IBM

Capital Structure: How Corporations Are Financed

Dr. Ian Giddy
New York University

The Agenda

- What determines the optimal mix of debt and equity for a company?
- How does altering the mix of debt and equity affect the value of a company?
- What is the right kind of debt for a company?
- When is the right time to finance?

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Financing

Cash Flows From Financing Activities $Mil

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TTM
Net Issuance of Stock	1,061.0	49.0	7.0	137.0	99.0	481.0	383.0	362.0	401.0	159.0	382.0
Net Issuance of Debt	(158.0)	777.0	18.0	210.0	480.0	454.0	1,185.0	3,862.0	(341.0)	(916.0)	(1,133.0)
Dividends	(149.0)	(236.0)	(261.0)	(286.0)	(288.0)	(291.0)	(333.0)	(356.0)	(364.0)	(372.0)	(377.0)
Other	517.0	686.0	(260.0)	(100.0)	1,627.0	81.0	3,884.0	(5,688.0)	(180.0)	(337.0)	856.0
Cash from Financing	**1,271.0**	**1,276.0**	**(496.0)**	**(39.0)**	**1,918.0**	**725.0**	**5,119.0**	**(1,820.0)**	**(484.0)**	**(1,466.0)**	**(272.0)**
Currency Adj	---	---	---	---	34.0	(33.0)	(100.0)	148.0	9.0	88.0	22.0
Change in Cash	(145.0)	(16.0)	788.0	(68.0)	8.0	1,892.0	(236.0)	2,781.0	425.0	1,370.0	3,713.0

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Cash Flows (As originally reported)

Cash Flows From Operating Activities $Mil

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TTM
Net Income	1,560.0	1,791.0	1,154.0	1,180.0	(962.0)	817.0	1,319.0	(3,937.0)	(2,485.0)	893.0	1,374.0
Depr&Amort	1,525.0	1,919.0	2,308.0	2,329.0	2,197.0	2,182.0	2,522.0	2,592.0	2,108.0	1,667.0	1,475.0
Deferred Taxes	(177.0)	(55.0)	(160.0)	(98.0)	(933.0)	(415.0)	239.0	(2,273.0)	(1,570.0)	1.0	1,364.0
Other	(356.0)	(358.0)	888.0	(815.0)	719.0	(656.0)	(5,243.0)	5,634.0	3,286.0	210.0	(196.0)
Cash from Operations	**2,552.0**	**3,287.0**	**4,190.0**	**2,596.0**	**1,021.0**	**1,928.0**	**(1,164.0)**	**1,976.0**	**1,339.0**	**2,771.0**	**4,015.0**

Cash Flows From Investing Activities $Mil

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TTM
Cap Ex	(3,320.0)	(4,225.0)	(2,973.0)	(2,874.0)	(3,221.0)	(2,684.0)	(4,131.0)	(1,321.0)	(607.0)	(655.0)	(870.0)
Purchase of Business	---	---	---	---	---	---	(1,912.0)	(512.0)	(94.0)	(302.0)	(346.0)
Other	(648.0)	(354.0)	67.0	249.0	256.0	1,956.0	1,952.0	4,310.0	262.0	934.0	1,166.0
Cash from Investing	**(3,968.0)**	**(4,579.0)**	**(2,906.0)**	**(2,625.0)**	**(2,965.0)**	**(728.0)**	**(4,091.0)**	**2,477.0**	**(439.0)**	**(23.0)**	**(52.0)**

Cash Flows From Financing Activities $Mil

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	TTM
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Free Cash Flow $Mil

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Cash from Operations	2,552.0	3,287.0	4,190.0	2,596.0	1,021.0	1,928.0	(1,164.0)	1,976.0	1,339.0	2,771.0	4,015.0
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Free Cash Flow	**(768.0)**	**(938.0)**	**1,217.0**	**(278.0)**	**(2,200.0)**	**(756.0)**	**(5,295.0)**	**655.0**	**732.0**	**2,116.0**	**3,145.0**

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First Principles

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

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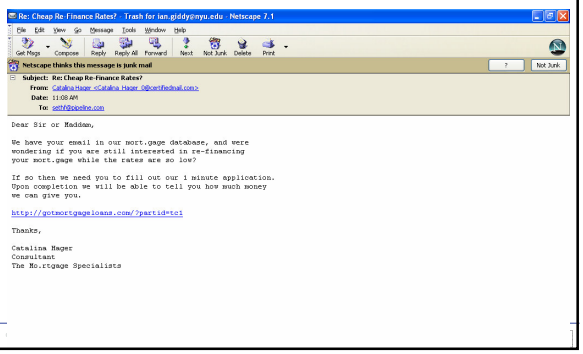
How to Refinance Cheaply


Re: Cheap Re-Finance Rates? - Trash for ian.giddy@nyu.edu - Netscape 7.1

File Edit View Go Message Tools Window Help

Get Msgs Compose Reply Reply All Forward Next Not Junk Delete Print

Netscape thinks this message is junk mail

Not Junk

Subject: Re: Cheap Re-Finance Rates?
From: Catalina Hager <Catalina_Hager_0@certifiedmail.com>
Date: 11:08 AM
To: ian76@pipeline.com

Dear Sir or Maddam,

We have your email in our mort.gage database, and were wondering if you are still interested in re-financing your mort.gage while the rates are so low?

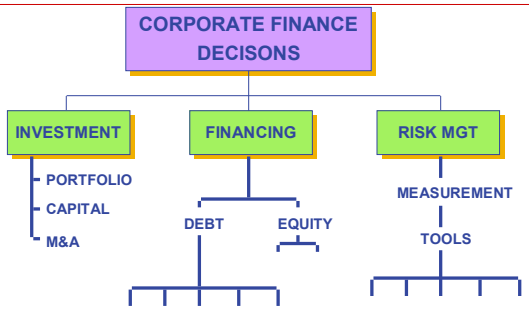
If so then we need you to fill out our 1 minute application. Upon completion we will be able to tell you how much money we can give you.

http://gotmortgageloans.com/?partid=tc1

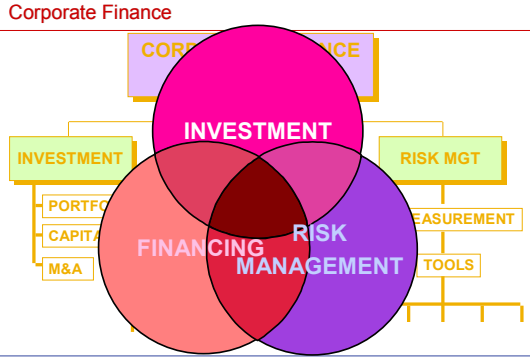
Thanks,

Catalina Hager
Consultant
The Mo.rtgage Specialists

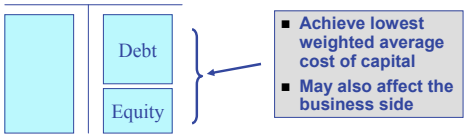
Corporate Finance



Corporate Finance

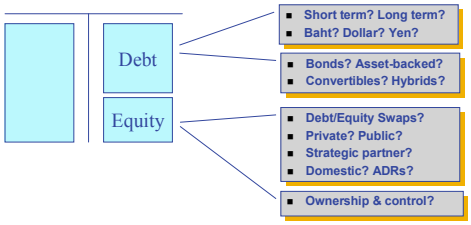


Getting the Financing Right
Step 1: The Proportion of Equity & Debt



- Achieve lowest weighted average cost of capital
- May also affect the business side

Getting the Financing Right
Step 2: The Kind of Equity & Debt



- Short term? Long term?
- Baht? Dollar? Yen?
- Bonds? Asset-backed?
- Convertibles? Hybrids?
- Debt/Equity Swaps?
- Private? Public?
- Strategic partner?
- Domestic? ADRs?
- Ownership & control?

Does Capital Structure Matter? Yes!

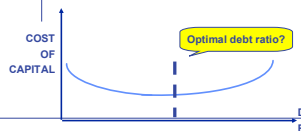
Assets' value is the present value of the cash flows from the real business of the firm

Value of the firm
=PV(Cash Flows)

Debt

Equity

Value of the firm
= D + E



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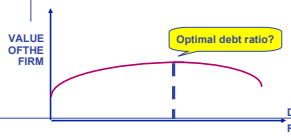

Does Capital Structure Matter? Yes!

Assets' value is the present value of the cash flows from the real business of the firm	Debt Equity
Value of the firm =PV(Cash Flows)	Value of the firm = D + E

Value of Firm
= PV(Cash Flows) + PV(Tax Shield) - Distress Costs

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Costs and Benefits of Debt

- Benefits of Debt
  - Tax Benefits
  - Adds discipline to management
- Costs of Debt
  - Bankruptcy Costs
  - Agency Costs
  - Loss of Future Flexibility

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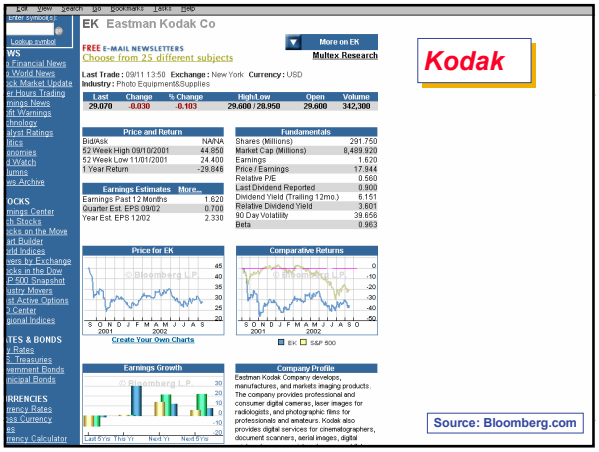

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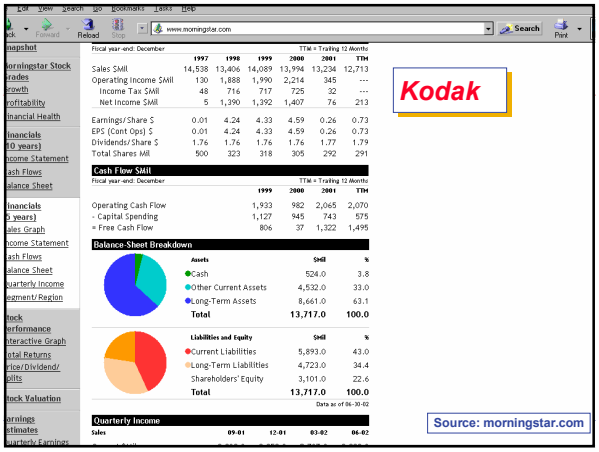

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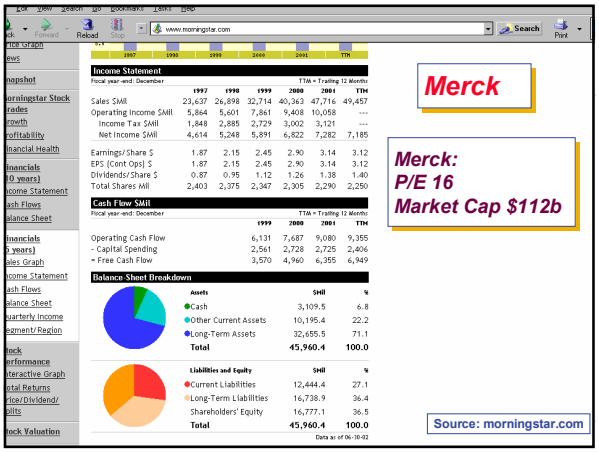
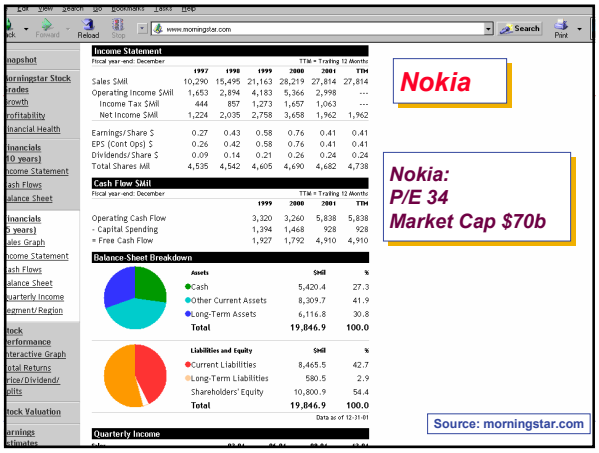


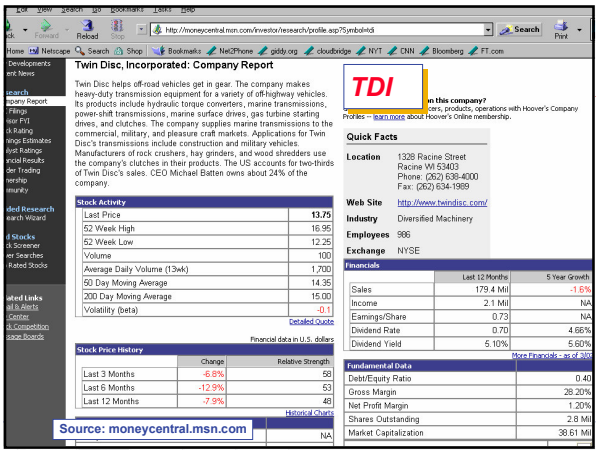
Merck

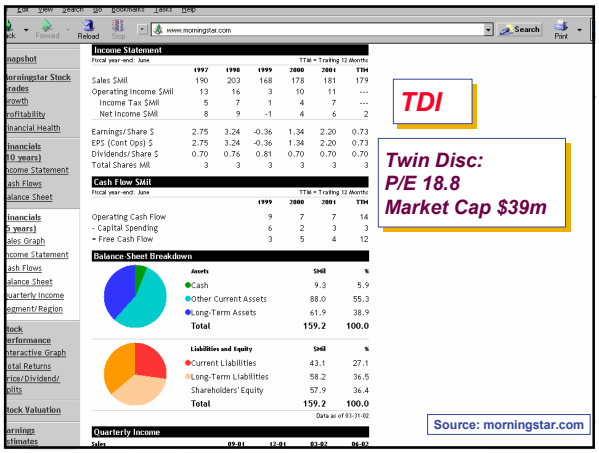
Merck:
P/E 16
Market Cap $112b

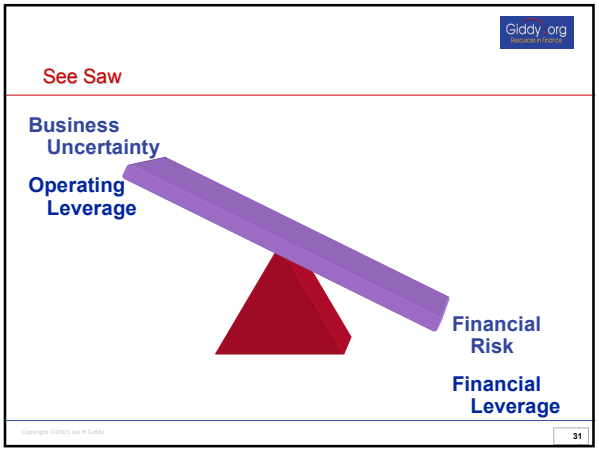


Nokia

Nokia:
P/E 34
Market Cap $70b


TDI
Twin Disc, Incorporated: Company Report
Source: moneycentral.msn.com


TDI
Twin Disc:
P/E 18.8
Market Cap $39m
Source: morningstar.com


See Saw
Business Uncertainty
Operating Leverage
Financial Risk
Financial Leverage
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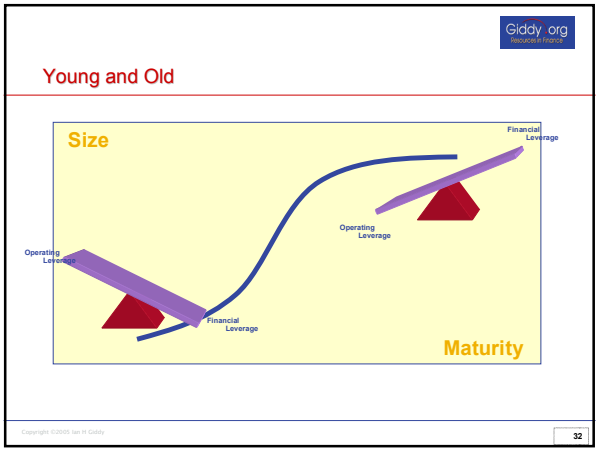
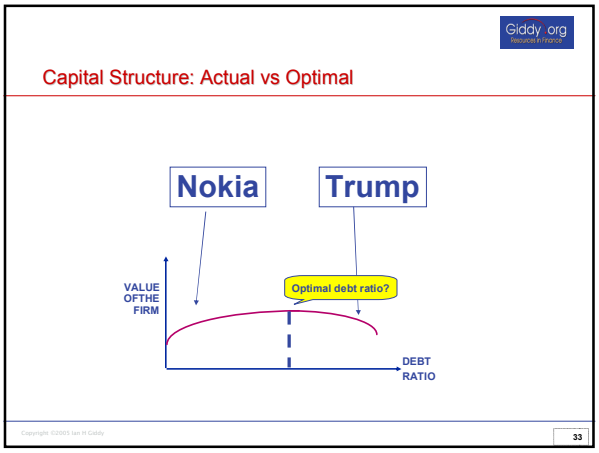
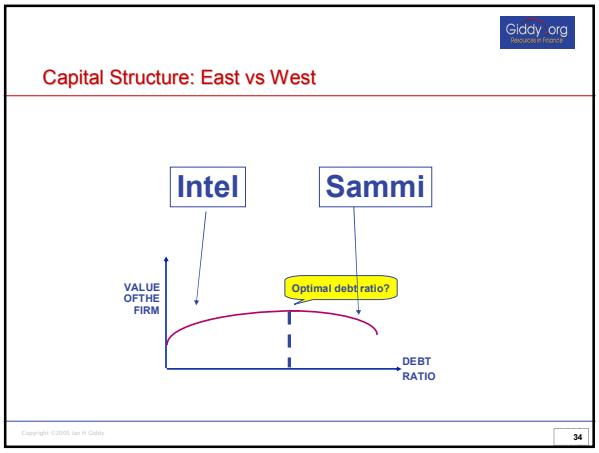
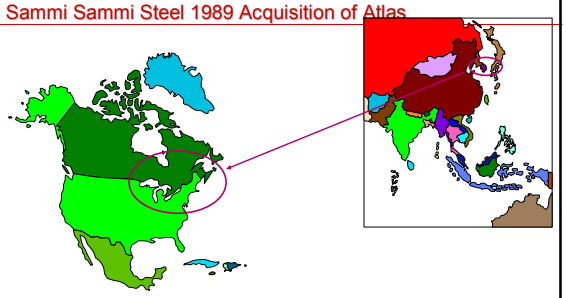

Young and Old
Size
Financial Leverage
Operating Leverage
Operating Leverage
Financial Leverage
Maturity
32


Capital Structure: Actual vs Optimal
Nokia
Trump
VALUE OFTHE FIRM
Optimal debt ratio?
DEBT RATIO
33


Capital Structure: East vs West
Intel
Sammi
VALUE OFTHE FIRM
Optimal debt ratio?
DEBT RATIO
34

Case Study:
Sammi Sammi Steel 1989 Acquisition of Atlas



How Much Debt?

EarthLink revolves around you™

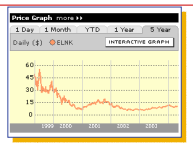
How Much Debt?

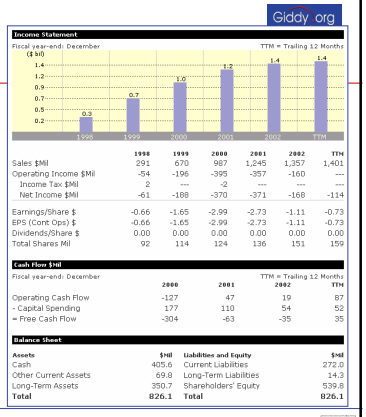
A $21.95 company...an "ISP"

- Growth: Rapid
- Profits: Zero
- Risks: High

EarthLink revolves around you™

Earthbound





Source: morningstar.com

Financing Growth Companies: The Agenda

- Where can we get the initial equity financing we need to grow?
- Do we want money, management, or more?
- When do we want to sell out, and how?
- When is the right time for debt for a growth company? What kind?

What Kind of Equity?

- Sources of Equity
  - Private investors
  - Strategic investors
  - Interventionist investors
  - Public market
- And Kinds
  - Common stock
  - Stock with restricted voting rights
  - Hybrids, including convertibles

Case Study: Photronics

1997: Should Photronics Finance its Growth with Debt?

- Benefits of Debt
  - Tax Benefits
  - Adds discipline to management
- Costs of Debt
  - Bankruptcy Costs
  - Agency Costs
  - Loss of Future Flexibility

Photronics

Cash Flows

Cash Flows From Operating Activities $Mil

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Net Income	---	4.4	4.9	10.3	18.6	21.0	25.6	20.5	10.7	10.2	(4.0)
Depr & Amort	---	5.2	5.6	8.7	9.8	13.2	20.9	34.0	40.7	56.9	73.0
Deferred Taxes	---	(0.1)	0.3	0.9	(0.8)	1.0	1.0	0.3	7.2	1.3	(6.0)
Other	---	(0.2)	(0.4)	1.2	6.0	3.4	(1.0)	(9.7)	(3.2)	(18.7)	50.7
Cash from Operations	---	**9.3**	**10.5**	**21.0**	**33.6**	**38.6**	**46.6**	**45.1**	**55.3**	**49.6**	**113.6**

Cash Flows From Investing Activities $Mil

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Cap Ex	---	(11.7)	(8.8)	(4.1)	---	---	---	---	---	---	---
Purchase of Business	---	---	(5.3)	---	(10.5)	(12.4)	(1.1)	(32.5)	---	(37.3)	(48.9)
Other	---	5.6	2.5	(0.8)	(43.4)	(45.8)	(112.5)	(42.6)	(71.1)	(37.0)	(49.7)
Cash from Investing	---	**(6.1)**	**(11.6)**	**(4.9)**	**(53.9)**	**(58.2)**	**(113.6)**	**(75.1)**	**(71.1)**	**(74.3)**	**(98.6)**

Cash Flows From Financing Activities $Mil

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Net Issuance of Stock	---	0.3	0.3	1.5	31.4	2.8	6.1	(2.8)	(2.1)	32.4	7.8
Net Issuance of Debt	---	(0.7)	(0.6)	(0.7)	(0.5)	0.0	99.6	(0.3)	10.7	10.4	(24.8)
Dividends	---	---	---	---	---	---	---	---	---	---	---
Other	---	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(0.3)	0.0	0.0
Cash from Financing	---	**(0.4)**	**(0.4)**	**0.7**	**30.9**	**2.7**	**105.6**	**(3.0)**	**8.2**	**42.8**	**(17.0)**

Source: morningstar.com

What is Our Cost of Capital?

Choice	Cost
1. Equity	Cost of equity
- Retained earnings	- depends upon riskiness of the stock
- New stock issues	- will be affected by level of interest rates
- Warrants	

Cost of equity = riskless rate + beta * risk premium

2. Debt	Cost of debt
- Bank borrowing	- depends upon default risk of the firm
- Bond issues	- will be affected by level of interest rates
	- provides a tax advantage because interest is tax-deductible

Cost of debt = Borrowing rate (1 - tax rate)

Debt + equity = Capital — Cost of capital = Weighted average of cost of equity and cost of debt; weights based upon market value.

Cost of capital = kd [D/(D+E)] + ke [E/(D+E)]

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.

Ratings and Spreads

Corporate bond spreads: basis points over Treasury curve

Rating	1 year	2 year	5 year	10 year	30 year	Typical Int	Coverage R
Aaa/AAA	40	45	60	85	96	>8.50	
Aa1/AA+	45	55	70	95	106	6.50-8.50	
Aa2/AA	55	60	75	105	116	6.50-8.50	
Aa3/AA-	60	65	85	117	136	6.50-8.50	
A1/A+	70	80	105	142	159	5.50-6.50	
A2/A	80	90	120	157	179	4.25-5.50	
A3/A-	90	100	130	176	196	3.00-4.25	
Baa1/BBB	105	115	145	186	208	2.50-3.00	
Baa2/BBB	120	130	160	201	221	2.50-3.00	
Baa3/BBB	140	145	172	210	232	2.50-3.00	
Ba1/BB+	225	250	300	350	440	2.00-2.50	
Ba2/BB	250	275	325	385	540	2.00-2.50	
Ba3/BB-	300	350	425	460	665	2.00-2.50	
B1/B+	375	400	500	610	765	1.75-2.00	
B2/B	450	500	625	710	890	1.50-1.75	
B3/B-	500	550	750	975	1075	1.25-1.50	
Caa/CCC	600	650	900	1150	1300	0.80-1.25	

The Cost of Equity

- Standard approach to estimating cost of equity:
  Cost of Equity = R_f + Equity Beta * ($E(R_m)$ - R_f)

where,

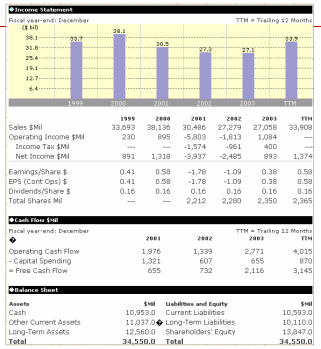
R_f = Riskfree rate

$E(R_m)$ = Expected Return on the Market Index (Diversified Portfolio)

- In practice,
  - Long term government bond rates are used as risk free rates
  - Historical risk premiums are used for the risk premium
  - Betas are estimated by regressing stock returns against market returns

Case Study: Motorola

MOTOROLA intelligence everywhere



Source: morningstar.com

Motorola WACC

MOTOROLA				
Assumptions				
Bond rating		A		
Risk free govt bond		4.10%		
Spread		1.12%		
Tax rate		35%		
MOT beta		1.6		
SP 500 long run return		12%		
			Actual	Alternative
Cost of debt		**3.39%**	**12%**	25%
Amount	$	5.30 billion		
Cost of equity		**16.7%**	**88%**	75%
Amount		38.6 billion		
Total D+E	$	43.90		
Cost of Capital			**15.13%**	13.40%
Note:				
"Value" of MOT as perp			20.82	$ 23.50
Diff				$ 2.68
"Value" of growth potential			17.78	

Source: Motorola_WACC.xls

Equity Betas and Leverage

- **The beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio**

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

where

β_L = Levered or Equity Beta

β_u = Unlevered Beta

t = Corporate marginal tax rate

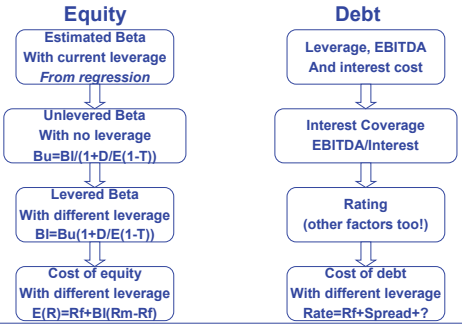
D = Market Value of Debt

E = Market Value of Equity

- While this beta is estimated on the assumption that debt carries no market risk (and has a beta of zero), you can have a modified version:

$$\beta_L = \beta_u (1+ ((1-t)D/E) - \beta_{debt} (1-t) D/(D+E)$$

Cost of Capital and Leverage: Method



Summary: The Weighted-Average Cost of Capital

Choice	***Cost***
1. Equity	Cost of equity
- Retained earnings	- depends upon riskiness of the stock
- New stock issues	- will be affected by level of interest rates
- Warrants	

Cost of equity = riskless rate + beta * risk premium

2. Debt	Cost of debt
- Bank borrowing	- depends upon default risk of the firm
- Bond issues	- will be affected by level of interest rates
	- provides a tax advantage because interest is tax-deductible

Cost of debt = Borrowing rate (1 - tax rate)

Debt + equity = Capital	Cost of capital = Weighted average of cost of equity and cost of debt; weights based upon market value.

Cost of capital = k_d [D/(D+E)] + k_e [E/(D+E)]

Next, Minimize the Cost of Capital by Changing the Financial Mix

- The first step in reducing the cost of capital is to change the mix of debt and equity used to finance the firm.
- Debt is always cheaper than equity, partly because it lenders bear less risk and partly because of the tax advantage associated with debt.
- But taking on debt increases the risk (and the cost) of both debt (by increasing the probability of bankruptcy) and equity (by making earnings to equity investors more volatile).
- The net effect will determine whether the cost of capital will increase or decrease if the firm takes on more or less debt.

Siderar: Optimal Debt Ratio

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.68	16.95%	AAA	11.55%	33.45%	7.69%	16.95%	$1,046
10%	0.73	17.76%	AA	11.95%	33.45%	7.95%	16.78%	$1,064
20%	0.80	18.77%	A-	12.75%	33.45%	8.49%	16.71%	$1,071
30%	0.88	20.07%	B+	14.25%	33.45%	9.48%	16.90%	$1,052
40%	0.99	21.81%	B-	16.25%	33.45%	10.81%	17.41%	$1,001
50%	1.14	24.24%	CCC	17.25%	33.45%	11.48%	17.86%	$961
60%	1.44	29.16%	CC	18.75%	25.67%	13.94%	20.02%	$803
70%	1.95	37.29%	C	20.25%	20.38%	16.12%	22.47%	$674
80%	2.93	52.94%	C	20.25%	17.83%	16.64%	23.90%	$615
90%	5.86	99.87%	C	20.25%	15.85%	17.04%	25.32%	$565

Question: If Siderar's current debt ratio is 60%, what do you recommend?

Siderar: Optimal Debt Ratio

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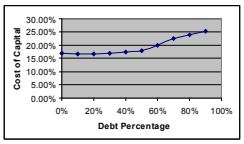
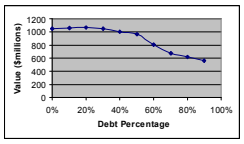




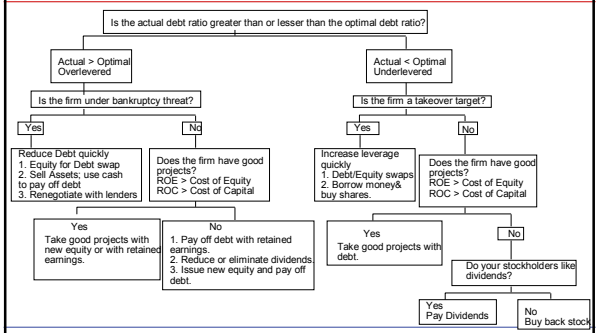
Case Study: SAP

Case Study: SAP

Debt	Rating	Interest rate	Interest expense	Interest coverage ratio	Debt / capitalization	Debt/book equity
0	AAA	5.65%	11	138.76	1%	0.1
2500	AAA	5.65%	153	10.28	7%	0.7
5000	A	6.37%	331	4.73	14%	1.4
7500	A-	6.56%	505	3.10	21%	2.1
10000	B+	10.90%	1,112	1.41	27%	2.7

- Should SAP take on additional debt? If so, how much?
- What is the weighted average cost of capital before and after the additional debt?
- What will be the estimated price per share after the company takes on new debt?

A Framework for Getting to the Optimal



First Principles

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

Links

- **Useful Links**
  Company information: biz.yahoo.com/ifc
  Industry ratios: www.stern.nyu.edu/~adamodar
  Debt ratings and spreads: bondsonline.com

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