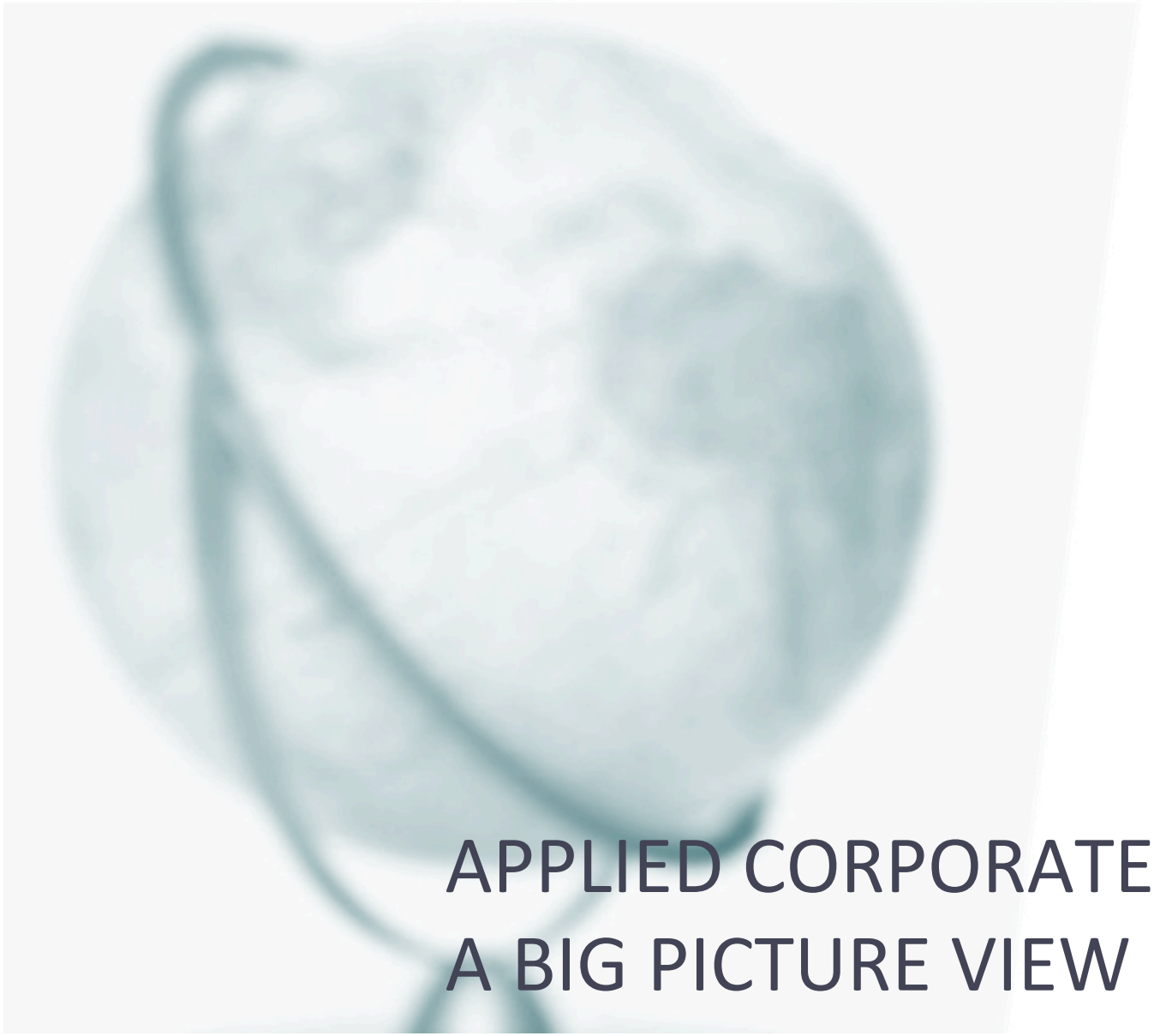
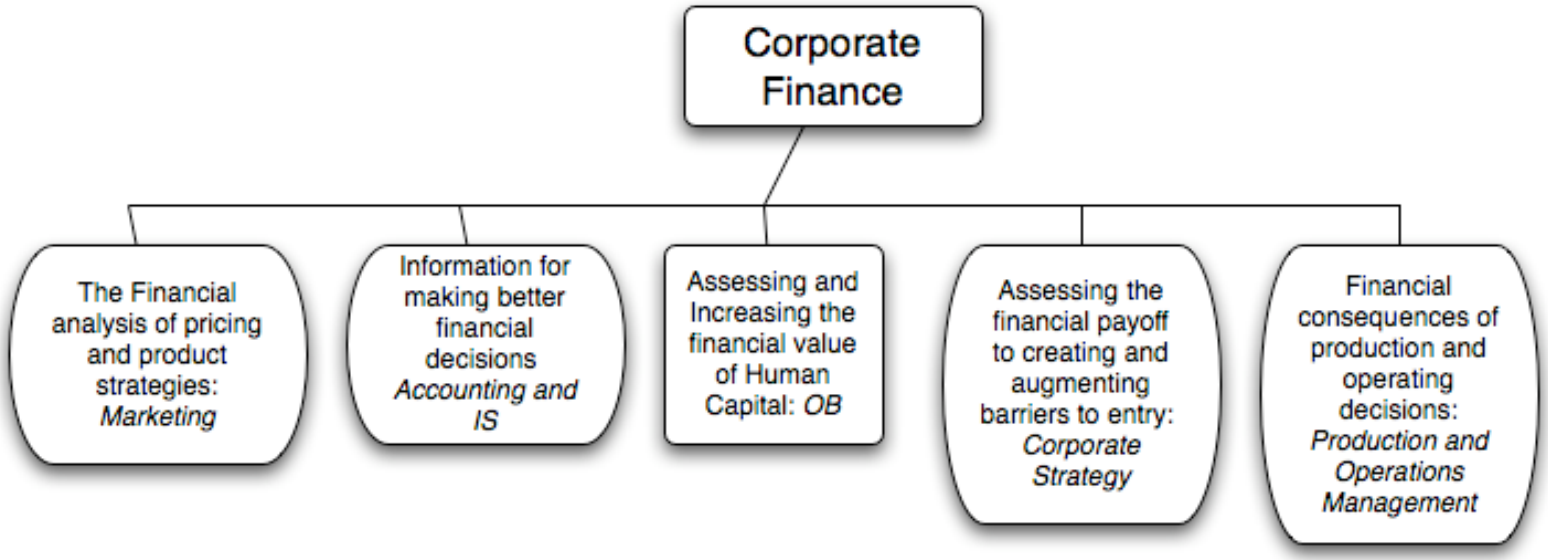


APPLIED CORPORATE FINANCE: A BIG PICTURE VIEW

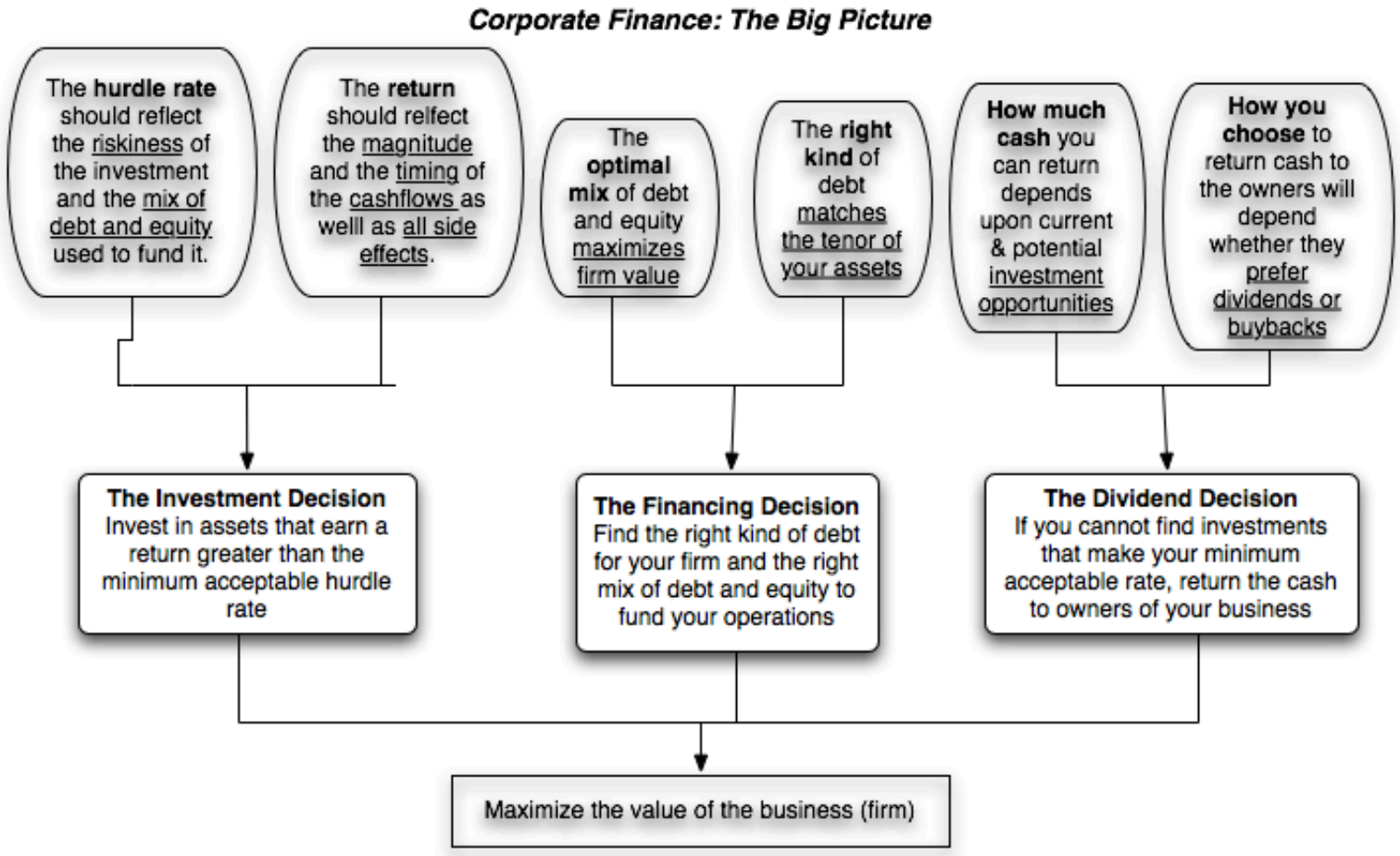
Aswath Damodaran
www.damodaran.com

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.

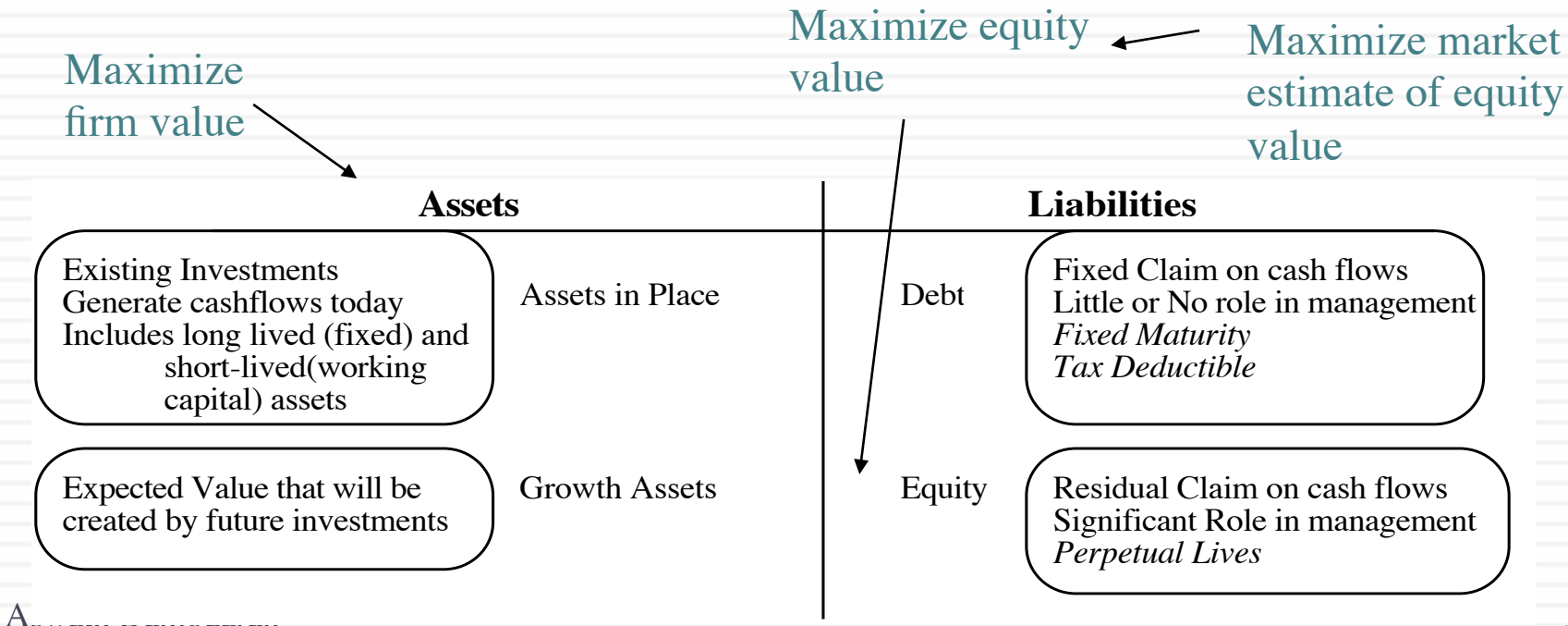


First Principles

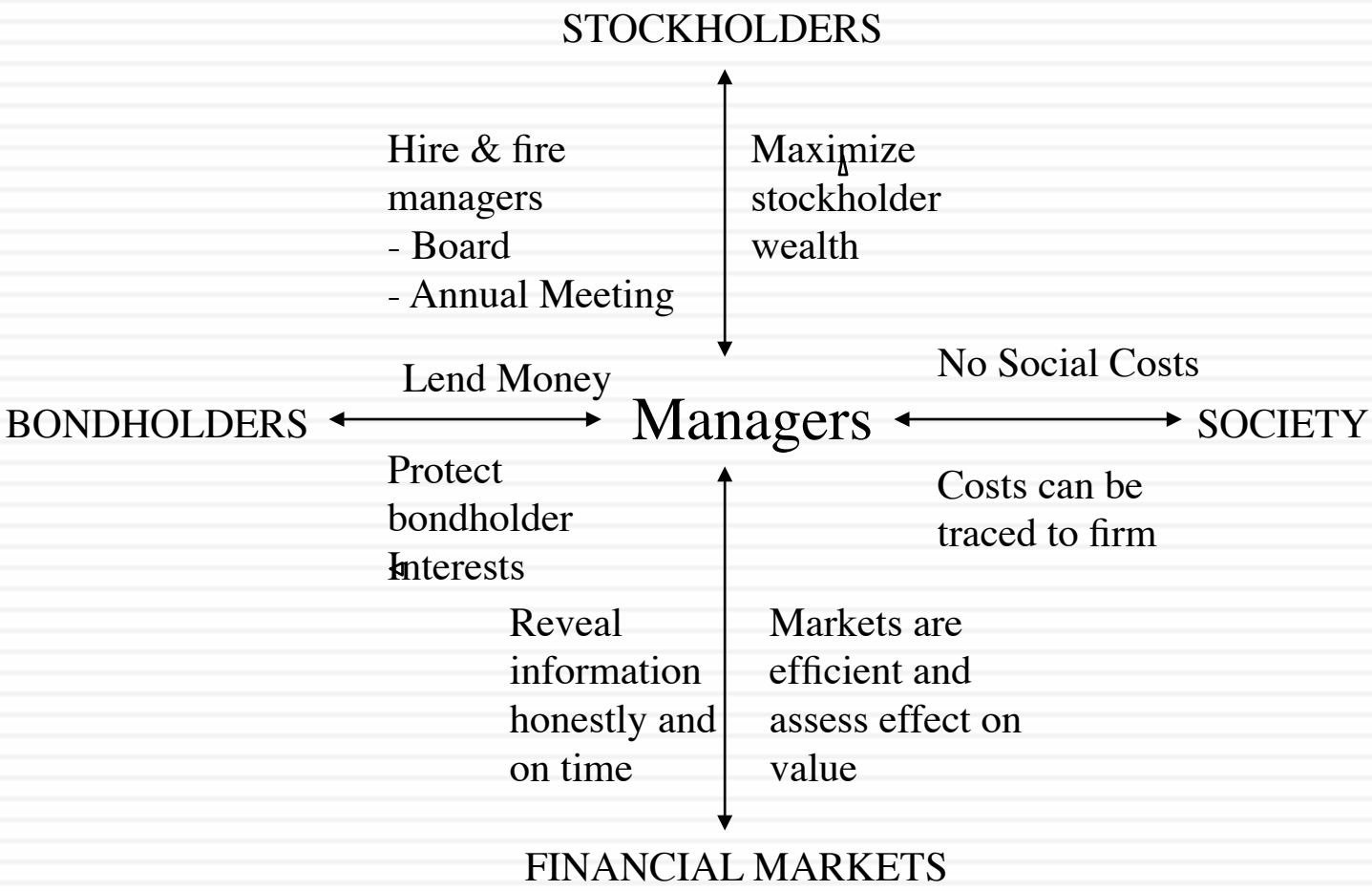


The Objective in Decision Making

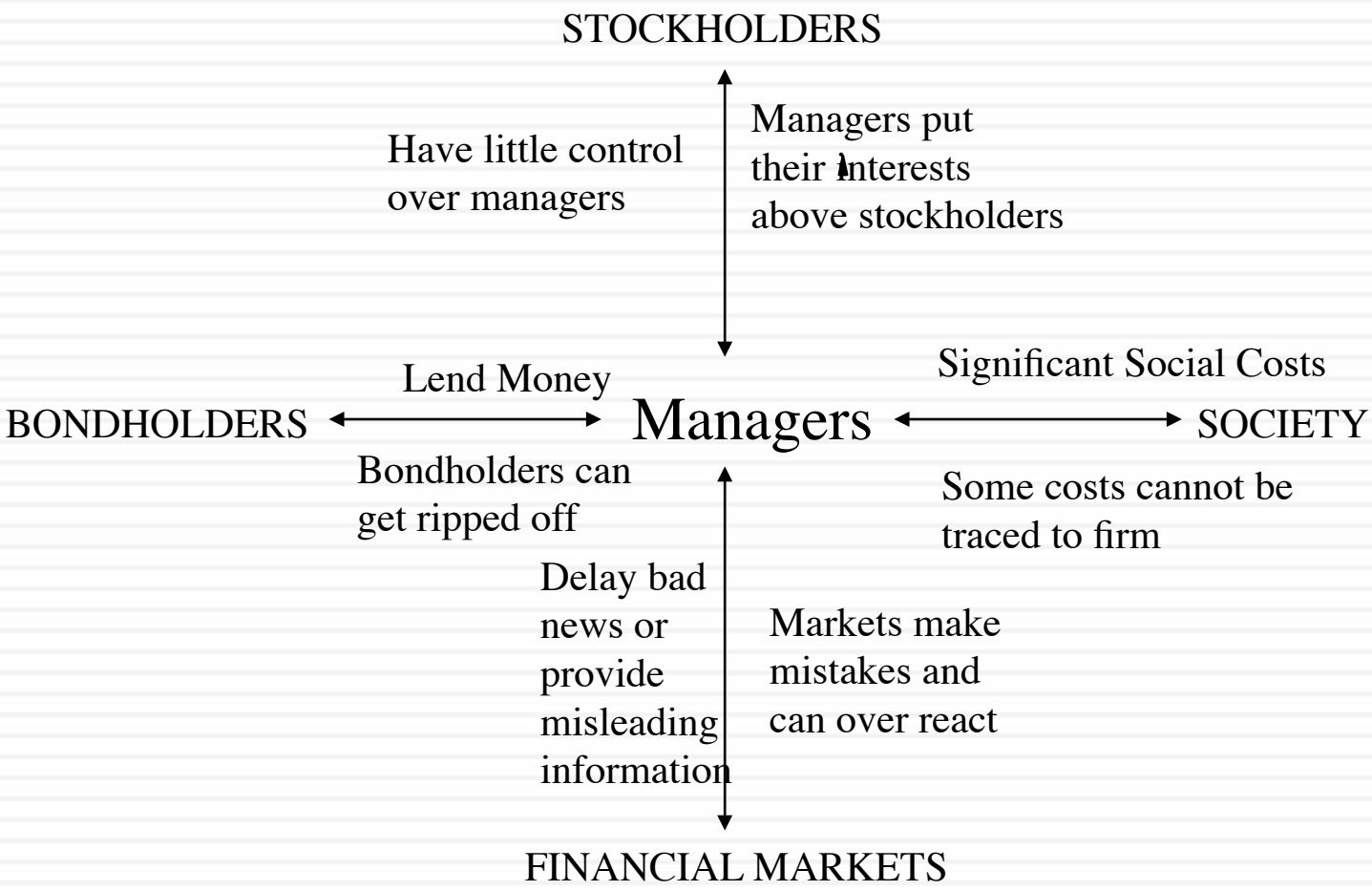
- In traditional corporate finance, the objective in decision making is to maximize the value of the firm.
- A narrower objective is to maximize stockholder wealth. When the stock is traded and markets are viewed to be efficient, the objective is to maximize the stock price.



The Classical Objective Function



What can go wrong?



Who's on Board? The Disney Experience - 1997

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

Roy E . Disney 3
Vice Chairman
The Walt Disney Company

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

Stanley 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 E. Lozano, Jr. 1,2,4
Editor-in-Chief, LA OPINION

George J. Mitchell 5
Special Counsel
Verner, Liipfert, Bernard, 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
Verdon-Cedric Productions

Irwin E. Russell 2,4
Attorney at Law

Robert A.M. Stern
Senior Partner Productions

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

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

Gary L. Wilson 5
Co-Chairman
Northwest Airlines Corporation

1 Member of Audit Review Committee
2 Member of Compensation Committee
3 Member of Executive Committee
4 Member of Executive Performance Plan Committee
5 Member of Nominating Committee

Who is on Board? Vale's board

MEMBERS (first year of appointment)
Dan Antonio Marinho Conrado (2012)
Mário da Silveira Teixeira Júnior (2003)
Marcel Juviniano Barros (2012)
Robson Rocha (2011)
Vacant
Renato da Cruz Gomes (2001)
Fuminobu Kawashima (2011)
Oscar Augusto de Camargo Filho (2003)
Luciano Galvão Coutinho (2007)
João Batista Cavaglieri (2013)
José Mauro Mettrau Carneiro da Cunha (2010)

Does Vale have an independent board?

a. Yes
b. No

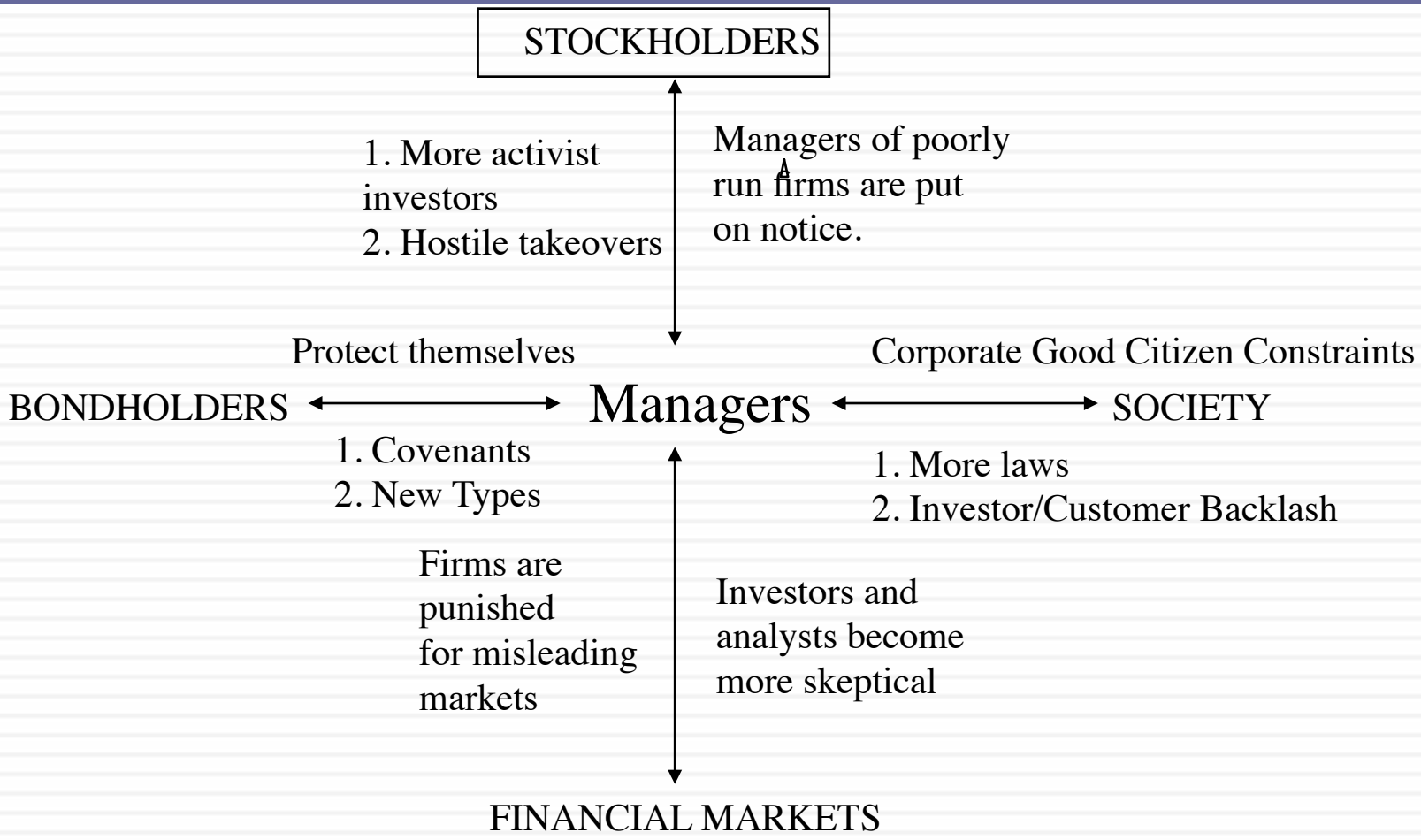
Does Vale have an effective board?

a. Yes
b. No

When traditional corporate financial theory breaks down, the solution is:

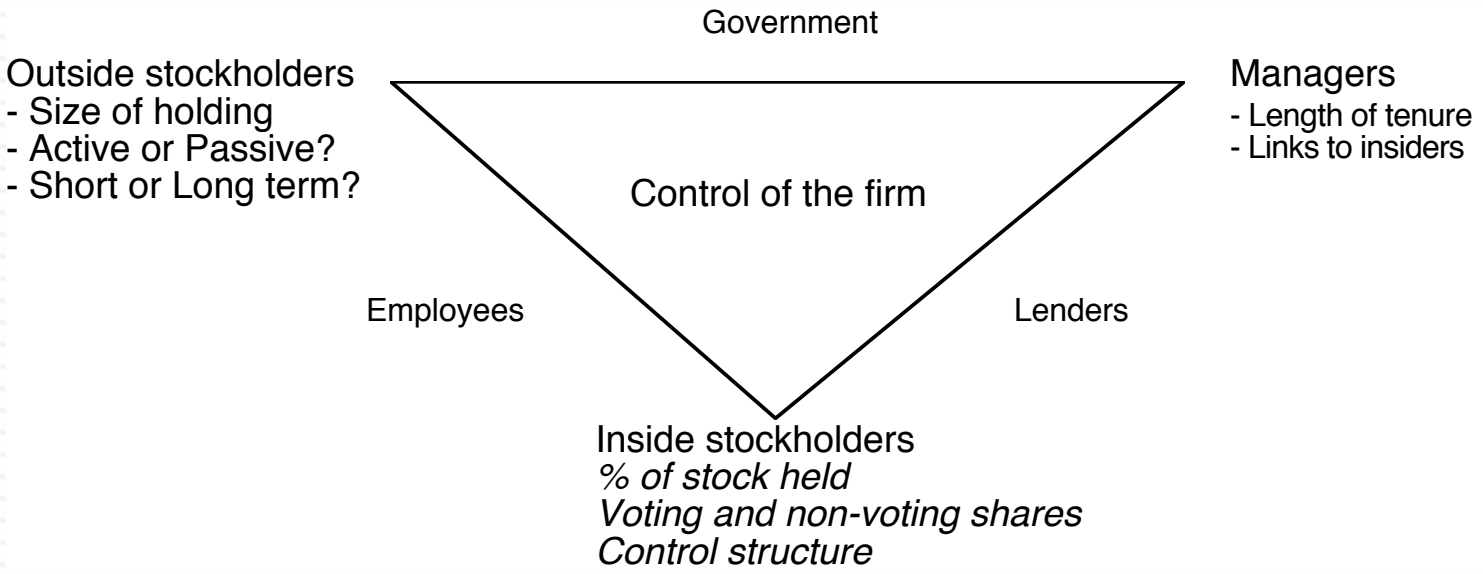
- To choose a different mechanism for corporate governance, i.e, assign the responsibility for monitoring managers to someone other than stockholders.
- To choose a different objective for the firm.
- To maximize stock price, but reduce the potential for conflict and breakdown:
  - Making managers (decision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

A Market Based Solution



Application Test: Who owns/runs your firm?

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



Splintering of Stockholders
Disney's top stockholders in 2003

<HELP> for explanation. dgp Equity HDS
Enter #<GO> to select aggregate portfolio and see detailed information

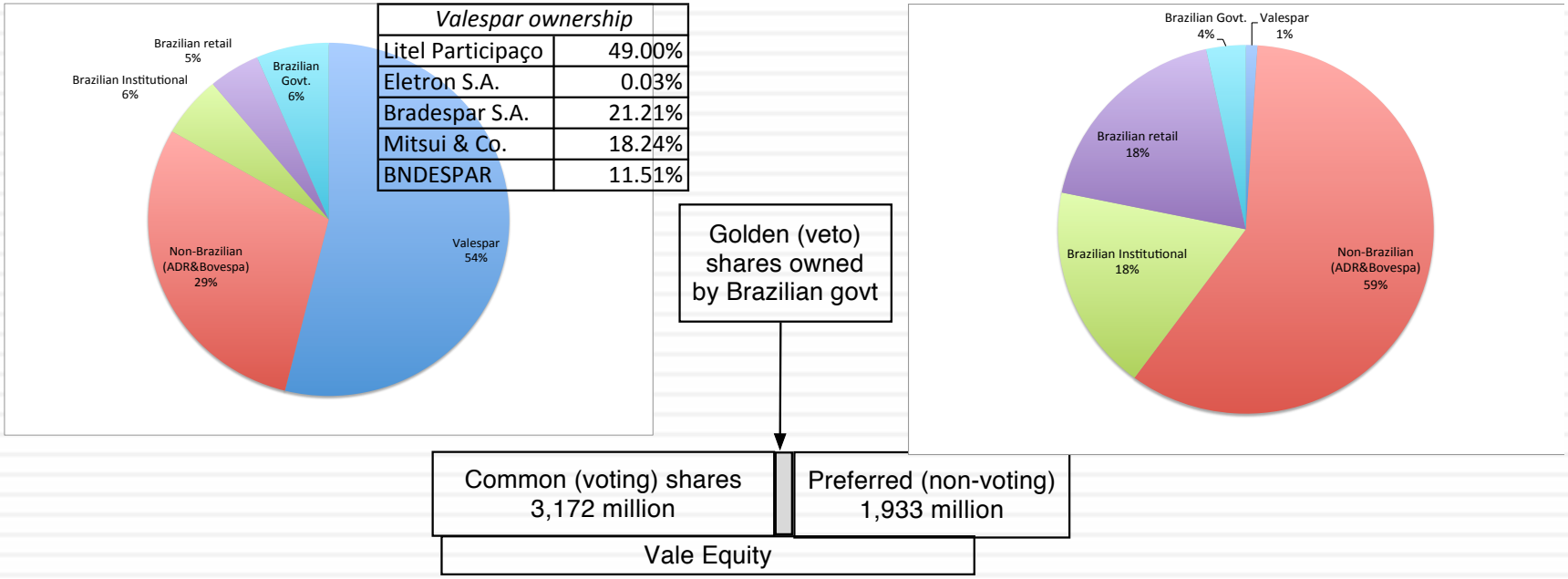
001189650224-000 HOLDINGS SEARCH CUSIP 25468710
DIS US DISNEY (WALT) CO Page 1 / 100

	Holder name	Portfolio Name	Source	Held	Percent Outstd	Latest Change	Filing Date
1	BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4.095	1,750M	09/02
* 2	CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3.078	4,811M	09/02
* 3	FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2.748	5,992M	09/02
4	STATE STREET	STATE STREET CORPORA	13F	54,635M	2.675	2,239M	09/02
* 5	SOUTHEASTRN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2.318	14,604M	09/02
6	ST FARM MU AUTO	STATE FARM MUTUAL AU	13F	41,938M	2.054	120,599	09/02
7	VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1.700	-83,839	09/02
8	MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1.601	957,489	09/02
9	PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1.379	-11,468M	09/02
10	LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1.202	5,385M	09/02
11	MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1.198	-11,373M	09/02
12	DEUTSCHE BANK AK	DEUTSCHE BANK AG	13F	23,239M	1.138	-5,002M	09/02
13	MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0.962	3,482M	09/02
14	PRICE T ROWE	T ROWE PRICE ASSOCIA	13F	19,133M	0.937	2,925M	09/02
15	ROY EDWARD DISNE	n/a	PROXY	17,547M	0.859	-126,710	12/01
16	AXA FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0.699	69,353	09/02
17	JP MORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0.696	-462,791	09/02
Sub-totals for current page:				599,159M	29.340		

* Money market directory info available. Select portfolio, then hit IP<GO>.

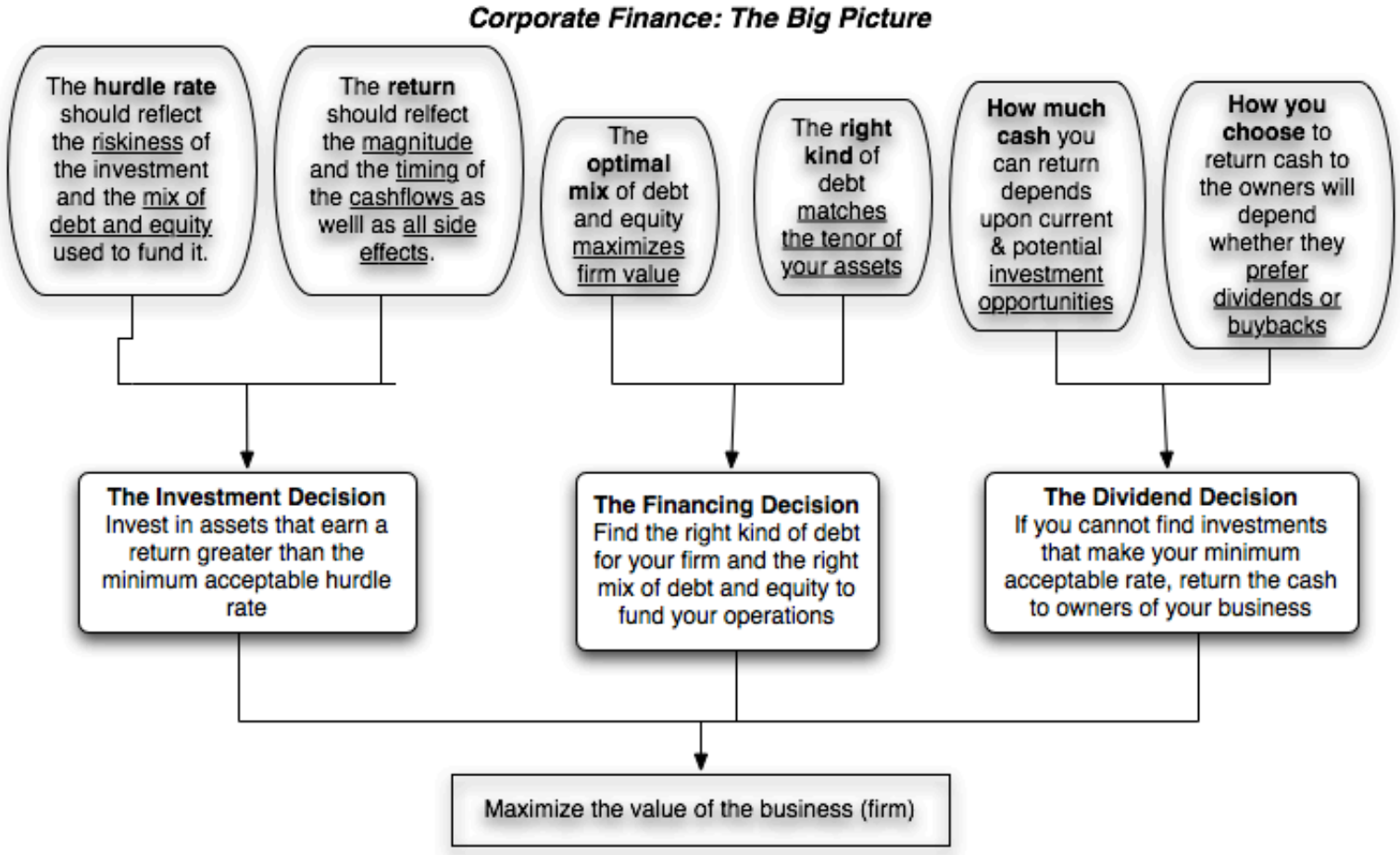
Bloomberg PROFESSIONAL

Vale: Shareholder Ownership Structure



Vale has eleven members on its board of directors, ten of whom were nominated by Valepar and the board was chaired by Don Conrado, the CEO of Valepar.

First Principles



What is Risk?

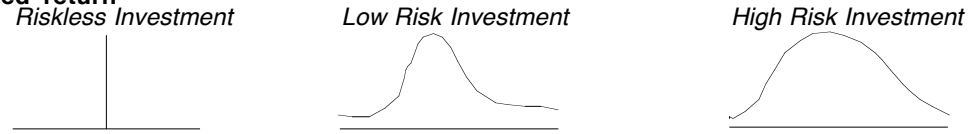
- Risk, in traditional terms, is viewed as a ‘negative’. Webster’s dictionary, for instance, defines risk as “exposing to danger or hazard”. The Chinese symbols for risk, reproduced below, give a much better description of risk:

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

Alternatives to the CAPM

Step 1: Defining Risk

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



Step 2: Differentiating between Rewarded and Unrewarded Risk

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

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

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

Step 3: Measuring Market Risk

The CAPM	**The APM**	**Multi-Factor Models**	**Proxy Models**
If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this<u>market portfolio</u> **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	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)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

Inputs required to use the CAPM -

- The capital asset pricing model yields the following expected return:
  - Expected Return = Riskfree Rate+ Beta * (Expected Return on the Market Portfolio - Riskfree Rate)
- To use the model we need three inputs:
  a. The current risk-free rate
  b. The expected market risk premium (the premium expected for investing in risky assets (market portfolio) over the riskless asset)
  c. The beta of the asset being analyzed.

I. A Riskfree Rate

- 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, then, it has to have
  - No default risk
  - No reinvestment risk

1. Time horizon matters: Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time.
2. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

- The conventional practice of estimating riskfree rates is to use the government bond rate, with the government being the one that is in control of issuing that currency. **In November 2013**, for instance, the rate on a ten-year US treasury bond (2.75%) is used as the risk free rate in US dollars.

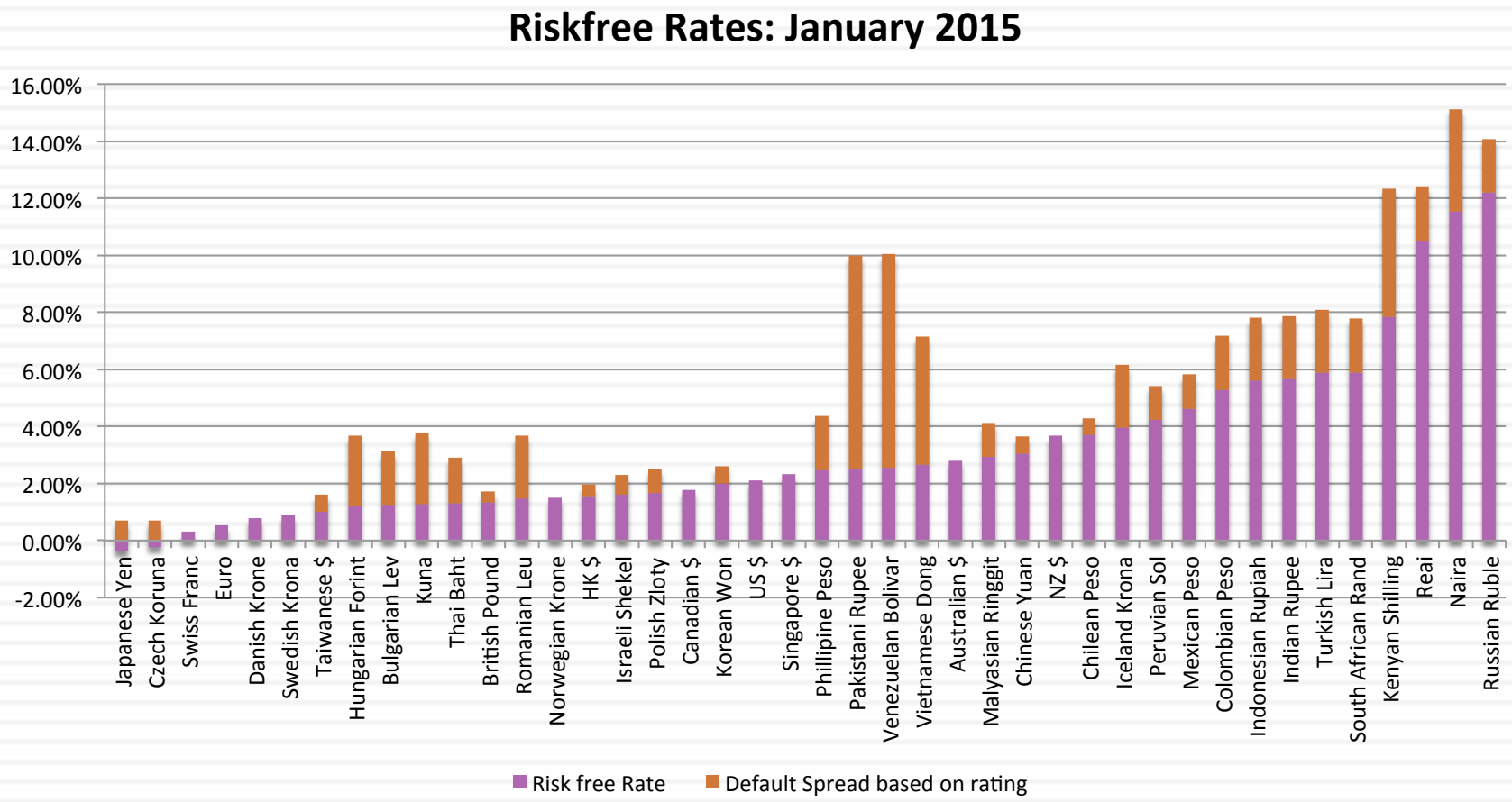
What if there is no default-free entity? Risk free rates in November 2013

PB Page 14-21

- If the government is perceived to have default risk, the government bond rate will have a default spread component in it and not be riskfree. There are three choices we have, when this is the case.
  - Adjust the local currency government borrowing rate for default risk to get a riskless local currency rate.
    - In November 2013, the Brazilian government rupee bond rate was 12.18%. the local currency rating from Moody's was Baa3 and the default spread for a Baa2 rated country bond was 2%.

    Riskfree rate in $R = 12.18% - 2.00% = 10.18%
  - Do the analysis in an alternate currency, where getting the riskfree rate is easier. With Vale in 2013, we could chose to do the analysis in US dollars (rather than estimate a riskfree rate in R$). The riskfree rate is then the US treasury bond rate.
  - Do your analysis in real terms, in which case the riskfree rate has to be a real riskfree rate. The inflation-indexed treasury rate is a measure of a real riskfree rate.

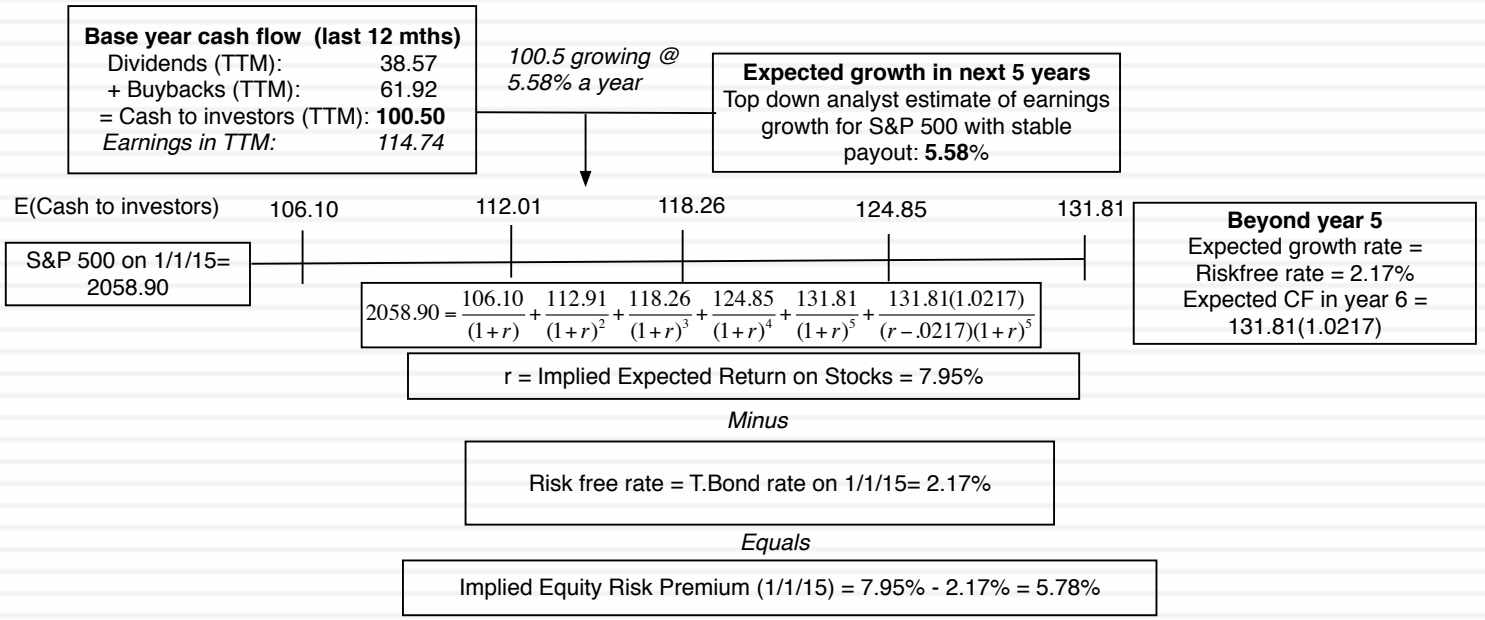
Risk free rates by currency: January 2015



II. The Equity Risk Premium

	Arithmetic Average		*Geometric Average*	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2014	8.00%	6.25%	6.11%	4.60%
	2.17%	2.32%		
1965-2014	6.19%	4.12%	4.84%	3.14%
	2.42%	2.74%		
2005-2014	7.94%	4.06%	6.18%	2.73%
	6.05%	8.65%		

Historical premium for the US



Country Risk: Look at a country's bond rating and default spreads as a start

- In this approach, the country equity risk premium is set equal to the default spread for the country, estimated in one of three ways:
  - The default spread on a dollar denominated bond issued by the country. (In November 2013, that spread was 1.55% for the Brazilian $ bond)
  - The sovereign CDS spread for the country. In November 2013, the ten year CDS spread for Brazil was 2.86%.
  - The default spread based on the local currency rating for the country. Brazil's sovereign local currency rating is Baa2 and the default spread for a Baa2 rated sovereign was about 2.00% in November 2013.
- Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. This would yield a risk premium of 7.5% for Brazil, if we use 5.5% as the US risk premium and the default spread based on the rating.

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.
- Another is to multiply the bond default spread by the relative volatility of stock and bond prices in that market. Using this approach for Brazil in November 2013, you would get:
  - Country Equity risk premium = Default spread on country bond* $\sigma_{\text{Country Equity}} / \sigma_{\text{Country Bond}}$
    - Standard Deviation in Bovespa (Equity) = 21%
    - Standard Deviation in Brazil government bond = 14%
    - Default spread on Brazilian $ bond = 2.00%
  - Brazil Country Risk Premium = 2.00% (21%/14%) = 3.00%
  - Mature Market Premium = 5.5%
  - Brazil Total ERP = Mature Market Premium + CRP = 5.5% + 3.00% = 8.50%

ERP : Nov 2013

Andorra	7.45%	1.95%
Austria	5.50%	0.00%
Belgium	6.70%	1.20%
Cyprus	22.00%	16.50%
Denmark	5.50%	0.00%
Finland	5.50%	0.00%
France	5.95%	0.45%
Germany	5.50%	0.00%
Greece	15.63%	10.13%
Iceland	8.88%	3.38%
Ireland	9.63%	4.13%
Italy	8.50%	3.00%
Liechtenstein	5.50%	0.00%
Luxembourg	5.50%	0.00%
Malta	7.45%	1.95%
Netherlands	5.50%	0.00%
Norway	5.50%	0.00%
Portugal	10.90%	5.40%
Spain	8.88%	3.38%
Sweden	5.50%	0.00%
Switzerland	5.50%	0.00%
Turkey	8.88%	3.38%
United Kingdom	5.95%	0.45%
Western Europe	**6.72%**	**1.22%**

Canada	5.50%	0.00%
United States of America	5.50%	0.00%
North America	**5.50%**	**0.00%**

Argentina	15.63%	10.13%
Belize	19.75%	14.25%
Bolivia	10.90%	5.40%
Brazil	8.50%	3.00%
Chile	6.70%	1.20%
Colombia	8.88%	3.38%
Costa Rica	8.88%	3.38%
Ecuador	17.50%	12.00%
El Salvador	10.90%	5.40%
Guatemala	9.63%	4.13%
Honduras	13.75%	8.25%
Mexico	8.05%	2.55%
Nicaragua	15.63%	10.13%
Panama	8.50%	3.00%
Paraguay	10.90%	5.40%
Peru	8.50%	3.00%
Suriname	10.90%	5.40%
Uruguay	8.88%	3.38%
Venezuela	12.25%	6.75%
Latin America	**9.44%**	**3.94%**

Country	*TRP*	*CRP*
Angola	10.90%	5.40%
Benin	13.75%	8.25%
Botswana	7.15%	1.65%
Burkina Faso	13.75%	8.25%
Cameroon	13.75%	8.25%
Cape Verde	12.25%	6.75%
Egypt	17.50%	12.00%
Gabon	10.90%	5.40%
Ghana	12.25%	6.75%
Kenya	12.25%	6.75%
Morocco	9.63%	4.13%
Mozambique	12.25%	6.75%
Namibia	8.88%	3.38%
Nigeria	10.90%	5.40%
Rwanda	13.75%	8.25%
Senegal	12.25%	6.75%
South Africa	8.05%	2.55%
Tunisia	10.23%	4.73%
Uganda	12.25%	6.75%
Zambia	12.25%	6.75%
Africa	**11.22%**	**5.82%**

Albania	12.25%	6.75%
Armenia	10.23%	4.73%
Azerbaijan	8.88%	3.38%
Belarus	15.63%	10.13%
Bosnia	15.63%	10.13%
Bulgaria	8.50%	3.00%
Croatia	9.63%	4.13%
Czech Republic	6.93%	1.43%
Estonia	6.93%	1.43%
Georgia	10.90%	5.40%
Hungary	9.63%	4.13%
Kazakhstan	8.50%	3.00%
Latvia	8.50%	3.00%
Lithuania	8.05%	2.55%
Macedonia	10.90%	5.40%
Moldova	15.63%	10.13%
Montenegro	10.90%	5.40%
Poland	7.15%	1.65%
Romania	8.88%	3.38%
Russia	8.05%	2.55%
Serbia	10.90%	5.40%
Slovakia	7.15%	1.65%
Slovenia	9.63%	4.13%
Ukraine	15.63%	10.13%
E. Europe & Russia	**8.60%**	**3.10%**

Bahrain	8.05%	2.55%
Israel	6.93%	1.43%
Jordan	12.25%	6.75%
Kuwait	6.40%	0.90%
Lebanon	12.25%	6.75%
Oman	6.93%	1.43%
Qatar	6.40%	0.90%
Saudi Arabia	6.70%	1.20%
United Arab Emirates	6.40%	0.90%
Middle East	**6.88%**	**1.38%**

Bangladesh	10.90%	5.40%
Cambodia	13.75%	8.25%
China	6.94%	1.44%
Fiji	12.25%	6.75%
Hong Kong	5.95%	0.45%
India	9.10%	3.60%
Indonesia	8.88%	3.38%
Japan	6.70%	1.20%
Korea	6.70%	1.20%
Macao	6.70%	1.20%
Malaysia	7.45%	1.95%
Mauritius	8.05%	2.55%
Mongolia	12.25%	6.75%
Pakistan	17.50%	12.00%
Papua NG	12.25%	6.75%
Philippines	9.63%	4.13%
Singapore	5.50%	0.00%
Sri Lanka	12.25%	6.75%
Taiwan	6.70%	1.20%
Thailand	8.05%	2.55%
Vietnam	13.75%	8.25%
Asia	**7.27%**	**1.77%**

Australia	5.50%	0.00%
Cook Islands	12.25%	6.75%
New Zealand	5.50%	0.00%
Australia & NZ	**5.50%**	**0.00%**

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

Estimating ERP for Disney: November 2013

- Incorporation: The conventional practice on equity risk premiums is to estimate an ERP based upon where a company is incorporated. Thus, the cost of equity for Disney would be computed based on the US equity risk premium, because it is a US company, and the Brazilian ERP would be used for Vale, because it is a Brazilian company.
- Operations: The more sensible practice on equity risk premium is to estimate an ERP based upon where a company operates. For Disney in 2013:

Region/ Country	*Proportion of Disney's Revenues*	*ERP*
US& Canada	82.01%	5.50%
Europe	11.64%	6.72%
Asia-Pacific	6.02%	7.27%
Latin America	0.33%	9.44%
Disney	**100.00%**	**5.76%**

Vale: Equity Risk Premium (based on revenues)

Region/ Country	*Weight*	*ERP*
US & Canada	4.90%	5.50%
Brazil	16.90%	8.50%
Rest of Latin America	1.70%	10.09%
China	37.00%	6.94%
Japan	10.30%	6.70%
Rest of Asia	8.50%	8.61%
Europe	17.20%	6.72%
Rest of World	3.50%	10.06%
Company	100.00%	7.38%

ERP : Jan 2015

Andorra	8.15%	2.40%
Austria	5.75%	0.00%
Belgium	6.65%	0.90%
Cyprus	15.50%	9.75%
Denmark	5.75%	0.00%
Finland	5.75%	0.00%
France	6.35%	0.60%
Germany	5.75%	0.00%
Greece	17.00%	11.25%
Guernsey	6.35%	0.60%
Iceland	9.05%	3.30%
Ireland	8.15%	2.40%
Isle of Man	6.35%	0.60%
Italy	8.60%	2.85%
Jersey	6.35%	0.60%
Liechtenstein	5.75%	0.00%
Luxembourg	5.75%	0.00%
Malta	7.55%	1.80%
Netherlands	5.75%	0.00%
Norway	5.75%	0.00%
Portugal	9.50%	3.75%
Spain	8.60%	2.85%
Sweden	5.75%	0.00%
Switzerland	5.75%	0.00%
Turkey	9.05%	3.30%
UK	6.35%	0.60%
W. Europe	**6.88%**	**1.13%**

Albania	12.50%	6.75%
Armenia	10.25%	4.50%
Azerbaijan	9.05%	3.30%
Belarus	15.50%	9.75%
Bosnia	15.50%	.75%
Bulgaria	8.60%	2.85%
Croatia	9.50%	3.75%
Czech Repub	6.80%	1.05%
Estonia	6.80%	1.05%
Georgia	11.15%	5.40%
Hungary	9.50%	3.75%
Kazakhstan	8.60%	2.85%
Latvia	8.15%	2.40%
Lithuania	8.15%	2.40%
Macedonia	11.15%	5.40%
Moldova	15.50%	9.75%
Montenegro	11.15%	5.40%
Poland	7.03%	1.28%
Romania	9.05%	3.30%
Russia	8.60%	2.85%
Serbia	12.50%	6.75%
Slovakia	7.03%	1.28%
Slovenia	9.50%	3.75%
Ukraine	20.75%	15.00%
E. Europe	**9.08%**	**3.33%**

Canada	5.75%	0.00%
US	5.75%	0.00%
North America	**5.75%**	**0.00%**

Argentina	17.00%	11.25%
Belize	19.25%	13.50%
Bolivia	11.15%	5.40%
Brazil	8.60%	2.85%
Chile	6.65%	0.90%
Colombia	8.60%	2.85%
Costa Rica	9.50%	3.75%
Ecuador	15.50%	9.75%
El Salvador	11.15%	5.40%
Guatemala	9.50%	3.75%
Honduras	15.50%	9.75%
Mexico	7.55%	1.80%
Nicaragua	15.50%	9.75%
Panama	8.60%	2.85%
Paraguay	10.25%	4.50%
Peru	7.55%	1.80%
Suriname	11.15%	5.40%
Uruguay	8.60%	2.85%
Venezuela	17.00%	11.25%
Latin America	**9.95%**	**4.20%**

Angola	10.25%	4.50%
Botswana	7.03%	1.28%
Burkina Faso	15.50%	9.75%
Cameroon	14.00%	8.25%
Cape Verde	14.00%	8.25%
Congo (DR)	15.50%	9.75%
Congo (Republic)	11.15%	5.40%
Côte d'Ivoire	12.50%	6.75%
Egypt	17.00%	11.25%
Ethiopia	12.50%	6.75%
Gabon	11.15%	5.40%
Ghana	14.00%	8.25%
Kenya	12.50%	6.75%
Morocco	9.50%	3.75%
Mozambique	12.50%	6.75%
Namibia	9.05%	3.30%
Nigeria	11.15%	5.40%
Rwanda	14.00%	8.25%
Senegal	12.50%	6.75%
South Africa	8.60%	2.85%
Tunisia	11.15%	5.40%
Uganda	12.50%	6.75%
Zambia	12.50%	6.75%
Africa	**11.73%**	**5.98%**

Abu Dhabi	6.50%	0.75%
Bahrain	8.60%	2.85%
Israel	6.80%	1.05%
Jordan	12.50%	6.75%
Kuwait	6.50%	0.75%
Lebanon	14.00%	8.25%
Oman	6.80%	1.05%
Qatar	6.50%	0.75%
Ras Al Khaimah	7.03%	1.28%
Saudi Arabia	6.65%	0.90%
Sharjah	7.55%	1.80%
UAE	6.50%	0.75%
Middle East	**6.85%**	**1.10%**

Bangladesh	11.15%	5.40%
Cambodia	14.00%	8.25%
China	6.65%	0.90%
Fiji	12.50%	6.75%
Hong Kong	6.35%	0.60%
India	9.05%	3.30%
Indonesia	9.05%	3.30%
Japan	6.80%	1.05%
Korea	6.65%	0.90%
Macao	6.50%	0.75%
Malaysia	7.55%	1.80%
Mauritius	8.15%	2.40%
Mongolia	14.00%	8.25%
Pakistan	17.00%	11.25%
Papua New Guinea	12.50%	6.75%
Philippines	8.60%	2.85%
Singapore	5.75%	0.00%
Sri Lanka	12.50%	6.75%
Taiwan	6.65%	0.90%
Thailand	8.15%	2.40%
Vietnam	12.50%	6.75%
Asia	**7.26%**	**1.51%**

Australia	5.75%	0.00%
Cook Islands	12.50%	6.75%
New Zealand	5.75%	0.00%
Australia & NZ	**5.75%**	**0.00%**

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

III. The Beta

- The beta of a stock (asset) measures its exposure to market risk, i.e., the risk that cannot be diversified away by the marginal investors. It is therefore a measure of exposure to broad macroeconomic risk factors.
- The beta of a stock is standardized around one.
  - A beta that is greater than one indicates above-average risk
  - A beta that is close to one indicates average risk
  - A beta less than one indicates below average risk
  - A beta below zero is a indication of a market risk reducing investment
- Implications:
  - The weighted average beta of stocks in any market (even the most risky ones) is one. Thus, beta cannot carry the weight of country risk.
  - A stock can be risky and have a low beta, if most of the risk in the stock is firm-specific risk.

Measuring Beta

- The standard procedure is to regress stock returns (Rj) against market returns (Rm):

$$R_j = a + b\ R_m$$

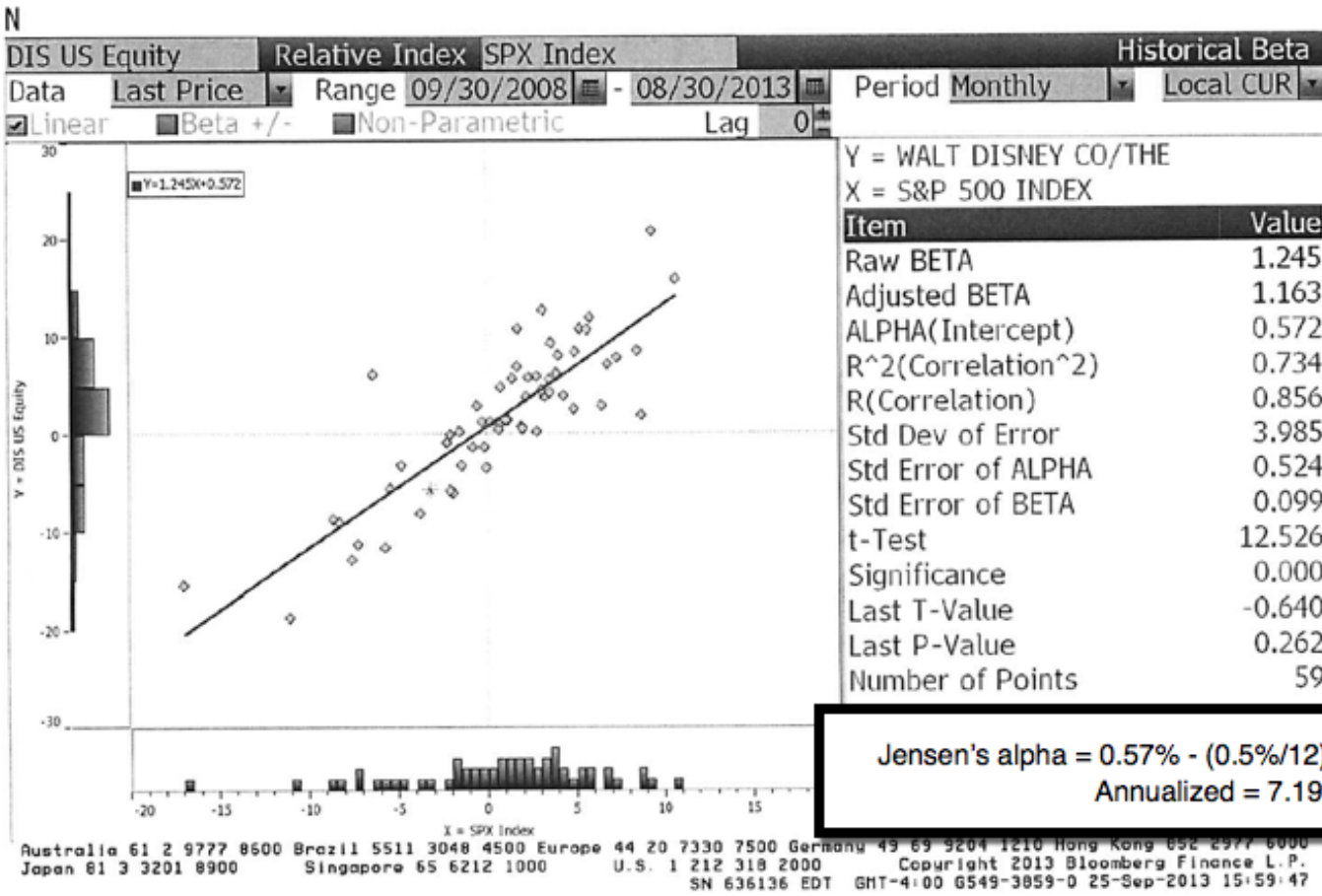
- Risk measure: The slope of the regression (b) corresponds to the beta of the stock, and measures the riskiness of the stock. The regression yields a range on the beta that can be computed from the standard error of the beta estimate.
  - Plus (minus) one standard errors: 67% confidence interval
  - Plus (minus) two standard errors: 95% confidence interval
- Performance measure: The intercept (a) of the regression is a measure of how well or badly the stock performed during the period of the regression, after adjusting for risk and market performance. If the regression is run with raw returns, the intercept has to be compared to Rf (1- Beta) to measure what's called **Jensen's alpha (a – Rf (1- Beta)**

  a > Rf (1-b) : Positive Jensen's alpha = Stock did better than expected during regression period

  a = Rf (1-b): : Zero Jensen's alpha = Stock did better than expected during regression period

  a < Rf (1-b) : Negative Jensen's alpha = Stock did better than expected during regression period
- Risk source: The R squared (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.

Disney: Beta Regression



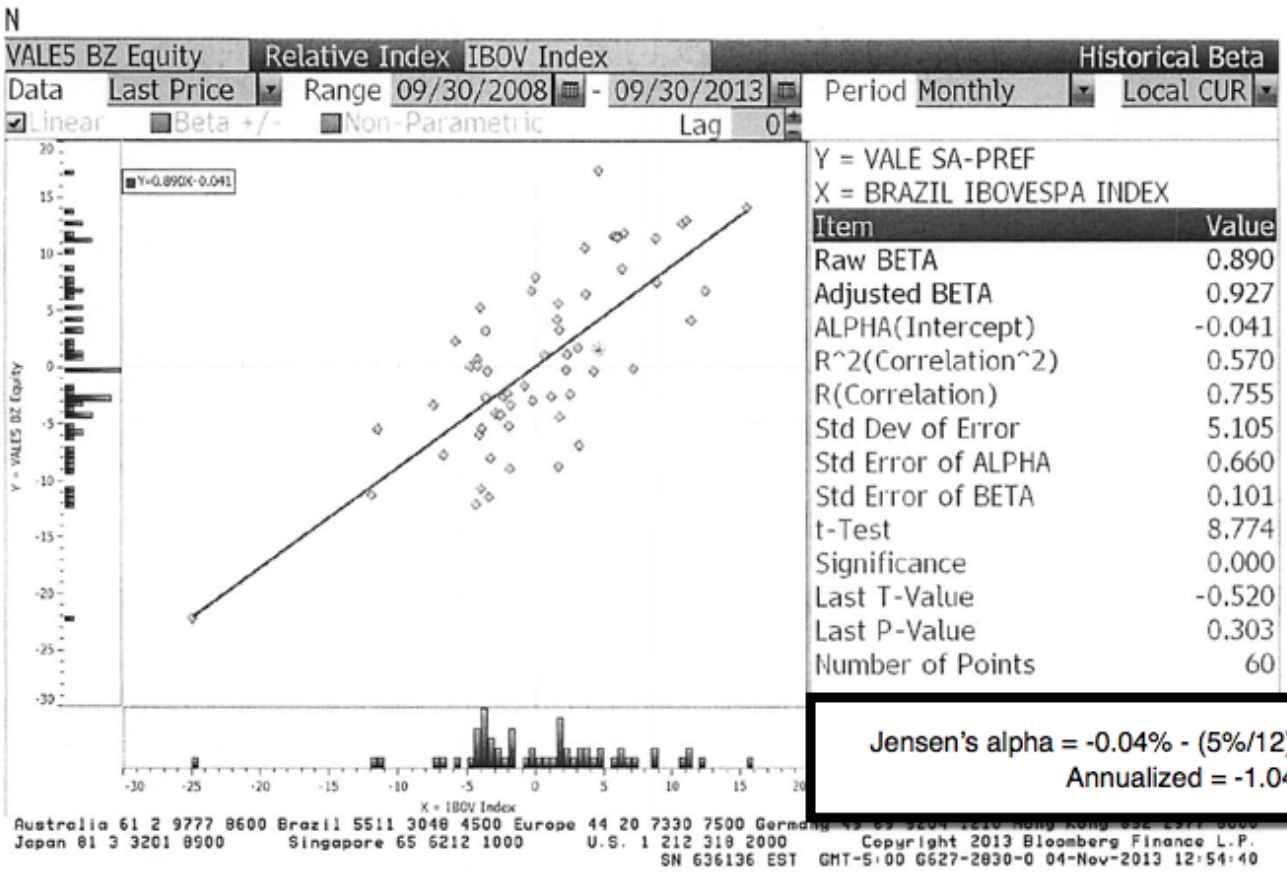
Beta =1.25

73% of risk is from market

67% (95%) range on beta: 1.15 - 1.35 (1.05-1.45)

Jensen's alpha = 0.57% - (0.5%/12) (1-1.245) = 0.58%
Annualized = 7.19%

Vale: Beta Regression



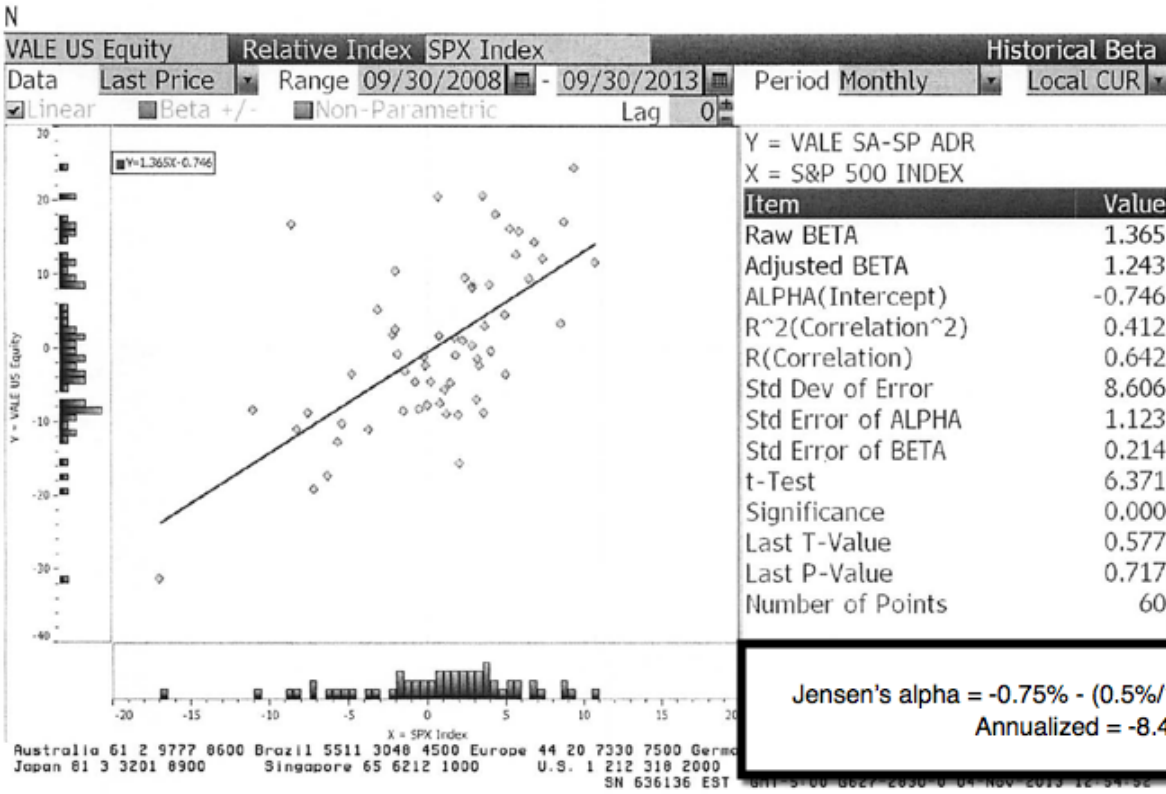
Beta = 0.89

57% of risk is market risk

67% (95%) range for beta: 0.79-0.99 (0.69-1.09)

Jensen's alpha = -0.04% - (5%/12) (1-0.89) = -0.09%
Annualized = -1.04%

And another regression…



Beta = 1.37

41% of risk is from market risk

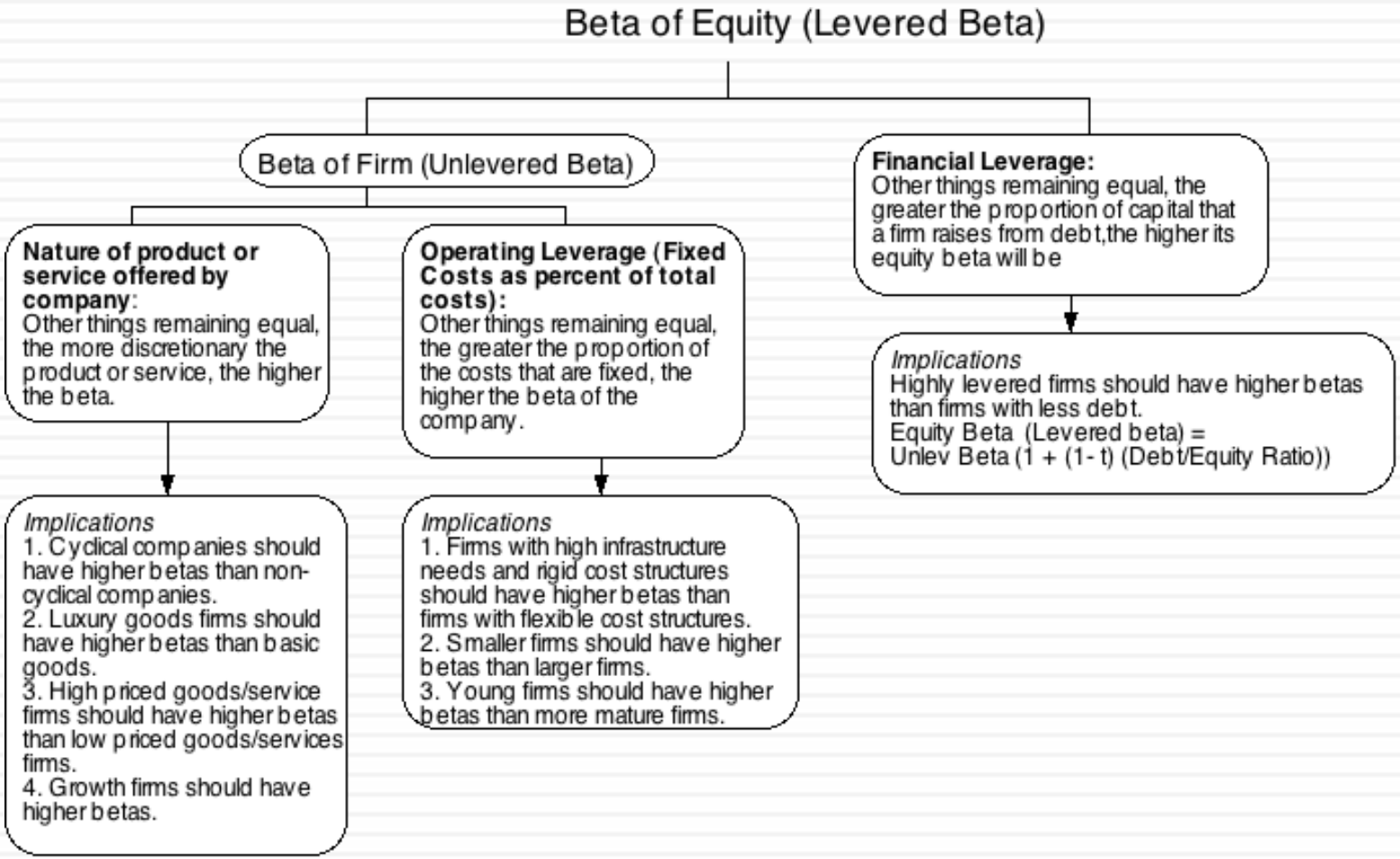
67% (95%) range for beta: 1.16 - 1.58 (0.95- 1.79)

Jensen's alpha = -0.75% - (0.5%/12) (1-1.37) = -.73%
Annualized = -8.43%

The problem with regression betas

- They are backward looking: By definition, a regression beta is backward looking because it is computed based upon past returns. Consequently, if a company's business mix or financial leverage has changed during the regression period, the regression beta (even if well estimated) is no longer operational.
- They are subject to manipulation: Changing the market index used, the time period of the regression or even the return intervals (daily, weekly,monthly) can yield very different regression output.
- They are noisy: A regression slope (which is what we use as a beta) comes with a standard error, and if you regress a stock against a broad enough index, the regression beta should have a high standard error (it is a feature, not a bug)>

Determinants of Betas



Disney's business betas

$$\frac{\text{Unlevered Beta}}{(1 - \text{Cash/ Firm Value})}$$

Business	*Comparable firms*	*Sample size*	*Median Beta*	*Median D/E*	*Median Tax rate*	*Company Unlevered Beta*	*Median Cash/ Firm Value*	*Business Unlevered Beta*
Media Networks	US firms in broadcasting business	26	1.43	71.09%	40.00%	1.0024	2.80%	1.0313
Parks & Resorts	Global firms in amusement park business	20	0.87	46.76%	35.67%	0.6677	4.95%	0.7024
Studio Entertainment	US movie firms	10	1.24	27.06%	40.00%	1.0668	2.96%	1.0993
Consumer Products	Global firms in toys/games production & retail	44	0.74	29.53%	25.00%	0.6034	10.64%	0.6752
Interactive	Global computer gaming firms	33	1.03	3.26%	34.55%	1.0085	17.25%	1.2187

Disney's Levered beta by division

Business	*Revenues*	*EV/Sales*	*Value of Business*	*Proportion of Disney*	*Unlevered beta*	*Value*	*Proportion*
Media Networks	$20,356	3.27	$66,580	49.27%	1.03	$66,579.81	49.27%
Parks & Resorts	$14,087	3.24	$45,683	33.81%	0.70	$45,682.80	33.81%
Studio Entertainment	$5,979	3.05	$18,234	13.49%	1.10	$18,234.27	13.49%
Consumer Products	$3,555	0.83	$2,952	2.18%	0.68	$2,951.50	2.18%
Interactive	$1,064	1.58	$1,684	1.25%	1.22	$1,683.72	1.25%
Disney Operations	$45,041		$135,132	100.00%	0.9239	$135,132.11	

Business	*Unlevered beta*	*Value of business*	*D/E ratio*	*Levered beta*	*Cost of Equity*
Media Networks	1.0313	$66,580	10.03%	1.0975	9.07%
Parks & Resorts	0.7024	$45,683	11.41%	0.7537	7.09%
Studio Entertainment	1.0993	$18,234	20.71%	1.2448	9.92%
Consumer Products	0.6752	$2,952	117.11%	1.1805	9.55%
Interactive	1.2187	$1,684	41.07%	1.5385	11.61%
Disney Operations	0.9239	$135,132	13.10%	1.0012	8.52%

Estimating Bottom Up Betas & Costs of Equity: Vale

Business	*Sample*	*Sample size*	*Unlevered beta of business*	*Revenues*	*Peer Group EV/Sales*	*Value of Business*	*Proportion of Vale*
Metals & Mining	Global firms in metals & mining, Market cap>$1 billion	48	0.86	$9,013	1.97	$17,739	16.65%
Iron Ore	Global firms in iron ore	78	0.83	$32,717	2.48	$81,188	76.20%
Fertilizers	Global specialty chemical firms	693	0.99	$3,777	1.52	$5,741	5.39%
Logistics	Global transportation firms	223	0.75	$1,644	1.14	$1,874	1.76%
Vale Operations			*0.8440*	*$47,151*		*$106,543*	*100.00%*

Business	Unlevered beta	D/E ratio	Levered beta	Risk free rate	ERP	Cost of Equity
Metals & Mining	0.86	54.99%	1.1657	2.75%	7.38%	11.35%
Iron Ore	0.83	54.99%	1.1358	2.75%	7.38%	11.13%
Fertilizers	0.99	54.99%	1.3493	2.75%	7.38%	12.70%
Logistics	0.75	54.99%	1.0222	2.75%	7.38%	10.29%
Vale Operations	0.84	54.99%	1.1503	2.75%	7.38%	11.23%

Discussion Issue

- The head of the fertilizer business has come to you with a new investment in **Brazil** that he would like you to fund. He claims that his analysis of the movie indicates that it will generate a return on equity of 12% (in **Brazilian Reais**). Would you fund it?
  a. Yes.
  b. No.

  What return on equity would this investment need to make to be justified? Why? (The inflation rate in Reais is 9% whereas the inflation rate in US dollars is 2%).

Vale: Cost of Equity for a Brazilian fertilizer investment in nominal $R

- To convert a discount rate in one currency to another, all you need are expected inflation rates in the two currencies.

$$(1+\$\text{ Cost of Equity})\frac{(1+\text{Inflation Rate}_{\text{Brazil}})}{(1+\text{Inflation Rate}_{\text{US}})}-1$$

- To estimate the cost of equity that Vale should use for a fertilizer investment in Brazil, let's start by estimating the cost of equity in US dollars:

Cost of equity = 2.75% + 1.3493 (8.50%) = 14.22%

The risk free rate is in US dollars, the beta is that of the fertilizer business and the equity risk premium is for Brazil.

- $$\text{Cost of Equity}_{\text{Nominal R\$}} = (1+\text{ Cost of Equity}_{\text{US \$}})\frac{(1+\text{Expected Inflation}_{\text{R\$}})}{(1+\text{Expected Inflation}_{\text{US \$}})}-1$$

$$= (1.1422123)\ \frac{(1.09)}{(1.02)}-1 = 22.06\%$$

Estimating the Cost of Debt

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

Estimating Synthetic Ratings

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, we can use just the interest coverage ratio:

  Interest Coverage Ratio = EBIT / Interest Expenses

- The interest coverage ratio measures how much operating income a firm generates relative to a dollar of interest expenses.

Company	Operating income	Interest Expense	Interest coverage ratio
Disney	$10,023	$444	22.57
Vale	$15,667	$1,342	11.67

Interest Coverage Ratios, Ratings and Default Spreads- November 2013

Large cap (>$5 billion)	*Small cap or risky (<$5 billion)*	*Rating is (S&P/ Moody's)*	*Spread (11/13)*
>8.50	>12,5	Aaa/AAA	0.40%
6.5-8.5	9.5-12.5	Aa2/AA	0.70%
5.5-6.5	7.5-9.5	A1/A+	0.85%
4.25-5.5	6-7.5	A2/A	1.00%
3-4.25	4.5-6	A3/A-	1.30%
2.5-3	4-4.5	Baa2/BBB	2.00%
2.25-2.5	3.5-4	Ba1/BB+	3.00%
2-2.25	3-3.5	Ba2/BB	4.00%
1.75-2.25	2.5-3	B1/B+	5.50%
1.5-1.75	2-2.5	B2/B	6.50%
1.25-1.5	1.5-2	B3/B-	7.25%
0.8-1.25	1.25-1.5	Caa/CCC	8.75%
0.65-0.8	0.8-1.25	Ca2/CC	9.50%
0.2-0.65	0.5-0.8	C2/C	10.50%
<0.2	<0.5	D2/D	12.00%

Disney: Large cap, developed 22.57 → AAA
Vale: Large cap, emerging 11.67 → AA

Synthetic versus Actual Ratings: Rated Firms

- Disney's synthetic rating is AAA, whereas its actual rating is A. The difference can be attributed to any of the following:
  - Synthetic ratings reflect only the interest coverage ratio whereas actual ratings incorporate all of the other ratios and qualitative factors
  - Synthetic ratings do not allow for sector-wide biases in ratings
  - Synthetic rating was based on 2013 operating income whereas actual rating reflects normalized earnings
- Vale's synthetic rating is AA, but the actual rating for dollar debt is A-. The biggest factor behind the difference is the presence of country risk, since Vale is probably being rated lower for being a Brazil-based corporation.

Company	S&P Rating	Risk-Free Rate	Default Spread	Cost of Debt	Tax Rate	After-Tax Cost of Debt
Disney	A	2.75% (US $)	1.00%	3.75%	36.1%	2.40%
Vale	A-	2.75% (US $)	1.30%	4.05%	34%	2.67%

Divisional Costs of Capital: Disney and Vale

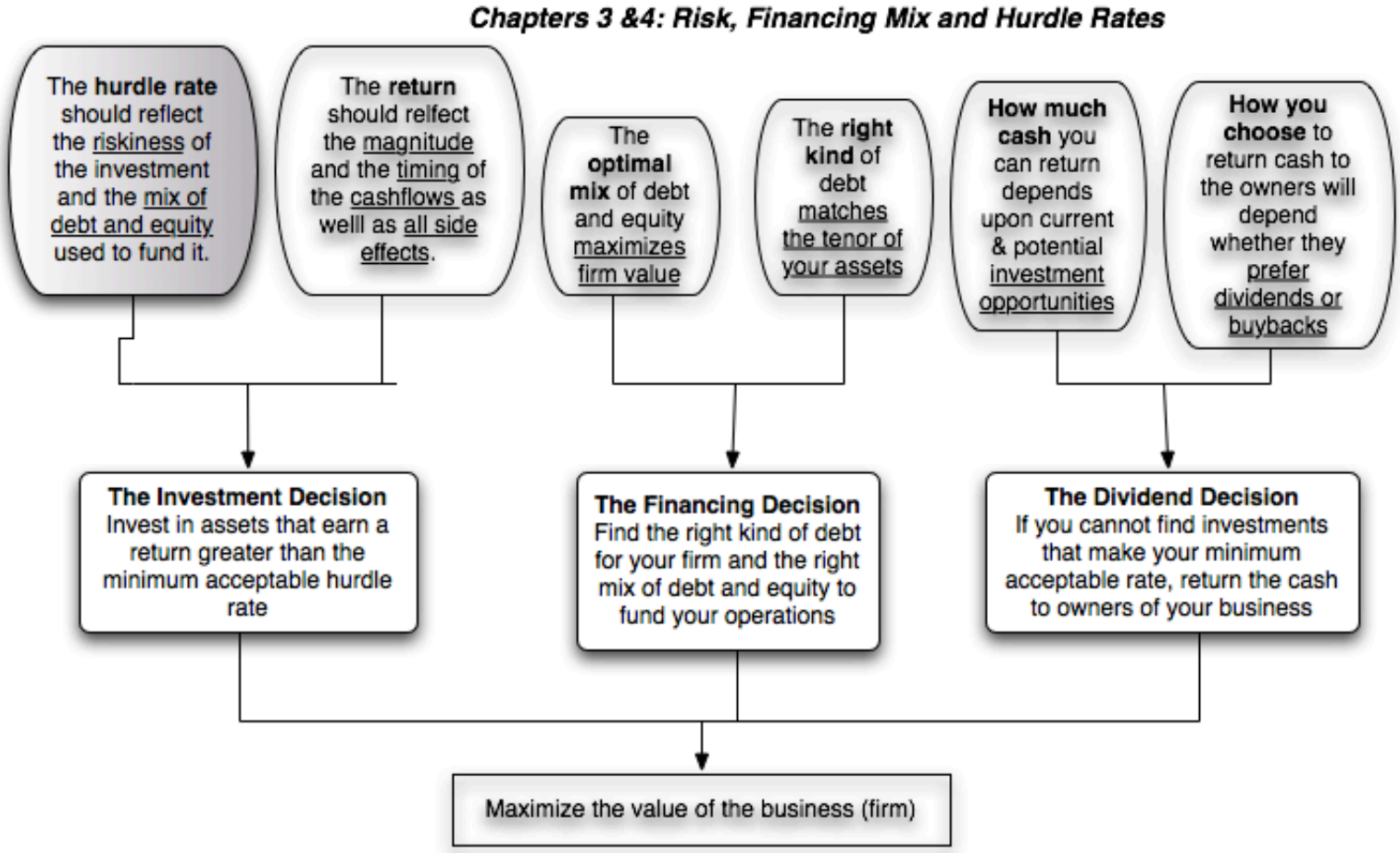
Disney

	Cost of equity	Cost of debt	Marginal tax rate	After-tax cost of debt	Debt ratio	Cost of capital
Media Networks	9.07%	3.75%	36.10%	2.40%	9.12%	8.46%
Parks & Resorts	7.09%	3.75%	36.10%	2.40%	10.24%	6.61%
Studio Entertainment	9.92%	3.75%	36.10%	2.40%	17.16%	8.63%
Consumer Products	9.55%	3.75%	36.10%	2.40%	53.94%	5.69%
Interactive	11.65%	3.75%	36.10%	2.40%	29.11%	8.96%
Disney Operations	8.52%	3.75%	36.10%	2.40%	11.58%	7.81%

Vale

Business	*Cost of equity*	*After-tax cost of debt*	*Debt ratio*	*Cost of capital (in US$)*	*Cost of capital (in $R)*
Metals & Mining	11.35%	2.67%	35.48%	8.27%	15.70%
Iron Ore	11.13%	2.67%	35.48%	8.13%	15.55%
Fertilizers	12.70%	2.67%	35.48%	9.14%	16.63%
Logistics	10.29%	2.67%	35.48%	7.59%	14.97%
Vale Operations	11.23%	2.67%	35.48%	8.20%	15.62%

Back to First Principles



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.

The Return Mantra: "Time-weighted, Incremental Cash Flow Return"

Earnings versus Cash Flows: A Disney Theme Park

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

Step 1: Estimate Accounting Earnings on Project

	0	1	2	3	4	5	6	7	8	9	10
Magic Kingdom - Revenues		$0	$1,000	$1,400	$1,700	$2,000	$2,200	$2,420	$2,662	$2,928	$2,987
Epcot Rio - Revenues		$0	$0	$0	$300	$500	$550	$605	$666	$732	$747
Resort & Properties - Revenues		$0	$250	$350	$500	$625	$688	$756	$832	$915	$933
Total Revenues			**$1,250**	**$1,750**	**$2,500**	**$3,125**	**$3,438**	**$3,781**	**$4,159**	**$4,575**	**$4,667**
Magic Kingdom – Direct Expenses		$0	$600	$840	$1,020	$1,200	$1,320	$1,452	$1,597	$1,757	$1,792
Epcot Rio – Direct Expenses		$0	$0	$0	$180	$300	$330	$363	$399	$439	$448
Resort & Property – Direct Expenses		$0	$188	$263	$375	$469	$516	$567	$624	$686	$700
Total Direct Expenses			**$788**	**$1,103**	**$1,575**	**$1,969**	**$2,166**	**$2,382**	**$2,620**	**$2,882**	**$2,940**
Depreciation & Amortization		$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
Allocated G&A Costs		$0	$188	$263	$375	$469	$516	$567	$624	$686	$700
Operating Income		**-$50**	**-$150**	**-$84**	**$106**	**$315**	**$389**	**$467**	**$551**	**$641**	**$658**
Taxes		-$18	-$54	-$30	$38	$114	$141	$169	$199	$231	$238
Operating Income after Taxes		-$32	-$96	-$54	$68	$202	$249	$299	$352	$410	$421

Direct expenses: 60% of revenues for theme parks, 75% of revenues for resort properties
Allocated G&A: Company G&A allocated to project, based on projected revenues. Two thirds of expense is fixed, rest is variable.
Taxes: Based on marginal tax rate of 36.1%

And the Accounting View of Return

Year	After-tax Operating Income	BV of pre-project investment	BV of fixed assets	BV of Working capital	BV of Capital	Average BV of Capital	ROC(a)	ROC(b)
0		500	2000	0	$2,500			
1	-$32	$450	$3,000	$0	$3,450	$2,975	-1.07%	-1.28%
2	-$96	$400	$3,813	$63	$4,275	$3,863	-2.48%	-2.78%
3	-$54	$350	$4,145	$88	$4,582	$4,429	-1.22%	-1.26%
4	$68	$300	$4,027	$125	$4,452	$4,517	1.50%	1.48%
5	$202	$250	$3,962	$156	$4,368	$4,410	4.57%	4.53%
6	$249	$200	$3,931	$172	$4,302	$4,335	5.74%	5.69%
7	$299	$150	$3,931	$189	$4,270	$4,286	6.97%	6.94%
8	$352	$100	$3,946	$208	$4,254	$4,262	8.26%	8.24%
9	$410	$50	$3,978	$229	$4,257	$4,255	9.62%	9.63%
10	$421	$0	$4,010	$233	$4,243	$4,250	9.90%	9.89%
Average							4.18%	4.11%

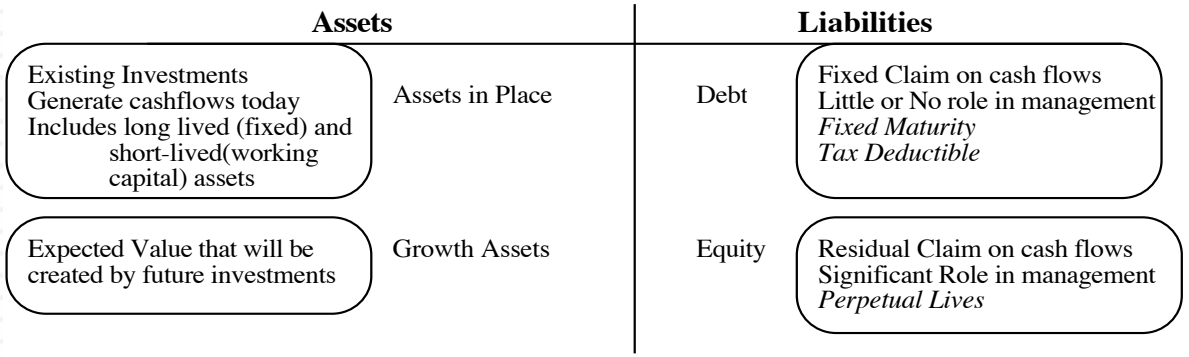
(a) Based upon book capital at the start of each year
(b) Based upon average book capital over the year

Estimating a hurdle rate for Rio Disney

- We did estimate a cost of capital of 6.61% for the Disney theme park business, using a bottom-up levered beta of 0.7537 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- The only concern we would have with using this cost of equity for this project is that it may not adequately reflect the additional risk associated with the theme park being in an emerging market (Brazil). We first computed the Brazil country risk premium (by multiplying the default spread for Brazil by the relative equity market volatility) and then re-estimated the cost of equity:
  - Country risk premium for Brazil = 5.5%+ 3% = 8.5%
  - Cost of Equity in US$= 2.75% + 0.7537 (8.5%) = 9.16%
- Using this estimate of the cost of equity, Disney's theme park debt ratio of 10.24% and its after-tax cost of debt of 2.40% (see chapter 4), we can estimate the cost of capital for the project:
  - Cost of Capital in US$ = 9.16% (0.8976) + 2.40% (0.1024) = 8.46%

A Tangent: From New to Existing Investments: ROC for the entire firm

How "good" are the existing investments of the firm?



Measuring ROC for existing investments..

Company	*EBIT (1-t)*	*BV of Debt*	*BV of Equity*	*Cash*	*BV of Capital*	*Return on Capital*	*Cost of Capital*	*ROC - Cost of Capital*
Disney	$6,920	$16,328	$41,958	$3,387	$54,899	12.61%	7.81%	4.80%
Vale	$12,432	$49,246	$75,974	$5,818	$119,402	10.41%	8.20%	2.22%
Baidu	¥9,111	¥13,561	¥27,215	¥10,456	¥30,320	30.05%	12.42%	17.63%
Tata Motors	120,905₹	471,489₹	330,056₹	225,562₹	575,983₹	20.99%	11.44%	9.55%
Bookscape	$1,775	$12,136	$8,250	$1,250	$19,136	9.28%	10.30%	-1.02%

Old wine in a new bottle.. Another way of presenting the same results…

- The key to value is earning excess returns. Over time, there have been attempts to restate this obvious fact in new and different ways. For instance, Economic Value Added (EVA) developed a wide following in the the 1990s:
- EVA = (ROC – Cost of Capital) (Book Value of Capital Invested)
- The excess returns for the four firms can be restated as follows:

Company	ROC - Cost of Capital	BV of Capital	EVA
Disney	4.80%	$54,899	$2,632
Vale	2.22%	$119,402	$2,645

The cash flow view of this project..

	0	1	2	3	4	5	6	7	8	9	10
After-tax Operating Income		-$32	-$96	-$54	$68	$202	$249	$299	$352	$410	$421
+ Depreciation & Amortization	$0	$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
- Capital Expenditures	$2,500	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in non-cash Work Capital		$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cashflow to firm	($2,500)	($982)	($921)	($361)	$198	$285	$314	$332	$367	$407	$434

To get from income to cash flow, we

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

	1	2	3	4	5	6	7	8	9	10
Depreciation	$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
Tax Bendfits from Depreciation	$18	$153	$169	$160	$134	$132	$132	$132	$132	$133

II. subtracted out the capital expenditures

III. subtracted out the change in non-cash working capital

The incremental cash flows on the project

	0	1	2	3	4	5	6	7	8	9	10
After-tax Operating Income		-$32	-$96	-$54	$68	$202	$249	$299	$352	$410	$421
+ Depreciation & Amortization	$0	$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
- Capital Expenditures	$2,500	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in non-cash Working Capital		$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cashflow to firm	($2,500)	($982)	($921)	($361)	$198	$285	$314	$332	$367	$407	$434
+ Pre-project investment (sunk)	$500										
- Pre-project Depreciation * tax rate		$18	$18	$18	$18	$18	$18	$18	$18	$18	$18
+ Non-incremental Allocated Expense (1-t)		$0	$80	$112	$160	$200	$220	$242	$266	$292	$298
Incremental Cash flow to the firm	($2,000)	($1,000)	($860)	($267)	$340	$467	$516	$555	$615	$681	$715

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

2/3rd of allocated G&A is fixed. Add back this amount (1-t) Tax rate = 36.1%

Closure on Cash Flows

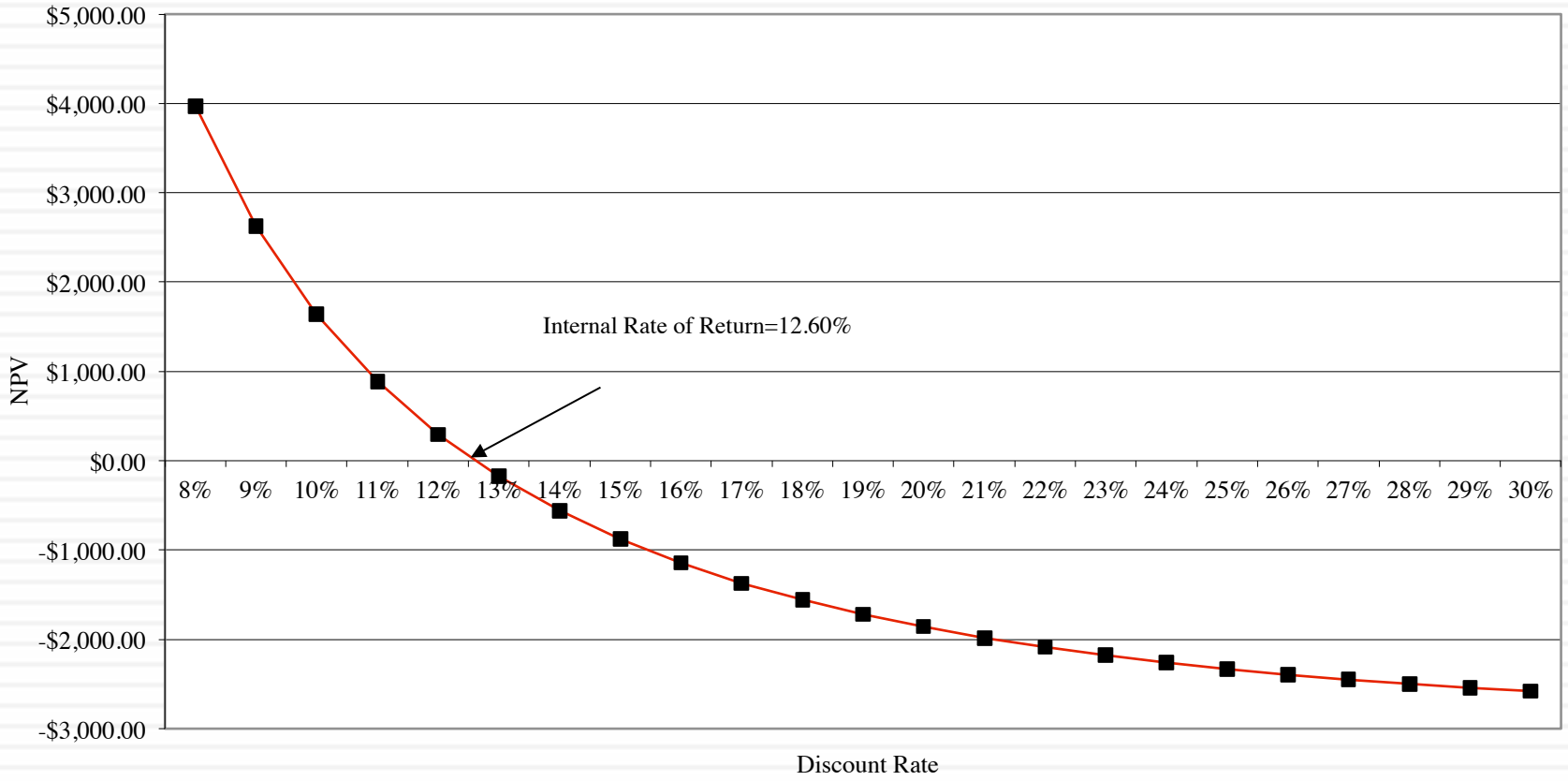
- In a project with a finite and short life, you would need to compute a salvage value, which is the expected proceeds from selling all of the investment in the project at the end of the project life. It is usually set equal to book value of fixed assets and working capital
- In a project with an infinite 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)
    =715 (1.02) /(.0846-.02) = $ 11,275 million

Which yields a NPV of..

Year	Annual Cashflo	Terminal Value	Present Value
0	-$2,000		-$2,000
1	-$1,000		-$922
2	-$859		-$730
3	-$267		-$210
4	$340		$246
5	$466		$311
6	$516		$317
7	$555		$314
8	$615		$321
9	$681		$328
10	$715	$11,275	$5,321
			$3,296

Discounted at Rio Disney cost of capital of 8.46%

The IRR of this project



Disney Theme Park: $R NPV

Expected Exchange Rate$_t$
= Exchange Rate today * $(1.09/1.02)^t$

Discount at $R cost of capital
= (1.0846) (1.09/1.02) – 1 = 15.91%

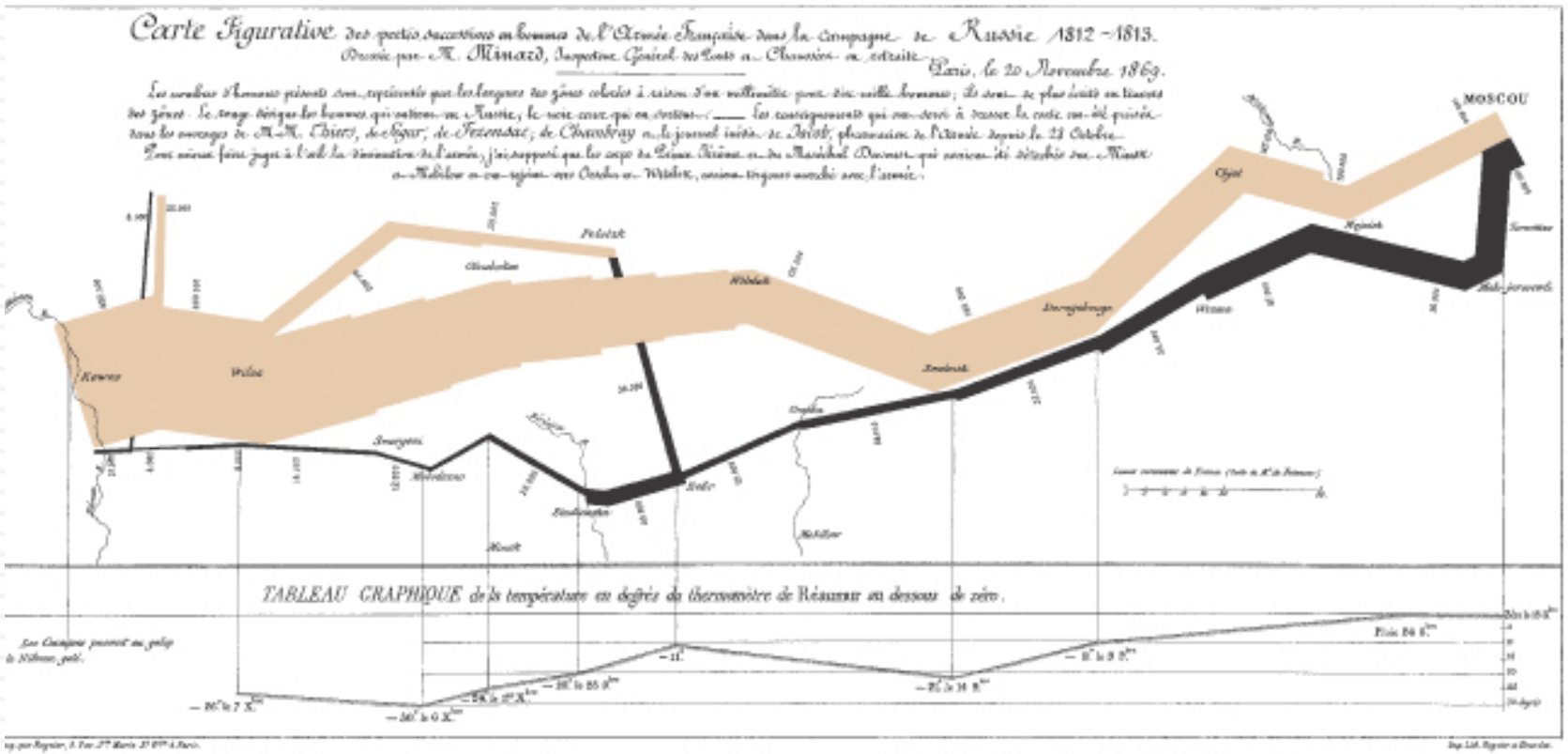
Year	Cashflow ($)	$R/$	Cashflow ($R)	Present Value
0	-R$ 2,000.00	R$ 2.35	-R$ 4,700.00	-R$ 4,700.00
1	-R$ 1,000.00	R$ 2.51	-R$ 2,511.27	-R$ 2,166.62
2	-R$ 859.03	R$ 2.68	-R$ 2,305.29	-R$ 1,715.95
3	-R$ 267.39	R$ 2.87	-R$ 766.82	-R$ 492.45
4	R$ 340.22	R$ 3.06	R$ 1,042.63	R$ 577.68
5	R$ 466.33	R$ 3.27	R$ 1,527.21	R$ 730.03
6	R$ 516.42	R$ 3.50	R$ 1,807.31	R$ 745.36
7	R$ 555.08	R$ 3.74	R$ 2,075.89	R$ 738.63
8	R$ 614.95	R$ 4.00	R$ 2,457.65	R$ 754.45
9	R$ 681.46	R$ 4.27	R$ 2,910.36	R$ 770.81
10	R$ 11,989.85	R$ 4.56	R$ 54,719.84	R$ 12,503.50
				R$ 7,745.43

NPV = R$ 7,745/2.35= $ 3,296 Million
NPV is equal to NPV in dollar terms

Sensitivity Analysis & What-if Questions…

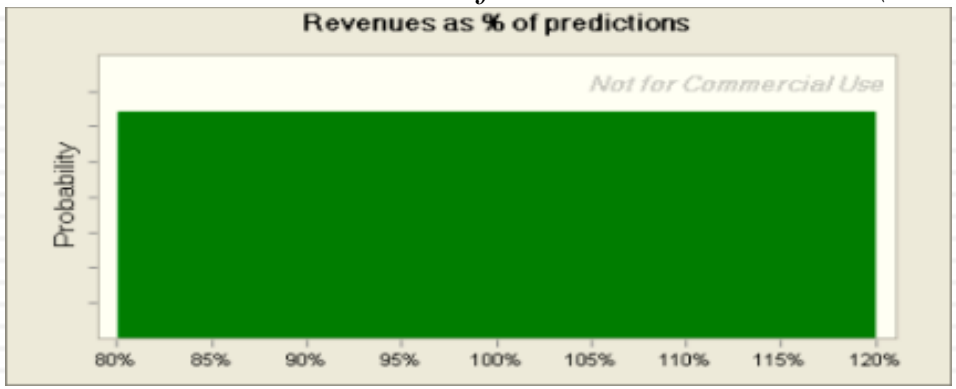
- The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.
- One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier to do over time, there are caveats that we would offer.
- Caveat 1: When analyzing the effects of changing a variable, we often hold all else constant. In the real world, variables move together.
- Caveat 2: The objective in sensitivity analysis is that we make better decisions, not churn out more tables and numbers.
  - Corollary 1: Less is more. Not everything is worth varying…
  - Corollary 2: A picture is worth a thousand numbers (and tables).

And here is a really good picture…

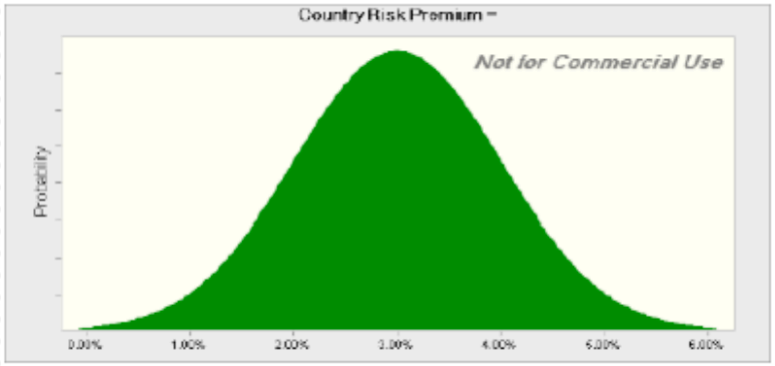


The final step up: Incorporate probabilistic estimates.. Rather than expected values..

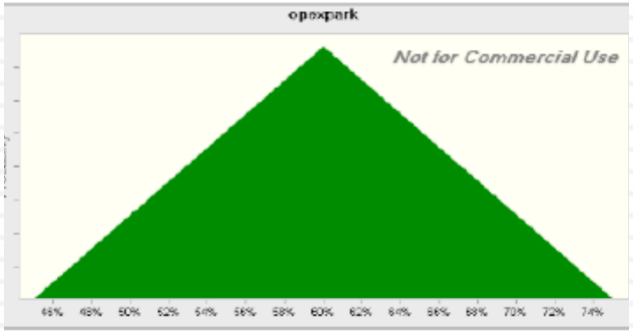
Actual Revenues as % of Forecasted Revenues (Base case = 100%)



Country Risk Premium (Base Case = 3% (Brazil))

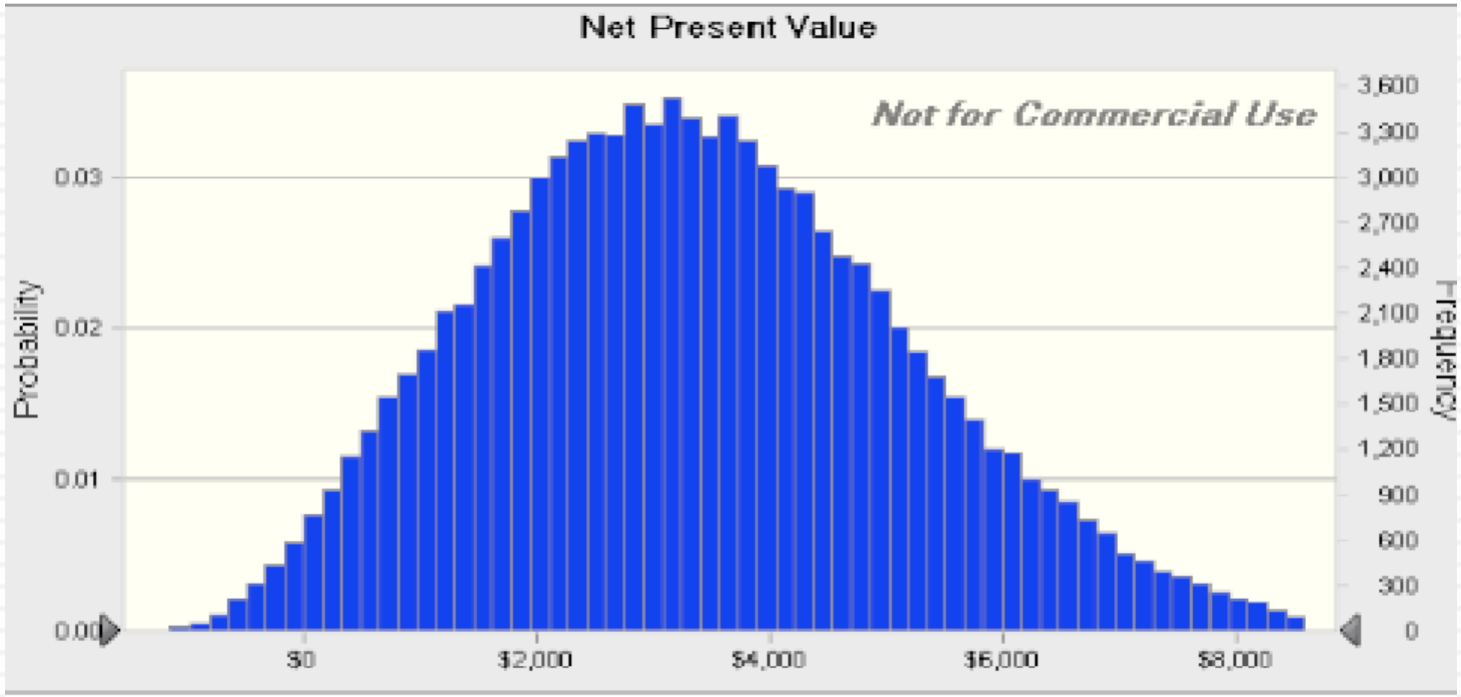


Operating Expenses at Parks as % of Revenues (Base Case = 60%)



The resulting simulation…

Average = $3.40 billion
Median = $3.28 billion



NPV ranges from -$1 billion to +$8.5 billion. NPV is negative 12% of the time.

Equity Analysis: The Parallels

- The investment analysis can be done entirely in equity terms, as well. The returns, cashflows and hurdle rates will all be defined from the perspective of equity investors.
- If using accounting returns,
  - Return will be Return on Equity (ROE) = Net Income/BV of Equity
  - ROE has to be greater than cost of equity
- If using discounted cashflow models,
  - Cashflows will be cashflows after debt payments to equity investors
  - Hurdle rate will be cost of equity

A Vale Iron Ore Mine in Canada Investment Operating Assumptions

1. The mine will require an initial investment of $1.25 billion and is expected to have a production capacity of 8 million tons of iron ore, once established. The initial investment of $1.25 billion will be depreciated over ten years, using double declining balance depreciation, down to a salvage value of $250 million at the end of ten years.
2. The mine will start production midway through the next year, producing 4 million tons of iron ore for year 1, with production increasing to 6 million tons in year 2 and leveling off at 8 million tons thereafter (until year 10). The price, in US dollars per ton of iron ore is currently $100 and is expected to keep pace with inflation for the life of the plant.
3. The variable cost of production, including labor, material and operating expenses, is expected to be $45/ton of iron ore produced and there is a fixed cost of $125 million in year 1. Both costs, which will grow at the inflation rate of 2% thereafter. The costs will be in Canadian dollars, but the expected values are converted into US dollars, assuming that the current parity between the currencies (1 Canadian $ = 1 US dollar) will continue, since interest and inflation rates are similar in the two currencies.
4. The working capital requirements are estimated to be 20% of total revenues, and the investments have to be made at the beginning of each year. At the end of the tenth year, it is anticipated that the entire working capital will be salvaged.
5. Vale's corporate tax rate of 34% will apply to this project as well.

Financing Assumptions

Vale plans to borrow $0.5 billion at its current cost of debt of 4.05% (based upon its rating of A-), using a ten-year term loan (where the loan will be paid off in equal annual increments). The breakdown of the payments each year into interest and principal are provided below:

Year	Beginning Debt	Interest expense	Principal Repaid	Total Payment	Ending Debt
1	$500.00	$20.25	$41.55	$61.80	$458.45
2	$458.45	$18.57	$43.23	$61.80	$415.22
3	$415.22	$16.82	$44.98	$61.80	$370.24
4	$370.24	$14.99	$46.80	$61.80	$323.43
5	$323.43	$13.10	$48.70	$61.80	$274.73
6	$274.73	$11.13	$50.67	$61.80	$224.06
7	$224.06	$9.07	$52.72	$61.80	$171.34
8	$171.34	$6.94	$54.86	$61.80	$116.48
9	$116.48	$4.72	$57.08	$61.80	$59.39
10	$59.39	$2.41	$59.39	$61.80	$0.00

The Hurdle Rate

- The analysis is done US dollar terms and to equity investors. Thus, the hurdle rate has to be a US $ cost of equity.
- In the earlier section, we estimated costs of equity, debt and capital in US dollars and $R for Vale's iron ore business.

Business	*Cost of equity*	*After-tax cost of debt*	*Debt ratio*	*Cost of capital (in US$)*	*Cost of capital (in $R)*
Metals & Mining	11.35%	2.67%	35.48%	8.27%	15.70%
Iron Ore	**11.13%**	**2.67%**	**35.48%**	**8.13%**	**15.55%**
Fertilizers	12.70%	2.67%	35.48%	9.14%	16.63%
Logistics	10.29%	2.67%	35.48%	7.59%	14.97%
Vale Operations	11.23%	2.67%	35.48%	8.20%	15.62%

Net Income: Vale Iron Ore Mine

	1	2	3	4	5	6	7	8	9	10
Production (millions of tons)	4.00	6.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
* Price per ton	102	104.04	106.12	108.24	110.41	112.62	114.87	117.17	119.51	121.9
= Revenues (millions US$)	$408.00	$624.24	$848.97	$865.95	$883.26	$900.93	$918.95	$937.33	$956.07	$975.20
- Variable Costs	$180.00	$275.40	$374.54	$382.03	$389.68	$397.47	$405.42	$413.53	$421.80	$430.23
- Fixed Costs	$125.00	$127.50	$130.05	$132.65	$135.30	$138.01	$140.77	$143.59	$146.46	$149.39
- Depreciation	$200.00	$160.00	$128.00	$102.40	$81.92	$65.54	$65.54	$65.54	$65.54	$65.54
EBIT	-$97.00	$61.34	$216.37	$248.86	$276.37	$299.91	$307.22	$314.68	$322.28	$330.04
- Interest Expenses	$20.25	$18.57	$16.82	$14.99	$13.10	$11.13	$9.07	$6.94	$4.72	$2.41
Taxable Income	-$117.25	$42.77	$199.56	$233.87	$263.27	$288.79	$298.15	$307.74	$317.57	$327.63
- Taxes	($39.87)	$14.54	$67.85	$79.51	$89.51	$98.19	$101.37	$104.63	$107.97	$111.40
= Net Income (millions US$)	-$77.39	$28.23	$131.71	$154.35	$173.76	$190.60	$196.78	$203.11	$209.59	$216.24
Book Value and Depreciation										
Beg. Book Value	$1,250.00	$1,050.00	$890.00	$762.00	$659.60	$577.68	$512.14	$446.61	$381.07	$315.54
- Depreciation	$200.00	$160.00	$128.00	$102.40	$81.92	$65.54	$65.54	$65.54	$65.54	$65.54
+ Capital Exp.	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
End Book Value	$1,050.00	$890.00	$762.00	$659.60	$577.68	$512.14	$446.61	$381.07	$315.54	$250.00
- Debt Outstanding	$458.45	$415.22	$370.24	$323.43	$274.73	$224.06	$171.34	$116.48	$59.39	$0.00
End Book Value of Equity	$591.55	$474.78	$391.76	$336.17	$302.95	$288.08	$275.27	$264.60	$256.14	$250.00

A ROE Analysis

68

Year	Net Income	Beg. BV: Assets	Depreciation	Capital Expense	Ending BV: Assets	BV of Working Capital	Debt	BV: Equity	Average BV: Equity	ROE
0		$0.00	$0.00	$1,250.00	$1,250.00	$81.60	$500.00	$831.60		
1	($77.39)	$1,250.00	$200.00	$0.00	$1,050.00	$124.85	$458.45	$716.40	$774.00	-10.00%
2	$28.23	$1,050.00	$160.00	$0.00	$890.00	$169.79	$415.22	$644.57	$680.49	4.15%
3	$131.71	$890.00	$128.00	$0.00	$762.00	$173.19	$370.24	$564.95	$604.76	21.78%
4	$154.35	$762.00	$102.40	$0.00	$659.60	$176.65	$323.43	$512.82	$538.89	28.64%
5	$173.76	$659.60	$81.92	$0.00	$577.68	$180.19	$274.73	$483.13	$497.98	34.89%
6	$190.60	$577.68	$65.54	$0.00	$512.14	$183.79	$224.06	$471.87	$477.50	39.92%
7	$196.78	$512.14	$65.54	$0.00	$446.61	$187.47	$171.34	$462.74	$467.31	42.11%
8	$203.11	$446.61	$65.54	$0.00	$381.07	$191.21	$116.48	$455.81	$459.27	44.22%
9	$209.59	$381.07	$65.54	$0.00	$315.54	$195.04	$59.39	$451.18	$453.50	46.22%
10	$216.24	$315.54	$65.54	$0.00	$250.00	$0.00	$0.00	$250.00	$350.59	61.68%
Average ROE over the ten-year period =										31.36%

US $ ROE of 31.36% is greater than
Vale Iron Ore US$ Cost of Equity of 11.13%

An Incremental CF Analysis

	0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Net Income		($77.39)	$28.23	$131.71	$154.35	$173.76	$190.60	$196.78	$203.11	$209.59	$216.24
+ Depreciation & Amortization		$200.00	$160.00	$128.00	$102.40	$81.92	$65.54	$65.54	$65.54	$65.54	$65.54
- Capital Expenditures	$750.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
- Change in Working Capital	$81.60	$43.25	$44.95	$3.40	$3.46	$3.53	$3.60	$3.68	$3.75	$3.82	($195.04)
- Principal Repayments		$41.55	$43.23	$44.98	$46.80	$48.70	$50.67	$52.72	$54.86	$57.08	$59.39
+ Salvage Value of mine											$250.00
Cashflow to Equity	($831.60)	$37.82	$100.05	$211.33	$206.48	$203.44	$201.86	$205.91	$210.04	$214.22	$667.42

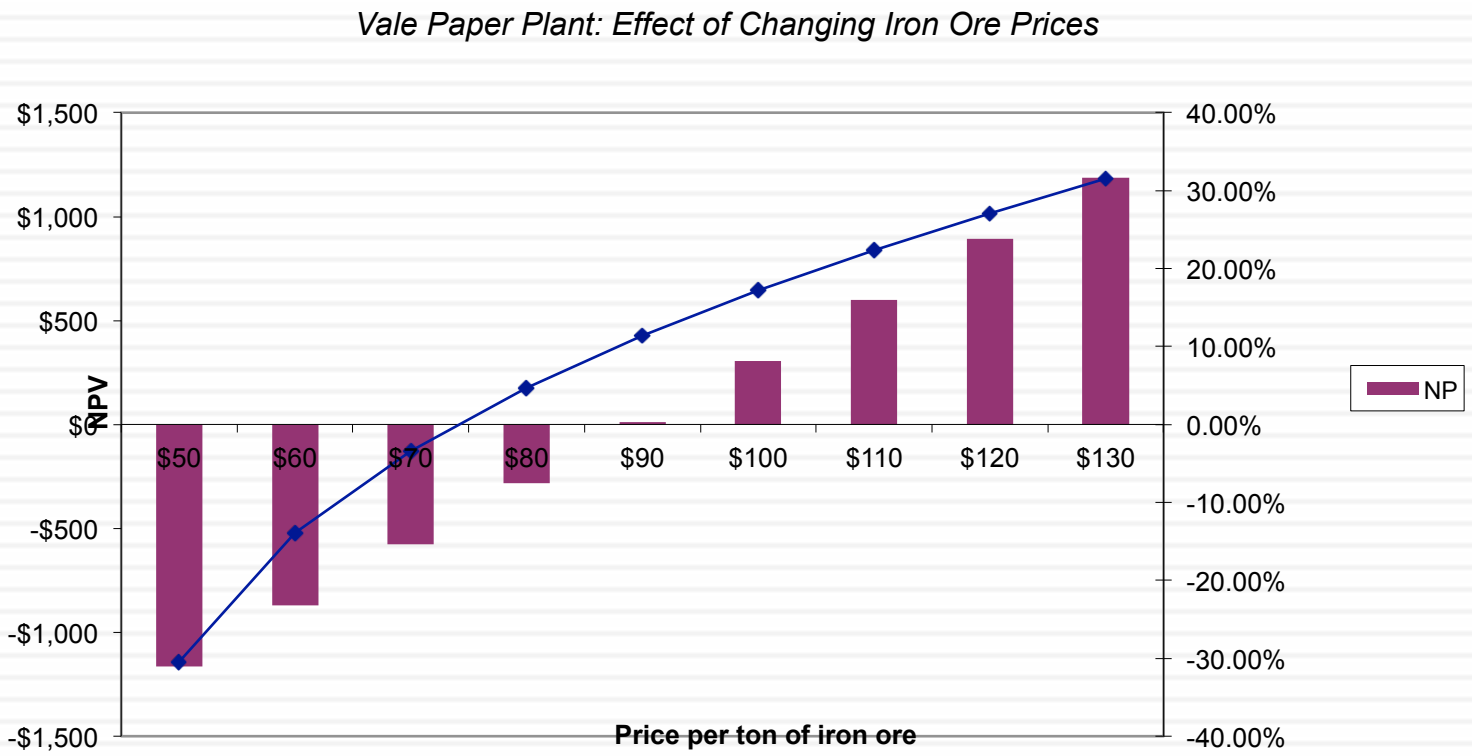
An Equity NPV

Discounted at US$ cost of equity of 11.13% for Vale's iron ore business

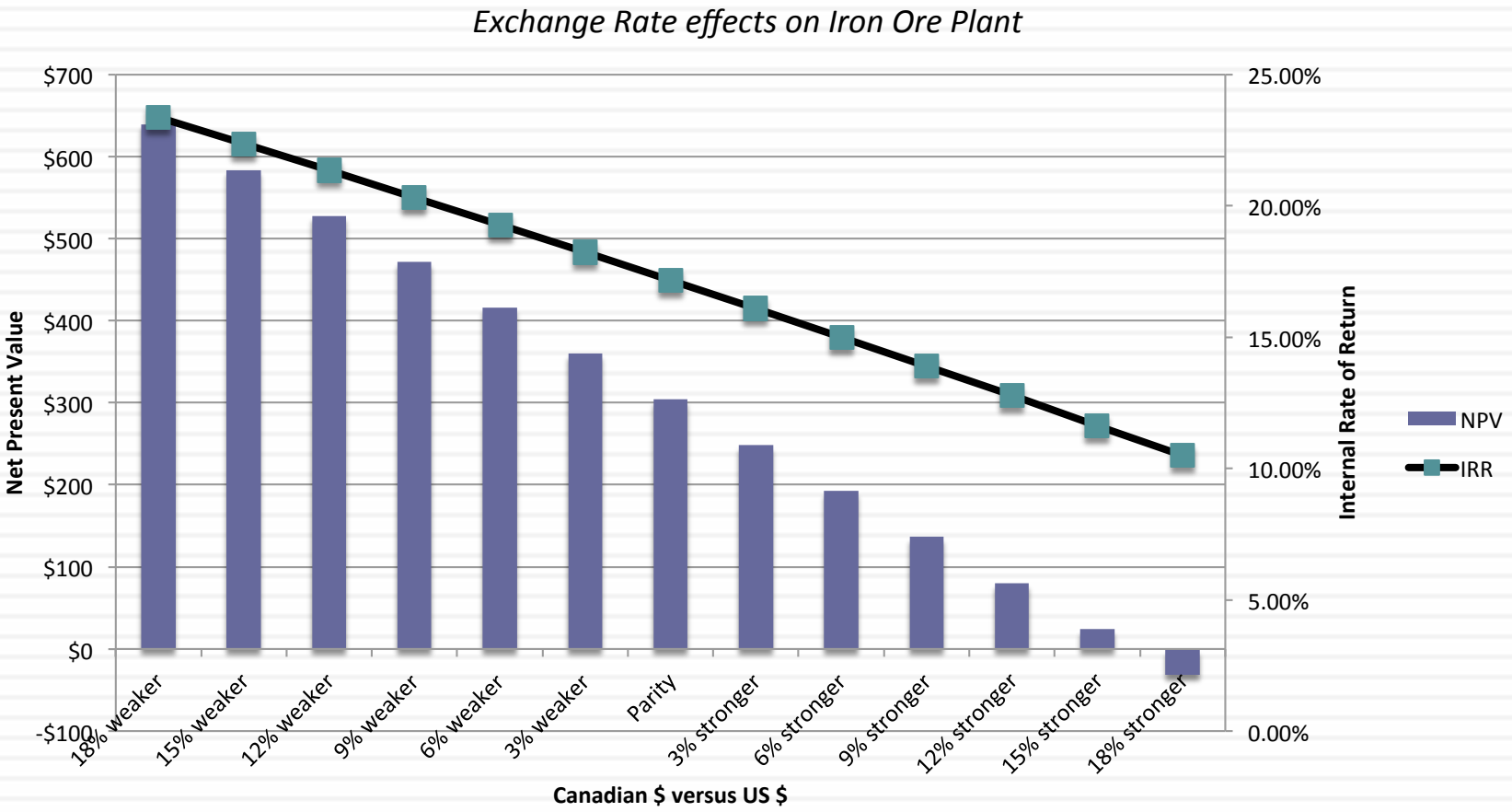
Year	Cash flow to equity	PV @11.13%
0	-$831.60	-$831.60
1	$37.82	$34.03
2	$100.05	$81.02
3	$211.33	$153.99
4	$206.48	$135.40
5	$203.44	$120.04
6	$201.86	$107.18
7	$205.91	$98.39
8	$210.04	$90.31
9	$214.22	$82.89
10	$667.42	$232.38
NPV		$304.04

Dealing with Macro Uncertainty: The Effect of Iron Ore Price

- Like the Disney Theme Park, the Vale Iron Ore Mine's actual value will be buffeted as the variables change. The biggest source of variability is an external factor –the price of iron ore.



And Exchange Rates…



Should you hedge?

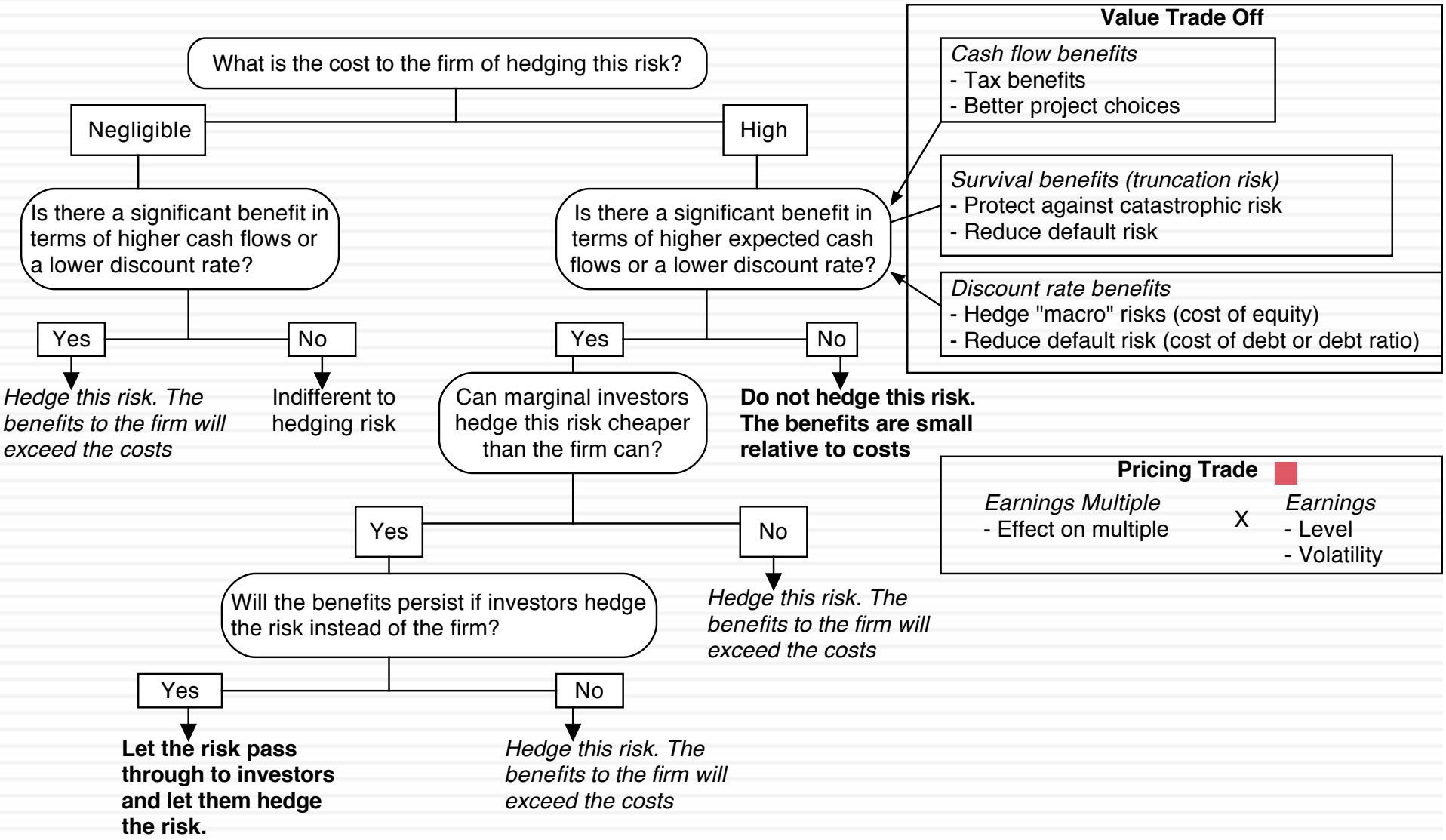
- The value of this mine is very much a function iron ore prices. There are futures, forward and option markets iron ore that Vale can use to hedge against price movements. Should it?
  - Yes
  - No

Explain.

- The value of the mine is also a function of exchange rates. There are forward, futures and options markets on currency. Should Vale hedge against exchange rate risk?
  - Yes
  - No

Explain.

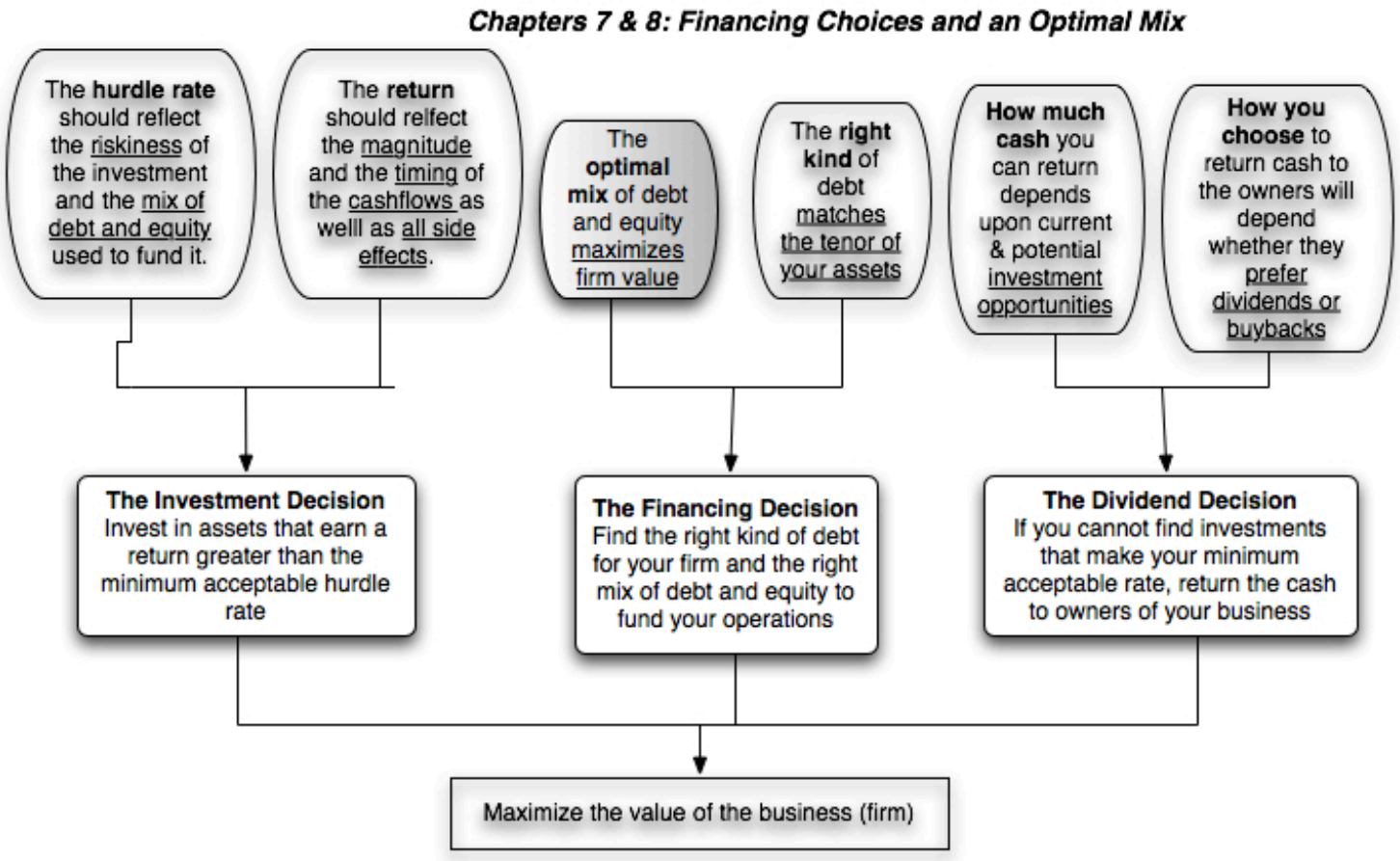
- On the last question, would your answer have been different if the mine were in Brazil.
  - Yes
  - No


What is the cost to the firm of hedging this risk?
Negligible
High
Is there a significant benefit in terms of higher cash flows or a lower discount rate?
Is there a significant benefit in terms of higher expected cash flows or a lower discount rate?
Yes
No
Yes
No
Hedge this risk. The benefits to the firm will exceed the costs
Indifferent to hedging risk
Can marginal investors hedge this risk cheaper than the firm can?
Do not hedge this risk. The benefits are small relative to costs
Yes
No
Will the benefits persist if investors hedge the risk instead of the firm?
Hedge this risk. The benefits to the firm will exceed the costs
Yes
No
Let the risk pass through to investors and let them hedge the risk.
Hedge this risk. The benefits to the firm will exceed the costs
Value Trade Off
Cash flow benefits
- Tax benefits
- Better project choices
Survival benefits (truncation risk)
- Protect against catastrophic risk
- Reduce default risk
Discount rate benefits
- Hedge "macro" risks (cost of equity)
- Reduce default risk (cost of debt or debt ratio)
Pricing Trade
Earnings Multiple
- Effect on multiple
X
Earnings
- Level
- Volatility

A final thought: Side Costs and Benefits

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

First Principles



Debt: Summarizing the trade off

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

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.

Disney's cost of capital schedule…

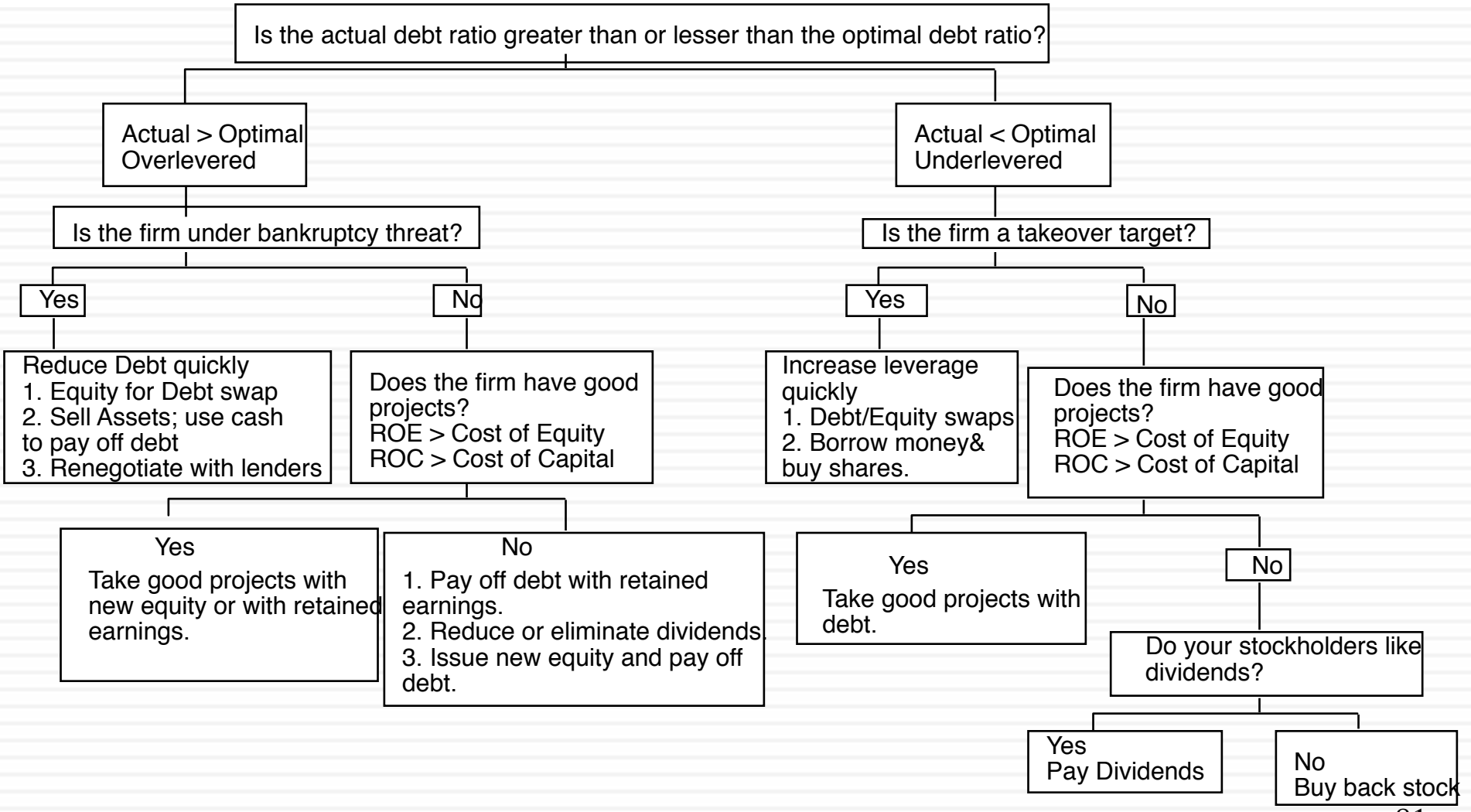
Debt Ratio	Beta	Cost of Equity	Cost of Debt (after-tax)	WACC
0%	0.9239	8.07%	2.01%	8.07%
10%	0.9895	8.45%	2.01%	7.81%
20%	1.0715	8.92%	2.01%	7.54%
30%	1.1770	9.53%	2.20%	7.33%
40%	1.3175	10.34%	2.40%	7.16%
50%	1.5143	11.48%	6.39%	8.93%
60%	1.8095	13.18%	7.35%	9.68%
70%	2.3762	16.44%	7.75%	10.35%
80%	3.6289	23.66%	8.97%	11.90%
90%	7.4074	45.43%	10.33%	13.84%

Extension to a firm with volatile earnings: Vale's Optimal Debt Ratio

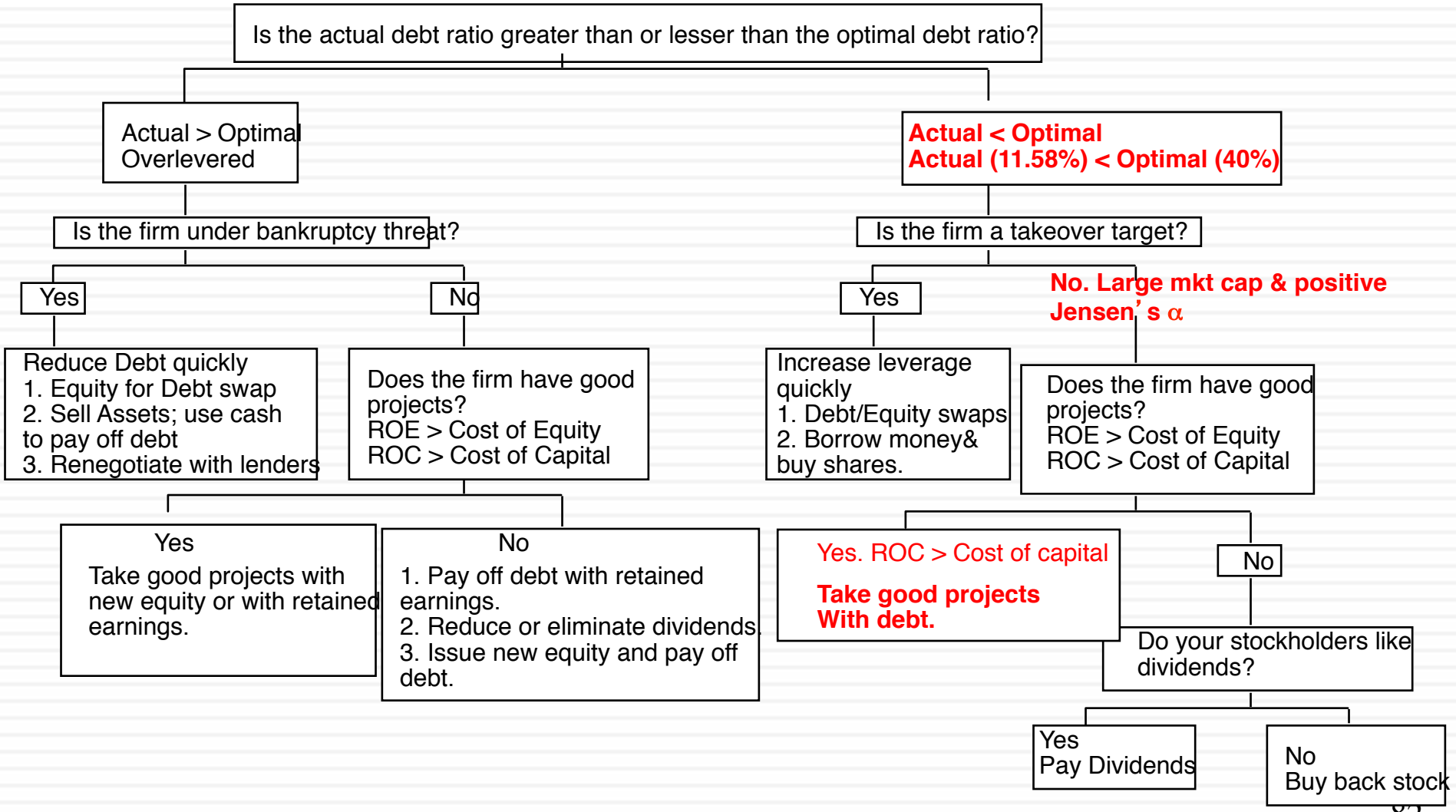
Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.8440	8.97%	Aaa/AAA	5.15%	34.00%	3.40%	8.97%	$98,306
10%	0.9059	9.43%	Aaa/AAA	5.15%	34.00%	3.40%	8.83%	$100,680
20%	0.9833	10.00%	Aaa/AAA	5.15%	34.00%	3.40%	8.68%	$103,171
30%	**1.0827**	**10.74%**	**A1/A+**	**5.60%**	**34.00%**	**3.70%**	**8.62%**	**$104,183**
40%	1.2154	11.71%	A3/A-	6.05%	34.00%	3.99%	8.63%	$104,152
50%	1.4011	13.08%	B1/B+	10.25%	34.00%	6.77%	9.92%	$85,298
60%	1.6796	15.14%	B3/B-	12.00%	34.00%	7.92%	10.81%	$75,951
70%	2.1438	18.56%	B3/B-	12.00%	34.00%	7.92%	11.11%	$73,178
80%	3.0722	25.41%	Ca2/CC	14.25%	34.00%	9.41%	12.61%	$62,090
90%	5.8574	45.95%	Ca2/CC	14.25%	34.00%	9.41%	13.06%	$59,356

	Last 12 months	-1	-2	-3	Average
Revenues	$48,469	$48,058	$61,123	$47,343	$51,248
EBITDA	$19,861	$17,662	$34,183	$26,299	$24,501
EBIT	$15,487	$13,346	$30,206	$23,033	$20,518
Pre-tax operating margin	31.95%	27.77%	49.42%	48.65%	39.45%

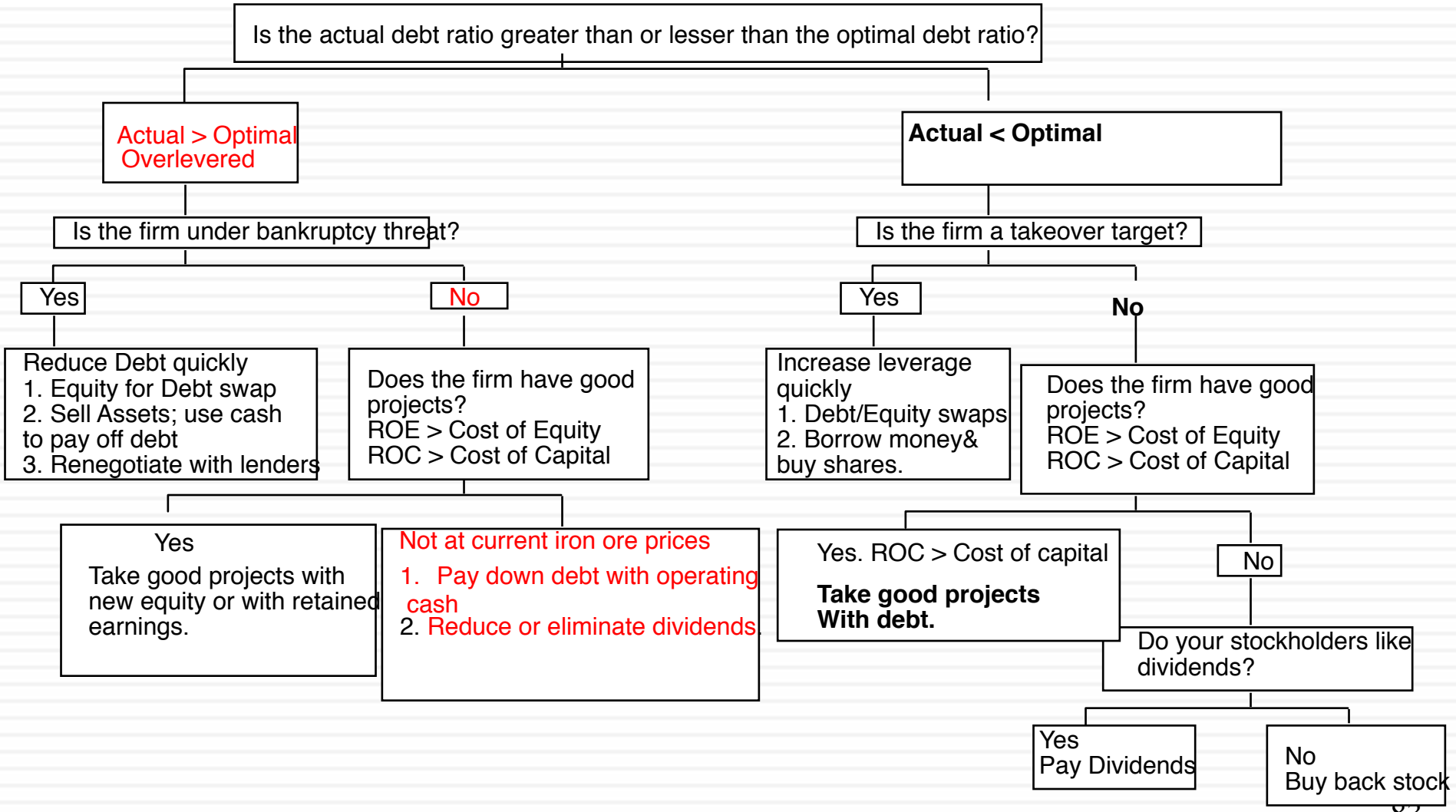
A Framework for Getting to the Optimal



Disney: Applying the Framework

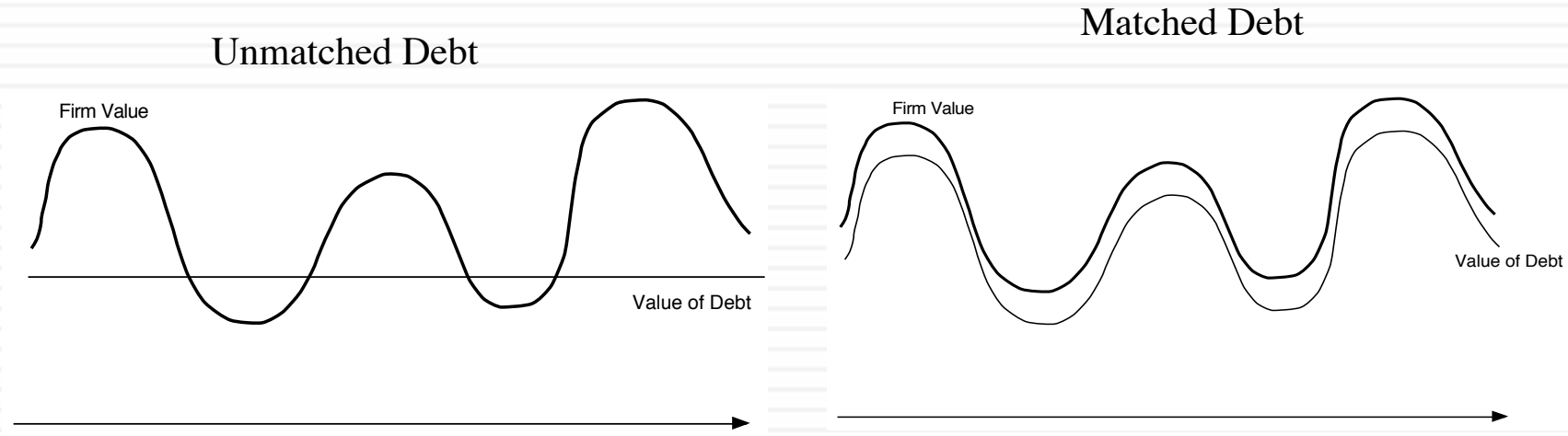


Vale: Applying the Framework

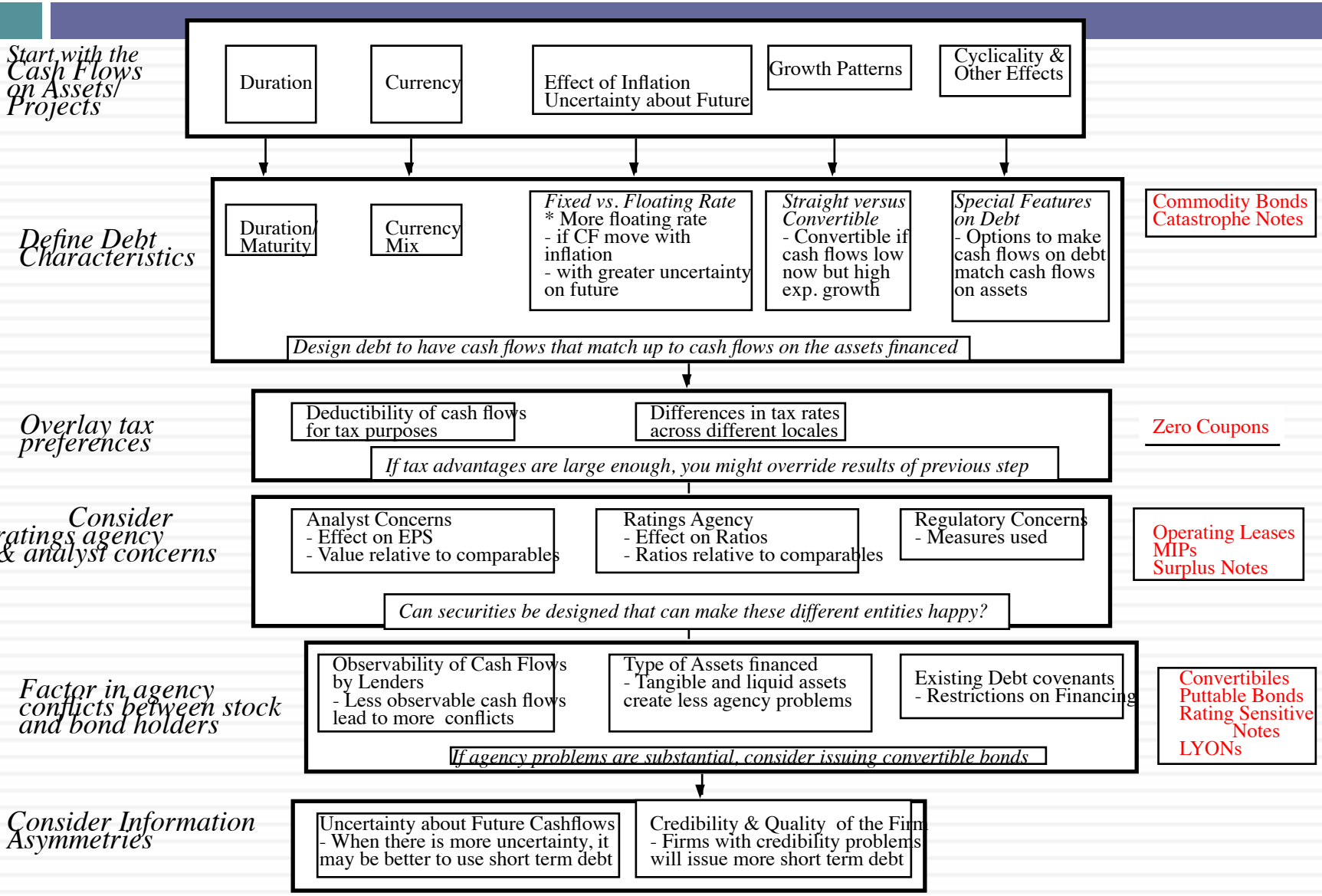


Designing Debt: The Fundamental Principle

- 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.



Designing Debt: Bringing it all together



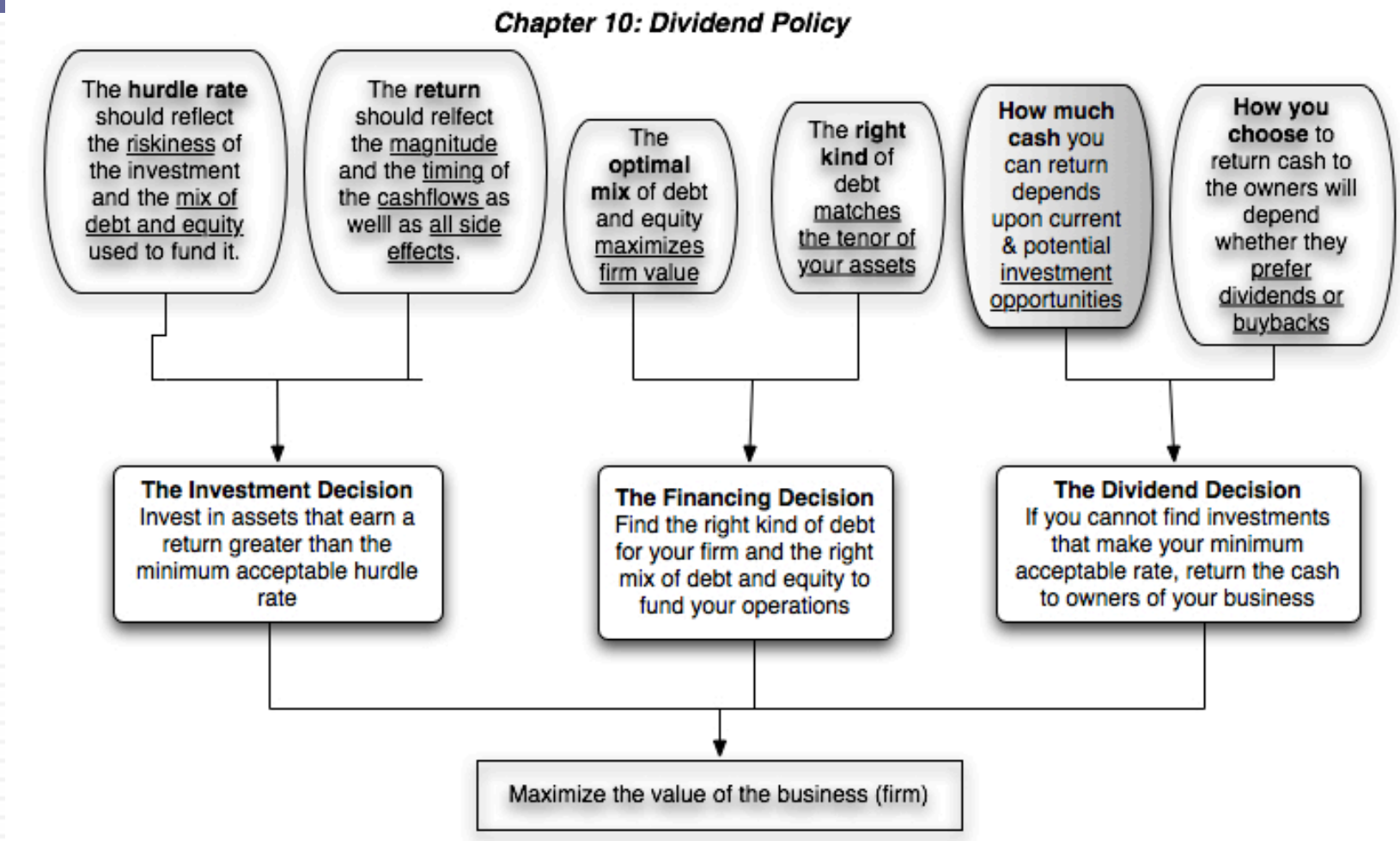
I. Disney's perfect debt

Business	*Project Cash Flow Characteristics*	*Type of Financing*
Studio entertainment	Movie projects are likely to • Be short-term • Have cash outflows primarily in dollars (because Disney makes most of its movies in the U.S.), but cash inflows could have a substantial foreign currency component (because of overseas revenues) • Have net cash flows that are heavily driven by whether the movie is a hit, which is often difficult to predict	Debt should be 1. Short-term 2. Mixed currency debt, reflecting audience make-up. 3. If possible, tied to the success of movies.
Media networks	Projects are likely to be 1. Short-term 2. Primarily in dollars, though foreign component is growing, especially for ESPN. 3. Driven by advertising revenues and show success (Nielsen ratings)	Debt should be 1. Short-term 2. Primarily dollar debt 3. If possible, linked to network ratings
Park resorts	Projects are likely to be 1. Very long-term 2. Currency will be a function of the region (rather than country) where park is located. 3. Affected by success of studio entertainment and media networks divisions	Debt should be 1. Long-term 2. Mix of currencies, based on tourist makeup at the park.
Consumer products	Projects are likely to be short- to medium-term and linked to the success of the movie division; most of Disney's product offerings and licensing revenues are derived from their movie productions	Debt should be 1. Medium-term 2. Dollar debt
Interactive	Projects are likely to be short-term, with high growth potential and significant risk. While cash flows will initially be primarily in US dollars, the mix of currencies will shift as the business ages.	Debt should be short-term, convertible US dollar debt.

II. Vale's perfect debt

- Vale's mines are spread around the world, and it generates a large portion of its revenues in China (37%). Its mines typically have very long lives and require large up-front investments, and the costs are usually in the local currencies but its revenues are in US dollars.
- Recommendation: Long term, dollar-denominated debt (with hedging of local currency risk exposure) and if possible, tied to commodity prices.
- Actual: The existing debt at Vale is primarily US dollar debt (65.48%), with an average maturity of 14.70 years. All of the debt, as far as we can assess, is fixed rate and there is no commodity-linked debt.

First Principles



Assessing Dividend Policy

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

How much has the company returned to stockholders?

- As firms increasing use stock buybacks, we have to measure cash returned to stockholders as not only dividends but also buybacks.
- Looking at Disney & Vale

	Disney		*Vale*	
Year	Dividends	Buybacks	Dividends	Buybacks
2008	$648	$648	$2,993	$741
2009	$653	$2,669	$2,771	$9
2010	$756	$4,993	$3,037	$1,930
2011	$1,076	$3,015	$9,062	$3,051
2012	$1,324	$4,087	$6,006	$0
2008-12	**$4,457**	**$15,412**	**$23,869**	**$5,731**

A Measure of How Much a Company Could have Afforded to Pay out: FCFE

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

  Net Income

  + Depreciation & Amortization

  = Cash flows from Operations to Equity Investors

  - Preferred Dividends

  - Capital Expenditures

  - Working Capital Needs

  - Principal Repayments

  + Proceeds from New Debt Issues

  = Free Cash flow to Equity

Disney's FCFE and Cash Returned: 2008 – 2012

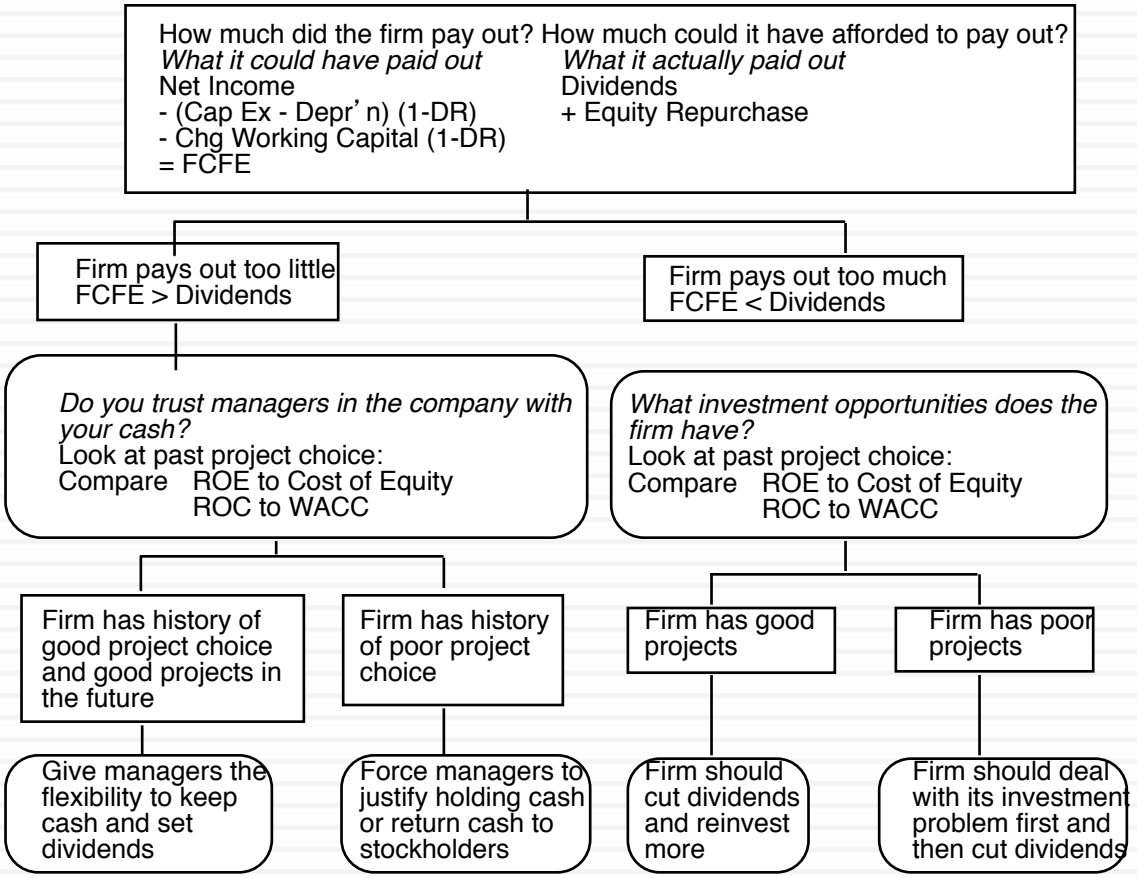
	2012	2011	2010	2009	2008	Aggregate
Net Income	$6,136	$5,682	$4,807	$3,963	$3,307	$23,895
- (Cap. Exp - Depr)	$604	$1,797	$1,718	$397	$122	$4,638
- ∂ Working Capital	($133)	$940	$950	$308	($109)	$1,956
Free CF to Equity (pre-debt)	$5,665	$2,945	$2,139	$3,258	$3,294	$17,301
+ Net Debt Issued	$1,881	$4,246	$2,743	$1,190	($235)	$9,825
= Free CF to Equity (actual debt)	$7,546	$7,191	$4,882	$4,448	$3,059	$27,126
Free CF to Equity (target debt ratio)	$5,720	$3,262	$2,448	$3,340	$3,296	$18,065
Dividends	$1,324	$1,076	$756	$653	$648	$4,457
Dividends + Buybacks	$5,411	$4,091	$5,749	$3,322	$1,296	$19,869

Disney returned about $1.5 billion more than the $18.1 billion it had available as FCFE with a normalized debt ratio of 11.58% (its current debt ratio).

Vale – Dividends versus FCFE

	Aggregate	Average
Net Income	$57,404	$5,740
Dividends	$36,766	$3,677
Dividend Payout Ratio	$1	$1
Stock Buybacks	$6,032	$603
Dividends + Buybacks	$42,798	$4,280
Cash Payout Ratio	$1	
Free CF to Equity (pre-debt)	($1,903)	($190)
Free CF to Equity (actual debt)	$1,036	$104
Free CF to Equity (target debt ratio)	$19,138	$1,914
Cash payout as % of pre-debt FCFE	FCFE negative	
Cash payout as % of actual FCFE	4131.08%	
Cash payout as % of target FCFE	223.63%	

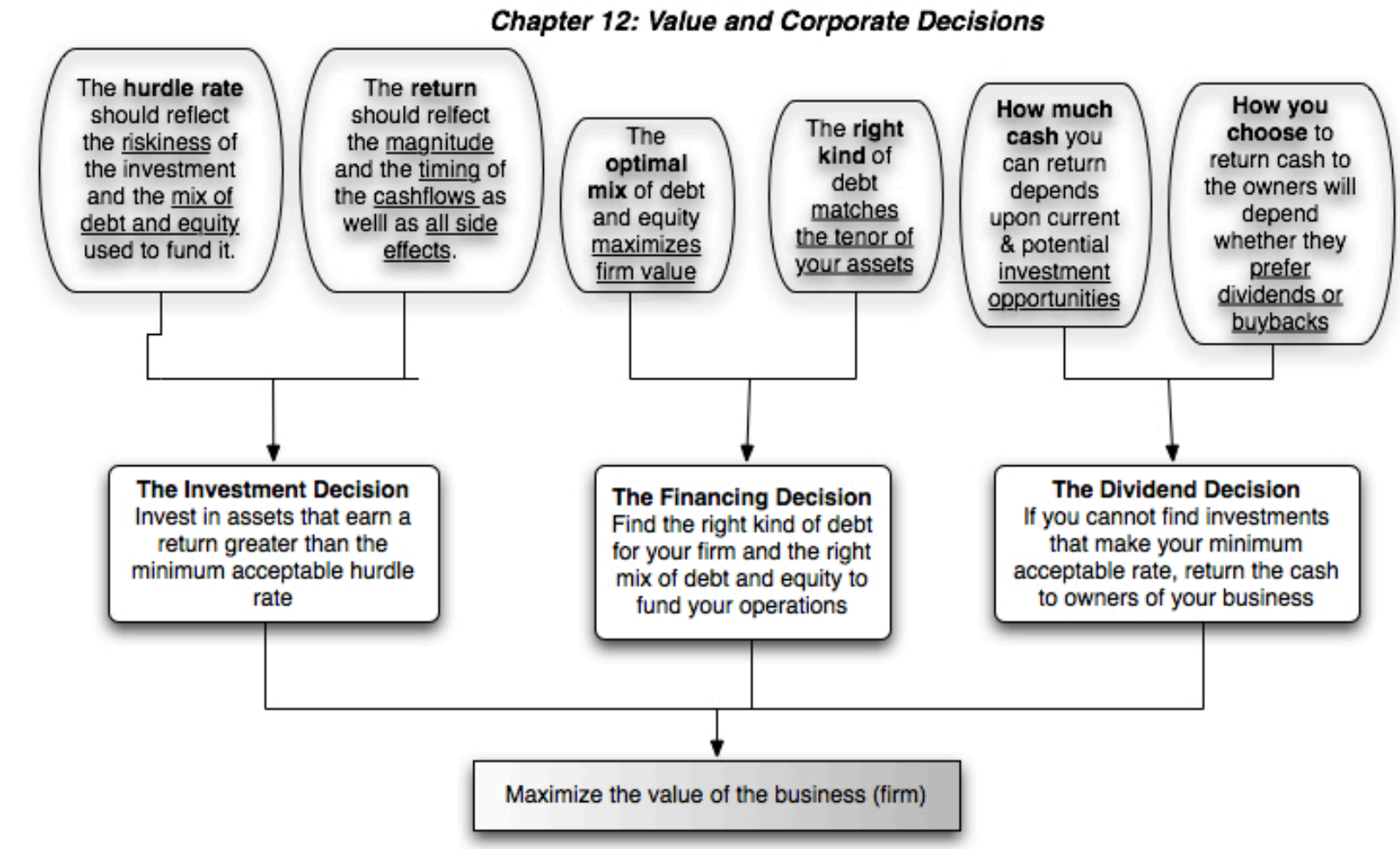
A Practical Framework for Analyzing Dividend Policy



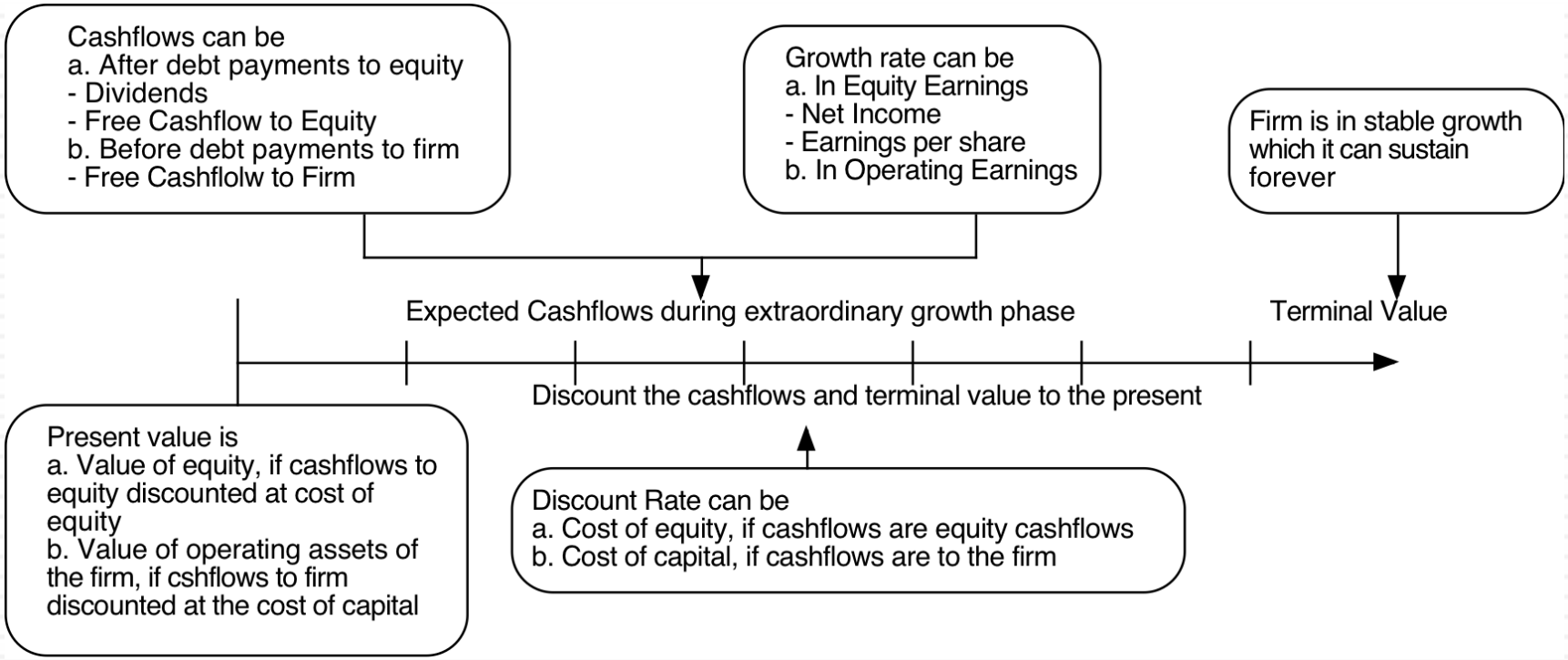
Can investors trust Vale's management?

- Given Vale's track record, if you were a Vale common stockholder, would you be comfortable with Vale's dividend policy?
  - Yes
  - No
- How would your answer be different if you were a Vale preferred stockholder?

First Principles



The Ingredients that determine value.



Disney - November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)= 6,920
- (Cap Ex - Deprecn) 3,629
- Chg Working capital 103
= FCFF 3,188
Reinvestment Rate = 3,732/6920 =53.93%
Return on capital = 12.61%

Reinvestment Rate 53.93%

Return on Capital 12.61%

Expected Growth
.5393*.1261=.068 or 6.8%

Stable Growth
g = 2.75%; Beta = 1.00;
Debt %= 20%; k(debt)=3.75
Cost of capital =7.29%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Terminal Value$_{10}$= 7,980/(.0729-.025) = 165,323

Term Yr
10,639
2,660
7,980

First 5 years

Growth declines gradually to 2.75%

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,391	$7,893	$8,430	$9,003	$9,615	$10,187	$10,704	$11,156	$11,531	$11,819
- Reinvestment	$3,985	$4,256	$4,546	$4,855	$5,185	$4,904	$4,534	$4,080	$3,550	$2,955
FCFF	$3,405	$3,637	$3,884	$4,148	$4,430	$5,283	$6,170	$7,076	$7,981	$8,864

Op. Assets 125,477
+ Cash: 3,931
+ Non op inv 2,849
- Debt 15,961
- Minority Int 2,721
=Equity 113,575
-Options 972
Value/Share $ 62.56

Cost of Capital (WACC) = 8.52% (0.885) + 2.40% (0.115) = 7.81%

Cost of capital declines gradually to 7.29%

Cost of Equity
8.52%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on actual A rating

Weights
E = 88.5% D = 11.5%

In November 2013, Disney was trading at $67.71/share

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.0013

Unlevered Beta for Sectors: 0.9239

D/E=13.10%

X

ERP for operations
5.76%

Valuing Vale in November 2013 (in US dollars)

Let's start with some history & estimate what a normalized year will look like

Year	Operating Income ($)	Effective tax rate	BV of Debt	BV of Equity	Cash	Invested capital	Return on capital
2009	$6,057	27.79%	$18,168	$42,556	$12,639	$48,085	9.10%
2010	$23,033	18.67%	$23,613	$59,766	$11,040	$72,339	25.90%
2011	$30,206	18.54%	$27,668	$70,076	$9,913	$87,831	28.01%
2012	$13,346	18.96%	$23,116	$78,721	$3,538	$98,299	11.00%
2013 (TTM)	$15,487	20.65%	$30,196	$75,974	$5,818	$100,352	12.25%
Normalized	**$17,626**	**20.92%**					**17.25%**

Estimate the costs of equity & capital for Vale

Business	*Sample size*	*Unlevered beta of business*	*Revenues*	*Peer Group EV/Sales*	*Value of Business*	*Proportion of Vale*
Metals & Mi	48	0.86	$9,013	1.97	$17,739	16.65%
Iron Ore	78	0.83	$32,717	2.48	$81,188	76.20%
Fertilizers	693	0.99	$3,777	1.52	$5,741	5.39%
Logistics	223	0.75	$1,644	1.14	$1,874	1.76%
Vale Operations		*0.8440*	*$47,151*		*$106,543*	*100.00%*

Market D/E = 54.99%
Marginal tax rate = 34.00% (Brazil)
Levered Beta = 0.844 (1+(1-.34)(.5499)) = 1.15
Cost of equity = 2.75% + 1.15 (7.38%) = 10.87%

	% of revenues	ERP
US & Canada	4.90%	5.50%
Brazil	16.90%	8.50%
Rest of Latin America	1.70%	10.09%
China	37.00%	6.94%
Japan	10.30%	6.70%
Rest of Asia	8.50%	8.61%
Europe	17.20%	6.72%
Rest of World	3.50%	10.06%
Vale ERP	**100.00%**	**7.38%**

Vale's rating: A-
Default spread based on rating = 1.30%
Cost of debt (pre-tax) = 2.75% + 1.30% = 4.05%

Cost of capital = 11.23% (.6452) + 4.05% (1-.34) (.3548) = 8.20%

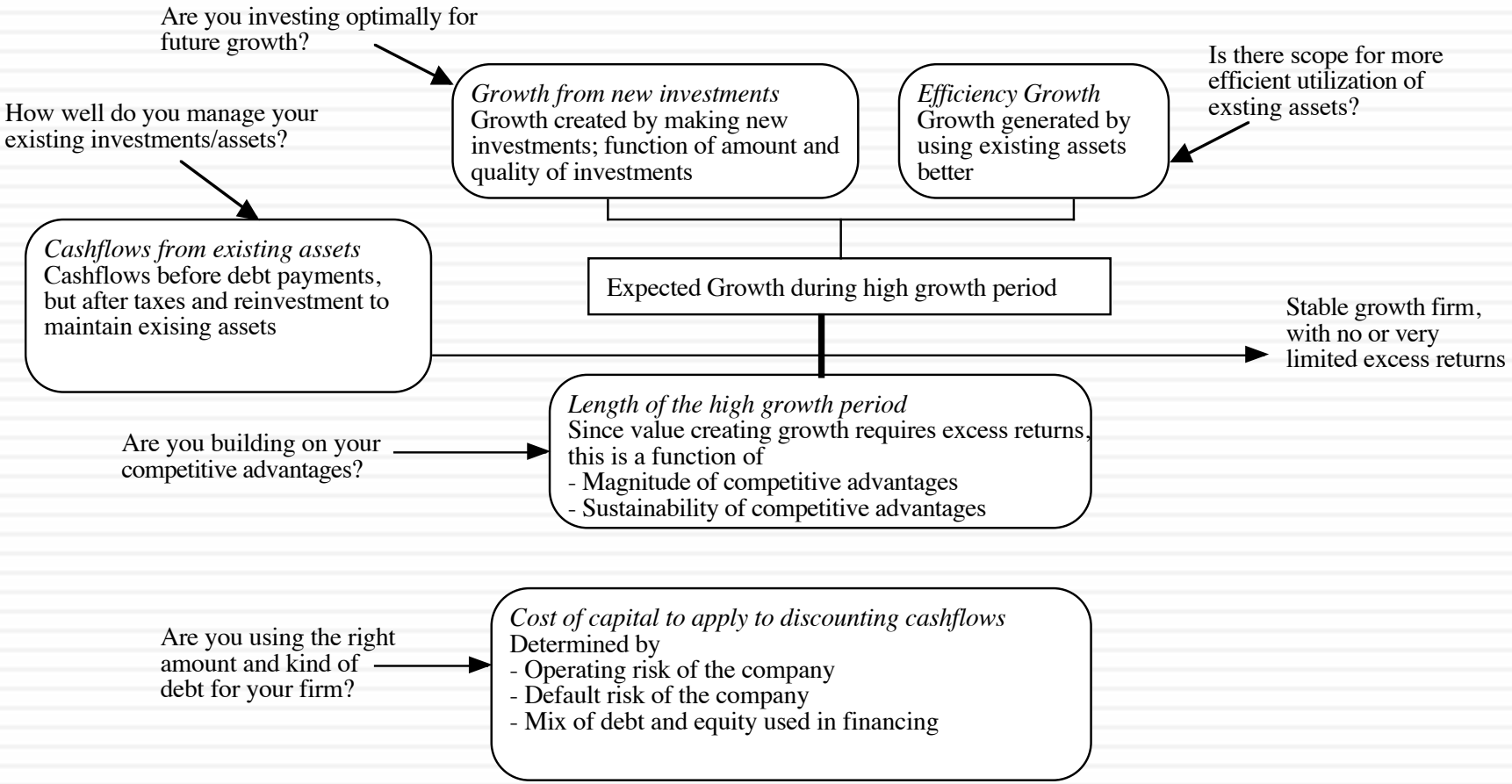
Assume that the company is in stable growth, growing 2% a year in perpetuity

$$Reinvestment\ Rate = \frac{g}{ROC} = \frac{2\%}{17.25\%} = 11.59\%$$

$$Value\ of\ Operating\ Assets = \frac{17{,}626\ (1-.2092)(1-\ .1159)}{(.082-.02)} = \$202{,}832$$

Value of operating assets	= $202,832
+ Cash & Marketable Securities	= $ 7,133
- Debt	= $ 42,879
Value of equity	= $167,086
Value per share	=$ 32.44
Stock price (11/2013)	= $ 13.57

Ways of changing value…



Disney (Restructured)- November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)= 6,920
- (Cap Ex - Deprecn) 3,629
- Chg Working capital 103
= FCFF 3,188
Reinvestment Rate = 3,732/6920 =53.93%
Return on capital = 12.61%

Reinvestment Rate 50.00%

More selective acquisitions & payoff from gaming

Return on Capital 14.00%

Expected Growth
.50* .14 = .07 or 7%

Stable Growth
g = 2.75%; Beta = 1.20;
Debt %= 40%; k(debt)=3.75%
Cost of capital =6.76%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Terminal Value$_{10}$= 9,206/(.0676-.025) = 216,262

Term Yr
12,275
3,069
9,206

First 5 years

Growth declines gradually to 2.75%

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,404	$7,923	$8,477	$9,071	$9,706	$10,298	$10,833	$11,299	$11,683	$11,975
- Reinvestment	$3,702	$3,961	$4,239	$4,535	$4,853	$4,634	$4,333	$3,955	$3,505	$2,994
Free Cashflow to Firm	$3,702	$3,961	$4,239	$4,535	$4,853	$5,664	$6,500	$7,344	$8,178	$8,981

Op. Assets 147,704
+ Cash: 3,931
+ Non op inv 2,849
- Debt 15,961
- Minority Int 2,721
=Equity 135,802
-Options 972
Value/Share $ 74.91

Cost of Capital (WACC) = 8.52% (0.60) + 2.40%(0.40) = 7.16%

Cost of capital declines gradually to 6.76%

Cost of Equity
10.34%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on synthetic A rating

Weights
E = 60% D = 40%

In November 2013, Disney was trading at $67.71/share

Move to optimal debt ratio, with higher beta.

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.3175

Unlevered Beta for Sectors: 0.9239

D/E=66.67%

x

ERP for operations
5.76%

Valuing Vale in April 2015 (in US dollars)

Let's start with some history & estimate what a normalized year will look like

Earning Surprise
Vale's last quarter earnings report came in well below expectations.

Year	Operating Income ($)	Effective tax rate	BV of Debt	BV of Equity	Cash	Invested capital	ROIC
2010	$23,033	18.67%	$23,613	$59,766	$11,040	$72,339	25.90%
2011	$30,206	18.54%	$27,668	$70,076	$9,913	$87,831	28.01%
2012	$13,434	18.96%	$23,116	$78,721	$3,538	$98,299	11.08%
2013	$17,596	15.00%	$30,196	$75,974	$5,818	$100,352	14.90%
2014	$8,497	20.00%	$29,198	$64,393	$5,277	$88,314	7.70%
Average	**$18,553**	**18.23%**					**17.52%**

Petrobrased?
Vale could become the government's new focus, now that Petrobras is beyond repair.

Estimate the costs of equity & capital for Vale

Business	Unlevered beta	Proportion of value	D/E ratio	Levered beta
Metals & Mining	0.86	16.65%	90.63%	1.3744
Iron Ore	0.83	76.20%	90.63%	1.3264
Fertilizers	0.99	5.39%	90.63%	1.5821
Logistics	0.75	1.76%	90.63%	1.1986
Vale Operations	**0.84**	**100%**	**90.63%**	**1.3424**

Region	% of total	ERP
Brazil	68%	8.60%
Rest of the world	32%	7.18%
Vale		8.15%

Riskfree Rate	2.00%
Default Spread for Brazil	3.00%
Default spread for Vale	2.00%
Cost of debt for Vale (pre-tax)	7.00%

Brazil's rating & equity markets have held up, but its reputation and currency have suffered. ERP & Default Spreads (country & Vale) have widened.

Cost of equity = 2.00% + 1.3424 (8.15%) = 12.93%
Cost of capital = 12.93% (.5246) + 7.00% (1-.34) (.4754) = 8.98%

Assume that the company is in stable growth, growing 2% a year in perpetuity, with the last 12 months as the base year for operating income and assuming return on capital = cost of capital in perpetuity.

$$\text{Reinvestment Rate} = \frac{\text{Expected growth rate}}{\text{Return on Capital}} = \frac{2\%}{8.98\%} = 22.27\%$$

$$\text{Value of Operating Assets} = \frac{\$8{,}497\ (1.02)\ (1-.1823)(1-.2227)}{(.0898-.02)} = \$77{,}195$$

Value of operating assets	= $ 77,195
+ Cash & Equity in Affliates	= $ 8,121
- Debt & Minority Interests	= $ 30,108
Value of equity	= $ 55,208
Value per share	**=$ 10.71**
Stock price (4/15/15)	= $ 6.19

First Principles