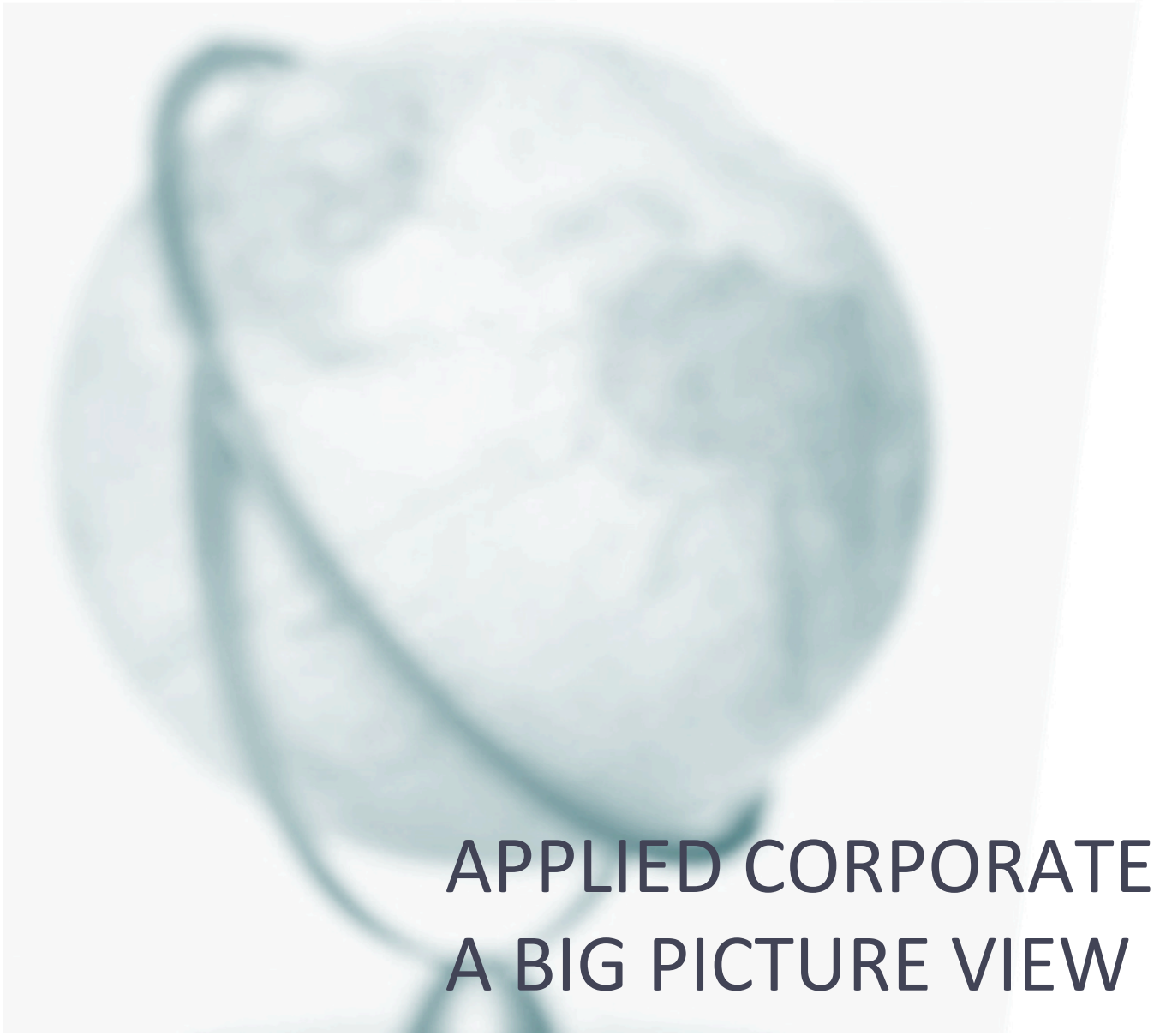
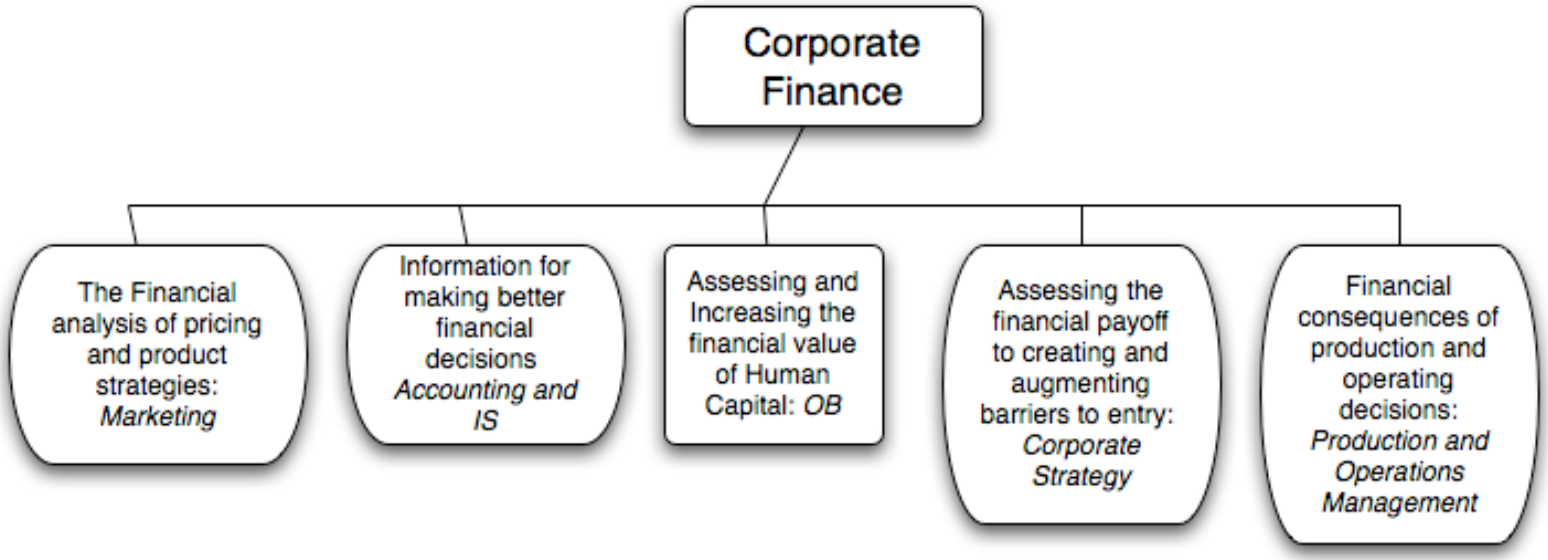


APPLIED CORPORATE FINANCE: A BIG PICTURE VIEW

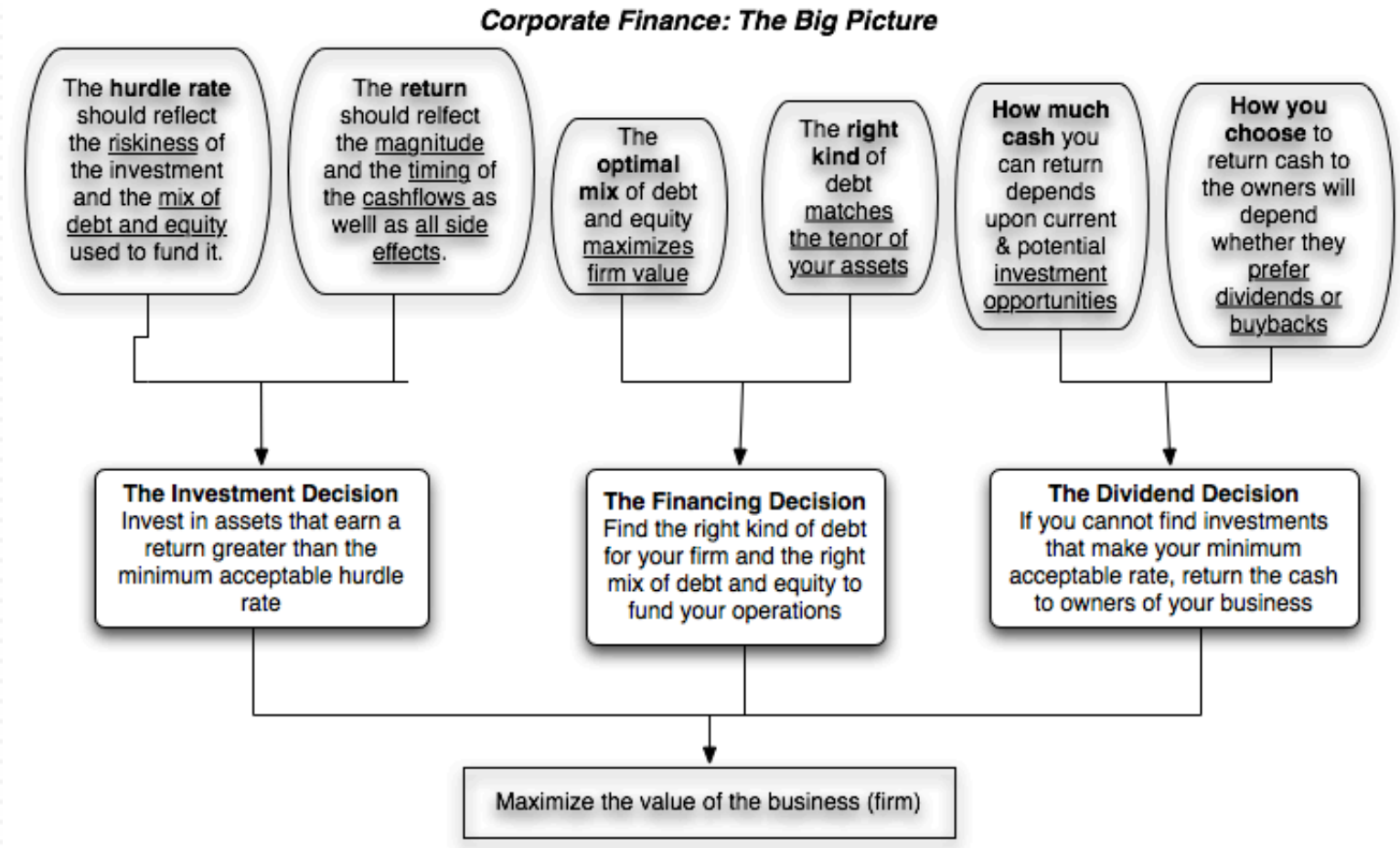
Aswath Damodaran
www.damodaran.com

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.

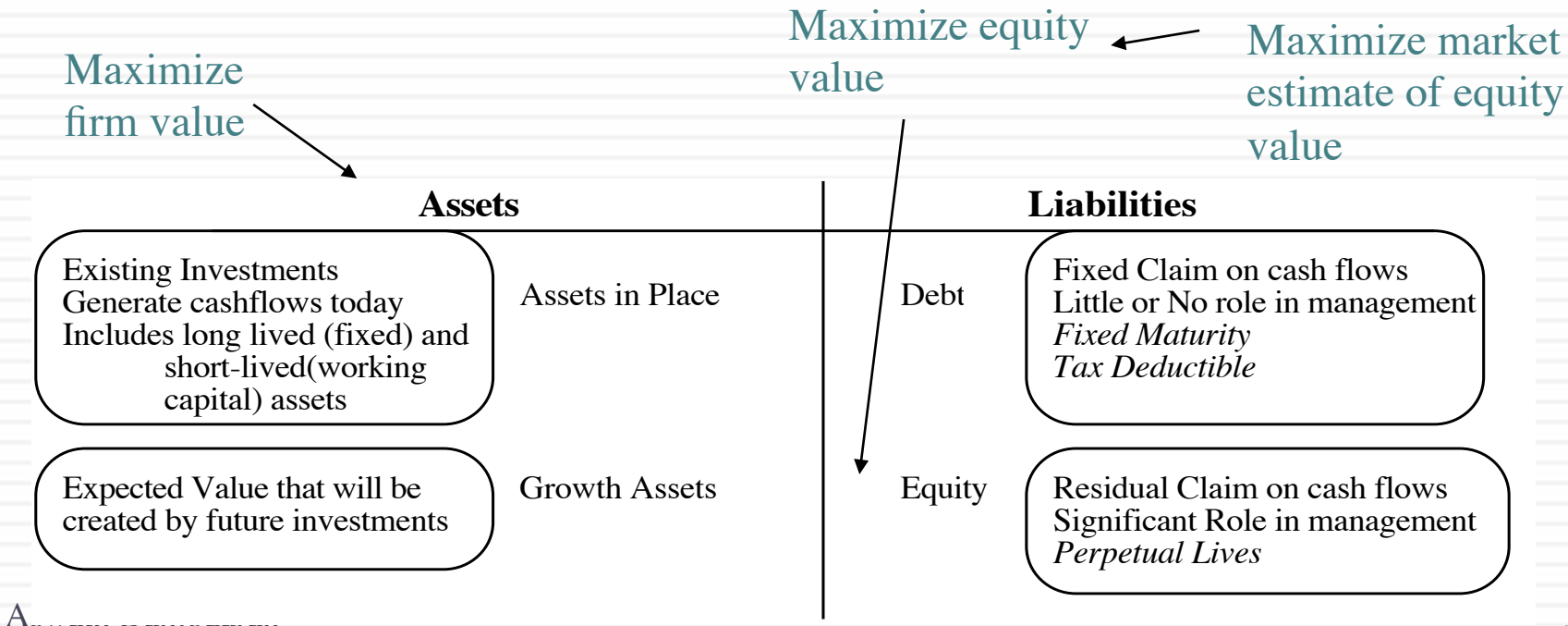


First Principles

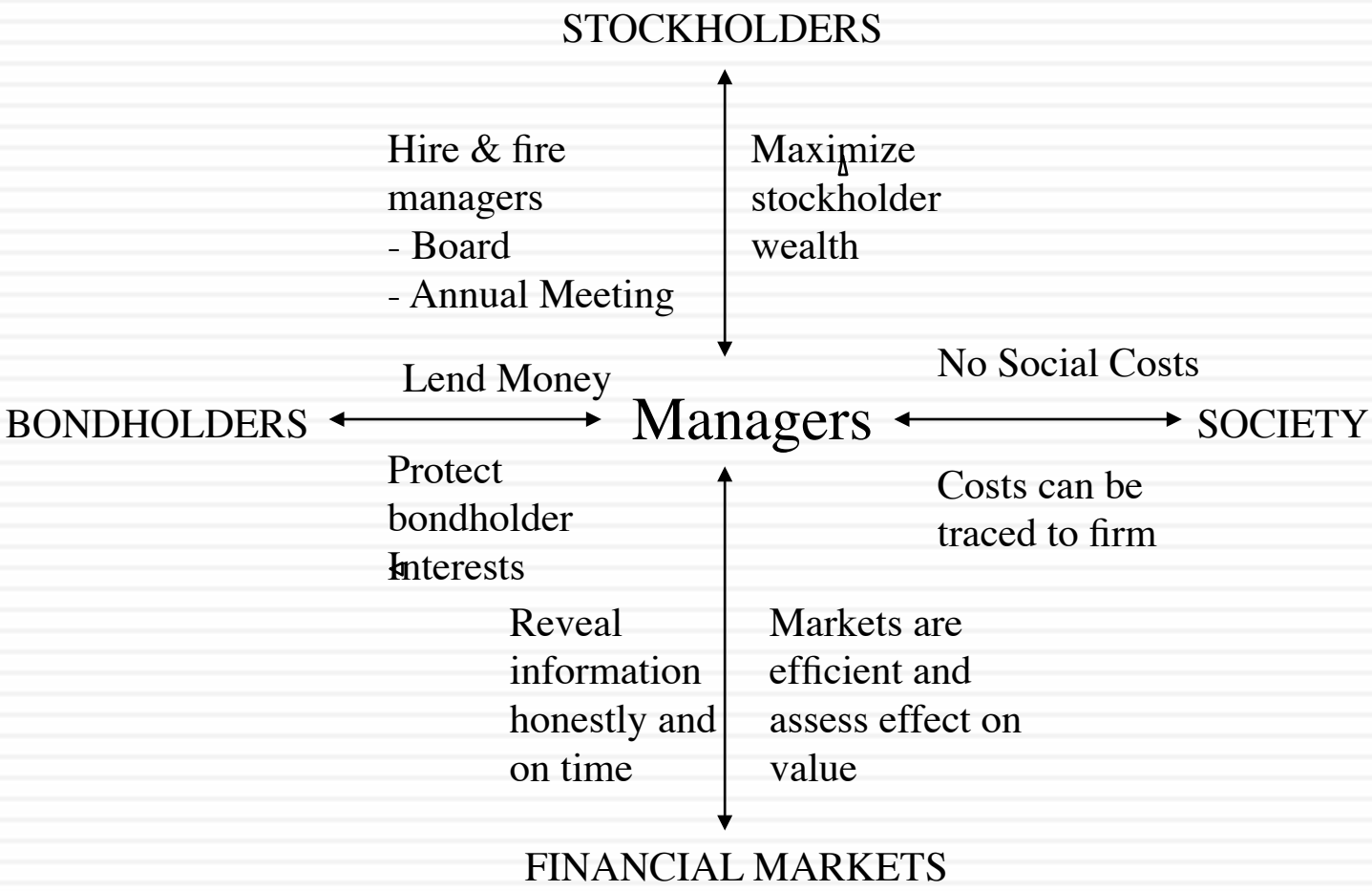


The Objective in Decision Making

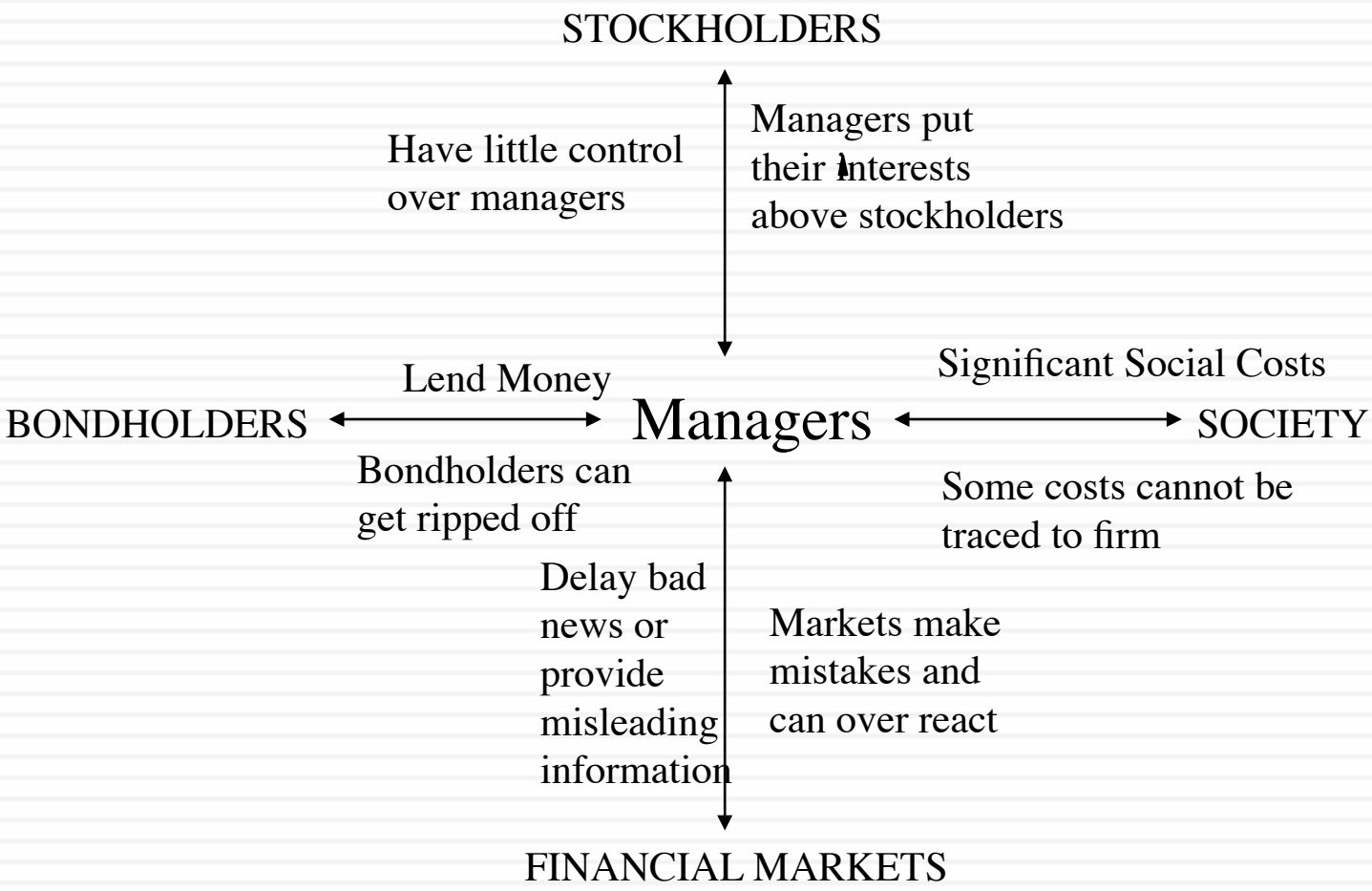
- In traditional corporate finance, the objective in decision making is to maximize the value of the firm.
- A narrower objective is to maximize stockholder wealth. When the stock is traded and markets are viewed to be efficient, the objective is to maximize the stock price.



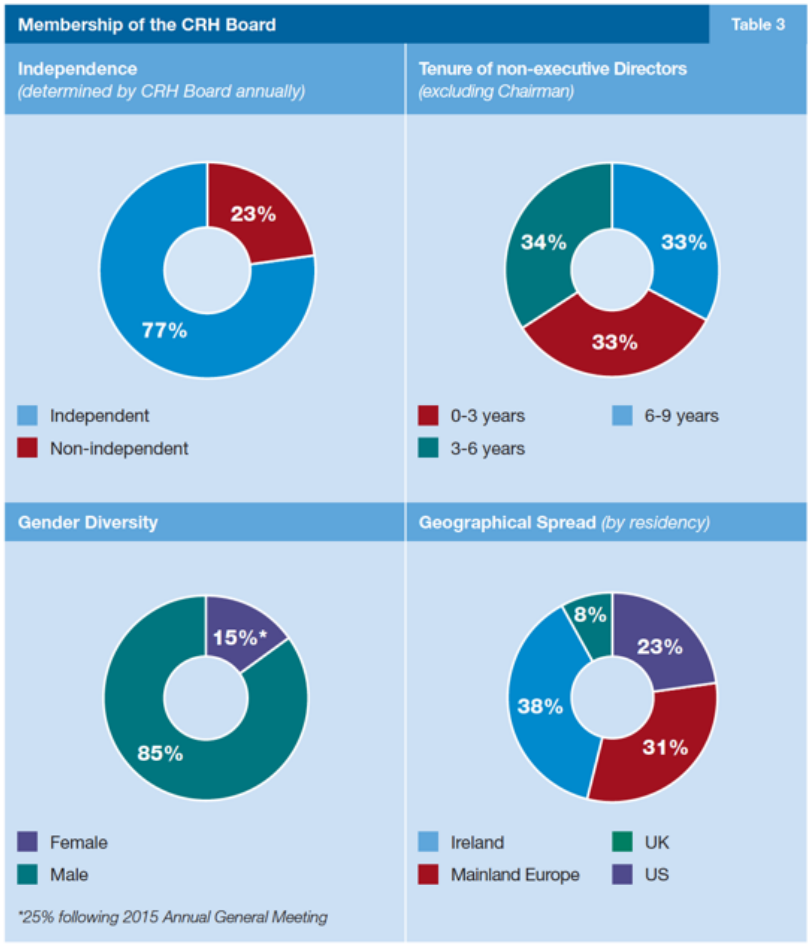
The Classical Objective Function



What can go wrong?



Who is on Board? CRH's board assessment



Does CRH have an independent board?

a. Yes
b. No

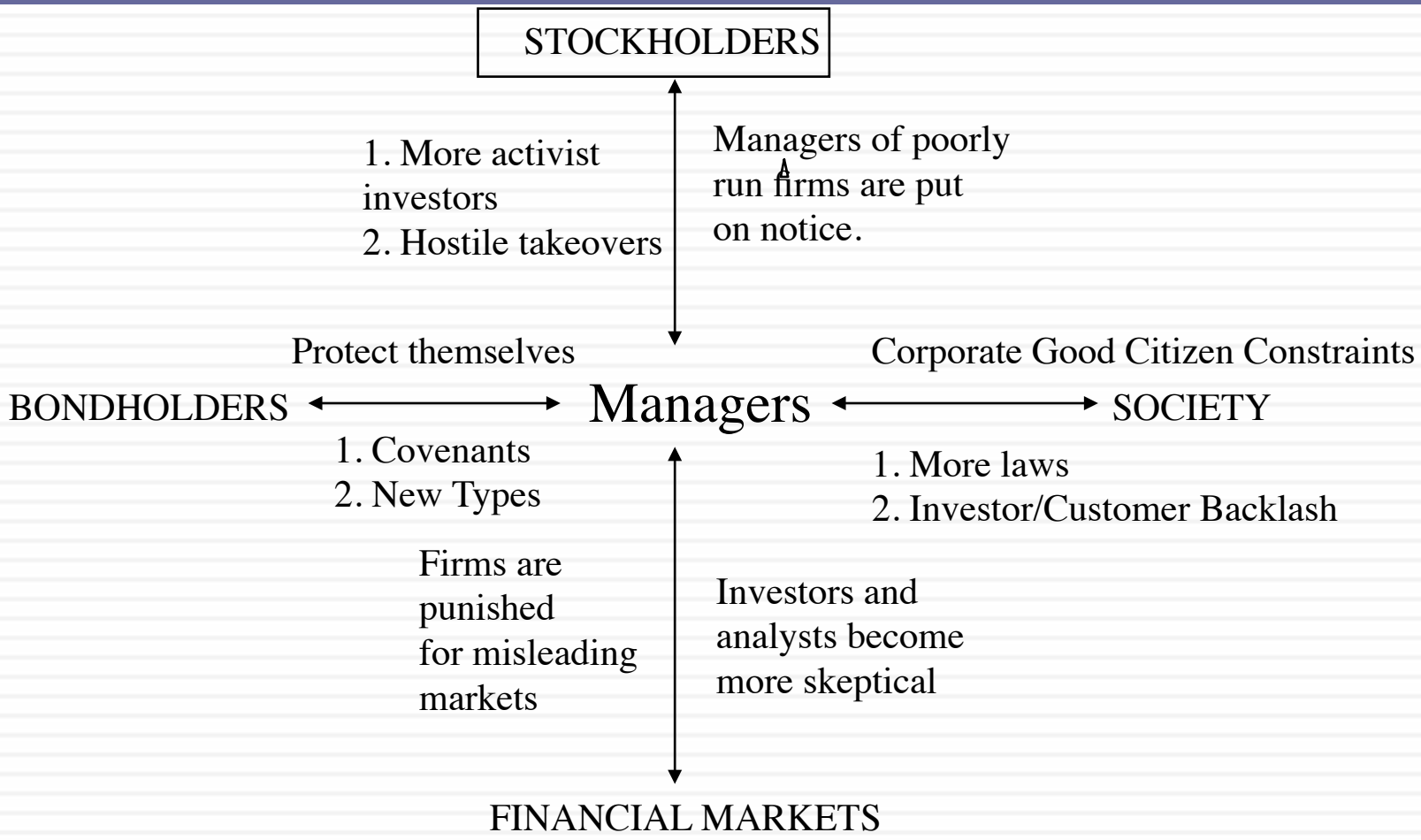
Does CRH have an effective board?

a. Yes
b. No

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

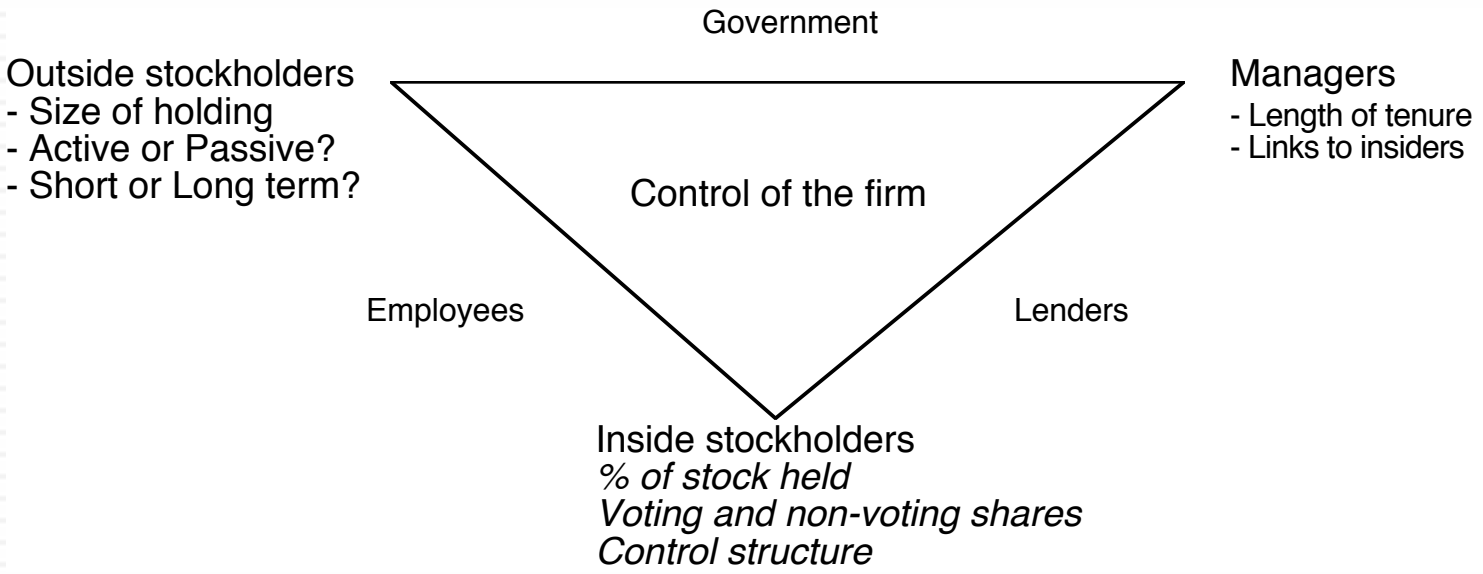
- To choose a different mechanism for corporate governance, i.e, assign the responsibility for monitoring managers to someone other than stockholders.
- To choose a different objective for the firm.
- To maximize stock price, but reduce the potential for conflict and breakdown:
  - Making managers (decision 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?



Who owns your equity?
CRH's top stockholders in 2015

CRH LN GBp XD ↑ AT 1748.00 -63.00 L1747.00/1749.00L 4855x8578
At 10:27 d Vol 5,533,892 O 1758.00L H 1771.00L L 1734.00L Prev 1811.00

CRH LN Equity | 25) Settings | What's New | Holders by Size: Current

CRH PLC ISIN IE0001827041

1) Current | 2) Historical | 3) Matrix | 4) Ownership | 5) Transactions | 6) Options

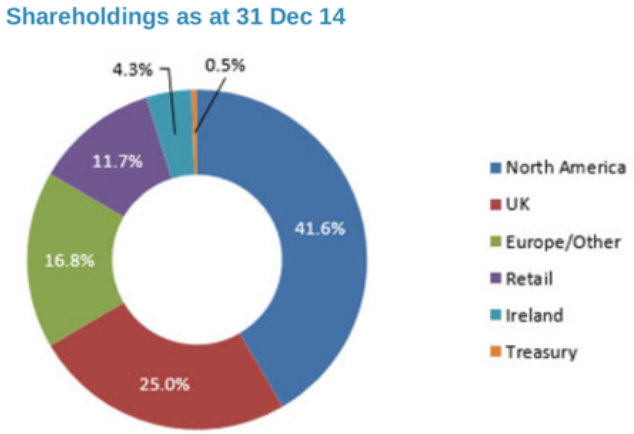
Search Name -- | 20) Save | 22) Delete | 3) Saved Searches 24) Refine Search

Text Search | Holder Group All Holders | Allocate Multi-Managed | 20) Export

	Holder Name	Portfolio Name	Source	Opt	Position	% Out	Latest Chg	File Dt	
			All Sources	All					
1.	BLACKROCK	n/a	RNS-MAJ		67,412,664	8.27	3,821,335	02/12/15	
2.	UBS AG	n/a	Co File		26,380,604	3.23	0	12/31/13	
3.	HARBOR CAPITAL ADVISORS I	n/a	RNS-MAJ		21,853,816	2.68	0	01/30/15	
4.	FRANKLIN RESOURCES	n/a	Co File		21,503,171	2.64	0	12/31/13	
5.	FIRST EAGLE INVESTMENT MG	Multiple Portfolios	MF-AGG		16,066,372	1.97	-67,504	12/31/14	
6.	VANGUARD GROUP INC	Multiple Portfolios	MF-AGG		15,705,224	1.93	494,089	02/28/15	
7.	NORGES BANK INVESTMENT M	NORGES BANK IM GOVER	MF-NOR		14,393,737	1.76	0	12/31/13	
8.	BNP PARIBAS	n/a	ULT-AGG		7,957,693	0.98	1,284,535	11/30/14	
9.	BANK OF NEW YORK MELLON	Multiple Portfolios	MF-AGG		7,516,846	0.92	2,959,804	03/13/15	
10.	MANNING & NAPIER ADVISOR	Multiple Portfolios	MF-AGG		5,651,409	0.69	-892,190	12/31/14	
11.	TIAA CREF INVESTMENT MANA	Multiple Portfolios	MF-AGG		4,912,512	0.60	260,334	01/31/15	
12.	STATE STREET CORP	Multiple Portfolios	MF-AGG		4,876,572	0.60	-24,804	03/13/15	
13.	UNICREDIT SPA	n/a	ULT-AGG		4,651,664	0.57	-927,464	12/31/14	
14.	MORGAN STANLEY	n/a	ULT-AGG		4,082,418	0.50	-92,446	01/31/15	
15.	INVESTEC ASSET MANAGEMEN	Multiple Portfolios	MF-AGG		3,683,575	0.45	-44,071	01/31/15	
16.	CAPITAL RESEARCH GLOBAL I	AMERICAN FUNDS CAPIT	MF-USA		3,000,000	0.37	0	12/31/14	
17.	LEGAL & GENERAL GROUP PL	Multiple Portfolios	MF-AGG		2,858,043	0.35	37,734	02/27/15	
18.	HARTFORD FINANCIAL SERVIC	n/a	ULT-AGG		2,643,500	0.32	4,672	01/31/15	
19.	FRANK RUSSELL TRUST COMP	Multiple Portfolios	MF-AGG		2,434,898	0.30	-257,757	02/18/15	

% Out 38.65 | Short Interest % Out n/a | Zoom 100%

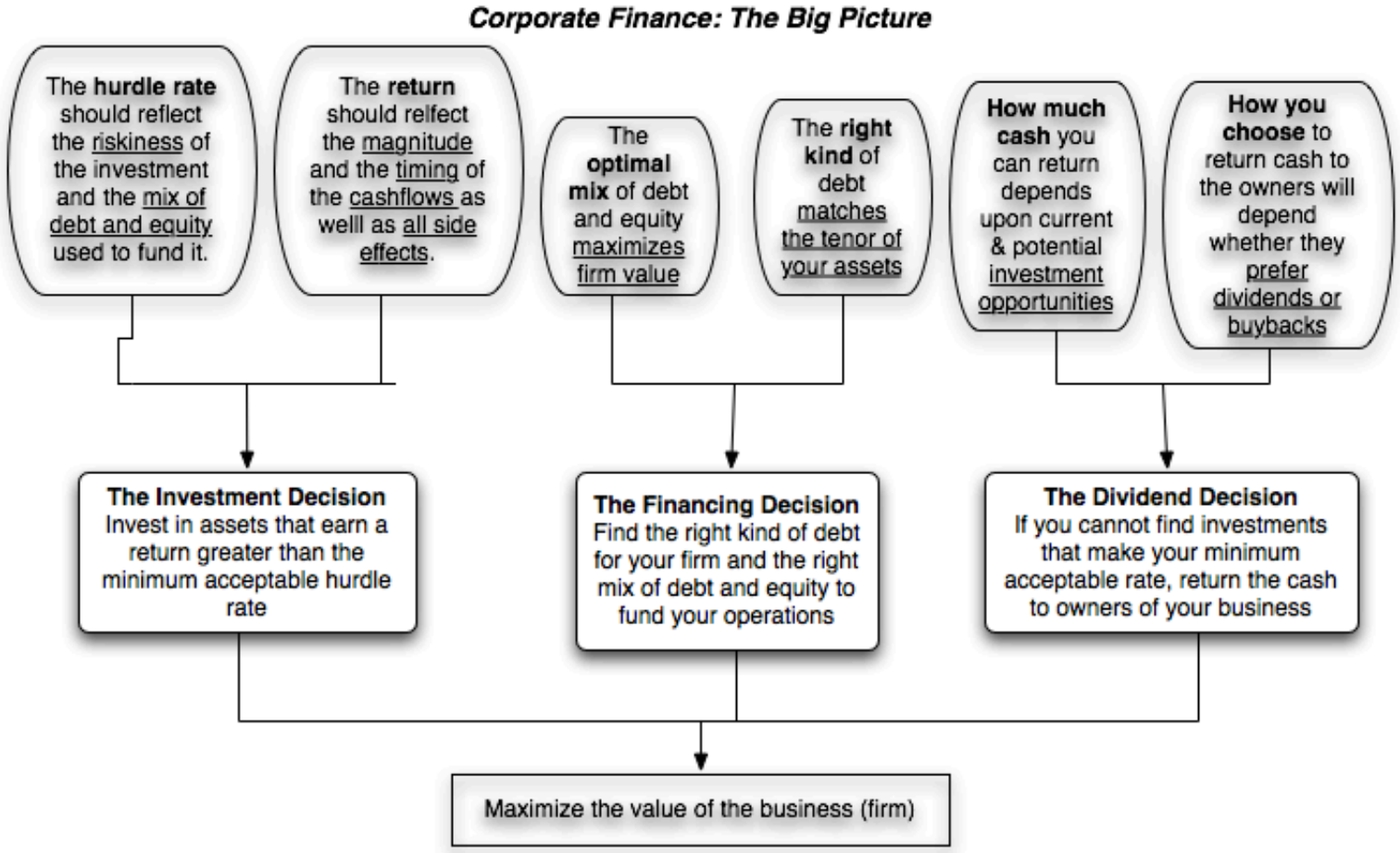
And the geographical breakdown..



Ownership of Ordinary Shares

Geographic location*	Number of shares held '000	% of total
North America	309,829	41.61%
UK	185,851	24.96%
Europe/Other	125,413	16.85%
Retail	87,458	11.75%
Ireland	32,198	4.32%
Treasury	3,776	0.51%
	744,525	100.00%

First Principles



What is Risk?

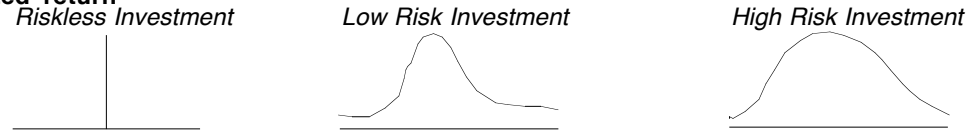
- Risk, in traditional terms, is viewed as a ‘negative’. Webster’s dictionary, for instance, defines risk as “exposing to danger or hazard”. The Chinese symbols for risk, reproduced below, give a much better description of risk:

- 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 -

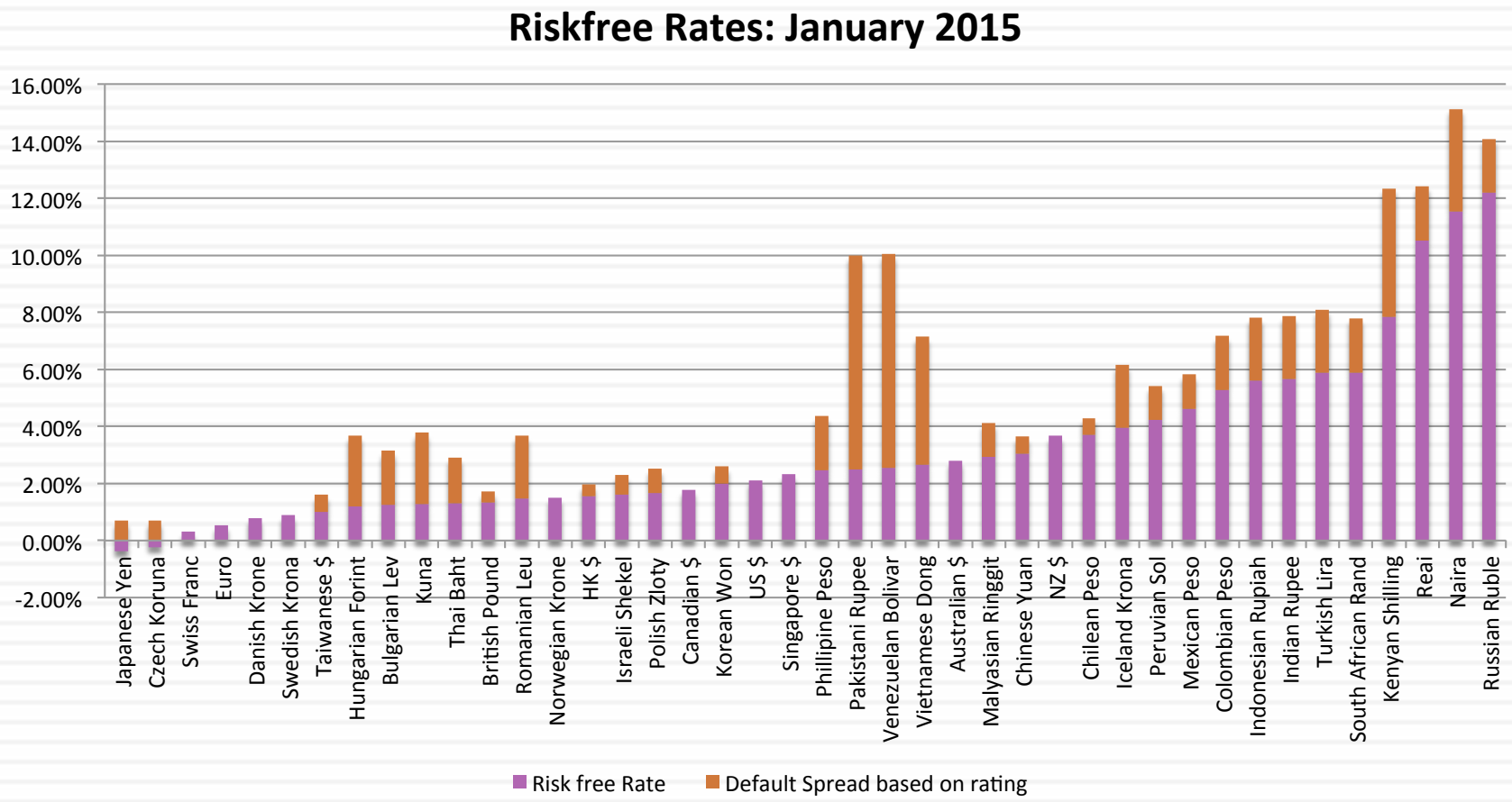
- The capital asset pricing model yields the following expected return:
  - Expected Return = Riskfree Rate+ Beta * (Expected Return on the Market Portfolio - Riskfree Rate)
- To use the model we need three inputs:
  a. The current risk-free rate
  b. The expected market risk premium (the premium expected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

I. A Riskfree Rate

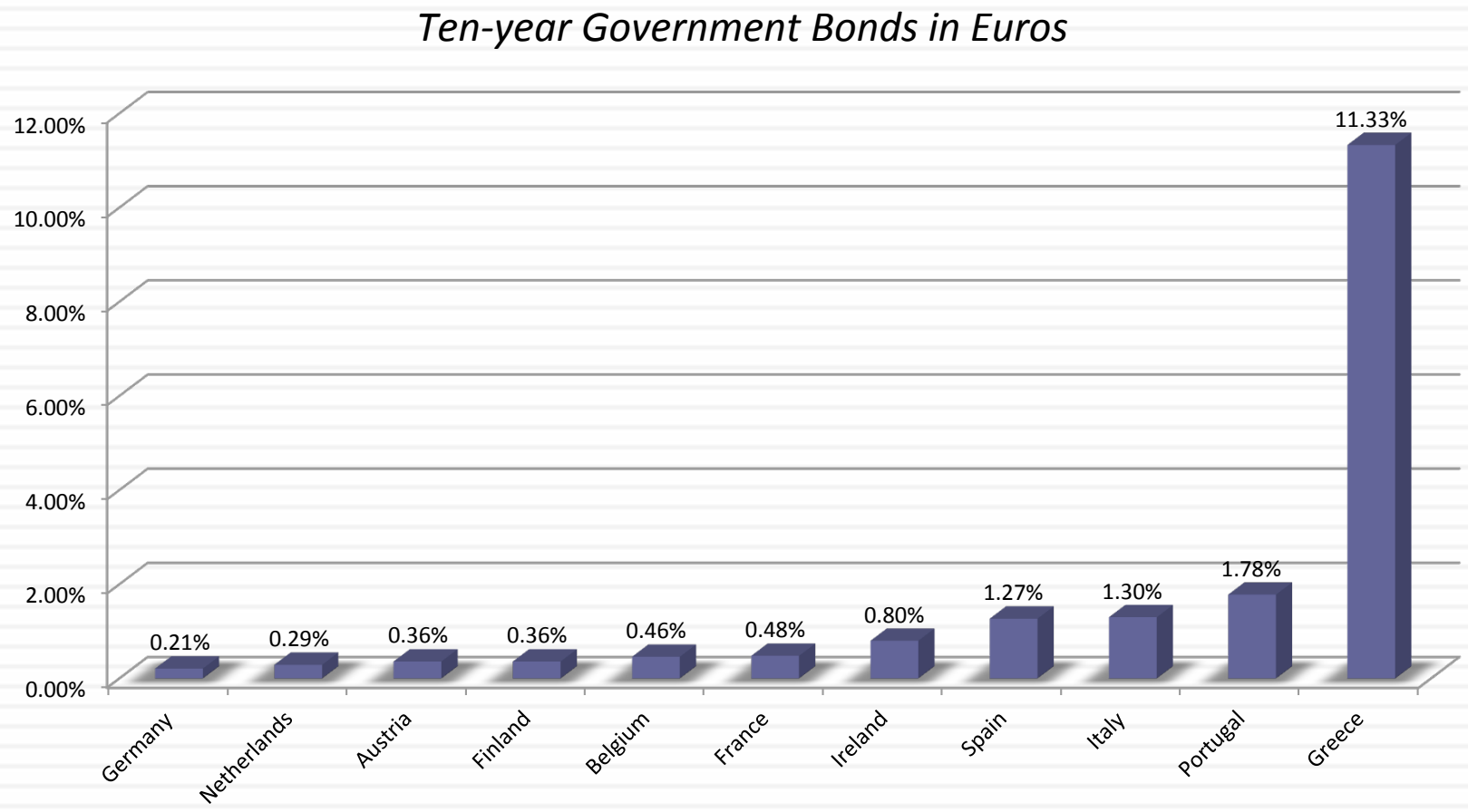
- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
  - No default risk
  - No reinvestment risk

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.

Risk free rates by currency: January 2015



The Euro Risk Free Rate: March 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

Base year cash flow (last 12 mths)
Dividends (TTM): 38.57
+ Buybacks (TTM): 61.92
= Cash to investors (TTM): **100.50**
Earnings in TTM: *114.74*

100.5 growing @ 5.58% a year

Expected growth in next 5 years
Top down analyst estimate of earnings growth for S&P 500 with stable payout: **5.58**%

E(Cash to investors) 106.10 112.01 118.26 124.85 131.81

S&P 500 on 1/1/15= 2058.90

$$2058.90 = \frac{106.10}{(1+r)} + \frac{112.91}{(1+r)^2} + \frac{118.26}{(1+r)^3} + \frac{124.85}{(1+r)^4} + \frac{131.81}{(1+r)^5} + \frac{131.81(1.0217)}{(r-.0217)(1+r)^5}$$

Beyond year 5
Expected growth rate = Riskfree rate = 2.17%
Expected CF in year 6 = 131.81(1.0217)

r = Implied Expected Return on Stocks = 7.95%

Minus

Risk free rate = T.Bond rate on 1/1/15= 2.17%

Equals

Implied Equity Risk Premium (1/1/15) = 7.95% - 2.17% = 5.78%

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 January 2015, that spread was 1.55% for the Brazilian $ bond)
  - The sovereign CDS spread for the country. In January 2015, 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 1.90% in January 2015.
- 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 7.65% for Brazil, if we use 5.75% 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 January 2015, 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 C-Bond = 1.90%
  - Brazil Country Risk Premium = 1.90% (21%/14%) = 2.85%
  - Brazil Total ERP = Mature Market Premium + CRP = 5.75% + 2.85% = 8.60%

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%**

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

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

CRH: Equity Risk Premium

Region	*Sales (in millions of Euros)*	*Proportion*	*Weighted average ERP for region*	*Weight * ERP*
North America	10071	53.17%	5.75%	3.06%
Europe	8871	46.83%	6.88%	3.22%
CRH	**18942**	**100.00%**		**6.28%**

Implication 1: A CRH investment in North America, in any given business or currency, will require a lower cost of equity than an equivalent investment in Western Europe.
Implication 2: Given the divergence of ERP within Europe, an investment in Ireland or Poland will require a higher cost of equity than an equivalent investment in the Netherlands.

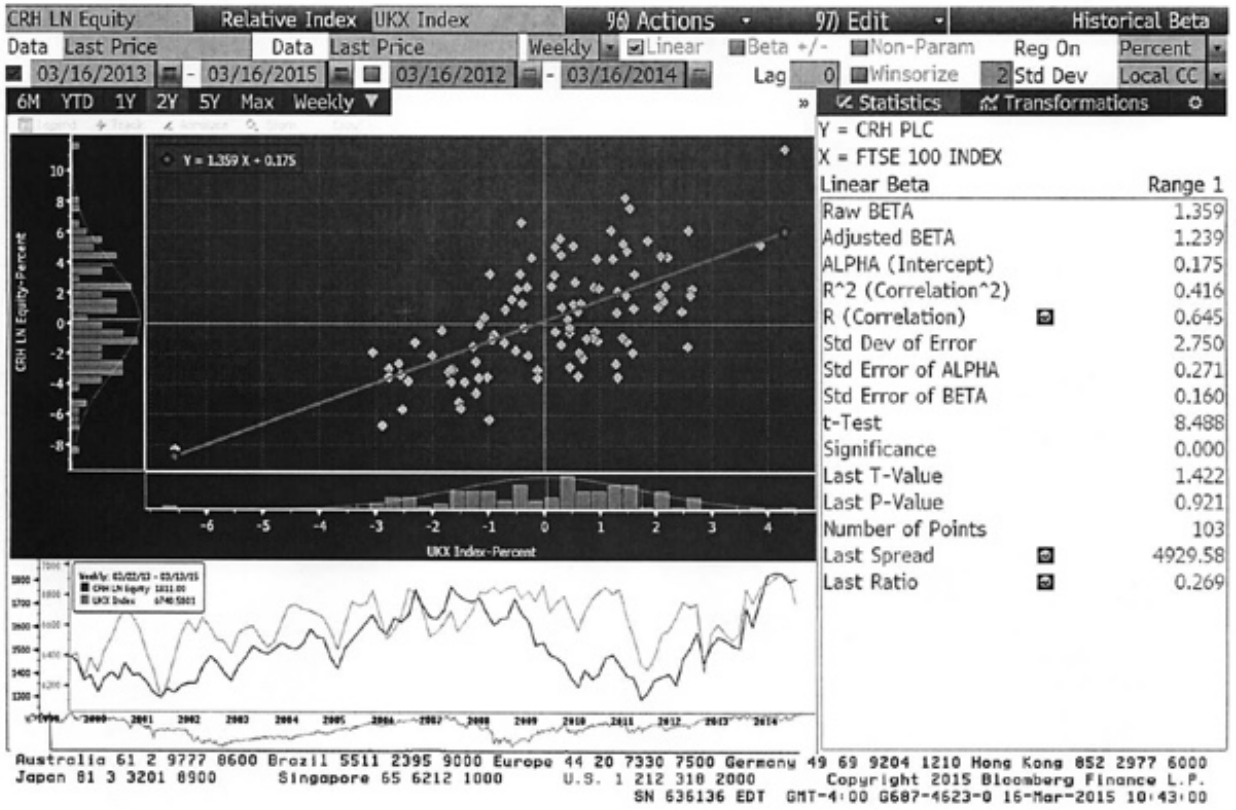
Just be glad that you are not Coca Cola (from 2012)

Region	*Revenues*	*Total ERP*	*CRP*
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

Things to watch out for

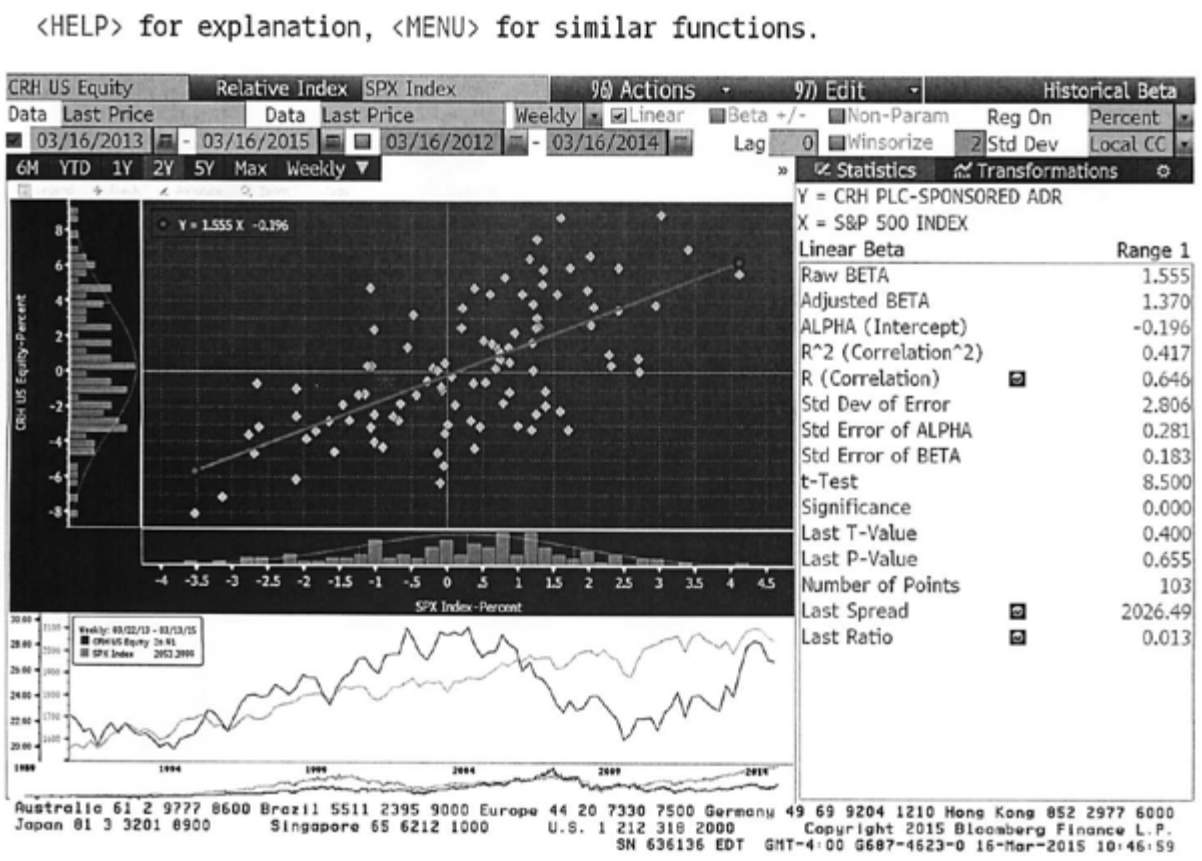
1. Aggregation across regions. For instance, the Pacific region often includes Australia & NZ with Asia
2. Obscure aggregations including Eurasia and Oceania

Estimating Beta: The Regression Approach

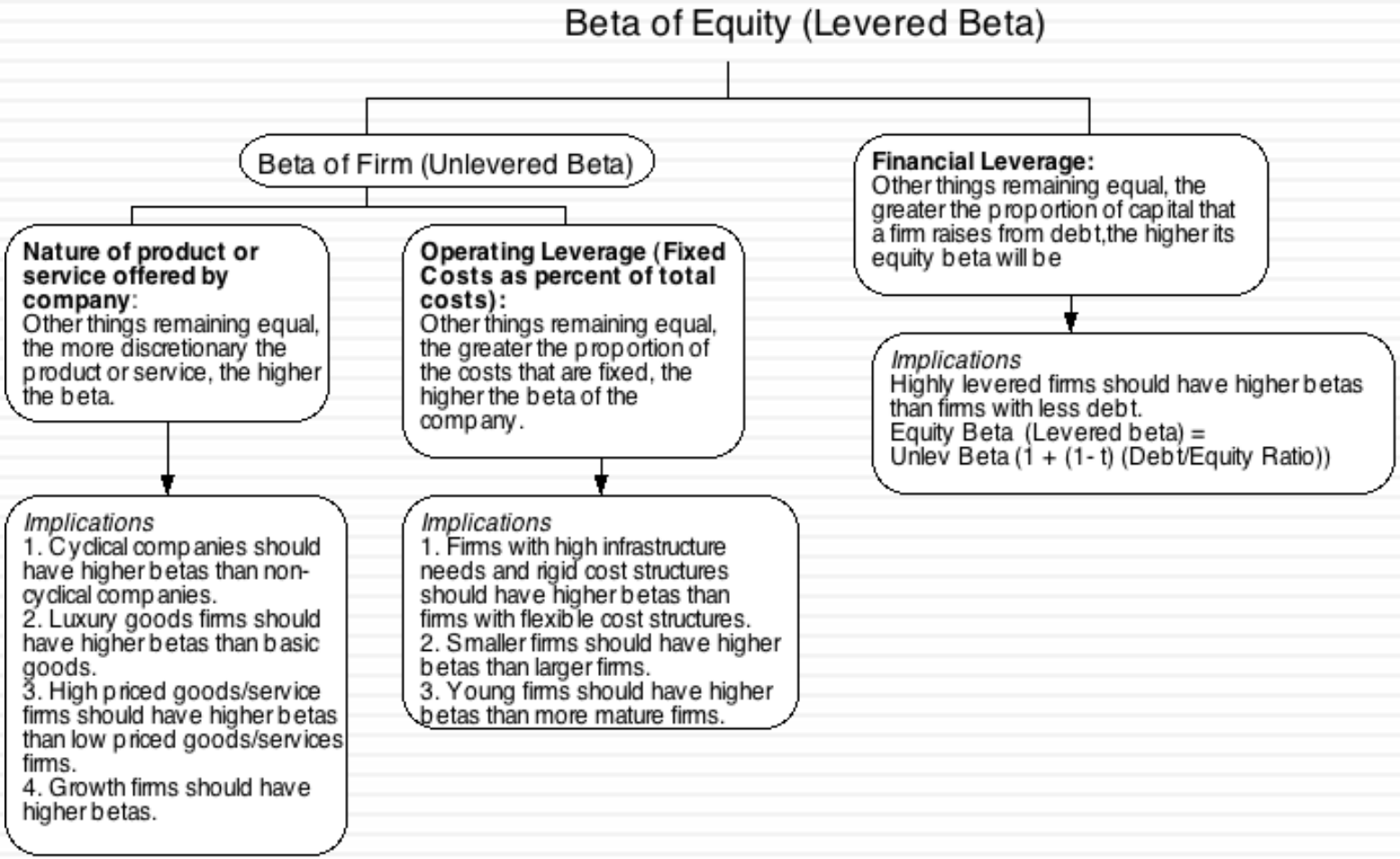


Regression Beta = 1.36

And another regression…



Determinants of Betas



Bottom up beta for CRH

CRH is in 3 businesses, and we estimate the beta of each one:

CRH Division	*Business*	*Revenues*	*EV/Sales*	*Estimated Value*	*Proportion*	*Unlevered Beta*
Heavyside/Materials	Construction Supplies	8,999.00€	1.3707	12,335 €	49.21%	0.8934
Lightside/Products	Building Materials	4,138.00€	1.1117	4,600 €	18.35%	0.7998
Distribution	Retail (Building Supply)	5,775.00€	1.4076	8,129 €	32.43%	0.8970
CRH: Company		**18,912.00€**		**25,063 €**		**0.8774**

- Step 1: Start with CRH's revenues by business.
- Step 2: Estimate the value as a multiple of revenues by looking at what the market value of publicly traded firms in each business is, relative to revenues.

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

- Step 3: Multiply the revenues in step 1 by the industry average multiple in step 2 to get the estimated value, by business.

CRH's Cost of Equity

- Step 1: Allocate debt across businesses

CRH Division	*Estimated Value*	*Sector-average D/E ratio*	*Estimated Value*	*Debt based on Sector average*	*Proportion of debt in division*	*Actual Debt allocated*	*CRH Divisional D/E ratio*
Heavyside/ Materials	Construction Supplies	47.79%	12,334.55€	3,989 €	57.83%	3,601€	47.79%
Lightside/Products	Building Materials	37.23%	4,600.25€	1,248 €	18.09%	1,127€	37.23%
Distribution	Retail (Building Supply)	25.68%	8,128.64€	1,661 €	24.08%	1,500€	25.68%
CRH: Company				**6,897 €**		**6,228 €**	**30.27%**

- Step 2: Compute levered betas and costs of equity for CRH's operating businesses.

CRH Division	*Unlevered Beta*	*CRH Divisional D/E ratio*	*Levered Beta*	*Cost of Equity*	*Cost of Equity Europe (Euros)*	*Cost of Equity North America (Euros)*	*Cost of Equity North America (US $)*
Heavyside/ Materials	0.8934	47.79%	1.1923	7.70%	8.41%	7.07%	8.86%
Lightside/Products	0.7998	37.23%	1.0082	6.54%	7.15%	6.01%	7.80%
Distribution	0.8970	25.68%	1.0582	6.86%	7.49%	6.29%	8.08%
CRH: Company	**0.8774**	**30.27%**	**1.0633**	**6.89%**	**7.53%**	**6.32%**	**8.11%**

Discussion Issue

- The head of the European **distribution business** has come to you with a new investment in **Poland** 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 10% (in **Zlotys**). 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 Zlotys is 2% whereas the inflation rate in Euros is close to zero).

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
- For CRH, we obtain the following:
  - Operating Income/ Interest Expense = 966/258 = 3.74
  - For every euro in interest expenses, CRH delivers 3.74 Euros in operating income.

Interest Coverage Ratios, Ratings and Default Spreads

Interest coverage ratio	*Rating is*	*Spread is*
> 8.5	Aaa/AAA	0.40%
6.5-8.5	Aa2/AA	0.70%
5.5-6.5	A1/A+	0.90%
4.25-5.5	A2/A	1.00%
3-4.25	A3/A-	1.20%
2.5-3	Baa2/BBB	1.75%
2.25-2.5	Ba1/BB+	2.75%
2-2.25	Ba2/BB	3.25%
1.75-2	B1/B+	4.00%
1.5-1.75	B2/B	5.00%
1.25-1.5	B3/B-	6.00%
0.8-1.25	C2/C	7.00%
0.65-0.85	Ca2/CC	8.00%
0.2-0.65	Caa/CCC	10.00%
<0.25	D2/D	12.00%

CRH's actual rating is Baa2/ BBB+.

CRH, Market Cap > $ 5 billion: 3.74 → Synthetic rating = A3/A-

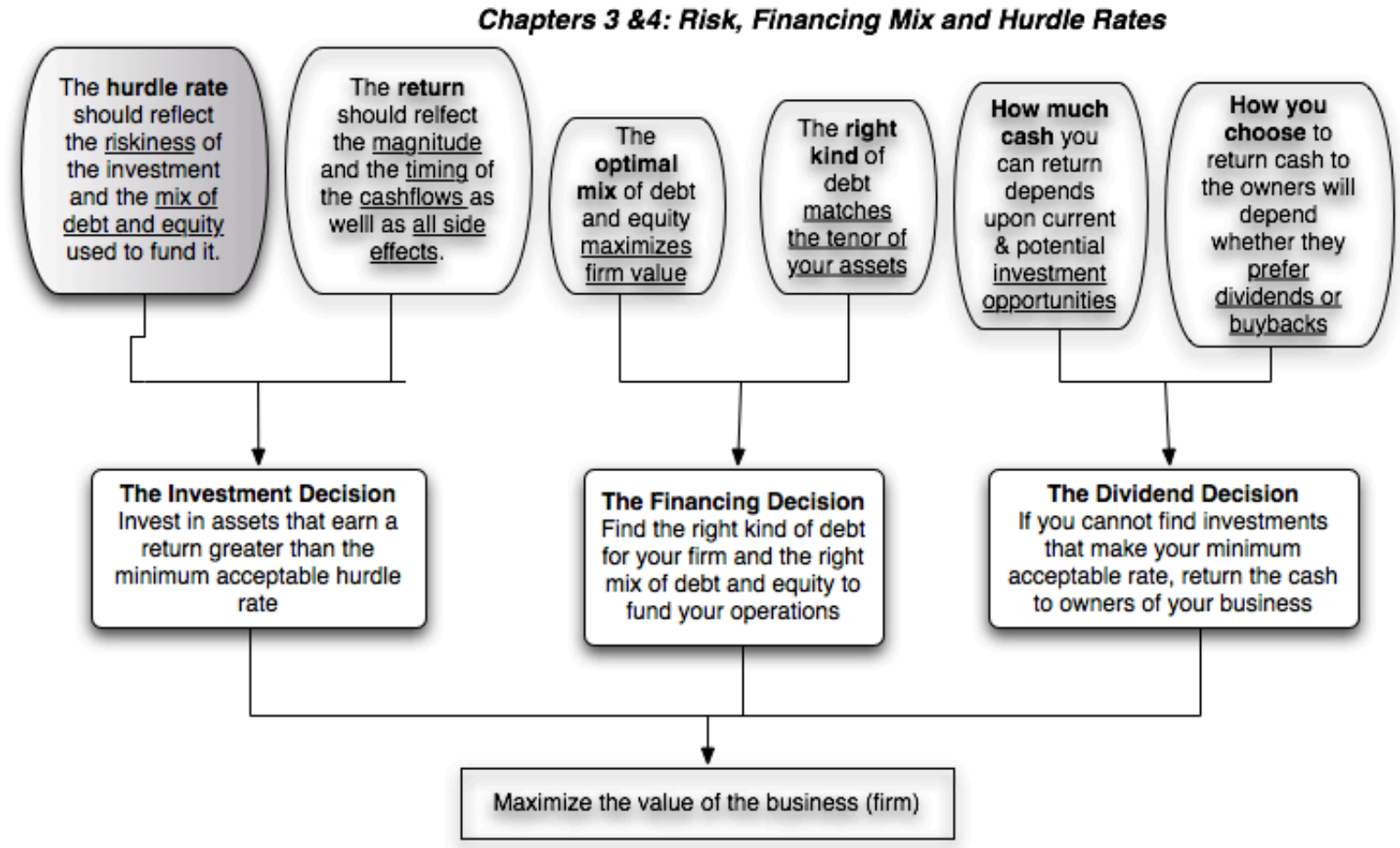
CRH's cost of debt

- Based on the actual rating, the default spread is 1.75%, which can be added to the risk free rate of 0.21% to arrive at a pre-tax cost of debt of 1.96% (in Euros).
- Given that CRH derives so much of its revenues outside Ireland, it makes sense for it to place most of its debt in the US and claim a tax benefit, based upon the US marginal tax rate of 30%.
  - After-tax cost of debt = 1.96% (1-.30) = 1.37%
- If you were computing the cost of debt in US dollar terms, you would start with the US $ risk free rate instead:
  - Pre-tax cost of debt = 2.00% + 1.75% = 3.75%
  - After-tax cost of debt = 3.75% (1-.30) = 2.625%

Current Cost of Capital: CRH

			All in Euros					
CRH Division	*CRH Divisional D/E ratio*	*Divisional Debt to Capital Ratio*	*Cost of equity*	*After-tax cost of debt*	*Cost of capital*	*Cost of Capital Europe (Euros)*	*Cost of Capital North America (Euros)*	*Cost of Capital North America (US $)*
Heavyside/ Materials	47.79%	32.34%	7.70%	1.37%	5.65%	6.14%	5.22%	6.84%
Lightside/ Products	37.23%	27.13%	6.54%	1.37%	5.14%	5.58%	4.75%	6.39%
Distribution	25.68%	20.43%	6.86%	1.37%	5.73%	6.24%	5.29%	6.97%
CRH: Company	30.27%	23.24%	6.89%	1.37%	5.61%	6.10%	5.17%	6.84%

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"

The CRH Asset Purchase

- LaFarge and Holcim, as part of a requirement to complete a merger, were forced to sell some of their assets and CRH was a potential buyer.
- The assets had a price tag of 6.5 billion Euros and offered CRH a chance to enter “new” markets and perhaps other synergies.
- CRH planned to finance this merger with the following combination:
  - 1.6 billion Euros from a new equity offering
  - 2.0 billion Euros in cash
  - 2.9 billion Euros of new debt

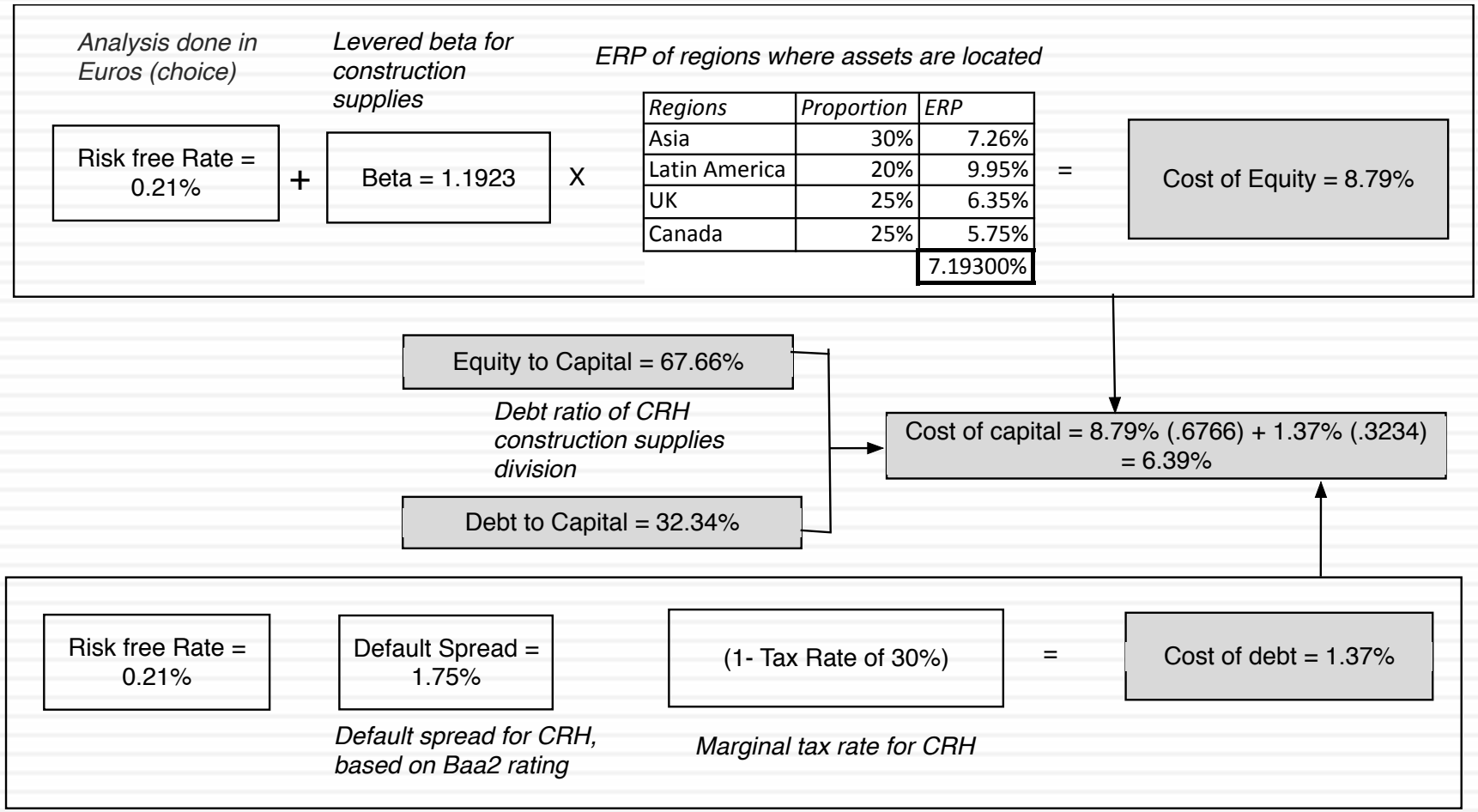
What are you buying?

- Business: The assets are primarily in the construction material (cement) business.
- Geographies: The revenues from these assets come from Britain, Canada, Brazil and parts of Asia and there are production facilities in Asia and Latin America. Buying these assets will double CRH's exposure to emerging markets.
- Operations: The assets generated 6 billion Euros in revenues in the most recent year.

Estimating a cost of capital for this asset acquisition

- In estimating a 'hurdle rate' to use in assessing this acquisition, what should you use as
  - The risk free rate?
  - The beta for the investment (risk)?
  - The equity risk premium?
  - The debt mix?

Cost of capital for asset acquisition



Expected Earnings on acquired assets: Assumptions

- The acquired assets are primarily in the construction supplies business.
- The assets generated 6 billion Euros in revenues last year and those revenues are expected to grow 8% a year for the next 5 years, 5% a year for the following 5 years and then settle into mature growth (growth rate of the global economy).
- The assets currently has an EBITDA/Sales margin of 10% but this will rise over the next 5 years to 12.27%, the average for construction supplies companies in 2014. The DA/Sales will be 4.51%for the next 10 years (resulting in a steady state operating margin of 7.76%); this was the average for global construction supplies companies in 2014.
- To maintain the earning power of the assets and to generate the expected growth, CRH will have to reinvest 110% of its depreciation as capital expenditures each year.
- The non-cash working capital invested will amount to 16.27% of revenues, the industry average for construction supplies in 2014.
- The average tax rate that CRH will pay on its earnings from these assets will be 30%.

Step 1: Estimate Accounting Earnings on Project

Year	1	2	3	4	5	6	7	8	9	10
Revenues	€ 6,300	€ 6,804	€ 7,348	€ 7,936	€ 8,571	€ 9,000	€ 9,450	€ 9,922	€ 10,418	€ 10,939
EBITDA Margin	10.45%	10.91%	11.36%	11.82%	12.27%	12.27%	12.27%	12.27%	12.27%	12.27%
EBITDA	€ 659	€ 742	€ 835	€ 938	€ 1,052	€ 1,104	€ 1,159	€ 1,217	€ 1,278	€ 1,342
DA	€ 284	€ 307	€ 331	€ 358	€ 387	€ 406	€ 426	€ 447	€ 470	€ 493
EBIT	€ 374	€ 435	€ 504	€ 580	€ 665	€ 698	€ 733	€ 770	€ 808	€ 849
Taxes	€ 112	€ 131	€ 151	€ 174	€ 200	€ 210	€ 220	€ 231	€ 243	€ 255
EBIT (1-t)	€ 262	€ 305	€ 352	€ 406	€ 466	€ 489	€ 513	€ 539	€ 566	€ 594

And the Accounting View of Return

Year	Afrer-tax Operating Income	Invested Capital	ROIC
1	€ 262.13	€ 6,500.00	4.03%
2	€ 304.72	€ 6,577.22	4.63%
3	€ 352.45	€ 6,689.91	5.27%
4	€ 405.87	€ 6,811.61	5.96%
5	€ 465.58	€ 6,943.05	6.71%
6	€ 488.86	€ 7,085.00	6.90%
7	€ 513.30	€ 7,195.32	7.13%
8	€ 538.97	€ 7,311.15	7.37%
9	€ 565.92	€ 7,432.77	7.61%
10	€ 594.21	€ 7,560.47	7.86%
Average			**6.35%**

Invested Capital = Capital invested at start of the year + Capital Expenditures – Depreciation + Change in non-cash WC

A tangent: How do CRH's existing investments measure up?

CRH Division	*EBITDA*	*Operating Income (2014)*	*Invested Capital*	*ROIC*	*Cost of Capital*	*Total Assets*	*% of invested capital*
Heavyside Europe	€ 380	€ 151	€ 2,956	3.93%	6.14%	€ 3,864	23.30%
Materials US	€ 609	€ 355	€ 4,777	5.71%	5.22%	€ 6,245	37.66%
Lightside Europe	€ 94	€ 71	€ 582	9.37%	5.58%	€ 761	4.59%
Products US	€ 263	€ 145	€ 1,945	5.73%	4.75%	€ 2,542	15.33%
Distribution Europe	€ 190	€ 112	€ 1,699	5.07%	6.24%	€ 2,221	13.39%
Distribution US	€ 105	€ 83	€ 727	8.77%	5.29%	€ 951	5.73%
CRH: Company	**€ 1,641**	**€ 917**	**€ 12,686**	**5.56%**	**5.61%**	**€ 16,584**	

The cash flow view of this project..

	1	2	3	4	5	6	7	8	9	10
EBIT (1-t)	€ 262	€ 305	€ 352	€ 406	€ 466	€ 489	€ 513	€ 539	€ 566	€ 594
+ DA	€ 284	€ 307	€ 331	€ 358	€ 387	€ 406	€ 426	€ 447	€ 470	€ 493
- Cap Ex	€ 313	€ 338	€ 365	€ 394	€ 425	€ 446	€ 469	€ 492	€ 517	€ 543
- Chg WC	€ 49	€ 82	€ 89	€ 96	€ 103	€ 70	€ 73	€ 77	€ 81	€ 85
FCFF	€ 185	€ 192	€ 231	€ 274	€ 324	€ 379	€ 397	€ 417	€ 438	€ 460

To get from income to cash flow, we

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

	1	2	3	4	5	6	7	8	9	10
DA	€ 284	€ 307	€ 331	€ 358	€ 387	€ 406	€ 426	€ 447	€ 470	€ 493
Tax rate *DA	€ 85	€ 92	€ 99	€ 107	€ 116	€ 122	€ 128	€ 134	€ 141	€ 148

- subtracted out the capital expenditures
- subtracted out the change in non-cash working capital

To incremental cash flows

- The principle of "incremental" cash flows: Here is a simple test:
  - What will happen (to this line item) if I take this investment?
  - What will happen (to this line item) if I do not?
  - If the answer is the same, that item is non-incremental and should not affect this decision.
- Any sunk costs?
  - Let's assume that $500 million of the $6.5 billion in this asset acquisition has already been spent and that you are not going to get that money back. Will that alter your decision?
  - If yes, why? If not, why not?
- Or allocated expenses?
  - Let's also assume that CRH plans to allocate $1 billion in G&A costs to these assets, after it acquires them.
  - Will that change your assessment of the investment? If yes, why? If not, why not?

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 assets that CRH acquires will last well past year 10, with cash flows growing at 0.2% a year in perpetuity, the value of the assets at the end of year 10 can be written as:

Terminal Value in year 10= CF in year 11/(Cost of Capital - Growth Rate)

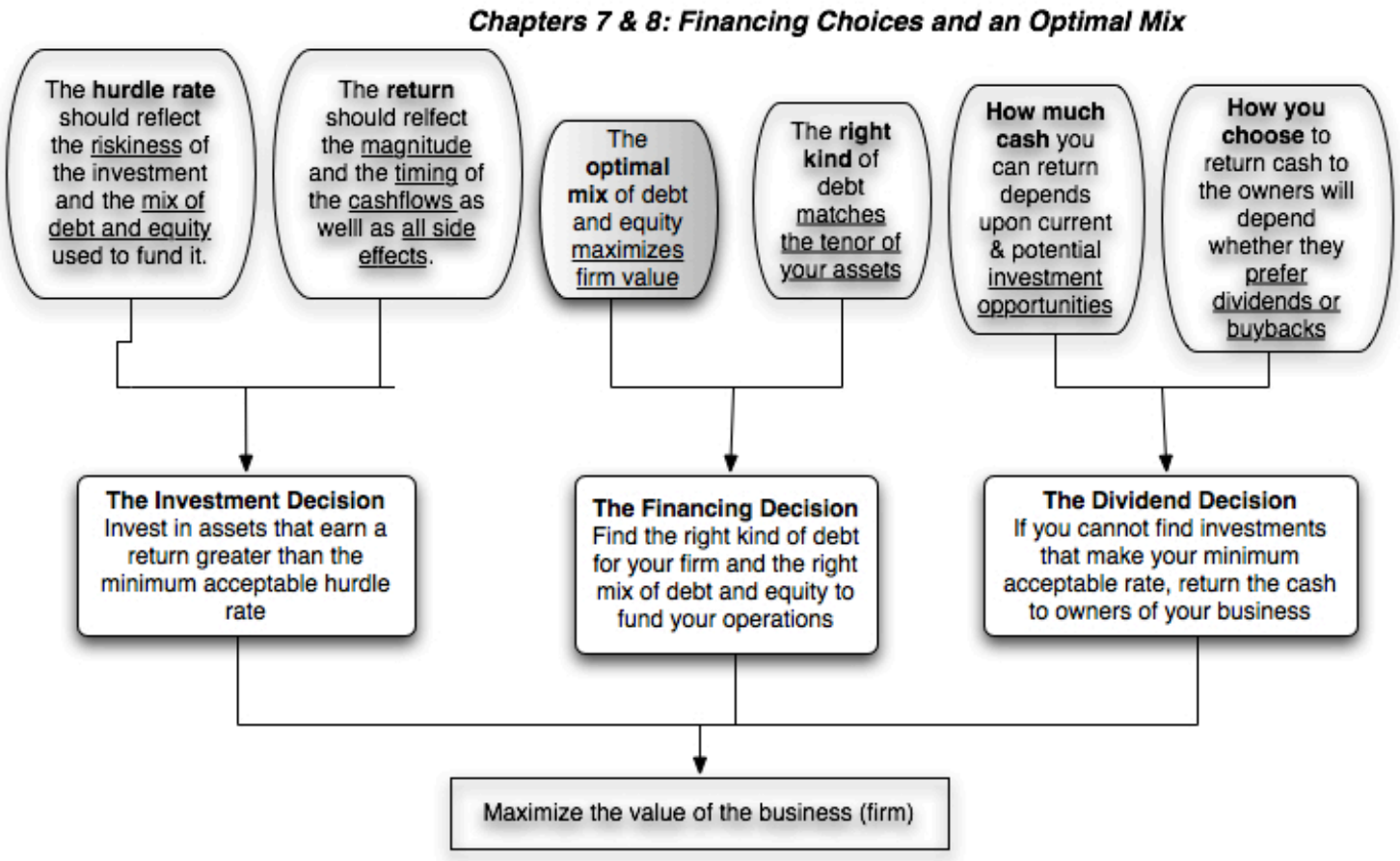
=460 m (1.002) /(.0639-.002) = 7,451 m

Which yields a NPV of..

Year	Incremental Cash flow	Terminal Value	PV @ 6.39%
1	€ 184.91		€ 173.81
2	€ 192.04		€ 169.67
3	€ 230.75		€ 191.63
4	€ 274.43		€ 214.23
5	€ 323.63		€ 237.46
6	€ 378.55		€ 261.08
7	€ 397.47		€ 257.67
8	€ 417.35		€ 254.31
9	€ 438.21		€ 250.99
10	€ 460.13	€ 7,450.86	€ 4,259.04
			€ 6,269.88
Cost of acquiring assets			€ 6,500.00
Net Present Value =			-€ 230.12

Discounted at the asset cost of capital of 6.39%

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)

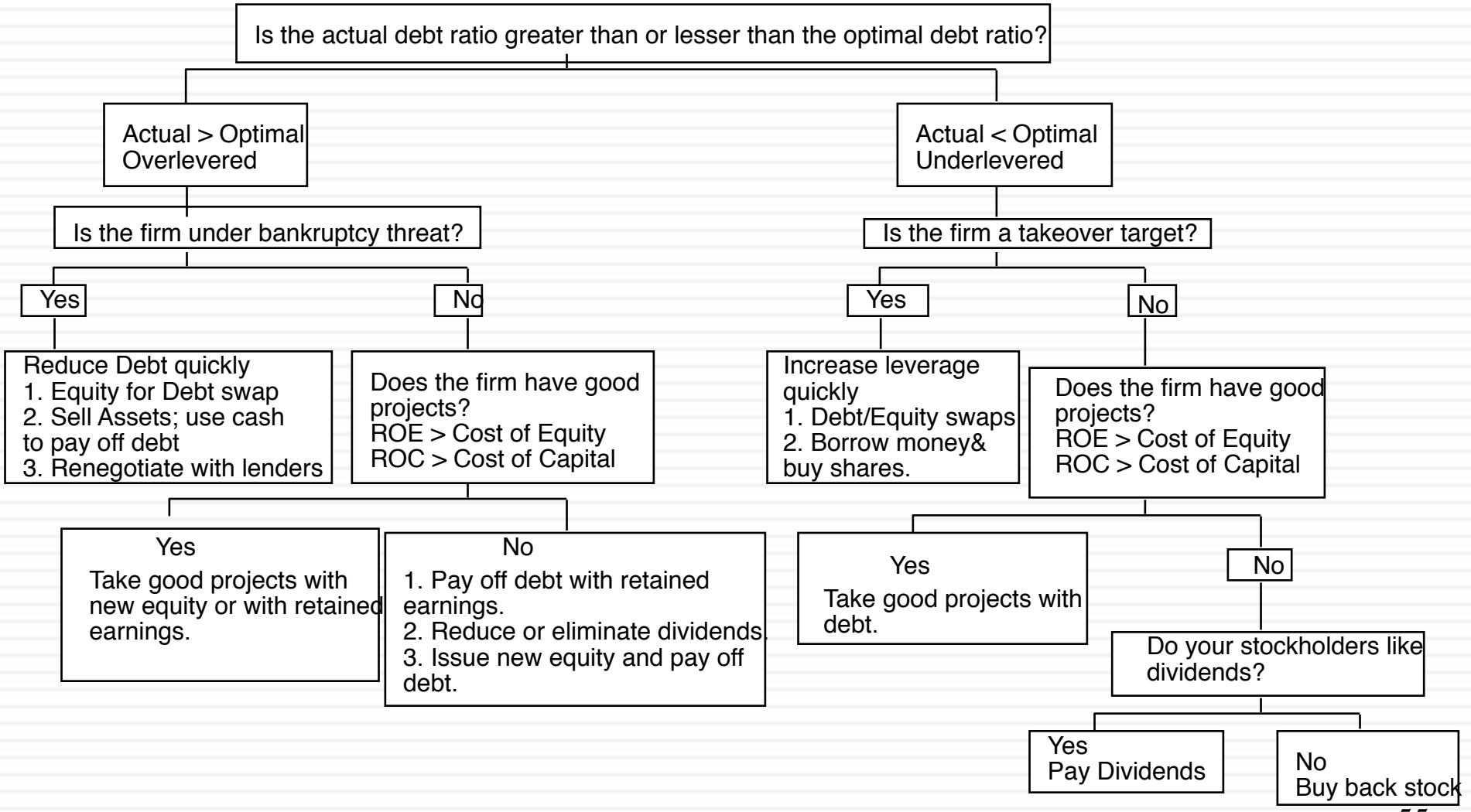
3. Estimate the Cost of Capital at different levels of debt

4. Calculate the effect on Firm Value and Stock Price.

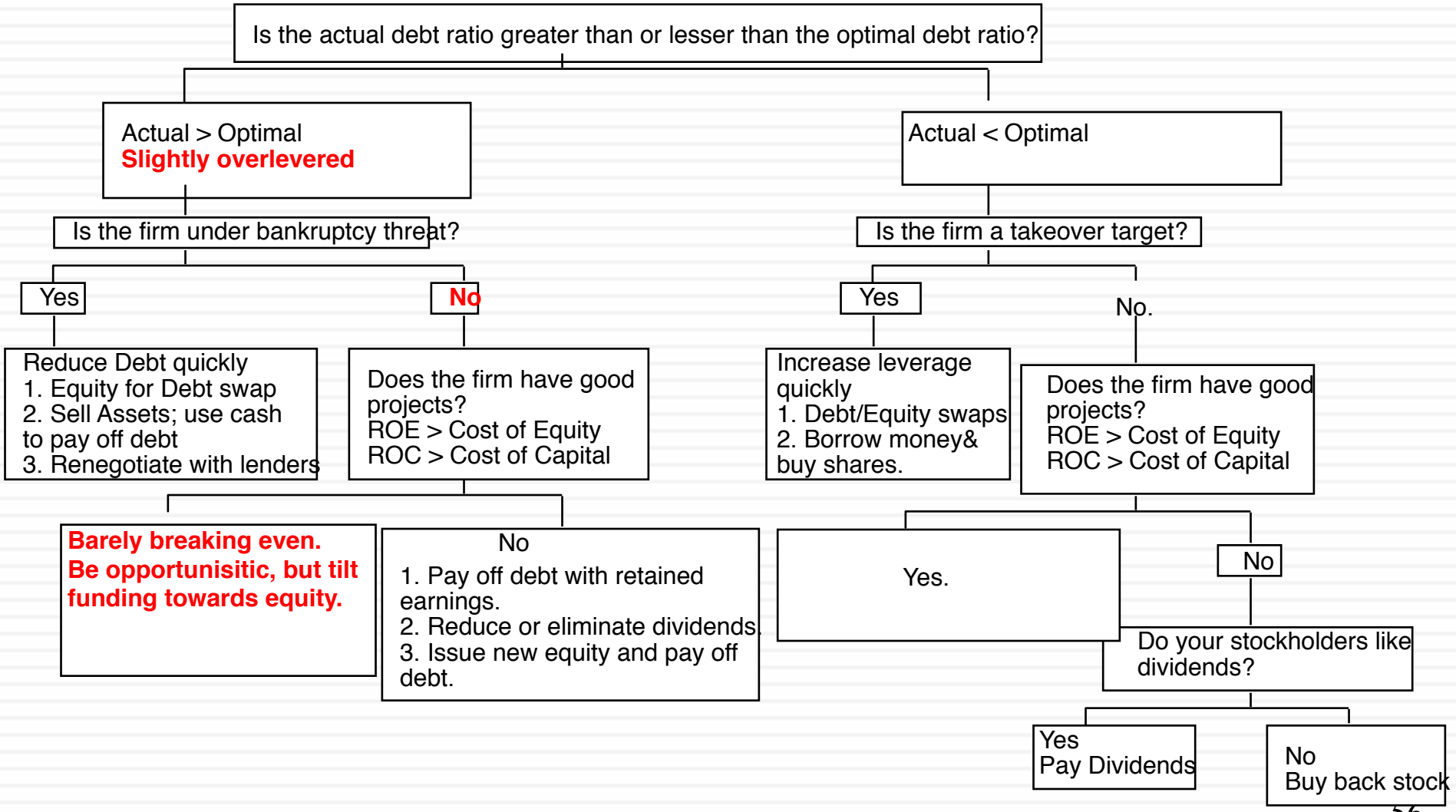
Finding an optimal mix: CRH's cost of capital schedule…

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	Cost of capital
0%	0.8774	5.72%	Aaa/AAA	1.41%	30.00%	0.99%	5.72%
10%	0.9456	6.15%	Aaa/AAA	1.41%	30.00%	0.99%	5.63%
20%	1.0309	6.68%	Aa2/AA	1.71%	30.00%	1.20%	5.59%
30%	1.1406	7.37%	Caa/CCC	8.01%	30.00%	5.61%	6.84%
40%	1.3399	8.62%	Ca2/CC	9.01%	20.92%	7.13%	8.03%
50%	1.6346	10.48%	C2/C	11.01%	13.69%	9.50%	9.99%
60%	2.0432	13.04%	C2/C	11.01%	11.41%	9.75%	11.07%
70%	2.7243	17.32%	C2/C	11.01%	9.78%	9.93%	12.15%
80%	4.0865	25.87%	C2/C	11.01%	8.56%	10.07%	13.23%
90%	8.1730	51.54%	C2/C	11.01%	7.61%	10.17%	14.31%

A Framework for Getting to the Optimal

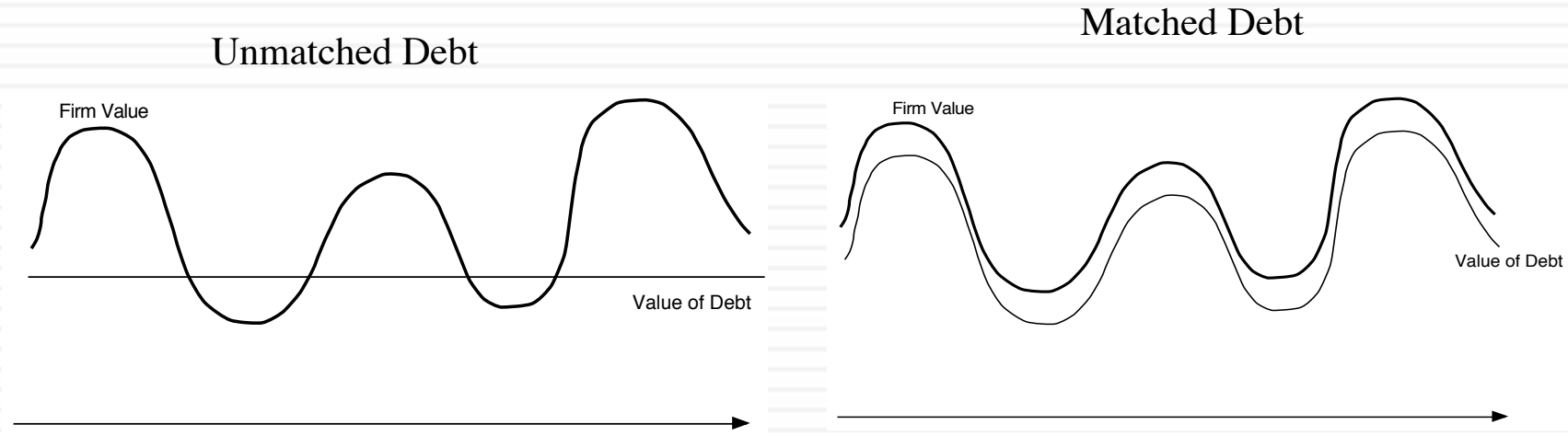


CRH: Applying the Framework

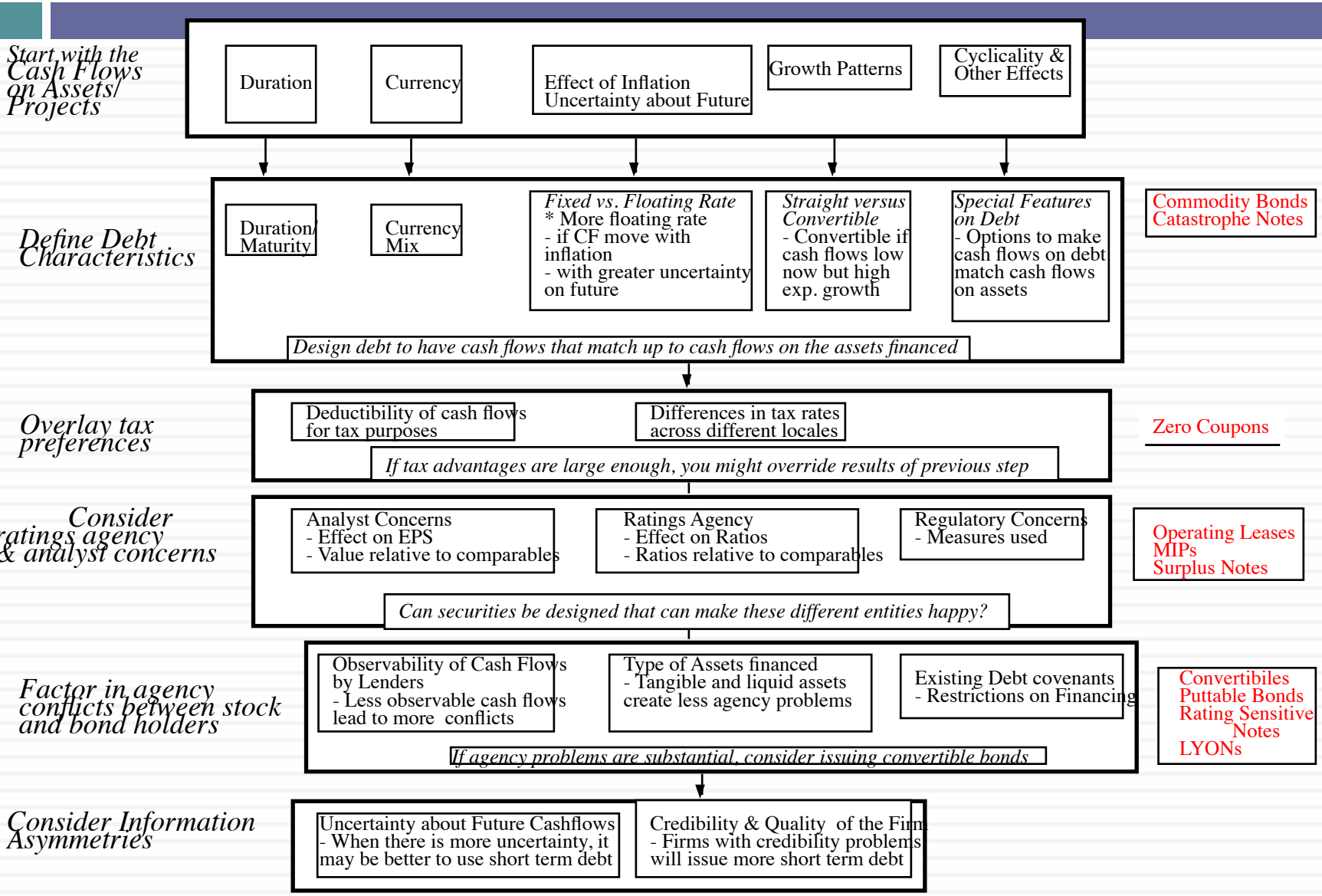


Designing Debt: The Fundamental Principle

- 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.



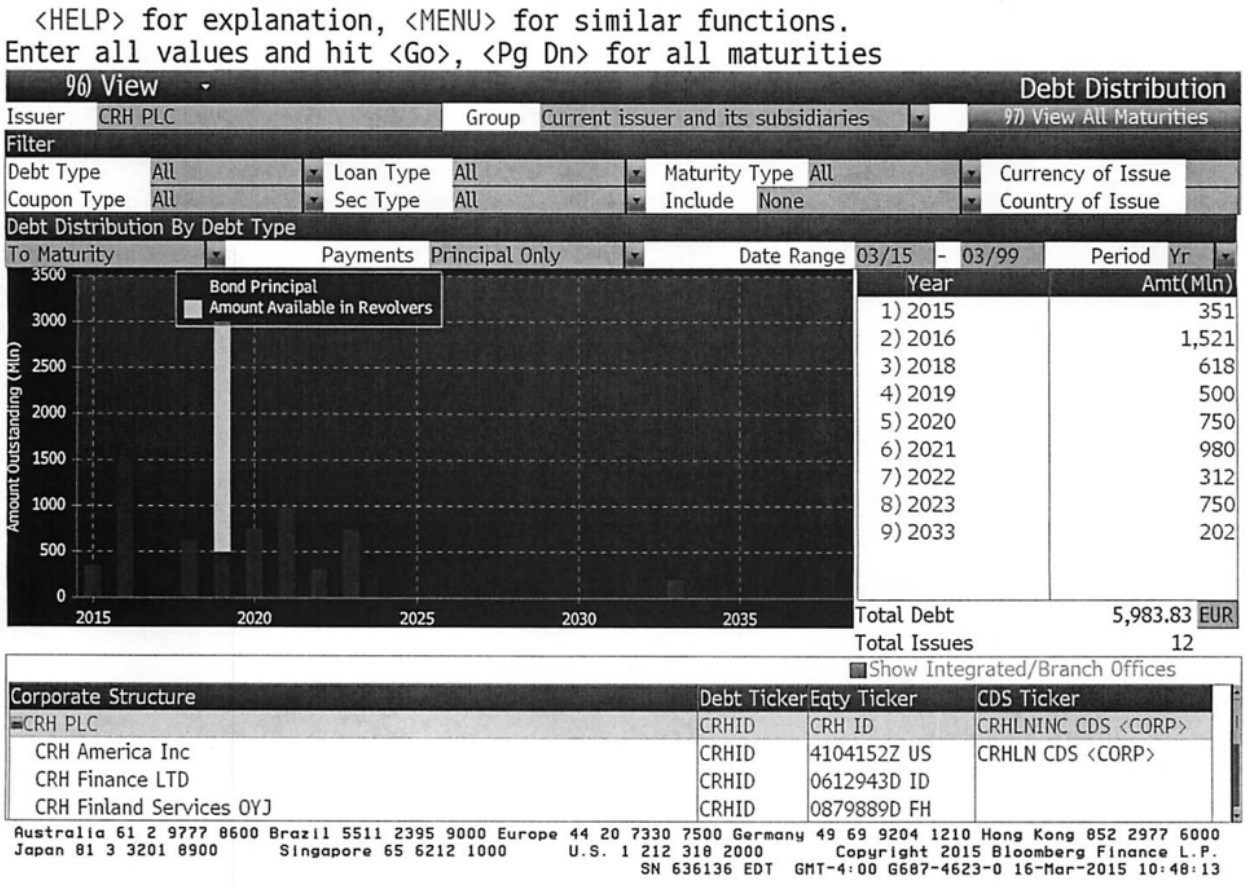
Designing Debt: Bringing it all together



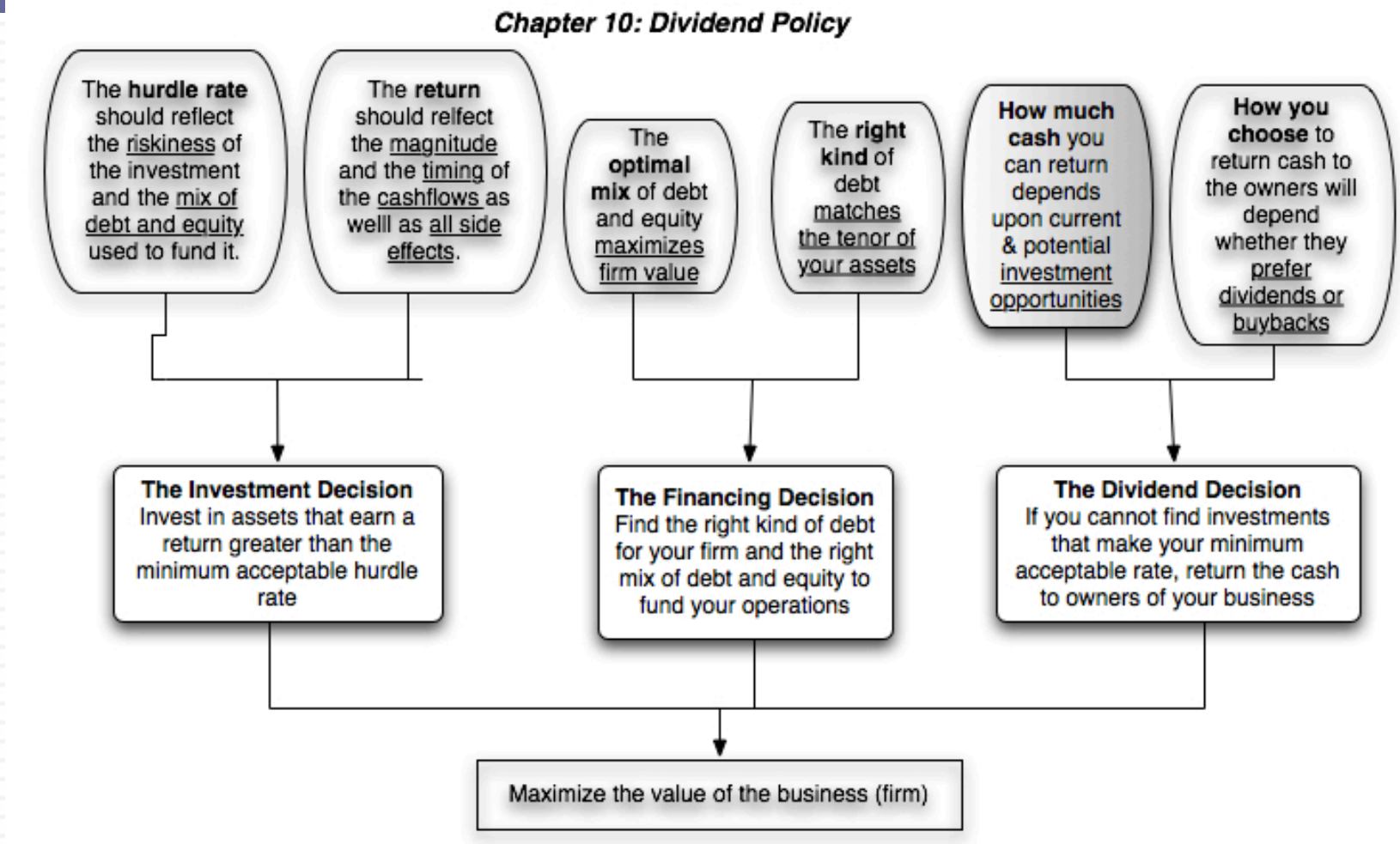
Designing CRH's debt

- What is the duration of a typical project for CRH?
  - Very short term (< 1 year)
  - Short term (1-3 years)
  - Medium term (3-5 years)
  - Long term
- What currency are your cash flows in?
- How much pricing power do you have (to deal with changes in inflation)?
  - None. We are price takers
  - Some. We are the third largest building products company
  - A great deal.
- What macro-economic variables most affect your cash flows?

Analyzing CRH's Current 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.
- For instance, for CRH, we obtain the following:

	2010	2011	2012	2013	2014
Dividends	$298.00	$310.00	$362.00	$367.00	$353.00
+ Stock Buybacks	$0.00	$0.00	$0.00	$0.00	$0.00
= Cash to Stockholders	$298.00	$310.00	$362.00	$367.00	$353.00

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

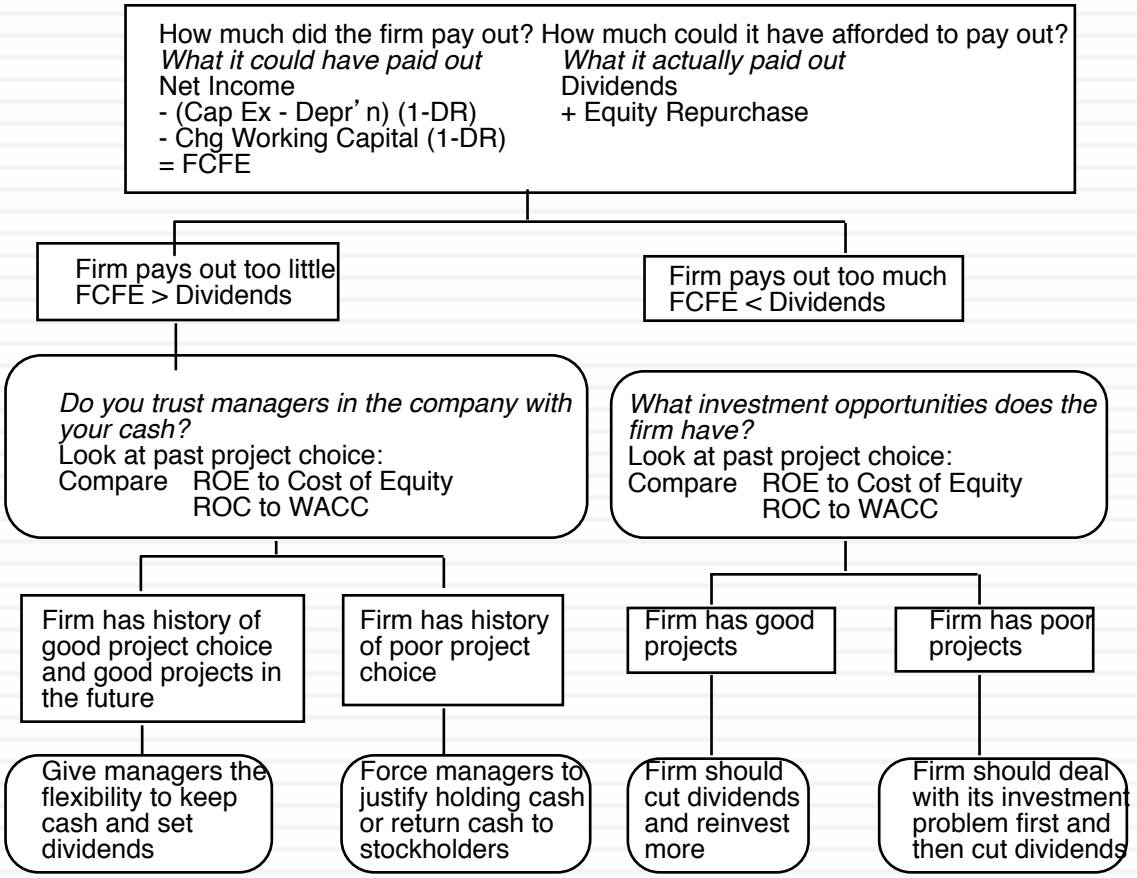
CRH's FCFE

	2010	2011	2012	2013	2014
Net Income	$432.00	$590.00	$538.00	($296.00)	$582.00
- (Cap. Exp - Depr)	($452.00)	($209.00)	($186.00)	($228.00)	($240.00)
- ∂ Working Capital	($142.00)	$211.00	$58.00	($77.00)	($35.00)
Free CF to Equity (pre-debt)	$1,026.00	$588.00	$666.00	$9.00	$857.00
+ Net Debt Issued	$566.00	$101.00	$487.00	$1,491.00	$901.00
= Free CF to Equity (actual debt)	$1,592.00	$689.00	$1,153.00	$1,500.00	$1,758.00
Free CF to Equity (target debt ratio)	**$887.18**	**$588.47**	**$636.09**	**($62.28)**	**$792.73**

CRH: Cash Returned vs FCFE

	2010	*2011*	*2012*	*2013*	*2014*
FCFE	$887.18	$588.47	$636.09	($62.28)	$792.73
Dividends + Buybacks	$298.00	$310.00	$362.00	$367.00	$353.00
	2010	*2011*	*2012*	*2013*	*2014*
Cash Retained	$589.18	$867.65	$1,141.74	$712.46	$1,152.19

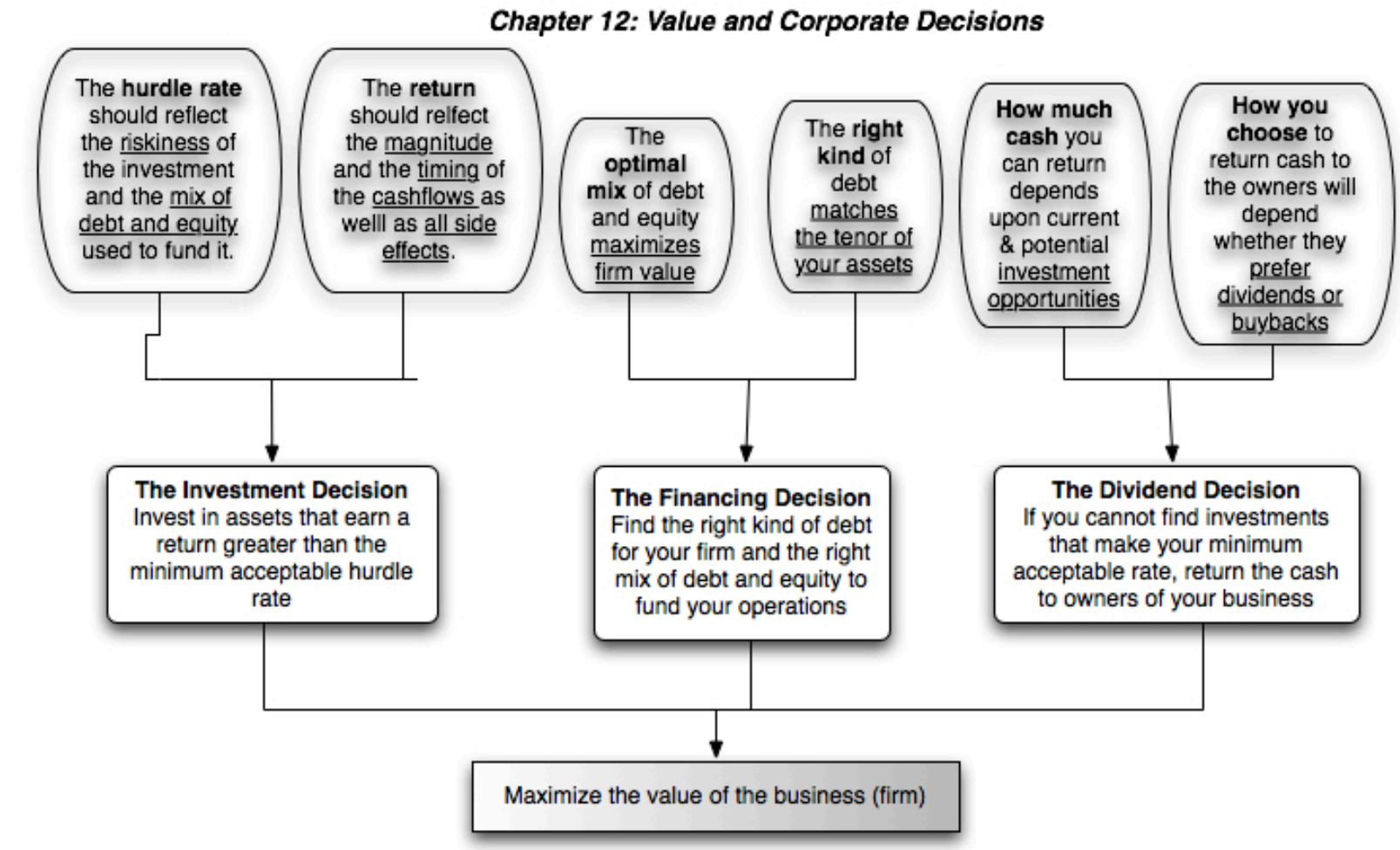
A Practical Framework for Analyzing Dividend Policy



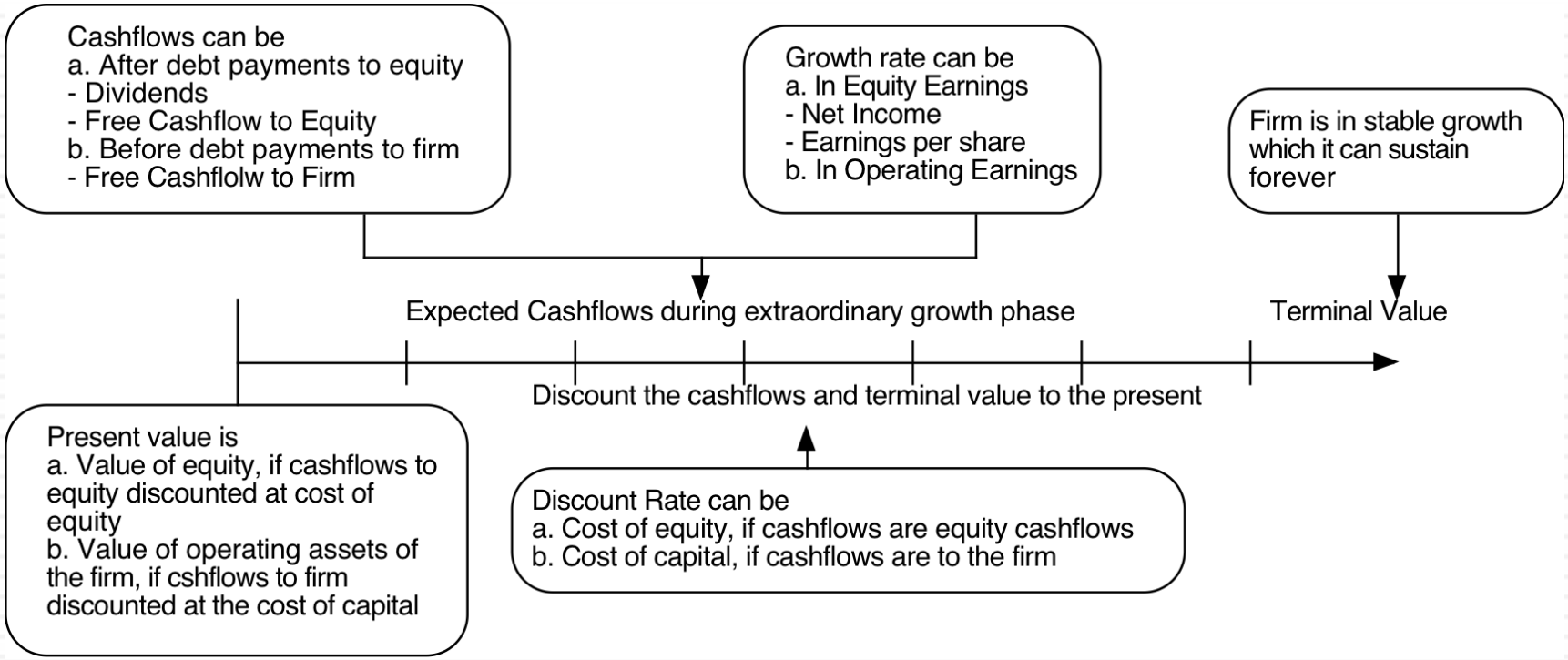
Can investors trust CRH's management?

- Given CRH's track record, if you were a CRH stockholder, would you be comfortable with CRH's dividend policy?
  - Yes
  - No
- CRH clearly has used the cash built up over the last few years to acquire assets in the Lafarge/Holcim merger? What are the implications for dividend policy in the future?

First Principles



The Ingredients that determine value.



CRH: My valuation (March 2015)

	Company	*Industry (US)*	*Industry (Global)*
Revenue growth last year =	4.89%	8.98%	7.27%
Pre-tax operating margin	5.11%	10.03%	7.82%
Sales to capital ratio =	1.48	1.48	1.20
ROIC in most recent year	5.85%	12.42%	7.93%

Revenue growth of 5% a year for 5 years, tapering down to 0.21% in year 10

Pre-tax operating margin increases to 8% over time.

Sales to capital ratio of **1.48** for incremental sales

Stable Growth
g = 0.21%;
Cost of capital = 6%
ROC= 6%;
Reinvestment Rate=.2%/6% = 3.33%

Terminal Value$_{10}$= 1451/(.06-.0021) = 25068

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Revenue growth rate	5.00%	5.00%	5.00%	5.00%	5.00%	4.04%	3.08%	2.13%	1.17%	0.21%
Revenues	€ 19,858	€ 20,850	€ 21,893	€ 22,988	€ 24,137	€ 25,113	€ 25,887	€ 26,437	€ 26,746	€ 26,802
EBIT (Operating) margin	5.40%	5.69%	5.98%	6.26%	6.55%	6.84%	7.13%	7.42%	7.71%	8.00%
EBIT (Operating income)	€ 1,072	€ 1,186	€ 1,308	€ 1,440	€ 1,582	€ 1,718	€ 1,846	€ 1,962	€ 2,062	€ 2,144
Tax rate	23.14%	23.14%	23.14%	23.14%	23.14%	24.51%	25.88%	27.26%	28.63%	30.00%
EBIT(1-t)	€ 824	€ 911	€ 1,005	€ 1,107	€ 1,216	€ 1,297	€ 1,368	€ 1,427	€ 1,472	€ 1,501
- Reinvestment	€ 639	€ 671	€ 704	€ 740	€ 777	€ 659	€ 523	€ 372	€ 209	€ 38
FCFF	€ 185	€ 240	€ 301	€ 367	€ 439	€ 638	€ 845	€ 1,055	€ 1,263	€ 1,463

Terminal year
EBIT (1-t) 1504
- Reinv 53
FCFF 1451

Operating assets	18,966
+ Cash	3,262
+ Cross holdings	1,329
- Debt	5,866
- Min Interest	21
- Mgt Options	169
Value of equity	17,501
Value/share	23.63

Cost of capital = 6.89% (.768) + 1.37% (.232) = 5.60%

Cost of capital decreases to 6.65% from years 6-10

Cost of Equity
6.89%

Cost of Debt (Rating: Baa2)
(0.21%+1.75%)(1-.30)
= 1.37%

Weights
E = 76.8% D = 23.2%

In March 2015, CRH was trading at 27.79 Euros per share.

Riskfree Rate:
Riskfree rate = 0.21%

+

Beta
1.06

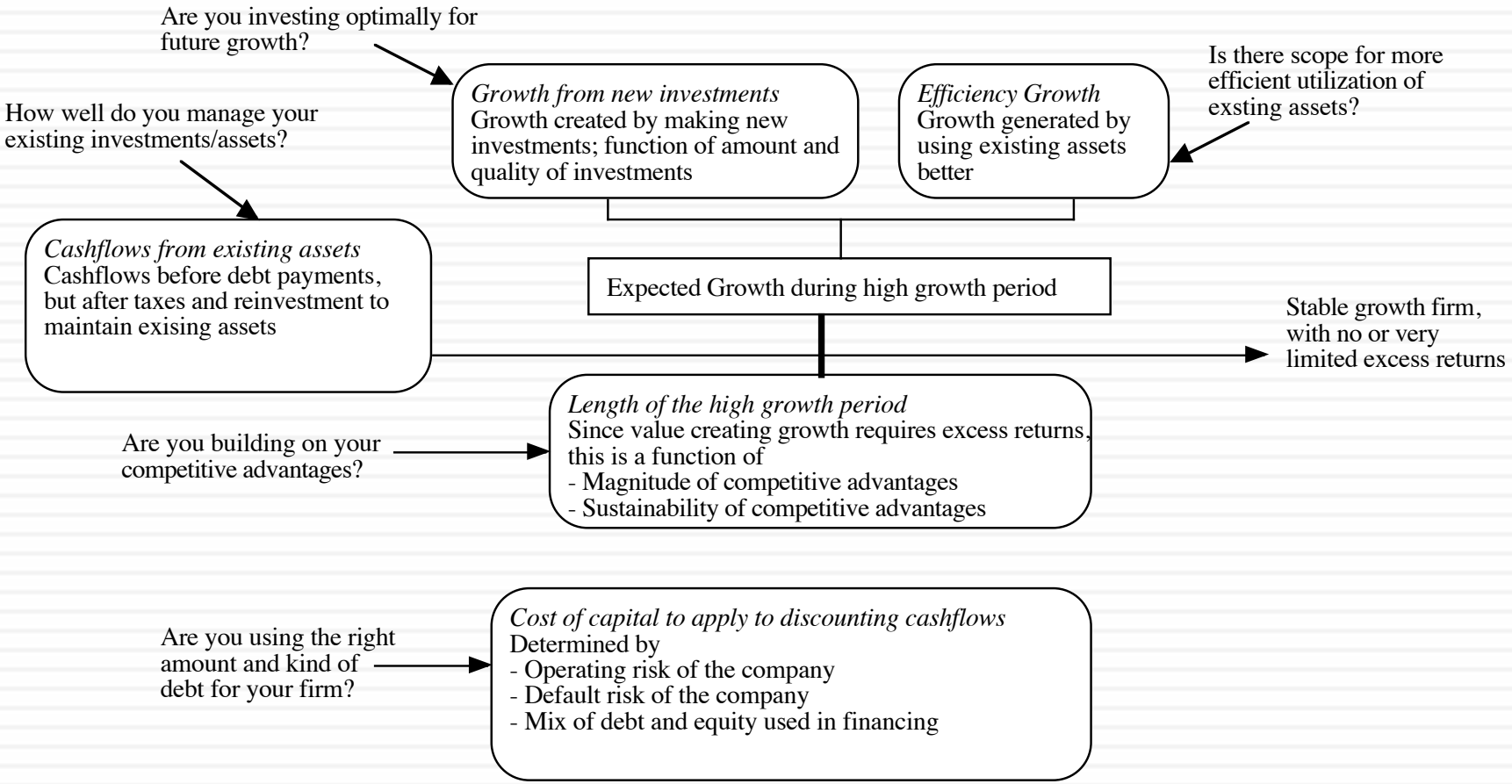
x

Region	*Proportion*	*ERP*
North America	53.17%	5.75%
Western Europe	46.83%	6.88%
CRH	100.00%	6.28%

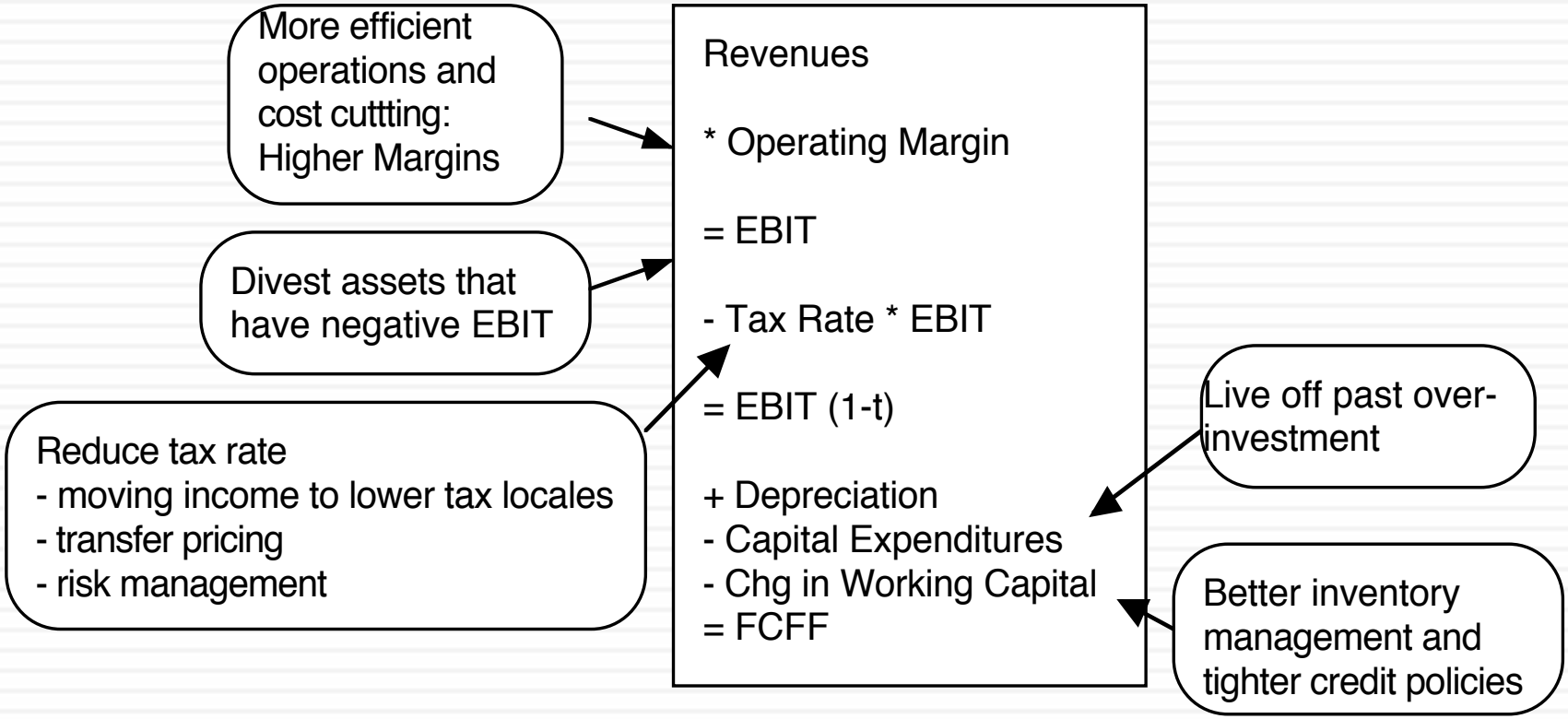
Business	*Proportion*	*Unlevered Beta*
Construction Supplies	49.21%	0.8934
Building Materials	18.35%	0.7998
Retail (Building Supply)	32.43%	0.8970
CRH (Company)		0.8774

D/E
30.27%

Ways of changing value…

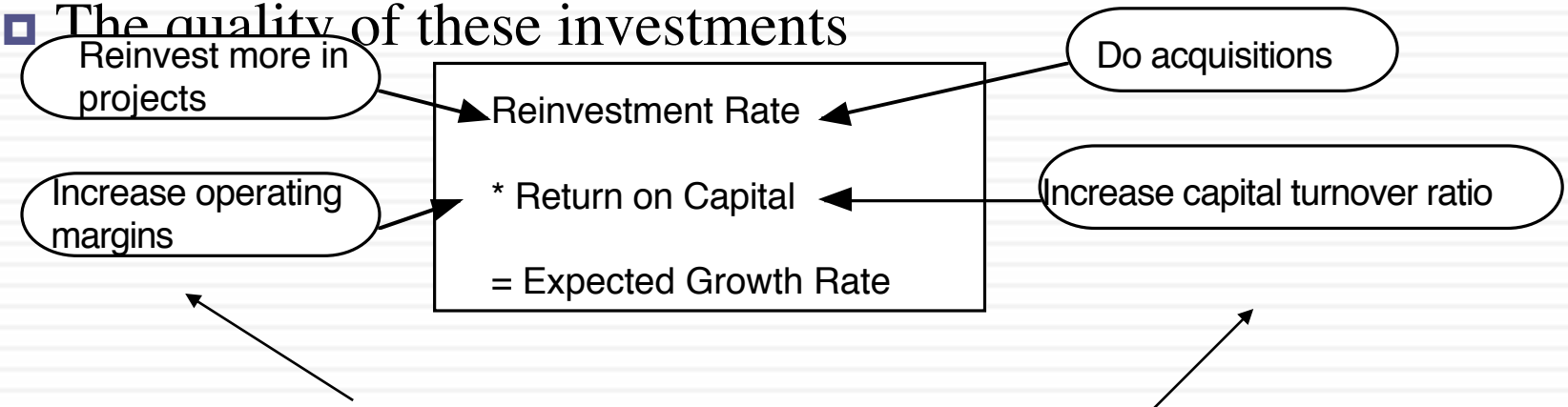


Value Creation 1: Increase Cash Flows from Assets in Place



Value Creation 2: Increase Expected Growth

- Keeping all else constant, increasing the expected growth in earnings will increase the value of a firm.
- The expected growth in earnings of any firm is a function of two variables:
  - The amount that the firm reinvests in assets and projects
  - The quality of these investments



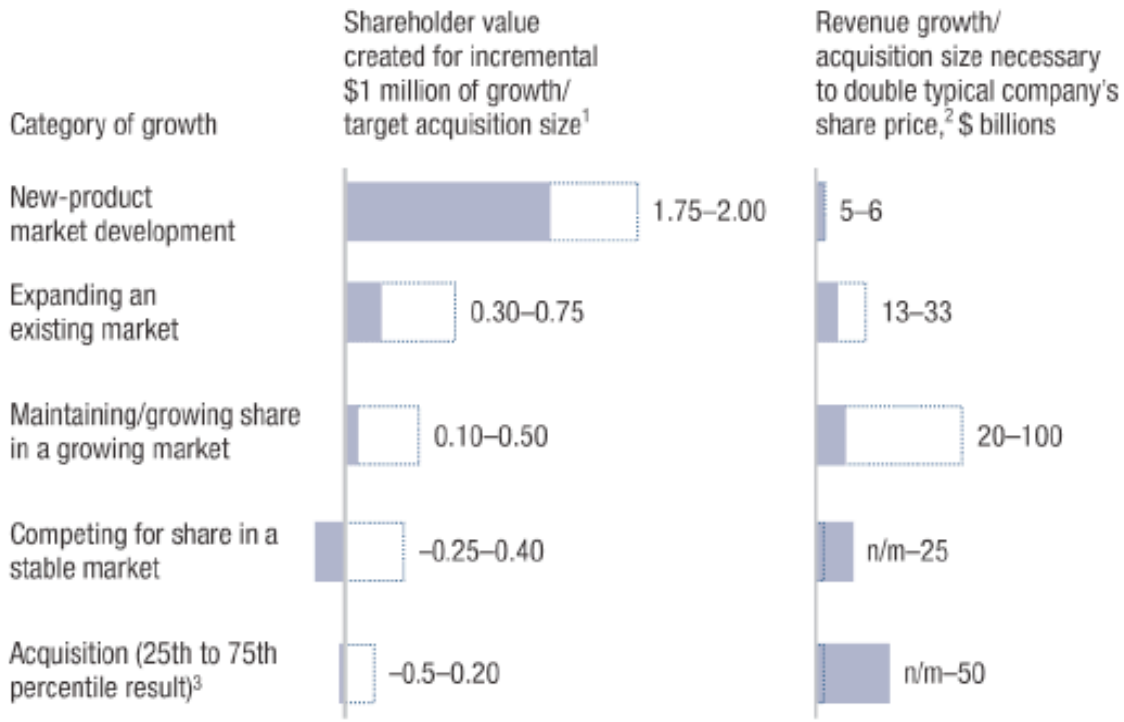
Price Leader versus Volume Leader Strategies
*Return on Capital = Operating Margin * Capital Turnover Ratio*

A postscript on creating growth: The Role of Acquisitions and Divestitures

- An acquisition is just a large-scale project. All of the rules that apply to individual investments apply to acquisitions, as well. For an acquisition to create value, it has to
  - Generate a higher return on capital, after allowing for synergy and control factors, than the cost of capital.
  - Put another way, an acquisition will create value only if the present value of the cash flows on the acquired firm, inclusive of synergy and control benefits, exceeds the cost of the acquisitons
- A divestiture is the reverse of an acquisition, with a cash inflow now (from divesting the assets) followed by cash outflows (i.e., cash flows foregone on the divested asset) in the future. If the present value of the future cash outflows is less than the cash inflow today, the divestiture will increase value.
- A fair-price acquisition or divestiture is value neutral.

Value Creating Growth… Evaluating the Alternatives..

Modes of organic growth vary in value creation intensity—consumer goods industry



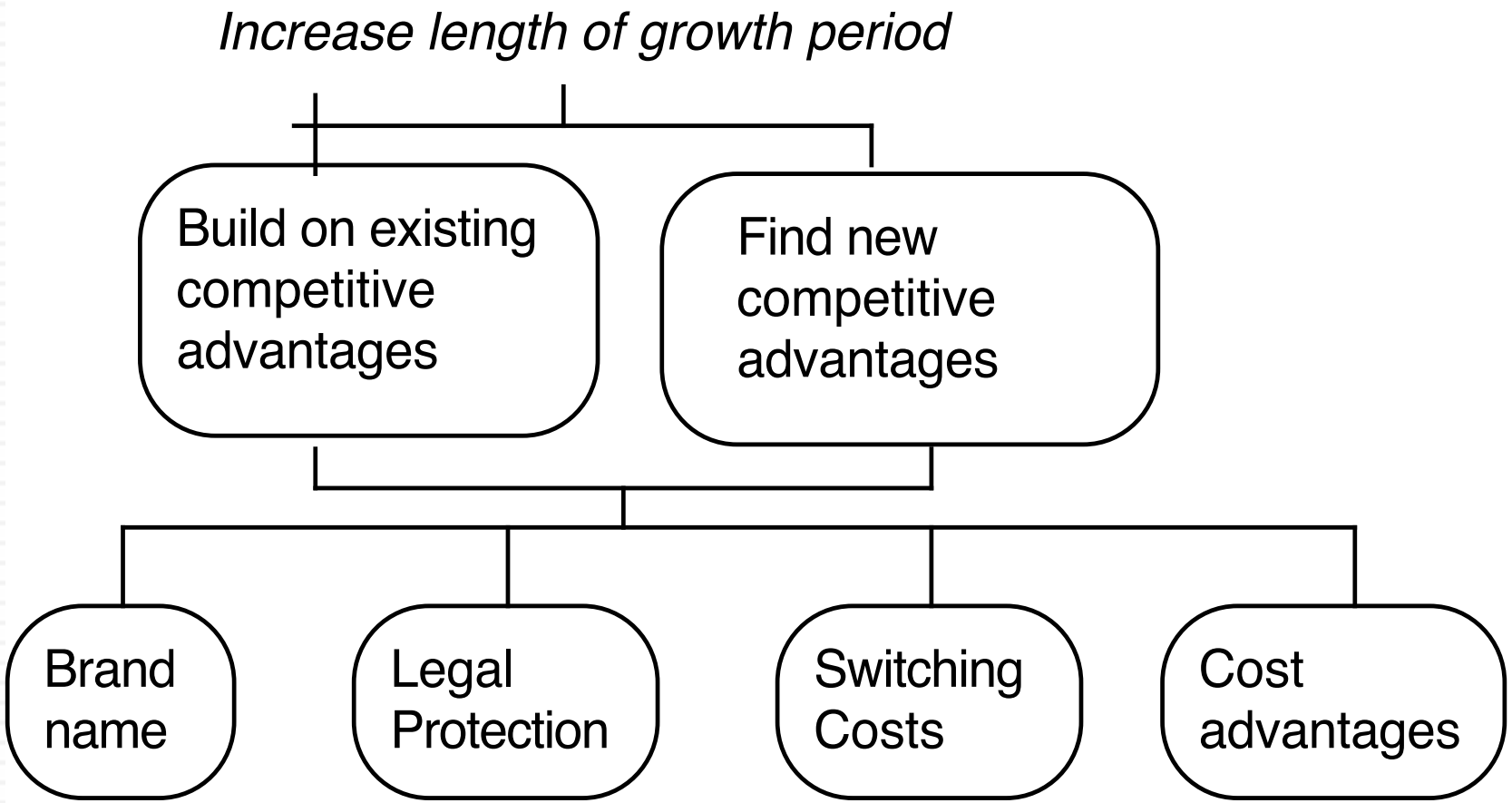
A more general problem… Growing through acquisitions has never been easy…

- Firms that grow through acquisitions have generally had far more trouble creating value than firms that grow through internal investments.
- In general, acquiring firms tend to
  - Pay too much for target firms
  - Over estimate the value of "synergy" and "control"
  - Have a difficult time delivering the promised benefits
- Worse still, there seems to be very little learning built into the process. The same mistakes are made over and over again, often by the same firms with the same advisors.
- Conclusion: There is something structurally wrong with the process for acquisitions which is feeding into the mistakes.

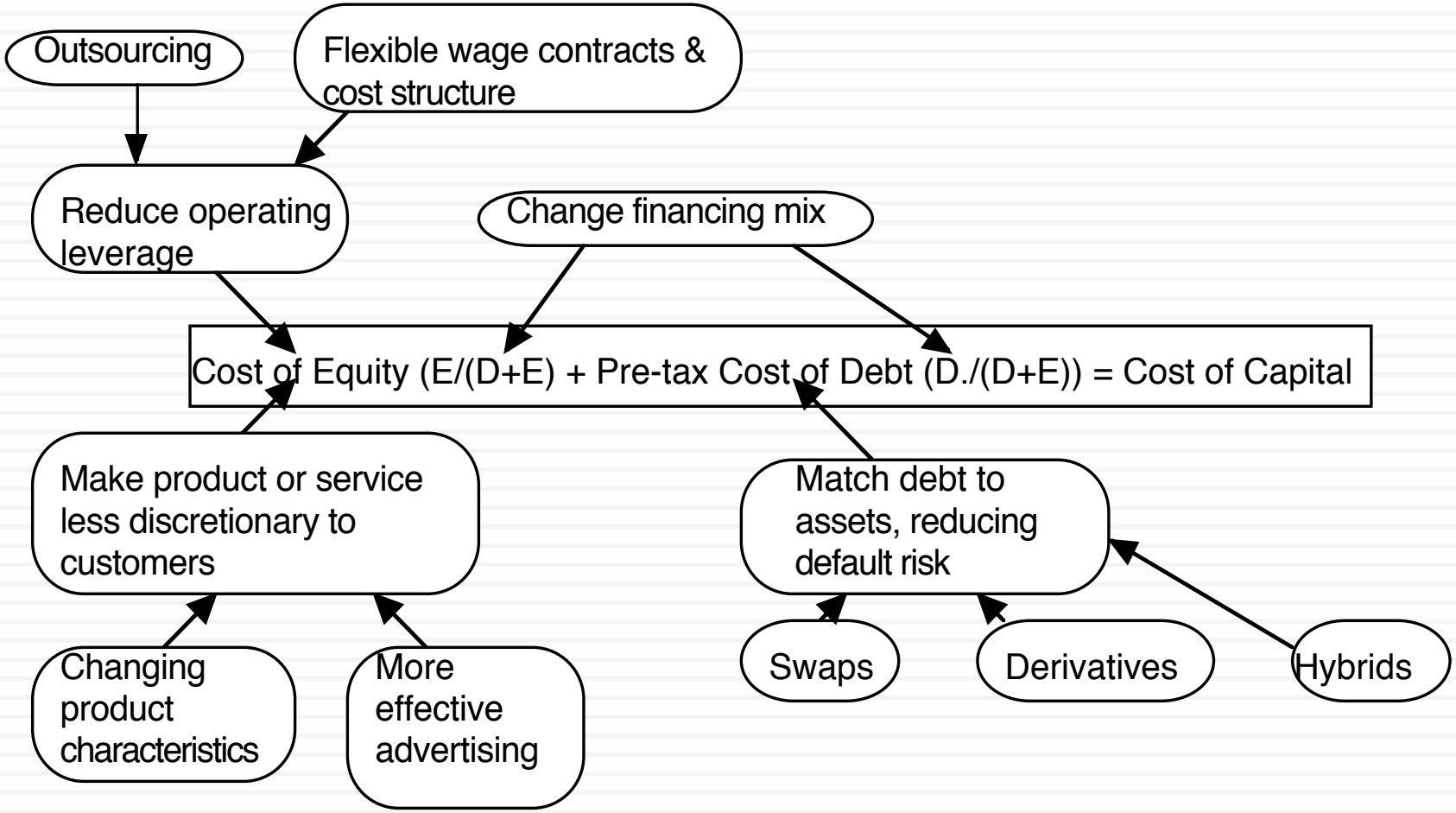
Seven reasons why acquisitions fail…

1. Risk Transference: Attributing acquiring company risk characteristics to the target firm. Just because you are a safe firm and operate in a secure market, does not mean that you can transfer these characteristics to a target firm.
2. Debt subsidies: Subsiding target firm stockholders for the strengths of the acquiring firm is providing them with a benefit they did not earn.
3. Auto-pilot Control: Adding 20% or some arbitrary number to the market price just because other people do it is a recipe for overpayment. Using silly rules such as EPS accretion just makes the problem worse.
4. Elusive Synergy: While there is much talk about synergy in mergers, it is seldom valued realistically or appropriately.
5. Its all relative: The use of transaction multiples (multiples paid by other acquirers in acquisitions) perpetuates over payment.
6. Verdict first, trial afterwards: Deciding you want to do an acquisition first and then looking for justification for the price paid does not make sense.
7. It's not my fault: Holding no one responsible for delivering results is a sure-fire way not to get results…

III. Building Competitive Advantages: Increase length of the growth period



Value Creation 4: Reduce Cost of Capital



CRH: Growth through investments

- Of the options available to increase CRH's value per share, which of the following offers the most promise?
  a. Efficiency growth: Increase margins on existing investments.
  b. Invest in existing markets in Europe and North America, going for higher market share.
  c. Expand into new markets: Invest in emerging markets (either as projects or by acquiring companies).
  d. Expand into new businesses: Enter new businesses, perhaps in the construction/building sphere.

CRH: Financial Engineering?

- If you see potential value creation for CRH in capital structure, which of the following do you see as your best option?
  - Change the debt ratio (either increase or decrease it)
  - Change the maturity of the debt (longer term or shorter term)
  - Change the types of debt (more floating rate? More convertible)

CRH: Dividend Potential

- If you are trying to increase CRH's value to equity investors and are looking at dividend policy, which of the following offers the best potential?

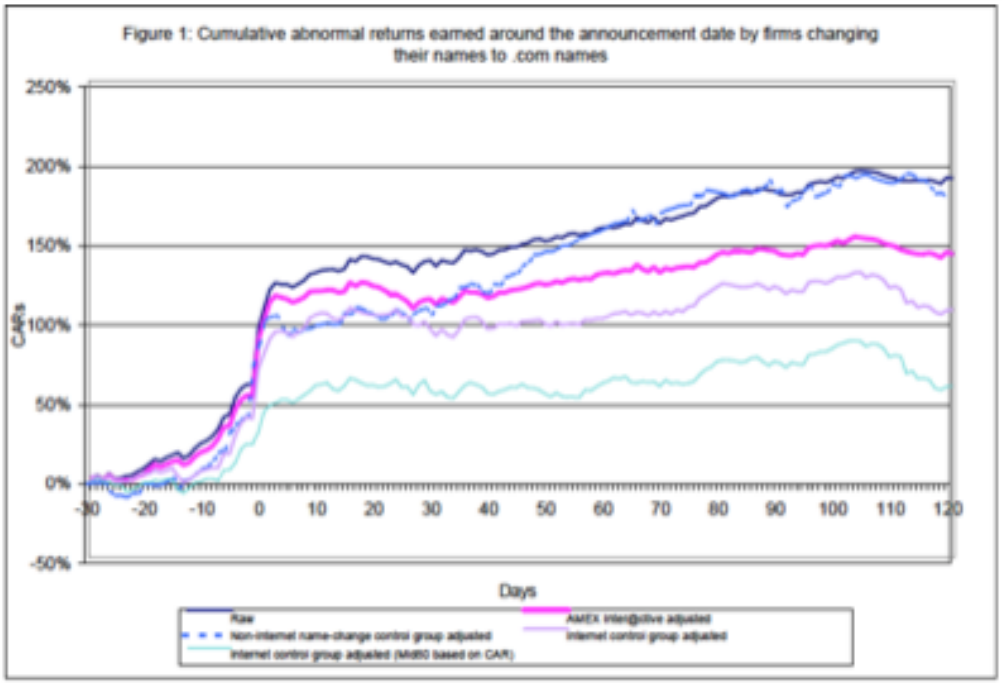
a. Increase dividends paid to stockholders
b. Hold dividends stable and increase stock buybacks
c. Decrease dividends paid to stockholders
d. Don't return cash

Value Effects

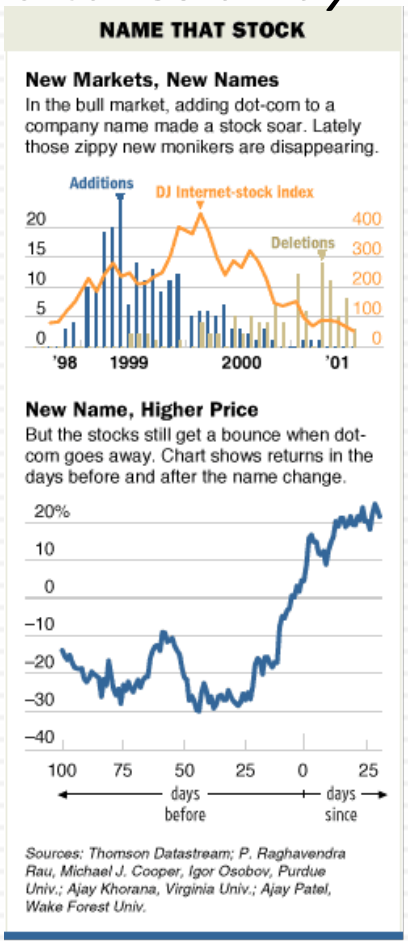
Target Operating Margin	Compounded revenue growth rate: Next 5 years				
	1.00%	*3.00%*	*5.00%*	*7.00%*	*9.00%*
4.00%	€ 11.18	€ 10.70	€ 10.16	€ 9.55	€ 8.87
5.11% (Current)	€ 14.06	€ 13.98	€ 13.89	€ 13.79	€ 13.67
6.00%	€ 16.38	€ 16.62	€ 16.89	€ 17.19	€ 17.53
8.00%	€ 21.58	€ 22.55	€ 23.63	€ 24.83	€ 26.18
10.00%	€ 26.78	€ 28.47	€ 30.36	€ 32.47	€ 34.83
12.00%	€ 31.99	€ 34.39	€ 37.09	€ 40.11	€ 43.49

You can always play the pricing game..

The market gives…



And takes away….



First Principles