfree rate + Beta * Risk Premium
  \[ = 4\% + 1.25 \times (4.82\%) = 10.00\% \]
- Market Value of Equity = $55.101 Billion
- Equity/(Debt+Equity) = 79%

**Debt**
- After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)
  \[ = (4\% + 1.25\%) \times (1-0.373) = 3.29\% \]
- Market Value of Debt = $14.668 Billion
- Debt/(Debt+Equity) = 21%

**Cost of Capital**
\[ = 10.00\% \times 0.79 + 3.29\% \times 0.21 = 8.59\% \]

\[
\frac{55.101}{(55.101+14.668)}
\]
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.
Estimating Cost of Equity

Unlevered Beta = 1.0674 (Bottom up beta based upon Disney’s businesses)
Market premium = 4.82% T.Bond Rate = 4.00% Tax rate=37.3%

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>D/E Ratio</th>
<th>Levered Beta</th>
<th>Cost of Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00%</td>
<td>0.00%</td>
<td>1.0674</td>
<td>9.15%</td>
</tr>
<tr>
<td>10.00%</td>
<td>11.11%</td>
<td>1.1418</td>
<td>9.50%</td>
</tr>
<tr>
<td>20.00%</td>
<td>25.00%</td>
<td>1.2348</td>
<td>9.95%</td>
</tr>
<tr>
<td>30.00%</td>
<td>42.86%</td>
<td>1.3543</td>
<td>10.53%</td>
</tr>
<tr>
<td>40.00%</td>
<td>66.67%</td>
<td>1.5136</td>
<td>11.30%</td>
</tr>
<tr>
<td>50.00%</td>
<td>100.00%</td>
<td>1.7367</td>
<td>12.37%</td>
</tr>
<tr>
<td>60.00%</td>
<td>150.00%</td>
<td>2.0714</td>
<td>13.98%</td>
</tr>
<tr>
<td>70.00%</td>
<td>233.33%</td>
<td>2.6291</td>
<td>16.67%</td>
</tr>
<tr>
<td>80.00%</td>
<td>400.00%</td>
<td>3.7446</td>
<td>22.05%</td>
</tr>
<tr>
<td>90.00%</td>
<td>900.00%</td>
<td>7.0911</td>
<td>38.18%</td>
</tr>
</tbody>
</table>
## Estimating Cost of Debt

Start with the current market value of the firm = 55,101 + 14668 = $69,769 mil

<table>
<thead>
<tr>
<th>D/(D+E)</th>
<th>0.00%</th>
<th>10.00%</th>
<th>Debt to capital</th>
</tr>
</thead>
<tbody>
<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>$6,977</td>
<td>10% of $69,769</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EBITDA</th>
<th>$3,882</th>
<th>$3,882</th>
<th>Same as 0% debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>$1,077</td>
<td>$1,077</td>
<td>Same as 0% debt</td>
</tr>
<tr>
<td>EBIT</td>
<td>$2,805</td>
<td>$2,805</td>
<td>Same as 0% debt</td>
</tr>
<tr>
<td>Interest</td>
<td>$0</td>
<td>$303</td>
<td>Pre-tax cost of debt * $ Debt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-tax Int. cov</th>
<th>∞</th>
<th>9.24</th>
<th>EBIT/ Interest Expenses</th>
</tr>
</thead>
<tbody>
<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>4.35%</td>
<td>4.35%</td>
<td>Riskless Rate + Spread</td>
</tr>
</tbody>
</table>
The Ratings Table

<table>
<thead>
<tr>
<th>Interest Coverage Ratio</th>
<th>Rating</th>
<th>Typical Default Spread</th>
<th>Market Interest Rate on Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 8.5</td>
<td>AAA</td>
<td>0.35%</td>
<td>4.35%</td>
</tr>
<tr>
<td>6.50 - 6.50</td>
<td>AA</td>
<td>0.50%</td>
<td>4.50%</td>
</tr>
<tr>
<td>5.50 – 6.50</td>
<td>A+</td>
<td>0.70%</td>
<td>4.70%</td>
</tr>
<tr>
<td>4.25 – 5.50</td>
<td>A</td>
<td>0.85%</td>
<td>4.85%</td>
</tr>
<tr>
<td>3.00 – 4.25</td>
<td>A-</td>
<td>1.00%</td>
<td>5.00%</td>
</tr>
<tr>
<td>2.50 – 3.00</td>
<td>BBB</td>
<td>1.50%</td>
<td>5.50%</td>
</tr>
<tr>
<td>2.05 - 2.50</td>
<td>BB+</td>
<td>2.00%</td>
<td>6.00%</td>
</tr>
<tr>
<td>1.90 – 2.00</td>
<td>BB</td>
<td>2.50%</td>
<td>6.50%</td>
</tr>
<tr>
<td>1.75 – 1.90</td>
<td>B+</td>
<td>3.25%</td>
<td>7.25%</td>
</tr>
<tr>
<td>1.50 - 1.75</td>
<td>B</td>
<td>4.00%</td>
<td>8.00%</td>
</tr>
<tr>
<td>1.25 – 1.50</td>
<td>B-</td>
<td>6.00%</td>
<td>10.00%</td>
</tr>
<tr>
<td>0.80 – 1.25</td>
<td>CCC</td>
<td>8.00%</td>
<td>12.00%</td>
</tr>
<tr>
<td>0.65 – 0.80</td>
<td>CC</td>
<td>10.00%</td>
<td>14.00%</td>
</tr>
<tr>
<td>0.20 – 0.65</td>
<td>C</td>
<td>12.00%</td>
<td>16.00%</td>
</tr>
<tr>
<td>&lt; 0.20</td>
<td>D</td>
<td>20.00%</td>
<td>24.00%</td>
</tr>
</tbody>
</table>
A Test: Can you do the 20% level?

<table>
<thead>
<tr>
<th></th>
<th>0.00%</th>
<th>10.00%</th>
<th>20.00%</th>
<th>2nd Iteration</th>
<th>3rd?</th>
</tr>
</thead>
<tbody>
<tr>
<td>$D/(D+E)$</td>
<td>0.00%</td>
<td>10.00%</td>
<td>20.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D/E</td>
<td>0.00%</td>
<td>11.11%</td>
<td>25.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$ Debt</td>
<td>$0</td>
<td>$6,977</td>
<td>$13,954</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBITDA</td>
<td>$3,882</td>
<td>$3,882</td>
<td>$3,882</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depreciation</td>
<td>$1,077</td>
<td>$1,077</td>
<td>$1,077</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EBIT</td>
<td>$2,805</td>
<td>$2,805</td>
<td>$2,805</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest</td>
<td>$0</td>
<td>$303</td>
<td>$606</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>.0485*13954=676</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-tax Int. cov</td>
<td>∞</td>
<td>9.24</td>
<td>4.62</td>
<td>2805/676=4.15</td>
<td></td>
</tr>
<tr>
<td>Likely Rating</td>
<td>AAA</td>
<td>AAA</td>
<td>A</td>
<td>A-</td>
<td></td>
</tr>
<tr>
<td>Cost of debt</td>
<td>4.35%</td>
<td>4.35%</td>
<td>4.85%</td>
<td>5.00%</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>Cost of Debt (after-tax)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$0</td>
<td>$0</td>
<td>?</td>
<td>AAA</td>
<td>4.35%</td>
<td>37.30%</td>
<td>2.73%</td>
</tr>
<tr>
<td>10%</td>
<td>$6,977</td>
<td>$303</td>
<td>9.24</td>
<td>AAA</td>
<td>4.35%</td>
<td>37.30%</td>
<td>2.73%</td>
</tr>
<tr>
<td>20%</td>
<td>$13,954</td>
<td>$698</td>
<td>4.02</td>
<td>A-</td>
<td>5.00%</td>
<td>37.30%</td>
<td>3.14%</td>
</tr>
<tr>
<td>30%</td>
<td>$20,931</td>
<td>$1,256</td>
<td>2.23</td>
<td>BB+</td>
<td>6.00%</td>
<td>37.30%</td>
<td>3.76%</td>
</tr>
<tr>
<td>40%</td>
<td>$27,908</td>
<td>$3,349</td>
<td>0.84</td>
<td>CCC</td>
<td>12.00%</td>
<td>31.24%</td>
<td>8.25%</td>
</tr>
<tr>
<td>50%</td>
<td>$34,885</td>
<td>$5,582</td>
<td>0.50</td>
<td>C</td>
<td>16.00%</td>
<td>18.75%</td>
<td>13.00%</td>
</tr>
<tr>
<td>60%</td>
<td>$41,861</td>
<td>$6,698</td>
<td>0.42</td>
<td>C</td>
<td>16.00%</td>
<td>15.62%</td>
<td>13.50%</td>
</tr>
<tr>
<td>70%</td>
<td>$48,838</td>
<td>$7,814</td>
<td>0.36</td>
<td>C</td>
<td>16.00%</td>
<td>13.39%</td>
<td>13.86%</td>
</tr>
<tr>
<td>80%</td>
<td>$55,815</td>
<td>$8,930</td>
<td>0.31</td>
<td>C</td>
<td>16.00%</td>
<td>11.72%</td>
<td>14.13%</td>
</tr>
<tr>
<td>90%</td>
<td>$62,792</td>
<td>$10,047</td>
<td>0.28</td>
<td>C</td>
<td>16.00%</td>
<td>10.41%</td>
<td>14.33%</td>
</tr>
</tbody>
</table>
Stated versus Effective Tax Rates

- You need taxable income for interest to provide a tax savings.
- In the Disney case, consider the interest expense at 30% and 40%.

<table>
<thead>
<tr>
<th></th>
<th>30% Debt Ratio</th>
<th>40% Debt Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBIT</td>
<td>$ 2,805 m</td>
<td>$ 2,805 m</td>
</tr>
<tr>
<td>Interest Expense</td>
<td>$ 1,256 m</td>
<td>$ 3,349 m</td>
</tr>
<tr>
<td>Tax Savings</td>
<td>$ 1,256 * .373 = 468</td>
<td>2,805 * .373 = $ 1,046</td>
</tr>
<tr>
<td>Tax Rate</td>
<td>37.30%</td>
<td>1,046 / 3,349 = 31.2%</td>
</tr>
<tr>
<td>Pre-tax interest rate</td>
<td>6.00%</td>
<td>12.00%</td>
</tr>
<tr>
<td>After-tax Interest Rate</td>
<td>3.76%</td>
<td>8.25%</td>
</tr>
</tbody>
</table>

- You can deduct only $2,805 million of the $3,349 million of the interest expense at 40%. Therefore, only 37.3% of $2,805 million is considered as the tax savings.
## Disney’s Cost of Capital Schedule

<table>
<thead>
<tr>
<th>Debt Ratio</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>9.15%</td>
<td>2.73%</td>
<td>9.15%</td>
</tr>
<tr>
<td>10%</td>
<td>9.50%</td>
<td>2.73%</td>
<td>8.83%</td>
</tr>
<tr>
<td>20%</td>
<td>9.95%</td>
<td>3.14%</td>
<td>8.59%</td>
</tr>
<tr>
<td>30%</td>
<td>10.53%</td>
<td>3.76%</td>
<td>8.50%</td>
</tr>
<tr>
<td>40%</td>
<td>11.50%</td>
<td>8.25%</td>
<td>10.20%</td>
</tr>
<tr>
<td>50%</td>
<td>13.33%</td>
<td>13.00%</td>
<td>13.16%</td>
</tr>
<tr>
<td>60%</td>
<td>15.66%</td>
<td>13.50%</td>
<td>14.36%</td>
</tr>
<tr>
<td>70%</td>
<td>19.54%</td>
<td>13.86%</td>
<td>15.56%</td>
</tr>
<tr>
<td>80%</td>
<td>27.31%</td>
<td>14.13%</td>
<td>16.76%</td>
</tr>
<tr>
<td>90%</td>
<td>50.63%</td>
<td>14.33%</td>
<td>17.96%</td>
</tr>
</tbody>
</table>
Disney: Cost of Capital Chart

Figure 8.3: Disney Cost of Capital at different Debt Ratios

- Optimal Debt ratio is at this point.
- Cost of equity climbs as levered beta increases.
- After-tax cost of debt increases as interest coverage ratio deteriorates and with it the synthetic rating.

Costs of debt and equity:
- After-tax Cost of Debt
- Cost of Capital
- Cost of Equity
Effect on Firm Value

Firm Value before the change = 55,101 + 14,668 = $ 69,769

\[ WACC_b = 8.59\% \quad \text{Annual Cost} = \frac{69,769 \times 8.59\%}{100} = 5,993 \text{ million} \]
\[ WACC_a = 8.50\% \quad \text{Annual Cost} = \frac{69,769 \times 8.50\%}{100} = 5,930 \text{ million} \]

\[ \Delta WACC = 0.09\% \quad \text{Change in Annual Cost} = 63 \text{ million} \]

If there is no growth in the firm value, (Conservative Estimate)

- Increase in firm value = $63 / 0.0850 = $ 741 million
- Change in Stock Price = $741 / 2047.6 = $0.36 per share

If we assume a perpetual growth of 4% in firm value over time,

- Increase in firm value = $63 /(0.0850 - 0.04) = $ 1,400 million
- Change in Stock Price = $1,400 / 2,047.6 = $ 0.68 per share

**Implied Growth Rate obtained by**

\[ \text{Firm value Today} = \frac{\text{FCFF}(1+g)}{(WACC-g)}: \text{Perpetual growth formula} \]
\[ 69,769 = \frac{1,722(1+g)}{0.0859-g}: \text{Solve for g -> Implied growth} = 5.98\% \]
A Test: The Repurchase Price

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 $26.91) Assuming that firm value will grow by 4% a year, estimate the maximum price.

What would happen to the stock price after the buyback if you were able to buy stock back at $26.91?
The Downside Risk

- Doing What-if analysis on Operating Income
  - A. Standard Deviation 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. Past Recession 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>
</tbody>
</table>
Disney: Effects of Past Downturns

<table>
<thead>
<tr>
<th>Recession</th>
<th>Decline in Operating Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Drop of 15.82%</td>
</tr>
<tr>
<td>1991</td>
<td>Drop of 22.00%</td>
</tr>
<tr>
<td>1981-82</td>
<td>Increased</td>
</tr>
<tr>
<td>Worst Year</td>
<td>Drop of 29.47%</td>
</tr>
</tbody>
</table>

- The standard deviation in past operating income is about 20%.
## Disney: The Downside Scenario

<table>
<thead>
<tr>
<th>% Drop in EBITDA</th>
<th>EBIT</th>
<th>Optimal Debt Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>$ 2,805</td>
<td>30%</td>
</tr>
<tr>
<td>5%</td>
<td>$ 2,665</td>
<td>20%</td>
</tr>
<tr>
<td>10%</td>
<td>$ 2,524</td>
<td>20%</td>
</tr>
<tr>
<td>15%</td>
<td>$ 2,385</td>
<td>20%</td>
</tr>
<tr>
<td>20%</td>
<td>$ 2,245</td>
<td>20%</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 30%, Disney has an estimated rating of BB+.
- Assume that Disney imposes a rating constraint of A or greater.
- The optimal debt ratio for Disney is then 20% (see next page)
- The cost of imposing this rating constraint can then be calculated as follows:

  Value at 30% Debt = $71,239 million
  - Value at 20% Debt = $69,837 million
  Cost of Rating Constraint = $1,376 million
## Effect of Ratings Constraints: Disney

<table>
<thead>
<tr>
<th>Debt Ratio</th>
<th>Rating</th>
<th>Firm Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>AAA</td>
<td>$62,279</td>
</tr>
<tr>
<td>10%</td>
<td>AAA</td>
<td>$66,397</td>
</tr>
<tr>
<td>20%</td>
<td>A-</td>
<td>$69,837</td>
</tr>
<tr>
<td>30%</td>
<td>BB+</td>
<td>$71,239</td>
</tr>
<tr>
<td>40%</td>
<td>CCC</td>
<td>$51,661</td>
</tr>
<tr>
<td>50%</td>
<td>C</td>
<td>$34,969</td>
</tr>
<tr>
<td>60%</td>
<td>C</td>
<td>$30,920</td>
</tr>
<tr>
<td>70%</td>
<td>C</td>
<td>$27,711</td>
</tr>
<tr>
<td>80%</td>
<td>C</td>
<td>$25,105</td>
</tr>
<tr>
<td>90%</td>
<td>C</td>
<td>$22,948</td>
</tr>
</tbody>
</table>
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.
Analyzing Financial Service Firms

- The interest coverage ratios/ratings relationship is likely to be different for financial service firms.
- The definition of debt is messy for financial service firms. In general, using all debt for a financial service firm will lead to high debt ratios. Use only interest-bearing long term debt in calculating debt ratios.
- The effect of ratings drops will be much more negative for financial service firms.
- There are likely to regulatory constraints on capital
### Interest Coverage ratios, ratings and Operating income

<table>
<thead>
<tr>
<th>Long Term Interest Coverage Ratio</th>
<th>Rating is</th>
<th>Spread is</th>
<th>Operating Income Decline</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.05</td>
<td>D</td>
<td>16.00%</td>
<td>-50.00%</td>
</tr>
<tr>
<td>0.05 – 0.10</td>
<td>C</td>
<td>14.00%</td>
<td>-40.00%</td>
</tr>
<tr>
<td>0.10 – 0.20</td>
<td>CC</td>
<td>12.50%</td>
<td>-40.00%</td>
</tr>
<tr>
<td>0.20 – 0.30</td>
<td>CCC</td>
<td>10.50%</td>
<td>-40.00%</td>
</tr>
<tr>
<td>0.30 – 0.40</td>
<td>B-</td>
<td>6.25%</td>
<td>-25.00%</td>
</tr>
<tr>
<td>0.40 – 0.50</td>
<td>B</td>
<td>6.00%</td>
<td>-20.00%</td>
</tr>
<tr>
<td>0.50 – 0.60</td>
<td>B+</td>
<td>5.75%</td>
<td>-20.00%</td>
</tr>
<tr>
<td>0.60 – 0.75</td>
<td>BB</td>
<td>4.75%</td>
<td>-20.00%</td>
</tr>
<tr>
<td>0.75 – 0.90</td>
<td>BB+</td>
<td>4.25%</td>
<td>-20.00%</td>
</tr>
<tr>
<td>0.90 – 1.20</td>
<td>BBB</td>
<td>2.00%</td>
<td>-20.00%</td>
</tr>
<tr>
<td>1.20 – 1.50</td>
<td>A-</td>
<td>1.50%</td>
<td>-17.50%</td>
</tr>
<tr>
<td>1.50 – 2.00</td>
<td>A</td>
<td>1.40%</td>
<td>-15.00%</td>
</tr>
<tr>
<td>2.00 – 2.50</td>
<td>A+</td>
<td>1.25%</td>
<td>-10.00%</td>
</tr>
<tr>
<td>2.50 – 3.00</td>
<td>AA</td>
<td>0.90%</td>
<td>-5.00%</td>
</tr>
<tr>
<td>&gt; 3.00</td>
<td>AAA</td>
<td>0.70%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
## Deutsche Bank: Optimal Capital Structure

<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>0.44</td>
<td>6.15%</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
<td>6.15%</td>
<td>$111,034</td>
</tr>
<tr>
<td>10%</td>
<td>0.47</td>
<td>6.29%</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
<td>5.96%</td>
<td>$115,498</td>
</tr>
<tr>
<td>20%</td>
<td>0.50</td>
<td>6.48%</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
<td>5.77%</td>
<td>$120,336</td>
</tr>
<tr>
<td>30%</td>
<td>0.55</td>
<td>6.71%</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
<td>5.58%</td>
<td>$125,597</td>
</tr>
<tr>
<td>40%</td>
<td>0.62</td>
<td>7.02%</td>
<td>AAA</td>
<td>4.75%</td>
<td>38.00%</td>
<td>2.95%</td>
<td>5.39%</td>
<td>$131,339</td>
</tr>
<tr>
<td>50%</td>
<td>0.71</td>
<td>7.45%</td>
<td>A+</td>
<td>5.30%</td>
<td>38.00%</td>
<td>3.29%</td>
<td>5.37%</td>
<td>$118,770</td>
</tr>
<tr>
<td>60%</td>
<td>0.84</td>
<td>8.10%</td>
<td>A</td>
<td>5.45%</td>
<td>38.00%</td>
<td>3.38%</td>
<td>5.27%</td>
<td>$114,958</td>
</tr>
<tr>
<td>70%</td>
<td>1.07</td>
<td>9.19%</td>
<td>A</td>
<td>5.45%</td>
<td>38.00%</td>
<td>3.38%</td>
<td>5.12%</td>
<td>$119,293</td>
</tr>
<tr>
<td>80%</td>
<td>1.61</td>
<td>11.83%</td>
<td>BB+</td>
<td>8.30%</td>
<td>32.43%</td>
<td>5.61%</td>
<td>6.85%</td>
<td>$77,750</td>
</tr>
<tr>
<td>90%</td>
<td>3.29</td>
<td>19.91%</td>
<td>BB</td>
<td>8.80%</td>
<td>27.19%</td>
<td>6.41%</td>
<td>7.76%</td>
<td>$66,966</td>
</tr>
</tbody>
</table>
Determinants of Optimal Debt Ratios

- **Firm Specific Factors**
  - 1. Tax Rate
    - Higher tax rates → Higher Optimal Debt Ratio
    - Lower tax rates → Lower Optimal Debt Ratio
  - 2. Pre-Tax CF on Firm = EBITDA / MV of Firm
    - Higher Pre-tax CF → Higher Optimal Debt Ratio
    - Lower Pre-tax CF → Lower Optimal Debt Ratio
  - 3. Variance in Earnings [Shows up when you do 'what if' analysis]
    - Higher Variance → Lower Optimal Debt Ratio
    - Lower Variance → Higher Optimal Debt Ratio

- **Macro-Economic Factors**
  - 1. Default Spreads
    - Higher → Lower Optimal Debt Ratio
    - Lower → Higher Optimal Debt Ratio
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?
II. Relative Analysis

I. Industry Average with Subjective Adjustments

- 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></th>
<th>Disney</th>
<th>Entertainment</th>
<th>Aracruz</th>
<th>Paper and Pulp (Emerging Market)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Debt Ratio</td>
<td>21.02%</td>
<td>19.56%</td>
<td>30.82%</td>
<td>27.71%</td>
</tr>
<tr>
<td>Book Debt Ratio</td>
<td>35.10%</td>
<td>28.86%</td>
<td>43.12%</td>
<td>49.00%</td>
</tr>
</tbody>
</table>
A Framework for Getting to the Optimal

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
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 & buy shares.

No
Does the firm have good projects?
ROE > Cost of Equity
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?

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Is the firm under bankruptcy threat?

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2. Borrow money & buy shares.

No
Does the firm have good projects?
ROE > Cost of Equity
ROC > Cost of Capital

Yes
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.
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

Design debt to have cash flows that match up to cash flows on the assets financed

Define Debt Characteristics

Start with the Cash Flows on Assets/Projects

- Duration
- Currency
- Effect of Inflation
- Uncertainty about Future
- Growth Patterns
- Cyclicality & Other Effects

Define Debt Characteristics

- Duration/Maturity
- Currency Mix
- Fixed vs. Floating Rate
  * More floating rate
    - if CF move with inflation
    - with greater uncertainty on future
- Straight versus Convertible
  - Convertible if cash flows low now but high exp. growth
- Special Features on Debt
  - Options to make cash flows on debt match cash flows on assets

Commodity Bonds
Catastrophe Notes
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.

Consider ratings agency & analyst concerns

<table>
<thead>
<tr>
<th>Analyst Concerns</th>
<th>Ratings Agency</th>
<th>Regulatory Concerns</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Effect on EPS</td>
<td>- Effect on Ratios</td>
<td>- Measures used</td>
</tr>
<tr>
<td>- Value relative to comparables</td>
<td>- Ratios relative to comparables</td>
<td></td>
</tr>
</tbody>
</table>

Can securities be designed that can make these different entities happy?

Consider ratings agency & analyst concerns

Operating Leases
MIPs
Surplus Notes

Aswath Damodaran
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.
Debt, Equity and Quasi Equity

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.
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.

If agency problems are substantial, consider issuing convertible bonds.
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 Debt: Bringing it all together

Start with the Cash Flows on Assets/Projects

Define Debt Characteristics

Overlay tax preferences

Consider ratings agency & analyst concerns

Factor in agency conflicts between stock and bond holders

Consider Information Asymmetries

Aswath Damodaran

Duration Maturity
Currency Mix
Duration / Maturity
Currency
Effect of Inflation
Uncertainty about Future
Growth Patterns
Cyclicality & Other Effects

Fixed vs. Floating Rate
* More floating rate
- if CF move with inflation
- with greater uncertainty on future

Straight versus Convertible
- Convertible if cash flows low now but high exp. growth

Special Features on Debt
- Options to make cash flows on debt match cash flows on assets

Define Debt Characteristics

Design debt to have cash flows that match up to cash flows on the assets financed

Deductibility of cash flows for tax purposes
Differences in tax rates across different locales

If tax advantages are large enough, you might override results of previous step

Analyst Concerns
- Effect on EPS
- Value relative to comparables

Ratings Agency
- Effect on Ratios
- Ratios relative to comparables

Regulatory Concerns
- Measures used

Can securities be designed that can make these different entities happy?

Observability of Cash Flows by Lenders
- Less observable cash flows lead to more conflicts

Type of Assets financed
- Tangible and liquid assets create less agency problems

Existing Debt covenants
- Restrictions on Financing

If agency problems are substantial, consider issuing convertible bonds

Uncertainty about Future Cashflows
- When there is more uncertainty, it may be better to use short term debt

Credibility & Quality of the Firm
- Firms with credibility problems will issue more short term debt

Commodity Bonds
Catastrophe Notes
Zero Coupons
Operating Leases
MIPs
Surplus Notes
Convertibles
Puttable Bonds
Rating Sensitive Notes
LYONs
## The Right Debt for Disney

<table>
<thead>
<tr>
<th>Business</th>
<th>Project Cash Flow Characteristics</th>
<th>Type of Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Movies</td>
<td>Projects are likely to</td>
<td>Debt should be</td>
</tr>
<tr>
<td></td>
<td>1. Be short term</td>
<td>1. Short term</td>
</tr>
<tr>
<td></td>
<td>dollars (since Disney makes most</td>
<td></td>
</tr>
<tr>
<td></td>
<td>of its movies in the U.S.) but</td>
<td></td>
</tr>
<tr>
<td></td>
<td>cash inflows could have a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>substantial foreign currency</td>
<td></td>
</tr>
<tr>
<td></td>
<td>component (because of overseas</td>
<td></td>
</tr>
<tr>
<td></td>
<td>sales)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Have net cash flows that are</td>
<td></td>
</tr>
<tr>
<td></td>
<td>heavily driven by whether the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>movie is a “hit”, which is often</td>
<td></td>
</tr>
<tr>
<td></td>
<td>difficult to predict.</td>
<td></td>
</tr>
<tr>
<td>Broadcasting</td>
<td>Projects are likely to be</td>
<td>Debt should be</td>
</tr>
<tr>
<td></td>
<td>1. Short term</td>
<td>1. Short term</td>
</tr>
<tr>
<td></td>
<td>foreign component is growing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Driven by advertising revenues</td>
<td>3. If possible, linked to network ratings.</td>
</tr>
<tr>
<td></td>
<td>and show success</td>
<td></td>
</tr>
<tr>
<td>Theme Parks</td>
<td>Projects are likely to be</td>
<td>Debt should be</td>
</tr>
<tr>
<td></td>
<td>1. Very long term</td>
<td>1. Long term</td>
</tr>
<tr>
<td></td>
<td>2. Primarily in dollars, but a</td>
<td>2. Mix of currencies, based upon tourist make up.</td>
</tr>
<tr>
<td></td>
<td>significant proportion of</td>
<td></td>
</tr>
<tr>
<td></td>
<td>revenues come from foreign</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tourists, who are likely to stay</td>
<td></td>
</tr>
<tr>
<td></td>
<td>away if the dollar strengthens</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3. Affected by success of movie</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and broadcasting divisions.</td>
<td></td>
</tr>
<tr>
<td>Consumer Products</td>
<td>Projects are likely to be</td>
<td>Debt should be</td>
</tr>
<tr>
<td></td>
<td>short to medium term and linked</td>
<td>a. Medium term</td>
</tr>
<tr>
<td></td>
<td>to the success of the movie</td>
<td>b. Dollar debt.</td>
</tr>
<tr>
<td></td>
<td>division. Most of Disney’s product offerings are derived from their movie productions.</td>
<td></td>
</tr>
</tbody>
</table>
Analyzing Disney’s Current Debt

- Disney has $13.1 billion in debt with an average maturity of 11.53 years. Even allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney’s debt is far too long term for its existing business mix.
- Of the debt, about 12% is Euro debt and no yen denominated debt. Based upon our analysis, a larger portion of Disney’s debt should be in foreign currencies.
- Disney has about $1.3 billion in convertible debt and some floating rate debt, though no information is provided on its magnitude. If floating rate debt is a relatively small portion of existing debt, our analysis would indicate that Disney should be using more of it.
Adjusting Debt at Disney

- It can swap some of its existing long term, fixed rate, dollar debt with shorter term, 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 short term, floating rate, foreign currency debt to fund these new investments. While it may be mismatching the funding on these investments, its debt matching will become better at the company level.
Returning Cash to the Owners: Dividend Policy
First Principles

- Invest in projects that **yield a return greater** than the **minimum acceptable hurdle rate**.
  - The hurdle rate should be **higher for riskier projects** and reflect the **financing mix** used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on **cash flows** generated and the **timing** of these cash flows; they should also consider both **positive and negative side effects** of these projects.

- Choose a **financing mix** that **minimizes the hurdle rate** and **matches the assets being financed**.

- If there are not enough investments that earn the hurdle rate, **return the cash to stockholders**.
  - The **form of returns** - dividends and stock buybacks - will depend upon the stockholders’ **characteristics**.

**Objective:** Maximize the Value of the Firm
Steps to the Dividend Decision…

How much did you borrow?
- Cashflow from Operations
  - Cashflows to Debt (Principal repaid, Interest Expenses)
- Cashflows from Operations to Equity Investors

How good are your investment choices?
- Reinvestment back into the business

What is a reasonable cash balance?
- Cash available for return to stockholders
- Cash held back by the company

What do your stockholders prefer?
- Stock Buybacks
- Dividends
- Cash Paid out
I. Dividends are sticky
II. Dividends tend to follow earnings
III. More and more firms are buying back stock, rather than pay dividends...
IV. But the change in dividend tax law in 2003 may cause a shift back to dividends
Measures of Dividend Policy

- **Dividend Payout:**
  - measures the percentage of earnings that the company pays in dividends
  - $= \frac{\text{Dividends}}{\text{Earnings}}$

- **Dividend Yield:**
  - measures the return that an investor can make from dividends alone
  - $= \frac{\text{Dividends}}{\text{Stock Price}}$
Dividend Payout Ratios: January 2007

Firms not paying dividends = 2699
Firms paying dividends = 1664
Payout ratio not meaningful = 2935
Dividend Yields in the United States: January 2007

- Firms not paying dividends = 5347
- Firms paying dividends = 1710

Graph showing the distribution of dividend yields in the United States for January 2007.
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 have a tax disadvantage,
   - **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?
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
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
- Change in Non-Cash Working Capital = $35 Million
- Debt Ratio = 0%

FCFE = Net Income - (Cap ex - Depr) (1-DR) - Chg WC (!-DR)

= $2,176 - (494 - 480) (1-0) - $35 (1-0)

= $2,127 Million
Microsoft: Dividends?

- 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?
Dividends versus FCFE: U.S.

Figure 11.2: Dividends paid as % of FCFE
The Consequences of Failing to pay FCFE

Chrysler: FCFE, Dividends and Cash Balance

<table>
<thead>
<tr>
<th>Year</th>
<th>Cash Flow</th>
<th>Cash Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td></td>
<td>($500)</td>
</tr>
<tr>
<td>1986</td>
<td></td>
<td>$0</td>
</tr>
<tr>
<td>1987</td>
<td></td>
<td>$500</td>
</tr>
<tr>
<td>1988</td>
<td></td>
<td>$1,000</td>
</tr>
<tr>
<td>1989</td>
<td></td>
<td>$1,500</td>
</tr>
<tr>
<td>1990</td>
<td></td>
<td>$2,000</td>
</tr>
<tr>
<td>1991</td>
<td></td>
<td>$2,500</td>
</tr>
<tr>
<td>1992</td>
<td></td>
<td>$3,000</td>
</tr>
<tr>
<td>1993</td>
<td></td>
<td>$3,500</td>
</tr>
<tr>
<td>1994</td>
<td></td>
<td>$4,000</td>
</tr>
</tbody>
</table>

- Free CF to Equity
- Cash to Stockholders
- Cumulated Cash

Legend:
- = 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)
+ Stock Buybacks

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

-Common Dividend
- Decrease in Capital Stock
+ Increase in Capital Stock
A Practical Framework for Analyzing Dividend Policy

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

\[
\begin{align*}
\text{What it could have paid out} & = \text{Net Income} - (\text{Cap Ex} - \text{Depr'n}) (1-\text{DR}) - \text{Chg Working Capital} (1-\text{DR}) = \text{FCFE} \\
\text{What actually paid out} & = \text{Dividends} + \text{Equity Repurchase}
\end{align*}
\]

Firm pays out too little

\[\text{FCFE} > \text{Dividends}\]

Do you trust managers in the company with your cash?

- Look at past project choice:
  - Compare ROE to Cost of Equity
  - ROC to WACC

Firm pays out too much

\[\text{FCFE} < \text{Dividends}\]

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>Dividends paid out relative to FCFE</th>
<th>Poor projects</th>
<th>Good projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash Surplus + Poor Projects</td>
<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>Cash Deficit + Poor Projects</td>
<td>Cut out dividends but real problem is in investment policy.</td>
<td></td>
</tr>
<tr>
<td>Cash Surplus + Good Projects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash Deficit + Good Projects</td>
<td>Reduce cash payout, if any, to stockholders</td>
<td></td>
</tr>
</tbody>
</table>
Disney: An analysis of FCFE from 1994-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Depreciation</th>
<th>Capital Expenditures</th>
<th>Change in non-cash WC</th>
<th>FCFE (before debt CF)</th>
<th>Net CF from Debt</th>
<th>FCFE (after Debt CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>$1,110.40</td>
<td>$1,608.30</td>
<td>$1,026.11</td>
<td>$654.10</td>
<td>$1,038.49</td>
<td>$551.10</td>
<td>$1,589.59</td>
</tr>
<tr>
<td>1995</td>
<td>$1,380.10</td>
<td>$1,853.00</td>
<td>$896.50</td>
<td>($270.70)</td>
<td>$2,607.30</td>
<td>$14.20</td>
<td>$2,621.50</td>
</tr>
<tr>
<td>1996</td>
<td>$1,214.00</td>
<td>$3,944.00</td>
<td>$13,464.00</td>
<td>$617.00</td>
<td>($8,923.00)</td>
<td>$8,688.00</td>
<td>($235.00)</td>
</tr>
<tr>
<td>1997</td>
<td>$1,966.00</td>
<td>$4,958.00</td>
<td>$1,922.00</td>
<td>($174.00)</td>
<td>$5,176.00</td>
<td>($1,641.00)</td>
<td>$3,535.00</td>
</tr>
<tr>
<td>1998</td>
<td>$1,850.00</td>
<td>$3,323.00</td>
<td>$2,314.00</td>
<td>$939.00</td>
<td>$1,920.00</td>
<td>$618.00</td>
<td>$2,538.00</td>
</tr>
<tr>
<td>1999</td>
<td>$1,300.00</td>
<td>$3,779.00</td>
<td>$2,134.00</td>
<td>($363.00)</td>
<td>$3,308.00</td>
<td>($176.00)</td>
<td>$3,132.00</td>
</tr>
<tr>
<td>2000</td>
<td>$920.00</td>
<td>$2,195.00</td>
<td>$2,013.00</td>
<td>($1,184.00)</td>
<td>$2,286.00</td>
<td>($2,118.00)</td>
<td>$168.00</td>
</tr>
<tr>
<td>2001</td>
<td>($158.00)</td>
<td>$1,754.00</td>
<td>$1,795.00</td>
<td>$244.00</td>
<td>($443.00)</td>
<td>$77.00</td>
<td>($366.00)</td>
</tr>
<tr>
<td>2002</td>
<td>$1,236.00</td>
<td>$1,042.00</td>
<td>$1,086.00</td>
<td>$27.00</td>
<td>$1,165.00</td>
<td>$1,892.00</td>
<td>$3,057.00</td>
</tr>
<tr>
<td>2003</td>
<td>$1,267.00</td>
<td>$1,077.00</td>
<td>$1,049.00</td>
<td>($264.00)</td>
<td>$1,559.00</td>
<td>($1,145.00)</td>
<td>$414.00</td>
</tr>
<tr>
<td>Average</td>
<td>$1,208.55</td>
<td>$2,553.33</td>
<td>$2,769.96</td>
<td>$22.54</td>
<td>$969.38</td>
<td>$676.03</td>
<td>$1,645.41</td>
</tr>
</tbody>
</table>
## Disney’s Dividends and Buybacks from 1994 to 2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Dividends (in $)</th>
<th>Equity Repurchases (in $)</th>
<th>Cash to Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994</td>
<td>$153</td>
<td>$571</td>
<td>$724</td>
</tr>
<tr>
<td>1995</td>
<td>$180</td>
<td>$349</td>
<td>$529</td>
</tr>
<tr>
<td>1996</td>
<td>$271</td>
<td>$462</td>
<td>$733</td>
</tr>
<tr>
<td>1997</td>
<td>$342</td>
<td>$633</td>
<td>$975</td>
</tr>
<tr>
<td>1998</td>
<td>$412</td>
<td>$30</td>
<td>$442</td>
</tr>
<tr>
<td>1999</td>
<td>$0</td>
<td>$19</td>
<td>$19</td>
</tr>
<tr>
<td>2000</td>
<td>$434</td>
<td>$166</td>
<td>$600</td>
</tr>
<tr>
<td>2001</td>
<td>$438</td>
<td>$1,073</td>
<td>$1,511</td>
</tr>
<tr>
<td>2002</td>
<td>$428</td>
<td>$0</td>
<td>$428</td>
</tr>
<tr>
<td>2003</td>
<td>$429</td>
<td>$0</td>
<td>$429</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>$ 308.70</strong></td>
<td><strong>$ 330.30</strong></td>
<td><strong>$ 639</strong></td>
</tr>
</tbody>
</table>
Disney paid out $330 million less in dividends (and stock buybacks) than it could afford to pay out (Dividends and stock buybacks were $639 million; FCFE before net debt issues was $969 million). How much cash do you think Disney accumulated during the period?
Disney’s track record on projects and stockholder wealth

Figure 11.3: ROE, Return on Stock and Cost of Equity: Disney

Disney acquired Cap Cities in 1996
Can you trust Disney’s management?

- Given Disney’s track record over the last 10 years, if you were a Disney stockholder, would you be comfortable with Disney’s dividend policy?
  - Yes
  - No
The Bottom Line on Disney Dividends

- Disney could have afforded to pay more in dividends during the period of the analysis.
- It chose not to, and used the cash for acquisitions (Capital Cities/ABC) and ill-fated expansion plans (Go.com).
- While the company may have flexibility to set its dividend policy a decade ago, its actions over that decade have frittered away this flexibility.
- Bottom line: Large cash balances will not be tolerated in this company. Expect to face relentless pressure to pay out more dividends.
## Aracruz: Dividends and FCFE: 1998-2003

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Depreciation</th>
<th>Capital Expenditures</th>
<th>Change in non-cash WC</th>
<th>FCFE (before net Debt CF)</th>
<th>Net Debt Cashflow</th>
<th>FCFE (after net Debt CF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>$3.45</td>
<td>$152.80</td>
<td>$88.31</td>
<td>$76.06</td>
<td>($8.11)</td>
<td>$174.27</td>
<td>$166.16</td>
</tr>
<tr>
<td>1999</td>
<td>$90.77</td>
<td>$158.83</td>
<td>$56.47</td>
<td>$2.18</td>
<td>$190.95</td>
<td>($604.48)</td>
<td>($413.53)</td>
</tr>
<tr>
<td>2000</td>
<td>$201.71</td>
<td>$167.96</td>
<td>$219.37</td>
<td>$12.30</td>
<td>$138.00</td>
<td>($292.07)</td>
<td>($154.07)</td>
</tr>
<tr>
<td>2001</td>
<td>$18.11</td>
<td>$162.57</td>
<td>$421.49</td>
<td>($56.76)</td>
<td>($184.06)</td>
<td>$318.24</td>
<td>$134.19</td>
</tr>
<tr>
<td>2002</td>
<td>$111.91</td>
<td>$171.50</td>
<td>$260.70</td>
<td>($5.63)</td>
<td>$28.34</td>
<td>$36.35</td>
<td>$64.69</td>
</tr>
<tr>
<td>2003</td>
<td>$148.09</td>
<td>$162.57</td>
<td>$421.49</td>
<td>($7.47)</td>
<td>($103.37)</td>
<td>$531.20</td>
<td>$427.83</td>
</tr>
<tr>
<td>Average</td>
<td>$95.67</td>
<td>$162.70</td>
<td>$244.64</td>
<td>$3.45</td>
<td>$10.29</td>
<td>$27.25</td>
<td>$37.54</td>
</tr>
</tbody>
</table>
### Aracruz: Cash Returned to Stockholders

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Income</th>
<th>Dividends</th>
<th>Payout Ratio</th>
<th>FCFE</th>
<th>Cash returned to Stockholders</th>
<th>Cash Returned/FCFE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>$3.45</td>
<td>$24.39</td>
<td>707.51%</td>
<td>$166.16</td>
<td>$50.79</td>
<td>30.57%</td>
</tr>
<tr>
<td>1999</td>
<td>$90.77</td>
<td>$18.20</td>
<td>20.05%</td>
<td>($413.53)</td>
<td>$18.20</td>
<td>NA</td>
</tr>
<tr>
<td>2000</td>
<td>$201.71</td>
<td>$57.96</td>
<td>28.74%</td>
<td>($154.07)</td>
<td>$80.68</td>
<td>NA</td>
</tr>
<tr>
<td>2001</td>
<td>$18.11</td>
<td>$63.17</td>
<td>348.87%</td>
<td>$134.19</td>
<td>$63.17</td>
<td>47.08%</td>
</tr>
<tr>
<td>2002</td>
<td>$111.91</td>
<td>$73.80</td>
<td>65.94%</td>
<td>$64.69</td>
<td>$75.98</td>
<td>117.45%</td>
</tr>
<tr>
<td>2003</td>
<td>$148.09</td>
<td>$109.31</td>
<td>73.81%</td>
<td>$427.83</td>
<td>$112.31</td>
<td>26.25%</td>
</tr>
<tr>
<td>1998-2003</td>
<td>$574.04</td>
<td>$346.83</td>
<td>60.42%</td>
<td>$225.27</td>
<td>$401.12</td>
<td>178.07%</td>
</tr>
</tbody>
</table>
Aracruz: Stock and Project Returns

Figure 11.4: ROE, Return on Stock and Cost of Equity: Aracruz

ROE Return on stock Cost of Equity
Aracruz: Its your call..

Assume that you are a large stockholder in Aracruz. They have been paying more in dividends than they have available in FCFE. Their project choice has been acceptable and your stock has performed well over the period. Would you accept a cut in dividends?

- Yes
- No
Mandated Dividend Payouts

There are many countries where companies are mandated to pay out a certain portion of their earnings as dividends. Given our discussion of FCFE, what types of companies will be hurt the most by these laws?

- Large companies making huge profits
- Small companies losing money
- High growth companies that are losing money
- High growth companies that are making money
## BP: Dividends- 1983-92

<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>Net Income</td>
<td>$1,256.00</td>
<td>$1,626.00</td>
<td>$2,309.00</td>
<td>$1,098.00</td>
<td>$2,076.00</td>
<td>$2,140.00</td>
<td>$2,542.00</td>
<td>$2,946.00</td>
<td>$712.00</td>
<td>$947.00</td>
</tr>
<tr>
<td>- (Cap. Exp - Depr)*(1-DR)</td>
<td>$1,499.00</td>
<td>$1,281.00</td>
<td>$1,737.50</td>
<td>$1,600.00</td>
<td>$580.00</td>
<td>$1,184.00</td>
<td>$1,090.50</td>
<td>$1,975.50</td>
<td>$1,545.50</td>
<td>$1,100.00</td>
</tr>
<tr>
<td>- Working Capital*(1-DR)</td>
<td>$369.50</td>
<td>($286.50)</td>
<td>$678.50</td>
<td>$82.00</td>
<td>($2,268.00)</td>
<td>($984.50)</td>
<td>$429.50</td>
<td>$1,047.50</td>
<td>($305.00)</td>
<td>($415.00)</td>
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<td>= Free CF to Equity</td>
<td>($612.50)</td>
<td>$631.50</td>
<td>($107.00)</td>
<td>($584.00)</td>
<td>$3,764.00</td>
<td>$1,940.50</td>
<td>$1,022.00</td>
<td>($77.00)</td>
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<tr>
<td>Dividends</td>
<td>$831.00</td>
<td>$949.00</td>
<td>$1,079.00</td>
<td>$1,314.00</td>
<td>$1,391.00</td>
<td>$1,961.00</td>
<td>$1,746.00</td>
<td>$1,895.00</td>
<td>$2,112.00</td>
<td>$1,685.00</td>
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<tr>
<td>+ Equity Repurchases</td>
<td>$831.00</td>
<td>$949.00</td>
<td>$1,079.00</td>
<td>$1,314.00</td>
<td>$1,391.00</td>
<td>$1,961.00</td>
<td>$1,746.00</td>
<td>$1,895.00</td>
<td>$2,112.00</td>
<td>$1,685.00</td>
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<tr>
<td>= Cash to Stockholders</td>
<td>$831.00</td>
<td>$949.00</td>
<td>$1,079.00</td>
<td>$1,314.00</td>
<td>$1,391.00</td>
<td>$1,961.00</td>
<td>$1,746.00</td>
<td>$1,895.00</td>
<td>$2,112.00</td>
<td>$1,685.00</td>
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<td></td>
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<tr>
<td>Payout Ratio</td>
<td>66.16%</td>
<td>58.36%</td>
<td>46.73%</td>
<td>119.67%</td>
<td>67.00%</td>
<td>91.64%</td>
<td>68.69%</td>
<td>64.32%</td>
<td>296.63%</td>
<td>177.93%</td>
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<td>Cash Paid as % of FCFE</td>
<td>-135.67%</td>
<td>150.28%</td>
<td>-1008.41%</td>
<td>-225.00%</td>
<td>36.96%</td>
<td>101.06%</td>
<td>170.84%</td>
<td>-2461.04%</td>
<td>-399.62%</td>
<td>643.13%</td>
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<td>1. Accounting Measure</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>ROE</td>
<td>9.58%</td>
<td>12.14%</td>
<td>19.82%</td>
<td>9.25%</td>
<td>12.43%</td>
<td>15.60%</td>
<td>21.47%</td>
<td>19.93%</td>
<td>4.27%</td>
<td>7.66%</td>
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<tr>
<td>Required rate of return</td>
<td>19.77%</td>
<td>6.99%</td>
<td>27.27%</td>
<td>16.01%</td>
<td>5.28%</td>
<td>14.72%</td>
<td>26.87%</td>
<td>-0.97%</td>
<td>25.86%</td>
<td>7.12%</td>
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<td>Difference</td>
<td>-10.18%</td>
<td>5.16%</td>
<td>-7.45%</td>
<td>-6.76%</td>
<td>7.15%</td>
<td>0.88%</td>
<td>-5.39%</td>
<td>20.90%</td>
<td>-21.59%</td>
<td>0.54%</td>
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</table>
## BP: Summary of Dividend Policy

<table>
<thead>
<tr>
<th>Summary of calculations</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
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</thead>
<tbody>
<tr>
<td><strong>Free CF to Equity</strong></td>
<td>$571.10</td>
<td>$1,382.29</td>
<td>$3,764.00</td>
<td>($612.50)</td>
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<tr>
<td><strong>Dividends</strong></td>
<td>$1,496.30</td>
<td>$448.77</td>
<td>$2,112.00</td>
<td>$831.00</td>
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<tr>
<td><strong>Dividends+Repurchases</strong></td>
<td>$1,496.30</td>
<td>$448.77</td>
<td>$2,112.00</td>
<td>$831.00</td>
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<tr>
<td><strong>Dividend Payout Ratio</strong></td>
<td>84.77%</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Cash Paid as % of FCFE</strong></td>
<td>262.00%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROE - Required return</strong></td>
<td>-1.67%</td>
<td>11.49%</td>
<td>20.90%</td>
<td>-21.59%</td>
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</tbody>
</table>
B.P.'s Shares Plumpet After Dividend Is Slashed

By MATTHEW L. WALD

British Petroleum said yesterday that it would cut its dividend by 15 percent, a move that could impose an accounting charge of $1.62 billion for the quarter, the first such reduction since it was founded in 1901. The shares fell 9.8 percent on the London and New York Stock Exchanges.

The company said it was responding to lower than expected oil prices and the higher cost of production. "We face a very challenging environment," said Peter Voser, the company's chief executive.

The cut follows a similar move by Royal Dutch/Shell, which said last month that it would reduce its dividend by 30 percent.

The giant British oil company bet on rising oil prices.

**Britain's Oil Colossus**

*The New York Times*

**Earnings**

- **2009:** $2.0 billion
- **2008:** $2.5 billion
- **2007:** $3.0 billion
- **2006:** $1.5 billion
- **2005:** $1.0 billion

**BP**

- **BP's Shares Plumpet After Dividend Is Slashed**

---

Aswath Damodaran

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<table>
<thead>
<tr>
<th>Summary of calculations</th>
<th>Average</th>
<th>Standard Deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
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<td>Free CF to Equity</td>
<td>($34.20)</td>
<td>$109.74</td>
<td>$96.89</td>
<td>($242.17)</td>
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<td>Dividends</td>
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<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>
Growth Firms and Dividends

- 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?
Summing up…

Figure 11.5: Analyzing Dividend Policy

- Poor Projects
  - Cash Returned < FCFE
    - Increase payout
      - Reduce Investment
    - Disney
  - Cash Returned > FCFE
    - Cut payout
      - Reduce Investment
- Good Projects
  - Cash Returned < FCFE
    - Flexibility to accumulate cash
    - Microsoft
  - Cash Returned > FCFE
    - Cut payout
      - Invest in Projects
      - Aracruz

ROE - Cost of Equity

FCFE - Cash Flows
Valuation

Aswath Damodaran
First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.

Objective: Maximize the Value of the Firm
Generic DCF Valuation Model

**Discounted Cashflow Valuation**

- **Cash flows**
  - Firm: Pre-debt cash flow
  - Equity: After debt cash flows

- **Expected Growth**
  - Firm: Growth in Operating Earnings
  - Equity: Growth in Net Income/EPS

- **Firm is in stable growth:** Grows at constant rate forever

- **Discount Rate**
  - Firm: Cost of Capital
  - Equity: Cost of Equity

- **Value**
  - Firm: Value of Firm
  - Equity: Value of Equity

**Length of Period of High Growth**

**Terminal Value**

**Forever**
Disney: Valuation

Current Cashflow to Firm:
- EBIT(1-t) : 1,759
- Nt CpX : 481
- Chg WC : 454
= FCFF $ 824
Reinvestment Rate=(481+454)/1759 = 53.18%

Expected Growth in EBIT (1-t)
.5318*.12=.0638
6.38%

Return on Capital
12%

Stable Growth
g = 4%; Beta = 1.00;
Cost of capital = 7.16%
ROC= 10%
Reinvestment Rate=g/ROC
=4/ 10= 40%

Terminal Value
10= 1,904/(.0716-.04) = 60,219

Cost of Equity 10%
(4.00%+1.25%)(1-.373) = 3.29%

Cost of Debt

Weights
E = 79% D = 21%

Riskfree Rate:
Riskfree Rate= 4%

+ Beta 1.2456

x Mature market premium
4%

Unlevered Beta for Sectors: 1.0674

Term Yr
3089
- 864
= 2225

In transition phase, debt ratio increases to 30% and cost of capital decreases to 7.16%

Disney was trading at about $26 at the time of this valuation.
Disney: Corporate Financing Decisions and Firm Value

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 businesss.

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

Existing Investments
ROC = 4.22%

New Investments
Return on Capital = 12%
Reinvestment Rate = 53.18%

Current EBIT (1-t) $1,759
Expected Growth Rate = 12% * 53.18% = 6.38%

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Growth</th>
<th>EBIT</th>
<th>EBIT (1-t)</th>
<th>Reinvestment Rate</th>
<th>Reinvestment</th>
<th>FCF</th>
<th>Cost of capital</th>
<th>PV of FCF</th>
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</thead>
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<td>$1,871</td>
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Terminal Value $60,219.11
Value of Operating Assets = $35,372.62
+ Cash & Non-op Assets = $3,432.00
Value of firm = $38,804.62
- Debt = $14,668.22
- Options = $1,334.67
Value of equity in stock = $22,801.73
Value per share = $11.14
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 match your financing to your assets.

Investment decision affects risk of assets being financed and financing decision affects hurdle rate.

Return on Capital
15%

Reinvestment Rate
53.18%

Expected Growth Rate
15% * 53.18% = 7.98%

Cost of capital = 10.53% (.70) + 3.45% (.30) = 8.40%

Disney: The Value of Control

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Growth EBIT</th>
<th>EBIT (1-t)</th>
<th>Reinvestment Rate</th>
<th>Reinvestment</th>
<th>FCFF</th>
<th>Cost of capital</th>
<th>PV of FCFF</th>
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<td>$58,645</td>
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</table>

Value of Operating Assets = $74,900
+ Cash & Non-op Assets = $3,432
Value of firm = $78,332
- Debt = $14,649
- Options = $1,335
Value of equity in stock = $62,349
Value per share = $30.45
First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners’ funds (equity) or borrowed money (debt).
  - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
  - The form of returns - dividends and stock buybacks - will depend upon the stockholders’ characteristics.

Objective: Maximize the Value of the Firm